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FIELD VETERINARY SERVICES IN SOUTH AFRICA

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Pretoria

To those of us, who have spent a lifetime in the Division of Veterinary Services, it is a great disappointment to watch so many graduates pass by our portals, on their way to establish their careers elsewhere. Few even pause to read our notice, " Enquire Within ".

This changed position has been referred to as a " healthy sign ", a " good thing for the profession ", and " by no means detrimental to the country ". It may be so. But there is surely another side to this story, no less realistic, and no less worthy of consideration.

To whom are the legacies of past successes, in the suppression of animal diseases in this country, to be handed down for preservation and development ? Must the records of achievement of the men who eradicated Rinderpest, Pleuropneumonia and Glanders, be consumed by the dust of time ? Has the work of reducing East Coast Fever, Sheep Scab and Nagana to the point of elimination been in vain ? Will the gravity of the situation only be realised when the country is once more riddled with the diseases which it has taken so much energy and sacrifice to suppress and eradicate ?

Necessary as the veterinary practitioner may be, he can never replace the Field State Veterinarian, whose long association with the complicated control of stock diseases in South Africa has made him a specialised epidemiologist of no mean calibre. The success of the practitioner is, in any case, considerably dependant on an adequate Division of Veterinary Services.

Who are to be the Veterinary Educationalists of the future ?

In the 1890's there was a mere handful of State Veterinarians, less than a dozen. At Union their numbers had risen to nearly sixty. By 1938 the peak had been reached. There were than 66 State Veterinarians in the Field, and 26 connected with Research and Education, in addition to the Directorate and the Senior Veterinary Officers. The amalgamation of the Field and Research Divisions in 1929, has been of considerable benefit to the country. It has given security to the international trade of the Union in animals and animal products. One of the reasons, put forward at the time as a need for the amalgamation, was that the two Divisions were expanding so rapidly that there was a danger of their growing apart. To-day the activities of even the consolidated Division are taxed to the utmost and the expansion contracted to the bare minimum.

In 1953, a still greater number of students are being trained. Yet never has the famous Churchillian expression applied more aptly to the Division. Including the Directorate and Senior Veterinarians,

it now has a mere 49 Veterinarians in the Field Section and 29 in the section responsible for Research and Education. The same records show some 150 private practitioners, 15 employed full-time by Municipalities, and about 12 serving private enterprise in one way or another. To cope with the situation, the Division has been obliged to make greater use of lay staff — even to an extent of make-believe that disaster is not yet at hand. The lay staff have given wonderful service, but they too cannot replace Veterinarians.

What of the problems which still lie ahead — Foot and Mouth Disease, Rabies, Swine Fever, .Newcastle Disease, Tuberculosis, " Epivag ", Lumpy Skin Disease, Rift Valley Fever, Dourine, B.W.D. and a host of other diseases too numerous to mention here ? Without a strong Division of Veterinary Services many of them are individually capable of ruining a large number of people. Collectively they can ruin the country. Bovine Tuberculosis alone has been steadily eroding the cattle population of this country for some years. Soon the tempo of this erosion will increase to such an extent that the threat to the cattle industry will approximate that of soil erosion to the country as a whole. The incidence of this disease in man here, hitherto regarded as rare, will then have assumed the proportions it has in other countries.

Are the graduates completely unmindful of this state of affairs ? Do they realise that the lights of the Division are burning low and that an extra puff of wind will put many of them out ? Is it such a sacrifice for some of the graduates to join the Division, be it only for a year or two ? They will find considerable benefit in taking such a decision. The Service offers many advantages which cannot always be measured in pounds, shillings and pence. It may be too, that their stay will become permanent. It not, they will have received a good training and will leave with much self assurance. Meantime they will have made a worthy contribution to the survival and maintenance of one of their country's greatest assets.

Some will say that it is the duty of the State to preserve its Veterinary Division and that an improvement in salary scales will effect this purpose. This is a decision which the State alone can take. The farming stock of this country has been conservatively valued at £200,000,000. The Division of Veterinary Services, in all its activities and in all its aspects, costs the country just over £1,000,000 annually. Viewed from a Veterinary angle it would seem that this low premium of £5 per £1,000 for such a comprehensive insurance, could well be increased, and that the increased premium would actually enhance the value of the capital sum. But this is a matter affecting the financial policy of the State as a whole, and the State will very likely decide it, taking into consideration the other financial obligations it has to meet.

Quite obviously some very serious and deep thinking is necessary — yea is long overdue.

DAIRY CATTLE PRACTICE IN HONGKONG, WITH SPECIAL REFERENCE TO TUBERCULIN TESTING

H. C. WATSON

George

When I went to Hongkong in 1930 as veterinary surgeon to the Dairy Farm there, the herd consisted of 850 dairy cattle of Ayrshire, Friesian and Jersey breeds. The herd had grown to close on 2,000 cattle in 1941 when the Japanese occupied the colony. Four years later when we were relieved there were 300 cattle left, but the herd is now up to a strength of 1,700 again.

The cattle, which are housed in 50 cowsheds dispersed throughout 300 acres on the southern slopes of the hilly island of Hongkong, are milked three times daily, and are all stall fed: even the guinea and elephant grasses, which are cultivated between the cowsheds and are the only green stuff available, are brought in to them. These grasses grow profusely in the hot season from April to September when 80 inches of rain fall. Surplus grass is made into ensilage for feeding in the remaining months when only six inches of rain fall.

Owing to the use of such drugs as thalazole in calf scour and penicillin in calf pneumonia we have recently been able to rear many more calves than was the case in the past, so that our herd has become pretty well self-contained. For many years previous to the war we found it necessary to import annually about 100 pregnant animals from various countries such as Scotland, Holland, the United States of America, Canada and Australia — chiefly from the latter two. It was found that until these cattle became acclimatised, that is to say until they had passed through one tropical summer in Hongkong, if they suffered from any of the usual ailments to which dairy cattle are prone, they suffered badly, and the ailment from which they suffered worst of all was " foot-rot " or " foul in the foot ". It was no uncommon experience to have, out of 100 shipped, 40 cases of " foot-rot " with ten deaths. I have tried to prevent this trouble by standing the cattle in copper sulphate foot baths for five minutes every day and by keeping them inside the cowshed throughout their first summer, or by cementing over the exercising paddocks attached to the cowsheds, but all to no avail. Since the war I have adopted as a routine measure the intravenous injection of sulphapyridine soluble or sulphamezathine solution in every case as soon as foot lameness is reported and this seems to have eased matters considerably.

A further point about these cattle is that, having dropped their first calves soon after arrival in the springtime, they will not conceive,

or even show oestrum, until some time afterwards. Many of them will not conceive until at least six months later, when the tropical summer is past.

But infertility has always been a problem on this Farm, even among locally bred animals from their second calving onwards. Prior to my arrival the practice had been to do uterine irrigation with Lugol's iodine a month after calving in all cows, and I continued with this, but I had to conclude that it did not produce any outstanding beneficial results where endometritis was suspected, and further, I felt that in many cases where the uterus was healthy, infection might be introduced. I discontinued it and restricted myself to the usual routine examination for pregnancy three months after mating, with attention to the corpus luteum if I found an animal not in calf. In cases that kept returning to the bull we just kept mating them until they either became unprofitable, when we put them through our own slaughterhouse as beef, or they became pregnant which the great majority did after repeated service. I have known cases still giving a profitable amount of milk to come in calf after 20 services.

The chief cause of this infertility I put down to the fact that the herd has been riddled with contagious abortion for many years. I did make an attempt in 1933 to control the disease by blood testing and isolation, but this attempt was not a success, I doubt if in our herd, where our grass is manured by the excreta from our own cows and then brought back in to be fed to them, that it ever could be a success.

As we were shut away for four years during the Japanese occupation, it was not until 1947 that I commenced the regular use of Strain 19 vaccine, inoculating calves at eight months, and thereafter subsequent to their having given birth to their second, fourth, sixth calves and so on. That the use of the vaccine was beneficial is indicated by the fact that while in 1947 out of every 100 births, 24 were premature, in 1951 out of every 100 births only seven were preamture.

But this figure of 7% seemed to me to be still too high in a herd where Strain 19 vaccination was regularly practised, and it seemed to be indicated that I should investigate the possibility of Vibrio-foetus being present. As it happened, the Government Bacteriologist found Vibrio-foetus in the first aborted calf I sent up for examination, a five-month's one out of a heifer.

I considered it worth while to have the semen of our eleven Stock bulls examined. At least twice at intervals of a week samples of semen from each of the bulls were sent for examination. The results surprised me. While the bacteriologist in no case found the vibrio by direct smear examination, on at least one occasion in each of seven bulls he was able to grow the vibrio in culture from the semen supplied. This to me was the more extraordinary as artificial insemination is regularly practised in our herd, and although there is a theory that the vibrio is transmitted only venereally, six of those bulls had never had contact with a cow, in fact one of them — a 10-month's old bull — had never

been used except on the occasion when he was made to serve into a clean artificial vagina in order that his semen might be examined. I should mention that the culture medium used by the bacteriologist was "Robertson's cooked meat medium + 10% defibrinated fresh sheep's blood."

I had read in the Veterinary Record that penicillin had been used against the vibrio with marked success, so I gave each of the ten bulls in use a 5-day course of 4 by 2 by 2 by 2 by 2 Mega units of I.C.I. Avloprocil. At the same time I picked out 100 females which were due to be given a first insemination or to be done for the first time since their previous parturition and gave them a 5-day course of 2 by 1 by 1 by 1 by 1 Mega units. This was towards the end of last year; I have heard since that just over 50% of these animals conceived to the first insemination, as against the usual appallingly low figure of 30%. The conception rate, by which I mean the percentage of animals conceiving to one insemination in the United Kingdom is expected to be at least 60 or 70.

While on this subject I may say that in the George District, Cape Province, dairy cattle seem to be so fertile that farmers I have spoken to are very disappointed with any cow that does not conceive to one service only.

In 1934 and again in 1941 Foot and Mouth Disease swept through the herd. Mortality, chiefly due to the sequel of prolonged foot lameness in tropical heat, was about 4-5%. In a milder outbreak in 1937 it became apparent that animals that had been affected in 1934 were immune to the particular type of virus present.

The mortality in the herd for the year 1951 was 2% and that included 11 deaths from photosensitisation. Two factors must be present before this disease manifests itself, (1) the ingestion of a weed or plant containing a pigment which sensitises the body to sunlight and (2) actual exposure to sunlight. This of course is well known, but it may be a surprise to you, as it was to me, that mortality in these cases can be so high. The great itch or irritability of the white parts of the skin later gives way to an acute dermatitis. I was in Australia on a flying visit last July when these 11 deaths out of 24 cases occurred. The outbreak was a real worry to the man who relieved me. He tried Anthisan, but as far as I am aware there is no specific treatment for the condition. It could be prevented, of course, by elimination of the guilty plant or by painting over the white parts of the body, but neither is practicable.

Labour on this farm before the war was cheap. A man was paid about 30/- per month, but since the war he costs £9 or £10 per month. Also foodstuffs have become very expensive — the retail price of our milk, of which we produce about 2,000 gallons per day, is 1/8 per pint. We do however make something these days out of our culled or discarded cattle. The European population of Hongkong is content to eat frozen beef from Australia, but the Chinese, of whom there are over two million in the place, prefer fresh beef. The

Communists have put an embargo on cattle coming over our border, so the 200 or so cattle which came over for slaughter daily in the past no longer come. The only fresh meat available is our discards, for which the wealthier Chinese will pay as much as 8/6 per lb. For a year and a half now we have been selling to the market cast off Jerseys at £50 or £60 each, and Friesians at £90 to £110 each.

I might say, by the way, that in addition to the cattle, we had 2,000 pigs and 5,000 poultry on the farm, which gave us very little trouble. The pigs were vaccinated against swine fever with crystal violet vaccine, and treated with sodium fluoride for worms at weaning; the poultry were vaccinated against Newcastle disease, cholera, typhoid and diphtheria.

Two diseases which I found of particular interest on this farm were rinderpest and tuberculosis. I will not say much about rinderpest, from which the Union is mercifully free. It is prevented now by the use of lapinised (rabbit) vaccine which I proved to my own satisfaction gives an immunity of at least one year, probably of several years. In the old days it caused terrible havoc on the farm, in 1896 wiping out all the stock. And more recently, but before my time, another tragedy occurred. A shipment of cattle from Australia, in order to avoid them all contracting rinderpest at once, were dispersed throughout many different cowsheds. As it happened, they were suffering from contagious bovine pleuropneumonia, and spread this disease all over the farm.

In 1930 about one third of the cattle on the farm were tubercular and were housed in cowsheds about one mile away from the main farm. My predecessor had started, and I continued, the biannual testing of the remaining cattle, removing reactors as they occurred to the tubercular area. In this area animals as they became either clinical cases or unprofitable went through our own private slaughterhouse.

While working as an assistant in Scotland from 1926 to 1929, I had a lot of experience in the use of the subcutaneous test in Aberdeen Angus cattle going to the annual sales at Perth. Sales were held in January and tests had to be done in December, the inoculations were done at 9 p.m. and the temperature taken at the 9th, 12th, 15th and 18th hours afterwards. Doing a few herds in a busy country practice meant a lot of work, especially in a Scottish winter when my principal was ill. I remember that the extra strain put on me resulted in my getting a 25% increase in salary.

The trouble with this test was that advanced cases often did not show the temperature reaction. I remember seeing pictures of the grape lesions in the Shorthorn bull that was slaughtered on arrival in the Argentine about 25 years ago: this beast had cost 3,500 guineas in Scotland and had passed the test there. Another disadvantage was that some animals during the test showed fever due to some other cause. A client of ours bought a bull for 500 guineas, subject to passing our test. During the test I did, the bull's temperature rose to 104 so he was a reactor, and the buyer could return him, but as

the buyer's own herd was by no means free from tuberculosis, and he liked the bull, he kept him, and took a 250 guinea rebate on him. I retested the bull sometime later when doing some other animals on this farm and he passed the test.

After some experience of the double intradermal test in Shanghai in 1929-1930, I continued with this test when I went to Hongkong. Although I had not previously been accustomed to testing calves under six months of age, at the first test I did all cattle down to three months old. At this age I picked out four reactors(all of which were slaughtered and showed tuberculosis in the mesenteric glands.

I found that in doing the double intradermal test on so many animals, one was bound to get a certain number of inconclusive results, and I was interpreting those results too strictly. At the time I was corresponding regularly with my friend Mr. J. N. Ritchie, then a County Veterinary Officer in Scotland, and now the Chief Veterinary Officer in the Ministry of Agriculture in the United Kingdom. He was having the same troubles as I was having, and I can assure you Scottish Farmers are not the best subjects to take with equanimity the slaughter of their cattle as reactors to the test when in fact on slaughter no tuberculosis can be found.

Later I gave up the double intradermal test, as I believed the second injection merely confused the issue: I used the single intradermal test, and by 1936 could say that our herd was TB free, as by this time all reactors had been killed off. It is to be remembered of course that as all our cattle went through our private slaughterhouse, I had an ideal opportunity to make post-mortem examinations on all cattle slaughtered, and of correlating the results of those examinations with the results of tests.

After the war we had to restock with particularly large shipments of cattle from Australia and Canada, and these cattle were bought subject to passing a tuberculin test done by me on arrival. Several of the Australian cattle proved to be reactors and showed tuberculosis on autopsy: on the other hand, out of perhaps 1,000 cattle bought from Canada in pre-war and post-war times we have never had a tubercular animal.

It was all the more surprising therefore to find in a shipment of 100 Ayrshire and Friesian cattle in 1948 from Canada, one reactor. I had the cow tested at appropriate intervals by two independent veterinary surgeons — by the single intradermal test — and they both agreed with me that she was a reactor. Then when a few months after their arrival I subjected the whole hundred to a second test, I found that perhaps 40% were reactors.

It may seem surprising that as last as 1948 no less than three of us were not aware of the fact that we should be using the comparative test, but for a period of five years or so I had been laid off and the other two had been in the Royal Army Veterinary Corps. However, late in 1948 I did use the comparative test on all our cattle, and found that all those Canadian cattle, including the original " reactor " passed

the test: in them, although mammalian reactions were evident, avian reactions were still more evident. Between that time and the last test I did last November they have passed further tests.

In April, 1950, we imported 50 pregnant Ayrshire heifers from Scotland at a cost of about £250 each. On arrival one of them, when tested by the single comparative test, showed measurements as follows: original — 6 mms.: at 72nd hour — avian 11 mms.: mammalian 16 mms. As this animal had come from an attested herd in Scotland, and had a certificate from a veterinary surgeon there, I chose to regard her as an inconclusive reactor. However, when I retested her after an appropriate interval, her mammalian reaction was very definite, and I sent her in to the Government Slaughterhouse so that the Government Veterinary Officer might give his independent opinion on the autopsy. His report was to the effect that tuberculosis was present in the mediastinal glands and elsewhere.

Until November last year I might say that any anomalous results I met with in carrying out intradermal tests, whether single or single comparative, were due to my own remissness in not interpreting the results properly. But last November I had almost completed the herd test, and had met with no reactors until in the last batch of 200 young heifers I was testing I came across two 6-month old calves which, although the reactions were not of the hen's egg variety, could only be classed as reactors. These animals were slaughtered, and, although the carcases were gone through with a fine tooth comb by the Government Veterinary Officer and two qualified Meat Inspectors and myself, no tuberculosis was detected. Further, there was simply no apparent source from which those calves could have become infected. There was no evidence of any of the attendants, who are subjected to medical examination, being affected with tuberculosis. This is the only occasion on which I feel that the comparative test let me down and I cannot explain it.

The difficulty about intradermal testing, especially the single intradermal test, is the fact that it cannot be interpreted on calliper measurements alone. The degrees of pain and oedema are important, and are difficult to record. I became aware of the danger of condemning inconclusive cases too hastily: I found it good policy to isolate and retest again and again if necessary. As I was placed this of course was not difficult, knowing all the animals.

As far as the interpretation of the test goes, I find that according to a pamphlet entitled "Single Intradermal Comparative Tuberculin Test: Technique and Interpretation" I have been interpreting the test exactly according to the lines laid down in Appendix II of this pamphlet. I would draw your attention to paragraph 2 (e), which says:

"Animals which give a positive reaction to mammalian tuberculin and a positive or doubtful reaction to avian tuberculin when the increase to mammalian tuberculin is 5 or 6 mms. greater than the increase to avian tuberculin should be:

(1) retested, if non-specific infection is established;

(2) removed, if non-specific infection is not established.

This reference to the establishment or non-establishment of non-specific infection perplexes me. How is one to establish the presence or absence of non-specific infection *except* by the intelligent interpretation of the test in individuals ? I will illustrate what I mean by one case. A cow tested by my predecessor in practice here in January this year with British Ministry of Agriculture Tuberculin showed calliper measurements as follows: Original — 4 mms. at 72nd hour — avian 11 mms.: mammalian 11 mms. The difference here between the avian and mammalian measurements was nil: the cow therefore in my opinion had passed the test. In April she was tested by me with mammalian (Onderstepoort) tuberculin alone, no avian tuberculin being available at the time. Here the original measurement was 6 mms. and the measurement at the 72nd hour was 9 mms. This means nothing, as there is no avian measurement for purposes of comparison.

I tested the cow again in June, with avian and mammalian (both Onderstepoort) tuberculin. Measurements were: original 4 mms. at 72nd hour avian: 4 mms.: mammalian 8 mms. On paper I must call this an inconclusive reaction, although according to the nature of the swelling my opinion is that she is free from tuberculosis.

In the original test when, if you remember, swellings went from 4 mms. to 11 mms. in *each* case avian and mammalian at the 72nd hour, it was suggested to me that "if we ignore the avian reaction we must say that the animal is definitely positive." But the whole point of doing the *comparative* test is to *compare* the avian reaction with the mammalian reaction, and we *cannot* ignore the avian reaction.

I have referred to an experience which I had in testing one hundred Canadian cattle where, when I used the comparative test, it became obvious that non-specific infection was present among many of those cattle. But I remember 20 years ago finding among another shipment of Canadian cattle — 100 head — *one* cow. only which, according to calliper measurements showed a definite reaction to the single intradermal test — this was of course before the comparative test was in use. This cow was moved to the tubercular area: at repeated retests she showed slight reactions, but on autopsy years later she showed no visible signs of tuberculosis. This was a case where in my opinion although no non-specific infection could be established in the shipment as a whole, non-specific infection existed in this one cow.

I was interested to receive a letter from a friend of mine in the Ministry of Agriculture (Animal Health Division) in England recently in which he says: "in this country the single comparative test has superseded all previous methods for official tuberculin testing of cattle."

But if it should be admitted that the comparative test is the best one to use when *officially* carrying out tests, surely it will be conceded that the comparative one is the best to use when pilot or survey tests

are carried out, as the use of this test ought to result in smaller numbers of inconclusive reactors and therefore less trouble and expense to the farmer.

During the few months I have been in general practice in this country the farming community in my District of Outeniqualand have left no doubt in my mind as to their views on tuberculin testing under the conditions at present in existence. They will not consider going in for attestation of their herds. The difficulties are chiefly inconvenience and expense. One very progressive young farmer, of a type that is an asset to the farming community in any country, is a case in point. His 50 cattle were originally tested by the comparative test by my predecessor with Ministry of Agriculture tuberculin in January this year. There were 4 or 5 inconclusive reactors, but no definite positives. The cattle were retested by me in April with Onderstepoort tuberculin — mammalian only: the only reactions that occurred were of such a nature that I could not say they were definite without using avian tuberculin for purposes of comparison. I was supplied with avian tuberculin, and retested five of those cattle in June. I thought that, to be on the strict side, two were still inconclusive.

The owner feels that he may at least now say that in his herd there are not more than 5% of reactors, and he may apply for attestation. But when he is informed that even if animals now inconclusive pass a retest in August, his herd will have to be tested by a Government Veterinary Officer in November and again six months later before it can become officially attested, he becomes discouraged. This is more particularly the case as he is especially careful not to advertise his herd as tuberculin tested until it has been certified by the Government as attested, while his neighbour blithely advertises his herd as " Tuberculin-tested " — which, as far as I know anyone is at liberty to do, irrespective of the results of any test or the number of tests done.

I know that this farmer and others are anxious to keep tuberculosis out of their herds or to eradicate it in their herds by testing as often as may be advisable in each individual case.

In the district from Mossel Bay to Plettenberg Bay between the mountains and the sea I feel sure that tuberculosis is not very prevalent. This feeling is strengthened by the fact that very little tuberculosis is seen in carcases in the George Slaughterhouse. In so far as dairy herds are concerned in this area I think it would not be difficult to eradicate any existing tuberculosis and maintain the herds free. It would encourage the farmer if the Authorities could be persuaded to stand at least part of the cost of tuberculin testing: in fact it would encourage not only the farmer but the practitioner — like myself. I have just read an excellent paper in the Veterinary Record on the economics of veterinary practice, where the speaker says " Can anyone present tell me where this losing battle, which practising veterinary surgeons are now waging with the economic position, is going to end ? Without the Ministry of Agriculture's

quarterly cheque for services rendered, most of us could scarcely carry on, considering the present low percentage of profit."

As far as fees for tuberculin testing are concerned, I would not dare to suggest to any of my clients the rates I have seen quoted in either the Witwatersrand or the Cape Province scales. I was asked recently by two farmers living in close proximity to each other 40 miles from me what I would take to test their 230 cattle. My reply was to the effect that I did not want to be struck off the roll within five minutes of starting in this country for tendering an offer for work done as this is unethical. However, I did suggest that instead of making a charge per head I would charge £2 2s. per hour for the time taken by me on each of two visits, the time to be taken from the time I left home in each case until the time I returned home, plus mileage at 1/- per mile each way. At their end the farmers could reduce the time factor by, as I suggested, having all their cattle tattooed and shaved (or clipped) before my arrival and having cattle tied up in readiness for me, with a good staff standing by.

Although in view of the fact that with good staff work this might work out at somewhere about 3/6 per head, which to my mind almost amounts to " undercutting ", the reply was that those charges could not be met in the meantime. And please note that I had omitted to take into account the hours that would have had to be spent by me in clerical work recording in duplicate or triplicate the reactions and descriptions of those 230 cattle and sending them to Regional Veterinary Headquarters.

I am heartily in agreement with the excellent circular recently sent out by the Veterinary Board where it states that " the attainment of affluence in the shortest space of time is foreign to the dictates of the profession " — but there is a limit.

Although not a stranger to South Africa it is only recently I have commenced to practise in this country. Whereas previously I have been in the habit of turning to the British Veterinary Association or the Ministry of Agriculture for advice, I now look upon the South African Veterinary Medical Association (which I think could well drop the word " Medical ") and Onderstepoort as my mentors. I must express appreciation and hearty thanks to the many who have so kindly and courteously given me advice on various matters: in particular Drs. Alexander, Neitz, Diesel, van Drimmelen, Robinson, Cooper, my old friend Dr. Gilles de Kock and Dr de Lange.

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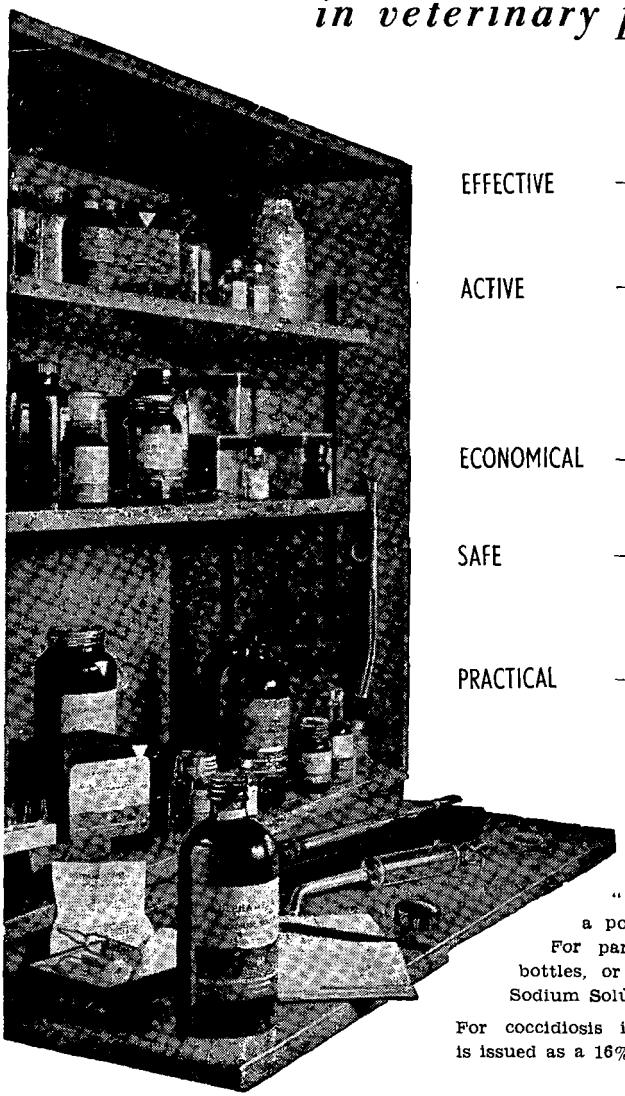

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A HERD WITH UNEXPLAINED SEROLOGICAL REACTIONS TO BRUCELLA ABORTUS.

G. C. VAN DRIMMELEN
Onderstepoort

Robinson(1) first reported successful eradication of bovine brucellosis in an infected herd by means of serological tests and removal of reactors. The test and slaughter method of brucellosis control has since been applied on many herds in different countries. The purpose of this report is to submit the results of a number of tests showing unexpected and unexplained reactions in a herd of this kind.

HISTORY

An experimental herd commenced in 1924 showed positive agglutination reactions to **Brucella abortus** after introduction of eight cows in 1926. By means of isolation camps all reactors were controlled. Those with titres above 1:40 were placed in one camp and those with lower titres, regarded as negative, in the other. By 1927 over a hundred animals were thus isolated as the result of tests carried out at intervals of three months. Only one or two abortions occurred.

Four of the reactors were sent to Onderstepoort Laboratory and isolated in separate boxes. There is no record of any infection having been diagnosed in these animals and their serological reactions became negative after approximately one year.

Most of the reactors on the farm eventually also became negative, and were returned to the herd. A few that remained positive or doubtful were slaughtered. From 1930 no reactors were found in the annual tests until June 1948, when one of low but positive titre was found and slaughtered.

In June 1949 five reactors were found among 420 animals tested. Two were valuable bulls which were isolated, one cow was slaughtered and the other two, both seven year old pregnant cows, were taken to the Onderstepoort Laboratory for examination. Three-monthly testing of the herd was instituted. As the subsequent finding of a large number of reactions of low titre precluded slaughter of reactors without interfering with the experiments conducted on the station, no further animals were removed. Calfhood vaccination was considered but as the reactions could not be correlated with the few abortions which occurred it was decided to postpone this step until the cause of the reactions had been investigated. This proved to have been a very fortunate decision, as the subsequent reactions found revealed a situation differing from any of which available records exist.

STANDARDS

All reactions were detected by means of the tube agglutination test, using the technique of Stableforth(2) and serum of the O.I.E.

standard ([3]), distributed by W.H.O.([4]). By this technique a minimum positive reaction is given by 50% agglutination at a serum dilution of 1:40 which is exactly comparable to a dilution of 1:100 in the standard technique adopted by the B.A.I. ([5,6]). The antigen and serum used for daily control tests has been examined by Dr. Stableforth and was found satisfactory.

NON-SPECIFIC REACTIONS

Serological brucellosis reactions have been ascribed to the effects of contact with antigenically related organisms of the genera **Vibrio, Pasteurella, Haemophilus, Proteus, Escherichia** and **Salmonella.** Though Wilson and Miles([7]) state that absorption tests have failed to confirm these observations, the **Haemophilus (Brucella) bronchisepticus** in dogs and the **Pasteurella (Brucella) tularensis** in rodents are antigenically related.

McCullough, Eisele and Beal([8]) report the existence of the H antigen of **V. cholerae** in all species of **Brucella** as proved by agglutinin absorption tests. No report on the effect of **V. foetus** infection in cattle on the **Brucella** reaction has been found.

AGGLUTININS IN BRUCELLOSIS

Thomsen([9]) has shown that the period between infection and agglutinin response is highly variable and may be prolonged to seven months (225 days), depending on the route of infection and the state of pregnancy. Correias([10]) found a positive agglutination reaction in cattle dosed with live or dead **Brucella** organisms by stomach tube. Earlier experiments have shown that cows which abort are usually high titre reactors. Infected herds, nevertheless, may contain early aborters or non-aborters with low titres which may disappear in time([11,12]) or continue for one to eight years([13]). Active "spreaders" of infection in milk or vaginal discharges occasionally become "ceased" reactors;([14]) in other words, they may fail to show agglutinins and yet excrete **Brucella abortus** in the milk([15]).

RESULTS

A. Reactions.

A summary of the herd test findings is given in table 1.

TABLE 1.

Date of Test	No. of Bovines tested	No. with positive reactions	Percentage of Bovines showing various Titres			
			Below 1:10	1:10	1:20	1:40 and Over
June 1948	277	1	97.83	1.81	0	0.36
June 1949	420	5	95.95	2.86	0	1.19
October 1949	416	18	71.39	20.19	4.09	4.33
January 1950	600	24	68.67	18.33	9.00	4.00
April 1950	478	0	90.79	7.95	1.26	0
June 1950	811	0	99.01	0.86	0.12	0
October 1950	768	2	93.23	5.86	0.65	0.26
January 1951	904	10	80.31	15.37	3.21	1.11
April 1951	805	1	97.52	1.61	0.75	0.12
July 1951	793	0	98.24	1.13	0.63	0
October 1951	793	4	90.67	6.43	2.40	0.50
January 1952	956	11	93.20	3.66	1.99	1.15
April 1952	861	3	97.79	1.74	0.12	0.35

The incidence of reactions showed a seasonal increase which is better demonstrated in graph (a), where similar results for females, males and equines are shown separately.

This was actually the case with several individual animals shown in table 2.

The titre of the positive reactors was low. In October 1949 a heifer, two cows and a bull showed a titre of 1:160 (equal to 1:400 with the B.A.I. standard). The bull (No. 1861, table 3) was negative at 1:10 in January 1950. One cow (No. 8379, table 3), ten years old, produced her seventh calf, normal in all respects, on 5th November 1949 and her titre dropped to 1:40 in January. The other cow was not pregnant but had normal calves on the 25th November 1948 and 26th December, 1950. Her titre dropped to 1:20 in January, 1950. The heifer calved normally on 15th November, 1949 and again on 1st December, 1950.

Ten females and one bull reacted to a titre of 1:80 (equal to 1:200 with the B.A.I. standard). The bull became negative after three months and was disposed of. Several cows were irregular breeders, for instance No. 8753 at nine years old had had four calves from three pregnancies in six breeding seasons. Three cows, however, had normal calves every year and four cows failed to calve in some years. One cow, No. 1937, aborted with a negative titre of 1:20, but had a normal calf a year later after a rise of titre to 1:40 (positive).

Tabulated case histories of the "best" reactors are given in table 3.

A summary of the titres found in all the "reactions" is given in table 4. Negative as well as positive titres are shown in this table and the transient reactions are given separately.

B. **Abortions.**

General pregnancy diagnosis was carried out during August, four to seven months after service. Daily observation and controlled servicing enabled all abortions to be recorded but as the cattle were on free range only a few foetuses could be examined. Fresh material was examined at Onderstepoort. Evidence of brucellosis or trichomoniasis was never found. **Vibrio** foetus was diagnosed twice.

A summary of the calves born and abortions recorded is given in table 5. Heifers and cows are shown separately. A high incidence of abortions in heifers occurred in 1947 and 1948.

TABLE 2.
EXAMPLES OF THE SEASONAL RISES IN TITRE IN INDIVIDUAL ANIMALS

Date of Test	Sex. Date of Birth	Cow Jan. 1943	Cow Nov. 1943	Cow Nov. 1944	Cow Nov. 1944	Cow Dec. 1944	Cow Dec. 1945	Cow Jan. 1946	Cow Feb. 1946	Cow Nov. 1946	Cow Nov. 1946	Cow Dec. 1946	Cow Nov. 1947	Cow Dec. 1947	Cow Jan. 1948	Cow Dec. 1939	Cow Nov. 1941	Bull Dec. 1943	Ox Nov. 1948	Ox Dec. 1948	Ox Dec. 1948
ne 1948		C –	 –	C +	 –	C –	 –	 –	 –	 –	 –	 –	 –	 –	 –	C –	C –	 –	0	0	0
ine 1949		 –	 –	 –	 –	 –	 –	 –	 –	 –	C –	 –	 –	 –	 +	 –	 –	 –	0	0	0
ct. 1949		C +++	 +++	C +	C ++++	 +++++	 ++++	 +	F +++ *	C ++++	C +++++	 ++++	 +	 –	 +	C +++++	F ++	 ++++	0	0	0
an. 1950		 ++	C +++	 +++	 +++	 +++	 ++	C –	 +++	 +++	 +++	C +++	 –	 –	 –	 +++	 ++	 +++++	0	0	0
pril 1950		 –	 –	 +	 ++	 ++	 ++	 –	 –	 ++	 ++	 –	 –	 +	 ++	 +	 –	 –	0	0	0
une 1950		 –	 –	 –	 –	 +	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	+	–	
Oct. 1950		C ++	 –	 +	 +++	C ++	 –	 ++	 –	 ++	C ++	 +	 –	 –	 +	 +	C +	 +	+++	+	
an. 1951		 +++	 –	 +	C ++	 +	F ++	 ++	C –	C +	 –	 +	 +++	 –	 +	 ++	 +	 ++	+++	+	
April 1951		 –	 –	 +	 –	 +++	 ++	 –	 –	 –	 –	 –	 –	++ –	 –	 +	 –	 ++	+++	–	–
July 1951		 +	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 –	 0	 –	 –	++	+	–
Oct. 1951		 ++	F +++	C ++	 +	 –	 ++	C +	C –	C –	C –	C –	 +	C ++	 ++	 0	 –	 +	+++	+++	+
Jan. 1952		C +++	 ++	 +++	C ++	 +	C ++++	 +++	 –	 –	 0	 –	 ++	 ++	 –	 0	 –	 +++	+++	+	+
April 1952		 +	 –	 +	 –	 +	 +	 –	 –	 –	 0	 –	 ++	 +	 –	 0	 –	 –	0	0	0
July 1952		 –	 –	 –	 –	 –	 –	 –	 –	 –	 0	 –	 –	 –	 –	 0	 0	 –	0	0	0

Reactions indicated by:—

0 = not tested.
– = no agglutination at 1:10.
+ = agglutination at 1:10.
++ = agglutination at 1:20.
+++ = agglutination at 1:40.
++++ = agglutination at 1.80.
+++++ = agglutination at 1:160.

C = normal calf born.
F = foetus aborted.
* Cow 2003: Aborted Positive for Vibrio Foetus.

TABLE 3.
HISTORY OF THE "BEST" REACTORS

Date of Test	Sex / Date born	Cow Dec. 1939	Cow Dec. 1944	Cow Nov. 1946	Cow Nov. 1940	Cow Nov. 1941	Cow Nov. 1943	Cow Nov. 1944	Cow Oct. 1945	Cow Dec. 1945	Cow Dec. 1945	Cow Nov. 1946	Cow Dec. 1946	Heifer Nov. 1950	Bull Dec. 1943	J
June 1948		C −	C −	−	−	−	−	C −	−	−	−	−	−	0	−	−
June 1949		−	−	−	−	++++	−	−	+	−	−	−	−	0	−	−
Oct. 1949		C +++++	+++++	C +++++	++++	+++	+	C ++++	++++	++++	++++	C ++++	++++	0	++++	+
Jan. 1950		+++	++	+++	+	+	++++	+++	+	++	+	+++	C +++	0	+++++	+
April 1950		+	+	++	++	−	+	++	++	++	−	++	−	0	−	−
June 1950		−	+	−	−	−	−	−	−	−	−	−	−	0	−	0
Oct. 1950		+	C ++	C ++	0	++	0	+++	+	−	+	++	+	0	+	0
Jan. 1951		++	+	−	0		0	C ++	+	F ++	−	C +	+	−	++	0
April 1951		+	+++	−	0		0	−	0	++	0	−	−	−	++	0
July 1951		0	−	−	0		0	−	0	−	0	−	−	−	−	0
Oct. 1951		0	−	−	0		0	+	0	++	0	−	C −	++	+	0
Jan. 1952		0	+	0	0		0	C ++	0	C ++++	0	C −	−	+++	+++	0
April 1952		0	+	0	0		0	−	0	+	0	−	−	++++	−	0
July 1952		0	−	0	0		0	−	0	−	0	−	−	−	−	0

Reactions indicated by:—

0 = not tested.
− = no agglutination at 1:10.
+ = agglutination at 1:10.
++ = agglutination at 1:20.
+++ = agglutination at 1:40.
++++ = agglutination at 1:80.
+++++ = agglutination at 1:160.
C = normal calf born.
F = foetus aborted.

TABLE 4.

SUMMARY OF SEROLOGICAL REACTION INCLUDING ALL TITRES ABOVE 1:10.

Animals Tested		"Reactions" Recorded						"Reactions" preceded and followed by Absence of Agglutination at 1:10.					
Group	Age	Number of reactions	1:10	1:20	1:40	1:80	1:160	Reactions of less than 6 months' duration	1:10	1:20	1:40	1:80	1:160
Heifers													
	One year old	17	9	5	2	1	–	13	8	4	1	–	–
	Two years old	28	21	5	2	–	–	19	15	4	–	–	–
	Three years old	72	40	20	9	2	1	39	23	13	3	–	–
Cows	More than three years old	354	237	76	31	8	2	140	110	25	4	1	–
Bulls	Under one year	1	–	–	1	–	–	1	–	–	1	–	–
	More than one year old.	19	11	3	2	2	1	15	11	3	1	–	–
Oxen	One year old	47	23	15	5	4	–	41	21	13	4	3	–
	Two years old	39	25	10	4	–	–	25	17	8	–	–	–
	Three years old	56	28	22	5	1	–	33	22	10	–	1	–
Equines	Mature	36	22	11	2	1	–	15	10	4	–	1	–
	TOTALS												

* In this table "reactions" are defined as instances when an animals's serum contained detectable amounts of *Brucella* agglutinins in one test or in a consecutive series of tests.

TABLE 5.

CALVING PERCENTAGE.

Season	HEIFERS				COWS				
	No. of heifers	No. of abort. heifers	% abort. heifers	Calving %	No. of cows	No. of abort. cows	% abort. cows	Calving %	Total No. reactors annual test only
1940	53	5	9.43	58.49	212	3	1.42	66.51	0
1941	42	1	2.38	90.48	213	11	5.16	64.79	0
1942	50	2	4.00	74.00	177	6	3.39	63.28	0
1943	31	1	3.23	61.29	158	5	3.16	53.16	0
1944	58	5	8.62	48.28	153	4	2.61	64.05	0
1945	97	6	6.19	75.26	176	7	3.98	64.77	0
1946	20	1	5.00	60.00	200	8	4.00	49.00	0
1947	33	4	12.12	51.52	208	11	5.29	62.98	0
1948	53	7	13.46	53.85	186	8	4.30	47.31	1
1949	72	7	9.72	61.11	205	11	5.37	63.41	5
1950	104	8	7.69	61.54	227	7	3.08	52.42	0
1951	32	1	3.13	68.75	253	9	3.56	56.13	0
1952	80	5	6.25	77.50	221	9	4.07	73.30	

Every case of abortion since 1949, when elimination of reactors was suspended after the first series of positive results, was carefully checked for a complete breeding and C.A. test history. Analysis of these cases showed no convincing evidence of a connection with reactions to the agglutination tests but a few appeared to be associated with physiological conditions such as twinning. This is presented in table 6.

C. **Immunity Tests.**

Four reactors were brought to Onderstepoort Laboratory for examination — two in 1949 and two in 1952.

Two were Friesian cows, both pregnant and reacting at low positive titres. They arrived on 13th October, 1949 and calved in November without any sign of abnormality. Blood, milk, discharge and afterbirth gave completely negative results in bacteriological tests. Their serological titres receded and after completion of all biological tests six months later they were served and conceived forthwith. Challenged at 5-6 months gestation with 150 million **Brucella abortus** organisms of strain 544 (McEwen, 1940) both cows aborted and one developed into a typical chronic permanent carrier. A vaccinated and a susceptible control animal showed the expected difference in susceptibility to this test. The case histories are shown more fully in table 7.

Two were young Afrikanders, a heifer and a tollie, which arrived on 1.5.52, each with a serological titre of 1:40 (equal to 1:100 with B.A.I. standard). The tollie was slaughtered and specimens of selected tissues were minced and injected into guinea-pigs. The results were completely negative. The heifer is being exposed in an infected camp in contact with one carrier infected with strain 544.

TABLE 6.

SUMMARY OF ABORTIONS: 1949–1952.

SEASON			1949	1950	1951	1952
Number of abortions recorded (1)			17	15	10 (one case of twins)	14 (one monstrosity, one case of twins)
Percentage abortions in females bred			6.50	4.53	3.51	4.65
Reactions found in aborting animals	Positive 1:40		–	1	–	–
	Negative 1:20		–	1	–	1(2)
	1:10		1	3	2	2(3)
	Less than 1:10		16	10	8	11
Breeding history of aborting cows :—						
Previous breeding record	Normal calves	More than two	2	3	–	2
		Two	2	2	–	4
		One	2	2	2	1
	Abortions and stillborn calves	More than two	–	–	–	–
		Two	–	1	1(4)	–
		One	1(5)	1	1	1
	No progeny	More than two seasons	–	1	–	–
		Two seasons	2	2	1	2
		One season	5	2	5	5
Subsequent breeding history	Normal calves	More than two	4	–	–	–
		Two	3	5	–	–
		One	4	7	6(6)	–
	Abortions and stillborn calves	More than two	–	–	–	–
		Two	–	–	–	–
		One	2	–	1	–
	No progeny	More than two seasons	–	–	–	–
		Two seasons	5	1	–	–
		One season	4	3	1(4)	–

REMARKS

(1) Under open range conditions, early abortions may be missed. Daily technical inspection excluded this.

(2) Reacted 21 months previously; titre 1:40 at second normal calving when aged six years.

(3) Both reacted negatively at 1:10, 24 months previously when one was 20 months and one four months old.

(4) A seven-year old cow which never reacted and aborted twins in 1947 and in 1950.

(5) Another cow which aborted twins in 1947 and again in 1950.

(6) Two cows with normal twins.

TABLE 7.

IMMUNITY TEST

		8949 (Armoedsvlakte)	8924 (Armoedsvlakte)	1824 (Vaccinated Control)	8816 (Susceptible Control)
1949	J			++++++++++ Vaccinated ++++++++++++ 20.1.49 +++++++++++++	+++
	F			+++++++++	+
	M			+++++ Abortion +++++ 26.3.49	+++
	A			+++++++ +++++++	
	M			++++++	+ ++
	J			++++++ ++++++++	
	J	00++++	00+++		
	A			++++++ ++++++	+++ +++++
	S			++++	+++
	O				
	N	+++++ Calf 4307 2.11.49	+++++ Calf 4306 17.11.49	+++++	
	D				
1950	J	+++++	+++++	++++++	+++++
	F	++++	++++		
	M	++++	+++	++++	++
	A				
	M	++++ Served Bull 3053	++ Served Bull 3053	+++ Calf 5076 10.5.50	++
	J				
	J	+	+++	++	+ Calf 5136 1.8.50
	A	+++	+++	Served Bull 3053	+
	S	+++++ Eye Infection A496W +++++ +++++	++++ Eye Infection A496W ++++++	+++++ + Eye Infection A496W ++++++ +++++++ ++++ ++	+++ Eye Infection A496W ++++
	O	++++++ ++++++ ++++++	+++++ ++ +++++++ ++++++++	++++ ++++++	++++++ +++++ ++++
	N	+++++ Eye Infection A496W ++++++ Abortion 29.11.50	+++++++++ Eye Infection A496W ++++++++++	+++++ Eye Infection A496W +++++	Eye Infection A496W +++ +++++ Served Bull 3052
	D	+++++ +++++	+++++ ++++	++++++ +++++	++++++ +++++++ (Apparently pregnant. Failed to calve, but abortion missed—)
1951	J	+++ +++	++++++++ ++++++++ Abortion 2/1/51	+++++ +++++	+++++++ ++++++
	F	+++	++++++++++	+++++	
	M	+++ ++	++++++++++ ++++++++++	+++++ +++++ Eye Infection A496W	+++++++ +++++++ Eye Infection A496W
	A	++ +++	+++++++++	++++ +++++	+++++++ ++++++++
	M	+++	+++++++++	+++++	+++++++ Discharge from Vagina
	J		+++++ ++++	+++++ Calf 5415 18.5.51	++++++++
	J	+++		++++	++++++++++
	A				
	S	+++	+++++++++	++++	++++++++++
	O	++++ ++	++++++++++ +++++ +++	++++ +++	++++++++++ ++++++++++
	N	+++	+++++ ++++	+++++	++++++++++
	D	+++ ++	+++++ +++ +++++++ Injected Vaccine 887	++ ++++	+++++++++ +++++ ++++ Injected Vaccine 887
1952	J	++++	+++++++	+++	++++++++++
	F	+++	+++++ ++++	++++	++++++++++ Anoestrus
	M	Served Bull 4306		Served Bull 4306	
	A		Served Bull 3053 7.4.52		
	M	+++ ++	++++++++ ++++++++	+ ++++	+++++ +++++ ++++++++++
	J				

Comparative record of tube agglutination test reactions in two Armoedsvlakte reactors and two control animals.
[+ = agglutination at 1:2·5
++ = agglutination at 1:5.
++/+ = agglutination at 1:10.
++/++ = agglutination at 1:20.
++/+++ = agglutination at 1:40 (positive).
++/++++ = agglutination at 1:80.
++/+++++ = agglutination at 1:160, etc.]
(A496W = 150 × 106 organisms. Brucella abortus strain 544 McEwen 1940.)

D. **Biological, Cultural and Morphological Tests.**

A number of specimens, including foetal abomasums and afterbirths from the cases listed in B were examined bacteriologically at Onderstepoort. Most of the material was unsuitable for examination, owing to transport difficulties. In 1951 screw-capped culture bottles with medium were inoculated with foetal abomasal contents by means of a sterile syringe, and the cultures forwarded to the laboratory. This is to be supplemented in future by inoculation of guinea-pigs which are being forwarded to the farm, with fresh foetal material. The guinea-pigs will then be returned to Onderstepoort for examination.

The final outcome of this work is at present as follows:—

No case of brucellosis or trichomoniasis was found.

Two cases of **Vibrio foetus** infection were diagnosed, one in a non-reactor to the C.A. test and one in a continuous reactor of low but positive titre.

One case of salmonellosis was discovered. The organism is being classified overseas since it belongs to Group B of the Kaufmann-White scheme but is not identical with **S. typhi-murium** or **S. abortivo bovina.**

Seven cases giving pure cultures of Eijckman-positive **Escherichia** species were found.

No **Brucella** agglutinins were produced in guinea-pigs inoculated with all this material.

The negative biological tests on the slaughtered reactor have been mentioned under C.

DISCUSSION

The reactions observed in this herd must either be the result of a predominantly subclinical **Brucella** infection or have a non-specific origin.

Confirmation of the presence of **Brucella abortus** could not be obtained by the usual tests. The circumstantial evidence in favour of infection are:—

1. Bovine brucellosis is common in the area and on surrounding farms.
2. The history of some reactors, e.g. No. 1937 (table 2) is rather typical of contagious abortion.
3. The percentage of abortions in heifers showed an increase in 1947-1948 prior to the first reactions. The fact that the regular annual tests were carried out in mid-winter, three to six months after service, at a time of lowest seasonal incidence of reactions, may have obscured the general position (see graph a and table 5, column 10).
4. The calving percentage in cows was at its lowest in 1949.

A non-specific origin for the reactions could also not be discovered, although this may be suggested by the following:—

1. The organisms isolated from the foetal material failed to produce **Brucella** agglutinins in guinea-pigs and hardly any of the aborters reacted at all.
2. Only one abortion was observed in the 13 females which showed titres of 1:80 to 1:160 (equal to 1:200 to 1:400 with the B.A.I. standard). Several of these, however, showed breeding seasons when no progeny was produced. Though under free range conditions, early abortions may have been missed; this is very improbable with the daily inspection by trained technical staff.
3. No immunity against exposure to virulent infection could be demonstrated (see table 7).

It may be held that perseverance with elimination of reactors in October 1949 and January 1950 might have prevented the appearance of reactors in subsequent summers. The two successive completely negative tests in April and June 1950 do not support this view. The reactions found in equines (see graph a and table 4) also suggest a fresh origin.

It is believed that the seasonal variation in titres and reactions was connected with the stage of gestation. The highest titres and greatest incidence of reactions were found during the calving seasons when soiling of the environment with discharges from the reproductive tract was most common. The lowest titres were found after the breeding season shortly before weaning. This supports the theory of low-grade **Brucella** infection and suggests that annual testing of ranch herds, if required, should take place preferably shortly after calving. Some of the disappointing experiences where reactors are again discovered after successive negative tests might be eliminated in this way.

The effect of adequate feeding and mineral supplements on the course of **Brucella** infection has not been investigated here, but it should be noted that this experimental herd is the one in which the relation between botulism and phosphorus deficiency was originally determined by Theiler and his co-workers. The phosphatic supplements of the animals are at present adequate in every respect.

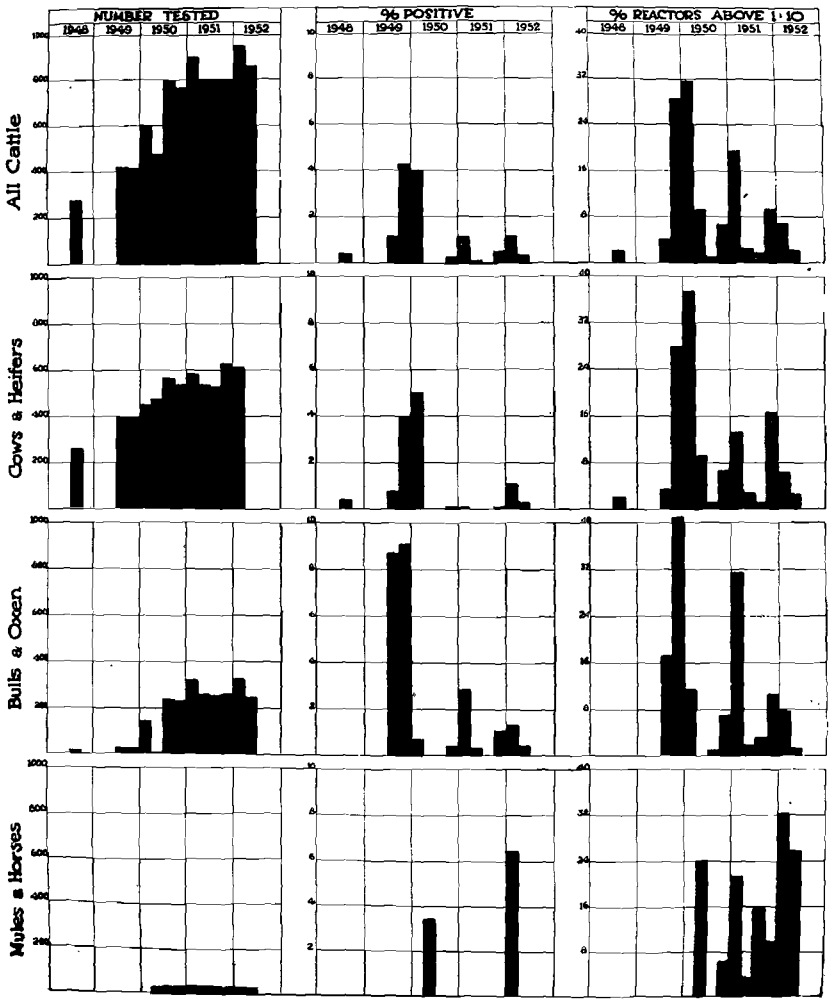
It has been stated that the Anti-Brucellosis Campaign in South Africa should primarily take the form of inoculating cattle with strain 19 vaccine.

(a) All heifers should be vaccinated during calfhood, preferably at the age of ten months.

(b) Mature, non-pregnant heifers and cows on infected or non-isolated properties should also be vaccinated at least for an introductory period of five years.

GRAPH (a)

REACTIONS FOUND AT ARMOEDSVLAKTE EXPERIMENTAL FARM.



This is supported by the data submitted. Uneconomical elimination of reactors which neither abort nor spread infection cannot be justified under present conditions, except in properly isolated herds.

SUMMARY

1. Low titre, serologically positive **Brucella** agglutination reactions were found in a herd of 600 to 900 open range cattle without a significant increase of the abortion rate.
2. Bacteriological evidence of infection should not be obtained.
3. Seasonal exacerbation and recession of reactions was found to

coincide with calving (summer) and early pregnancy (winter) seasons.

4. No immunity against exposure to virulent infection could be demonstrated.
5. Abortions observed bore no relation to the reactions found. Isolated diagnoses of **Vibrio foetus** were made in cases also not related to reactions to the C.A. test.

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FERRET BREEDING REPORT

G. WILSON-JONES

Onderstepoort

Ferrets have been bred at Onderstepoort since 1937 for use in experiments. From then up to the present a number of problems have arisen in connection with the breeding.

During the season 1946-47 answers were sought to questions that had arisen after the 1945-46 season. These were as follows:—

A. Is there any advantage in keeping ferrets that have proved themselves good breeders and mothers over for another season ?

B. The possibility of getting the ferret to breed more than once during the season.

C. The effect of allowing the male to remain with the female throughout the season on —
   (a) the young;
   (b) the female.

D. Non-oestrus females in the 1945-46 season. Was this due to unfavourable environmental conditions ?

Question A: Old Breeding Females.

In March, 1946, twelve females chosen for their fecundity and good temper were set aside for breeding in the 1946-47 season. These females had all successfully reared one litter each.

Procedure:

The females were put into two of the large guinea-pig cages, six in each and one male was put with each group. When pregnant the females were placed in individual cages.

TABLE I.

Results:

	Young Born	*No.*	*Remarks*	*Weaned*
1	7.11.47	11	—	11
2	13.11.47	7	—	7
3	14.11.47	10	—	10
4	5.11.47	6	7/11 seen lacks milk	—
5	16.11.47	8	—	8
6	22.11.47	11	—	3
7	29.11.47	7	—	7
8	21.11.47	3	8 from No. 10	6
9	12.11.47	10	2 born (still-born)	8
10	20. 1.47	10	Female accidentally killed 8 transferred to No. 8	
		83		60

Summary:

I. 2 females did not breed.

II. Average birth litter 8.3.

III. Percentage weaned 73%.

Based on the above it is difficult to express an opinion as to the advisability or not of keeping over old females for breeding.

Question B: *Allowing Ferrets to Breed more than Once.*

The Ferret — A Monoestrous Animal.

Ovulation in the ferret is nerve-induced so that there is really no "best" time. It has been suggested that successful mating depends on the size of the vulva (Hammond & Marshall) and that the vulva should be 50 times the size of the anoestrous vulva (Murray).

Although the vulva is a good outward indication of heat it need not necessarily attain its maximum size to ensure successful mating. Any time that the female will accept the male is satisfactory.

In previous years it has been customary, just before the commencement of the breeding season, to separate the sexes and to examine weekly for signs of oestrus; no mating was allowed until it was thought the vulva had attained maximum size. An obvious result was the lateness in the season before females were bred from, due to difficulty experienced in determining the degree of oestrus based on the size of the vulva. There were cases where "optimum" heat was obvious and others where there was only partial swelling of the vulva and little if any signs of hyperaemia.

Running the sexes together ensures early mating and with a breeding season of seven months' duration (Sept. to March inclusive) it would seem possible to have ferrets breed more than once. Investigation into this is proceeding.

Question C: *Allowing Males to Remain with Females.*

A few available females were chosen at random early in August and allowed to remain with the male throughout the season. Nothing unusual was noticed. The young were not molested in any way.

It is not unusual to find the female, in certain species, on the establishment of the corpus luteum, showing resentment towards the male. This, in the form of indifference or even positive antagonism, does not appear to be the case with the ferret where squabbling only seemed to take place at feeding times.

Preliminary Observation:

In view of the above it would appear possible to pair the sexes for life. This would have the advantage, that it would simplify the keeping of records and the collection of data, ferrets being difficult to mark. Investigation of the problem is still proceeding.

TABLE II

Question D: *Non-oestrus Females.*

After the 1946-47 season it was noticed that seven females had failed to show oestrus. The supposition was that this was due to unfavourable environmental conditions. These ferrets had been kept

for several months in a large room that did not allow much light to enter. (Bissonnette 1935). J. Exp. Biol., Vol. 12, P. 315-320.

In January, 1946, these seven females were transferred to the ferret colony. One male was left with them.

Results:		*Young born*	*No.*	*Weaned*
No.	1	26.10.46	10	10
	2	15.10.46	2	2
	3	14.10.46	3	3
	4	30.10.46	5	5
	5	Did not breed		—
	6	Did not breed		—
	7	18.11.46	2	—
			22	20

Conclusion:

It would appear to be not unusual for a ferret to miss an oestrus cycle. (See B, C.) (b) Selective breeders — of the 25 only 23 bred. (c) Available breeders 16 — of which 12 had young.

TABLE III

Selective Breeders:		*Breeding*		*Weaned*
			Remarks	
No. 1	20.10.46	10		10
2	30.10.46	11		11
3	24.10.46	11		11
4	19.10.46	8	24.10.46 all dead. Female on heat 7.11.46	
5	25.11.46	8	2 from No. 10	10
6	22.10.46	8		8
7	27.10.46	6	No milk	1
8	13.11.46	8		8
9	30.10.46	11		10
10	21.11.46	3	29/11 2 transferred to 5	1
11	21.11.46	9	No milk (all died)	—
12	22.11.46	8		8
13	23.12.46	5		5
14	25.12.46	8		8
15	29.12.46	8		8
16	14. 1.47	5		5
17	5. 1.47	11		10
18	29.12.46	10		7
19	6.12.46	7		7
20	18. 1.47	10		10
21	14. 1.47	10		9
22	8. 1.47	3		3
23	19. 1.47	10		10
24			Failed to breed	
25			Failed to breed	
		188		160

Summary:

(a) Average birth litter — 8.5.

(b) Percentage weaned — 85%.

TABLE IV

Females Intended for Issue used during Breeding Season

		Born	*No.*	*Remarks*	*Weaned*
No.	1	15.10.46	10		8
	2	18.10.46	6		6
	3	15.10.46	10		10
	4	23.10.46	7	24.10.46 all dead	—
	5	30.10.46	11		10
	6	20.11.46	6		3
	7	27.10.46	9		9
	8	27.10.46	10		8
	9	9.11.46	10		8
	10	9.11.46	8		5
	11	27.11.46	10		8
	12	14.11.46	9	5 dead, stuck together by umbilical cord	3
			106		78

Summary:

(a) 4 females did not breed.

(b) Average birth litter — 8.8.

(c) Percentage weaned — 74.5%.

General Observations

Management:

Pregnant Females. — It is advisable to bed them down in sawdust. A small quantity of partially dried lucerne, left in the sun for 48 hours, should remain in the hutch as nest material as the female likes total seclusion when suckling her litter.

It is not advisable to use wood wool or veld hay as nest material, for the former has a tendency to cling to the young and cases have occurred where the wood wool has become entangled with the umbilical cords and there may be as many as 5 young all tied together. Struggling causes infection at the navel and the young invariably die. Veld hay and teff hay are thought to be responsible for the numerous cases of pyogenic infection experienced in our stocks a few years ago as the stalks have numerous barbs which penetrate the skin causing wounds.

Feeding:

In the breeding season it is advisable, particularly in cases where there are mother ferrets, to feed a strictly meat and milk diet. A satisfactory arrangement for feeding ferrets over 24 hours is to give each adult, in the mornings during the breeding season 4 fluid ounces of milk and between 5 and 6 ounces of fresh meat. In the afternoons 4 fluid ounces of milk should be given. Females with young should be closely watched for as the young grow their demands on the mother increase. Should the female not be given sufficient to eat she is apt

to lose condition and her milk. Out of season, bread soaked in milk and/or mealiemeal porridge mixed with minced meat may be given on alternate days.

During the summer months it is advisable to supply each cage with a fairly large shallow trough, say 2" in depth, filled with water, as ferrets do enjoy a bathe.

Question A:

Subsequent investigation has shown that there is no advantage in keeping over for another season ferrets that have proved themselves good breeders. Attention should rather be given to selecting future breeders from large litters, particularly where it is noticed that the mother is of a tractable nature.

Question B:

It is possible for the ferret to breed more than once during the season. Mild winters are conducive to early matings thus extending the breeding season to one of 8 months' duration.

During the present 1952-53 season one female littered down during the first half of August. At the beginning of September her young were removed and she was put back with the male. Her second litter was born at the end of October.

Question C:

The system of having one dog to every bitch is not advocated. Better results are obtained where one male is put with from six to ten females and the females are removed to individual cages when pregnant.

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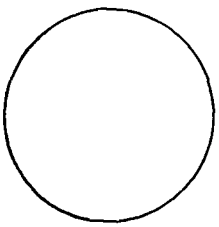

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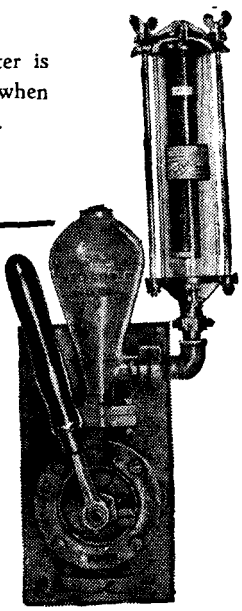

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THE ASSOCIATION OF ENTEROTOXAEMIA (PULPY KIDNEY) WITH OTHER DISEASES OF SHEEP

G. D. SUTTON
Onderstepoort

SUMMARY

Four cases have been described where Enterotoxaemia has been associated with other diseases. The possible significance of these diseases in the aetiology of Enterotoxaemia has been discussed.

During the course of routine examination of specimens for Enterotoxaemia the toxin of Clostridium welchii type D has been found in the bowel content of sheep which had other diseases concurrently. These diseases were Geilsiekte (Prussic acid poisoning), Rift Valley fever, Trichostrongyle infestation and Bluetongue.

Geilsiekte and Enterotoxaemia.

In January, 1951, the brain of a sheep was found to contain prussic acid. Material from the small intestine of the same sheep contained the toxin of Enterotoxaemia. This may indicate that there is some connection between these two diseases. Schulz in his investigation in 1948 found that deaths in sheep increased after a sudden change in weather conditions, conducive to wilting and retarded growth of crop plants. Numerous stock owners have reported that after using the Enterotoxaemia vaccine Geilsiekte has disappeared from their farms. Clark and Quin state that after the consumption of lucerne hay surprisingly large amounts of cyanide could be tolerated by sheep. Prussic acid has the effect of paralysing the rumen and small intestine. Bennetts in Australia found that sluggishness of the small bowel is a factor of prime importance in the aetiology of Enterotoxaemia. These observations may mean that Geilsiekte is primarily a paralysis of the gastrointestinal tract by prussic acid followed by death from Enterotoxaemia. The toxin of the Enterotoxaemia organism is known to be rapid in its action. Experiments to see if Clostridium welchii type D produced prussic acid when cultivated on media containing lucerne hay or grass hay plus concentrate feed mixtures were negative. Thus, it is considered that the Enterotoxaemia organism itself is not the factor producing prussic acid from the contents of the rumen and bowel.

Rift Valley Fever and Enterotoxaemia.

During his investigations in 1951 Schulz diagnosed Rift Valley fever in sheep. In some cases pathological examination of organ sections revealed typical lesions of Rift Valley fever and the bowel

content of the same sheep contained the toxin of Enterotoxaemia. These two diseases can, therefore, be present in the same sheep.

Trichostrongyle Infestation and Enterotoxaemia.

In January, 1953, deaths occurred in a flock of sheep which had been inoculated against Enterotoxaemia. The inoculations were properly done and the sheep should have been immune. A sheep from this flock brought in for examination had a severe Trichostrongyle infestation with marked catarrhal inflammation of the intestine. The kidneys were flabby and red in colour. In addition material in the small intestine contained the toxin of Enterotoxaemia. This may indicate that parasitic infestation setting up inflammation in the intestine can cause a breakdown in immunity in inoculated sheep or be an exciting cause in the development of Enterotoxaemia.

Bluetongue and Enterotoxaemia.

During an investigation of mortality in sheep in 1953 Schulz found the clinical symptoms of Bluetongue. A biological test on material from one of these sheep which had died was positive for Bluetongue. The intestinal content of the same sheep showed Enterotoxaemia toxin. The kidneys of this sheep did not show any signs either macroscopically or microscopically which would have led to a suspicion that Enterotoxaemia was present. Bluetongue is known to cause damage to the bowel of sheep. This damage may allow the Enterotoxaemia organism to develop and cause death.

CONCLUSION

Where mortality in sheep is occurring and some obvious condition is found the possibility of Enterotoxaemia as an intercurrent infection should be considered.

ACKNOWLEDGEMENT

I wish to acknowledge with thanks the assistance given me by Dr. K. C. A. Schulz who has placed his findings at my disposal.

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SOME IMPRESSIONS OBTAINED DURING A VISIT TO A NUMBER OF VETERINARY AND OTHER INSTITUTIONS IN EUROPE IN 1952

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Pretoria

During the course of an extended visit to the Continent of Europe and to Great Britain, a very marked advance in both agricultural and veterinary research could be observed everywhere. In many respects this advance can be regarded as revolutionary.

It took two world wars to convince the authorities in Great Britain of the value of agriculture and veterinary research to the state. In spite of the extremely favourable climatic conditions for agriculture and for stock-raising agricultural research was badly neglected because foodstuffs could be imported so cheaply. This position has completely changed since the war. Large amounts of money are made available annually for it and every possible encouragement is given. Most of this money is controlled by the Agricultural Research Council, which is a free body not controlled and hampered by Public Service Regulations.

As a result of the recommendations of the Loveday Report all veterinary education now falls under the universities and provision has been made for the proper staffing, financing and maintenance of the veterinary schools, of which there are now six in Britain. Each school is provided with a field station within a convenient distance from the university. At these field stations, excellent facilities are provided for research work on farm animals and for clinical work for the students. These schools, therefore, serve not only as teaching institutions but also as important investigational centres. But, although the State seems to be prepared to provide almost unlimited funds for research, the expenditure on buildings is limited. In many cases old farm buildings and stables are converted into laboratories and experiment stations. In the case of the **Vibrio foetus** investigation, the state provided an amount of approximately £25,000 for expenditure on staff, and equipment, and on the maintenance of animals.

In addition to the veterinary schools there are a number of institutions that are concerned exclusively with investigational work. The Veterinary Laboratory at Weybridge is the largest and the best-known of these. Others are the Institute of Animal Pathology at Cambridge which includes the veterinary school, the Moredun Institute of the Animal Diseases Research Association, Edinburgh, the Stations of the Animal Health Trust, viz. the

Equine Research Station at Newmarket, the Bovine and Poultry Research Stations at Houghton Grange, Huntingdon, and the Canine Station at Kennet.

Some medical research institutions, e.g. the National Laboratory of the Medical Research Council, Mill Hill, and the Central Public Health Laboratory, Colindale, are also concerned with a great deal of fundamental research which is of very great value to the investigator of animal health. The work of Polge at the M.R.C. Laboratories on the preservation of semen by deep-freezing is a good example. By means of a special technique he was able to preserve fresh semen in a mixture of citrate buffer and glycerine at —79°C. Bull semen thus preserved remained viable and potent for more than 7 months.

There are also a number of research stations maintained by by Commercial Houses, e.g. The Wellcome Laboratories at Langley Court, Beckenham, and the Wellcome Field Station at Frant, Tunbridge Wells, the Cooper's Technical Bureau at Berkhampstead, the experimental stations of Unilever at Hobbs Cross, Epping, and at Stoke-Mandeville, and the Laboratories of May & Baker, and Imperial Chemical Industries.

Some of the observations made by Hignett at Frant on the value of phosphorus in relation to fertility must be regarded as outstanding. He showed that a very marked decrease of P in the diet may have a depressing effect on the fertility of cows. Even when the inorganic phosphorus in the blood is maintained at a high (normal) level a surplus of phosphorus in the diet will assure a high fertility rate in heifers, whereas a low one will cause a reduced fertility rate.

Extremely valuable work is also being done by the Veterinary Investigation Officers (V.I.O.S.). These officers are chiefly concerned with diagnostic work and with the investigation of local problems, and are under the control of Weybridge. They are stationed in various centres in the country, where they are usually provided with laboratory facilities in an agricultural college or a veterinary school.

A very striking feature of the various research institutions is the wide interest that is being displayed in the physiology of farm animals. But physiological research is not confined to the purely veterinary institutions; there are also a number of non-veterinary laboratories that are studying fundamental problems on animal physiology. These include:—

(a) The National Institute for Research in Dairying, Shinfield, Reading.
(b) The Hannah Dairy Research Institute, Kirkhill, Ayr.
(c) The Rowett Institute, Bucksburn, Aberdeen.
(d) The Institute of Animal Physiology, Babraham, Cambridge.

(e) The National Laboratories of the M.R.C., Mill Hill, London.

The combined efforts of these institutions have produced outstanding contributions on various problems connected with animal health. Marked progress has been made with the programme for the eradication of tuberculosis and brucellosis, and fundamental research has been conducted on both these diseases as well as on diseases like foot-and-mouth, Johne's Disease, calfhood diseases, diseases of pigs, infertility of animals, deficiency diseases and constitutional disturbances. No less than 90,811 herds comprising 37.3% of the total cattle population of Britain are already free from tuberculosis and a further 20,000 herds are being cleaned annually. The study of calfhood diseases is receiving much attention at different institutions. The relationship of **Bact. coli** strains and white scours, the antigenic structure of various strains of **Bact. coli,** and the properties of colostrum from different localities are some of the problems that are being investigated by a team of workers in Reading and London. In Cambridge and Liverpool a virus has been proved to be the cause of certain forms of calf-pneumonia and strains of actinoides and haemophilus have been incriminated as causes of pneumonia elsewhere.

Excellent work on calf paratyphoid is being done by Field of Cambridge, and Taylor of the Central Public Health Laboratories is actively employed in the typing of Salmonella strains.

As a result of the war, conditions have been created that have completely revolutionized the production of meat and dairy products. The production of milk has increased from 1,600 million gallons per annum to over 2,000 million gallons. The producer is paid 38.14d. and the consumer pays 52d. per gallon, but the state pays a subsidy of 7d. per gallon. Barely 238 million gallons of milk were used in 1952 for the manufacture of dairy products in comparison to 509 million in 1939.

This high price for milk made calf raising so uneconomical that unduly large numbers of bobby-calves were slaughtered. In order to encourage the raising of calves, therefore, the government introduced a calf premium system, by means of which a farmer was entitled to a subsidy of approximately five pounds for every calf raised.

This system also encouraged manufacturers of feeding-stuffs to prepare milk-substitutes, milk-equivalents or calf starters to take the place of milk. These mixtures contain large amounts of digestible animal proteins, mainly milk and whey-powders, and are sold to the farmer at about one shilling per pound. One pound of the powder is approximately equivalent to one gallon of milk. Feeding with milk equivalent is commenced on about the seventh day and is continued for eight to ten weeks. In addition the calves should be fed from the second week on good hay and protein-low calf meal, usually administered in the form of nuts. The nuts or

meals are usually composed of a mixture of different grain meals, and the amount given is gradually increased until the calf consumes two to three pounds at the age of eight weeks. The sooner the calf consumes the nuts the sooner it will be able to digest hay. If the calves are well looked after, and the feeding of the milk-equivalent is carefully carried out the calves are not likely to suffer from any digestive disturbances, and they will grow normally. Some farmers have managed to raise as many as 200 calves per year by means of this method without any trouble.

The cost of raising calves on this plan is reduced to about 40% when compared with the cost of the usual way of raising them on milk.

Apart from the usual method of raising calves on their dams or on the bucket, a system of raising them on foster-cows is becoming very popular. Depending on her milk yield a foster-cow raises from two to six calves every three months, and may raise as many as twelve during a lactation period.

On account of the lack of opportunities in the past, very few old and experienced workers are at present available in Britain and research institutions are compelled to employ mainly young men. But on account of the excellent opportunities and inducements provided for research work scientific institutions have very little trouble in recruiting promising young scientists.

The Netherlands

In the Netherlands, Veterinary and Agricultural Research is supported partly by the state and partly by the farming community. There are two State Veterinary Laboratories, the one at Rotterdam that deals with the investigation of all animal diseases, and the other at Amsterdam that confines itself specifically to the study of foot-and-mouth disease. In addition, each of the eleven provinces is provided with an "Animal Health Laboratory". Each one is concerned with the diagnosis of diseases and with the study of local problems, it helps with the organisation work in combating tuberculosis, brucellosis and foot-and-mouth disease, and it carries out fertility tests on cattle. The maintenance of these laboratory services is provided for out of a fund derived from a levy of five cents per 100 Kgm. milk produced. This fund yields approximately 2,000,000 guilders (£200,000) per annum. Most of the credit for the complete eradication of tuberculosis from Friesland goes to the Health Service of Friesland which was started in 1920.

The methods adopted for the eradication of tuberculosis and brucellosis can be regarded as both practical and highly effective. Herds are divided into those that are infected with tuberculosis 10, 20, 30, 40 or 50 per cent respectively. Owners are required to clean their herds according to the percentage of infected animals

in 1, 2, 3, 4 or 5 years respectively. For every reactor slaughtered he receives 150 guilders (£15) compensation in addition to the salvage money for the carcase. The compensation is paid out of a fund of which the State contributes 50 per cent, the rest is being provided by the farmers themselves out of a levy of 25 cents (sixpence) per 100 Kgm. milk produced. Another levy of 50 cents (a shilling) per 100 Kgm. milk is also made on all milk produced. This money is deposited in a savings-bank to the credit of the farmer who has made the contribution. If he should clean his herd in the prescribed period his whole contribution is refunded, but if he fails to do so he forfeits everything.

This method is so effective that during the first year no less than 100,000 reactors were slaughtered. But as 500,000 cows are normally slaughtered for meat the reactors can be included in this group so that the slaughtering of reactors is not likely to deplete the cattle population to any extent.

About 1,300,000 calves are born annually. Of these only 500,000 are raised in order to replace the cows that are slaughtered. The remainder are slaughtered: approximately 700,000 as bobby-calves and about 100,000 as fat calves. These fat calves are kept in a dark box and fed on about three to four gallons of milk per day. At eight to ten weeks they weigh about 200 pounds and are ready for slaughter. The price realized per fat calf varies from £25 to £40.

Calves are raised mainly on full-milk and skim-milk. The latter is pasteurized and soured by means of a bacterial culture before it is given to the calf, and is believed to improve the general health of the calf considerably. Calfnuts and hay are gradually introduced after a week or ten days. At first protein-rich nuts are given, but later low-protein nuts are introduced. It is believed that the use of pasteurized skim-milk that has been allowed to sour has resulted in a considerable reduction in the incidence of calfhood diseases in Holland.

According to Grashuis the milk ration of calves on many farms in Holland has been far too big. As a result of the over-feeding calves have subsequently suffered from constitutional disturbances. They are inclined to become infertile, to suffer from dystokia and to develop mastitis when they grow up.

Grashuis believes that many of the Dutch pastures are deficient in various mineral salts and trace elements, and advises the addition of these substances to the deficient pastures. He also believes that the feeding of dehydrated grass and silage in winter improves the health of both the cow and the calf.

Denmark

The Danish Agricultural industry is one of the most prosperous in Europe. This state of affairs can be attributed largely to a system of Farmers' Cooperative Societies and agricultural

education. There are no less than 1,300 co-operative creameries handling over 90% of the milk produced, and 62 co-operative bacon factories controlling over 90% of all pork products. Over 3,000 agricultural students are trained annually in 28 agricultural schools, and more than 7,000 students are enrolled in the 52 Folk High Schools all over the country.

More than 60 per cent of the Danish cows are artificially inseminated and the semen is obtained from some of the best bulls in the country, owned and controlled by 103 bull societies. During one season the semen of a particular bull was used to fertilize 5,700 cows and of another 7,500 cows.

Before admission to the Royal Agricultural and Veterinary High Schools in Copenhagen, students are required to spend at least 12 months in active farming on a recognized farm.

An excellent system of milk-recording is practised whereby the milk-production and food-consumption of approximately 800,000 cows are carefully controlled. This system has brought about an increase in the milk yield per cow of from 7,500 to 10,000 pounds per annum and of the butter fat from 3.4 to 4.18 per cent.

An excellent example of the maintaining of a herd closed to the introduction of females from outside is provided by the Kolle-Kolle Station near Copenhagen, where no female has been introduced for nearly 60 years. The uniformity in build, milk production and in freedom from disease is phenomenal.

Fundamental work on the relationship of vitamins, trace elements and protein metabolism is carried on in the physiological institute at the Royal Veterinary and Agricultural School by Möllgaard and Moustgaard. At the State Veterinary Serum Institute Plum has made a thorough study of tuberculosis in farm animals. Bendixen and Thomsen are investigating brucellosis and have evolved an excellent method for eradicating the disease. By universally employing the ring-test for milk Thomsen can test every herd three times a year.

With the collaboration of the cooperative creameries, farmers' associations and individual farmers, tuberculosis has been completely eradicated, and brucellosis is well on the way to disappearing. In 1937 over 34% of all slaughtered adult animals were tubercular, and 73.5 of all the herds contained reactors. In 1949 less than one per cent of all slaughtered adult cattle were infected and barely 0.3% of the herds reacted. In 1952 no further infected carcases were reported and the odd reactions obtained with tuberculin-testing proved to be due to a non-specific cause.

Pigs and calves are very carefully maintained in specially constructed houses with the walls, floors and ceilings insulated and respiratory diseases seldom make their appearance.

Calves are fed on full-milk and on sweet skim-milk. Later calf-nuts and hay are introduced. On account of the large amounts

of skim-milk available, milk-substitutes are not fed to any extent. But the Danish farmer prefers feeding his skim-milk to pigs so that a large number (500,000) of bobby-calves are slaughtered annually.

Fundamental investigational work on Salmonella types and on **Bact. coli** is being done at the Staten-Serum Institute under the very able direction of *Kauffmann*.

S. dublin infection in calves seems to be on the decrease but several outbreaks of calf-pneumonia associated with a pneumococcus infection have been studied. Many workers believe that white scours in calves is largely a matter of feeding. If the mother is fed on sufficient green fodder, or even on dehydrated grass and silage the incidence of white scours is low.

Since 1938 herds infected with foot-and-mouth disease are no longer slaughtered, but strict sanitary measures are imposed on the infected farms. All herds in the vicinity are vaccinated on a voluntary basis on the recommendation of the State Veterinary Service. The vaccination is organised by the cooperative dairy that handles the milk from the infected area. The method serves to create an immune zone around the infected farms and usually works very well.

The vaccine is prepared at the Staten-Serum Institute in Copenhagen from virus harvested on the Island of Lindholm from the fresh blisters of cattle artificially infected on the tongue. It is a formalized aluminium hydroxide preparation.

Sweden

In many respects the investigational work in Sweden corresponds to that in Denmark. All agricultural research is directed from the Royal Agricultural College at Ultuna, Uppsala, but there are specialized sub-stations in horticulture, plant breeding, plant diseases, agronomy and animal husbandry located in the South.

At one of these stations, Wiad, Johansson has been carrying on nutritional experiments on identical twins.

Both the Royal Veterinary High School at Stockholm and the Royal Agricultural High School near Uppsala are very well staffed and members are appointed primarily for research work. The ambulatory clinic in Stockholm is managed by six assistant-professors and lecturers. Physiological research is conducted on the nervous system of ruminants with special reference to the influence of the hypothalamus on the digestive and reproductive systems.

The excellent work of Lagerlöf on the physiology and pathology of reproduction and of Höflund on metabolic disturbances of ruminants was found to be most inspiring.

The buildings and equipment provided at these two institutions and at the Veterinary Research Institute, Experimentalfältet,

are unsurpassed anywhere, and there is evidently no scarcity of well-trained men for scientific research.

In Germany reconstruction work is progressing rapidly and institutions like the Veterinary High School at Hanover and the Parasitological Institute at Elberfelden are making outstanding contributions, particularly in the field of the physiology of reproduction and in parasitological research. The clinic at Hanover compares favourably with the best in Europe.

In Switzerland the Foot-and-Mouth Vaccine Institute at Basel produces large quantities of vaccine from virus obtained from blisters on the tongues of cattle infected on the previous day. Virus stored at —40°C. to —50°C. was found to remain potent for years.

At Zurich, Fey has succeeded in isolating a pneumococcus from the internal organs of 10 to 14 day old calves suffering from a septicaemia. Some of the types obtained from calves were found to resemble those of man. The work of Steck at Berne on infectious anaemia of horses has thrown much light on the epideimology and distribution of this disease. Steck has found that it occurs in topographically well defined areas and suspects an arthropod as the vector. The appearance of small haemorrhages under the tongue of animals exposed to infection is regarded as characteristic of the disease. Schmidt, also of Berne, believes that some nutritional diseases of pigs, including gut oedema, are due to incorrect protein metabolism associated with Vibrio infection of the large gut.

In France there are a number of excellent breeds of cattle of which the Normandie, a dual-purpose breed is the most popular. The Charolais and the Limousin are exclusively beef breeds; the Bretonne, a Jersey-like animal and the Friesland are favourite milk breeds. Under the able guidance of Professor le Roy of the Institut National Agronomique large scale nutritional and breeding experiments are being conducted at Jony-en-Josas near Paris.

At the Ecole Vétérinaire d'Alfort, as in many other European Institutions, an extensive research programme is being conducted on the physiology and pathology of reproduction.

Organized measures for combating tuberculosis and brucellosis have not yet been introduced. But the danger of using bulls with a low agglutination titre, as a means of spreading brucellosis is fully realized. Foot-and-mouth disease is very prevalent and infectious equine anaemia occurs over widespread areas.

In Ireland the National economy is based on the export of beef. It is believed that the beef industry is much more consistent than dairying and is less liable to suffer from serious market fluctuations as there is a greater shortage of beef than of dairy products. The dual-purpose shorthorn is the most popular breed, and is kept for dairy purposes in certain countries. Although there

is no subsidy for raising calves there is no question of slaughtering bobby-calves as in Britain. Every calf not wanted by the breeder is readily bought by other farmers and raised either for beef or for dairy purposes.

Calves are raised on whole-milk plus skim-milk. Milk substitutes are often given. Feeding of calf-nuts or calf meal and hay is commenced after 2 weeks. The calf-nuts are prepared from locally grown grain and are low in protein.

White scours is very prevalent in calves born during winter and spring, but not in autumn calves. Congenital tuberculosis is reported in 0.6% of the calves. This is probably due to an ineffective campaign against tuberculosis.

By introducing a method of insulating pig houses Lamont succeeded in almost completely eliminating deaths in pigs from respiratory disturbances. He also devised an insulated ark for housing farrowing sows and their young when placed out in the open. The object of the system is to retain as much as possible of the body heat evolved by the pigs so that a more or less even temperature can be maintained in the house or ark, thus preventing the chilling of the pigs.

ACKNOWLEDGMENT

The study reported here was carried out on a grant generously made available to the author by the Meat and Livestock Industries and Dairy Industries Control Boards to whom the author wishes to express his sincere gratitude.

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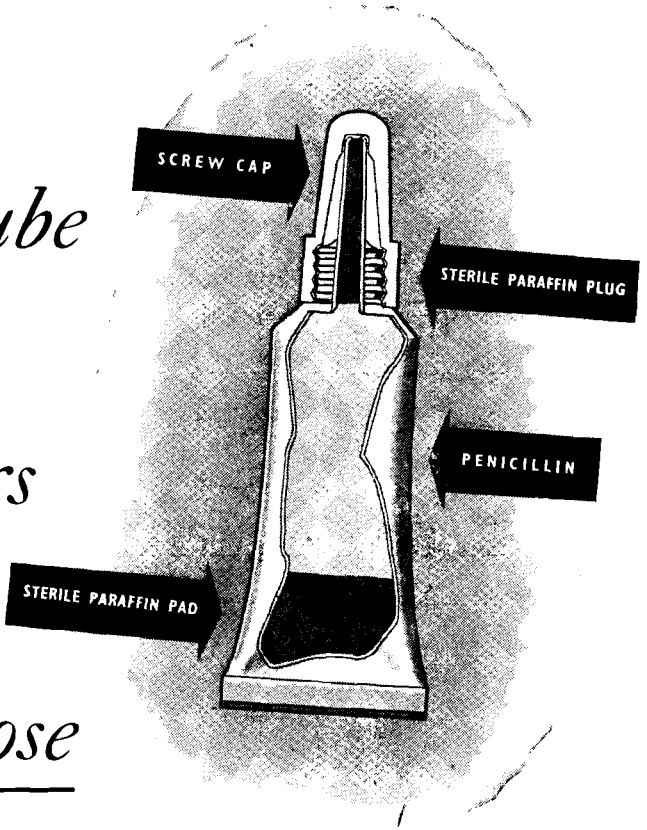

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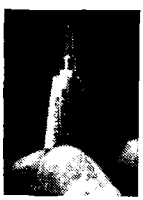

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A UNIQUE CASE OF A SAND-LADEN LIVER IN A PIG

K. C. A. SCHULZ

Onderstepoort

Summary: This paper deals with an uncommon case where fine sand was found in enormous quantities in the extensively dilated bile ducts of a pig. The macroscopical description of the liver is given together with the histological report of various liver sections.

The chemical analysis of the washed and air-dried material removed from the dilated bile ducts disclosed that 92.6 per cent was sand.

The microscopical examination showed a cystic dilation of the bile ducts with hyperplastic chronic inflammation, congestion and cirrhosis of the liver, chronic cholangitis and chronic cholecystitis. Icterus was not apparent.

The pathogenesis of the process involved is discussed and differed considerably from that previously indicated. In the case under consideration there was a congenital malformation of the ductus choledochus (duplication), one branch opening into the pylorus, whereby the entrance of sand into the bile ducts would have been facilitated either by gastric contractions or by its own weight. Presumably this is the first time this malformation of the ductus choledochus has been described in the pig and forms the most likely route by which the masses of sand had entered the biliary system.

Accumulations of foreign material entering the bile ducts and gall-bladder presumably via the alimentary tract are relatively uncommon in our domestic animals. From the literature at our disposal it would appear that this peculiar condition is more prevalent in hogs than in other animals. The nature and the amount of contents may vary considerably in different types of stock. Nails, needles, pieces of wire, twigs, wood splinters, bone or glass fragments, grit, ash, seeds of cultivated plants and weeds, intestinal contents (vegetable particles), sand and helminthic parasites have been recorded. Several of these substances may be present in the biliary system of an animal at the same time.

Of these, sand is the most common substance found in the distended bile ducts (sand-laden biliary system or liver), the extent of the lesion depending on the size of the accumulated mass. The condition has been described in the pig (*Gurlt, Joest,*[1] *Kinsley,*[2] *Mathews,*[3] *Meyer,*[4] *Martins,*[5] *Bugge and Liebig*[6]) in the bovine (*Guillebeau,*[7] *Dedulin, Rabison*[8]) in the sheep (*Bugge and Liebig,*[6] *Thomas*[9]) in deer (*Kitt,*[10] *Krembs,* 1937) in the dog (*Bruckmüller*) and in the horse (*Bruckmüller, Müller, Bohl*).

Description of Case

The case to be described here is unique in that the ductus choledochus was double and the biliferous ducts as a result of impacted sand, were considerably dilated. The weight of the affected, fresh liver was over 30 lb. (12 Kg.) and that of the contents (air dried) of the biliary system about 24 lb. and 6 ounces (about 11.1 Kg.). This latter amount is enormous when compared with the maximum weights of 2-2.5 Kg. in the pig,[6] 650 gm. in a cow (*Dedulin*) and about 12 Kg. in a horse (*Bohl*) recorded in the literature (4 lb. or 1.5-2 Kg. is the average weight of the liver of an adult pig). The condition is so uncommon and of such interest as to warrant its publication.

This most unusual morbid specimen was received round about the 3rd September, 1949, from the Johannesburg Abattoirs for examination at this Institute. Unfortunately no accurate account of the case was available. However, it was stated that during that period two pigs had been condemned for jaundice and the liver in question may have come from one of these.

The specimen consisted of the stomach, intestines, liver and urogenital tract of an adult sow in an apparently well-nourished condition. It was extremely fortunate that the organs were sent intact and that the attachment of the liver to the intestinal tract had not been severed during the process of exenteration.

On examination, the colour of the markedly enlarged and thickened liver was reddish brown with a slight yellowish tinge. There were no apparent signs of icterus in the other attached organs. The thickening of the organ could be correlated with the very prominent swellings forming *cul de sacs* of variable sizes on the visceral surface. The dilatation, involving the left lateral lobe, was the most conspicuous. Its shape tapering off towards both ends, resembled that of a small rugby ball to some extent, measuring 10″x6″x4½″ at its widest portion. The next in size was that of the left medial lobe. It was, however, appreciably smaller (6″x4″x3″) than the former but comparatively speaking much larger than that of the right lateral (4″x3″x2″) and of the right medial (3″x2″x1″) lobes, the last mentioned being the smallest. In these respects it differed from the previously described cases where the ducts of the left lobes principally were affected, the middle and right lobes progressively less, and the largest dilatation was 5 by 2½ inches.([3]) The serosa, especially over the protuberances, was more opaque than usual. On palpation these were very firm and contained variable amounts of a blackish, fine gritty firmly impacted material, which from its appearance was at first mistaken for fine coal dust. The masses could be easily removed. Gritty particles remained stuck to the exposed surfaces. After washing and air-drying, the contents consisted mainly of a fine greyish brown sand. The silicious nature of almost the entire mass was confirmed by ignition, microscopical examination and various solubility tests. In fact 92.6 per cent of it was determined chemically to be sand.

(*Myburgh.*) The specimen was kept in a glass container for museum purposes and its volume was $7\frac{1}{2}$"x$7\frac{1}{2}$"x$7\frac{1}{8}$" i.e. about 400 cubic inches or $6\frac{1}{2}$ litres (Fig. 1). During the process of washing, a fair amount of vegetable particles (intestinal content) rose to the surface of the water forming a distinct scum.

Figure 1

The cavities of the swellings were subdivided by fibrous septa into a number of compartments of variable sizes. Some of these originated from the periphery of the lobes, converged towards the origin of the ductus choledochus and a branched system was indicated. The surface, which was lined by a swollen, more or less smooth mucosa, had several shallow depressions along its course. These structures represented extensively dilated biliferous ducts, which had developed at the expense of the hepatic parenchyma. No liver tissue could be identified macroscopically on the septa.

A duplication of the ductus choledochus was exposed by careful

dissection of the tissues in that vicinity. One opened into the duodenum at its usual site and the other into the stomach anteriorly to the pyloric sphincter. The dilated biliferous duct of the right lateral lobe joined the gastric branch some distance from the junction of the two main ducts. The lumen of the biliary system here was distinctly wider than that of either ductus choledochus. On opening the ducts it became apparent that a more direct route existed between the pylorus and the left lobes, especially the lateral, than with the right lobes and the gall-bladder.

The gall-bladder was not appreciably enlarged and contained bile mixed with a fair amount of sand, the latter filling about one-third of its lumen. The mucosa showing signs of focal necrosis and extravasations, was thinner than usual.

The liver tissue on the whole, was appreciably reduced especially in the vicinity of the dilatation involving the left lateral lobe, where it formed merely a relatively narrow border. Its consistence was considerably increased and owing to excessive connective tissue formation, the lobulation was indistinct. Histological examination revealed distinct changes due to liver cirrhosis, chronic catarrhal cholangitis and cholecystitis complicated with focal necrosis erosions and extravasations. Striking was the proliferation of the mucosa of the larger biliferous ducts, which were changed to a distinct adenomatous structure (normally the glandular tissue is comprised of a few and usually small glands[11]). However, there was a reduction of the glands in the mucosa of the gall-bladder. Scarcely any bile pigmentation was noted in the hepatic cells. The degree of the cirrhosis varied according to the site from which the specimens were taken. Hypertrophy of the muscular and connective tissues was responsible for the pronounced thickening of the walls of the bile ducts and gall-bladder. The blood vessels in Glisson's capsule were markedly distended. In the lumina of the bile ducts vegetable fragments were seen in addition to desquamated epithelial cells.

Diagnosis:. Cystic dilatation of the biliferous ducts, due to an excessive accumulation of sand, accompanied by a chronic hyperplastic inflammation, congestion, cirrhosis of the liver, chronic cholangitis and cholecystitis.

Differential diagnosis: Thickening or dilatation of the bile ducts may occur to a certain extent by accumulations of bile after blockage of the biliary system for instance by gall-stones or by the presence of excessively large gall-stones, partially occluding the ductus choledochus as in the case described by Rabison[8], or by concrements consisting mainly of calcium salts and phosphates or by helminthic or protozoal parasites. These conditions can be easily differentiated from the above-mentioned case.

Pathogenesis: How this enormous quantity of sand found its way into the biliary system seemed at first a mystery. However, after the double ductus choledochus was exposed, the mystery seemed to clear up. This anatomical malformation forms a direct route between the

stomach and the biliary system, by which gastric contents may pass relatively freely into the various bile ducts, preferably to those of the left lateral lobe.

Pigs are sometimes inclined to ingest large quantities of sand causing a very marked impaction especially of the large intestine. In such cases sand was never found to be present in the bile ducts. It can be visualized, however, that under similar circumstances considerable quantities of sand may accumulate in the biliary system of hogs with a malformation of this type. It is, therefore, not unreasonable to conclude that the pig in question, prior to slaughter, must have ingested variable quantities of sand, part of which entered the biliary system via the stomach rather than from the duodenum via an abnormal *papilla duodeni* with retrograde penetration of food and sand, as has been suggested by *Joest* and others. The latter explanation may be a feasible one, where foreign material is found mainly in the ductus choledochus or when the contents consist of awned plant seeds or helminthic parasites. A double choledochus, as in this case, need not necessarily be the only malformation responsible. A similar condition may arise when the ductus choledochus opens into the stomach instead of, as usual, into the duodenum. No records could be found of these malformations in animals. Although uncommon in the human, they have been described on several occasions (*Hektoen-Riesman,*[12] *Kaufmann, E.,* 1922: and *Sitsen*[13]) and according to *Delafield and Prudden*[14] both ductus choledochus may empty into the duodenum or one of the two or even a single one into the stomach. The duplication may be due either to a double "Anlage" or abnormal division of it.[13]

There is experimental evidence, however, that fine particles in suspension, not larger than lycopodium grains (*Hemmeter, Band* and *Goldmann*[15]) may enter the biliary system from the alimentary tract by means of a "rückläufigen" (retrograde) movement.[15] This may occur under normal and pathological conditions, such as digestive disturbances associated with retarded bile secretion. Large adhesive masses never are transported in this way, the particles being found singly or in very minute quantities. The specific gravity of a particular granule may possibly be also a determining factor, and should be considered.

Another likely way is the existence between the biliary system and some part of the alimentary tract, of a fistula through which sand could have passed. Signs indicative of such a pathological condition were not present on examination of the organs. Such fistulae may be formed by perforation of the gut wall by certain objects which then penetrate into the biliary system. Usually the gall-bladder and infrequently the bile ducts become involved.

From the scanty information available, it is doubtful whether the pig was suffering from jaundice or not. On taking the morbid changes into account, however, there were no signs indicative of icterus. This view was substantiated on examining specially stained sections of the liver. The bile capillaries were apparently normal or

reduced in size and number to some extent. Presumably the bile was transported by the newly formed bile ducts, thus bile stasis, as expected, remained in abeyance. The absence of icterus is in accordance with observations previously recorded in a cow[3] and pig[4]. However, an icteric condition was invariably seen in cases described by *Kinsley*[2].

In the past owing to the lack of information and the incomplete material collected in most cases, it was impossible to arrive at any conclusive or even likely explanation of the condition. The pathogenesis previously given is thus based principally on speculation. It is essential, therefore, to examine the condition *in situ* or to receive the abdominal organs intact after exenteration.

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A REMARKABLE CAUSE OF ACUTE ABDOMEN IN A DOG

C. F. B. HOFMEYR
Pretoria

SUMMARY

(1) A case in a dog of simultaneous strangulation of the oesophagus and duodenum by the gastro-splenic ligament of a displaced spleen is reported.
(2) The clinical picture is given.
(3) The remedial operation is described.
(4) An attempt is made to explain how the condition could have arisen.

Subject:

The subject was a Dobermann Pinscher dog about 8 years old.

History:

According to the owner the dog was completely normal on the day preceding the consultation. Four hours before examination the abdomen was seen to be distended and the animal was distressed. It became progressively worse up to the time it was seen by the writer.

Clinical Findings:

The patient was in a state of collapse. The pulse was very fast and barely perceptible, the temperature was subnormal, respirations fast, shallow and stertorous, and the visible mucous membranes cyanotic. The abdomen was tympanitic, drum-like and distended to its maximum.

Diagnosis:

It was obvious that there was obstruction of some part of the alimentary tract. The only organ in the dog capable of such tremendous distension is the stomach. As it was considered that the only way by which both entry to and exit from the stomach could be blocked simultaneously was torsion, this diagnosis was made. Emergency laparotomy was advised and agreed to.

The Operation:

Preparations for operation were immediately made. Nembutal intravenously was used as the anaesthetic .Only half the calculated dose was required to attain surgical anaesthesia.

With the patient supported on his back by sandbags, an

incision was made from the xiphoid along the linea alba to a short distance beyond the umbilicus. This exposed part of the visceral surface of the stomach, which was distended to its maximum capacity, mainly with gas. Large haemorrhagic areas were present in the stomach wall, which was in contact with the diaphragm anteriorly and the pelvis posteriorly.

The great intra-abdominal pressure did not allow manual exploration of the abdomen. A serum needle was passed into the stomach to release the gas. The needle was then surrounded by a purse-string suture. This was drawn tight to close the opening when the needle was removed.

In order to confirm the correctness of the diagnosis of gastric torsion a gloved hand was directed towards the cardia. The diagnosis appeared to be confirmed by the existence of a spiral fold round the termination of the oesophagus. Even though an attempt was made to rotate the stomach in a contrary direction, it did not move at all. Thinking that there still was too much gas in the stomach, a purse-string suture was again inserted and a knife passed through the centre. A small amount of very foul smelling gas escaped. The stomach contained a large amount of pieces of porridge and meat, which was malodorous and decomposing. The opening was closed as before and rotation attempted once more without result.

It was then noticed that, although the stomach as a whole was so much enlarged, the cardia and pylorus remained in the same actual and relative positions. This gave rise to the idea that the torsion was on an axis at right angles to the pylorus-cardia line. This was found not to be the case.

As the spiral fold round the terminal end of the oesophagus could only be explained in terms of some form of torsion, and as the stomach itself was not rotated, it was decided to explore the whole abdomen systematically. Every organ occupied its correct position, except the spleen, which was situated on the **right.** A remarkable fact was then discovered: the spleen had passed through the epiploic foramen of Winslow emerging on the right hand side between the kidney and caudate process of the liver. How this could have happened will be discussed later.

The transposition of the spleen caused a simultaneous strangulation of the end of the oesophagus and the first part of the duodenum by the gastro-splenic ligament. The spiral fold previously referred to was this ligament passing over the oesophagus. The ligament also effectively prevented the pylorus from being pushed back by the mounting pressure in the stomach. The strangulation led to a greatly reduced gastric circulation, followed by abnormal fermentation and decomposition of the ingesta. In the mean time a very marked tumor splenis developed because of pressure on the splenic vein.

As it was impossible to return the greatly enlarged spleen the

way it came, splenectomy was performed. The severed gastro-splenic ligament was followed through the foramen of Winslow to the normal position of the spleen. It then became immediately apparent that the patency of both oesophagus and duodenum had been restored.

If the operation could have been done some hours earlier an optimistic prognosis would have been justified. However, this case was in a critical condition with a stomach wall damaged by prolonged overdistention and impaired circulation. The contents had undergone toxic changes and absorption by itself was enough to seriously prejudice recovery. By means of a thick tube ($\frac{1}{2}$ inch or 1.25 cm. bore) it was attempted to flush out the stomach with lukewarm water. This was unsuccessful as the tube was continually being blocked by the solids.

As expected, restoration of the gastric circulation allowed rapid absorption of the noxious contents, causing sudden deterioration of the patient's condition. The abdomen was closed and restorative measures applied, in spite of which death took place soon afterwards.

Discussion:

It is suggested that the following factors were involved in producing this remarkable case:

(1) Violence involving rolling. It is clear that the spleen could not have passed through the foramen of Winslow from left to right without tearing through the greater omentum and entering the omental bursa. For this violence would be essential and a rolling movement would help the displacement of the spleen.

(2) A well filled stomach. The weight of such a stomach would help to create a space between itself and the dorsal abdominal wall causing the foramen of Winslow to gape.

(3) An enlarged epiploic foramen that was congenital or acquired. It is difficult to visualise any form of injury leading to the latter alternative. The former alternative is thus more likely. The normal foramen is much too small to allow the passage of the spleen.

In the present case there was no history of trauma, but injury could have occurred without having been observed. The stomach was well filled and the epiploic foramen admitted the flat hand.

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DUIWESIEKTES

Duiwesport in Suid-Afrika neem in die laaste aantal jare geweldig toe en gevolglik kry ons net soos in België en Holland waar dit die nasionale sport is, al meer te doen met duiwesiektes.

Vanjaar is hier in die Westelike Provinsie as gevolg van die ongestadige klimaat en die besonder lang en nat winter blykbaar gunstige omstandighede geskep vir duiwesiektes, en baie honderde duiwe is ook dood. Daar was weinig hokke wat nie een of ander tyd met 'n siekte te doen gehad het nie.

Ek verwys veral na weersomstandighede as 'n belangrike etiologiese faktor daar die higiëne blykbaar 'n ondergeskikte rol gespeel het. Siektes het gefloreer, nie alleen in swak hokke nie maar veral in skoon en goedversorgde hokke.

Een van die meesgevreesde siektes is Trichomoniase. Die siekte het vanjaar honderde duiwe doodgemaak; ekself het vyf-en-dertig verloor voordat ek iets kon vind wat dit genees. By duiweboere is die siekte ook bekend as vuilkrop, kotssiekte, of "getting light".

Alhoewel sommige wil beweer dat alle duiwe hierdie organisme onderlede het sonder om enige siektetekens as gevolg daarvan te vertoon en dat dit alleen aktief word as die voël se weerstand vir een of ander rede verswak word, blyk dit tog in die praktyk nie altyd so te wees nie. Hoewel dit ook beweer word dat die organisme nie te lank buite leef nie, moet dit tog langer besmetlik bly as wat gemeen word. In party hokke is die siekte oorgedra deur draers uit hokke waar die siekte geheers het.

Die siekteverskynsel van die kwaadaardige gevalle is as volg : duif sit inmekaar, het swak eetlus, kan blykbaar kos nie verteer nie en vomeer na 'n sekere tyd, drink besonder baie water. As die krop dan uitgedruk word of selfs as die kop na onder gehou word, ontsnap 'n stinkende vuilbruin water wat warm voel. (Blykbaar het die duif 'n hoë koors). Die diarree is 'n uitstaande simptoom. Die ontlasting is tipies taai, groen en drillerig en kom kort-kort tevoorskyn. Indien behandeling nie gou toegepas word nie vrek sulke duiwe binne 'n paar dae.

Jong duiwe is die meeste vatbaar vir die akute vorm terwyl ou duiwe weer die chroniese vorm opdoen, die sogenaamde "getting light". Die chroniese vorm lei later tot sweertjies in die dunderm, met noodlottige gevolge. Die ander chroniese vorm is die geel seertjies in die bek en slukderm en word dikwels verwar met roep (witseerkeel). Ou duiwe met laasgenoemde vorm van die siekte dra dit aan die kleintjies oor. Sulke kleintjies wat nog gevoer word se bekke en keel is dan toegepak met 'n krummelrige en etterige geel massa wat bekend staan as keelkanker.

Ek het verskeie behandelings geprobeer, selfs arseen in die vorm van Stovarsol, sonder enige sukses. Blouvitrioel het egter spesifiek geblyk te wees teen die siekte. Duiwe wat so siek was dat hulle byna nie meer kon beweeg nie, het binne 'n paar dae gesond geword.

Blouvitrioel word opgelos in drinkwater in die verhouding van een gram op 2½ liter water en gegee vir drie tot vyf dae om te drink. Drink-

bakke moet natuurlik nie van metaal wees nie.

Dit sal interessant wees om te weet of kopersulfaat die sogenaamde "blackhead" van kalkoene netso effektief kan genees. Ek meen stellig dat met die gebruik van kopersulfaat die probleem van trichomoniase onder duiwe opgelos is. Die wenslikheid van goeie higiëne bly egter nog bestaan. Ander faktore wat die siekte begunstig is lang nat winters en voeding met kos van hoë eiwitgehalte. Dit word aanbeveel dat tesame met die kopersulfaatbehandeling alle ryk kosse verwyder moet word en vervang word met gars totdat die siekte verby is.

Witseerkeel (roep, snotsiekte, piep, kanker) kom dikwels voor onder enige ouderdom van duiwe. Ou duiwe wat dit gehad het is lief om draers van die siekte te bly. Kleintjies uit sulke duiwe (kleintjies wat gevoer word) vrek dikwels aan die siekte. Witseerkeel is gelukkig gewoonlik nie so kwaadaardig nie en 'n uitbreking kan gou beheer word. Soos die naam aandui is die opvallendste simptoom wit stukkies in die keel. Sulke duiwe verloor hulle eetlus en word maer.

In teenstelling met trichomoniase is dit 'n siekte wat voorkom in vuil en swakgeboude hokke met slegte ventilasie, slegte behandeling en voeding. Die beste behandeling is die afsondering van siekes, vernietiging van draers, voorsiening van goeie kos, en reinheid. Goeie ventilasie in hokke is vernaam en hulle moenie winderig of trekkerig wees nie. Die preparaat "sulphamezathine" is 'n goeie middel om te gebruik in die drinkwater vir omtrent vyf dae om die siekte teen te werk en komplikasies te genees.

Koksidiose is 'n siekte wat dikwels onder duiwe voorkom, veral kouduiwe. Duiwe met die siekte onderlede is geweldig kroes en ly aan diarree. Die ontlasting is meer semelagtig en skuimerig en indien behandeling nie gou geskied nie is die vrektesyfer baie hoog.

Gewone toepassing van goeie higiëne met die toediening van "sulphamezathine" gee onmiddellike resultate.

Traanoog (Cold eye). Dit is 'n baie aansteeklike siekte wat elke jaar in baie hokke voorkom. Of die oorsaak 'n bakterium of 'n virus is en of ornithose daar iets mee te doen het is onbekend. Die oog of oë van so 'n duif traan geweldig; slymvliese is ontsteek, en indien behandeling nie gou toegepas word nie kan die oog heeltemal verlore gaan met gevolglike blindheid. Behandeling met "sulphadiazine cream" (Maybaker) maak die oë maklik gesond.

Snotsiekte (droë snot, nat snot), ook bekend as kopsiekte kom baie ooreen met roep of witseerkeel, behalwe dat in hierdie geval die siekte meer beperk is tot die duif se kop. Dit gee die indruk van 'n tipiese verkoue, en duiwe snuit en nies soms en haal swaar asem (nat snot). Partymaal egter is daar net dik, taai slym in die duif se bek en keel (droë snot).

Ek verneem dat die Laboratorium Reynolds in Engeland 'n preparaat vervaardig (Ceniciline) wat die toestand genees. Die firma vervaardig Ceniciline B 1 wat alle trichomoniase en Ceniciline wat weer alle soorte snotsiekte en koksidiose vernietig.

Paratifus kom nie so dikwels hier onder duiwe voor as oorsee nie. Die siekte is bekend as knopvlerk maar moet nie verwar word met knopvlerk veroorsaak deur te hoë eiwitvoeding nie. Die siekte kom gewoonlik voor in hokke waar hoenders saam met duiwe aangehou word.

Die siekte is betreklik aansteeklik en siek duiwe sit inmekaar. Hulle

wys gewoonlik 'n groen waterige diarree. Goeie higiëne, afsondering van siekes en toëdiening van sulphamezathine help om die siekte onder beheer te bring. Allerbeste is om alle siek duiwe te vernietig, daar duiwe wat gesond word draers van die siekte bly. Oorsee waar die siekte baie voorkom word jaarliks geënt.

Ander siektes soos pokkies wat oorsee dikwels voorkom is by ons nog onbekend.

Wurms kom nie so dikwels voor nie, behalwe so af en toe die Ascaris, veral in die minder gegoede hokke. Koolstoftetrachloried-behandeling tesame met netheid is heeltemal voldoende. 'n Lintwurm wat hier en daar by duiwe voorkom is die Aporina delafondi.. Dit word veral gevind in hokke waar dikwels kropslaai vir groenigheid gegee word. Dit is onbekend of die klein slakkies of myte wat dikwels op slaai gevind word, die gashere van die wurm is. Vir behandeling word die ergste stukke van die lintwurm wat gewoonlik by die anus uithang uitgetrek en word die duif behandel met 'n "Dicestal" (Maybaker) tablet.

Luise en vlieë kom maar gedurig voor in baie hokke, maar met al die uitstekende bestrydingsmiddels op die mark is dit baie maklik om die hokke van die parasiete skoon te hou.

J. A. R. VAN BLERK.

JUBILEE OF THE HANOVER VETERINARY HIGH SCHOOL

A circular has been received from the Rector of the Veterinary High School at Hanover in Germany, intimating that a jubilee celebration will be held at the School from July 29th to 31st, 1953, to mark the 175th anniversary of the establishment of the Institution.

A review of the development of Veterinary Colleges throughout the world is to be held. An invitation is extended to any of our members who may be in Europe at the time to attend. Attendance at the celebrations could easily be fitted in with the International Veterinary Congress in Stockholm in August of this year. The college authorities would like to know in good time if any member wishes to attend.

CASE REPORT

DIAPHRAGMATIC HERNIA IN A COW

F. B. W. DU CASSE
Johannesburg

The subject was a mature pedigreed Jersey cow and had originally been treated by a colleague for bloat. In spite of all the usual remedies the bloat persisted in a mild form. The animal gave a positive reaction to the metal detector and was operated on for traumatic reticulitis, a penetrating piece of wire being removed from the reticulum. Recovery was uninterrupted. Shortly afterwards the animal again started with hoven and was treated by the owner with antifrothing agents. The animal continued to show an almost chronic hoven, particularly after feeding, and started to lose condition. A few months after the wire operation the animal developed a very severe bloat which the owner could not relieve and I was called out. Severe frothy fermentation was present which could not be relieved. In view of the history it was decided to perform rumenotomy and leave a permanent ruminal fistula (Van der Kaay's operation). Recovery was complete after manual removal of the ingesta. Two months later the owner requested that we close the fistula to see if hoven recurred. The animal had continued to lose weight steadily even with the fistula, so it was closed by separating and suturing the rumen, muscles and skin. Closure was successful but almost immediately hoven in a mild form recurred. Another acute attack occurred six weeks after the closure. At the owner's request the animal was destroyed.

Post-mortem examination: The carcass was emaciated but otherwise normal except for a diaphragmatic hernia. The reticulum was lying in the chest cavity. The rupture in the diaphragm was very small with the reticulum constricted, its narrowed lumen almost completely preventing the passage of ingesta, and it was practically empty, with extensive adhesions. The rumen was filled with frothy ingesta. There was no growth or other obstruction of the oesophagus. This hernia would normally have been recognised during the performance of the wire operation when the reticulum was palpated with great care, except that the extreme narrowing of its lumen by the hernial ring made it easily missed. The tear probably took place after the operation. The respiratory symptoms associated with this diaphragmatic hernia would in all cases have been put down to the chronic hoven, for which the hernia was responsible.

It is suggested that this condition may be a cause of some cases of chronic bloat in ruminants and that diagnosis during life should be possible by means of rumenotomy.

Summary: A case of chronic hoven in a cow probably due to diaphragmatic hernia is described.

CASE REPORT

DIAPHRAGMATIC HERNIA IN A HORSE

F. B. W. DU CASSE
Johannesburg

The subject was an 11 year old bay gelding stabled at a Riding School in Johannesburg. It had shown mild symptoms of colic a week before and had been treated by a colleague with a mild laxative administered by a stomach tube. Recovery was complete. When seen by me a week later it was showing mild symptoms of colic with a very marked tendency to lie down, only to show immediate distress and to rise again. The pulse was extremely fast and very weak, the respirations were fast and shallow, the mucous membranes very injected, and the temperature 102.4°. Rectal examination revealed nothing unusual. The passage of the stomach tube was not obstructed, and borborygmi were normal. Auscultation and percussion showed nothing except a dull area over the left lung, posteriorly and high up. There was complete inappetence. No definite diagnosis was made; the case was temporarily classed as a possible cardiac collapse with incipient pneumonia. The animal was given three million units of procaine penicillin together with camphor in oil as a heart stimulant. It was heavily rugged up and the extremities bandaged.

The following morning the animal was no better and a second opinion was obtained. A diagnosis of pneumonia was made with a possibility of a hernia. A full history of the horse given by the owner revealed that she had had the horse for the past 8 years. It had been ridden daily for exercise and hunted on Sundays. It had always been a very good "doer", and had never before had an attack of colic, apart from the attack a week previously. The horse had never been involved in an accident, nor had it ever had a fall. This history seemed to make the possibility of a hernia unlikely and it was thus treated for pneumonia with penicillin and heart stimulants. The horse gradually got worse and died eighteen hours after the original consultation.

Post-mortem Examination. Nothing unusual was seen apart from a diaphragmatic hernia. The entire stomach was lying in the thoracic cavity but the other organs were normal. No adhesions were present. The diaphragm showed a triangular rupture about six inches long with the apex nearest the sternum and the base about two-and-a-half inches long. The base and both sides of the rupture, for a distance of three inches were tremendously thickened being almost an inch thick, and consisted of very hard fibrous tissue with no trace of adhesions to any surrounding organs. The

remainder of the tear was ragged and haemorrhagic. The stomach was filled with ingesta. From the post-mortem appearances it can only be concluded that this animal must have had a long standing hernial ring in the diaphragm which produced no symptoms until further extension of the rupture occurred shortly before death.

A peculiar feature of the case was that both the riding school owner who exercised the horse daily, and the owner of the horse who hunted it, assured me that this animal had never, even after hard work, showed any symptoms of undue respiratory distress.

Summary: A case of diaphragmatic hernia in a horse is described where no symptoms of distress after work were shown throughout life, although **post-mortem** examination revealed a longstanding rupture.

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BOOK REVIEW

Banham's *THE VETERINARY SURGEON'S VADE MECUM*. Eighth Edition, by W. A. Greig, B.Sc., M.R.C.V.S. Published by Baillière, Tindall & Cox, London. 1952. Pp. 216. Published price 17s. 6d.

Of the title of this book the great majority of us would recognize only the word "Banham". Banham's original *Veterinary Posology and other Information* was published for the first time in 1887. Since then it has been revised three times, and with the present revision the title has been changed to that given above. This has been necessitated by a change in the scope of the work which in its turn was caused by certain new trends in veterinary science, notably a "gradual abandonment of the older non-specific remedies," and "an increasing realization that many valuable laboratory tests may be quickly and simply carried out by the general practitioner himself."

Greig, in this revised edition has set himself the aim of compiling "in a compact and convenient form a minor encyclopædia of facts and figures to which a veterinary surgeon in practice may from time to time need to refer." He has selected the essential points from a diverse range of subjects with the avoidance of superfluous detail and has thus succeeded in very large measure in his aims.

New material includes information on Nutrition, Milk, Blood and Urine Examination, Allergic Tests, and Poisonous Plants. In spite however of the apparently over-ambitious scope, "Banham" has retained its "pocket" format, and at the same time enhanced its usefulness.

The binding is attractive and the print very clear. The publishers can once again be congratulated on the production of an excellent little book which should rightly grace the bookshelf of every practitioner who wishes to remain up to date.

W. D. M.

THE EXTRA PHARMACOPOEIA (Martindale. 23rd Edition. Vol. I. Published by the Pharmaceutical Press, London. 1952. Pp. xxii—1352. Price 55s.

This twenty-third edition of "Martindale" has appeared seventy years after the first was published as a slim little book of 313 pages in 1883. Since that period immense strides have been made in medical science and the approach to therapeutics has undergone profound modification. This is reflected in the great changes that have taken place in the set-up of the book, and must have involved a truly colossal amount of research and reading. One's imagination boggles at the industry of the compilers.

It is stated that during the past eleven years, since the publication of the previous volume, more important additions to *materia medica* have

been made than during any similar period since "Martindale" was first published. Penicillin in the previous edition occupied less than a half-page and now the section on Antibiotics runs to 98 pages.

An important feature of this book is the great number of brief abstracts from medical and pharmaceutical literature. These number in the vicinity of 4,000, and of them about three-quarters are less than ten years old. Of abstracts older than ten years only those of particular interest or significance have been retained. The references are therefore entirely up to date.

The aim of this book is to provide for practising physicians and pharmacists a "convenient book of reference on matters pertaining to the composition, properties and uses of all substances, official, unofficial, and proprietary, used in medicine and pharmacy." The field covered is of word-wide origin andl has entailed a study of world medical and pharmaceutical literature, of new editions of foreign pharmacopoeias, and of new proprietaries constantly being issued by pharmaceutical firms all over the civilized world.

To encompass this vast amount of material within a reasonably sized volume, old material had had to be pruned, new material carefully edited, use made of larger type area per page, and of small clear print on good thin paper.

For the benefit of those not familiar with "Martindale" it should perhaps be explained that the two volumes which comprise it are published consecutively, volume II usually from one to three years after volume I. The second volume deals with numerous subjects ancillary to those dealt with in the first volume, such as assay processes and analytical addenda.

Squires' "Companion to the British Pharmacopoeia" which was of earlier origin than "Martindale" has ceased to appear independently and has now been incorporated in the present publication. This has left "Martindale", certainly as far as the English speaking world is concerned, unique in its chosen sphere of usefulness.

W. D. M.

OBITUARY

WILLIAM HORNER ANDREWS (1887-1953)

We regret to have to record the death on March 17th of Dr. W. H. Andrews. At the time of going to press it has not been possible to obtain all the details required for a full-length memoir but this will appear in our next issue.

In the meantime we tender our deepest sympathy to his widow and children in their sad bereavement.

E.M.R.

VENUE OF ANNUAL GENERAL MEETINGS

At the last Annual General Meeting, Council was instructed to consider the possibility of holding future meetings at centres other than at Onderstepoort. The General Purposes Committee of Council was entrusted to investigate the matter and would like to place the following considerations before all members.

The desirability of the principle need not be enlarged on, but there are numerous practical difficulties which must be faced. These are :—

1. **Organisation.**

   Members of the Association resident in the area of the proposed venue would have to form a strong committee to carry out the preliminary organisation such as the booking of a hall, catering, etc. The obvious body to undertake this would be a branch of the Association.

2. **Attendance.**

   It must be remembered that 30 members and 4 Honorary Associate Members are stationed at Onderstepoort. With an average daily attendance of a little over 100 members, this represents a considerable proportion of the total.
   Furthermore, numerous State Veterinarians are called to Pretoria to attend a departmental meeting and they also attend the Association meeting. It is doubtful whether this arrangement could be adhered to, if the Association meeting were elsewhere.

3. **Papers and Demonstrations.**

   The bulk of the papers and demonstrations are usually given by members of the Onderstepoort staff. This is not due to selection but to the fact that very few papers from other members are forthcoming. As not more than 2 or 3 Onderstepoort members could be spared to attend a meeting elsewhere, other members would have to be willing to supply the scientific programme.
   The only demonstrations possible away from Onderstepoort would be those of a clinical nature.

4. **Expense.**

   The Association enjoys considerable privileges at Onderstepoort such as the free use of the Hall and the fact that satisfactory refreshments are available on the spot at a reasonable price.
   The Honorary Secretary and Honorary Treasurer, together with their two paid assistants are, and presumably always will be, at Onderstepoort or Pretoria. These two Honorary officials and at least one assistant would have to attend the Annual General Meeting and it would hardly be fair to expect them to do so at their own expense.
   Council feels that the initial move must come from some branch in the form of a concrete invitation to hold an Annual General Meeting in their area. Such a proposal would be placed before the 1953 meeting which will be held at Onderstepoort, for consideration.

RICHARD CLARK,
W. D. MALHERBE,
M. C. ROBINSON,
Members of the General Purposes Committee.

MUNICIPAL VETERINARY SERVICE

M. C. ROBINSON

Johannesburg

The Veterinarian in municipal service may be compared to his colleague, the medical officer of health, but this comparison is not entirely correct, for, in municipal service, there is still some scope and opportunity for field and clinical work.

The growth and development of municipal veterinary service has not been and never will be spectacular, but the municipal veterinarian plays an extremely important role in public health work and with the expansion and development of large municipalities, there will be a steady but limited demand for veterinarians who wish to make this branch of veterinary science their career.

There is probably no less understood branch of veterinary work than municipal veterinary science and most young students think that it will involve a life of dull routine work at an abattoir. It is true that the work at an abattoir is one of the foundations upon which municipal veterinary work was originally established, but its scope and interest have widened considerably in recent years.

The functions of a municipal veterinarian may be briefly summarised under the following headings:—

(a) Control of livestock markets and abattoirs.

(b) Control, from the veterinary point of view, of the milk-producing herds supplying a city or town.

(c) Veterinary supervision over the animals owned by the local authority.

The number of veterinarians employed by a local authority naturally varies with its size. In Johannesburg the veterinary staff consists of 6 qualified men but in smaller areas, only one part-time veterinarian is employed to supervise the abattoir and make routine inspections of the dairy herds supplying milk to the city or town.

If the functions of the veterinarian are more closely analysed, the scope and need for highly trained municipal veterinarians will become more apparent.

(a) Abattoir and Livestock Market.

In any major abattoir, cattle are assembled from widely scattered areas and close supervision and ante-mortem inspection are needed. Ante-mortem inspection performs a double function in that it is the first stage in observing the fitness of an animal

for human consumption and it forms a valuable source of information to the State service in detecting outbreaks of disease.

Post-mortem inspection is simply the secondary stage of ensuring that the meat of slaughtered animals is fit for consumption. At major abattoirs, the function of the veterinarian in regard to meat inspection is to perform an adequate ante-mortem inspection and to evaluate the fitness or otherwise of meat detained by lay inspectors, for human consumption.

Veterinarians, in close contact with abattoir operation, have to acquire a knowledge of refrigeration and by-product manufacture. There is still a wide field open for research into the best methods of utilising meat condemned as being unfit for human consumption. In a country such as South Africa where, in the past few years, the words "meat shortage" have an all too familiar ring, it gives food for thought that in Johannesburg, for example, 2.5 per cent of cattle and 3.5 per cent of pigs are infected with cysticercosis and altogether some 4,000,000 lbs. of meat are condemned annually for various diseases. Here surely, is a challenge to our profession to investigate the causes and devise methods to overcome the huge annual wastage of invaluable protein.

(b) Dairy Herd Inspection

The other major field for the operation of municipal veterinarians lies in the inspection and control of dairy herds supplying milk to any local authority's area. This work entails a large amount of field activity combined with an intimate knowledge of dairy bacteriology and pasteurisation.

In milk control work, the veterinarian works in close collaboration with his medical colleague (the medical officer of health) and with the growth of South Africa, the control of municipal milk supplies should provide an interesting and expanding field of activity. Medical Officers of Health are becoming more keenly aware of the services to public health which can be rendered by the veterinarian, and it is now readily recognised that clean, disease-free milk can only be obtained by the closest collaboration between the medical and veterinary professions.

(c) Clinical Veterinary Work

Depending on the size of the local authority, there is a field for the veterinary clinician within municipal service. For many years there has been some difference of opinion as to whether the daily removal of domestic refuse can be more economically performed by motor or animal-drawn transport and in several large municipalities, it has been decided that animal-drawn transport still performs the service most economically. In Johannesburg nearly 2,000 horses and mules are still in use, and these animals require constant veterinary attention. In addition, where circumstances necessitate it, the municipal veterinary clinician is

called upon to advise the local authority on the best methods of utilising sewage farms for the grazing of cattle and to attend to the animals in the zoological gardens.

It will be seen, in this brief review, that municipal veterinary work can provide a career of absorbing interest and variety for graduates who prefer security, comparatively regular hours, reasonable pay and leave privileges.

Salary

It is only fair to mention that, under the Public Health Act, as amended, the local authority which employs a veterinarian on full-time public health work, must obtain ministerial approval of the salary and allowances paid to any veterinarian, if the local authority desires to claim a part refund of the emoluments in terms of the Act.

An example of how this may affect municipal salaries is seen by the fact that the City of Cape Town recently advertised an appointment of a veterinarian on the scale £1,040 — £1,644. This scale was not approved of by the Department of Health and the post has recently been re-advertised at a salary of 1,150 × 50 — £1,300.

The full implications of this new amendment to the Public Health Act on municipal posts are not yet clear, but the aim of the legislation is to create as little disparity as possible between state and equivalent municipal posts. The salary scales attached to the various municipal veterinary posts, have not as yet, been published. It is feared, however, that the legislation may have the effect of lowering the scale of salaries paid by local authorities for some posts and thus have a serious repercussion on the number of applicants for municipal appointments.

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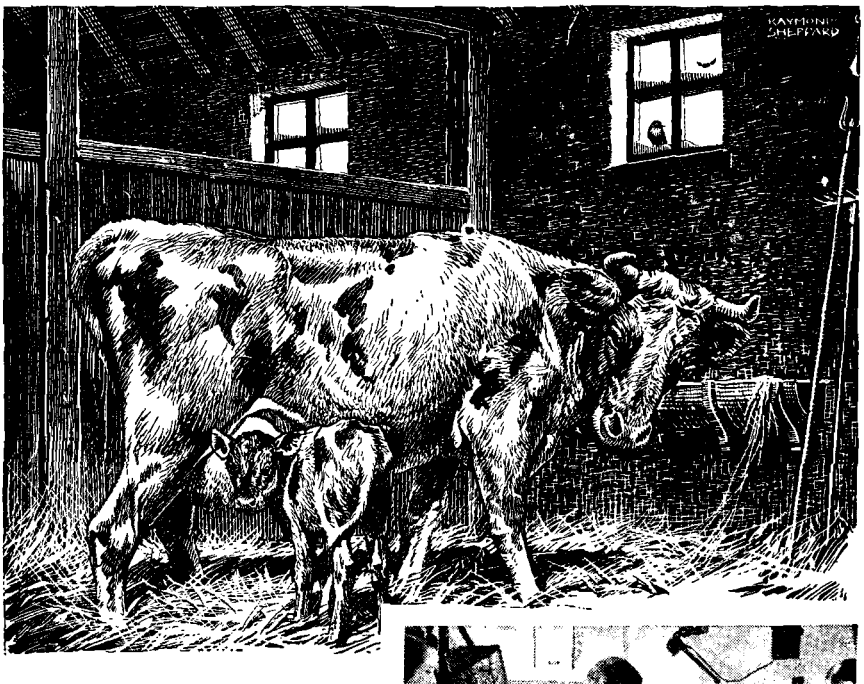

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RESEARCH INTO INFERTILITY IN CATTLE AND SHEEP

S. W. J. VAN RENSBURG

Dairy, Meat and Wool Control Boards Senior Research Fellow, Onderstepoort.

INTRODUCTION

For the first time in the history of veterinary research in South Africa an officer has now been assigned to carry out full-time research into all aspects of infertility and problems connected with the application of artificial insemination in cattle and sheep. This has been made possible by the decision of the Dairy, Meat and Wool Control Boards to allocate for this purpose one of the five senior research fellowships which have been made available by them for veterinary research.

The advantages of this new line of attack on some of the most serious handicaps to animal breeding are obvious when one considers the difficulties which have beset workers in this sphere in the past. Right from the outset the holder of the fellowship appreciates that the mere fact of granting such a scholarship is evidence of a realisation of the urgency of these problems by those most intimately concerned with the welfare of the two most important branches of the livestock industry of this country. He therefore feels assured of their full support and encouragement as long as he makes an honest endeavour to improve the present notoriously low calving and lambing rates in South Africa.

A definite amount has been allocated for carrying out this work over a specified period. It can therefore be planned with a feeling of security and without fear that sections of it will have to be abandoned prematurely on account of lack of funds. The incumbent in consultation with and with the approval of the Director of Veterinary Services has a free choice of subjects. It is therefore not a case of square pegs in round holes. Furthermore, he is not saddled with a number of extraneous and distracting routine, administrative, tuitional and other duties. His full time and undivided attention can be concentrated on the problems concerned, with a feeling of security and with the knowledge that he is not likely to be called upon to abandon it halfway in order to take up other duties as exigencies may demand.

SELECTION OF SUBJECT

The greatest difficulty confronting the infertility research worker at the outset is the choice of a suitable subject, because he

is completely bewildered by the great variety of problems that present themselves and call for study.

In making a decision in this instance due consideration must be given to the motives which inspired the provision of funds for this study, and also to the most pressing needs of the livestock industry of this country. Here it must be pointed out that the functions of the Control Boards embrace far more than mere fixation of prices, which certainly is the most unenviable of all their duties, because irrespective of how well it is administered price control can never give complete satisfaction to both producer and consumer. Actually the empowering acts specifically authorise the Boards to levy funds for, inter alia, assisting the development and betterment of the livestock industries which they represent. The granting of the fellowships for veterinary research therefore emanates from a desire on the part of the three Boards to make their contribution towards prevention of the heavy loss of cattle and sheep through disease and to increase production by controlling and eliminating the many factors which cause lowered reproductive efficiency.

Viewed in this light it is evident that the objects of the fellowships will not be attained by concentrating exclusively on merely one aspect of fundamental research only. The aim should rather be to make the investigations more comprehensive and to obtain tangible results which will bring appreciable benefit to both bovine and ovine species in the shortest possible time. The sporadic type of infertility affecting the individual animal must not receive preference over the great variety of factors which lower fecundity in the herd and flock as a whole.

In planning this work it must be realised right at the start that sterility is not a disease like any other which can be studied by one or two experts within the four walls of a laboratory. It is rather a symptom of, or a sequel to, a large number of pathological, anatomical and physiological abnormalities which may either be systematic or localised in the genitalia. The many different aspects of herd infertility accordingly constitute enormous ramifications which render the problem incapable of solution by any one individual.

A scrutiny of the many factors involved will show that the ideal set-up for sterility research would be a unit consisting of clinicians, bacteriologists, virologists, protozoologists, histopathologists, endocrinologists, geneticists, nutritionists, bio-chemists and several others. The paucity of research workers in South Africa completely dispels all illusions one may have had about the creation of such a team. Neither has the perfect all-rounder been found who can pass as an authority on each of these subjects. The only alternative therefore is for the incumbent to get the co-operation of other workers who could assist by investigating those aspects which pertain to their own particular sphere of

activity, and such collaboration with a number of workers has already been obtained by virtue of the fact that the work is carried out within the Division of Veterinary Services.

The point that must be emphasised is that this is not a one-man job and also that it is not a subject for laboratory research alone. On the contrary, many aspects of breeding problems must of necessity be studied in the herd or flock on the farm. It is therefore the one type of research in which field officers and practitioners can contribute as much as or even more than laboratory workers.

The many conditions which may produce infertility may be considered under the following main categories:—

(1) Infectious systemic diseases.

(2) Infectious coital diseases.

(3) Functional sterility.

(4) Hereditary factors.

(5) Diseases incidental to gestation.

As already indicated the one other class, namely the organic diseases which cause sterility in the individual animal, must for the present be relegated into the background, and preference must be given to those that are of greater economic importance.

INFECTIOUS SYSTEMIC DISEASES

While all infectious diseases may interfere with breeding efficiency by causing abortion in the pregnant female or an upset in the oestrus cycle in the non-pregnant female and by retarding spermatogenesis in the male, there are several which merit special attention from the sterility worker on account of the frequency with which the genitalia are involved, and for differential diagnostic purposes.

Brucellosis is the one disease that is unique in so far as it is the only one of the many diseases which affect fertility for which a reliable diagnostic test and an efficient method of control are available. The function of the sterility worker and the practitioner in this respect is therefore merely to make the diagnosis and to apply the recognised methods of dealing with the disease.

Bovine tuberculosis when widely prevalent in dairy herds can be quite an important causal factor of sterility on account of the high incidence of tuberculous metritis and salpingitis found in such herds. Quinlan (1929) found the genitalia involved in 18 per cent of tuberculous cows slaughtered during his investigation into sterility in cows in South Africa, and Canham (1937) reported eleven cases of abortion due to tuberculosis in a pedigree herd.

Lumpy skin disease may produce nodules or small circumscribed abscesses in the uterine wall causing abortion or sterility. In the bull the scrotum and testes may be similarly affected and

lesions may also occur on the inner surface of the prepuce and on the glans penis. Other likely sequelae are orchitis and atrophy of the testes resulting in oligospermia or aspermia.

Globidiosis is fairly widespread in the Transvaal bushveld and is on the increase. In bulls the globidium cysts show a great tendency to penetrate into the deeper structures in the scrotum and inguinal canal and to invade the stroma of the testes, epididymis and pampiniform plexus. Many bulls in the affected area have been rendered sterile in this manner. While the general aspects of this disease are being investigated at Onderstepoort, no study of the semen picture shown by affected bulls has as yet been made.

Corynebacterium ovis infection, ovine pseudotuberculosis or caseous lymphadenitis is rapidly becoming the most serious type of infectious disease concerned in the causation of reduced fertility in sheep on account of the frequent involvement of the epididymis in rams. Belonje (1951) attributes to Engela the statement that at a certain big sale of stud rams 30 per cent showed evidence of epididymitis. The incidence of this disease in sheep is assuming serious proportions. Research in which workers of the Veterinary Division and Grootfontein Agricultural College are collaborating is being carried out with the object of determining the sperm picture of affected rams, the possible presence of the organism in the semen and the possibility of its transmission by coitus, the possible preparation of an effective vaccine, and the chemotherapeutic aspect. Further work is necessary to determine whether there are no other organisms besides C. ovis concerned in the production of the high incidence of epididymitis in rams. For instance, in Australia recently Simmons and Hall (1953) isolated a bacterium with characteristics of the genus Brucella from natural cases of ovine epididymitis.

Non-specific infections. A large number of non-specific organisms have been incriminated as the cause of poor fertility. Among those are streptococci, staphylococci, corynebacteria, pseudomonas pyocyanea, pleuropneumonia-like organisms, moulds, etc. Very little is known regarding the bacterial flora of semen and of the genital tract of the female. It is suspected that many of the organisms mentioned as well as others may cause a low grade catarrhal endometritis which may be responsible for the large number of cases of cows with apparently normal genital tracts and regular oestrous cycles failing to hold to natural service or insemination. The bacterial content of the uterus and of semen therefore provides a big field for bacteriological research.

Febrile diseases and particularly those accompanied by anaemia, produce a degeneration of testicular epithelium in the male which adversely affects spermatogenesis. Our most recent observations show that regeneration in the testes in such cases is far more protracted than was thought at first, and that complete

regeneration may not take place at all. It has been noted that although bulls may make a rapid recovery from some of the protozoal diseases like redwater and gallsickness and may appear strong and vigorous, the quantity and quality of their semen remain poor for months subsequently. Permanent sterility may be produced in the bull by working him too soon or excessively after an attack of one of these diseases.

While haematologists have worked out in detail the changes that take place in the blood during the course of these infectious diseases, nothing has yet been done on the semen picture presented during the course of such an attack and after.

INFECTIOUS COITAL DISEASES

Contagious granular vaginitis for years presented a very useful scapegoat for all types of sterility, and afforded nostrum vendors a fruitful field for disposing of their wares to farmers troubled with any type of herd infertility. Its importance as an aetiological factor in sterility has been greatly exaggerated, and the greatest harm it has done is in the number of cows that have been rendered sterile by the irrational treatment that is frequently applied for so-called vaginitis. Therefore as far as granular vaginitis is concerned the greatest service that the practitioner can render is to warn owners against indiscriminate treatment.

Contagious vesicular vaginitis, coital exanthema or bull-burn has the unique distinction that it is the one and only venereal disease of animals which occurs in other countries but has not yet been recorded in any part of Southern Africa. Our main duty here consists in guarding against its introduction.

Trichomoniasis was first recorded in South Africa by Robinson in 1937 and has since been diagnosed in herds in different parts of the country. It has been studied at Onderstepoort for several years now, but great difficulty is experienced in producing the disease artificially. This experience associated with observations in the field indicates that the trichomonas is far less virulent in South Africa than overseas. At present it is certainly not such a serious breeding problem here, and is eclipsed by several of the other types of coital infections.

Vibrio foetus as a cause of abortion was first reported in the Union by Snyman (1931), and Canham (1948) found that abortions in a number of herds in Natal were produced by it. Subsequent investigations have shown that it is widespread throughout the Union. Though it has not yet been diagnosed in sheep in South Africa there is a strong suspicion that it may be the cause of some of the outbreaks of abortion in ewes that occur from time to time.

Apart from causing abortion, vibrio foetus is now recognised as being also the principal aetiological factor in herd infertility in Europe and America. In the Union too it has been found in herds

showing an infectious cervico-vaginitis which clinically is indistinguishable from epivag.

Contagious epididymitis and vaginitis (epivag) is still the most serious breeding problem of both beef and dairy cattle in the affected areas, namely the Transvaal and Northern Orange Free State. The investigations into epivag have brought to light the fact that we have in this country another type of venereal disease, namely:

Infectious anterior vagino-cervicitis which in the cow presents many of the characteristic features of epivag, but yet appears to be different because:—

(1) Although the bull is the carrier of the casual organism and transmits it to clean cows, no macroscopic lesions of any type develop in the bull and his fertility is unimpaired.

(2) The incubation period in both natural and artificially produced cases is under 24 hours whereas in epivag it is two to four days.

(3) The vagino-cervicitis subsides more rapidly and there does not appear to be the same tendency for the infection to spread forward producing undesirable sequelae like salpingitis, pavilionitis, peritonitis and permanent sterility.

(4) This infection is not confined to the epivag area, but occurs more extensively and has been found in all provinces.

The rôle played by vibrio foetus and the one or more viruses that may be concerned in the causation of the various types of vagino-cervicitis presents a variety of problems. A study of these and of other puzzling features has now been intensified under the new organisation, and the different aspects are being investigated both in the laboratory and in the field.

FUNCTIONAL STERILITY

Under this classification are grouped all those types of infertility which are produced by ovarian dysfunction without the presence of pathological lesions to account for this physiological deviation from normality. They may occur in various forms such as infantilism, anoestrus, static ovaries, silent heat, anovulatory oestrus, persistent corpus luteum and cystic ovaries.

While any one of these conditions may only affect the odd individual, one frequently finds, when there is a common aetiological factor, that the majority of females in the herd or flock may be affected. The incidence of all forms of ovarian dysfunction is increasing at an alarming rate in both cattle and sheep. No other form of breeding trouble is more generally present in dairy herds than cystic ovaries which renders thousands of valuable breeding cows sterile every year and which is probably of greater

economic importance to the dairy industry than the worst of the infectious venereal diseases.

In ewes, anoestrus and other irregularities of the oestrous cycle constitute the greatest breeding problem of the sheep farmer, and sheep appear to be even more sensitive to the causal factors of functional sterility than cattle.

The immediate cause of ovarian dysfunction is a disturbance of the hormonal equilibrium, and the latter again is brought about by adverse nutritional, environmental, climatic or genetic factors acting on the reproductive system through the pituitary.

Logically it can be surmised that a disturbance in the hormonal balance can be rectified by administration of the appropriate hormone. All the results of the vast amount of research work that has already been done on the sex hormones show however that hormonal therapy is no panacea for this type of infertility.

Furthermore, the knowledge that a deficiency of certain minerals, trace elements or vitamins is one of the common causes of endocrine disturbance does not provide a complete solution either, since these substances should not be supplemented in the food unless it is known which is deficient and to what extent. Feeding any one of these elements in excess of bodily requirements may stop or retard the absorption in utilisation by the body of some of the other essential elements.

While some of the causes of functional sterility have already been determined, many still require clarification. In this, collaboration with workers in the relative spheres, such as soil chemists, agronomists and nutritionists must be undertaken. Observations by veterinarians should also be made on the animals in affected herds on the farms. One practitioner for instance has already accumulated a lot of data on cystic ovaries, and after completion of certain experimental work, he may be able to make a valuable contribution to our knowledge of the incidence, aetiology and treatment of this condition.

HEREDITARY FACTORS

Inheritance may play an important role in reduced breeding efficiency. Certain families in both bovine and ovine species are notoriously poor breeders on account of an undesirable hereditary characteristic in those families.

There is an unfortunate tendency in breeding to over-emphasise one main quality and to ignore the rest. For instance in the dairy cow milk production is the great criterion, and in sheep it is the quality and quantity of the wool. Reproductive ability and length of the reproductive life get scant consideration because selective breeding, which should be very comprehensive, has in practice become too restricted. A one-sided breeding policy, when perpetuated, ultimately leads to a loss of many desirable hereditary characters and this often includes loss of reproductive genes.

Poor breeding ability is seen in males as often as in females, and it is surprising how many bulls with excellent pedigrees have been shown by artificial insemination to yield poor quality semen or to be completely sterile. This lowered reproductive efficiency is frequently found in certain blood lines.

Gonadal hypoplasia is another hereditary defect frequently seen in both beef and dairy animals in South Africa. Recently nine sterile heifers and two bulls, all from one farm and all showing a marked degree of genital hypoplasia, were received at Onderstepoort. The aetiology of this condition is still being investigated but there is a strong possibility of a genetic origin.

Hereditary hypoplasia of the sexual glands of both bulls and cows had increased to such an extent in Sweden that it has become the main cause of lowered fertility in that country. A survey indicated that approximately 26 per cent of breeding animals were affected. Then a campaign for culling both males and females was started, and within seven years the incidence dropped to 8 per cent.

These hereditary conditions may justifiably be regarded as problems requiring solution by the breeder and not by the research worker. As indicated, however, breeders have not yet been roused to appreciate the necessity for eliminating animals with poor reproductive ability. It is therefore the duty of the research worker to fully investigate the cause of all cases of gonadal hypoplasia and other hereditary forms of infertility and to bring these to the notice of the breeders and breed societies for further action. If these inherited defects continue to be ignored in our breeding policy, they may become as serious a problem here as in Sweden.

DISEASES INCIDENTAL TO GESTATION

The responsibility of the sterility worker does not end with conception, but supervision must be maintained over the pregnant female until a strong viable foetus is born.

Many of the factors that may terminate gestation prematurely are known and have already been mentioned but there are several of unknown aetiology which may cause heavy losses.

Death and resorption of the embryo during early pregnancy appears to be a far more common phenomenon than was thought at first. The institution of artificial breeding, which necessitates careful observation and records being kept, has brought the frequency of this occurrence to notice. The usual history is that of a cow having been served or inseminated three or four months previously suddenly showing a recurrence of oestrus.

Apart from the known infections, several other conditions may produce it, such as defective sperm or ovum, inheritance, nutritional defects, endocrine disturbance and defective luteinisation. It is a subject which provides a lot of material for research.

Hydrops amnii in cattle has in recent years appeared as a

herd problem causing appreciable loss in some areas, and in the past two years it has also occurred in ewes in the Transvaal.

Foetal anasarca which is probably closely related to hydrops amnii as far as aetiology is concerned has been causing appreciable losses in a flock of sheep in the Western Province, The aetiology and treatment of both of these conditions are now being investigated on the affected farms as well as in the laboratory.

Dystokia in ewes is sometimes prevalent to an unusual degree in some areas. Very little is known regarding the cause and this will require investigation whenever outbreaks are reported.

Abortion in ewes and the birth of weak lambs periodically occur in some areas without any of the known causes being present. The possibility of vibrio foetus, rickettsia-like organisms, the psittacosis-lymphogranuloma group of infective agents, leptospirosis and other organisms being responsible for these outbreaks will have to be investigated. At the same time too the possible presence of oestrogens in some of our grasses has also to be determined.

DISPOSAL OF STERILE COWS

Very many of the South African beef and dairy herds carry an unusually large number of sterile and unproductive cows, which add appreciably to the cost of meat and milk production.

If a cow is not in calf and on examination is found to be completely sterile four to five months after her last calving, she should be earmarked for slaughter as soon as her milk yield has dropped to an uneconomic level. By spaying such cows, however, at the appropriate time, lactation can be appreciably prolonged and body weight will be increased. In this way they will provide more and better when eventually slaughtered. Experiments are now in progress to determine whether the results of spaying will justify recommending the procedure to farmers.

Similar investigations have also been undertaken to ascertain the feasibility of better utilisation of sterile heifers by spaying and induction of lactation with hormonal implants before they are finally slaughtered.

ARTIFICIAL INSEMINATION

The inclusion of artificial insemination with infertility research is most appropriate since these two are complementary and each contributes in large measure to a solution of the problems of the other.

Artificial breeding for instance still provides the best and only reliable preventative for all forms of infectious venereal disease. Further it has aroused in the owner a realisation of the necessity for keeping accurate breeding records and for regular veterinary examination of his herd. The breeding history of the herd is essential for any thorough investigation of herd infertility.

In addition the complete records of every herd which are kept at the headquarters of the A.I. Co-operative Societies provide a mass of data enabling a detailed study to be made of many different aspects of fertility in both cows and bulls.

It is not proposed to duplicate the extensive research carried out in other countries on the general problems connected with artificial insemination, but the application of this method of breeding under South African conditions presents local difficulties which must be overcome in order to achieve still better results.

The success which has attended overseas efforts to preserve semen almost indefinitely by deep freezing is of particular interest to this country and opens up vast possibilities. It will for instance enable us to build up banks of semen from the best bulls, and then only to use the semen of the bulls that have proved themselves through their progeny. Calves will be obtained from these bulls years after they have died. Present transport difficulties will be overcome by the creation of semen depots in various parts of the country, and it is possible that one large central bull station will then be able to provide for all the needs of the country. The acquisition of new blood in the form of imported bulls may be replaced by importing the semen of such bulls instead. Importation of frozen semen is at present being done on an experimental basis, the Divisions of Veterinary Services, Animal Husbandry, and Agricultural Education and Research co-operating with the British authorities at Cambridge. These experiments will show to what extent the importation of frozen semen is feasible.

CONCLUSION

The above brief review gives some idea of the multitude and complexity of the problems that militate against high fecundity in animals in South Africa. Careful study of these shows that in only one of them, namely brucellosis, have we got a satisfactory method of diagnosis and control. The remainder and many others not mentioned provide a wide field for research not only for the sterility worker or every other class of veterinarian but also for practically every type of agricultural research worker.

A great void in the set-up of agricultural research in this country is the absence of a central co-ordinating body which can ensure that the fullest possible advantage is taken of every planned experiment. The result is that there is too great a tendency for research into agricultural problems to be done in watertight compartments. For instance a soil chemist doing fertilising experiments may also get results of great importance to the agronomist, the animal husbandryman and the veterinarian, but because there is no collaboration betwen these workers the full significance of such results is not appreciated or interpreted, and that information is thus lost to the country. Hence this plea for

greater co-operation between the different classes of agricultural research workers, especially in the study of problems that may affect fertility in animals.

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CHOLECYSTOSTOMY IN A DOG

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RESUME

(1) A case of obstructive jaundice due to a tumour of the ductus choledochus communis in a dog is reported.
(2) To obtain relief cholecysto-duodenostomy was done.
(3) The treatment of the patient with a severely damaged liver is given.

The subject of this report was a very valuable 9 months old Great Dane bitch.

Anamnesis:

She was presented for examination with a vague history of capricious appetite, and steady loss of weight over a period of a month.

Physical Examination:

Her habitus was nearly normal and her condition fairly good.

The temperature, respirations, pulse and heartbeat were normal. Abdominal palpation was negative. Very obvious icterus was present in all the visible mucous membranes as well as in the unpigmented skin. There was no indication of clinical anaemia.

Enquiry elicited that her urine was brownish yellow and that her stools were large, loose, fatty and grey i.e. the faeces showed the typical features of poor digestion, when bile does not have access to the bowel.

Diagnosis:

The absence of clinical anaemia and of bile pigment in the faeces proved the icterus to be hepatogenic even before a plasma van den Bergh test was done. The jaundice appeared to be obstructive rather than due to dysfunction of the parenchyma as in cirrhosis and hepatitis. When these conditions are severe enough to cause advanced jaundice, it is certain that marked deterioration takes place in the patient's condition in a short time. In these cases, too, bile does enter the bowel.

The obstruction could have been due to:

(1) Cholelithiasis.
(2) Cholangitis.
(3) Worms in the bileduct.
(4) Neoplasm in or pressing on the ductus choledochus communis or d. hepaticus.
(5) An abscess having the same effect as the neoplasm in (4).

(1) Cholelithiasis was tentatively excluded, because authorities deny its occurrence in the dog. (Schnelle quoted by Kirk and by Kirk (1939) himself). Even if it could conceivably be found in the dog the youth of the patient militated against it.

(2) Cholangitis was considered unlikely, because signs of a usually concomitant duodenitis were absent. It stands to reason duodenitis severe enough to lead to complete biliary obstruction for at least a month would have caused much severer symptoms.

(3) Worms were eliminated as a cause, because of the fairly long history.

(4) Neoplasia was regarded as possible, but improbable, because it very rarely occurs in this site especially in the young subject.

(5) A small abscess pressing on the duct was favoured as the cause, as infection in that region was, in the writer's experience, more often encountered than a tumour.

The possibility of cicatricial contraction of tissues in the region of the major bile passages was not seriously entertained. A lesion giving rise to such a cicatrix would have been severe and in existence for at least a few months before the present illness. At that time there was no suggestion of ill health in the patient.

Accordingly item (5) was advanced as the likely diagnosis with item (4) heading the list of differential diagnoses.

In an attempt to obtain further information Priodax (Schering) was employed as contrast medium for röntgenography of the biliary system. The technique employed was as advised by the manufacturers. The skiagraphs confirmed complete biliary obstruction. In the region of the common bile duct a density was detected, which could have been caused by a fibrous tumour or a thickwalled abscess.

With inflammatory changes in mind, the animal was put on to a course of penicillin injections, but no improvement resulted.

The advisability of exploratory laparotomy was then mentioned to the owner.

As he hailed from a country town, it was not possible to see the dog frequently. When next seen three months had elapsed and the animal was weak and emaciated. The client was then advised, that, even though immediate operation offered only a slender hope of recovery, delay would certainly prove fatal. The weight of the patient by then had decreased from 120 to 70 lbs.

The Operation:

Surgical anaesthesia was attained with only 9 ml. Nembutal Veterinary (Abbott) intravenously.

An incision was made from the xiphoid process two inches (5 cm.) along the linea alba, then at an angle of 45 degrees to the

right until the nipple line was reached, and continued for a further two inches (5 cm.) along this line. This gave maximum exposure.

The abdominal cavity was now explored. The abnormal findings were as follows: The liver was a bright golden colour, the gallbladder greatly enlarged and the hepatic duct had the remarkable diameter of about one inch (2.5 cm.). A small fibrotic tumour was found enclosing the distal end of the common bile duct, part of the duodenal wall, and abutting on to the pancreatic duct.

An attempt was made to deliver these structures through the wound for the radical removal of the tumour, portion of the duodenal wall and the affected parts of the ducts. The intention was to close the opening in the duodenal wall and implant the ducts lower down. Unfortunately the dog was too deep chested to get these organs even near to the surface and these attempts had to be abandoned.

To provide an outlet for the bile, the fundus of the gallbladder was then anastomosed to a loop of the duodenum. The technique employed was as described by Markowitz (1937) for the reverse Eck fistula. First of all a stay suture was passed through the fundus of the gallbladder and then through the free border of the duodenal loop. This was done at either end of the intended suture line. An assistant, by pulling on the stay sutures, approximated the walls, which were joined by carefully placed continuous catgut sutures on an atraumatic needle. A cutting suture of silk on a straight roundbodied needle was then passed into the gallbladder close to one end of the suture line, the needle directed parallel with it and made to emerge just short of the other end. Here it entered the duodenum and was passed in a reverse direction to emerge opposite the place where it entered the gallbladder. Both ends of the cutting suture were then drawn taut and held by artery forceps. The continuous suture line was now continued on the other side of the cutting suture until it was completely encased, leaving only a very small opening from which the double cutting suture emerged. This was then gently sawn to and fro, cutting through the walls of the gallbladder and duodenum. The continuous suture was then tied and the stay sutures removed. The patency of the stomum was tested and found to be about threequarters of an inch (2 cm.).

Recovery from anaesthesia was uneventful despite the great damage to the liver. On being promised by the owner that he would follow directions to the letter, the case was not hospitalized, but allowed to be taken home while still drowsy.

Subsequent to the operation every stool contained bile, which was self evident. The gradual disappearance of the icterus and the colour of the faeces indicated patency of the anastomosis.

The convalescence was very stormy. The first few days her progress was very gradual. There was some appetite. Her diet

consisted of maizena and mealiemeal porridge, rice, glucose and sugar, i.e. it was high in carbohydrate and low in fat. When she showed some interest in white chicken meat, this was given to her. Soon after, but probably coincidentally, she suffered a complete mental aberration, failing to recognise anybody, and chewing at anything that came in her way, including a metal waste paper receptacle. All the while her breathing was heaving and deep. She then gradually sank into a coma. At this stage it was noticed, that the muscle wound had parted and the skin sutures were giving way.

On being urgently summoned, the author was able to resuture the muscles and skin under local anaesthesia using only a minimum of the local anaesthetic (planocaine 1 per cent). To indicate the violence of the excursions of the chest wall during the deep respirations, the catgut (No. 2) had not torn through the tissues at all, but was broken in several places.

After this episode the owner was reluctant to offer any protein food at all. The first meat was only given weeks afterwards. Her food was given by teaspoon.

A very gradual improvement took place until the patient was ambulatory again. Nearly a week after the first attack she had a similar one starting with restlessness that increased, accompanied by gradual loss in intelligence, until she appeared completely demented.

She passed through another similar, but less severe phase before eventual recovery. After the last attack she showed a keen appetite and began to gain weight rapidly.

Medicinal treatment:

At the outset yeast tablets as well as vitamin B complex capsules were prescribed in high doses.

When the wound breakdown occurred, the patient was given penicillin for 4 days (300,000 I. U. in oil and wax intramuscularly daily).

By the time the dog had the second attack of dementia the author had succeeded with some difficulty in getting Methionine (Abbott) to aid in the restoration of liver function. The dose was two grams t.d.s.

On this occasion the dog was at her worst since the operation. 2ml. Bejectal (Abbott) (i.e. B complex and crude liver extract) was injected subcutaneously. Within half an hour a remarkable transformation was witnessed. The aimless wandering ceased, the lack lustre eyes began to sparkle, and the vacant look was replaced by dawning recognition of people and objects. Very soon her tail started wagging in greeting and she asked for food.

Henceforth oral vitamin therapy was supplemented daily by injections of Bejectal and pure thiamin hydrochloride.

Subsequent developments:

The animal regained the energy, appetite and weight she had before her illness, although during the first few months she occasionally showed signs of epigastric discomfort.

At the first oestrus she was mated and in due course gave birth to a litter of near full term puppies (at approximately 54 days). They actually appeared more immature than would have been expected. Only one survived.

Fearing eventual metastatic cancer, the owner was advised to breed her again at the next oestrus. This time she carried 59 days, but still the puppies appeared to be underdeveloped and weak, and only a few survived.

Two years after the operation, on a routine check-up, some unevenness could be palpated on the liver. Some time later there was an enlargement of the right femoral lymph node. It was removed for pathological examination, the result of which was: "Granuloma. No indication of aetiology".

This diagnosis came as a surprise. The most likely aetiology was then considered to be fungus infection e.g. blastomycosis. Accordingly streptomycin-aureomycin therapy was used, but no benefit ensued.

At the same time the **caput medusae** (i.e. the thick tortuous veins resembling the coiled snakes that Medusa was supposed to have had instead of hair) became apparent on the ventral abdominal wall — the ominous sign of portal obstruction.

Deterioration in the patient now proceeded rapidly until euthanasia was performed.

Post mortem examination:

This showed extensive intra-abdominal metastases of a tumour, which appeared to be a scirrhous carcinoma macroscopically. The liver parenchyma was not invaded, but the bile ducts and the gallbladder were extensively affected, as were the portal vein, omentum, etc.

Discussion:

The attention of the reader is directed to the employment of the cutting suture as described by Markowitz (1937). It is suggested that this method could be used more frequently with advantage (as in aseptic entorrhaphy) despite the scant attention it receives in veterinary literature.

With regard to the episodes of disorientation, it is interesting to note the clinical resemblance to Senecio poisoning in horses. The reason why periods of somnolence and meaningless movements alternate with those of violence in certain liver states still awaits elucidation. The remarkable response in this case to injection of a vitamin B complex preparation can hardly be regarded as a coincidence.

It is known that the liver catabolizes the oestrogens and progesterone, although knowledge in this regard is still very incomplete. It is impossible to be sure whether a liver unable to fulfil its functions in this respect can be held responsible for a poor breeding record as in the present case.

In man one of the sequelae of cholecystostomy is cholangitis due to ascending infection from the bowel. It is suggested, that some infection of the bile ducts occurred in the dog as indicated by periods of epigastric discomfort at intervals after operation, and that eventually a resistance to infection was built up by the mucous membrane of the gallbladder and the ducts. Serious cholangitis never took place. This was due to the fact that in this dog postural drainage was excellent — much better than in man — and, whenever chyle was forced into the gallbladder, it was discharged quickly again through the stomum, which was made wide for this reason. A narrow stomum would have been much more likely to convert the biliary system into a reservoir for chyle. This is easily explained and is in accordance with the experience in man.

Conclusions:

(1) Cholecystostomy is a feasible operation in the dog and is without serious sequelae.

(2) The clinical recovery of a liver severely impaired by prolonged, complete biliary stasis may be ascribed to:

(a) A high carbohydrate, low fat diet,

(b) Methionine in sufficient amount,

(c) The administration of vitamins, particularly of the B complex in high dosage.

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STUDIES ON THE EFFECTS OF REPEATED BLOOD REPLACEMENT WITH DEXTRAN AND PLASMOSAN IN DOGS

R. CLARK, W. D. MALHERBE and K. E. WEISS
Onderstepoort

INTRODUCTION

The use of solutions of certain molecular grades of dextran and polyvinylpyrrolidone as plasma substitutes has become standard practice in human medicine in recent years. Although some experimental work on dogs with preparations of both these substances has been reported, it was decided to investigate further. Whilst it is possible that qualitatively similar findings may be obtained with all forms in which these macromolecular substances have been prepared, our conclusions are confined to the particular solutions we have used.

It may also be emphasised that this study is entirely confined to the dog. Although it might be expected that such apparently inert protein free solutions would have very similar effects in all species of mammals, this is not the case. Preparations of both dextran and polyvinylpyrrolidone are apparently entirely suitable for use of humans, yet certain types of dextran cause oedema in rats [Morrison, Bloom and Richardson (1951), Edlund, Löfgren and Väli (1952) and others] while the dog would appear to be peculiar in that polyvinylpyrrolidone causes vasocollapse in this species. This fact is mentioned in May and Baker's booklet on "Plasmosan" and is confirmed in the present investigation.

On the other hand dextran would appear to cause no undesirable reactions in the dog. Ingleman (1949) reported, "one dog has now been given about 100 infusions (150 to 200 ml. per infusion) for the past four years without injurious effects". Marshall, Hanna, Specht and Neal (1952) injected dogs with up to 20 ml. of a dextran solution three times weekly for 13 weeks and found no ill effects except a rise in red cell sedimentation rate.

The preparations used in the experiments to be described were:—

Dextran Saline Intravenous — "Intradex",
African Dextran (Pty.), Ltd.,
Polyvinylpyrrolidone — "Plasmosan",
May and Baker.

METHOD

Six mongrel dogs weighing between 8 and 9 kilos were used. They were dewormed and immunised against distemper beforehand and fed throughout on a standard ration consisting mainly of maize meal porridge and meat.

The dogs were bled at weekly intervals, 120 ml. being withdrawn on each occasion. Two of the dogs (controls) received no further treatment; in two the blood was replaced by an equal volume of plasmosan, while in the last two dextran was used. The infusions were given by gravity into the radial vein.

Blood samples were taken prior to each treatment and on the first, third, fifth and sixth day after each treatment. The following determinations were made:—

(i) Red cell count;
(ii) percentage red cell volume;
(iii) haemoglobin;
(iv) red cell sedimentation rate;
(v) plasma Van den Bergh test;
(vi) non-protein nitrogen.

In addition liver function was tested by the bromsulphalein retention test (% retention after 30 minutes) once every week.

RESULTS

i. Immediate Effects:

The dogs which were merely bled and those that received dextran showed no immediate ill effects.

The infusion with plasmosan, on the first occasion, caused alarming symptoms of shock which started after only some 30 to 40 ml. had been administered. (The total of 120 ml. was given over 10 to 15 minutes). The symptoms exhibited were: Salivation and lachrymation, defaecation and urination, a weak and rapid pulse and general collapse. Recovery took from one to two hours.

Although the severity of the reaction decreased with each subsequent infusion, an accelerated pulse was still observed even at the sixth treatment.

ii. Liver and Kidney Function:

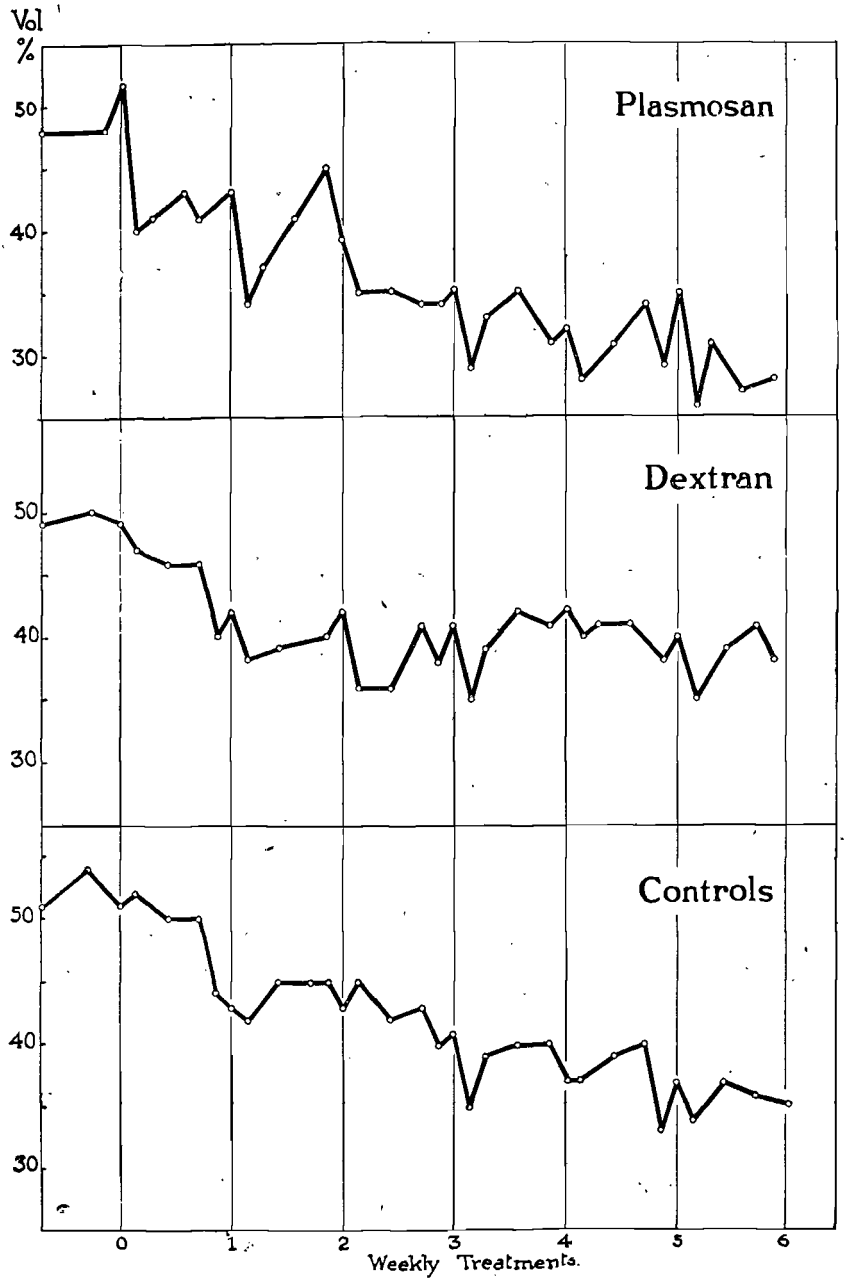
There was no evidence of any interference in either liver or kidney function in any of the dogs as judged by the bromsulphalein test and the non-protein-nitrogen level of the blood respectively.

The animals were retained for several weeks after the experiment and all remained outwardly healthy.

iii. The Blood:

The effects of the treatments on the red cell counts, red cell volume and haemoglobin are shown in Table 1. Graph No. 1 shows the average percentage red cell volume for the two dogs in each group.

GRAPH 1.



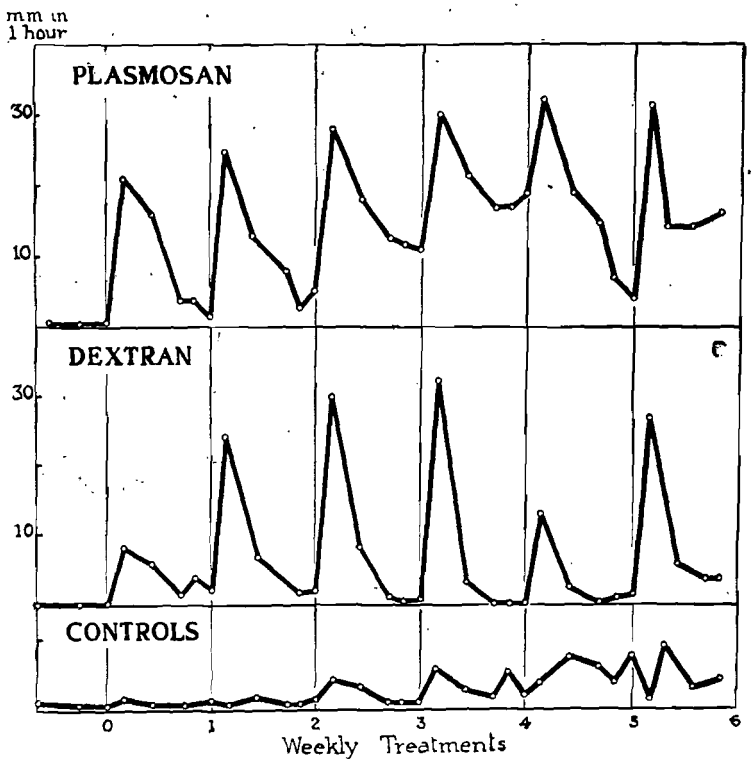
The Percentage Red Cell Volume.

TABLE I.

Group		Before		After	
		Dog 1	Dog 2	Dog 1	Dog 2
Controls	R.C.C.	8.2	8.1	4.4	6.2
	R.C.V.	54	50	31	40
	Hb	17.9	17.1	9.3	11.9
Dextran	R.C.C.	7.4	7.6	5.2	5.4
	R.C.V.	48	50	36	40
	Hb	16.4	16.7	11.0	11.5
Plasmosan	R.C.C.	7.1	7.4	4.4	4.2
	R.C.V.	48	51	32	32
	Hb	15.6	16.1	8.9	8.9

Before = Average of three readings during the five days before the experiment started.
After = Average of three readings during the five days after the sixth treatment.
R.C.C. = Red cell count.
R.C.V. = Red cell volume %.
Hb = Haemoglobin gm/100 ml.

GRAPH 2.



Red Cell Sedimentation Rate.

Although no conclusions can be drawn as to any possible effect the plasma substitutes may have had on red cell regeneration, these figures are of interest in that they indicate the reaction of normal dogs to repeated blood loss.

Red Cell Sedimentation Rate.

As will be seen from graph 2 the infusion of both plasmosan and dextran caused a marked rise in sedimentation rate when tested 24 hours later. In the case of dextran the return to normal took place in about five days, but with plasmosan recovery was slower, leading to a cumulative effect. As the increased sedimentation rate is presumed to continue so long as the plasma substitutes are present in the circulation, this would indicate that plasmosan is eliminated more slowly than dextran.

THE NATURE OF PLASMOSAN SHOCK IN DOGS

In view of the similarity of the symptoms shown by the dogs when injected with plasmosan to those of anaphylactic shock, the protective action of antihistamines was investigated. Three normal dogs, each weighing 8 to 9 kilos, were injected intramuscularly with 2 ml. of a 5% "Phenergan" (May and Baker) solution 20 minutes prior to the infusion of plasmosan. Under these circumstances the plasmosan caused no visible reaction.

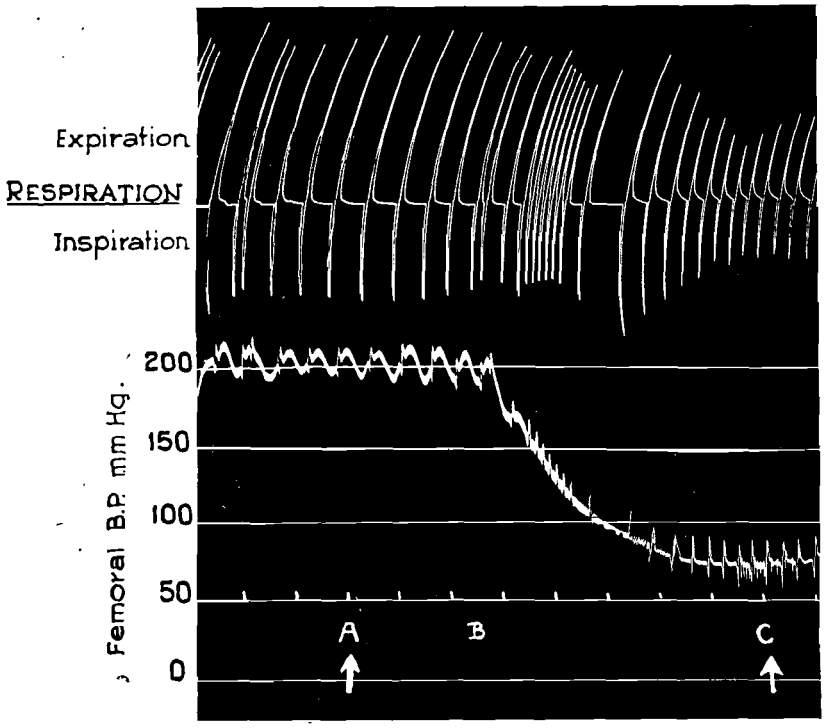
The injection of antihistaminics after the onset of the shock did not result in any detectable alleviation of the symptoms or hastening of recovery.

A further series of experiments was then undertaken. Dogs were anaesthetised with pentobarbital sodium and the femoral arterial pressure recorded by direct canulisation to a recording mercury manometer. In some cases the respiration was also recorded by means of a T canula inserted into the trachea and connected to a membrane tambour.

As will be seen in Tracing No. 1, the intravenous infusion of plasmosan caused a collapse in arterial blood pressure after some 40 to 50 ml. had been administered. A new low level was attained and further administration did not cause any further drop. The reaction is, therefore, very similar to that seen with autonomic ganglion blocking agents such as hexamethonium. The blood pressure remained low for 30 to 40 minutes and then gradually recovered to reach the normal level in an hour to an hour and a half. The duration of the hypotension, therefore, coincided with that of the clinical symptoms. During these experiments it was found that methylamphetamine at a dosage of 2 mg. per Kilo caused a prompt rise in blood pressure.

In a subsequent experiment the reactions of the dog to bilateral carotid occlusion and to adrenaline were recorded prior to and after the infusion of plasmosan. As will be seen from Tracing No. 2 the normal pressor response to both these stimuli was inhibited after plasmosan infusion.

TRACING NO. 1.



The Effect of Plasmosan on the Femoral Blood Pressure and Respiration of the Dog.

Time: 30 seconds.

A to C: Infusion of 100 ml. Plasmosan.

B: Drop in blood pressure after infusion of 40 ml.

This experiment was later repeated on another subject but the plasmosan was replaced by a dilute solution of histamine acid phosphate. As shown in Tracing No. 3 a very similar effect was obtained. The carotid sinus reflex was again abolished and the response to adrenaline was retarded.

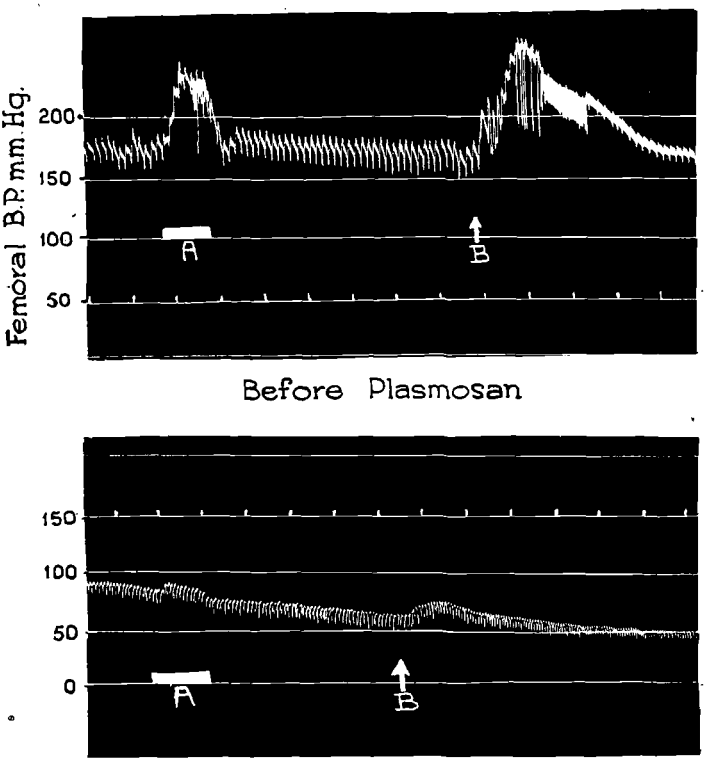
Blood pressure recordings made during plasmosan infusions in dogs which had previously received antihistaminics showed a very much less severe drop in blood pressure.

These results are a further indication that plasmosan shock in dogs is due to the release of histamine or a histamine-like substance.

Similar experiments with dextran showed only a slight rise in blood pressure.

TRACING NO. 2.

THE EFFECT OF PLASMOSAN INFUSION ON THE BLOOD PRESSURE OF THE DOG (45 LBS.)



Before Plasmosan

Time 30 secs.
After 65 c.c Plasmosan

A: Bilateral carotid occlusion. B: 0·025 c.c 1/1000 Adrenalin.

Note: Drop in Blood Pressure and abolition of response after Plasmosan.

SUMMARY

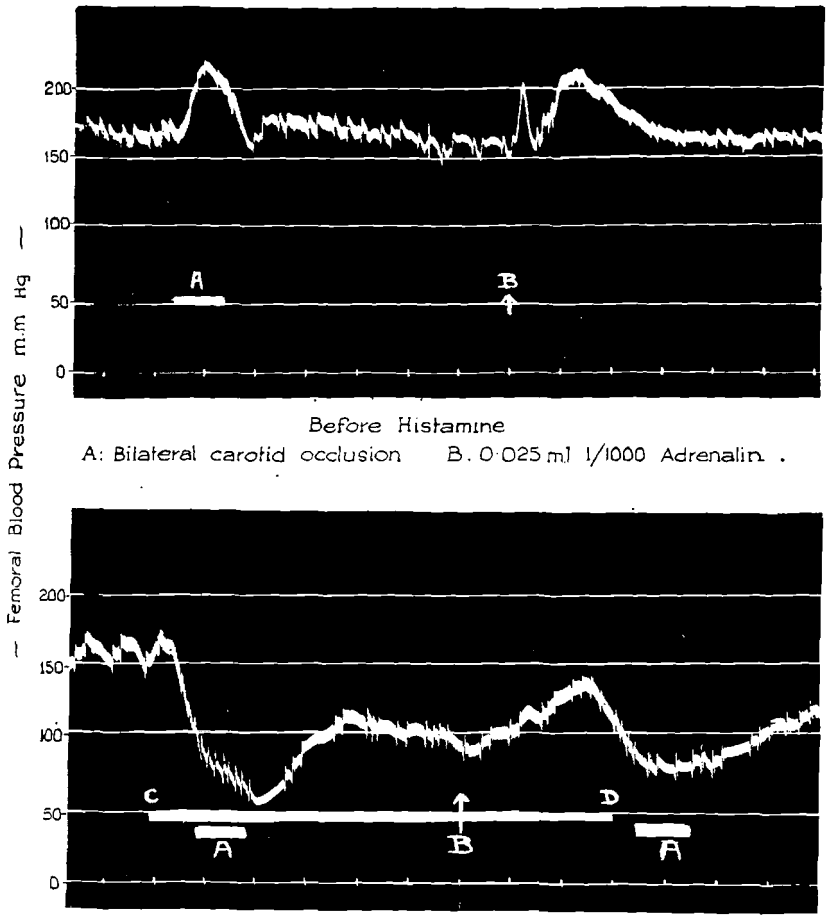
1. Six normal experimental dogs were bled weekly for six consecutive weeks. Two received no further treatment, in two the blood was replaced by dextran and in two by plasmosan.

2. The synthetic plasma substitutes had no effect on liver or kidney function as tested by the bromsulphalein retention test and the non-protein-nitrogen level of the blood respectively.

3. On the first occasion the infusion of plasmosan caused

TRACING NO. 3.

THE EFFECT OF HISTAMINE ACID PHOSPHATE ON THE FEMORAL BLOOD PRESSURE OF THE DOG (43 LBS.)



C to D : Slow Injection of 2 mg. Histamine Acid Phosphate.
A and A : Bilateral carotid occlusion. Note absence of response.
B. : 0·025 m.l. 1/1000 Adrenalin.

---

symptoms of acute shock. The severity of the reaction decreased with subsequent infusions. Dextran caused no visible reaction.

4. Blood pressure recordings from anaesthetised dogs showed that plasmosan caused a marked drop in arterial pressure together with inhibition of the carotid sinus pressor reflex and the normal response to adrenaline injection.

5. Similar effects were obtained by the slow intravenous

infusion of histamine acid phosphate. Furthermore the symptoms of shock and the collapse of blood pressure caused by the plasmosan could be prevented by the prior administration of antihistaminics. These results indicate that plasmosan shock in dogs is due to the release of histamine or a histamine-like substance.

6. Both plasmosan and dextran caused a temporary increase in the red cell precipitation rate. This effect was of longer duration with plasmosan than with dextran.

ACKNOWLEDGEMENTS

The authors wish to thank the Director of Veterinary Services for the generous facilities provided and the firms of Maybaker (S.A.) Ltd., and African Dextran (Pty.), Ltd., for the complimentary supply of the plasma substitutes.

They also wish to thank Messrs. W. H. Haupt and B. H. J. Smit of the Section of Medicine for the blood determinations.

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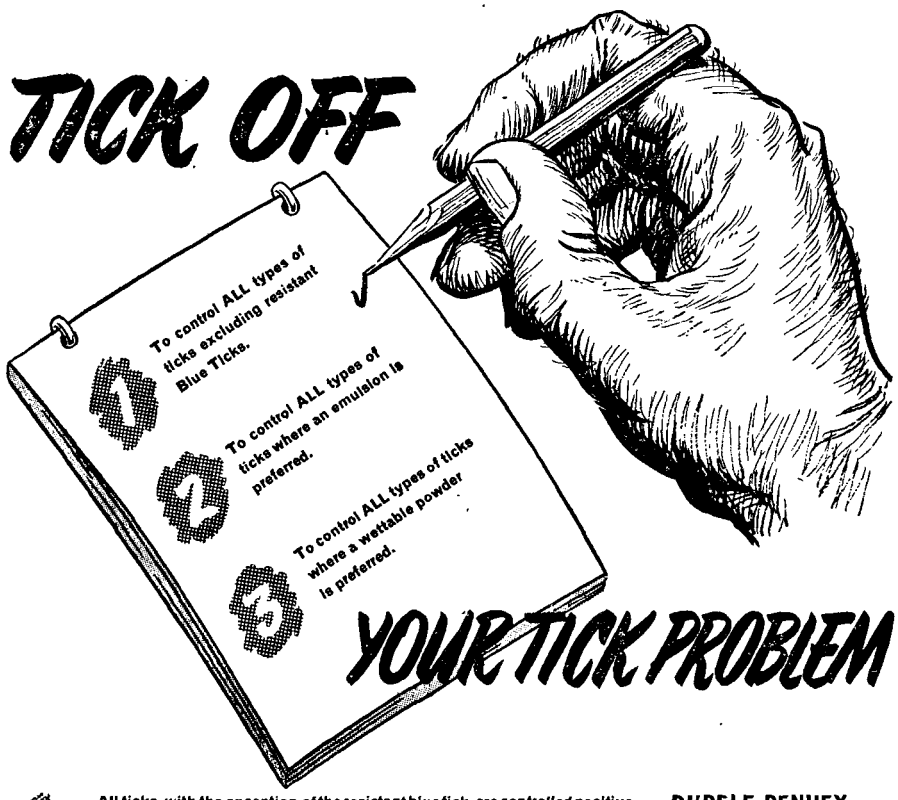
TICK OFF



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A FEW CASES OF TUBERCULOSIS

E. M. ROBINSON
Onderstepoort

SUMMARY

A few cases of tuberculosis in domesticated animals and antelopes are described. In each one the causal organism was typed.

* * * * *

The purpose of this article is to record the typing of a few strains of M. tuberculosis isolated from cases of the disease from various sources. They include strains from a cat, springbok and from cattle under ranching conditions.

Cat Strain:

In November, 1951, a private veterinarian sent in a specimen of the liver of a cat. From inspection of the lesions in the organ tuberculosis was suspected as it had a yellowish red mottled appearance both externally and on section. Acid fast bacilli were found in scrapings from the cut surface of the liver and guineapigs were inoculated with the material. These developed typical lesions of tuberculosis and pure cultures of M. tuberculosis were obtained from them on Dorset's egg without the addition of glycerine. After three subcultivations on this medium, guineapigs and rabbits were inoculated with the standard doses of the organism, 1 mg. subcutaneously for guineapigs and .01 mg. intravenously for rabbits. Lesions of generalized tuberculosis developed in both lots in six weeks. Cultures on glycerinated media did not show a better growth than on unglycerinated. The growth was rather scanty and had a rather moist and glistening appearance. The organism was considered to be of the bovine type.

It may be of interest to mention that several strains of M. tuberculosis have been isolated from dogs at Onderstepoort from specimens sent in by private practitioners but all have so far been of the human type.

Strain from a Springbok:

In November 1951 a springbok at the Pretoria Zoological Gardens, which had given a positive reaction to the tuberculin test, was killed and at post mortem, extensive lesions of tuberculosis were found in the lungs. Acid fast bacilli were very frequent in smears from the lung lesions. Guineapigs were inoculated from the material and cultures were made on Dorset's egg without

glycerine. Pure cultures of M. tuberculosis were obtained and the guineapigs developed extensive generalized tuberculosis in six weeks. Another springbok which had been in contact with the first case, died shortly after it and at post mortem, showed very extensive lesions of tuberculosis in the lungs. The pus in the lesions was of a soft creamy type. Again acid fast bacilli were very frequent. A pure culture of M. tuberculosis was obtained from the animal.

After several subcultures the organism from the first case was inoculated into guineapigs and rabbits in the standard doses. One of the two rabbits used died after 39 days. At post mortem it showed lesions in the lungs only, not of a very extensive type. Acid fast bacilli were present in the lesions. It is possible that this rabbit did not actually die of tuberculosis. The second rabbit died after 42 days and showed extensive generalized tuberculosis most marked in the lungs. Both guineapigs were killed after six weeks and showed extensive generalized tuberculosis. The growth of the organism on glycerinated media was not improved. The cultures were considered to be of the bovine type.

Strains from Cattle under ranching conditions.

In recent years tuberculosis has been diagnosed several times in cattle under ranching conditions. About two years ago material was received from cases on a very big ranch, the name of which cannot be divulged for reasons of publicity. The disease is quite extensive on this ranch but produces very few cases which could be diagnosed clinically. It is usually only found at post mortem and the lesions are mainly confined to the lymphatic glands of the head region or sometimes some of the mesenteric glands are involved.

Cultures made from lesions in guineapigs from material from some of these cases, on Dorset's egg medium without glycerine showed a growth corresponding to that of the bovine type and the addition of glycerine to the medium did not improve it.

Two rabbits and two guineapigs were inoculated with the standard doses of the organism after several subcultivations. The guineapigs showed advanced generalized tuberculosis at six weeks and both rabbits showed well developed lesions in the lungs and kidneys. The organism was considered to be of the bovine type. There did not appear to be any evidence of attenuation of the strain which had about the usual virulence of a bovine strain.

Strains from Tanganyika:

Tuberculosis in cattle in the Southern provinces of Tanganyika has been found on investigation to be widespread and has been the subject of a report by Mr. A. E. G. Markham. (Report of a tuberculosis survey of the Southern Highland Province of Tanganyika 1949 to 1951, unpublished.) By the courtesy of Mr. Markham,

several strains isolated by him from cattle were sent to Onderstepoort. These were all culturally of the bovine type. One strain (Markham X) was used for inoculation into guineapigs and rabbits for the purpose of typing.

One rabbit died on the 40th day showing very extensive lesions in the lungs but none in the other organs. The other rabbit died on the 43rd day, showing extensive lesions of tuberculosis in the lungs, liver, spleen and kidneys. Acid fast bacilli were very frequent in smears from the lung lesions. Both guineapigs showed very extensive generalized tuberculosis when killed at six weeks. From the biological test one would judge that the strain was in no way attenuated, in fact its virulence was rather higher than usual.

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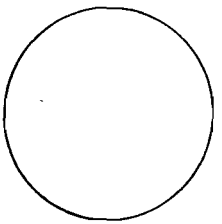

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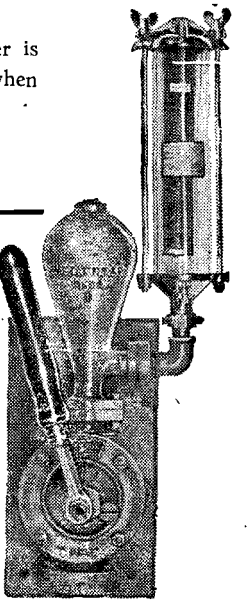

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INCIDENTAL OCCURRENCE OF INFUSORIA IN THE LUNGS OF A SUSPECTED CASE OF ENTEROTOXAEMIA

K. C. A. SCHULZ and W. J. RYKSEN
Onderstepoort Bethlehem

SUMMARY

Various protozoal organisms occurring in the alveoli and bronchioles of a karakul ram are described for the first time. The animal in question showed symptoms and pathological lesions suggestive of enterotoxaemia. Thus it may be assumed that this disease possibly occurred in South West Africa a considerable time prior to its diagnosis in the Union of South Africa. From the data at our disposal, it can be definitely concluded that the death of the ram was not attributable to the presence of the infusoria in the lungs. They were presumably displaced protozoal flora of the rumen. The possible ways of their entry into the lungs have been briefly discussed. There is evidence indicating that enterotoxaemia was the most likely cause of the death of the ram. Other diseases, from a differential diagnostic point of view, have also been mentioned.

DESCRIPTION OF CASE

During February, 1945, specimens of lung in formalin, and lung and kidney smears were forwarded by one of us (W.R.), then Government Veterinary Officer at Windhoek, of a karakul ram suspected to have died of a rickettsiosis (*R. ovina*) as previously described by Schulz (1939).

The animal, aged 15 months, was purchased in the Usakos district and had been transported by rail in a crate with a floor space 5 ft. by 4 ft., to Windhoek. On delivery the animal appeared listless, stood with arched back, but had a good feed. It died, however, overnight, two days after its arrival. The pathological anatomical changes were suggestive of heartwater, a disease unknown in South West Africa. A marked hydropericardium containing a large gelatinous clot, hyperaemia and oedema of the lungs and in addition small greyish foci, reddened and oedematous parapharyngeal lymph glands, a small amount of turbid urine in the bladder, enlargement and venous stasis of the liver, no subepicardial or subendocardial haemorrhages, atony of the forestomachs and pronounced autolysis of the kidneys were the main features seen at autopsy. No abnormalities could be observed in the arteriae renales and posterior aorta.

The ruminal contents consisted of a mixture of oats and lucerne. The colon and caecum contained no faeces; probably the animal

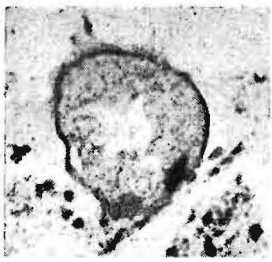

Fig. 1.

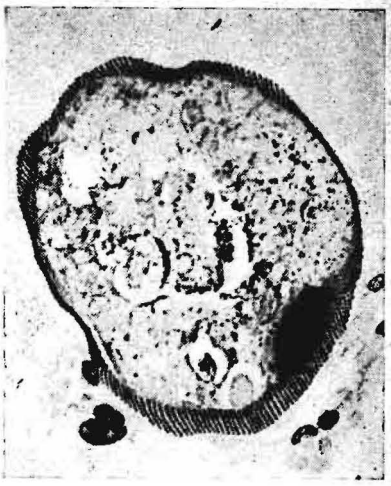

Fig. 1a.

Fig. 2.

Fig. 2a.

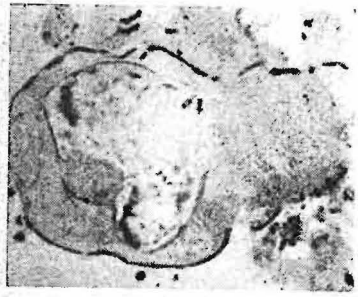

Fig. 3.

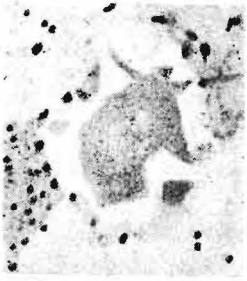

Fig. 4.

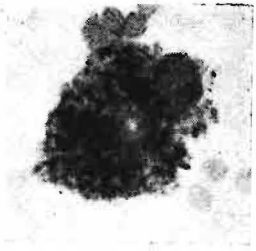

Fig. 5.

Fig. 6.

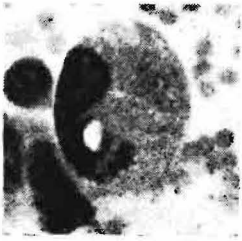

Fig. 7.

Fig. 8.

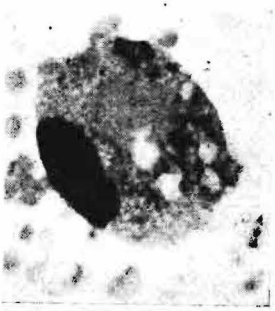

Fig. 9.

scoured prior to death. The vest pocket test for prussic acid, carried out immediately after opening the carcase, proved to be negative.

Since the interim did not last longer than eight hours and the other internal organs were very slightly autolysed, the state of the kidneys was not ascribed to post mortem changes. This conclusion is now known to be fallacious, since marked softening of the kidneys consistently occurs, shortly after death, in sheep which were suffering from enterotoxaemia or "pulpy" kidney disease, Bosworth (1943) and Schulz and McIntyre (1948).

Histologically the following changes were observed: Hyperaemia and oedema of the meninges and of the brain substance (*Rickettsiae ruminantium absent,*) venous stasis and cloudy swelling of the liver, slight lymphadenitis, advanced signs of autolysis, petechiae in and nephrosis of the kidneys. On examination the kidney smears proved negative. In addition to hyperaemia and oedema of the lungs, a fair number of alveoli and a few bronchioles enclosed an obscure, unicellular organism, the size of which varied considerably, the length being from 24 to 100μ and the breadth from 12 to 81μ. The average length and breadth was 70μ and 55μ respectively. The relation of length to breadth was 1.3. Possibly these structures represent either different stages of development of or portions of various species of a protozoal organism. Some of these appeared to be enclosed by a striated cuticle (figs. 1 and 1a) and others showed cilia, cirri and spines of variable lengths (figs. 2 and 2a), and others were busy disintegrating (fig. 3). As some structures, by casual examination, could be mistaken for a metazoan parasite, possibly a mite (fig. 4), serial sections were cut to either confirm or refute this supposition. Subsequently it was decided that the appendages were spines belonging to a protozoan. Attempts to obtain parasites by teasing out the remaining fixed tissue were unsuccessful. The only specimen found was lost during the process of mounting. The difficulty of obtaining and demonstrating such structures under these circumstances will be appreciated.

In the immediate vicinity of the infected alveoli and bronchioli there were changes of a low grade chronic irritation manifested by bronchiolar catarrh (proliferation and desquamation of epithelial cells) and slight chronic peribronchitis and perivascular cell infiltrations, the latter consisting chiefly of lymphocytes and some eosinophiles.

On re-examining the lung smears the granules, seen in a number of lymphocytes (monocytes), resembled those occurring in smears made from oedematous lungs and pneumonic areas. They had been previously mistaken for rickettsiae as described by Canham (1943) on a former occasion. Possibly they represent phagocytized material (fig. 5). There were also numerous granules present in the cytoplasm of several cylinder epithelial cells. In addition, a unicellular organism, more or less ovoid in shape and with a variable length of from 30.5 to 84.6μ and width of from 27 to 72μ, was found, simulating one of those seen in the lung sections. The average length was 54μ and the breadth 41μ.

The relation of length to breadth was 1.8. There was a round or elliptical dark staining nucleus. The bluish tinted cytoplasm was dense in the smaller forms but became vacuolated, to a variable extent, in the larger ones. It contained round magenta staining granules and phagocytized elongated particles. In some of the larger specimens an oral and ventral opening were indicated (figs. 6-9) and in others a distinct, indented outer cuticula and an elongated more or less dumbbell-shaped nucleus were noted. Presumably this organism was in the act of binary fission.

As the organisms could not be determined with certainty, no definite views can be expressed on their life cycles at present. It would appear, however, that they multiply by binary fissure and resemble, in some respects, specimens of protozoal flora occurring naturally in the rumen of sheep and cattle, as described by Braune (1914) and Dogiel (1927). They belong to *Ophryoscolecidae.* According to the latter author these infusoria usually propagate asexually, that is by division, for several generations. Thereafter they conjugate and by this sexual procedure they attain the ability to multiply asexually again for a definite period. No sexual forms could be demonstrated in the smears and sections. How these organisms invaded the lung tissue will remain a mystery, but presumably either by means of the blood stream or the upper respiratory tract. An organism, penetrating the gut mucosa, may exceptionally find its way via the blood stream to the lungs as indicated by Ruge *et al.* in a single case of *Balantidium enteritis* infection. On considering the second port of entry, the upper respiratory tract, it is significant that the presence of aspirated ruminal content was not recorded at autopsy and that no foreign particles could be demonstrated in the lung sections, although they were carefully examined. Thus it may be postulated that the infusoria probably entered the air passages freely from the pharynx during the act of rumination and not with aspirated, regurgitated ruminal content either during agony or some time prior to death. The absence of an aspiration pneumonia supports this latter view.

It is of interest that the protozoa both in the lung smears and sections belonged seemingly predominantly to the genus *Entodinium* and to a lesser extent to other genera. This finding is in accordance with the observations of Van der Wath and Myburgh (1941) who recorded that the genus *Entodinium,* commonly seen in sheep, forms about 95 per cent of the total infusorial population in the rumen of animals kept on diets rich in protein and carbohydrates.

No matter what the case may have been, it became apparent that the protozoa may remain alive in the lungs for relatively long periods even after the death of the animal. The slight chronic bronchial catarrh and cell infiltrations previously mentioned were indicative of an irritation, possibly caused by the moving organisms prior to the death of the ram. The temperature of the lung (37°C) and its gaseous (CO_2) and moisture contents presumably formed very suitable conditions for the motility and longevity of the infusoria. Their

survival there, however, could not be expected to exceed that recorded by Kane (1951) under optimum experimental conditions, that is a period not longer than from five to nine days.

One can only speculate as to the cause of death of the ram, but the following conditions could definitely be excluded: Rickettsiosis (both *R. ruminantium* and *R. ovina*), prussic acid poisoning and any form of verminosis. As in the case of *Rickettsiae ovina* described by Schulz contributory factors, associated with nutritional disturbances, must be considered, the most likely one being enterotoxaemia. In this respect it is noteworthy to record that the contents of the urinary bladder of the ram gave a strongly positive reaction for glucose, a finding corresponding to glucosuria in "pulpy" kidney disease and enterotoxaemia of lambs demonstrated in Great Britain by Bosworth (1943) and later in South Africa by Schulz and McIntyre (1948). This observation may be regarded as confirmatory evidence of the above supposition.

Of interest is that mortalities and ill-health among rams during and following protracted railway journeys have been known to occur for many years in Australia. Mortalities of up to 100 per cent have been mentioned and losses up to 20 per cent are not uncommon. Clinically the disease is characterized by similar symptoms as those in the former described cases and enterotoxaemia. Franklin *et al.* (1944) are of the opinion that several aetiological factors may predispose to the condition, for instance, primary or secondary effects of starvation may accentuate the malady when animals had been kept on a diet low in roughage. The trouble may be prevented by educating the rams to trough-feeding some time prior to their intended transit by rail, and not allowing them a liberal food supply, linseed meal for example, at their journey's end.

Hypocalcaemia associated with hypoglycaemia or so-called transit tetany must also be considered. A number of such cases were seen in sheep at the Pretoria Railway station in a flock en route from the Free State to Eerste Fabrieke a few years ago by De Wet and Schulz (1950). The striking feature which differentiated this condition from "domsiekte" was the absence of acetone in the breath, blood and urine of affected sheep.

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PNEUMONYSSUS CANINUM, THE FRONTAL SINUS AND NASAL MITE OF DOGS.

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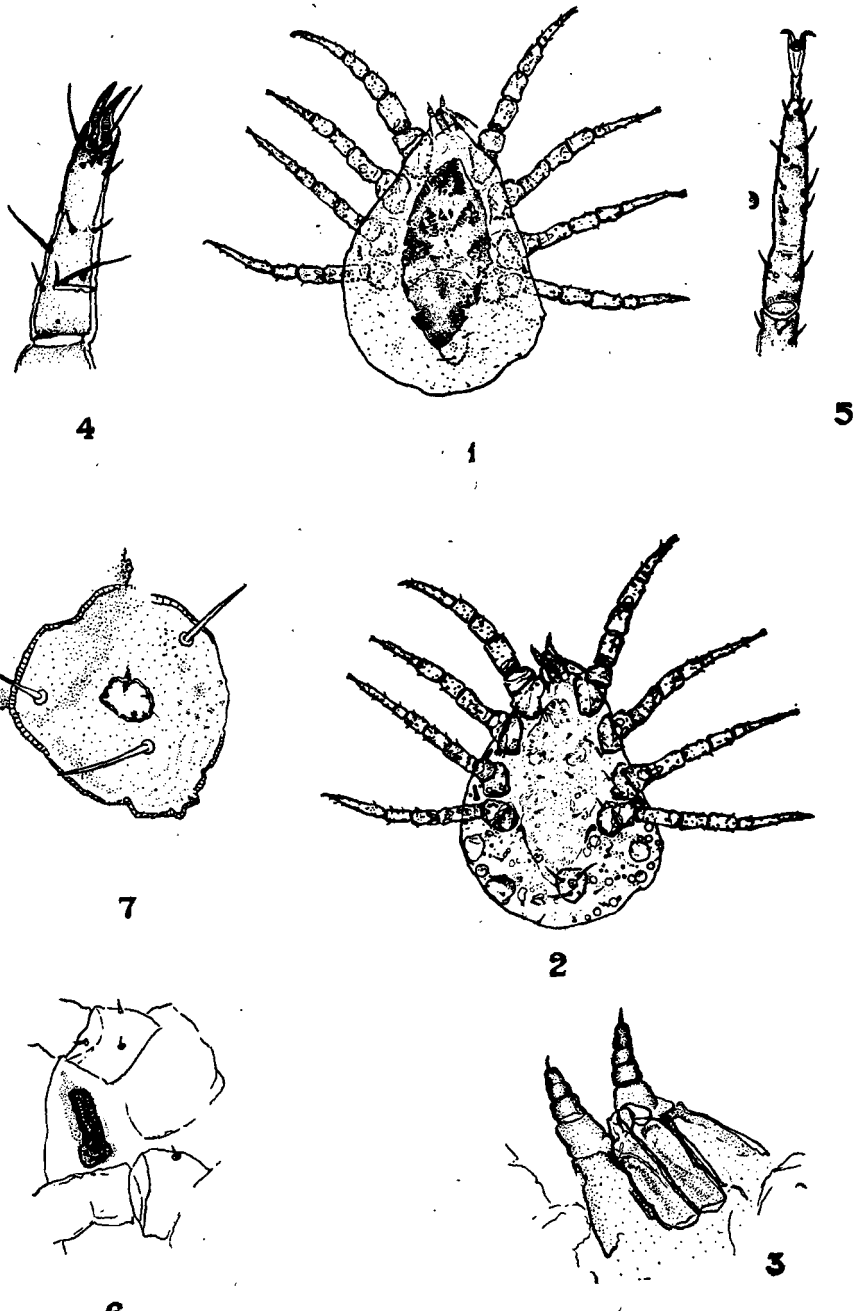
Onderstepoort Pretoria

In 1940 *Chandler and Ruhe* reported and described the mite *Pneumonyssus caninum* for the first time in the frontal sinuses and nasal passages of a male Boston Bulldog in Michigan. Since then other cases have appeared in the literature. Its occurrence has been reported from New York by *Monlux* (1940), from Pennsylvania by *Martin and Deubler* (1943), from Texas by *Monlux and Turk* (1951) and *Monlux* (1951), from California by *Douglas* (1951), from Hawaii by *Cross* (1953) and from Ohio by *Koutz, Chamberlain* and *Cole* (1953). It would appear, therefore, that the mites are more widely distributed and common than indicated by these reports. Possibly they are not frequently found because of their location within the host. The breed, sex and age of the dog do not seem to be contributory factors. The following breeds, Coon Hound, Cocker Spaniel, English Setter, German Shepherd, Great Dane, crossbred Terrier, Pointer, Airedale, Labrador Retriever, Collie and Greyhound are represented in these series. The age varied from two to ten years and older, and both sexes were affected.

No specific disease could be attributed to the presence of these mites since the necropsy diagnosis included such diverse conditions as canine Bright's disease, bilateral hydrocephalus involving the lateral ventricles and a non-suppurative encephalitis, a tumour in the right olfactory lobe of the brain, a foul discharge from the nostrils, nephritis complicated by prostatitis, glaucoma, osteomalacia, histoplasmosis and toxoplasmosis.

In all these cases the mites were found at autopsy in the frontal sinus or in the sinuses and nasal passages or in the nasal cavity. However, sometimes the mites could be seen crawling from sleeping dogs' nostrils.

The purpose of this publication is to add another two cases to the above list. The mite *P. caninum* was discovered accidentally in the frontal sinuses and nasal passages at autopsy of two dogs while the brain was being removed. Both dogs were destroyed by an injection of magnesium sulphate intravenously on the 24th September and 22nd October, 1943, respectively. The former case was a male Dobermann in fairly good condition and about six years old. It had a history of haematuria. The anatomical pathological changes were anthracosis, an infarct (1″ x 1½″) in the left kidney, hypertrophy of the prostate, a compensatory thickening of the wall of the urinary bladder, and mites in the frontal sinus. The second animal, a female Ridgeback of about



PNEUMONYSSUS CANINUM

four years, was sacrificed because it was suffering from an incurable skin condition, which was diagnosed as a chronic hyperkeratatotic dermatitis accompanied with pruritis and some areas of moist eczema. In addition anthracosis, small cysts in the kidney, degenerative changes in the tubuli, otitis and in the frontal sinus and nasal cavity a few mites, *P. caninum,* were seen. In spite of the presence of the parasites the gross lesions were not remarkable, there being only signs of a slight muco-catarrhal sinusitis and rhinitis.

The mites could be seen with the unaided eye as white specks crawling over the mucosa of the nasal cavity and frontal sinuses. By their movement they could be easily differentiated from the small particles of bone sawdust. As the post mortem interval increased the parasites could be seen moving away from their habitat on to the surface of adjacent tissues. This greater activity may possibly be compared with that shown by other external parasites leaving the cold carcass. No mites were found in the trachea, bronchi or lungs. The mites were adult females and mounted specimens have been kept at Onderstepoort.

Nothing is known of the pathogenicity of these mites. Possibly the mild changes may be ascribed to the non-sessile habits of the parasites and the protective mucous covering of the mucosa, since mites enclosed in or on mucus appeared to be restricted in their movements. However, according to *Monlux and Turk* (1951), they are probably capable of producing considerable irritation when present in large numbers.

In the above cases only a few parasites were found but the degree of infection may vary from twelve to more than a hundred in number (*Koutz et al.* 1953).

It is of interest that, except in one case, only females have been found and described, thus the life cycle still remains obscure. The mites are probably viviparous since the mature female contains a fully developed embryo and eggs are absent in the nasal discharge and scrapings from the mucosa. Transmission may be by direct contact.

As a detailed description of the mite has been given by *Chandler and Ruhe,* we refrain from describing this mite fully. However, the parasite and parts of it appear in figures 1-7 for diagnostic purposes.

It may be concluded that, except for excessive mucus production by the mucosa lining the sinuses and the nasal passages, no gross or microscopic lesions could be attributed to the mites. Further, that our observations are in accordance with those published on former occasions. Although no pathological significance may be attached to this infection, it is of interest to note the presence of these rarely reported acari in this country.

ACKNOWLEDGEMENTS

We are greatly indebted to Miss D. Pringle for the illustrative diagrams and Dr. R. du Toit for confirming the identification of these mites.

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EXPLANATION OF PLATE

Fig. 1. Dorsal view of adult female showing dorsal plate and general conformation.

Fig. 2. Ventral view of adult female, showing head parts, legs, peritremata and anal plate.

Fig. 3. Head parts; palpi; capitulum; chelicerae; terminal sensory setae and gullet groove.

Fig. 4. Primary tarsus with gripping claws and sensory setae.

Fig. 5. Detail of tarsus with ambulacrum, showing hooks, typical of tarsi II, III, IV.

Fig. 6. Peritreme with spiracle opening and stigmal plate. The peritremes are laterally placed between coxae III and IV.

Fig. 7. Anal plate, with irregular anal opening and triad of setae.

INDICATIONS FOR AND TECHNIQUE OF AMPUTATION THROUGH THE SHOULDER IN THE DOG WITH A NOTE ABOUT PARALYSIS OF THE BRACHIAL PLEXUS

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SUMMARY

(1) A comparison is made between amputation through the shoulder and below the elbow.

(2) The reasons for disarticulation of the shoulder in paralysis of the brachial plexus are discussed.

(3) A new technique for disarticulation of the shoulder is described and reference is made to various theories about the mechanism of surgical shock.

As prosthetic appliances are seldom tolerated by the dog, the requirements of prosthesis are normally not considered when amputation of the thoracic limb is contemplated. The operator usually has to choose between two sites, viz.: (1) disarticulation of the shoulder and (2) amputation a short distance below the elbow.

A comparison of the two sites is as follows :

Amputation through the Shoulder.	*Amputation below the Elbow.*
(a) This is an operation not lightly to be undertaken by an inexperienced surgeon as faulty technique might easily lead to fatal haemorrhage or severe shock, especially in the debilitated subject.	(a) This operation is performed without difficulty. There is much less risk of severe haemorrhage and shock.
(b) Cannot be done very quickly — important in the weak subject.	(b) Can be done within a few minutes.
(c) Hospitalization somewhat longer.	(c) Hospitalization only about a week or less.
(d) Aesthetic appearance excellent.	(d) Though not unpleasant aesthetically, the appearance not as good.

From this table it can be deduced, that the decision as to what method to employ in a particular case, is an individual one concerning, as indicated, the proficiency of the operator, the condition of the

patient, the feeling of the owner about the relative aesthetic merits of the two sites, etc.

There are some conditions, which make disarticulation of the shoulder obligatory, viz.:

(1) If the cause of the decision to amputate, such as mutilation, is situated between the shoulder and the distal site.

(2) In paralysis of the brachial plexus or of the major nerves of the thoracic limb after failure to respond to therapy.

PARALYSIS OF THE BRACHIAL PLEXUS

Brachial paralysis in the dog is not often seen. References to this condition are infrequent in the literature. As a matter of fact, some standard reference works do not even mention it — an omission certainly not justified.

Brumley (1943), Jakob (1924) and Kirk (1939) all make similar observations regarding this condition. Concerning traumatic paralysis they give a favourable prognosis. This optimism is not shared by the present writer. In complete paralysis of the radial nerve alone or in various combinations with other nerves of the plexus, therapeutic results as long as a year afterwards have been very disappointing. The therapy followed the lines suggested by these authors and, in addition, high dosages of vitamin B complex have been given orally and parenterally.

It is perhaps not justifiable to regard paralysis as permanent if it has been unchanged for a year or 18 months. However, mutilation of the limb and other disfigurements force the hand of the veterinarian long before. Unless some salutary change takes place within three months, it is felt, that the prognosis should be most unfavourable.

It has been noticed that complete paralysis of the radial, median and ulnar nerves obtains in some cases without the other nerves of the front limb being affected. In the writer's opinion the following explanation can be advanced :

The first three mentioned nerves form a common trunk originating from the last cervical and the first two thoracic nerves. The other nerves of the brachial plexus originate from the sixth and seventh cervical nerves in roughly two groups interlinked with each other and the above-mentioned trunk in series. The position of this trunk makes it most vulnerable to overabduction. This statement is supported by tests conducted on a cadaver.

As stated previously, incurable paralysis of the brachial plexus or of the major nerves of the thoracic limb only, makes disarticulation of the shoulder obligatory. As has been found in two such cases, where amputation was performed below the elbow, there was complete failure to heal. The suture line and the areas round the sutures became sodden. On the ventral part of the stump the skin became raw due to pressure necrosis, in spite of heavy padding. Eventually the lips of the wound gaped and the raw surface steadily increased in size. The absence of the trophic influences associated with an intact nerve

supply proved tremendously important and accounted for the failure to heal.

The last statement might be disputed. If amputation below the elbow in cases where there is no paralysis always heals very well, but fails to heal when the nerves are paralysed, it follows that the absence of nerve function must be considered responsible for the non-union of the tissues.

OPERATION TECHNIQUE

Frick (1949) describes a technique for disarticulation of the shoulder. The present writer originally employed a method similar to Frick's. The veterinarian, who does this operation frequently will, because of repeated practice, be able to apply this technique safely. As this operation forms an insignificant percentage of the total number of surgical cases, such an experienced veterinarian would be uncommon. It was therefore considered advisable to evolve a technique, which would minimize the main hazards of this operation, especially when it has to be attempted without the facilities and personnel available in a well equipped hospital.

Briefly, the main differences between the alternative technique presented here and that of Frick are as follows :

(a) The landmarks for the primary skin incisions are clearly indicated. This ensures enough skin to cover the raw area.

(b) Adequate provision is made for soft tissue to fill the considerable hollow below the glenoid cavity. The way these tissues are dealt with ensures an absence of a depression at the end of the scapula. This makes for a better appearance. At the operation, then, the disarticulation is done at the end and not at the beginning.

(c) The most important difference is the tying off of the main bloodvessels *before* extensive dissection is attempted. At the same time the ulnar, radial and median nerves are divided. According to some of the recent theories about shock, these manoeuvres are significant in preventing it. It is quite certain, that ligating and cutting the large bloodvessels so early in the operation minimizes haemorrhage and avoids the risk of sudden, severe bleeding and collapse. In view of the price of the newer plasma substitutes, the difficulties attendant upon blood transfusion in the dog, and the limited skilled help available to most veterinarians, such a vascular accident might be catastrophic.

In view of what has been stated in the preceding paragraph brief, references to the predisposing factors of traumatic shock as well as to the theories on the aetiology is necessary. A detailed review is outside the scope of this article.

It is generally accepted, that the greater the haemorrhage and trauma, the greater the predisposition to shock.

Although there is as yet no completely satisfactory explanation of the causes of shock, the following theories are important and each possibly represents part of the truth :

(a) Theory of toxaemia, i.e. formation of a vasodepressor in the injured tissues and absorption into the bloodstream.

(b) Neurogenic factors, i.e. the transmission of shock producing impulses by the nerve trunks.

(c) Theory of fluid loss into traumatized tissues.

(d) Selye's theory that shock is a disease of adaptation.

A brief consideration of especially (a) and (b) above will make it plain why the writer is insistent on the early division of the main bloodvessels and nerves.

The technique to be described is designed to meet the requirements for the prevention of shock, and to promote rapid healing by enabling the approximation of tissues without tension.

The measurements below refer to a dog the size of a pointer. The anaesthetic used is Nembutal Veterinary (Abbott) intravenously. The prepared skin area is from the point of the scapula to the sternum, and from the costal arch to close to the angle of the mandible.

With the dog lying on the side opposite to that to be operated an incision is made just through the skin from where the axillary skin fold merges with the chest forward over the outside of the leg in a downward curve. It passes two inches (five cm.) below the shoulder to end more or less over the external jugular vein, and well forward of the shoulder. A corresponding incision is made on the medial aspect of the limb, joining the ends of the first incision. Every visible bloodvessel is picked up with artery forceps and ligated.

Where the incision traverses the anterior aspect of the arm careful dissection is carried out until the cephalic vein and the circumflex humeral artery are exposed. These are divided between ligatures. With an assistant holding the draped foreleg as close to the vertical as possible, the incision on the medial aspect is deepened over the middle of the limb. In this way the brachiocephalic, superficial and deep pectoral muscles are dissected through until the brachial artery and vein are exposed. They are also severed between ligatures, but some distance proximal to the original incision. The radial, median and ulnar nerves are now isolated and cut through on the same level. The deep brachial artery and vein will not be seen, unless the brachial vessels are divided below the point of origin of the former. The lateral thoracic artery and vein may be found towards the posterior end of the incision in the latissimus dorsi muscle.

Having sought out and tied off all major bloodvessels, and severed all major nerves in the surgical field, the operator rapidly deepens the original incisions until all tissues have been divided except the humerus. There is nothing to be gained by painstakingly identifying the various muscles at this stage, as they all have to be incised at the same level.

The humerus is now exposed all round about two inches (five cm) below the shoulder joint. By means of blunt dissection (occasionally sharp) the insertions of the muscles are separated from the bone. When this is completed the shoulder joint is disarticulated and the amputation is complete.

The glenoid cavity is now thoroughly curetted out. When the skin edges are now approximated, it will be seen, that it fits snugly everywhere except over the end of the scapula, where there is a space.

This is obliterated by suturing the detached ends of the muscles on the medial side to those on the lateral side across the glenoid cavity with chromic catgut. The lips of the skin wound are then brought closer to each other by joining the subcutaneous fascia on either side by means of a continuous suture of gut. Finally the skin is closed by means of interrupted silk stitches.

The operated area is bandaged tightly. Provided rigid asepsis has been maintained and bleeding has been controlled effectively, a smooth convalescence may be anticipated.

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Jl. S.A.V.M.A. 24(2), 1953.

Anatomical Anomaly

SITUS INVERSUS IN AN ADULT COW

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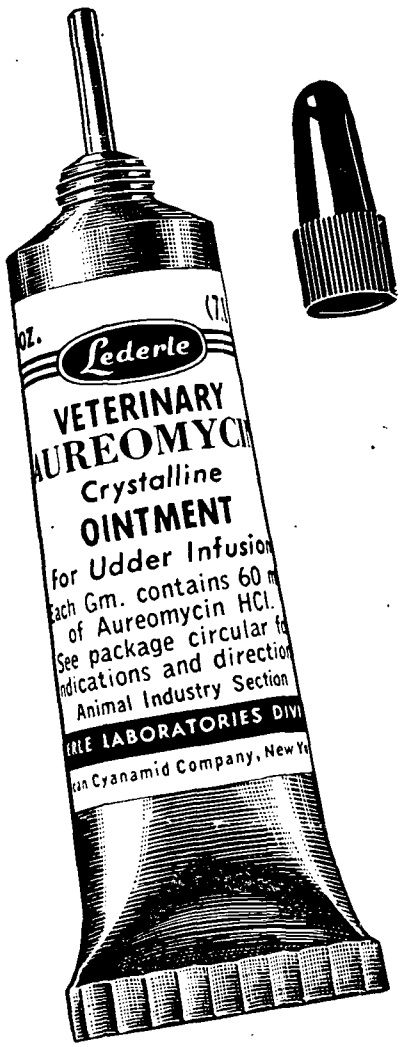
On the 30th January, 1953 I was invited by the Superintendent of the Bloemfontein Abattoir to inspect the carcass of an adult female crossbred cow that had been slaughtered as a tuberculin reactor.

The carcass had been partially eviscerated but the liver with a portion of the duodenum attached, the spleen, both kidneys, and the heart were still in situ. The liver was attached o the **left** side of the ribs, the spleen on the **right,** the left kidney was **anterior** to the right and occupied the renal impression on the liver, while the **right** kidney was floating.

Unfortunately the lungs could not be traced for observation of the lobulation, but the heart was found to be well towards the **right** side of the thorax.

When the position of the forestomachs and intestines was reconstructed, it was found that the rumen and reticulum had occupied the **right** side of the abdominal cavity while the omasum, abomasum and duodenum had obviously been on th **left** side of the abdomen. It would appear that the position of all organs in this animal was reversed without inconvenience to the animal during life and without any obvious malformation of the organs.

for MASTITIS



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Aureomycin is effective against more bacteria commonly found in mastitis than penicillin. One infusion is active for more than 48 hours.
Infusion of infected quarters with Aureomycin Crystalline Ointment, in most cases, results in the production of saleable milk.

In cases of acute septic mastitis, in addition to udder infusion, the injectable form of Sulmet* Sulfamethazine Lederle should be used, by or on the advice of a veterinarian. Sulmet Oblets* may be given as subsequent treatment.

Veterinary Aureomycin Ointment may be used for the prevention of superficial udder infections. When obvious injuries to the udder or teat occur, it is advisable to apply this ointment locally to the wound. At the same time infuse each quarter so affected with one full tube of Aureomycin Ointment as a preventive measure against mastitic infections.

For maximum efficiency in the use of Aureomycin Ointment For Udder Infusion and best management practices and disease-control procedures for avoidance of reinfection, consult your veterinarian.

Write for folder on Aureomycin Ointment.

* Reg. U.S. Pat. Off.

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Intravenous with diluent 2.5 gm.
Intramammary Ointment ½ oz.
Veterinary Ointment 1 oz.
Capsules 250 mgm. 16's.
Oblets 5 mgm. 4's (for Metritis).

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CASE REPORT

A CASE OF BOTRIOMYCOSIS IN A COW

E. M. ROBINSON and A. J. LOUW
Onderstepoort Bloemfontein

SUMMARY

Botriomycosis in the udder of the cow is a comparatively rare condition. A case is described where from the lesions and the pathological and bacteriological findings a diagnosis of botriomysosis was considered to be justified.

In October last year the Municipal Veterinarian, Bloemfontein, Dr. A. J. Louw, sent specimens of a cow's udder to Onderstepoort in formalin and glycerine for examination. The cow which had been slaughtered at the Municipal Abattoir, Bloemfontein, showed peculiar lesions in the udder, somewhat resembling those of tuberculosis. No acid fast bacteria could be found in smears from the lesions. The description of the lesions was given as follows:— Macroscopically the whole of the udder tissue was affected and was studded throughout with tumour like areas encapsulated with fibrous tissue and varying in size from that of a pea to a golf ball. On being cut into, the areas had a gritty feeling as if calcification is present. There was a considerable amount of connective tissue formation in the udder and the supramammary and deep inguinal glands were enlarged and apparently affected as well.

The specimens in 50./. glycerine were examined for tuberculosis but no acid fast bacteria could be found. Guineapigs were inoculated with material from the lesions but did not show any lesions when killed six weeks later. Examination for actinomycosis and actinobacillosis was negative. The portions of lesions sent in glycerine showed areas like those described and the cut surface had the appearance of granulation tissue and was gritty when cut into. Material from the lesion when pressed between a slide and coverslip showed what appeared to be colonies like those seen in actinomycosis but no clubs were present in them and when stained by Plaut's method there was no evidence of their presence. With Gram's stain the colonies appeared to be irregular in outline, pink in colour, with clumps of what appeared to be Gram positive cocci in them.

Cultures from the pus gave a pure growth of Staph. pyogenes aureus.

The report on the pathological picture described focal areas in which the udder tissue had been replaced by lesions showing areas of a pink colour with the eosin stain and evidence of calcifi-

cation. Gram positive staphylococci were present in these areas. There was infiltration with lymphocytes, plasma cells and neutrophiles. Proliferation of macrophages and fibroblasts was noted. A few giant cells were seen.

ABSTRACTS OF MEETINGS OF THE COUNCIL OF THE SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

26th February, 1953.

Present: A. M. Diesel (President), G. D. Sutton (Treasurer), M. C. Robinson, A. C. Kirkpatrick (Hon. Life Vice President), R. Clark, P. J. du Toit (Hon. Life Vice President), P. S. Snyman, S. W. J. van Rensburg, E. M. Robinson (Editor), A. D. Thomas (Vice President), W. D. Malherbe, M. de Lange (Hon. Secretary).

Apologies: G. Pfaff and R. A. Alexander.

Maud Bales Scholarship: The 1953 award was divided among students A. J. Snyders, H. C. Theron and R. Wege.

Article in Lay Press: An article on a veterinary hospital, which had appeared in one of the daily papers, had been submitted by Council to the Veterinary Board. The ruling of the Board was that it viewed lapses of this nature in a serious light. It had accepted the explanations tendered by the parties concerned in this instance, but in future would not hesitate to deal with such breaches to the limits of its power.

15th May, 1953.

Present: A. M. Diesel (President), G. D. Sutton (Treasurer), R. Clark, E. M. Robinson (Editor), P. J. du Toit (Hon. Life Vice President), S. W. J. van Rensburg, H. P. Steyn, P. S. Snyman, G. Pfaff, W. D. Malherbe, M. de Lange (Secretary).

Apologies: R. A. Alexander, A. D. Thomas, A. C. Kirkpatrick, M.D. Robinson.

Change of Title of the Association:

The Witwatersrand Branch had submitted a suggestion to Council enquiring whether the name of the Association could not be changed to "S.A. Veterinary Association."

It was indicated in the discussion that the term "medical" had been included originally to emphasise the scientific nature of the Association and that there was a tendency among bodies of farmers employing veterinarians to call themselves "Veterinary Associations".

For these reasons Council did not feel disposed to support the proposal.

Representation of the Association at the 15th International Veterinary Congress at Stockholm.

Dr. A. D. Thomas, Vice President, who is attending the Congress, was elected by Council to represent the Association at the Congress.

Dr. Thomas would also represent the Association at the 175th anniversary of the Hanover Veterinary College.

WILLIAM HORNER ANDREWS

An Appreciation

William Horner Andrew's outstanding characteristics were integrity, honesty and selflessness. He was endowed with a superb brain which was trained and whole heartedly applied to the service of science and its administration. In his short sojourn at the Royal Veterinary College (from 1924 to 1927) under Sir John Mc'Fadyean and when examining for the Royal College of Veterinary Surgeons, he exercised a radiating, beneficial influence on the young man and woman who passed through his hands, which continued to help and encourage them long after memories of "swot" and "exams" had faded.

When in 1927 he was chosen as Director for the Weybridge Veterinary Laboratories, he took over the direction of the Veterinary Research work of the Ministry of Agriculture at a most critical time. There was a great awakening in the field of scientific agriculture taking place in the United Kingdom and it was vital that our profession should play its full part. Andrews quietly and with the minimum of ostentation, answered this call. Looking back now, one realises there was no-one in the profession who could have carried out this task as effectively and with such credit to the profession as he did. It was indeed fortunate that Andrews was in Britain at this time.

In the realm of bricks and mortar and other facilities essential for research work, Andrew's achievements become more outstanding as time passes. The great Weybridge he left behind could hardly be recognised if compared with the healthy embryo he inherited from Sir Stewart Stockman. It must be remembered this growth was accomplished when money was everywhere short and during a period in which the most acute depression known, took place. His building up of Weybridge and its then satellite laboratory at Pirbright, will stand as an ever-lasting memorial to him. Pirbright has earned full fledged respectable independence and Weybridge has grown since Andrews left. Both these expansions could not have taken place had the foundations laid by Andrews and his team, not been sound, true and far sighted.

Wherever Andrews worked, he had a way of infusing honesty, encouraging original thought and above all, knitting together his workers into a wholesome unity. How often can an author of an obituary notice write such a statement, confident that it cannot be challenged !

Certain of his acquaintances have felt that it was a pity Andrews did not more often participate in the politics of our profession. Those who really knew him have long realised that Andrews was a force, always for good, in the Veterinary lobbies but that he would at no time even consider lowering his standard of intrepid honesty, even if such an action entailed his own interests suffering. For years he exercised immense influence in the Veterinary Field through his associations with the Colonial Office, though few have realised this, and fewer to-day even suspect that the renowned and respected Colonial Veterinary Service was built on Andrews' foundations. Being outside the Colonial Service itself, yet having its interest ever within him, he did much to unify the profession in the Colonies in a unique and lasting manner. His work for the profession was never parochial, it was world wide.

Mention has been made of Andrews's work in the veterinary profession but this, great as it was, does not complete the picture of the man.

Andrews had a happy married life; those who knew him took this for granted. Doris, his wife, was a South African who settled graciously in England and soon made herself respected and loved by all who came into contact with her. Wherever the Andrews lived, they took an active part in the local community and it was never long before Doris, as a true South African, became an integral part in the welfare of those around them. Their son, W. Horner Andrews, Junior —"Digger"— carries on his father's love. After leaving Oxford, where he gained a half-blue on the track, "Digger" served at home and Overseas with the Forces. He is at present engaged in teaching and research at the Liverpool School for Tropical Medicine and has made a name for himself which reflects credit, not only to the Medical profession, but also to the calling in which he was raised. Betty, the younger child, trained as a physiotherapist, has married a member of the British South African Police and they live at Inyanga, Southern Rhodesia.

To the widow, son, daughter and four grandchildren of William Horner Andrews, Senior, in their great loss, go the heart-felt sympathies of all those who knew and loved him.

H.S.P.

OBITUARY

WILLIAM HORNER ANDREWS (1887 to 1953)

A short note appeared in our last issue referring to the death of Dr. Andrews on March 17th. An appreciation of him appears in the present journal, by Dr. H. S. Purchase.

After a very successful student career at the Royal Veterinary College in London, Dr. Andrews was awarded the Jubilee Memorial Bursary and spent a period of study in Paris. He took the newly instituted B.Sc. degree in veterinary science concurrently with his ordinary diploma. In 1910 he came to South Africa to join Sir Arnold Theiler's staff at the Onderstepoort Laboratory.

In his early years at Onderstepoort he was engaged on investigations into lamb dysentery and lamsiekte under field conditions for some time. In 1914 and 1915 he served for a period as a captain in the S.A. Veterinary Corps and saw service in South West Africa. Later he was officer in charge of the branch laboratory in Natal where he made the observations which led to his doctor's thesis on poisoning of cattle with Matricaria nigellifolia, a very fine piece of work.

In 1920 he was appointed to the newly constituted Faculty of Veterinary Science in the University of South Africa as Professor of Physiology. Owing to ill health he resigned from the government service early in 1924 and later in the year commenced work in London in Sir John McFadyean's laboratory. In 1927 he became Director of the Ministry of Agriculture's Laboratory at Weybridge where he remained until 1941 when he was transferred to the Field Staff until he retired in 1947. He was associated very closely with the great developments which took place at Weybridge in the years he was there. In 1929 he attended the Pan African Conference in Pretoria as United Kingdom representative.

In his last few years he was a very welcome guest worker at Onderstepoort where his early scientific career was spent. The writer has many happy recollections of his friendship with him in the first Onderstepoort period which was renewed on his return, and the picture he will always retain in his mind is of a man of wide general culture with a first class intellect and who was a gentleman in every sense of the word.

E.M.R.

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LETTER TO THE EDITOR

Veterinary Hospital,
Tram Road,
Sandown,
Johannesburg.
9th May, 1953.

The Editor,
Journal S.A.V.M.A.

Sir,

In response to Dr. Diesel's challenging article in your last issue dealing with the decline of the State Veterinary Service, perhaps a few suggestions from one who has been to some extent involved in the drift to private practice, may not come amiss.

A practitioner's life is a hard and busy one, but it has one inestimable advantage and attraction — he is always occupied in the prosecution of his chosen profession and achieves the satisfaction, often repeated many times daily, of tasks, some easy and some difficult, successfully performed. It would be absurd and impertinent to imply or infer any detraction from our splendid State Service, but due to its very efficiency the position has arisen where, with many of the old (and new) diseases eradicated or in the process of successful control, the state veterinarian's tasks have tended to become less and less directly connected with his bent — the practice of veterinary science. He cannot forget that he is a veterinary surgeon, but may be in danger of doing so.

The financial aspect, though important, is not the whole story. The practitioner, no matter where he practises, cannot attain affluence. Our fees and the amount of work one man can do set a definite limit to incomes, and from the other point of view economic security is offered in a pensionable service.

Is there no place in South Africa for a part time state veterinary officer as suggested some years ago, but apparently dropped ? Although the possibilities for whole time private practice in the platteland are by no means exhausted there are at present areas where whole time practice may not succeed, but where a practitioner could effectively combine part time state duties with practice. By drawing on experience gained in the highly successful part time state services in Britain and elsewhere a scheme suitable to South African conditions could surely be evolved whereby the ranks of the depleted state service would be filled, and the profession could pull its full weight in the country's development.

Yours truly,
M. H. V. BROWN.

BOOK REVIEW

MANUAL OF VETERINARY CLINICAL PATHOLOGY by David L. Coffin, V.M.D. Pathologist, the Angell Memorial Animal Hospital, Boston, Massachusetts. Pp. xiv plus 322, figs. 73. Ithaca, New York. Comstock Publishing Co., Inc. Third Edition, 1953. Publ. price $5.50.

Contens: Prefaces. 1. *Microscopic technique for clinical pathological examinations.* 2. *How to collect, pack and ship specimens for laboratory diagnosis.* 3. *Parasitologic examninations.* 4. *Urine examinations.* 5. *Interpretation of urinary findings.* 6. *Diagnostic interpretation in clinical chemistry.* 7. *Haematology.* 8. *Interpretation of haematological findings.* 9. *Diagnostic methods in bacterial disease.* 10. *Diagnosis of bacterial diseases.* 11. *Diagnosis of mycotic diseases.* 12. *Diagnosis of protozoan blood diseases.* 13. *Diagnosis of protozoan genital infection.* 14. *Diagnostic methods in virus diseases.* 15. *Fertility examinations.* 16. *Poultry and game-bird autopsy.* 17. *Formulas and techniques. Index.*

The previous edition, that of 1945, of this Manual was reviewed in this Journal Vol. 17 No. 1. The emergence of laboratory examination as an increasingly important adjunct to the practice of veterinary medicine has been reflected in this third edition by the inclusion of a new chapter on "Diagnostic interpretation in clinical chemistry", extensive revision of the chapters on "Haematology" and "Interpretation of Haematologic Findings." The section on blood groups has been rewritten in the light of newer information, particularly concerning the horse and the dog. Increasing interest will be felt in this country in the diagnosis of Leptospirosis and Infectious Canine Hepatitis in Chapters 10 and 14, both of which have had more material added.

With the increasing realization of the usefulness and frequently the indispensability of at least the simpler diagnostic methods to the diagnosis of organic and infectious diseases, a book of this nature becomes a "must" to any modern practitioner. Even where he finds that he cannot himself undertake certain laboratory procedures it would certainly be useful to know which laboratory examinations were feasible and what material should be sent.

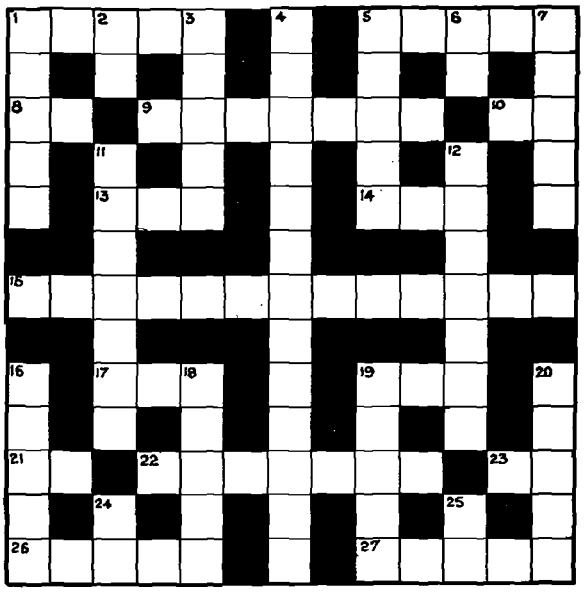
Our criticisms are mainly on minor points, a few of which could be mentioned here. For most purposes ordinary dry blood smears will suffice for anthrax diagnosis (p. 11). Blood samples and ligated ears are bound to cause contamination when collected. For brucellosis agglutination tests, blood samples collected with a little boric acid solution as a preservative are found to be very simple and practical in South Africa. Among the illustrations of helminth eggs of dogs (p. 36) we should like to see those of Spirocerca lupi and Filaroides osleri. For demonstration of bilirubin in urine we have for many years used the ordinary Van den Bergh reagent as for the "direct" test on serum. For field urinalysis (p. 76) a powder reagent for acetonaemia, obviating the use of ammonia, was described in this Journal in September, 1951. The figures given for specific gravity of urines (p. 82) are in general much too high. For dogs, for instance, the upper limit of normality is in the region of 1.025, not 1.060.

In format, paper, printing and binding the book fulfils all requirements and one suspects that the contents will present a challenge to those of our colleagues who have, perhaps, got into the habit of making a diagnosis from the kraal wall or the stable door.

W.D.M.

VETERINARY CROSSWORD PUZZLE

(By R.C.)



CLUES

Across:

1. Derived from Papaver somniferum. (5)
2. This nut is parasympathomimetic. (5)
8. Reputed to be rare among veterinarians. (2)
9. Normally about 10 mg. per cent in blood. (7)
10. Of veterinary science ? (2)
13. Could be nay. (3)
14. Present in P.M.S. (3)
15. A branch of physiology. (13)
17. May cause bloat. (3)
19. Contains xanthines. (3)
21. Slimy but protective in short. (2)
22. This cycle has no wheels. (7)
23. Where most of us were. (2)
26. Yanks speak so. (5)
27. Said to determine whether life is worth living. (5)

Down:

1. Might cop it in a fight. (5)
2. That is in short. (2)

3. Second year students have such battles. (5)
4. Perhaps, but what carbolic acid coefficient ? (13)
5. May be formed of cells round a vessel. (two words, 1 and 4)
6. Out of. (2)
7. Straight from the heart. (5)
11. The musicians appear to get old in order to support. (7)
12. Given 25 down as an anaesthetic. (7)
16. Its flora is important. (5)
18. Might be intestine. (5)
19. A confused trial. (5)
20. In excess. (5)
24. A skeletal unit. (2)
25. A shortened parenteral route. (2)

SOLUTION

Across:

1. Opium, 2. Areca, 8. T.T., 9. Calcium, 10. Dr., 13. Any, 14. F.S.H., 15. Endocrinology, 17. Gas, 19. Tea, 21. M.M., 22. Cardiac, 23. O.P., 26. Nasal, 27. Liver.

Down:

1. Optic, 2. i.e., 3. Meaty, 4. Bactericidal, 5. A cuff, 6. ex, 7. Aorta, 11. Bandage, 12. Chloral, 16. Rumen, 18. Small, 19. Trail, 20 Hyper, 24. Os, 25. I.V.

EDITORIAL

At the recent meeting of the South African Veterinary Medical Association at Onderstepoort, the papers were contributed mainly by members of the staff of the Division of Veterinary Services. Although most of these papers were of interest to the general practitioners who now form 60% of the profession in South Africa, it is felt that more papers or demonstrations of particular interest to them should be arranged. It is realized that the private practitioner has very little time to write papers and has limited access to the current veterinary literature. He may therefore feel diffident about contributing papers for fear of criticism.

At medical congresses the papers are mainly contributed by specialists in medicine, surgery, etc., and the private practitioner mainly confines himself to taking part in the discussions. It is felt, however, that as in South Africa a specialist class has not yet arisen in veterinary private practice, certain subjects could be discussed at our meetings which would have a general appeal to the private practitioner.

Although the following list of subjects does not pretend to be more than a number of suggestions made in consultation with private practitioners, it covers a fairly wide field:—

1. Blood transfusion.
2. Intravenous fluid therapy.
3. Tissue fluid balance and shock.
4. Emergency operative work in accident cases, etc., 1, 2 and 3 would be concerned here as well.
5. Management of and diseases of new born animals.
6. Obstretrical problems in all species.
7. Management of fractures.
8. Paraplegia in the various animal species.
9. Special operative techniques.
10. Infections of the genital organs (male and female) with specific reference to interpretation and control of these infections in herds.

There are numerous other important subjects which could be discussed but the above ones will serve as an outline of what could be envisaged.

The suggestion has been made that at least six month's notice should be given of such discussions to enable some

practitioner to draw up a paper to open the particular one he was prepared to. Another suggestion is that some particular practitioner should be approached to lead one of these discussions. If this should meet with approval it could easily be arranged.

The Editorial Committee, on which falls the onus of arranging the programme for the general meeting, would appreciate any constructive suggestions on or criticisms of the matter under discussion.

PRESIDENTIAL ADDRESS

ANNUAL MEETING — S.A.V.M.A.
18.8.53

Your Association, through it's Council and affiliated Branches, has attended to the problems which have come before it during the year with a fair amount of success and satisfaction. Success is, however, frequently deferred, and I think this may have to be the case with some of the problems with which we have had to contend.

I propose to draw your attention to a few of these issues, as their eventual solution is very much dependent upon concerted action on our part.

1. Powers of Condemnation by Meat Inspectors.

I need hardly remind you that this subject has engaged the attention of your Council and of a number of our members, for some considerable time.

We contend that only those persons who have been systematically trained to differentiate the normal from the abnormal, through an intensive study of comparative pathology, are capable of carrying the responsibility connected with the condemnation of human foods of animal origin. This in effect means that this duty must essentially be undertaken by members of the Veterinary and Medical Professions.

Those who oppose this view use a number of arguments and among them the following:

(a) That it is insufficient for a veterinarian or a member of the medical profession to regard himself as a good Meat Inspector merely because he holds an appropriate degree in these sciences. That until he has practised the art of meat and food inspection intimately, the knowledge he has gained through his training is in danger of being lost.

(b) If the trained and experienced lay meat inspector could be given authority to pass meat for human consumption, it would be inconsistent to prevent him from condemning without the consent of the owner, that which he has refused to pass.

(c) Arrangements can be concluded whereby appeals from the decisions of lay meat inspectors can be submitted, as they arise, for further decision by authorised veterinarians and medical officers.

(d) Adequate meat and food inspection services, through the employment of veterinarians and medical officers, could not be arranged in a large part of the rural districts of the Union for some considerable time to come.

Counter-arguments to these have been expressed and repeated many times by our members who are engaged in this work and your Council has supported their view wholeheartedly.

It is unreasonable to suppose that a veterinarian or medical officer who is constantly engaged in checking the work of the lay inspector, by condemning what the inspector has refused to pass, will permit his knowledge to deteriorate. These professional men are constantly revising their knowledge. Being engaged in the pursuit of their profession, they must of necessity remain acquainted, to a very considerable extent, with the advances which concern their particular speciality.

It is possible for a lay meat inspector to acquire his qualifying certificate after serving for a relatively short term, at an abattoir where a full-time veterinarian is employed. How can such laymen be expected to shoulder the responsibility connected with the condemnation of meat. Apart from the problem of safeguarding the health of the consumer, there is the question of economy in the use of available foods, which, according to world economists, is becoming more and more vital to the survival of the human race.

What better form of appeal can there be to the one which now obtains and which has stood the test of time, in so many countries, for so long.

Each occasion upon which a veterinarian or medical officer is asked to condemn food which the lay inspector has refused to pass, is in effect, a form of appeal to the person vested with the greater knowledge.

The problem of how best to arrange meat and food inspection services in the distant rural areas is not likely to be solved by permitting, and in fact, entrenching, what must be regarded as an inferior system of inspection.

In few of the foremost countries of the world has meat inspection been committed to the charge of insufficiently trained persons. These countries have built up large export trades in products of animal origin by the adoption of advanced meat inspection services.

The National Health Council has investigated this problem through a Committee appointed for the purpose. Upon receipt of the recommendations of this Committee by the Department of Health, the matter will be decided by that Department and we confidently leave the decision to them.

2. Pasteurization of Milk and Other Dairy Products.

Your Council and those members of the Association who are engaged in exercising veterinary supervision over milk production have on various occasions expressed their views on pasteurization, to such persons and bodies whose duty it is, to assess the value of this process.

The veterinary profession is fully mindful of the value of pasteurization as a public health measure. We feel, however, that considerable encouragement should be given to dairymen to present for public consumption, good, safe, wholesome, certified raw milk. We agree that there may be occasions when even this class of milk should be subjected to pasteurization. At least then the quality of the milk is assured. We have not supported the contention that the conditions which prevail in this country largely militate against the production of safe raw milk.

A scheme is now in operation in the municipal area of Cape Town, for the large-scale production of pasteurized milk. We are pleased to note that this scheme provides for the consumption of certified raw milk.

The Administrator of the Transvaal has recently appointed a Commission to enquire and report upon the subject of pasteurization of milk in this province. It is understood that this Commission is due to sit very soon. Your Council has prepared a short memorandum on the subject, which will be presented to the Commission when it calls for evidence. This memorandum particularly calls for encouragement in the production of certified raw milk of high quality.

I for one would like to see the adoption of a system which differentiates between obligatory pasteurization and ad hoc pasteurization. Both would be made compulsory, but ad hoc pasteurization would only be applied to certified raw milk, when in the opinion of the local authority this becomes desirable because of the presence of an infectious disease transmissible to man.

3. Therapeutic Substance Regulations.

The Department of Health is presently engaged in implementing a recommendation from the Pharmacy Board for improved control over preparations sold for veterinary purposes only. The intention is to delete No. 26 of the Therapeutic Substances Regulations, made under authority of Section 23 of the Medical Dental & Pharmacy Act, No. 13 of 1928. Provision would then be made in a new regulation, to schedule and control potentially harmful drugs. This control would be exercised through veterinary prescriptions and through the registration of stock remedies as arranged by the Fertilizers, Farm Feeds, Seeds and Remedies Act, No. 36 of 1947.

Your Council has considered this matter and is in agreement with the suggested alterations to the regulations. You are advised to be on the look out for these new regulations and to study them when they appear.

4. Professional Ethics.

Your Council has from time to time been called upon to express its opinion on certain aspects of the existing Ethical

Code. This it has done without fear or favour. These opinions have of course been given to the Veterinary Board, sometimes at the invitation of members and sometimes at the invitation of the Board itself. I would like to take this opportunity of conveying the thanks of the profession to the Veterinary Board and, in particular, to its Chairman, for this consideration.

In the absence of a more detailed code of Ethics it is becoming increasingly difficult to assess professional behaviour in all cases. There are now 315 veterinarians registered under the Veterinary Act. Of these, 147 are engaged in private practice, 78 are in the service of the Department of Agriculture, 15 are in the service of Municipalities, 13 are employed in private enterprises, 4 serve full-time at Universities, 36 are miscellaneously employed and 26 are resident beyond the Union's boundaries.

It is understood that the Veterinary Board is presently engaged in the preparation of a new and more comprehensive Ethical Code. It is trusted that this publication will appear soon after the return from Europe of one of our members who is also a member of the Veterinary Board. This member has undertaken to obtain as much information as he can on the Ethical Codes which apply in Europe and the United Kingdom.

When veterinarians practise their profession on their own account, they must be held entirely responsible for their actions. When, however, they are employed by non-veterinarians, they are frequently faced with the position of having to satisfy two masters. Ethical codes in all professions are vital to the survival of professionalism and all it stands for. To this extent, the provisions of the code must be scrupulously observed. Altered and ever-changing circumstances must however, wherever possible, be accommodated in the code if professional values are to be advanced.

I would also like to record our thanks to the Pharmaceutical Society of South Africa for including us in their representations to the highest levels of the lay press in order that an effective liaison may be created for the control of articles published on pharmaceutical and medical subjects.

5. State and Municipal Matters.

Under the authority of the new section No. 16 of the Public Health Amendment Act No. 44 of 1952, a veterinarian employed by a local authority and who devotes the whole of his time to his office, must have his salary suitably equated to that paid to a veterinarian employed by the State, before the one-third refund provided for, can be effected.

Your Council gave this matter its attention and I wish to place on record the consideration given to the subject by the Director of Veterinary Services.

It is understood that the equating committee of the Depart-

ment of Health have accommodated veterinarians in a satisfactory manner.

Our thanks are also due to our Municipal members for their approaches to the problem.

The Structure Committee recently appointed by the Public Service Commission is busy on improvements in the State Service, with the view to bringing about greater efficiency. It is understood that the question of revision and regrouping of certain salary scales and the part appropriation of cost of living allowances into these salary scales, is also to be included in their review. Your Council has submitted a memorandum to this Committee.

It is confidently expected that the Committee will make recommendations which, if accepted, will bring about considerable improvement in service conditions.

6. Concerning the Business of the Association.

(a) *Its Branches.*
A Cape Eastern Branch of the Association was formed on July 25th, 1953. Its constitution was confirmed at the inaugural meeting. We wish it every success for a long and happy life. We now have five active branches, viz.: Witwatersrand, Natal, Cape Western, South West African and Cape Eastern.

(b) *Future Venues for the Annual Conference.*
This matter is on the Agenda of our present Annual Meeting. The General Purposes Committee of your Council has reported on the matter and you will deal with this subject on Thursday when the business of the Association is discussed.

(c) *Proposed Change of Title of the Association.*
During the year your Council dealt with a proposal by one of its branches to change the title of the Association. After fully considering the proposal, your Council was unable to agree to its adoption. The Transvaal Veterinary Medical Association was registered in 1903, under Transvaal Ordinance No. 56 of 1903. That name was changed in 1920 to S.A.V.M.A. and registered as such in the register of Companies. A copy of the Constitution and rules was lodged with the Registrar of Companies in 1930. In terms of Section 10 of the Union Companies Act No. 46 of 1926, the Association may submit an application to the Registrar to change its title. Such an application would have to state adequately the reasons for the proposed change. The application would then have to be laid before the Minister. No fee is involved. In deciding against the change, your Council was influenced by the information given to it by one of its older members, who was able to recall that the name "Medical" was purposely incorporated in order

to exclude any possibility of confusion with various non-professional Veterinary Associations.

(d) *Representation at the XVth International Veterinary Congress.* Your Council agreed to contribute the sum of £150 in order that a member who may be visiting Europe at the time, could attend the International Veterinary Congress, on behalf of the Association. In so far as a suitable member was proceeding overseas, he was accordingly requested to attend the Congress which is to be held at Stockholm during this month. This member will no doubt submit a full report on his return and you will be accordingly informed of its contents in due course.

(e) *Assistance to Members and Dependants of Deceased Members.* Since 1950, £740 has been paid from the Benevolent Fund as grants to assist members and dependants of deceased members.

As at the close of the present financial year, the Benevolent Fund stood at £2,288 9s. 2d.

The Association comprises 326 members.

These figures are given to you as a reminder that you should not fail to make contributions to this fund whenever you possibly can.

(f) *The Council of the Association.*

Your Council meets several times a year to transact the business of the Association and to further the interests of its members.

It is more than a little disappointing to learn that at this last election, only 114 voting papers were received from a possible 312 members who could have voted. This means, if I interpret these figures correctly, that just over a third of the members of this Association appear to be interested enough to complete voting papers. I must appeal very strongly to you ladies and gentlemen not to permit this state of affairs to continue.

In conclusion, I wish to express my very great thanks to all Council Members for the most efficient and active manner in which they have contributed towards the welfare of the Association.

To the Secretary and Treasurer I am very much indebted for the able manner in which they have attended to our affairs. Our Secretary, who has given such long and faithful service, has asked to be relieved of this post. We are very sorry that he has had to take this decision. We thank him very sincerely for the services he has rendered. We are fortunate in that we shall continue to have his services as a member of Council.

Lastly, but by no means least, I wish to express our grateful thanks to our lady assistants whose willing contributions to our welfare are never in arrears.

A REVIEW OF THE ACTIVITIES OF THE VETERINARY PROFESSION IN SOUTH AFRICA

A. M. DIESEL
Pretoria.

The history of a country radiates from the records of achievement of its people.

The professions, industries, trades and other activities which the people engage in and develop are necessarily influenced and moulded by the conditions and circumstances which prevail, both nationally and internationally, during the times in which they live. In this pursuit of national and international development, the Veterinary Profession in South Africa has taken up its position and maintained its status at a standard quite comparable with that in most other countries.

For the assurance of adequate Veterinary Services in a country, provision must be made for Veterinary Research, Veterinary Education, and Veterinary Field Services, which would include State and Municipal Field Services, State and Municipal Food Inspection Services, and Veterinary Private Practice in all its aspects.

Within the comparatively short space of 50 years, the veterinary profession in South Africa has extended its activities in all these directions. Naturally this achievement has been brought about by virtue of the resources of the country, its veterinary needs, and its desire for veterinary scientific advancement. In reviewing the activities of the profession in South Africa, it seems fitting therefore to review them predominantly under the headings of Veterinary Research, Veterinary Education and Veterinary Field Services.

Veterinary Research.

While appreciating to the full the contributions to Veterinary Research in South Africa, made from an early date by visiting scientists such as Koch, Bruce, Stockman and others, it can be said that Veterinary Research was, really commenced by Theiler in the Transvaal in 1893, by Watkins-Pitchford in Natal in 1892-3 and by D. Hutcheon in the Cape in 1880. There were of course the Veterinary pioneers such as Wiltshire, who was appointed in Natal in 1875, and Brandford, who was appointed in the Cape in 1876. They were, in the main, field men.

Duncan Hutcheon made substantial contributions in the field of veterinary research and his name will be remembered as long

as there is a Veterinary profession in South Africa. Only after the termination of the Anglo-Boer War in 1902, did Veterinary Research in South Africa begin in earnest.

In 1908 Theiler moved from his wood and iron buildings at Daspoort into the newly erected Veterinary Research Laboratory at Onderstepoort. From then until the time of his retirement in 1927, there was hardly an avenue of veterinary research which he did not explore. During this time he laid a solid foundation for the future development of the research which he had so ably pursued in South Africa. It is beyond the scope of this paper to relate all Theiler's achievements. They have become immortalised in the buildings erected for his use at Onderstepoort and in the records of his researches to be found in the library of that institute.

Pitchford also added considerably to the knowledge of stock diseases in South Africa and his early work in Natal on the control of East Coast Fever by dipping will stand as a monument to him for all time. Allerton remembers Pitchford as Daspoort and Onderstepoort remembers Theiler.

Theiler built up a staff to assist him at Onderstepoort and these scientists have in succession carried on his work. The names of Du Toit, De Kock, Viljoen, Robinson, Green, Mitchell, Neser and very many others come to mind, but again, it would take too long to tell of their achievements in this paper.

Theiler laid the foundations and the good work has gone steadily forward. It is well to remember too that the relatively small band of research workers presently employed at Onderstepoort, are in every way a credit to their profession. The work of many of them is highly regarded internationally. It can be said of a good many of the workers who followed Theiler at Onderstepoort, that they considerably enhanced the value of the legacies left to them by him. The tenfold increase in production of vaccines, diagnostic agents and veterinary remedies alone bears testimony to their successes.

Veterinary Education.

This was commenced at the instigation of Theiler in 1920, and the first South African graduates qualified from the Onderstepoort Veterinary School in 1924. Since then a total of 242 have graduated from that school. These graduates now predominate in the veterinary profession in South Africa and they have taken over the destinies of their profession, to shape and fashion it in accordance with the best South African traditions. These graduates have in more recent years entered the profession at the rate of some 8–12 per annum. During this month (June, 1953) the Minister of Agriculture officially opened a new faculty building at Onderstepoort. From 1954, up to 30 students per annum will be accepted into the veterinary faculty at Onderste-

poort. This faculty has for some years now come under the control of the University of Pretoria.

The present Director of Veterinary Services, Dr. Alexander, is a graduate from the Onderstepoort Veterinary School. He has a very high international reputation. He has just recently returned from the United States of America, by which country he was invited to give an expression of opinion on the appearance of bluetongue in sheep in Texas, and to advise on the best means of controlling that disease in America. Veterinary education in South Africa has been assured for all time.

Veterinary Field Services.

Veterinary Field Services in South Africa have a long list of noble achievements to their credit. Under Veterinary Field Services is included State and Municipal Field Services, State and Municipal Food Inspection Services and Veterinary private practice in all its aspects.

The history of achievement of veterinarians engaged in the field services of the state dates back to the arrival of those early pioneers, e.g. Wiltshire in Natal in 1875, Brandford, Hutcheon and Borthwick in the Cape in 1876, 1880, 1889 respectively. Working in collaboration with Veterinary Research, the State Veterinary Field Services of South Africa have been responsible for the complete eradication from the Union of Rinderpest, Pleuropneumonia and Glanders; for the eradication from time to time of Foot and Mouth Disease, Swine Fever and Newcastle Disease, and for the suppression of Anthrax, Rabies, Sheep Scab, Nagana and East Coast Fever; for the detection and control of Lumpy Skin Disease, Epivag, Rift Valley Fever and many other stock diseases. Municipal Veterinary Services in South Africa commenced as far back as 1903/4, with the appointment of veterinarians to the Municipal Services of Johannesburg, Durban and Cape Town. More recently the activities of the Municipal Veterinarians have been extended to include supervision over the production of clean and healthy milk.

While private practice commenced at a very early date in the history of the profession in South Africa, it made little headway until about 1940.

It is of interest to compare the figures of 1922 with those of 1952 in regard to the distribution of veterinarians into the various categories of their employment in South Africa.

These figures are given below. They have been obtained from the records of the S.A.V.M.A.

Year	State	Municipal	Private Practice & Others	Army & Police	Firms, Farming & Miscellan.	Total
1922	60	4	18	2	—	84
1952	79	12	165	—	20	276

Private practice today is a highly specialised branch of the veterinary profession in South Africa. The present-day practitioner with his up-to-date dispensary, surgery, X-ray apparatus and other equipment, and with his fast-moving transport, has developed into a highly specialised Veterinary Unit. He is capable of doing many times the amount of work performed by his colleagues of the 1920's. By arranging consulting hours, his clients are able to bring their troubles to him, thus saving him much valuable time.

While the State Veterinary Service has been considerably depleted in recent years, owing to the influx of veterinarians into private practice, it is well to remember that the attainments of the practitioners have produced a Veterinary Service of a very high order. Farming bodies, co-operatives, livestock remedy organisations and stock feeds production enterprises have also drawn their quotas from the profession. This is of course progress in its true sense. As South Africa proceeds on the road of further advancement a still greater number of veterinarians will be employed in these avenues of veterinary private practice. One thinks too in terms of the possibilities of industrial veterinary medicine and particularly in regard to the development of enterprises which utilise products of animal origin on a large scale.

It is unfortunate that while this side of the profession is advancing in an encouraging manner the State Veterinary Service, whose glorious past has really been responsible for the steady progress of the profession in South Africa as a whole, is temporarily in a state of recession as far as its numerical strength is concerned. It is likely of course that 1953/54 may see yet another change and that some slight temporary saturation of the activities of private practice will be brought about. This would be an encouraging sign in many ways. It would allow the State Veterinary Service to make up the leeway it has lost in recent years and it would have the effect of forcing the private practitioner to take stock of his position.

Events have moved so fast in recent years that even the new entrant into practice has been encouraged to believe that a recession is something which he too can easily negotiate.

One hopes that such a recession will only be part of a national readjustment and that the practitioner will be no more affected thereby than any one else associated with private enterprise. The readjustment may be critical, but there is no reason to suppose that it will be seriously suppressive to private practice. The levelling-out process will doubtless lead to greater stability and to greater equality of progress in the profession as a whole.

Other Activities of Professional Advancement.

It is fitting to refer to the advances made over the past 50 years, on the ethical and personal sides of the profession.

Natal had a Medical and Pharmacy Act which came into

force in 1899. This arranged for the registration of veterinarians. The provisions of this Act were extended when Union came about in 1910 and they were maintained up to the time when the Union Veterinary Act No. 16 of 1933 was brought into being. Now even this Union Veterinary Act has become outmoded. Soon it too will have to be replaced or amended in order to meet modern needs. The activities of the S.A.V.M.A. also deserve mention in this review of the Veterinary profession in South Africa. Its membership has grown consistently. It now has a substantial sum of money to its credit with which to further the interests of its members.

The benevolent fund of the Association is very sound, but it should be continuously augmented, as the greater the membership of the Association, the greater the possibility of calls on its funds.

The Future Relationship of the Various Branches of the Profession in South Africa.

This review cannot be complete unless some reference is made to the inter-relationship between the various branches of the profession in South Africa. After the retirement on superannuation in 1928 of Theiler and Borthwick, the two Divisions, that of Veterinary Research and Education, and of Veterinary Field Services, were amalgamated into the Division of Veterinary Services which we know today. P. J. du Toit was the first director of the Amalgamated Division. This step has proved to be a wise one and it is likely that the Division of Veterinary Services will continue to function in its present form for many years. There has been a suggestion recently, of splitting off the section charged with Veterinary Education and of incorporating it solely under the control of the Pretoria University.

There is much to be said for this idea. Little harm can be done by developing a section of Veterinary Education within the Division of Veterinary Services, at least until such time as adequate financial arrangements are made for its complete incorporation as an integral faculty of the University of Pretoria.

The combination of the Research and Field Sections of the Division of Veterinary Services has been a great success. It is hoped that these two sections will operate as one as long as a State Veterinary Service exists in South Africa.

What of the future relationship between Veterinary private practice in all its aspects, Municipal Veterinary Service and the Division of Veterinary Services? There is no doubt that every endeavour must be made by each one of us engaged in these fields to collaborate to the full for our mutual benefit, for the advancement of animal welfare, and of the animal industry. Some consider that this collaboration might be stimulated if the State agreed to permit private practising veterinarians to give assistance

to the Division when this was called for, on payment of a prescribed fee. The control of bovine tuberculosis and of the other diseases which adversely affect the food production potential of livestock, has not yet commenced on any scale. State Departments move very slowly into new lines of action and while the staff shortages persist, many of us have little time for planning future development.

In the meantime I would appeal to all veterinarians to collaborate with each other to the full. There exists a very good esprit de corps. We should maintain this however much our numbers may increase. Let none of us fail to appreciate each other's value and each other's needs and in due course the interrelationship will work as we would like it to.

Jl. S.A.V.M.A. 24(3), 1953.

A CAREER IN VETERINARY RESEARCH

E. M. ROBINSON
Pretoria.

One of the avenues of employment open to the newly qualified veterinarian is a career in research. It is surprising how few actually seriously consider what is unquestionably a very fascinating and satisfying occupation. To some extent this may be due to insufficient contact being made by the student with research work during his course. This applies perhaps less to that at Onderstepoort than for instance at one of the overseas veterinary schools or medical courses in general. The actual teaching sometimes occupies the greater part of the time of members of the staff, leaving little time for research. There is an idea current that only students of special ability can hope to make a success of a research career. Although it may only be to workers of a particularly brilliant type that epoch-making new ideas come, it is obvious that most of the research work being undertaken at present is being carried out by men or women of good average ability, working on some aspect or aspects of a problem in which certain ideas have been put forward which need development. This is not to say that brilliant ideas will not come to the average worker. They have in the past and will continue to do so, in some cases accidentally perhaps, but as has been said by Pasteur himself, new ideas come to the prepared mind. Research is almost the only field left in which the human being can satisfy his creative ability and spirit of adventure. This has been well stated by Zinsser in his fascinating book "Rats, Lice and History". Only recently Mount Everest has gone the way of nearly all the other unconquered natural hazards.

If it is desired to take up research work as a career, there should not be too long a delay before a start is made. No harm will result from a year or two in private practice or some other form of professional employment not connected with research, in fact it may be of great value, but the start should not be too long delayed as a research career demands a great deal of those who take it up. There are no easy problems left nowadays and whatever one may be taken up, the literature is in most cases vast and one has to become well acquainted with it.

It is doubtful whether it is advisable to start a research career on some special problem, learning various techniques while engaged on the problem. An exceptional man may succeed in this way, but it is far better to spend two or three years in

acquiring a good general background before tackling a specific problem.

The question arises, if a research career be envisaged, whether it is advisable to take a degree in one of the fundamental branches of science such as chemistry for instance, before commencing the veterinary course. Such previous training may prove invaluable but it is not always possible for a student to realize what is his particular bent at the commencement of his university career. There is also the fact that the seven or more years of study that are entailed sometimes result in staleness. For certain types of research work, more especially the study of physiology, bacterial and virus diseases, immunology, etc., some knowledge of biochemistry and biophysics is becoming more and more essential. The future of the branches of study mentioned is inextricably bound up in them. Probably a veterinarian will rarely become a specialist in biochemistry or biophysics and the services of highly trained workers who are not veterinarians will always be essential if the best results are to be obtained. However there is no reason why veterinarians should not obtain a good general biochemical training and then be in the position to deal with problems involving biochemical knowledge.

The veterinary profession cannot carry on without research. If it attempts to do so it will become static and finally consist of quacks. There is no real shortage of money for veterinary research but the emphasis is naturally on obtaining practical results with as little delay as possible. Much of the scientific work carried out in veterinary laboratories has been on the application of fundamental discoveries made in non-veterinary institutions. There has been little tendency for veterinarians to specialize in fundamental lines such as biochemistry for instance. This should be remedied and would be facilitated if there were more collaboration with teaching organisations where the lecturer, apart from his teaching duties, would be able to concentrate on fundamental problems which might have no immediate practical application. Over-organisation of research workers must be avoided as the best and most vital fundamental research will flourish best in a free atmosphere. It may be advisable for some at least of veterinary research workers to train in laboratories where no actual veterinary work is being carried out. This would give a different perspective and there would be association with workers in other lines, contacts which would be invaluable.

There is a limited field of employment for veterinarians in the teaching institutions such as the veterinary and agricultural faculties. Research and teaching should always be intimately associated with each other. Theoretically a teacher in a university should be in a very favourable position to do research work and as has been previously stated, would be in the position to deal with problems of no immediate practical value, but nevertheless

the solving of which is of fundamental importance to the progress of veterinary science. In practice the teaching sometimes absorbs all the energies of the teacher, but this should not be the case with proper organisation and adequate staff.

The question of the emoluments of research workers does not come within the scope of this short article. At present as for some years past it has been in a state of flux. As it is likely that the great majority of veterinary as well as other research workers will be in the employment of the state, it will be the government which will decide what these emoluments are to be.

In any case for the individual who is looking for an interesting and satisfying career, but in which he is not likely to make a fortune, he could do far worse than take up veterinary research.

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* Reference has been made to certain suggestions in an anonymous article "Some reflections on present day veterinary research" which appeared in the Veterinary Record of 31/3/35.

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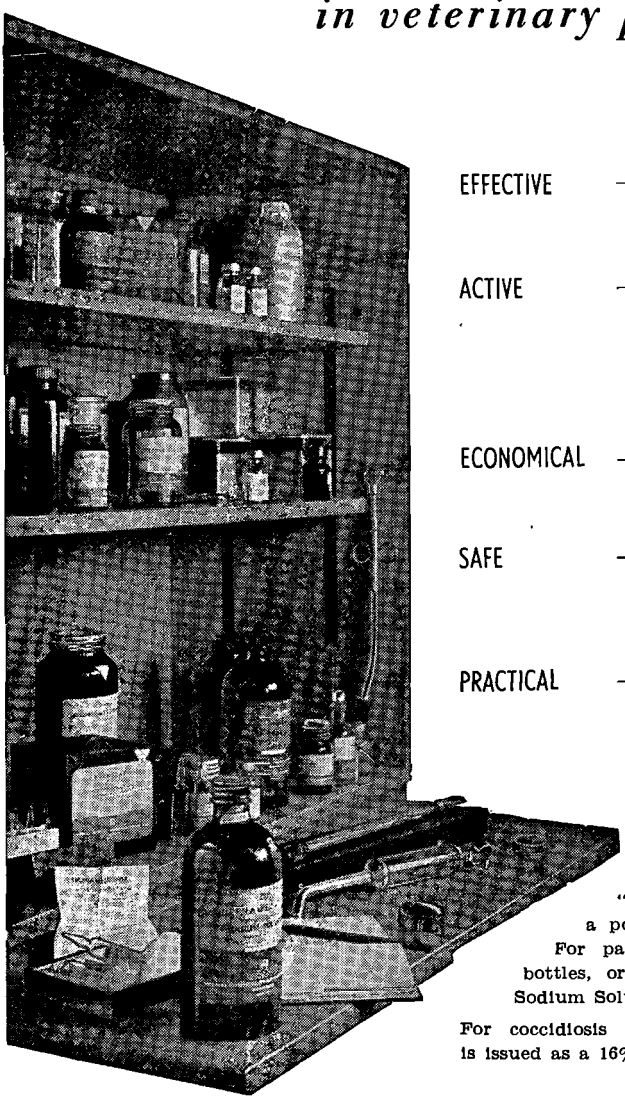

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A RECENT EPIDEMIC OF RIFT VALLEY FEVER IN THE ORANGE FREE STATE

N. T. VAN DER LINDE
Bloemfontein.

Alexander in August, 1951, concluded his paper on "Rift Valley Fever in the Union," given to the South African Veterinary Medical Association, with the following words: "This summer we may have to sit back and watch the disease take its toll of animals and man. As I said initially only the future will tell."

This anticipated heavy mortality in the old infected areas of the western Orange Free State and along the Vaal River Valley in the far Western Transvaal and Northern Cape did not take place during the summer of 1951-1952, probably owing to the stock having acquired a natural immunity or an immunity having been conferred as a result of vaccination.

On 30/1/52, Rift Valley Fever was diagnosed on the farm "Weltevreden" in the old infected Wolvenspruit area of the Boshof district. Thirty-two sheep died from the disease and one cow which contracted the disease recovered. Laboratory examination confirmed the field diagnosis. This was the only outbreak recorded that summer.

On 30/3/53 an extensive investigation was carried out on the mortality of sheep from blue-tongue in the Gannapan area in the Fauresmith district, and on farms along the banks of the Orange River near the Hopetown-Fauresmith boundary. No cases of Rift Valley Fever could then be reported. However, during the previous night heavy thunder storms passed over that whole area and 3.58 inches of rain fell. Heavy rains again fell during the following week-end filling all the spruits, dams and large shallow pans, especially the Legpan and the Gannapan, where the water stretched for more than four miles. Where the slope of the terrain permits there is often an overflow of water during rainy seasons into other pans in the vicinity. These pans have a locus of 24°40′ longitude and 29°40′ latitude and are situated about 15 miles north-west of Luckhoff and 20 miles from the Orange River.

Climatological conditions for the breeding, hatching and propagation of the insect vectors of the Rift Valley Fever virus became most favourable. Towards the middle of April the severe epidemic of blue-tongue in that area eased off, as a result of light frosts and slightly cold weather. This early cold snap passed over and on April 20th recently shorn sheep started dying on

the farm "Eldorado" and on April 24th on the adjoining farm "Legpan". The incidence of this heavy mortality was reported on April 28th, and on the same day the malady was investigated. A diagnosis of Rift Valley Fever was made, and the outbreak reported to the Director of Veterinary Services. Immediate measures to vaccinate all the susceptible stock and to protect them by means of spraying with B.H.C. insecticides were undertaken. "Eldorado" as the crow flies is 77½ miles from the last known infected farm "Weltevreden".

Soon afterwards the disease appeared on eleven (11) farms within the same area where the dams and pans had filled up with water. Whereas no figures are available in connection with numbers of sheep and cattle lost in the Free State during the 1950-51 outbreaks the following table illustrates the incidence of the disease in sheep, cattle and humans on the infected farms in the Gannapan area.

FARM	CATTLE			SHEEP			Duration of Mortality	Cessation of Mortality after Vaccination	No. of Human Cases
	Total on Farm	Deaths	Abortions	Total on Farm	Deaths	Abortions			
Eldorado	12	—	3	1200	201	—	3 weeks	9 days	5
Legpan	30	1	—	2500	208	—	3 weeks	10 days	4
Bossiespan A . .	10	2	2	900	210	50	2 weeks	9 days	1
Wolveenkraal . .	40	—	—	2000	45	—	2 weeks	9 days	—
Nelsdam	28	—	—	1150	60	4	2 weeks	8 days	1
Overskot	15	—	—	1200	20	—	2 weeks	9 days	—
Koppiesdam . . .	19	—	—	1220	30	—	3 weeks	9 days	—
Bossiespan B . .	3	—	—	1060	50	—	2 weeks	9 days	—
De Rif	50	1	—	2030	4	—	2 weeks	9 days	1
Alpha	25	—	—	820	3	—	11 days	9 days	—
Wolvenplaat . .	35	—	—	1400	20	—	2 weeks	9 days	—
TOTALS: 11 .	267	4	5	15480	853	54			12

The incidence of abortions in sheep would have been higher in this outbreak had most of the flocks not finished lambing. Two cows aborted during the outbreak.

Three cows aborted about 6 weeks after the end of the outbreak. When subjected to the virus-neutralization test, they all showed antibodies against Rift Valley Fever. Laboratory findings however could not prove whether these abortions were due to vaccination or to a natural infection.

All stock on the infected farms were vaccinated as soon as possible after Rift Valley Fever vaccine was obtained and farmers in the adjacent areas used the vaccine prophylactically. The mortality in sheep continued for about 9 to 10 days after vaccination and it can therefore be concluded that it takes about

10 days before sufficient immunity is established to arrest mortality completely during any outbreak.

The following features of the disease during this outbreak should be recorded:—

(a) The rapid decomposition of the carcase, in spite of the cool weather, was as significant on post-mortem examination as during the 1950-1951 outbreak.

(b) The liver did not show the typical yellowish brown colour but a dark reddish brown one. This organ also appeared to be more swollen than previously. Haemorrhages in the liver were more evenly distributed amongst the yellow necrotic foci. The massive haemorrhagic areas under the liver capsule as seen in 1951 were now smaller and more evenly distributed in the necrotic liver tissue. On the whole there now appeared to be more haemorrhage in the liver which accounted for the dark reddish brown colour of the organ. It was as friable as in previous cases. These observations were made on both freshly killed sheep and sheep which died from the disease.

(c) There was a tumour splenis in all cases with haemorrhages under the capsule.

(d) The lymph glands, and especially the mesenterics, were enlarged, moist and also showed extensive haemorrhages, although they were not discoloured as in African Swine Fever for example.

(e) The gall-bladder showed a typical haemorrhagic cholecystitis. The bile was thick and in some cases mixed with clotted blood.

(f) Although the lungs were hyperaemic, no haemorrhages were encountered in the lung tissue.

(g) The kidneys were pale, much enlarged and showed haemorrhages under the fibrous capsule. The sub-capsular blood vessels were congested.

(h) The fat in the renal adipose capsule showed such degeneration that only minute specks of fat were seen in a watery gelatinous mass. This condition was encountered in really fat carcases.

(i) In young lambs there was perforation of the abomasum and the caecum.

(j) The heart showed large endo- and epicardial haemorrhages. There was also extensive haemorrhage in the abdominal cavity where masses of clotted blood were encountered. There were more haemorrhages in the skin itself, especially around the eyes, in the inguinal region, on the udder, on the scrotum, and in the axilla, than previously noticed. In a few cases there was a slight coronitis and in no case was haemorrhage present in the feet.

(k) The course and symptoms of the disease corresponded with those observed in the 1950-1951 outbreak.

Finally it is co-incidental that as in the previous outbreak large numbers of migratory birds and locusts were present in the infected area, probably owing to similar climatic conditions prevailing during both outbreaks.

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A FIELD CAMPAIGN AGAINST WORMS IN THE ERMELO AREA

L. W. ROSSITER
Ermelo.

I wish to emphasize that this talk is not in the nature of a learned treatise such as you have heard and will hear from our colleagues at Onderstepoort, nor do I make any pretension to being a helminthologist. It was therefore with considerable trepidation and reluctance that I accepted the invitation to tell you something of a field campaign against worms which we have initiated in the Ermelo veterinary area.

Might I be permitted, briefly, to sketch the background of this campaign. My previous experience had been exclusively in East Coast Fever areas and arriving in Ermelo some four years ago, I naturally wondered how best I could occupy my time and how most usefully I could serve the community in which I lived and worked.

Two things struck me very forcibly soon after taking over,

(1) the very poor condition of the stock, particularly the cattle, even when the feeding was comparatively good, and the fact that whilst the sheep farmer dosed his sheep more or less regularly for internal parasites, no attempt whatsoever was made to dose cattle for the same condition;

(2) that little or no use was made of the Inspectorate staff, many of whom were men of vast experience and all of whom had received some form of technical training. These men, on the look out for scheduled diseases, roamed rather aimlessly through their areas without being of any real assistance to the average farmer.

It was at this stage that I was privileged to hear an inspiring address delivered at such a Conference as this a few years ago, entitled "The Rôle of the Veterinarian in Human Health". In his address Professor van Rensburg drew attention to the menace of the erosion diseases and conditions and the fallacy that exists that a veterinarian is merely the healer of sick animals. He appealed to the profession to be in the forefront in endeavouring to assist stock farmers to produce more of those protective foods of animal origin which are so essential for human nutrition. While this address inspired me, it was at the same time a challenge and an opportunity for action.

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* Paper read at the Annual Meeting of the S.A.V.M.A. 18th August, 1953.

It was obviously impossible to tackle each and every problem mentioned in that address, but the many post mortems made on cattle and sheep in the course of my official duties indicated that both the species mentioned were very heavily infected with worms. This then gave me the clue as to how I as a veterinarian could play a part in helping to bring about this greater production of foods of animal origin. A worm survey of the area was then carried out and numerous examinations of faeces were made, the results obtained confirmed the findings at the post mortems. It was found that cattle were mainly infected with paramphistomes, wire worms (*Haemonchus contortus*), bankrot worms, i.e. *Cooperia* species, and calves with tapeworms. In sheep the commonest worms were paramphistomes, wire worms, bankrot worms (*Trichostrongylus* species), nodular worms (*Oesophagostomum columbianum*), with tapeworms in lambs and young sheep, plus the ubiqitous liver fluke in both cattle and sheep.

It has been estimated by Mohler of the Bureau of Animal Industry that the annual loss suffered by the United States from parasites is some 418,000,000 dollars, while Taylor, a leading British parasitologist, considers that the annual losses suffered in the United Kingdom cannot be very much less. So far no one has attempted to assess the losses suffered by the Union, but in doing so it must be remembered that in addition to the direct and indirect losses suffered from internal parasites by the odd 100,000 farmers in this country, the terrific losses suffered by the non-European stock-owner must be added. Of the 12½ million cattle in the Union a little less than 50% are owned by the non-European and most of this stock is in the high summer rainfall areas like Zululand, Natal, the Eastern Transvaal and the Transkei, where internal parasites flourish. However difficult it is to estimate these losses, it is possible, I think, to say that they run into tens of millions of pounds per annum. Not only are these personal and individual losses, but they also represent a loss to the State and affect, amongst other things, our standard of living.

It was therefore decided to begin a small field campaign against internal parasites in the Ermelo district. It was felt that not only had the farmer to be told of the different remedies but that the advantages of a planned dosing programme for his stock would actually be demonstrated to him. In this connection it was decided to call on the Inspectorate staff to do the actual dosing. The remedy chosen was TETRAM, which as you know, consists of 99% Tetrachlorethylene, in the first place because it is effective against those worms which were most often found in sheep and cattle, with the exception of the nodular worm in sheep and liver fluke in both species; and secondly because of its cheapness. For example, a single dosing works out at ⅔ penny per sheep and 1⅔ penny per bovine.

In starting this campaign one literally had to bully the first few farmers into ordering the remedy. It was found that most farmers were unacquainted with the remedy whilst the few farmers that had heard of it were scared of it as they always knew of someone who had had severe losses after dosing with it. Today the position is vastly different because of the wonderful results which we have had, with the result that the remedy sells itself. I might mention in parenthesis that a few years ago the Ermelo office took only £300 to £400 per annum for vaccines but last financial year a sum of over £4,000 was taken. This increase is of course not all due to Tetram but it does show what effect propaganda has if backed by active assistance.

We concentrated on those herds and flocks showing the more obvious signs of worm infestation. We did not attempt to determine the particular kind of worm or worms responsible on each and every farm. The actual dosing, as has already been mentioned, was done and is still being done by the Inspectorate staff. The results obtained were in most cases beyond our expectations whilst in many cases they were nothing less than spectacular.

In cattle within 7 days one notices that they begin to fill their stomachs and within 14 days that they already begin to lie down at about 11 a.m. to chew the cud continuously where previously they were like locusts who eat, digest and discharge. They begin licking their coats and the old hair which looks as if it had been severely frost-bitten soon drops off and is replaced by a short, smooth and shiny coat. The animals move as if they are alive and not like the proverbial beast of burden; their eyes brighten and they take a more intelligent interest in their surroundings. Even in winter such cattle put on weight provided they are adequately fed, and in milk cows there is an increase in milk production without any extra feed.

Apart from these more immediate results it is very obvious that dosed cattle retain their condition so much better throughout the winter and are easily distinguished from cattle not dosed. Farmers find that they manage with less feed whilst the condition of their cattle remains good.

Sheep show very much the same changes; their "porridgy" dung, an infallible sign of worm infestation, soon becomes drier and finally normal. In those infected with nasal worm, the mucous nasal discharge begins to dry up within 3 to 5 days in about 80 to 90% of the sheep. There seems to be a very definite correlation between the degree of worm infestation and the degree of nasal worm infection, and it is our experience that if the internal parasites are energetically treated by dosing with Tetram — I repeat by dosing — nasal worm infection can very largely be eliminated.

In the first year the Inspectorate staff dosed some 56,000

head of cattle and 86,000 sheep in the Ermelo district in addition to their routine duties. There was no mortality in cattle, but it was noticed that milk cows fed on concentrates and cattle on lands were slightly more affected by the dosing — some staggered a bit and took some time to find their bearings.

On the other hand there were at least 25 sheep that, in our opinion, died as the direct result of dosing with Tetram. The majority died within a few seconds after dosing, although there were a few that died within an hour or two after it. The post mortem lesions are very similar to those of prussic acid poisoning. Many of the sheep became what one can best describe as "drunk," but if they were allowed to lie quietly in the shade they soon recovered. To some of these sheep we gave a cupful of strong sugar solution and this seemed to have a beneficial effect. We have been unable to establish any mortality in sheep at a later stage after dosing with Tetram in contra-distinction to certain Australian experience as reported by Southcott in the Australian Veterinary Journal. Here 18 sheep out of 420 died a couple of days after dosing with the pure drug.

An attempt was made to determine the cause of this mortality and as bloating was an invariable symptom in those sheep dying or very badly affected, it was decided to try dosing after a short period of starvation. This year some 145,000 sheep were dosed by the Inspectorate staff but we have insisted that all sheep to be dosed be kraaled early in the afternoon prior to dosing; we have dosed in all kinds of weather and throughout the day if necessary; we have not lost a single sheep as the result of dosing.

I therefore consider the advice given in the pamphlet accompanying the Tetram, namely to dose in the late afternoon, as not only wrong but dangerous.

If the secret of safe dosing is the period of starvation prior to dosing, then the secret of success in dosing sheep with Tetram is the dosing of a sufficient quantity of the 10% copper sulphate solution immediately prior to the Tetram in order to short-circuit the latter into the abomasum instead of allowing it to enter the rumen. In the case of cattle it is of course the dosing of a sufficient quantity of 10% salt solution. A few farmers complained that after dosing with Tetram they did not get the results expected and that they had found wireworm in sheep slaughtered a few days after dosing. Naturally these complaints were investigated and it was found that the farmers had one and all used very small doses of copper sulphate solution, which without doubt caused the Tetram to enter the rumen instead of the abomasum. In order therefore to make absolutely certain that the Tetram will enter the abomasum we now dose, instead of the X spoonful recommended, a dessertspoonful of 10% copper sulphate solution.

Good as the results were in sheep that were initially obtained,

it was found that even better results were obtained after dosing with either Nodular Worm Remedy or phenothiazine, and where necessary, with carbon tetrachloride for liver fluke.

*In cattle too some herds did not respond in the manner expected, in fact some herds actually appeared to have lost condition after dosing with Tetram and on investigating the matter it was found that they were very heavily infected with liver fluke. The areas where liver fluke infection exists are much more extensive than was originally thought and in them we dose with hexachloroethane and Tetram at an interval of 10 to 14 days. The results from this double dosing are truly amazing and today hundreds of pounds weight of hexachloroethane are dosed by the farmers themselves.

Most farmers immediately grasped the method of dosing, not that there is anything particularly difficult about it, and appreciating its advantages, carried on on their own. On the other hand there are unfortunately many farmers who lack that little bit of backbone to enable them to carry on without being spoonfed. However unfortunate it is that stock is owned by such farmers one should not forget that it is the stock, their health and their productivity, which is our main concern and even if it does entail more than one visit by the Inspectorate staff, it is, I maintain, worth it in the end.

This dosing campaign has had an incidental yet by no means unimportant result. It has greatly improved the relationship between the stock farmer and our staff.

I do not for one moment suggest that dosing with Tetram and the other remedies mentioned is the solution of all the stockfarmer's troubles, but I do maintain that if he can rid his stock of all internal parasites he will have done much to respond to that challenge to produce more and yet still more. It is not only the European but the non-European stock-owner who has to be educated and assisted to adopt a planned dosing programme. It will, amongst other things, enable the non-European to contribute more of the meat consumed by tens of thousands of his urbanised countrymen where now he contributes little. Not only will it focus attention more prominently on one of the most insidious forms of erosion disease but it will also raise the status of our profession.

In conclusion, therefore, I have tried to indicate firstly one more way in which the veterinarian can play a major rôle in helping the stockfarmer to produce more of those foods of animal origin which are so essential for human nutrition; secondly, how necessary it is to make the best possible use of the experienced and trained Inspectorate staff, and thirdly, how incidentally to improve the relationship between us and the public we serve.

SOUTCOTT, W. H. (1951). Australian Vet. J. 27. 6.
TAYLOR, E. L. (1951). M. & B. Vet. Review 2. 4.

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DIE VERSORGING VAN KALWERS

Dit is my beskeie mening dat die vernaamste vraagstukke waarmee die veterinêre professie in Suid-Afrika vandag te kampe het onvrugbaarheid onder teeldiere en verliese onder kalwers is.* Volgens Van Rensburg is die omvang van onvrugbaarheid onder ons beeskuddes so wyd vandag dat daar nouliks 800,000 van nagenoeg 1,750,000 melkkoeie en verse elke jaar kalf. Van die 800,000 kalwers wat gebore sou word is ongeveer die helfte bulkalwers, en van die oorblywende 400,000 verskalwers gaan daar, volgens my waarnemings, nog naasteby 40 tot 50 persent verlore as gevolg van slegte versorging, verkeerde voeding, siekte, slagting, ens.

Die gevolg van hierdie toedrag van sake is dat minder as 15 persent van die jaarlikse kalweroes beskikbaar is om normale verliese to vervang en nog verder voorsiening te maak vir vermeerdering van die veestapel.

Die gevaarlikste tydperk in die lewe van die bees is die eerste paar maande na sy geboorte. Gedurende geen ander periode van sy lewe is daar so 'n hoë vrekte nie. Dit moet dus ons doel wees om die vrekte gedurende hierdie tydperk so laag as moontlik te hou.

Dit is blykbaar nie nodig om enige besondere maatreëls vir die welsyn van kalwers, wat onder natuurlike omstandighede in die veld gebore is en daar grootgemaak word, te tref nie. Maar kalwers wat onder kunsmatige toestande gehou word moet spesiale aandag kry en spesiaal behandel en versorg word. Hoe meer die omgewingstoestande van die natuurlike afwyk, hoe makliker sal verstorings plaasvind en hoe moeiliker sal dit wees om die gesondheid van die kalf te handhaaf.

Die Behuising. Die gewone toestande waaronder kalwers in hokke, krale, vuil stalle of vuil kampe gehou word laat veel te wense oor en is seker die vernaamste oorsaak van meeste kalwersiektes in Suid-Afrika. Hoe 'n ideale kalwerstal moet wees is 'n saak waaroor daar nog heelwat verskil bestaan. Sommige werkers beveel 'n afsonderlike stal vir iedere kalf aan, terwyl ander van mening is dat so 'n stal nie nodig is nie, en selfs onwenslik mag wees omdat 'n kalf van geselskap sou hou, en nie gelukkig sou wees om afgesonder te word nie. Somtyds is die stal baie lugtig, en selfs heeltemal oop aan die een kant, of die kalf word buite

* Daar was in die verlede soveel ander dringende probleme wat onmiddellik ondersoek moes word dat hierdie twee nie die nodige aandag kon geniet nie.

in 'n plek waar daar skaduwee en skuiling is gehou. In ander gevalle word die kalf in 'n stal, wat digtoe gemaak kan word, vir twee of drie maande gehuisves.

Volgens my mening is, afgesien van behoorlike voeding en higiëne, egaligheid van die temperatuur in die stal die vernaamste vereiste. Dit geld besonder vir 'n land soos Suid-Afrika waar daar so 'n groot verskil tussen die maksimum- en minimum-temperatuur op dieselfde dag kan wees. 'n Skielike verandering in die temperatuur van die omgewing van die kalf, 'n trek in die stal, 'n nat en 'n koue vloer kan 'n baie nadelige invloed op sy gesondheid uitoefen.

Dit is nie nodig om voorsiening te maak vir meer as 30 tot 40 vierkante voet vloerruimte per kalf in die kalwerstal nie. Maar die hele gebou, insluitende die plafon, moet goed geïnsuleer word, die vensters en deure moet goed pas en die vloere moet van beton of hol teëls gemaak wees, en na 'n afloopvoor aan die een kant van die stal val. Die vloer moet egter altyd goed bedek wees met droë kooigoed, sodat die kalf warm kan staan, maar die kooigoed moet onder geen omstandighede nat word nie. Dit moet óf elke paar dae verwyder word, óf met vars kooigoed aangevul word. In koue weer moet die stal digtoe gehou word, sodat die warmte wat deur die kalf self afgegee word 'n egalige temperatuur in die stal kan handhaaf. Namate die temperatuur in die buitelug styg, kan vars lug by die deure en vensters ingelaat word, maar maatreëls moet voortdurend, in die somer sowel as in die winter, teen 'n trek geneem word.

Dit is wenslik om 'n voergang met 'n vasmaakplek aan die een kant van die stal op te rig. Daar moet ook voorsiening gemaak wòrd vir 'n hooirak en waterbak in iedere stal.

Voeding. Verreweg die gesondste kalwers is dié wat aanhoudend in die veld saam met die koeie loop. Onder sulke natuurlike omstandighede drink die kalf dikwels, maar net klein hoeveelhede melk op 'n keer; hy oorlaai sy maag nooit nie en verstorings van die maagdermkanaal tree nie in nie.

Selfs wanneer die kalf afgehok word en hy drink net in die more en in die aand met melktyd aan die koei neem hy iedere keer 'n halfuur of langer om klaar te suip.

Dieselfde geld vir kalwers wat aan pleegkoeie grootgemaak word. 'n Ou koei, of een wat uiermoeilikheid het, word as pleegmoeder vir twee of meer kalwers gebruik, volgens die hoeveelheid melk wat sy gee. Na 'n tydperk van tien of twaalf weke word die kalwers verwyder en deur 'n nuwe groep vervang. Op hierdie wyse kan een koei soveel as agt tot twaalf kalwers per jaar grootmaak.

By al hierdie suipkalwers word die melk stadig gedrink en geleidelik na die abomasum geneem, waar dit met die verteringsappe meng. Die abomasum word nie oorlaai nie en, mits die

versorging verder niks te wense oorlaat nie, sal daar geen sprake van verstoring van die verteringstelsel wees nie.

Aan die ander kant, wanneer die kalf uit 'n emmer gevoer word, en sy melk slegs tweekeer per dag kry, is hy gewoonlik so honger en dors as die maaltyd kom, dat hy sy hele rantsoen in minder as een minuut wegsluk. Die abomasum word oorlaai en 'n gedeelte van die melk word na die voormae teruggestoot, waar dit as voedingsbodem vir die aanwesige bakterieë kan dien. Is dié kieme skadeloos, gebeur daar gewoonlik niks nie, maar indien daar skadelike organismes aanwesig is mag hulle lei tot een of ander verstoring.

Daar bestaan heelwat onsekerheid omtrent die hoeveelheid volmelk wat 'n kalf moet kry. Ofskoon dit algemeen aanvaar word dat die volmelkrantsoen van 'n kalf ongeveer 10 persent van sy liggaamsgewig per dag moet wees, kry die kalf dikwels aansienlik meer of selfs minder as hierdie hoeveelheid. Volgens waarnemings wat in Nederland, Swede en elders geneem is het die voeding van verskalwers 'n belangrike invloed op hul latere vrugbaarheid wanneer geslagsrypheid bereik word. Teveel volmelk en die daaropvolgende ophoping van vet in die liggaam kan die kiemselle van die eierstok so erg beskadig, dat die volwasse vers later nie in staat mag wees om te teel nie. Johannsen en sy medewerkers het in 'n proef met identiese tweelingverse op die stasie Wiad naby Stockholm vasgestel dat, binne sekere perke, hoe hoër die voedingspeil waarop die kalwers gevoer word, hoe laer hul vrugbaarheid sal wees. Aan die ander kant is gevind dat die vrugbaarheid van verskalwers wat 'n matige of selfs 'n lae melkrantsoen kry gewoonlik nie veel te wense oorlaat nie.

Die totale hoeveelheid volmelk wat 'n kalf moet kry hoef nie 15 tot 20 gallon te oorskry nie. Teen die einde van die volmelkperiode, ongeveer twee tot drie weke na geboorte, kan die volmelk geleidelik met afgeroomde melk vervang word. In Nederland word die afgeroomde melk eers gepasteuriseer en dan met 'n kultuur *Lactobacillus* of *Streptococcus lactis* besmet. Eers na 24 uur, wanneer die melk goed suur is, word dit aan kalwers verstrek. Kalwers wat op suur gepasteuriseerde ondermelk gevoer is, sou dan nie aan kalwersiektes onderhewig wees nie. Aan die ander kant, melk wat nie vooraf gepasteuriseer is nie, mag met patogeniese kieme besoedel wees en kan sodoende nie met veiligheid aan kalwers gegee word nie.

Melk-substitute.

As gevolg van die stygende produksiekoste van melk het die opfok van kalwers op volmelk so duur geword, dat die gebruik van melkvervangmiddels in die afgelope tyd baie aandag geniet. Indien die samestelling van die vervangmiddels aan sekere vereistes voldoen en dit word streng volgens voorskrif gebruik, kan dit met die grootste vrymoedigheid aanbeveel word. Minstens 80 tot 85 persent van die bestanddele moet droë melkprodukte

(afgeroomde melkpoeier, weipoeier, kaasstof) wees. Die res kan aangevul word met maklik verteerbare koolhidrate, brouersgis, minerale soute en vitamien A-poeier. Lewertraan moet liewers nie in die mengsel geplaas word nie maar vars verstrek word. Ongeveer een pond van die mengsel in een gallon water moet in voedingswaarde naasteby aan een gallon melk gelykstaande wees. Voor iedere maaltyd word 'n sekere hoeveelheid van die middel in genoeg warm water ge-emulsifiseer en dan aan die kalf verstrek. Dit moet iedere keer vars aangemaak word.

Na 'n kalf vir ongeveer sewe tot tien dae kolostrum en sy moedersmelk gekry het, kan die melksubstituut ingevoer word. Maar die oorgang van melk na vervangmiddel moet geleidelik wees. In die afwesigheid van melk kan die vervangmiddel eers in 'n verdunde vorm met water verstrek word, totdat die kalf daaraan gewoon is.

Die gewone vereistes in verband met versorging, higiëne, skoonheid van die kosbakke, reëlmatigheid van voeding, ens., ens., moet stiptelik nagekom word. Die sukses van die onderneming sal afhang van die deeglikheid waarmee hierdie vereistes uitgevoer word.

Die voer van meel in plaas van melk aan jong kalwertjies, óf dit in 'n droë vorm óf as 'n emulsie verstrek word, kan nie sterk genoeg afgekeur word nie. Dit sal sonder enige twyfel 'n geweldige verstoring van die maagdermkanaal veroorsaak.

Of die kalf op melk of melksubstituut gevoer word moet maatreëls vroegtydig getref word om die ontwikkeling van die voormae en die vertering van vesel aan te moedig. Van die tiende dag af moet 'n bietjie eerste kwaliteit hooi en kalwerneute binne die bereik van die kalf geplaas word, en die kalf moet aangemoedig word om so gou as moontlik aan die hooi te peusel. Onder die invloed van ruvesel, waaraan die groeiende kalf steeds meer behoefte kry, ontwikkel en vergroot die voormae vinnig. Terselfdertyd moet die voormae besmet word met pensflora wat verantwoordelik vir die opbreek van die vesel is. Maar besmetting met pensflora kan slegs geskied wanneer daar direk of indirek aanraking met 'n ouer bees is wat alreeds herkou. Die inname van vesel, die vergroting van die voormae en die besmetting van die maaginhoud met pensflora geskied alles hand aan hand. Die een is afhanklik van die ander. Besmetting van die voormae met pensflora kan aansienlik verhaas word deur die kalf óf 'n vars herkoutjie óf vars pensmis by die mond in te gee. Maar besmetting kan ook bevorder word deur 'n ouer kalf in baie noue aanraking met jong kalwertjies te plaas.

Die mikroflora van die rumen is egter baie kieskeurig. Hulle sal hulle bedrywigheid aansienlik inkort en mag hulle werksaamhede heeltemal staak indien die hooi wat verstrek word nie van die allerbeste is nie. Deur gras of hooi te voer wat baie lignien bevat, sal die mikroflora honger ly, en later, indien die

kos nie verander word nie (sal hulle) heeltemal verdwyn. In sulke gevalle moet die voormae herbesmet word voor verdere ruvesel verteer kan word. Trouens, wanneer jong kalwertjies nie tot goeie hooi toegang het nie mag hulle enige growwe gras of kooigoed opneem, en sodoende mag daar irritasie en verstoring van die maagdermkanaal ontstaan.

Die waarde van die voormae en die pensflora vir die groeiende herkouer kan dus nie maklik oorskat word nie. Die herkouer is daarvan afhanklik vir sy groei, vir sy gesondheid en vir sy hele bestaan. Dit is in sy belang en in dié van die veeboer om die voormae so gou as moontlik in te span en dit in 'n gesonde, werkende toestand te hou.

Ofskoon die kalf neute of korrels nog nie by die tiende dag, of nog later, sal kan benuttig nie, moet hy tog geleidelik geleer word om dit op te neem. Namate sy voormae ontwikkel en hy meer hooi verteer, sal hy ook steeds meer neute kan verteer. Aan die begin kan die neute in die bodem van die emmer, onmiddellik na die kalf melk of melksubstituut gehad het, verstrek word. In sy gretigheid om nog melk uit die bodem van die emmer te kry, sal hy 'n paar neute opneem. In ander gevalle kan die neute in 'n hand geneem word en in die bek van die kalf geplaas word, sodat hy daaraan kan suig. Sodoende sal die kalf geleidelik meer en meer neute opneem, totdat hy eindelik dit met groot genot vreet.

Deur neute aan die kalf onmiddellik na sy gewone maaltyd te verstrek, sal daar nie veel geleentheid vir hom wees om die slegte suiggewoonte, wat suipkalwers so dikwels geneig is om aan te leer, te ontwikkel nie. Die aanleer van hierdie slegte gewoonte kan ook verhelp word deur iedere kalf met maaltye afsonderlik by sy voerbak vas te maak. Intussen word hooi en kalwerneute binne sy bereik geplaas om hom aan die gang te hou.

Die vernaamste bestanddele van kalwerneute of korrels is gemaalde graan, waarby 'n klein hoeveelheid melkpoeier, weipoeier, minerale soute en gis gevoeg is. Ander eiwit-ryke voedingstowwe soos wit, vet-vry vismeel en grondbonemeel, kan ook bygevoeg word, maar vismeel is geneig om die smaak te belemmer. Ongeveer 4 persent melasse word bygevoeg om die neute behoorlik te bind as dit gepers word. Hierdie neute is bekend as eiwit-ryk neute.

Namate die kalf meer hooi en neute opneem, sal sy afhanklikheid van melk en melksubstituut geleidelik afneem, totdat hy eindelik uitsluitlik op hooi en neute sal kan bestaan. Sodra sy voormae behoorlik gevorm is en die kalf genoeg ruvesel kan benuttig, sal sy buikomvang vergroot, sy algemene gesondheid sal verbeter, en hy sal baie minder geneig wees om aan maagdermverstorings te ly. Deur die vroeë ontwikkeling van die voormae aan te moedig en die vertering van rukos dus te verhaas,

sal dit nie nodig wees om groot hoeveelhede melk of melkvervangmiddels aan kalwers te voer nie. Na tien weke kan dit geheel-en-al met hooi en neute vervang word. Die neute wat nou verstrek word is bekend as eiwit-arm en dit bestaan byna uitsluitlik uit gemaalde graan, semels, lusern meel, minerale soute en melasse. Maar die oorgang van melk of melkvervangmiddel na eiwit-arm neute moet ook geleidelik geskied.

Kalwers wat op min melk of melksubstitute gevoer word mag in die begin skyn om agterlik te wees in vergelyking met kalwers wat volop melk gekry het, maar hierdie agterstand sal gou ingehaal word sodra hulle genoeg hooi kan benuttig. Hoe gouer hooi opgeneem word en hoe beter die gehalte van die hooi is, hoe gouer sal die agterstand verdwyn.

Wanneer daar nie behoorlik op die versorging van die kalf ag geslaan word nie, sal die weg wyd vir allerhande besmettings oopgestel word. In die pasgebore kalf sal virulente stamme *Bacterium coli* hul verskyning maak; daarna sal die gunstige toestande, wat deur die swak versorging geskep is Salmonella's, Corynebacterium, Necrophorus, Koksidia en ander besmettings bevorder. In die begin, wat die aard van die besmetting ook mag wees, is daar altyd verstoring van die verteringsetlsel tot 'n minder of 'n meerdere mate. Indien die diertjie nie gou aan septicaemie of toxaemie beswyk nie, sal ontsteking van die longe gewis intree. Om hierdie rede word daar altoos so 'n verskeidenheid van mikro-organismes in die longletsels in gevalle van pneumonie aangetref. Daar is tans nog geen helderheid in verband met die rol wat ieder en elk van hierdie kieme in die patogenese van kalwerpneumonie speel. Sover is daar nog net een smetstof gevind wat as 'n onmiddellike oorsaak van longontsteking kan intree; dit is die virus van kalwerpneumonie wat onlangs deur Glover en Jennings beskryf is — maar selfs hierdie besmetting gaan dikwels gepaard met 'n maagdermontsteking. Dit is my mening dat longontsteking in kalwers wat gepaard gaan met die indringing van die longweefsel deur Salmonella's, Corynebacterium, Necrophorus, Bact. coli, Staphylococcus, Streptococcus en ander bakterieë, grotendeels die gevolg van verkeerde of slegte versorging is.

Ten slotte, om te oordeel na die geweldige vordering wat kunsmatige bevrugting in Europa gemaak het en die belang wat Suid-Afrikaanse beestelers daarin stel, moet die vooruitsigte vir 'n uitgebreide diens in kunsmatige bevrugting in die nabye toekoms besonder gunstig wees. Dit sal egter nie net lei tot die uitskakeling van meeste geslagsiektes nie, en daardeur die vernaamste oorsake van onvrugbaarheid, maar ook tot 'n aansienlike vermeerdering in die getal en 'n verbetering in die gehalte van die kalwers en die veestapel. Dit alles moet groter verantwoordelikheid vir die veearts meebring. Die handhawing van die gesondheid en die versorging van hierdie ekstra kalwers

kan alleen met sy medewerking slaag. Indien die kalf van vandag behoorlik versorg word, sal daar geen moeilikheid met die melkkoei of slagos van more wees nie.

OPSOMMING

(1) Onvrugbaarheid en kalwervrektes is vandag die twee vernaamste vraagstukke vir die Suid-Afrikaanse Veearts.

(2) Minder as 15 persent van die jaarlikse kalweroes is beskikbaar vir die aanvulling van Suid-Afrikaanse melkbeeskuddes.

(3) Kalwerverliese kan aansienlik verminder word indien die algemene gesondheid van die kalwers verbeter kan word deur voorsiening te maak vir behoorlike versorging, behuising en voeding.

(4) Kalwers kan ekonomies kunsmatig grootgemaak word deur hulle (1) aan pleegkoeie te laat drink, (2) op suur gepasteuriseerde afgeroomde melk te voer, en (3) op melkvervangmiddels, wat aan sekere vereistes voldoen, te voer. Die versorging van die kalwers moet niks te wense oorlaat nie.

(5) Die verstrekking van kalwerneute aan kalwers word aanbeveel. Deur neute onmiddellik na 'n maaltyd te verstrek sal die kalf nie die slegte suiggewoonte aanleer nie.

(6) Die waarde van ruvesel vir die welsyn van die kalf kan nie genoeg benadruk word nie. Dit bevorder die „besmetting" van die voormae met mikroflora en dit prikkel die ontwikkeling van die voormae. Hoe eerder die kalf geleer kan word om ruvesel te benuttig, hoe eerder sal kalwersiektes verdwyn. Maar slegs hooi van die allerbeste gehalte sal gunstige omgewingstoestande vir die pensflora skep.

(7) Wanneer siek kalwers verwaarloos word, afgesien van wat die oorsaak van die siekte mag wees, sal longontsteking byna sonder uitsondering intree.

(8) As gevolg van die uitgebreide kunsmatige bevrugtingsdienste wat in hierdie land in die vooruitsig gestel word, sal die grootte, gehalte en waarde van die kalweroes jaarliks aansienlik toeneem. Die medewerking van die veterinêre professie is noodsaaklik om die gesondheid van hierdie kalwers te bewaar.

[*For English Summary see page* 174.

LEPTOSPIROSIS IN DOGS IN SOUTH AFRICA

W. D. MALHERBE and V. R. KASCHULA
Onderstepoort.

(Paper presented at the 48th Annual Conference, S.A.V.M.A., 19/8/53.)

ABSTRACT

This paper records for the first time that canine leptospirosis exists in the Union of South Africa. After a general review of the world situation concerning leptospirosis, the methods by which the diagnosis was made and confirmed at Onderstepoort are described. The available evidence indicates that the major rôle is played by L. canicola. *From the discussion following the paper it transpires that Weil's disease has recently been diagnosed in Cape Town and that it is suspected to occur in Durban in dogs.*

INTRODUCTION

It is probable that few clinicians in South Africa dealing with diseases of dogs have not wondered at one time or another whether the so-called Stuttgart disease does not exist in this country. Certainly many veterinarians have fallen into what should be regarded as the error of calling the uraemic syndrome, particularly that of chronic nephritis, Stuttgart disease. It is today generally accepted that this name should be used only for *Leptospira canicola* infection.

In Europe generally, and certainly in England, there seems to be a fairly general view that for practical purposes, nearly all nephritis in dogs is caused by leptospirosis[4]. Here, however, there is a considerable amount of evidence that this is not the case, since we have very prevalent infectious diseases which cause a certain amount of kidney damage and are responsible for many cases of kidney failure [5, 6]. Nevertheless we have for years been encountering nephritic syndromes in youngish dogs which we were unable to ascribe to the familiar infectious diseases. In the Onderstepoort small animal clinic these cases have become noticeably more frequent. Many of them were characterized by some fever, moderate to severe stomatitis, and very marked malaise. Often they showed a severe bloody diarrhoea. Ordinary symptomatic treatment gave very disappointing results, but it was soon found that four day courses of penicillin, without any local treatment, were very efficient in clearing up all symptoms of the disease within about a week.

Now and again a case did not respond, and it was found that organic changes were already too far advanced. The clinical and

clinical-pathological picture was one of uraemia, and it was clear that though the primary cause had been eliminated, the kidneys had undergone irreparable damage.

INCIDENCE AND DISTRIBUTION

There are a large number of different species of leptospirae affecting a number of different kinds of animals. Wiesmann[10] in a recent and comprehensive review lists some forty species of pathogenic leptospirae. The effect on animals, including humans, varies from a clinically hardly recognizable deviation from the normal to severe disease which may terminate fatally.

The distribution is world-wide. These diseases play a large rôle in both North and South America, in Europe and in Asia. They are known in Australia and as far as Africa is concerned Van Riel, a Belgian[8] found between 1936 and 1945 about eight species (of which two appear to be new ones) in the vicinity of Lake Kivu in Central Africa; and Piercy of Kabete (Kenya) in 1951[7] described a disease in dogs, due to a leptospira, probably *L. icterohaemorrhagiae*.

Apart from the publications of these two workers, there seems to be no record of leptospirosis in Africa. As far as South Africa is concerned it is difficult to imagine that the country could have escaped having become infected.

HISTORY

The first leptospiral disease described was that of Weil in 1886 but its aetiology remained obscure for 29 years after this date until in 1915 Uhlenhuth and Fromme[9] studied this disease amongst German soldiers in the trenches of the Western Front. Simultaneously and independently two Japanese workers Inada and Ido[3] made the discovery of the causal parasite in Japanese pit-workers affected with Weil's disease. Not only did these two groups demonstrate the responsible organism but also incriminated various kinds of rats as the vectors, spreading the infection by means of their urine. This particular spirochaete was later named *L. icterohaemorrhagiae*.

After this, other leptospirae were found all over the world to be the cause of septicaemic diseases sometimes like Weil's. The seven days fever of Japan was found to be of leptospiral origin (*L. hebdomanis*), Japanese autumnal fever (*L. autumnalis*), Indonesian Weil's disease (*L. bataviae*), Russian water fever (*L. grippotyphosa*), Stuttgart dog disease and human "canicola fever" (*L. canicola*), swineherds' disease of Switzerland (*L. pomona*). *L. pomona* was found to be also responsible for "periodic ophthalmia" in horses and disease in a group of school children after swimming in slowly flowing water in which pigs and cattle were watered.

In general the human being seems to be a chance victim of leptospiroses, which are really diseases of the lower animals. From the practical point of view human beings never infect each other, but rats and domestic animals contaminate water and food supplies with their excretions, particularly their urine, and so spread the infection.

The symptoms in humans vary according to the species of leptospira involved. The classical icteric Weil's disease may develop, or a vague septicaemic febrile disease, a disease resembling influenza, typhoid of meningitis, or an ophthalmia.

EXPERIENCE AT ONDERSTEPOORT

The present report represents a preliminary communication. Though it had long been suspected that leptospirosis was present in South Africa, it was only early in 1953 that active steps could be taken to establish whether this was indeed the case. Knowledge of the subject is therefore still limited.

Attempts to establish the presence of the disease were made by the following means:—

1) The isolation of leptospira in laboratory animals.
2) The demonstration of active leptospirae in the blood and urine of sick dogs and laboratory animals by dark-field microscopy.
3) Serologically.
4) Histologically.
5) Culturally in artificial media.

Briefly the findings were as follows:—

1. *Isolation in laboratory animals.* Blood and saliva from suspected dogs were injected intraperitoneally into guinea-pigs. As an example, blood from a young Boxer which we shall call "Joubert" was injected intraperitoneally into four guinea-pigs and their temperatures were recorded twice daily. For the sake of clarity the average of the daily temperatures of the four guinea-pigs are given in fig. 1. In passage No. 1 there were no significant temperature rises but after nine days the guinea-pigs were killed. Their livers and kidneys were emulsified and a passage was made with this material in a further group of four guinea-pigs. In this second passage a slight rise in temperature occurred on the fifth to eighth day. On the ninth day they were killed and a further passage was made. A marked febrile reaction was produced in this third generation in that on the fifth day a dramatic temperature rise occurred. Further passages were made on the seventh day. In the fourth to sixth passages, the temperature reaction occurred on the *fourth* day. In addition, the virulence was increased, for one out of four guinea-pigs died in the fourth and fifth, and three out of four in the sixth passage. Subinoculations were discontinued at this stage.

Infant white mice. When subinoculations from the guinea-pigs were made intraperitoneally into infant white mice up to ten days of age, 100% mortality occurred within five days. Adult mice did not die.

Other animals. It is realized that hamsters are regarded as the animals of choice for transmission work since they are the most sensitive. Unfortunately they were not available. But in addition to guinea-pigs and white mice, ferrets, rabbits and white rats were used with negative results.

2. *Dark-field microscopy.* Blood from a third passage guinea-pig showing a marked febrile reaction on the fifth day was examined under a phase-contrast microscope with the kind assistance of Dr. de Boom of this Institute. Organisms showing the characteristic tenuity, motility, size and shape of leptospirae could be discerned in the specimen.

Subsequently dark-field illumination was employed and found to afford considerably better definition. On many occasions similar organisms could be demonstrated in the blood and organ emulsions of guinea-pigs and infant white mice and in the blood and urine of sick dogs.

Leptospirae are notably refractory to ordinary stains so that dark-field microscopy has proved essential in these studies. In some dogs which had a foul-smelling stomatitis and from which leptospirae had been isolated in guinea-pigs, saliva and mouth scrapings were examined with dark-field illumination. Numbers of larger spirochaetes (treponemas and borrelias) could be demonstrated. This condition appears to correspond to that referred to by Coffin[1] as fusospirochaetosis. Its rôle in the symptomatology of leptospirosis still requires clarification.

3. *Serological tests.* Six dogs which had shown clinical symptoms of leptospirosis were bled after recovery. Their sera, inactivated at 56°C for 30 minutes and freeze-dried, were submitted to the Army Medical Centre at Washington, D.C., where they were examined by complement-fixation and agglutination-lysis tests[2]. One serum was positive for *L. canicola* and two for *L. sejroe* antibodies. One of the latter specimens also gave a weaker reaction with *L. andaman, L. autumnalis* A.B. and *hebdomanis.* The remaining specimens were negative.

4. *Histological Examination.* Sections cut from guinea-pig kidneys were stained by Levaditi's silver impregnation method and portions of leptospirae could easily be seen in the epithelial cells of certain convoluted tubules. When it is considered that paraffin-embedded sections are about 3μ thick one would not expect to find more than portions of leptospirae in such sections since these organisms may attain a length of 30-40μ. Random pieces of the organisms appearing as loops, circles, spirals, straight or curved lines, sometimes singly and sometimes in clumps, are to be seen. Figs. 2

and 3 give reproduction of typical affected portions of the kidneys. These sections also give evidence of the disintegration of affected epithelia, and in fig. 3 the presence of an albuminous exudate in the lumen of an affected tubule.

5. *Culture.* Limited attempts only were made to cultivate the organisms in a modification of Schüffner's medium at 22°C. These were unsuccessful due to the presence of contaminants.

CONCLUSION

The evidence for a diagnosis of *Leptospira canicola* infection may be briefly summarized as follows:—

a. The increasingly familiar syndrome of Stuttgart disease in young dogs, associated with severe kidney damage.

b. The ready response to penicillin.

c. The characteristic behaviour of the organism in guinea-pigs.

d. The dark-field demonstration of leptospirae in blood, urine and organ emulsions of some of the sick dogs and many of the guinea-pigs.

e. Serological evidence of the presence of antibodies against *canicola* and the *sejroe* group. The rôle of the latter group is not yet clear.

Up to the present no cases of *L. icterohaemorrhagiae* infection have been suspected at the Onderstepoort small animal clinic. In view however of its world-wide distribution it must be regarded as distinctly possible that this disease does exist in the country.

ACKNOWLEDGMENT

Grateful acknowledgments are due to Mr. Gerneke of Onderstepoort for excellent histological preparations, to Major Walker for the graph, and to Messrs. Marais and Odendaal for the clear photographic reproductions.

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DISCUSSION OF PAPER

In the discussion which followed the paper Dr. Cooper stated that Weil's disease had been diagnosed in two human beings in Cape Town and that Dr. Brownlie had encountered both *L. canicola* and *L. icterohaemorrhagiae* in dogs.

Drs. Morford and Doré also described canine cases with icterus in Durban which had not responded to penicillin.

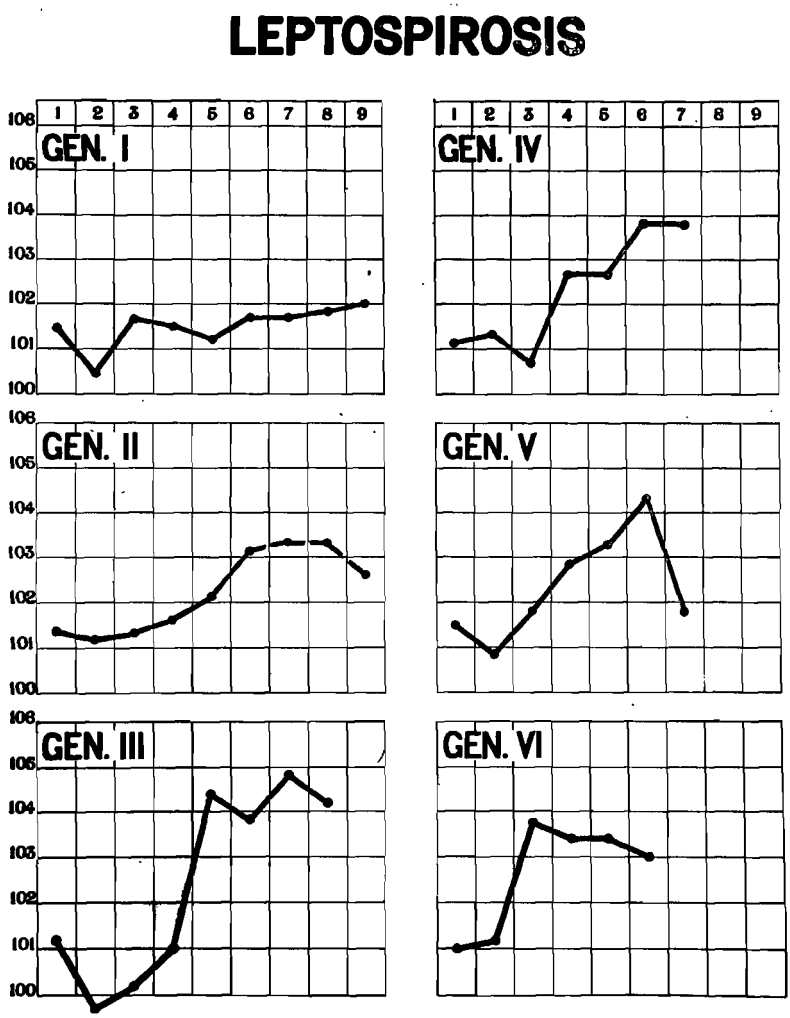
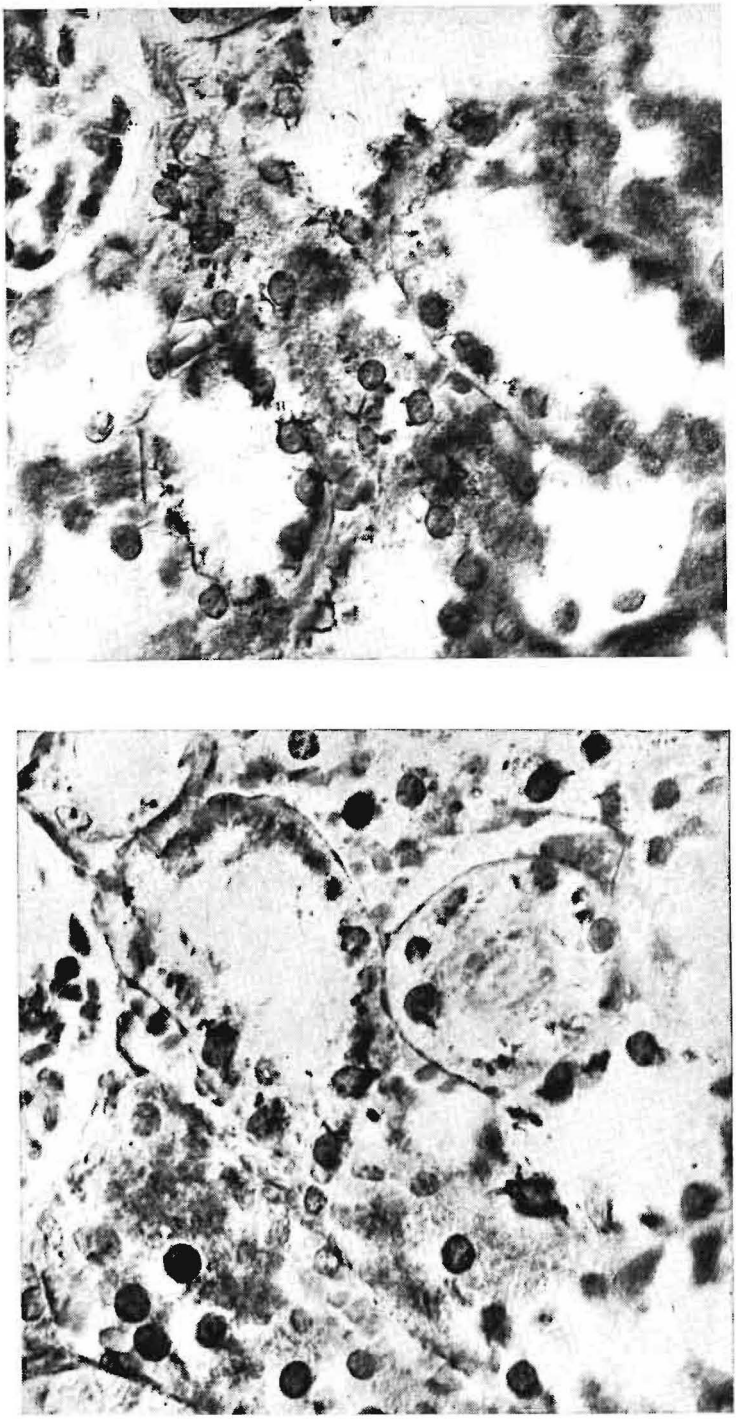
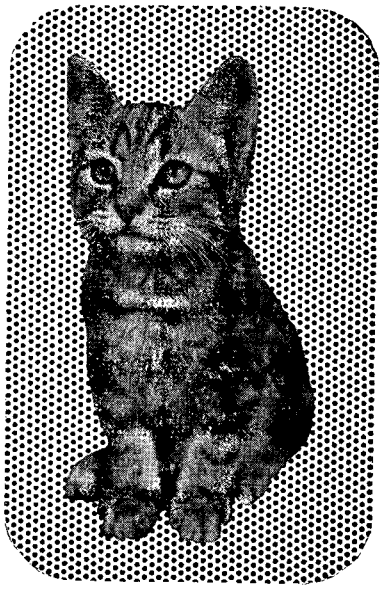


Fig. 1. Temperature charts of guinea-pigs of successive passages.



Figs. 2 and 3. Histological sections of guinea-pig kidney stained by Levaditis method.



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CASE REPORT:

THE REMOVAL OF 29 LBS. OF RUMINAL FOREIGN BODIES FROM STEER

J. R. FREAN
Potchefstroom.

Some time ago I recorded in the S.A.V.M.A. Journal the post mortem removal of 64 lbs. of foreign bodies from the rumen of a young steer. Since that time we have been on the lookout for similar cases, so when the Animal Husbandry Section reported a two-year-old experimental steer doing badly, I was able, by ballottement, to obtain the characteristic grinding sound of pebbles as if in a bag.

I performed a rumenotomy and removed 29 lbs. of stones, glass, tin, nails, screws, washers, sand and a portion of a bicycle pedal. The animal immediately started putting on weight and has now caught up with his companions.

This animal formed part of a group of steers which were receiving supplementary feed including a full ration of bonemeal so the pica must have been induced by something other than phosphorus deficiency.

Farmers frequently refer to large quantities of such foreign bodies and one wonders whether this depraved appetite is due to some sort of deficiency or whether stone-swallowing is just a bad habit. A friend employed in the X-ray department of a large hospital informs me that human foreign-body swallowers (nails, glass, pins and such like) become "chronics" and their repeated "come-back" occasions no surprise.

AN OUTBREAK OF FOWL CHOLERA IN SOUTHERN RHODESIA

D. K. SHONE

Veterinary Research Laboratory, Salisbury.

The object of publishing this paper is to place on record the diagnosis of a poultry disease, fowl cholera, which has not previously been identified in Southern Rhodesia and which is of considerable economic importance to the poultry industry.

The first diagnosis of this disease was made on the 11th July, 1952, in a flock of Muscovy ducks and fowls on a farm in the Banket district. The outbreak was of the epizootic type and closely associated with a dam to which the ducks had access. The fowls were in close contact with the ducks, mingling freely with them. A heavy mortality was reported in both ducks and fowls.

The only clinical symptom noted by the owner was a haemorrhagic diarrhoea immediately prior to death. In the majority of cases the birds were seen to be normal and then found dead a few hours later.

A dead Muscovy duck was submitted for post mortem examination and the lesions found closely resembled the classical descriptions of Fowl Cholera.

External examination of the carcass showed the wattles to be oedematous and a dark reddish blue in colour. Internal lesions noted were an acute pericarditis, sub-epicardial haemorrhages, tumour splenis, tumour hepatis, disseminated focal pinhead-sized necrotic foci in the liver, and an acute haemorrhagic enteritis of the duodenum, jejunum and ileum.

Heart's blood smears stained with a one in ten solution of Geimsa stain for forty-five minutes, showed typical bipolar organisms and a diagnosis of fowl cholera was made. The diagnosis was confirmed by blood agar cultures, and subinoculation of emulsified liver into a rabbit which died overnight, bipolar organisms being demonstrated in heart's blood smears.

No regulations were in existence for the control of the disease but the owner was persuaded to permit the slaughter and destruction of the remaining birds.

An interesting point which arises is the origin and mode of introduction of the disease. No heavy mortality in poultry had been recorded within the country and fowl cholera had not previously been diagnosed here. The presumption was that it had been introduced from some neighbouring country, probably by some migrating water bird which had settled on the dam and acted as a carrier.

AN OUTBREAK OF PSITTACOSIS IN PIGEONS

D. K. SHONE

Salisbury

This is the first record of a definite diagnosis of psittacosis in this country.

On the 6th February, 1953, a dead pigeon was submitted for post mortem examination by a local pigeon fancier. This examination showed that the bird was in a poor condition and that a greenish diarrhoea, a pseudo membranous perihepatitis and pericarditis were present. There was no evidence of conjunctivitis.

Smears were made from the pseudo membranous deposit on the heart and stained with a one in ten solution of Geimsa stain for forty-five minutes. Examination of these showed a large number of organisms in foam cells enabling diagnosis of psittacosis to be made. Further smears were forwarded to Professor J. D. W. A. Coles, Onderstepoort, who gave a confirmatory diagnosis of a massive psittacosis infection.

As no regulations were in existence empowering us to destroy the flock, the owner's consent to the destruction had to be obtained before any steps could be taken. Consent was eventually given when it was pointed out that it was in the interest of the public health and also of the poultry industry that the birds be destroyed.

Four other pigeons were found ill, some of these, according to the owner, were suffering from "roup", but no examination was carried out.

The pigeons, seventy-three in number, were housed in a brick building consisting of four adjoining rooms, one of which was a feed room separating two of the rooms housing pigeons from the third.

It was decided that the safest method of destruction would be to use some type of gas as this would obviate any handling of the live birds and inhalation of dust, etc., brought up by fluttering. The gas eventually used was a proprietary powder preparation, "Cyanogas", which releases hydrocyanic acid gas on exposure to air.

In order to keep the gas in two large buck sails were thrown over the building. At the back and sides they only hung about eighteen inches below the roof level and in front, which was partially netted, to within a couple of feet off the ground. Complete coverage was not thought essential as the birds were

perched above the floor, and the rising gas would be sufficiently concentrated — the sails preventing rapid dissipation — to be effective.

Two to three ounces of the powder were thrown into each room, and after some time had elapsed, periodic inspections were carried out. In one house a hundred per cent mortality was obtained, and in each of the other two, two birds were found alive. A further ounce of powder was added and the birds were dislodged from where they were perched immediately under the room and at the back, where draughts caused rapid dissipation of the gas. One bird did not die, but no trouble was experienced as the bird was extremely lethargic, and was caught and killed.

After all the birds had been killed they were left lying in the houses, and the ceiling, walls and floor were thoroughly sprayed out with a five per cent solution of saponified cresol. Gauze face masks, rubber gloves and gumboots were worn when removing the birds, and these were placed in wooden boxes and transported to the Veterinary Research Laboratory for incineration as it was found to be impossible to burn them on the premises on account of the continuous heavy rains. The owner was advised not to introduce any birds into these houses for a period of at least three months.

(Acknowledgments to Doctor D. A. Lawrence, Assistant Director of Veterinary Services (Research) for information and advice, and to Professor J. D. W. A. Coles, Onderstepoort, for the confirmatory diagnosis of psittacosis.)

THE CARE OF CALVES

SUMMARY

(1) Infertility and calfhood losses are at present the main problems confronting the South African Veterinarian.
(2) Less than 25 per cent of the annual calf crop is available as replacements for the South African dairy herds.
(3) Calfhood losses can be considerably decreased if the general health of the calves can be improved by providing proper care, housing and feeding.
(4) Calves can be raised artificially on an economic basis (1) on foster cows, (2) on sour pasteurized skim-milk and (3) on milk substitutes that comply with certain requirements.
(5) The feeding of calf nuts to young calves is recommended. By giving a calf nuts immediately after a meal the bad habit of sucking is not likely to be acquired.
(6) The value of roughage for the health of the calf cannot be overstressed. It facilitates "infection" of the forestomachs with microflora and it stimulates the development of the forestomachs. The sooner the calf can be induced to utilize roughage, the sooner will calfhood diseases disappear. But only hay of the very best quality will create a suitable environment for the ruminal flora.
(7) If sick calves are neglected, no matter what the cause of the illness may be, pneumonia will be almost an invariable sequel.
(8) Owing to the extensive artificial insemination services that are being organized in South Africa at present, the value and the size of the calf crop is bound to increase considerably every year. The co-operation of the Veterinarian is regarded as indispensable for the maintenance of the health of these calves.

THE SPAYING OF HEIFER CALVES AND HEIFERS

L. R. HURTER
Ladysmith.

Acting on numerous requests I have during the last 18 months spayed more than a hundred heifers and heifer calves on different farms. The main reason for wanting this operation is apparently that it simplifies the management of large herds of mixed cattle on unoccupied farms with only herd boys in attendance, and also that these animals sell very much better than unspayed females.

The procedure adopted was that as described by Frank in "Veterinary Surgery Notes" in the Revised Edition 1944. The following is a brief outline of the method and the results under ordinary field conditions. It must be remembered that the animals were off the veld and had never been handled before.

Operation in standing position.

Restraint:

Two races were constructed as a time-saving factor. After starving overnight, a heifer is secured in the race and the hair over the site as for rumenotomy removed with a clipper for polo ponies.

Instruments:

The instruments are the same as used for rumenotomy. 10 cc. of a 5% Planocaine solution as a local anaesthetic was found to be sufficient.

Operation:

The site and approach is the same as for rumenotomy. The muscles are always incised, never torn. After incising the peritoneum the left hand is introduced into the abdominal cavity and the ovaries removed by manual manipulation. This is very much easier than using an ecraseur. The closing of the wound is done in the usual manner. Clips were tried on the skin but it was found that in an animal off the veld they were often too weak. Silk appeared to be more suitable. Silk sutures were never removed.

The average age in this group was from 10-20 months and Hereford and Afrikaner × Hereford predominated. Out of more than 90 done in the standing position, two died, one after being bowled over and gored by oxen and another from internal haemorrhage.

Operation in elevated position.

A scaffold-like arrangement was constructed as described by Frank. The average age in this group was 6 months.

Restraint:

The calves are secured above the fetlocks to a cross-piece of wood and the hind legs elevated to the required height.

Operation:

The incision is made 2 inches in front of the udder on the linea alba after the usual aseptic measures have been taken and 10 cc. of a 5% Planocain solution infiltrated as a local anaesthetic. The hand is next introduced into the abdominal cavity where the ovaries are located and removed by manipulation. The closure of the wound is done in the usual manner.

Recovery was uneventful and no losses were experienced in this age group. Ten calves were done in this manner.

Conclusions.

(1) Only the practical aspect of "commercial spaying" is touched upon.

(2) Purely from the viewpoint of the operation itself, any Veterinarian will find it quite practicable under ranching conditions.

FROM A SURGEON'S CASE BOOK

M. H. V. BROWN
Johannesburg.

No. 1. — Osteotomy and plating for correction of lateral deviation of the foot.

The subject was a nine months old Collie dog weighing forty pounds, in good general health. When presented for examination there was a healed fracture of the distal end of the right radius, about one inch above the carpus. The foot was bent outwards at an angle of about 30 degrees, and the bony union was firm. Deformity was considerable: the animal was using the leg but it was much shorter than its fellow, and only the two inner pads touched the ground. The distal end of the ulna had become telescoped resulting in a bulbous enlargement above the styloid process.

X-ray examination confirmed the diagnosis and indicated that open operation and plating offered the best and probably the only way of correcting the deformity. This operation was therefore decided on and carried out under nembutal anaesthesia. Aseptic precautions, as strict as possible, did not attain the high standard customarily observed in orthopaedic work but this seems almost impossible in veterinary surgery. The leg was shaved and wrapped in sterile cloths soaked in approximately 3% cetrimide in spirit for two hours on the morning of the operation; cloths were autoclaved and instruments boiled. Gloves were not worn but the operator's hands, after thorough scrubbing, were treated with the same solution.

An incision about five inches long was made on the antero-lateral aspect of the forearm. No difficulty was encountered in going between the muscles and their tendons, and the periosteum was incised and stripped for about 1½ inches on each side of the centre of the old fracture. A wedge of bone directly through the old fracture callus was now cut and removed. The size of the wedge was judged at the time: its base was about half an inch wide and its point just reached the compact bone on the medial side of the radius. In the X-ray plate taken afterwards the wedge appeared too broad, but this did not seem to affect the result. With the wedge removed fairly gentle manipulation was sufficient to straighten the leg, the bulbous swelling on the ulna tearing apart without difficulty. A three inch Lane type vitallium plate was then put on with the leg as straight as possible, and as much of the periosteum as could be picked up,

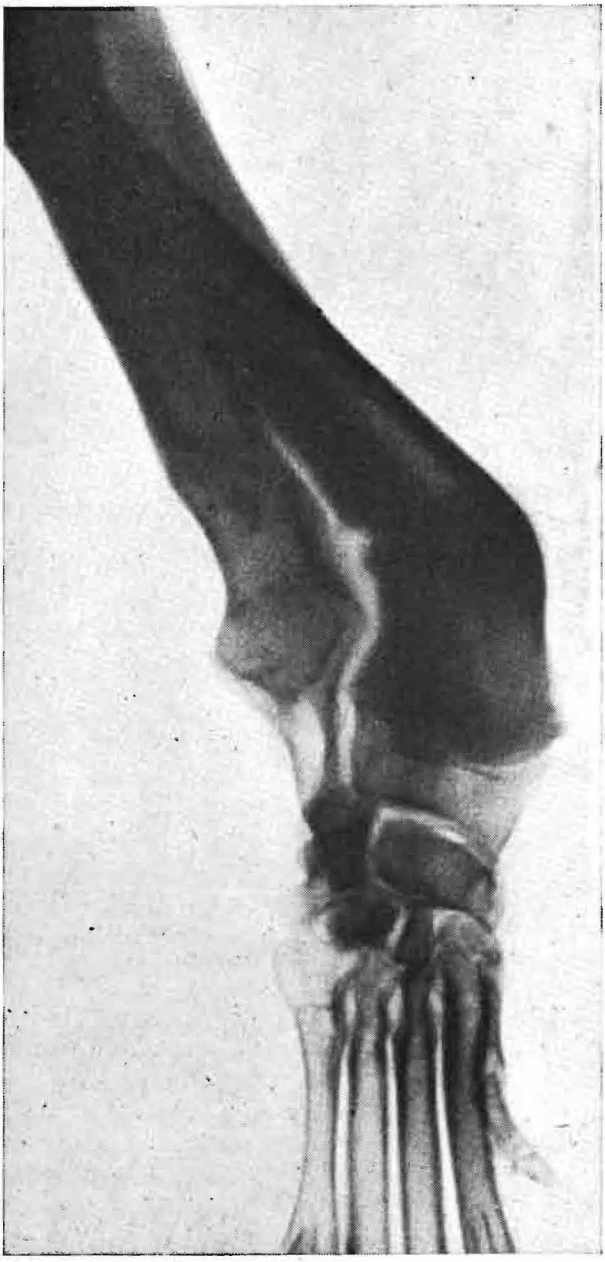


Fig. 1. Antero-posterior view showing deformity.

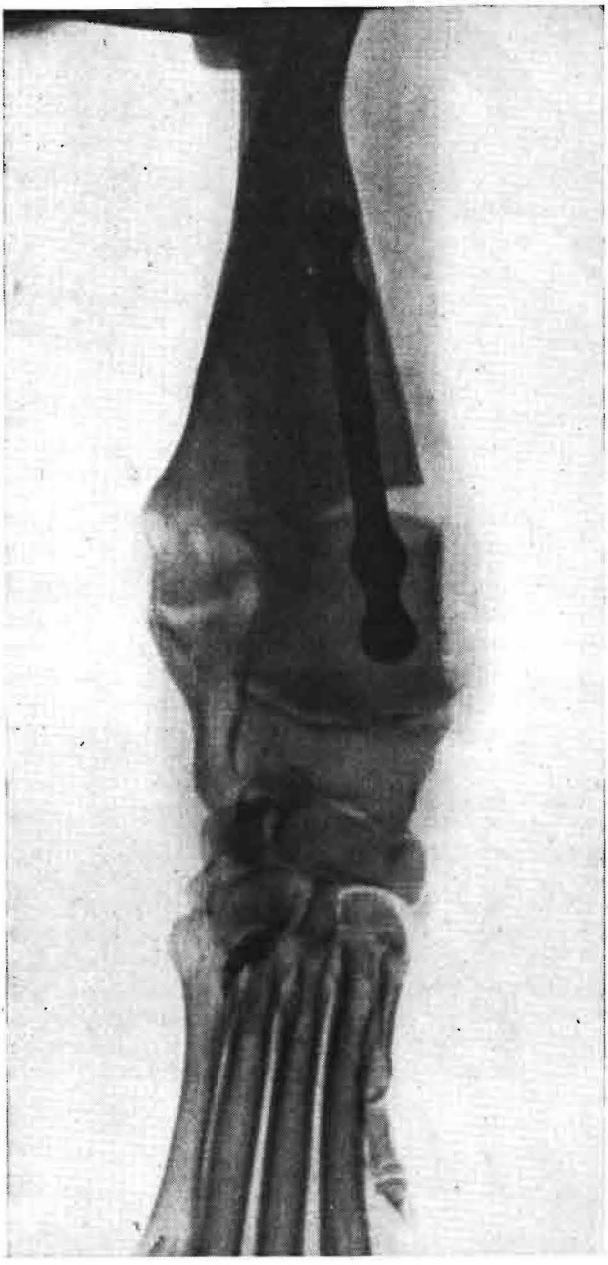


Fig. 2. The same view showing plate and correction.

sutured over the plate with catgut. A few catgut stitches held the muscles together, and interrupted nylon sutures were used through the skin and subcutis.

Procaine penicillin was given at the rate of 5000 units per pound per day for two days prior to the operation and this was continued for four days thereafter. No external fixation was used, only a light bandage covering the wound, which healed well, the stitches being taken out eight days after the operation. The plate held firm and the dog began to use the limb three days after operation; judicious exercise restored normal gait, with the whole foot touching the ground in about three weeks. Six months later there was no sign of abnormality.

This case appeared to illustrate the fact that orthopaedic surgical procedures are practical in veterinary surgery although our asepsis technique is not ideal, and to offer a means of dealing with a fairly common condition. It is possible to rebreak and straighten the leg in these cases when the callus is still soft, but even then prolonged immobilisation is required and a final good result is by no means certain. In this case the firm bony union would have made rebreaking too dangerous and the open operation appeared to be the method of choice.

OBSERVATIONS ON SOME COMPLICATIONS OF AND ON THE DIFFERENTIAL DIAGNOSIS OF THREE DAY SICKNESS (EPHEMERAL FEVER) OF CATTLE

C. F. B. HOFMEYR

Pretoria.

SUMMARY

(1) Four types of complications are listed and discussed.

(2) Some apparently unrecorded aspects of the differential diagnosis are described.

(3) Attention is drawn to a way in which death may be a sequel to this disease.

As Henning (1949) gives a comprehensive survey of the literature on three day sickness, no attempt will be made to draw a complete picture of the disease. It is the intention, rather, to remark upon aspects of it, which appear to have escaped publication and, possibly, observation.

Complications:

(1) Geophagia.

(2) Chronic myositis.

(3) Prolonged debility.

(4) Acute pulmonary congestion and pneumonia.

(1) Geophagia: This complication is rarely seen but when encountered, often ends fatally. Why the sick animal sometimes eats soil is difficult to explain. According to Henning (1949) mild congestion and oedema of the brain can be observed at autopsy in three day sickness. Mulhearn (1937) has reported abomasitis as another post mortem finding. The brain changes give rise to the speculation, that disturbed consciousness may occur in some cases, leading to a depraved appetite — as in heartwater. The abomasitis might cause gastric discomfort, which the animal attempts to alleviate by eating sand. The author has conducted an autopsy on a cow dead as a result of three day sickness in which the abomasum was filled with blood clots the size of a fist as well as with sand. The irritation set up by the sand was probably responsible for the haemorrhage.

(2) Chronic Myositis: Cattle with persisting myositis are not too often seen fortunately. The usual case is characterized by great loss of condition and general lack-lustre appearance.

The gait is slow and stiff. On one occasion an Afrikander bull, which had had three day sickness about four months previously, was observed by the author. The animal's condition was good, but he carried his head very low and when walking he swung it from side to side. His neck always made a right angle with a line drawn between the shoulder joints. Closer examination showed that his peculiar action was an attempt to keep the brachiocephalic muscles on either side of equal length during locomotion. They were painful as a result of chronic myositis, which, apparently, was a legacy from the ephemeral fever. Unfortunately the subsequent fate of the bull is unknown. It is evident that he was quite useless for breeding while in that condition as he was unable to raise his head in order to mount a cow.

(3) Prolonged Debility: Often with prolonged debility as a sequel to three day sickness the history is reliable enough to implicate this disease as the cause of it. With very little known of the pathology it is only possible to surmise that ephemeral fever can cause enough damage to the parenchymatous organs to prolong convalescence for months. Some credence is given to this suggestion by an observation made by many different farmers, viz., that many lactating cows that have suffered from this disease, fail to return to their normal level of milk production during that particular lactation. Thus the economic importance of this disease should not be underestimated.

(4) Acute Pulmonary Congestion and Pneumonia: It is interesting, that Mulhearn (1937) [as quoted by Henning (1949)] reports congestion of the respiratory mucous membrane and emphysema of the lungs and pleura. As pulmonary emphysema cannot occur spontaneously, it is obvious, that these observations with regard to the lungs are not complete. This is to be regretted as acute congestion of the lungs and pneumonia are very common and often serious complications of three day sickness. These complications can assume serious proportions on the first day of illness. As the heart remains strong clinically, it can only be assumed that the congestion is due to a specific effect on the lungs.

It is the writer's practice to employ one of the sulphonamides or penicillin whenever pneumonia is present or threatens. The beneficial effect thus obtained shows, that bacteria play a rôle in the development of the pneumonia. The proneness of cases of ephemeral fever to pulmonary involvement and its very early occurence in the course of the disease suggest that the virus paves the way for secondary infection. The question arises as to whether the virus may have pneumotropic properties.

Differential Diagnosis: In addition to observations under this heading by Henning (1949) attention must be directed to the following:

The period of the year when the incidence of ephemeral fever reaches a peak more or less coincides with that of the tick-borne diseases, notably heartwater, babesiasis and anaplasmosis. A discussion on how to differentiate these conditions from stiffsickness is therefore advisable.

Heartwater: The writer has known three days stiffsickness to be mistaken for heartwater. Occasional confusion is possible, but to fail repeatedly to differentiate the two diseases can only be ascribed to negligence. The usual case of heartwater is excitable, whereas the animal with ephemeral fever may show anxiety due to pain. The former disease causes locomotor ataxia, while in the latter the altered gait is a purposive adaptation to muscular pain. The very occasional case of soil eating seen has, in the writer's experience, never exhibited the dementia common to heartwater. Finally, the very marked capillary friability in heartwater as determined in the conjunctiva is not seen in three day sickness, unless there is co-existing pneumonia. By friability is meant the ease with which petechiae can be produced.

Anaplasmosis and babesiasis: Very commonly the patient suffering from ephemeral fever only shows stiffness after the temperature has returned to normal, i.e. on the second day of illness. During the first day, when the animal walks more or less normally, a clinically enlarged liver is often present as well as yellow tinged mucous membranes. These findings are usually indicative of the two tick-borne diseases. A negative bloodsmear will exclude these diseases. As it is impractical for the clinician to take a microscope on his rounds as a routine, he has to find other ways by which he can distinguish stiffsickness from the other two. As these diseases cause anaemia and the former does not, detection of developing paleness of the mucous membranes is most important. As these two tick-borne diseases always exhibit bilirubinuria, a Van den Bergh test on the urine has been recommended as a great aid in their diagnosis. This test is easily and conveniently carried out on the farm, but does not help to avoid confusion with ephemeral fever as this disease *frequently causes bilirubinuria as well.* In this case it is presumably due to liver damage.

Another test quickly and easily done in the field is Rothera's test for ketone bodies. This has led to the discovery, that many cases of three day sickness, especially towards the colder months, are complicated by ketosis. The interesting information gained from these tests possibly indicate a reason why the ephemeral fever sometimes exerts prolonged deleterious effects.

Ketosis can be expected in any good conditioned animal off its feed. Ketosis should not produce prolonged deleterious effects once the appetite is regained, except possibly kidney damage.

Traumatic reticulitis: Sometimes there can be a very close resemblance between this condition and stiffsickness. On occasion

the writer has had some difficulty in distinguishing the two. A case is recalled where he was asked to operate for foreign body and where it was found that the animal was ill as a result of stiffsickness. Acting as consultant, he had to operate on another cow for foreign body, the first diagnosis having been ephemeral fever. The fact that in this disease the seat of pain is in the muscles, is the greatest single aid in differentiating these two conditions.

In conclusion, a cause of death connected with three day sickness, and apparently unrecorded, must be mentioned. Affected animals, while lying down, sometimes push themselves over on to their sides like a horse, to ease their aching limbs. After a while they return to the sternal position. During a very severe outbreak some cattle have such severe myositis that, once on their sides, they are unable to regain the normal position, and die as a result of bloat unless helped. In one recent outbreak there were several deaths on one farm caused in this way.

REFERENCE

HENNING, M. W. (1949). Animal Diseases in South Africa, 2nd Ed. C.N.A., S.A., pp. 797-803.

LETTER TO THE EDITOR

The Editor,
Journal of the S.A.V.M.A.,
Onderstepoort.

Sir,

Diaphragmatic Hernia in a Jersey Cow

I was on the point of writing up a case for submission to you when I received the March, 1953, number of the Journal and therein read Dr. du Casse's report on a case of diaphragmatic hernia. Mine coincided more or less with that of Dr. du Casse but presented a few features that I consider warrant recording:—

I was called in to attend a recently calved medium-sized Jersey cow on which unsuccessful enterocentesis had been performed. In addition to marked, but not very tense, hoven the animal gave the appearance of being on the point of calving. The metal detector gave a positive reaction very far forward, well beyond the xiphoid process and also over the umbilical area. My diagnosis was traumatic reticulitis with penetration into the thorax. I told the owner that an operation was possible but the chances of its being successful, very remote. In spite of this warning and my advice to destroy the animal and so cut his loss, the owner insisted upon the operation.

Upon piercing the rumen a cascade of pea-soupy contents shot out and the rumen was further emptied to well below the wound level by siphonage. Upon exploration I was rather surprised that in a relatively small cow I had to stretch so very far forward to reach the reticulum over a lip for which I could not at the time account. The only metal found was a washer in the reticulum and none in the rumen whose floor I was able to search easily in the total absence of solid ingesta. However, from there I removed the best part of ten pounds of sand and this would probably account for the positive reaction given by the metal detector which I understand is liable to happen when a mass of considerably increased density is traversed. I could detect no adhesions of rumen or reticulum.

I closed the wounds feeling very unhappy about the case as I could not reconcile the condition with the presence of only one loose washer and some handfuls of sand.

From the complete absence of solid ingesta and knowing that the owner had fed large quantities of concentrates I thought that the animal had taken in no roughage during her illness so I advised feeding roughage only until further notice.

After a week of capricious feeding her abdomen enlarged and continued to do so to again give the appearance of impending parturition. The condition suggested pronounced ascites but I could detect no fluid

sounds but assumed that these were buffered by the intestines. She died on the fourteenth day after operation.

At post mortem the rumen was so distended as to completely fill the abdominal cavity forcing aside the other organs. Upon opening the rumen a similar pea-soupy fluid rushed out and through which I had literally to wade to reach the carcass for further examination when I found the herniated reticulum inside the thoracic cavity. The hernial rim caused a constriction which, whilst allowing of deglutition, apparently prevented the passage of food beyond the reticulum. The omasum, abomasum and intestines were empty. I was again impressed by the total absence of solid matter in an animal whose diet during the previous fourteen days had consisted exclusively of roughage and water.

This case supports Dr. du Casse's advice to bear the possibility of diaphragmatic hernia in mind in animals whose chronic hoven does not respond to treatment. It also serves as a warning that every positive reaction with the metal detector does not necessarily mean the presence of a piece of metal.

Yours faithfully,

J. R. FREAN,

State Veterinarian, Potchefstroom.

BOOK REVIEW

INTRODUCTION TO VETERINARY THERAPEUTICS by Geo. F. Boddie, B.Sc. (Edin.), M.R.C.V.S., Professor of Medicine, Royal (Dick) Veterinary College, Univertity of Edinburgh. Oliver and Boyd, Edinburgh and London. 1952. xii + 196 pp. Publ. price 15/-.

Contents: Part I. The elements of Materia Medica: sources of drugs; composition of drugs; the pharmacopoeia; weights and measures; preparations of drugs; assay of drugs; system of studying drugs; incompatability; routes and methods of administering drugs; factors modifying the actions of drugs; prescription writing.

Part II. The principles of Therapeutics: introduction; the alimentary system; the blood; the circulatory system; the respiratory system; the urinary system; metabolism; the nervous system; the eye, body heat; the skin; the reproductive system; hormones; vitamins; substitution therapy; chemotherapy; antibiotics; anthelminthics; antiseptics; disinfectants; physiotherapy; vaccine and serum therapy.

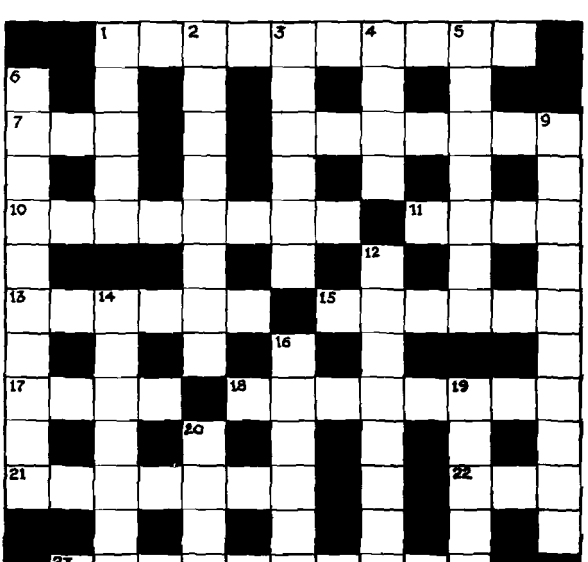
Appendix I. Synopsis of Law relating to drugs. Appendix II. Alphabetical list of selected preparations and their doses.

Notwithstanding the revolution which has been brought about during the past few decades as a result of the research activities of the large pharmaceutical houses and the production of new drugs and chemotherapeutic agents, including the sulphonamides and antibiotics, the veterinary student (as also his medical confrere) still requires to have a considerable amount of basic knowledge of the principles of materia medica and of the application of drugs to the alleviation and control of the manifestations of disease.

This basic knowledge is very ably presented by Prof. Boddie in this first edition of "Veterinary Therapeutics". The older books are mostly too wide in their scope and cover too large a field, with the result that the student is often left bewildered and somewhat discouraged. From this point of view then the present book, which does not profess to be more than an introduction, will be welcomed by teachers of veterinary materia medica, pharmacy and therapeutics. Not a few veterinarians will also not fail to derive considerable benefit from having this little book at their disposal. The table of contents above will give a good idea of the field covered.

W.D.M.

VETERINARY CROSSWORD PUZZLE



ACROSS

1. Tumours. (10)
7. We see our patients when they are this. (3)
8. Tumour. (7)
10. Grafts. (8)
11. For the long of tooth. (4)
13. It worries cattle. (6)
15. Scorpion sting. (6)
17. Turn the waster out of the herd ! (4)
18. Mental disorder.
21. Or venus (anag.). (7)
22. The marks will help you. (3)
23. You need guts for these. (10)

DOWN

1. Bulbous plant that can poison cattle. (5)
2. Put your arm right in. (8)
3. The alimentary is an example of these. (6)
4. Spinal cord. (4)
5. Carrots (anag.). (7)
6. Used to treat sprained tendons (two words). (6, 4)
9. The lashes and brows are these of the eye, for example. (10)
12. As I noted (anag.). (8)
14. Process of a nerve cell. (7)
16. Hound. (6)
19. Students usually dread them. (5)
20. Swelling. (4)

All the words used have, or can have, a veterinary, medical or technical connotation.

(Solution on page 189)

VACANCY FOR VETERINARIAN

Competent bilingual assistant required for extensive mixed practice. Good salary with prospects. Car and accommodation available. References essential. Apply Dr. H. E. Williams-Jones, Moreson, Durbanville, Cape.

VACANCY FOR RESIDENT VETERINARIAN, S.P.C.A., JOHANNESBURG

Applications are invited for the post of Resident Veterinarian to the above Society on a full-time basis, the duties consist mainly of attending to animals brought to the Society's Clinic for treatment and being responsible for the health of the animals housed on the S.P.C.A. property. Drugs and instruments are supplied by the Society.

Salary — £840.0.0 per annum (Cost of Living Allowance inclusive). Appointment to be on a 3 (three) months probationary period.

Free quarters are available in the form of a modern furnished flat with free water, light, telephone, gas and fuel, suitable for a young married couple. Leave privileges consist of 3 (three) weeks paid leave per annum plus one long week-end per month. Free evenings by arrangement.

The successful applicant will be expected to remain with the Society for at least 12 (twelve) months.

Applications stating age, qualifications, experience and marital state should be addressed to the Secretary, S.P.C.A., P.O. Box 2960, Johannesburg, to reach him on or before the 15th December, 1953.

PRACTICE FOR SALE

Large country practice including house, office and surgery for sale. Approximately 95% large animal practice.

For full particulars apply to: Dr. T. B. Nel, 97 Kerk Street, Nigel.

ANSWERS.

Across:

1. Teratomata. 7. Ill. 8. Adenoma. 10. Implants. 11. Rasp. 13. Gadfly. 15. Telson. 17. Runt. 18. Paranoia. 21. Nervous. 22. Age. 23. Intestines.

Down:

1. Tulip. 2. Rectally. 3. Tracts. 4. Myel. 5. Trocars. 6. Firing iron. 9. Appendages. 12. Sedation. 14. Dendron. 16. Basset. 19. Orals. 20. Node.

DEPARTMENT OF VETERINARY SERVICES, ZOMBA, NYASALAND

VACANCIES EXIST FOR THE FOLLOWING POSTS

Veterinary Officers (3 posts).

Qualifications — A degree in Veterinary Science or a diploma registrable with the Royal College of Veterinary Surgeons. Of equal importance to the academic qualifications held is that candidates should show keenness and interest in the control and prevention of disease, and in animal husbandry and production, in underdeveloped tropical or subtropical areas.

Duties — The control and prevention of disease, the improvement of livestock and the promotion of schemes of development in connection with livestock marketing, hides and skins, dairy products, poultry, etc. Little or no scope exists for private practice.

Emoluments and Conditions of Service — Salary scale £870/£1,515. Allowance for qualifications and experience will be made in determining initial salary scale. Cost of living allowance £114 to £195.10.0 according to salary. Furnished government quarters are provided at the rate of 8⅓ per cent of salary with a maximum of £150 per annum. Free return passages for three adults to U.K., or country in which recruited, every tour of a minimum of 33 months for vacation leave on full salary for which 5 days for every month of service is granted. Free medical and reduced charges for dental treatment for officer and family. Non-contributable pension. Compulsory contribution to Widows and Orphans pension scheme. Appointments subject to medical fitness.

These posts are all on the permanent establishment but if preferred contract terms can be arranged for a period of 2-3 years with payment of a gratuity of 10% of the total salary drawn payable on satisfactory completion of service.

Senior Animal Husbandry Officer (1 post).

Qualifications — A degree in Veterinary Science or a diploma registrable with the Royal College of Veterinary Surgeons or a degree in Dairy or Animal Husbandry together with experience in one or more of these fields. More important than the actual academic qualifications is that candidates should be interested in animal health, breeding, husbandry and production in underdeveloped tropical or subtropical areas.

Duties — The development of animal industry throughout the Protectorate including supervision of the work at Livestock Improvement and Animal Industry Centres, the improvement of livestock in the field and promotion of schemes of development in connection with livestock marketing, hides and skins, dairy products, poultry, etc.

Emoluments and Conditions of Service — Salary scale £870/£1,515. Allowance for qualifications and experience will be made in determining initial salary scale. Cost of living allowance £114 to £195.10.0 according to salary. Furnished government quarters are provided at the rate of 8⅓ per cent of salary with a maximum of £150 per annum. Free return passages for three adults to U.K., or country in which recruited, every tour of a minimum of 33 months for vacation leave on full salary for which 5 days for every month of service is granted. Free medical and reduced charges for dental treatment for officer and family. Non-contributable pension. Compulsory contribution to Widows and Orphans pension scheme. Appointments subject to medical fitness.

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Jl. S.A.V.M.A. 24(4), 1953.

THE EARLY VETERINARIANS OF THE CAPE

A. M. DIESEL*

Pretoria.

It is good to take the best from the past and build the future upon it. It is not good for the future, to live too much in the past.

Who were these early veterinarians of the Cape? What did they do? How did they travel about the country? What information did they pass on to their successors?

I cannot in a short talk of this kind, comprehensively answer all these questions, but I will endeavour to give you some idea of the lives they led and the work they did.

The first veterinarian to serve the State in the Cape Colony was Professor William Catton Branford. He was a Professor of Veterinary Medicine and Surgery and commenced his duties in 1877.

He operated single-handed over a great part of the vast territory which nowadays comprises the area of two provincial Veterinary Sub-Directors, viz. those of the Eastern and Western Cape.

He was expected to visit and report upon the Colony's livestock, and to advise the Government about its general health. He had to investigate mortality, ascertain its causes, take steps to remedy the troubles and make suggestions to prevent their recurrence, all this during the turbulent times through which the Colony was passing.

Some of the diseases with which he had to deal were known to him, e.g. Lungsickness, Tuberculosis, Glanders, Sheep Scab, Mange, etc. Others which he encountered had already been named by the farmers of the Colony, but that was about all that could be said of them; e.g. Galsiekte, Lamsiekte, Vermeersiekte, Slak, Dikkop in sheep, etc. "Meltziekte" confused him quite a bit and so did "Hartwater".

He was a much overworked veterinarian, for in his report in 1878 he stated that he was suffering from bloodpoisoning, contemplated resigning to restore his health and pointed to the fact that within barely 12 months of assuming duty in the Colony, he had covered between 3,000 and 4,000 miles. Some of his reports make very interesting reading. He asked a particular farmer once to answer a questionnaire about "Vermeersiekte" which was causing considerable mortality in sheep in the Victoria West district. In reply as to the treatment usually given by farmers, Branford was informed that this varied between gunpowder and vinegar, tar-water, oil and epsom salts.

Branford did quite a lot of useful work and made some very good suggestions to the Government. He advised the immediate destruction

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Paper read at the Fourth Annual General Meeting of the Cape Western Branch of the S.A.V.M.A., 3.9.53.

and burial of all equines certified to be infected with Glanders. He suggested that there should be a closed season for shooting in order to protect the Colony's bird life. He strongly advocated the prohibition of veld burning, as he maintained that this practice disturbed the balance of nature because it destroyed birds and reptiles.

He moved about the country by rail and post cart, and sometimes by steamer from Cape Town to Port Elizabeth.

Branford was followed in 1880 by Duncan Hutcheon. Hutcheon was a most intelligent investigator, a very hardworking veterinarian and by all accounts a most lovable personality, whose characteristic dress, even when moving about in the country, was a frock-coat and top-hat.

The Colony had a Government Experimental Farm, "Leeuwfontein", in the Fort Beaufort District, to which Hutcheon was a frequent visitor. He states in his report for 1880, that he left Cape Town on 21st June, travelled through the Divisions of Caledon, Bredasdorp, Swellendam, Riversdale, Mossel Bay, George, Humansdorp, Uitenhage, Port Elizabeth, Albany and reached Leeuwfontein on August 10th, 1880.

In comparing the reports of Branford and Hutcheon, one is struck by the superior investigational qualities of Hutcheon. His reports describe in great detail the varied conditions he met with in all classes of stock, including poultry. He analysed the symptoms and post-mortem changes at great length. In some instances he was able to diagnose the disease, while in other cases his descriptions served as a reference for later investigations. Contemporary and subsequent workers must have derived great benefit from the descriptions which he gave of diseases, the intimate features of which were only disclosed much later.

Hutcheon considerably improved the control and eradication measures for such diseases as Lungsickness, Glanders and Sheep Scab. His early investigations into Lamsiekte, Heartwater, Redwater and Bluetongue clearly stamp him as a discriminating investigator. He was not at a loss to recognise that "Meltziekte" was Anthrax and that the cause of the disease had "recently been determined in Europe."

His report for the year 1881/82 describes a large-scale outbreak of Pleuropneumonia in goats. He gives a very clear account of his investigations including attempts at protection through vaccination. A commission was appointed to ascertain all facts and make recommendations concerning the disease and in consequence the Slaughter Policy was applied. A total of 6,162 goats valued at £2,878 was destroyed and the disease was eradicated. Bearing in mind that Bovine Pleuropneumonia had been present in the Colony since its importation in 1854 by a bull brought from Holland, Hutcheon's action is all the more creditable.

The report goes on to describe how a firm, H. David & Co. of Somerset East, imported a number of Angora goats during December 1880. They left Angora on October 1st 1880, travelled via Constantinople and Southampton and arrived at Port Elizabeth about the middle of December. They were railed to Cookhouse where they

arrived on December 22nd. From Cookhouse they were conveyed by wagon to Somerset East and kept in Mr. David's yard until the day of the sale on January 26th, 1881. There had seemingly been no mortality up to this time. Mr. van Niekerk of Brakfontein bought one of the rams. This ram arrived on Mr. van Niekerk's farm on 27th January. It was shorn and dressed with a tobacco solution on the 28th. It sickened on the 29th, died soon afterwards and so commenced this large scale outbreak of Pleuropneumonia in goats.

He gives an account of a mortality in fowls in the Bedford district in 1882 and considered it to be due to "the Fowl Cholera recently described in France."

Hutcheon referred to the presence of Foot and Mouth disease in the Bechuanaland and Griqualand West areas in 1892/3 and hoped that the disease would not extend into the Cape proper. It did, however, spread southwards and was later taken from Beaufort West to Piquetberg Road in 1893 by a rail movement of slaughter cattle. By 1893/4 Foot and Mouth disease apparently existed in all the four provinces.

Hutcheon commenced a three weeks' course in Veterinary instruction at the Agricultural College, Stellenbosch, during August of 1890.

His reports describe the outbreak of Rabies of 1893, brought about by the importation of an Airedale dog at Port Elizabeth in 1892. The disease was seemingly diagnosed by a veterinarian called Britton, after it had gone undetected for at least 3 months. The diagnosis was later confirmed by Hutcheon after he had conducted a post mortem examination on a dog obviously showing clinical rabies. The disease was eradicated later.

Hutcheon played a big part in the control and eradication of Rinderpest (1896/1905).

In 1898 Equine Pleuropneumonia was also present in the Colony, brought in, no doubt, by the large-scale importation of horses.

He was later assisted by J. D. Borthwick (1889); J. F. Soga (1891) and Otto Henning (1892). Dr. Edington, the Government Bacteriologist, also gave him considerable assistance.

Hutcheon was made Director of Agriculture of the Cape in 1906, a post he held until his death on the 14th May 1907, at the age of 65.

Hutcheon qualified from the Dick Veterinary College in 1871, which in those days gave only a three years' course. He held the diploma of the Highland Agricultural Society and in 1902 was made an Honorary Associate of the Royal College of Veterinary Surgeons — a very high honour.

Hutcheon died a comparatively poor man and the Cape Province Agricultural Union subscribed some £5,000 towards the maintenance of his widow. The fund seemingly continued after the death of Mrs. Hutcheon and in 1947 it was offered by the Cape Province Agricultural Union, as a bursary in Veterinary Science, in commemoration of the late Dr. Hutcheon. This Duncan Hutcheon Bursary, valued at £40 p.a. is awarded annually by the Veterinary Faculty of the University of

Pretoria, to the most deserving fourth year Veterinary student from the Cape Province.

Borthwick did a lot of very useful work. He became Chief Veterinary Officer for the Cape in 1906, when Hutcheon became Director of Agriculture. Borthwick progressed to the post of Assistant Principal Veterinary Officer for the Union under C. E. Gray in 1912 and in 1921 was made Principal Veterinary Officer for the Union. He retired in 1928 and died on June 18th 1936.

Up to 1896 the veterinarians whom I have mentioned, were the only ones, as far as I can ascertain, employed in the Cape Colony. Britton was apparently a private practitioner.

From then onwards new veterinarians appeared. Among them the following:

Tomlinson,	Campbell,
Prudames,	Armstrong,
Lowe,	Sinclair,
Freer,	Edgar,
Jarvis,	Kearney,
Pattison,	R. W. Dixon,
Spreull,	Brandt,
J. W. Crowhurst,	Garland,
C. Crowhurst,	Shepherd,
Harvey,	Hutchence,
Robinson,	Worsley,
O'Donogue,	E. Fern.

The following was the Veterinary Staff in the Cape in 1908 and their salaries. I have included the Entomologist and Sheep Inspectors for comparison:

Chief Veterinary Surgeon	J. D. Borthwick	£650
Director, Veterinary Laboratory, Grahamstown	W. Robertson	£700
Assistant	E. George	£120
Chief Inspector of Sheep	A. G. Davison	£700
Asst. Sheep Inspectors	16 from £350	£450
	184 from £75	£350
Govt. Entomologist	C. P. Lounsbury	£800
Asst. Veterinary Surgeons (16)		£300—£500

These 16 were stationed at the following centres:

R. W. Dixon	Cape Town.
W. Jowett	Cape Town.
C. S. Elphick	Cape Town.
M. A. Hutchence	Kokstad.
G. W. Freer	Uitenhage.
J. Spreull	Somerset East.
J. A. Robinson	Kingwilliamstown.
A. Goodall	Worcester.
G. Goundry	Aliwal North.
J. H. Lyons	Grahamstown.

W. G. Pakeman ..... Queenstown.
S. Elley ..... Oudtshoorn.
R. Paine ..... Elsenburg, Muldersvlei.
P. X. Kearney ..... Umtata.
W. Simson ..... Vryburg.
J. A. Worsley ..... Butterworth.

Of the veterinarians who served the Cape between 1896 and the time of Union, quite a number rendered very valuable service to the Colony and to South Africa. Spreull and Robertson deserve special mention.

As early as 1901, Spreull conducted valuable research into the protection of sheep against Bluetongue by vaccination. Much of his work was later confirmed by Theiler. Spreull also worked on Lamsiekte and was in charge of experiments on this disease conducted at Koopmansfontein during 1907/8. He conducted some experiments on Biliary Fever in dogs. Spreull was in charge of the inoculation campaign against East Coast Fever in the Transkei between 1912 and 1914. He became Senior Veterinary Officer for the Transvaal in 1916 and in 1921 was transferred in that capacity to Cape Town where he retired in 1934. After retiring he practised privately at East London.

William Robertson was for some years Assistant to Hutcheon at Cape Town where he did a great deal of laboratory work for which he had a liking. He worked with Lounsbury on Heartwater in 1899. He investigated East Coast Fever with Gray in Rhodesia in 1902. After 1906 he was in charge of the Grahamstown Laboratory where he did some work on Lamsiekte and other diseases. He was appointed Assistant Director of Veterinary Services for the Union in 1912 and was in charge of Onderstepoort for a year (1912/13) during Sir A. Theiler's absence overseas. He returned to the Grahamstown Laboratory and died in 1919.

George Freer was a very able Administrator with a remarkable sense of humour. He became Senior Veterinary Officer and retired from this post in the Eastern Cape in 1933.

Alex Goodall was a charming man and very similar to Freer in lots of ways. He was promoted to the post of Senior Veterinary Officer. Later he became Assistant Principal Veterinary and Sub-Director of Veterinary Services (1927).

R. W. Dixon was promoted to the post of Senior Veterinary Officer and eventually to Assistant Principal Veterinary Officer for the Union.

Edgar did very good work as Veterinary Officer, Pietersburg, Transvaal, and was responsible to a great measure for the control of East Coast Fever in that area.

Robinson was the father of Dr. Eric Robinson of Onderstepoort, who as you know has a son who is also a veterinarian.

Assistant E. George is still at the Laboratory at Grahamstown. He is a great character and knows every road and every footpath in the Albany area.

I have not mentioned the names of many men who especially contributed towards the control of East Coast Fever in the Cape East and Transkei when this disease appeared in those parts from 1910 onwards. A number of them are still living. I have asked some of them to supply me with details of the work they did during the inoculation campaign against East Coast Fever in the Transkei. I hope to write up that story one day. By all accounts it is likely to make very interesting reading. It is a feature of East Coast Fever control about which a great deal more should be recorded.

I am still busy collecting information about the achievements of many of these old Veterinary Pioneers of pre-Union days and if anyone can make a contribution in this direction, I shall be very happy to receive it.

Those were the days!

Today, in the Western Cape area (which excludes the Eastern Cape and Kuruman, Kimberley, Vryburg and Mafeking area) there are thirty-six veterinarians. Of these, twenty-five are engaged in veterinary private practice, two are employed in municipal service and nine are in the employment of the State.

It is said that the Western Cape can still absorb a fair number of veterinarians into private practice. The State can certainly do with a good few more in this area.

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CLINICAL DIAGNOSIS OF BRUCELLOSIS AND SOME OTHER GENITAL INFECTIONS IN CATTLE

G. C. VAN DRIMMELEN

ABSTRACT.

Notes on technique of examining cattle for contagious abortifacient infections.

Prenatal mortality in farm livestock presents itself to the clinician in two ways:—

1. *Sterility,* characterized by the absence of pregnancy and irregular return to service.
2. *Abortion,* evident from the dead foetus and expelled afterbirth.

This is obviously an unfortunate distinction since it is becoming increasingly clear to the bacteriologist, that many infections manifest themselves in either way according to the conditions prevailing. In partly resistant cattle some infections lead to late abortion or eventually permit calving with weak or normal progeny. The same infections in less resistant animals run a more acute course and prevent implantation or precipitate early death of the embryo, which may be resorbed or expelled as nothing more than a large blob of mucus containing some degenerated tissues. For example, *Vibrio foetus* infection has popularly been associated with late abortion in cattle. Recent investigations by Adler, Albertsen, Rasbech and Szabo (1952); Terpstra and Eisma (1951); Stegenga (1950); and Lawson and McKinnon (1952) have demonstrated that return to service is the main symptom of vibriosis in cattle. Late abortion is evidently a rare occurrence and infected cows, as a rule, eventually return to normal breeding.

Confronted with a case of foetal death or irregular return to service, it is more satisfactory to be able to diagnose the presence of infection on the spot than to collect specimens which often do not reach a laboratory in the most suitable state. The purpose of this article is to describe briefly some useful techniques that may be applied to supplement physical examination. The samples required for laboratory tests are also mentioned with essentials of the tests necessary to permit co-operation of the various parties concerned.

1. Smears.

(a) Dry smears may be made from:—
Foetal abomasal contents or mucosa.
Foetal cotyledons (afterbirth).

Foetal caecal contents.
Sediment of colostral milk or udder secretion.
Vaginal discharge.

The staining technique of preference is that of Hansen:—

(i) Dry in air and fix by heat.
(ii) Flood with a mixture of 3 ml. saturated alcoholic solution of methylene blue and 10 ml. 0.04% watery solution of KOH — 2 minutes.
(iii) Wash in tap water.
(iv) Counterstain with 1.25% watery solution of Safranin (Geigy, Basle, Switzerland) — 15 seconds.
(v) Wash in tap water and dry in air.
(vi) Examine with oil immersion lens.

Brucella organisms are stained blue on a red background. Characteristically the *Brucella* organisms are grouped in cells which have been invaded or by which they have been phagocytised and even after the cell walls have been lysed in advanced decomposition some of the groupings are retained. Some *Brucella* organisms, probably non-viable at the time the smear was made, fail to retain the blue stain. Some large organisms of the *B. coli* type retain the blue stain but are easily distinguished.

Vibrio foetus organisms are stained red and easily recognized by the curvature and the wave-like appearance of a chain of two or three bacteria.

Alternatively the staining method of Kφster may be used:—

(i) Dry in air and fix by heat.
(ii) Flood with a mixture of 2 parts saturated watery solution of Safranin and 5 parts normal KOH solution ..... 1 minute.
(iii) Wash in tap water.
(iv) Decolorize with 0.1% H_2SO_4 .... 10-20 seconds.
(v) Wash well.
(vi) Counterstain with carbol methylene blue .... 2-3 seconds.
(vii) Examine with the oil immersion lens.

Tubercle bacilli and *Brucella* organisms are the only bacteria that stain red by this method. All others and the background are blue. Some practice on known specimens is advisable.

(b) Hanging drop or wet smears may be examined microscopically with reduced light transmission or with dark ground illumination.

The motile flagellate *Trichomonas foetus* is recognized by the undulating membrane, the three anterior flagella and the cytostome. The motile bacterium *Vibrio foetus* is recognized by the spiral appearance of short chains due to the curvature of individual bacterial bodies. Pairs are the most common.

2. Rapid Tests.

(a) **Milk Tests.**

The popularity of milk tests is probably due to the ease with which

milk specimens are obtainable. "Herd" samples, "Can" samples or "Cow" samples may be tested.

Smears of the sediment of a milk sample after centrifuging or standing overnight may be stained for acid-fast tubercle bacilli by the method of Ziehl-Neelsen. Naturally it does not follow from a positive finding in the milk (indicative of udder tuberculosis) that the sterility or abortion is caused by tuberculosis.

Smears of the cream of a milk sample after standing a few hours may be stained for *Brucella organisms* but is is not easy to produce a good preparation from which the fat has been removed, with retention of the bacteria.

The rapid test of preference is the *Brucella* Milk Ring Test:—

(i) A column of fresh milk about 2 cm. high is filled into a transparent tube e.g. glass, of ± 8 mm. diameter (roughly one millilitre of milk).

(ii) A drop (± 0.1 ml.) of haematoxylin-stained *Brucella* antigen is added to the milk and is mixed with it by shaking to produce a uniform purplish colouring.

(iii) The tube is incubated (or held roughly at body temperature) in a waterbath at 37°C for 40 minutes.

(iv) The tube is examined with reflected light.

A coloured cream layer ("Ring") with a white milk below indicates a positive reaction for Brucellosis.

The differential *Brucella* Milk Ring Test for infected and non-infected vaccinated animals may be useful in certain circumstances.

(i) Infected vaccinates may be distinguished from non-infected vaccinates SIX MONTHS after inoculation, with the aid of a completely negative milk sample as proved by a preliminary test.

(ii) Two (or more) tubes are used per cow sample to be tested.

(iii) One millilitre of milk from the cow to be tested is placed in the first tube, and one-tenth millilitre (roughly one drop) is placed in the second tube.

(iv) The second tube is now filled with negative milk up to the one millilitre mark.

(v) A drop (0.1 ml.) of stained *Brucella* antigen is added to each tube and the contents are thoroughly mixed.

(vi) The tubes are incubated (or held roughly at body temperature) in a waterbath at 37°C for 40 minutes.

(vii) They are examined with reflected light.

A positive reaction in the diluted milk 1 :10 indicates infection with virulent organisms in animals not recently vaccinated.

A rapid plate agglutination test may be carried out with milk:—

(i) A glass or glazed tile surface is cleaned and if possible heated to body temperature.

(ii) A large drop of about 0.25 ml. fresh milk is placed on the surface by means of a thick glass rod which can be wiped, rinsed in a bucket of hot water and again wiped after every sample handled.

(iii) A smaller drop 0.1 ml. of stained Brucella antigen is thoroughly mixed with the milk by means of a smaller rod. By frequent tilting and rotation the mixture is gently agitated on the surface of the plate and observed for clumping.

(iv) Only reactions occurring within two minutes are considered. (Late reactions may be complicated by drying).

(v) Five to ten tests may be carried out simultaneously on one plate; larger numbers introduce variations due to faulty timing.

(b) **Serum Tests.**

Serum samples are easily obtained by bleeding into sterile blood sample bottles with or without preservative. Clotting must be allowed immediately to obtain clear serum.

The Serum Plate Agglutination Test:—

(i) A wire loop of suitable size is used to place drops of saline on a glass slide or glazed tile surface, the number varying according to the degree of dilution desired to be tested.

(ii) Stained antigen is placed next to each drop in drops of equal size by means of the same loop.

(iii) Again with the same loop a drop of serum of equal size is mixed with the first drop of saline.

(iv) By carrying half of the mixture with the same loop over to the next and subsequent drops serial dilutions are made (e.g. 1 : 2, 1 : 4, 1 : 8, 1 : 16 and 1 : 32).

(v) Commencing at the highest dilution each of the mixtures of serum and saline is now added and mixed with the adjoining drop of antigen (i.e. 1 :4, 1 : 8, 1 : 16, 1 : 32 and 1 : 64).

(vi) By tilting the slide repeatedly and examining with strong light, agglutination if present can be seen and the result recorded (with concentrated antigen the appearance of agglutination at 1 : 4 is a positive result).

The Whole Blood Plate Test has been advocated as a screening test:—

(i) A drop of fresh blood is placed on a slide.

(ii) A drop of methylene blue stained antigen is added and mixed well.

(iii) Agitation by gentle circular tilting produces clumping and a typical colour change in the centre of the spot with blood of positive reactors.

3. Laboratory Tests.

The tube aggutination tests for brucellosis and vibriosis, are being carried out by some private practitioners in various countries although they require essentially a laboratory procedure. When the antigen is prepared at central laboratories and the technique is satisfactorily standardized, the results of work in small units can be highly successful.

(a) **Brucellosis.**

Samples of blood, if collected with preservative, should contain no

more than one-tenth $^{w}/_{v}$ saturated boracic acid solution in physiological saline. Again the samples should not be moved until a proper clot has formed to allow for extraction of clear serum.

Dilutions of serum used in the test in this country are 1 : 10, 1 : 20, 1 : 40 and 1 : 80. These tubes each finally contain antigen to a density of 1/20 of the standard antigen concentrate as supplied.

A 50% clearing of the suspension in 1 : 40 after 24 hours at 37°C is recognized as a positive result.

(b) **Vibriosis.**

Vibrio foetus infection in heifers and cows may be detected by carrying out an agglutination test on a vaginal mucus sample. These samples are collected by means of a glass tube ± 15 inches long and $\frac{3}{8}$ inches in diameter, plugged at both ends with cotton wool, sterilized and dried.

With *washed* hands the tube is attached to a rubber tube held in the mouth at the other end. The plug is removed from the free end of the glass tube and this is inserted into the anterior vagina through the *washed vulva* of the cow to be tested. Suction is applied and the tube moved up and down and forwards and backwards for a while. Suction is maintained until the tube is withdrawn completely.

The best samples consist of about 2-5 ml. tough white mucus. A large amount of clear fluid indicates oestrus and is unsuitable for testing. Yellow purulent material is of no value.-

For the test the mucus is mixed with saline and molten agar at 50°C and then allowed to set in a petri dish. Overnight the soluble antibodies are extracted by an added layer of carbol-saline. The dilution is now 1 : 10.

This is tested in tubes by serial dilution in formalized antigen 1 : 20, 1 : 40, 1 : 80, 1 : 160, 1 : 320, held at 37°C overnight.

Perceptible agglutination in any of the tubes is considered a positive reaction.

(c) **Trichomoniasis.**

Trichomonas foetus infection in heifers and cows is detected by employing similar vaginal mucus samples. The material is treated as for Vibriosis but dilutions of mucus are made so that in the petri dish agar preparation direct tests can be done.

Cultures of live *T. foetus* of suitable strains and age are then flooded on the surface of the agar and observed under the microscope for immobilization and agglutination.

Pre-agglutination immobility at titres of $^{1}/_{6}$ to $^{1}/_{24}$ and "echelon" clumping of immobile organisms in large single cell layered plates at titres of $^{1}/_{12}$ to $^{1}/_{48}$ indicate positive reactors.

4. Cultural and Biological Tests.

When necessary, clinical examination may be supported by other laboratory tests and it is useful to review the possibilities for final confirmation of the diagnosis.

Brucella organisms can be isolated from

(i) The foetal stomach contents.
(ii) The fresh foetal cotyledons.
(iii) Blood samples.
(iv) Milk samples (strippings).
(v) Semen samples.

Vibrio foetus can be isolated from

(i) The foetal stomach contents.
(ii) Vaginal discharge (anterior vagina).
(iii) Semen samples.

Trichomonas foetus can be obtained in pure culture from -

(i) The foetal stomach.
(ii) Vaginal discharge (anterior vagina).
(iii) Preputial washings.

In areas not within easy reach of the laboratory where specimens have to be transported for longer than 24 hours, special arrangements are required. Guinea-pig inoculation on the spot and despatch to the laboratory may meet the situation in some cases.

5. Allergic Tests.

Skin Tests.

Brucellosis may be diagnosed by skin tests using Brucellin, Melitin and various other preparations. The results are less reliable than those of other available tests.

Tuberculosis as diagnosed by the tuberculin test is, however, of prime importance. Genital tuberculosis is a very common source of infertility and may produce abortion in cattle. The technique of the test has to be demonstrated.

DISCUSSION.

Tests for the large number of pyogenic and viral infections limiting fertility in cattle have yet to be developed. There is no point in testing all animals in a herd of cattle for brucellosis when removal of reactors is not carried out. Where cases of sterility with obscure causation are concerned rapid individual tests are useful.

Herd testing for brucellosis is only undertaken in a small number of herds in South Africa. There is very little hope that a general systematic removal of reactors will be successful in this country. Millions of cattle are in charge of Bantu men who are not owners in the European sense of the word but only have ancestral custom and ethical and religious obligations to keep and herd them. Although in the event of death the carcasses of the animals may be consumed under certain conditions, and although the cattle may be suffering the worst imaginable privations such as starvation, thirst and cruelty, the act of selling or outright killing of certain animals is not permitted. This would constitute an outrageous disregard of tradition punishable by the "Spirits".

Infertility of relations, wives, children and livestock; failing crops and ill-health or malformed offspring of relatives and stock would

result from such gross misbehaviour. To question these customs may invite murder or open war.

Vaccination is the policy of choice and this is also favoured by the long suspected, but only recently satisfactorily reported, existence of seasonal reactors. These animals which showed positive reactions only during summer did not abort nor spread contageous abortion among large numbers of susceptible cattle in intimate contact, on an exceptionally well supervised experimental farm. Field observations suggest this to be a not uncommon occurrence in this country.

Obviously it is desirable to diagnose the presence of an infectious agent at the time and place when and where the herd is being examined. This is practically possible in the case of Brucellosis, Vibriosis, Trichomoniasis and Tuberculosis. Several other infections can be satisfactorily dealt with in a relatively small laboratory situated in closest touch with the farming community. A local laboratory such as the one set up and maintained by the "Gezondheidsdienst voor Vee in Friesland" at Leeuwarden is one of the finest examples of a profitable and useful institution. It is a diagnostic centre, demonstration room, school, college and experimental institute in one and cannot but contribute immensely to the higher standard of living and the greater happiness of the community which supports it.

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MINERAL DEFICIENCIES OF NATURAL VELD AND THEIR SUPPLEMENTATION IN RELATION TO FOOD PRODUCTION

J. G. LOUW and N. REINACH

Onderstepoort.

The standing invitation to farmers nowadays to increase food production is dictated by the requirements of an ever-increasing world population for existence at a reasonable standard of health. A recent estimate has shown this increase to be in the region of twenty-five millions per annum. When in the course of the 19th century the population of Europe was increasing at a rapid rate, the almost unpeopled continents of North and South America were conveniently waiting to receive its surplus population. The peoples of Asia and Africa have only now, according to Le Gros Clark (1953), reached their phase of accelerated growth. But there is no unpeopled continent waiting to receive the spill-over! It is expected that, as happened in Europe, this phase of accelerated growth will be followed by a decline in birth-rate and that the world population will then reach some measure of stability. But by that time the number of people on the face of the earth may well reach 8,000 or 12,000 millions!

Some authorities are gravely perturbed about this increase in population. They point to the claim that all land suitable for agriculture is in use and that whilst every baby born brings into the world a stomach to be fed, it does not also bring a fresh acre of cultivable soil. Under these conditions, they say, world famine is round the corner. UNO statisticians have, in fact, predicted this for 1960, unless new sources of proteins, carbohydrates and fats can be discovered. Alternatively, man must keep his own fecundity within necessary bounds. It is of interest to refer here to the fact that a South African savant recently advocated birth control as a means of staving off the menace of world famine. It is also of interest to recall that a newspaper correspondent seriously reminded the professor of the superfluity of his proposal, in view of the circumstance that long before such a disaster would come upon us, journeys to the moon would be an everyday occurrence and we would, therefore, be in a position to emigrate to this companion of the earth!

The rational optimists counter by agreeing that there will be periods and regions of scarcity, but that no famine need be of world dimensions. Famine and privation have always been local and temporary. Since the possibility for synthesis of foodstuffs such as carbohydrates and fats must for the present remain a matter for speculation

only, we shall remain, as in the past, entirely dependent upon the green plant and upon the soil for our sustenance. But food production could be greatly increased, once the factors that limit it presently are recognised and measures for overcoming these limitations introduced and energetically carried out. It is the purpose of this paper to discuss one such factor, namely, mineral deficiencies of the South African natural veld and methods for overcoming them. Much of what will follow is not new. However, the older findings seem to require resuscitation and studying afresh because:

(a) they appear to have been overlooked or ignored by most farmers, judged by their limited application;
(b) they assume added significance under the conditions referred to above.

Before dealing with the main aspect of the subject of the paper, it is necessary to refer briefly to certain features of the general problem of increasing food production. In the first place it is not irrelevant to remind you that the parasitic relationship between man and the green plant of the foraging and hunting stage of our history, has no place in modern agriculture. Responsible agricultural authorities and some farmers are fully aware of this, but it is vitally important that our relation to plants and the soil should without exception take on the form of a symbiosis. Secondly, as long as we are entirely dependent on plants, the population of the world must ultimately be limited by the vegetation which can be grown in it. In view of what has been said above, it follows that the best possible use must be made of the available acres. In this connection it is necessary to distinguish between areas where only animal food crops can be grown (ranching areas) and areas suitable for human food crops (arable land). In the former case, the only possibility of obtaining food for man, is through conversion of the plant material in the bodies of ruminant animals. However, there is, apart from this unique feed to food transformation, a competition between man and animals for foods of plant origin that are suitable for direct human consumption. Since the conversion of plant into animal food products is a most wasteful process (Leitch and Godden 1941) the extent to which this competition should be allowed to continue will have to be determined by at least two factors:—

(a) The total supply of and demand for food for the world population,
(b) the minimum daily requirements of animal protein compatible with the maintenance of a reasonable standard of health in man.

There is as yet no agreement amongst nutrition experts on this last point. In connection with the first factor, it can be said that the scarcer the food supply, the lower is the proportion of tillable land that can be spared for animal production, since it takes four to twelve acres of animal crop to produce the same amount of human food, as one acre of human food crop. Ranging areas and the by-products of the human food crop production industry would still be available for feed to food conversion.

In South Africa about 90 per cent of the acreage is said to be unfit for cultivation, "being too dry, mountainous, or otherwise unsuitable and can be utilized only for pasturage" (Leppan 1936). Since these pasture lands could be utilized most efficiently and almost exclusively by ruminants, it follows that our contribution to greater food production must be sought largely in the possibilities of increasing livestock production.

The extent to which livestock production may be increased relative to human needs, is governed by many factors. There is the question of genetic capacity to produce and the possibilities of reducing losses by controlling diseases and parasites. Given the necessary staff, the veterinary profession is well able to give the advice and produce the products required for controlling losses through the latter causes. In regard to breeding, it seems futile to increase genetic capacity to produce, unless the level of nutrition can simultaneously be brought into line. The importance of improved nutrition as a means of bringing about improvement in livestock production, seems to be beyond question, especially in tropical and sub-tropical regions and in other regions where animal husbandry is not highly developed. In such cases the possibilities of better feeding lie largely in correcting nutritional deficiencies, improving the general quality of the feed supplied to livestock within the limits of economic feasibility, and making maximum use of grazing and forages. The possibilities of increasing livestock production would then lie rather in obtaining more efficient production from existing numbers of animals than in increasing their numbers.

The question of the nutritional deficiencies of natural pastures in this country has been the subject of extensive research by the Division of Veterinary Services. These investigations were at first confined to the Vryburg area where they formed part of the study of the cause and prevention of lamsiekte. The discovery that one of the links in the aetiological chain of the disease is a depraved appetite, ultimately narrowed down to "osteophagia", and shown to be due to a phosphorus deficiency in the natural grazing, inspired the later and more extensive study of the nutritive value of natural pastures, covering almost the whole of South Africa. Indeed, the further discovery that the economic importance of phosphorus from a purely nutritional point of view, far surpassed its indirect significance in relation to actual loss of life, made such a study of vital importance to the livestock industry of the country. The final report on this work was published (Du Toit 1940) in 1940. Briefly, it revealed a widespread deficiency of phosphorus and protein in most grass pastures for approximately six months of the year, coinciding with the dry season. Certain pastures were border-line in respect of phosphorus also during the rainy season. Sodium and chlorine were deficient in certain areas and an energy deficiency appeared to occur concurrently with protein.

The effects of these nutritional shortages on livestock production are too well known to require further elaboration at this time. Of more importance for our present purpose are practical measures for over-

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coming some of these limitations and the substantial benefits to be expected from them. The ideal state of affairs would no doubt be to provide all animals at all times with adequate amounts of a well-balanced ration. In range areas this presupposes an efficient system of veld management coupled with supplementary feeding with the object of partly or wholly eliminating seasonal deficiencies and so ensuring uninterrupted production. That this can be done is suggested, inter alia, by experiments recently carried out by Clark (1952) at Nooitgedacht, Ermelo. However, the economics and feasibility of such a system for different areas of the Union, require further study and will no doubt receive further attention at another time. The periodic deficiencies of the feed supply on range areas are presently more often than not simply allowed to operate until the green pastures of a new season bring about resumption of production.

Putting right a single deficiency of a feed supply suffering from multiple deficiencies cannot completely eliminate decreased livestock production. Nevertheless the results of numerous studies conducted in this and overseas countries, leave no doubt as to the benefits that result from such a correction. The work on phosphorus deficiency at Armoedsvlakte, South Africa, and at King Ranch, Texas, U.S.A., and that on cobalt and copper in Australia, New Zealand and England are outstanding examples of benefits arising from correction of mineral deficiencies. These benefits include accelerated rate of growth, increased calf production, increased returns from calves, and a decrease in losses.

Since the quantitative requirement of an animal for a mineral is small in comparison with its needs for proteins and carbohydrates, the cost of rectifying a deficiency of the former would be proportionately low. The effect of a mineral supplement under these conditions is to improve the consumption and utilization of the available feed supply with the result that the improvement in general production is out of all proportion to the size and intrinsic value of the supplement.

Thirteen minerals are according to the present state of our knowledge required for normal growth, production and maintenance of general health. They are: phosphorus, calcium, magnesium, sodium, potassium, chlorine, sulphur, iron, copper, maganese, zinc, iodine and cobalt. Of these phosphorus is, as stated above, the only one of which a wide-spread deficiency in our pastures has been proved. Salt is deficient in some parts and a shortage of copper in the pasturage is held to be responsible for the disease "lamkruis" in certain coastal regions of the Cape Province. With this exception practically nothing is known about the iron, copper, manganese, cobalt, zinc and iodine contents of our natural pastures. These minerals are known as the "trace elements." To bring to an end this state of uncertainty, a country-wide survey of the trace element content of these pastures has recently been launched. Until the results of this study are known no authoritative recommendations are possible with regard to supplementation of these minerals. This leaves us with phosphorus, with or without salt.

One of the reasons given earlier in this paper for reviving the "phosphate story" is that it is apparently not enjoying the popularity demanded by its importance, especially at a time when the emphasis on its value as a supplement requires to be shifted from "enhanced profits to the farmer" to "increased food production". In this connection it is of interest to recall that in 1943-44 Groenewald and Malan (1945) found the demand for bone meal and phosphatic licks to bear a direct relationship to the incidence of lamsiekte and not to the density of the cattle population or the degree of phosphate deficiency as revealed by the surveys of du Toit and associates (loc. cit.) This picture of the demand for phosphate appears to apply also at the present day despite indications (1952) of a fairly general occurrence of the straight aphosphorosis, stywesiekte, in certain lamsiekte-free districts of the eastern half of the Union. The truth seems to be that, despite the availability of a vaccine, phosphate is still largely fed with the primary object of preventing losses from lamsiekte or, alternatively, it is fed only by farmers who have learnt to appreciate its nutritional value through its use as a prophylactic. In this connection it is necessary to refer to the fact that rations only partially deficient in one or more dietary essentials produce only sub-clinical manifestations such as slow growth, shy breeding, low milk production, susceptibility to certain infectious diseases, inefficient use of feed, etc. This being so, it is understandable that the farmer would heed and rectify only the acute deficiencies causing readily recognisable symptoms such as actual disease or marked reduction in production. Nevertheless, tremendous quantities of feeds are wasted in not heeding the milder deficiencies, resulting in large losses of human foods.

The question now arises, how does the present demand for bone meal and other phosphatic feeds compare with the potential consumption of these feeds as revealed by the actual extent of the deficiency in the natural pastures? This information would make possible estimates of: (a) the quantities of additional phosphates required by the animal industry, (b) the increase in food production in the form of animal products.

The results for phosphorus of the pasture surveys of the 1930's have been presented in the form of coloured charts to depict conditions in summer and in winter.* The figures for "summer" have been obtained by averaging those for the months November to April, whilst "winter" gives a mean reflection of the position during the period May to October. These charts have this to recommend them that the phosphate status of our pastures can be taken in at a glance. Table 1 gives the distribution of cattle and sheep (1951 census) in the phosphate deficient and borderline areas.

In the last two columns of Table 1 an estimate is made of the amount of phosphate required annually to eliminate the deficiency of cattle and sheep on the natural pastures of the Union. These figures are based on the assumption that a supplement representing half the

* These charts appear in the article by P. J. du Toit et al (1940).

TABLE 1.

DISTRIBUTION OF LIVESTOCK IN P-DEFICIENT AND BORDERLINE AREAS OF THE UNION (1951 CENSUS) AND PHOSPHATE REQUIREMENTS.

Figures in brackets refer to percentage of total in Union of South Africa.

Season	pasture. status of Phosphorus	Cattle.		Sheep.		Supplementation required for Phosphate in form of (tons)	
						P	Bone Meal.
Summer	Deficient	1,000,000	(9)	3,000,000	(8.6)	1,430	14,300
	Borderline	7,000,000	(61)	11,000,000	(32)	4,280	42,800
Winter	Deficient	10,000,000	(87)	14,000,000	(40)	12,000	120,000
	Borderline	750,000	(7)	8,000,000	(23)	945	9,450
					Totals	18,655	186,550

total requirement in the case of a "deficient" area and a quarter of the total requirement for a "borderline" area would suffice and that seven sheep equal one bovine. This estimate of 186,000 tons of bone meal compares with the present demand of only about 40,000 tons. We should hasten to point out that the phosphate status of an area was arrived at by averaging all the results obtained for that area and that only a small percentage of the farms within such an area were actually sampled. It is possible therefore that "borderline" and even "sufficient" spots may occur within a "deficient" area and *vice versa*. To what extent this would affect the above estimate it is not possible to say. Nevertheless, even if the figure of 186,000 tons is halved it means that only about 40 per cent of the animals that could benefit by phosphate supplementation are at present concerned. We will not try to estimate the effect that removal of the phosphate deficiency of 60 per cent of veld-grazed animals would have on food production. If the type of response that is obtained on deficient veld is remembered there can be no doubt that the increase in human food supplies would be considerable.

To conclude, it is necessary to refer briefly to the latest developments in methods for the supplementation of phosphates. The possibilities of applying phosphatic fertilizers to veld will not be considered at this time.

(1) **The Crush Method.** Spoon-feeding is ideal from the point of view of exact control of intake. But it cannot be widely applied on account of the time and labour involved. Two recent findings have a bearing on this method: (a) the response from two ounces of bone meal is the same as that from three ounces, the quantity originally recommended (Bisschop 1952), (b) it makes no difference whether

two ounces of bone meal are dosed daily or six ounces of bone meal dosed every third day (Reinach and Louw).

(2) **The Lick Method.** Where it is not possible to control the water supply this method in which bone meal or other phosphates are fed free choice, with or without salt, is the only practical one. In a trial lasting five years it has yielded results comparing favourably with the drinking water method. It is necessary that a sufficient number of boxes affording protection from wind and rain be used. Fine and dusty phosphates such as di- and tricalcium phosphate could be offered in the form of pellets.

(3) **The drinking water method.** Where it is possible to control the water supply, adding phosphorus to the water is probably the most satisfactory method of preventing phosphorus deficiency. The materials may be added to the water by hand or in the form of a solution with the help of an automatic dispenser. Such a machine is in use in Texas, U.S.A. Similar apparatuses developed in this country have yielded promising results.

Superphosphate is presently the only product available for this purpose. A method for the defluorination of concentrated solutions prepared from this product is available (Truter and Louw 1952). Its utilization is cumbersome, but safe, and is recommended as an emergency measure, until pure products such as mono- or disodium phosphate become available.

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RESEARCH INTO INFERTILITY IN CATTLE AND SHEEP

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Discussion of a paper published in Journal S.A.V.M.A. Vol. 24 No. 2, June 1953.

In opening the discussion and replying to the questions raised, the author stated the Census figures show that only just over a million calves are born annually from the 3,000,000 European owned cows and breeding heifers in South Africa. This represents a calving rate of approximately 35 to 40 per cent, which is half that obtained in other countries. This poor rate cannot be attributed to unavoidable local factors because many individual herds of both beef and dairy breeds can be cited in which the calving rate is 75 to 80 per cent and more. These are invariably herds that are free from infectious disease, are well fed and properly managed.

In clean and properly controlled dairy herds where calving should be arranged to take place all the year round in order to maintain a constant supply of milk, one should find at any time that 80 per cent of the cows are in milk while 75 per cent should be in various stages of pregnancy. The 20 per cent of dry cows should all be from 7 to 9 months pregnant. In beef animals where breeding is seasonal 75 per cent of cows ought to calve every year.

Investigations here have shown that in only a very small minority of cases does such a satisfactory state of affairs obtain. It is no surprise to find a dairy herd with less than 50 per cent of the cows in milk and under 25 per cent in calf. The same low calving rate is also found in some beef herds.

It has been estimated that infertility costs the milk producers supplying Pretoria alone over £250,000 annually and that it raises the cost of milk production by 10¼d. per gallon. It is also an important factor in the production of poor quality milk, since the milk solids of pregnant cows tend to increase with advancing pregnancy, while those of barren cows are rather inclined to show a downward trend. In consequence it is difficult to produce milk that conforms to the prescribed standards if a large percentage of the cows are not in calf.

There is no doubt that the various forms of infectious infertility are the main cause of our breeding troubles. Observations made in several herds infected with epivaginitis during the past few years have

shown that bulls may serve infected cows for years without developing detectable lesions of the epididymis or any other part of the genital tract. A study that is now being made of the semen of such bulls shows, however, that they secrete poor quality semen which frequently contains pus, and that they invariably transmit infection to susceptible animals. A clean cow or heifer conceives readily to service by the infected bull and may show a vaginal discharge at various stages during pregnancy. Many farmers who have artificial insemination service available make the fatal mistake of putting an apparently normal bull with their young heifers. This is on account of the fact that it is not so easy to detect oestrus in heifers since they do not come into the stable for milking. After calving such heifers show very severe vaginitis which may be accompanied by loss of condition and reduction in milk yield. Great difficulty is then experienced in getting them into calf again.

The percentage of cows rendered completely sterile by epivag varies greatly. In some herds it has been as high as 50 per cent while in others again the proportion has been very low. No reliable curative treatment for the disease is known as yet. In most cows all evidence of anterior vaginitis and purulent discharge disappears in time, only to reappear again later. This fact has deceived many owners or veterinarians into believing that the treatment they have applied has been successful. Cows which are apparently clean may still transmit the infection. Artificial insemination is the only method known at present, whereby the disease can be brought under control. Many herds that were badly infected three years ago have been apparently cleaned up by this method of breeding and the cows are again calving normally. In those in which the same degree of success cannot be claimed it is usually found that the owner has been using a bull on some of his cows and heifers.

Complete exclusion of natural service is the most essential factor in trying to control and eradicate this disease.

The recently published work of Ronson, Lamming and Fry on the relationship between various hormones and uterine infection is of great practical importance and has a direct bearing on the treatment of conditions like metritis. It might explain why treatment during the luteal phase of the oestrus cycle is not always successful. It also suggests that cutting down the progesterone supply by expression of the corpus luteium is essential for the successful treatment of uterine infections. Further this work offers a satisfactory explanation for the undeniable fact that sexual rest, whereby a cow is permitted to pass through several oestrus periods without service or insemination, has a markedly beneficial effect on various types of infection of the genitalia.

There still appears to be a tendency amongst some practitioners to base diagnosis of metritis merely on a vaginal discharge. Many cases of mere uncomplicated anterior vaginitis are thus subjected to unnecessary uterine irrigations for metritis. Recently two cases of abortion

were encountered, in which the owners stated that the cows were treated for metritis the day prior to the abortion.

The time of mating undoubtedly has a great influence on the conception rate in beef breeds. It appears that breeding during the autumn and winter months does not yield such a high calving rate as spring or summer mating. Observations on this aspect are at present being carried out on two ranching herds in the bushveld where artificial insemination is being practised throughout the year, and it is hoped to have more definite information on this within the next year or two.

It must be admitted that all the indications point to nutritional factors as the most important cause of endocrine imbalance especially in those cases where functional sterility occurs as a herd problem. Experience both here and in other countries has shown that hormone treatment in such cases is of limited value. This problem is one which must be tackled at its base, and it is hoped that the proposed mineral survey of the Union will contribute greatly to the elucidation of the major causes of functional sterility in this country.

Hypogonadism is more prevalent than is generally believed and is seen in both dairy and beef breeds. This condition is now being studied in one of the native territories where it appears to occur on a big scale, probably as the result of hereditary factors or the inbreeding which is unavoidable under the conditions under which many native cattle are bred.

SUSPECTED MALICIOUS POISONING

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Towards the end of 1952 while the writer was working at the Veterinary Research Laboratory, Kabete, mortality and swellings in cattle occurred at a mission station in the Kikuyu Reserve.

All the animals on the farm, cows, steers and yearlings, were herded together during the day and at night were brought into sheds enclosing two yards. They were dipped once a week in an Arsenical dip and, after going through it and standing in the race to drain off, were hand dressed with tobacco extract in old motor oil. This procedure had been followed for the last fifteen years.

Thirty three steers suddenly developed large oedematous swellings between the brisket and near fore leg extending for variable distances down the medial aspect of the limb and along the chest and belly. Six steers showed lesions both on the near fore and between the hind limbs. No animal showed a lesion on the offside. Eight steers died, six within five days of symptoms appearing.

Post mortem examination:—On cutting into the swellings, the subcutis and musculature were found distended with gelatinous oedema; there were numerous petechial and ecchymosial haemorrhages throughout the affected area and the musculature presented a slightly cooked appearance and was oily to the touch. The pre-scapular lymph gland was enlarged and oedematous, with petechiae. The cadaver showed signs of an acute toxaemia. There were epi- and endo-cardial haemorrhages, the lungs were hyperaemic and oedematous, the spleen enlarged, and the liver and kidneys congested.

An exhaustive investigation for infectious agents, of the dipping procedure (the nun responsible for the cattle had been present at the dipping three days before the outbreak and apparently all was in order), the harness, general management, including the pastures, all proved negative. It was finally concluded from the history that the damage had been intentional and malicious, occurring as it did at the beginning of the Mau Mau disturbances and following threats to the persons and property of the mission. The steers had not been worked for a period of three to four weeks and were apparently quite normal the day previous to the development of the swellings. The sheds were some distance from the mission dwellings and at night the stock could quite easily be tampered with without the knowledge of anyone at the mission.

It was assumed that some acute irritant must have been introduced sub-cutaneously or intra-muscularly by stabbing with a sharp

instrument. The animals were first seen by the writer 7-8 days after the appearance of the swellings, by which time the skin on the affected areas was necrotic and sloughing and no evidence of any wound could be obtained.

Tests for arsenic were negative. According to a colleague, cases of malicious damage to stock using extracts of the seeds of Abrus precatorius (Jequirity, Lucky Bean) are not unknown in India. Steyn[1] also mentions this. As it would have been an easy matter for anyone to have obtained seeds of Abrus precatorius (the seeds of Abrus are used for beads by the natives), Ricinus communis or Jatropha curcas, the sera of some of the animals was tested for antibody to abrin, ricin and curcin following production of control anti-sera in rabbits, but with negative results.

The latex of Synadenium grantii Hook, Euphorbiaceae, a plant common in the Kikuyu country and used by the natives as a blister in treating the swollen glands of East Coast Fever, is extremely irritant with properties similar to the latex of S. arborescens Boiss, Euphorbia candelabrum Tremant, and E. ingens E. Mey. E. candelabrum is also fairly common in the Kikuyu country and is stated by Watt & Breyer-Brandwijk[2] to have been used by the Bushmen for making poisoned arrows or as a game poison by placing branches of the plant in drinking pools.

A similar type of lesion to that in the steers was produced in guinea-pigs by sub-cutaneous and intra-muscular inoculation of .05 – .1 ml. of S. grantii latex, 40% of the guinea-pigs succumbed within 48-72 hours of inoculation.

In the pigs that survived the skin over the lesions was, as in the steers, necrotic and commencing to slough and no evidence of the needle wound could be found.

The above evidence coupled with the history led to the assumption that either the latex of S. grantii or some other Euphorbia was used.

During the last nine months there have been a number of cases of malicious poisoning of stock by Mau Mau adherents, arsenic being the most commonly used agent as it is so easily available in the form of dipping fluids. There have also been, however, instances of deaths in stock, like the above, of undetermined aetiology. Native witch-doctors have an extensive knowledge of poisonous plants and it is within the bounds of possibility that extracts of plants such as Gloriosa virescens Lindl, which abounds in various parts of the Colony, Adenia spp. or Acokanthera spp. were used, which would make diagnosis extremely difficult. In a recent paper Clark[3] mentions the rigid systole of the ventricles produced by poisoning with Acovenoside A. (Acokanthera venenata) a symptom which would be of great help in arriving at a diagnosis.

In Kenya at present only 33 species of plants are known to be toxic, a mere handful compared to the 240 odd species known in S. Africa. Until our knowledge of the toxic species and their principles is greatly extended, diagnosis will remain a problem.

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THE ISOLATION OF **TRICHOPHYTON GYPSEUM** FROM A CLINICAL CASE OF DERMATOMYCOSIS IN A HORSE

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Onderstepoort

A bay gelding, belonging to a farmer in the Brits district, was brought to the Institute for the treatment of a chronic skin condition. Large areas of its body surface were covered with dry, flaky crusts which could be rubbed off, leaving the underlying skin hairless, dry and dull. (Fig. I). Semi-bald patches, covered with thick crusts, were

distributed over its body, neck and legs and removal of these crusts left raw, bleeding surfaces. The impression was gained that the latter lesions were caused by secondary infection. A tentative diagnosis of globidiosis was made.

Microscopic examination of skin scrapings, however, revealed a few hairs with fungus spores surrounding their shafts and skin sections showed no globidium cysts. Subsequently hairs were dissected from the crust-like material and spread on to Littman's medium. After seven days' incubation at 23°C small, white, woolly colonies appeared in the vicinity of some of the hairs. These were transferred to Sabouraud's agar plates where colonies conforming to the description of *Trichophyton gypseum* developed. Culture mounts were prepared and the identification of this fungus confirmed.

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Q FEVER

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Q fever or Queensland fever is an infectious disease with a very wide host range, but it usually only causes clinical symptoms in man, when it is characterised by a sudden onset, a severe headache, a high fever, anorexia, malaise, a general weakness and an interstitial pneumonia. Animals usually merely develop an inapparent infection. It is caused by a rickettsia, viz. *Rickettsia burneti,* which invades the blood-stream during the acute stage of the illness, localizing in the placenta and the mammary gland of the cow, the ewe and the goat. Unlike other forms of rickettsiosis, however, this disease is never associated with a cutaneous rash and the serum of an affected animal does not give a positive Weil-Felix reaction.

HISTORICAL

Q fever was not recognised as a disease *per se* until 1935 when it made its appearance among meat workers and cattle men in Brisbane, Queensland. Derrick (1937, 1939) suspected a new type of infection and succeeded in transmitting it to guinea-pigs by means of blood and urine of patients. Then Burnet and Freeman (1937) continued the investigation. They found that rats and mice were also susceptible and that the infecting agent survived in the chorio-allantois of developing chick embryos. They also noticed that it was filterable through gradocol membranes with 0.7 micron pores. Infected mice developed a tumor splenis, and spleen smears revealed the presence of rickettsias which were named *Rickettsia burneti* by Derrick.

Ticks and tick faeces were suspected as sources of infection and a search for infected ticks resulted in the recovery of infected Haemaphysalis humerosa from bandicoots.

About the same time in the course of a study of other rickettsial diseases, a filterable rickettsia, named *R. diaporica,* was isolated from *Dermacentor andersoni* Dicks in Montana, U.S.A. by Davies and Cox (1938). A study of this organism led to human infection and then it was realised that this agent was identical with *R. burneti* (Burnet and Freeman 1939; Dyer, 1939, Bengtson, 1941a).

During the second world war the Germans encountered a form of broncho-pneumonia in the Balkans which they named "Balkan Grippe". They noticed that local people did not get the disease and that troops returning from the front did not carry the infection home. They isolated the infecting agent in experimental animals but did not identify it.

(Slavin, 1952).

When outbreaks of an atypical pneumonia occurred among allied troops stationed in Italy at the end of the war, this condition was identified as Q fever (Commission on Acute Respiratory Diseases, 1946, a, b, c.) Simultaneously a number of outbreaks occurred in California, where an investigation revealed that there was a widespread infection in cows, sheep and goats.

Meanwhile the disease was being recognised in different parts of the world. The first report of Q fever in Great Britain was made by Stoker (1949) and MacCallum, Marmion and Stoker (1949). Slavin (1952) found that no less than 6.9 per cent of the farms tested in England had the infection among their livestock. Soon afterwards its existence was discovered in South Africa by Saner and Fehler (1950) and Gear, Wolstenholme and Cart (1951).

DISTRIBUTION

Q fever has a very wide distribution. It occurs extensively in Australia (Derrick, 1937, 1939, 1953; Burnet and Freeman, 1937, 1939), in America (Davis and Cox, 1938; Smadel, 1948; Clark, Bogucki, Lennette, Dean and Walker, 1951; Derrick 1953), in Greece (Caminopetros, 1948), in Persia (Giroud and Yassemi 1952), in Ceylon (Schmid 1952) in Turkey (Payzin, 1948; Minett, 1952), Italy (Robbins, Gauld and Warner, 1946); Robbins and Ragan, 1946; Robbins, Rustigian, Snyder and Smadel, 1946; Babudieri, 1951), in Spain (de Prada, Gay, Lorente, 1930), in Switzerland (Kilchsperger and Wiesmann, 1949; Wiesmann, 1952), in North Africa (Blanc, Bruneau, Martin and Maurice), in the Belgian Congo (Giroud and Jadin, 1950), in Panama (de Rodaniche, 1949), in Great Britain (Stoker, 1949); MacCallum, Marmion and Stoker, 1949; Marmion and Stoker, 1950; Whittick, 1950; Slavin, 1952), in Germany (Hengel, Kausche and Sheris, 1950) and in the Union of South Africa (Saner and Fehler, 1950; Gear, Wolstenholme and Cart, 1950). According to the South African Institute for Medical Research (Reports 1951, 1952) Q fever is a widespread infection in South Africa. Most South Africans appear to contract the infection during their youth and acquire an immunity which is not shared by immigrants from North Western Europe. In 1952 a serological diagnosis was confirmed in 53 cases and in three cases the infection was transferred to guinea-pigs by the blood of the patients.

ETIOLOGY

The causal agent of Q fever is a rickettsia, viz. *R. burneti*, which was first described by Derrick (1937, 1939) and Burnet and Freeman (1937). The organism is a typical rickettsia. The various individuals are pleomorphic structures, some being rod-like, others cocco-bacillary. They stain readily with Giemsa's method and occur in infected tissues as large intra-cytoplasmic masses of tightly packed organisms about 20 to 30 microns in diameter. Some of the individual rickettsias are as

large as medium-sized Gram-positive bacteria but others are so small that they are filterable through Berkefeld N filters and collodion membranes with the pores 400 millimicrons in size (Bengtson, 1941b). When the American workers, Davis and Cox (1938) originally studied the organism as it occurred in the tick, *Dermacentor andersoni*, they found that it was filterable and named it *"Rickettsia diaporica."*

RESISTANCE

An outstanding character of *R. burneti* is its great resistance to various environmental conditions, viz. drying, physical agents and disinfectants. It will remain viable at room temperature for long periods. Tissues suspended in 50 per cent glycerine remain infective and *R. burneti* can be preserved at −70°C. *R. burneti* is destroyed by 70 per cent alcohol and ether in 2 minutes and by heat at 65°C in 15 minutes. Its growth is not affected by ultrasonic waves, ultraviolet waves, aureomycin and chloromycetin (Kirberger, 1951).

It may survive ordinary pasteurization. (Marmion, MacCallum, Rowlands, Thiel, McDonald and Phipps, 1951). Slavin (1952), however, reports that milk pasteurized for tuberculosis is free from infection. The organisms are readily destroyed when kept in 0.2 per cent formalin or 0.4 per cent phenol. When kept at room temperature milk containing 0.5 per cent boric acid remains infective for at least 54 days (Slavin, 1952). Tick faeces may retain their infectivity for 586 days (Philip, 1948), and infected dried blood for 186 days. (Parker, Bell and Stoenner, 1949). *R. burneti* may survive and be present in the dust-laden air emanating from pens, sheds or barns used for housing infected animals. (Delay, Lenette and de Ome, 1950; Lennette and Welsh, 1951).

CULTIVATION

According to Cox and Bell (1939), *R. burneti* can be readily cultivated in tissue culture and in developing chick embryos. A very rich yield can be obtained from the yolk-sac of chick embryos inoculated in the yolk-sac on the fifth or sixth day of incubation. Death of the embryo usually occurs four or five days later if the eggs are incubated at 35°C. An infected yolk-sac is one of the best sources of material for seed inocula, diagnostic antigens and vaccines. When chick embryos are infected via the yolk-sac the infection is confined to it and does not spread to the rest of the embryo. The number of rickettsias rapidly reaches a maximum and then declines. (Ormsbee, 1952).

Under natural conditions extensive multiplication of *R. burneti* takes place in the epithelial cells of the intestines of the tick so that there may be a very high concentration of rickettsias in the intestinal contents and in the faeces of an infected tick. The faeces evacuated by an infected tick on the skin of its host is probably one of the main sources of infection of man and animal. (Philip, 1948). *R. burneti* is also present in very large numbers in the placentas of infected goats and sheep. But rickettsias may be demonstrable in the placentas of

animals giving a negative as well as a positive serological test. (Welsh, Lennette, Abinanti and Winn, 1951).

PATHOGENICITY

R. burneti has a wide range of hosts, but Q fever is usually an occupational disease of man, commonly affecting individuals (particularly males) that handle livestock, raw animal products and animal secreta. It is, therefore, extremely common in slaughter-house workers, livestock attendants and farm labourers. (Derrick 1937, 1953; Clark, Lennette and Romer, 1951b). But many outbreaks have also been reported in laboratory workers handling infected material (Robbins and Rustigian, 1946; Derrick, 1953) and in persons attending autopsies (Whittick, 1950; Siegert, Sinirock and Stroeder, 1950), Marmion and Stoker, 1950; Babudieri (1951). Outbreaks have also followed the inhalation of dust contaminated with animal secreta, Sigal, Scott, Henle and Janton (1950), Slavin (1951).

Q fever is a definite clinical disease of man only and occurs in other species of animals merely as an inapparent infection. Under natural conditions *R. burneti* has been isolated from the cow, the sheep, the goat, the pig, the bandicoot (a marsupial), the merion (a Moroccan rodent) and the pigeon (Derrick, 1953). (See Table I). The bandicoot, the merion and the dog act as hosts for ticks that have been found naturally infected (Derrick and Smith, 1940; Siegert et al, 1950). In the cow, the sheep and the goat, the infecting agent may occur in the milk and the placenta. The incidence of infection (though inapparent) may be very high in sheep, goats and cows in certain areas as reflected by the complement fixation test. It is rare in equines and dogs. Infected goats may abort or may develop pneumonia, but otherwise the health of these animals remains unimpaired and the milk production proceeds normally. After an experimental infection, however, an acute phase of rickettsiaemia may precede the localisation of the organisms in the mammary gland and the placenta.

Some species of birds, viz. pigeons, ducks, goldfinches and sparrows from Q fever infected areas may give positive serological tests. The birds, however, do not retain complement fixing bodies for very long; yet they may continue to harbour rickettsias in their kidneys, although they have become serologically negative (Babudieri and Moscovici, 1952).

Several laboratory animals have also been found to be susceptible. These include guinea-pigs, mice, rats, rabbits and monkeys. With the exception of the guinea-pig, which may develop a severe reaction, the infection remains clinically inapparent in all those animals, but rickettsias may be recovered in smears made from their livers and spleens.

NATURAL SOURCES OF INFECTION

Several different species of ticks have already been found to be naturally infected with *R. burneti* (see table II). Several other species of ticks have been infected experimentally (see table III). Moreover, Smith (1940) has demonstrated that active multiplication of *R. burneti*

takes place in the epithelial cells lining the intestine of the tick and numerous rickettsias may be shed in the lumen, thus causing contamination of the faeces. According to Giroud and Jadin (1950b) human body lice may also become naturally infected when they infest infected human beings. But the *R. burneti* killed the lice in the course of a few days. Ticks evidently have little direct relationship to human infection. But cattle ticks, *Boophilus* sp. and *Haemaphysalis* sp., may become infected by feeding on cattle and evacuate large numbers of rickettsias with the faeces, thus contaminating the hides of their hosts. Infection of man then follows when the hides or meat from infected carcasses are handled, or when dust from the contaminated hides is inhaled. The infection in the domestic ruminant generally localises itself in the placenta (Luoto and Huebner, 1950; Welsh, Lennette, Abinanti and Winn, 1951) and the udder, so that the afterbirth and the milk may be important sources of infection. Although the cow shows no apparent clinical symptoms, it may excrete *R. burneti* in the milk for many months or even years. (Huebner, Jellison, Beck, Parker and Shephard, 1948; Lennette, Clark and Dean, 1949; Marmion and Stoker 1950; Slavin, 1952).

Placental tissues and post partum uterine discharges of infected animals and infected tick faeces provide probably the most important sources of infection for both man and animals under natural conditions. The infective potential of a single placenta is tremendous. No wonder the incidence of human infection, in places like Northern California and Greece, is at its peak during the lambing season when goats and sheep are the reservoirs. Zavagli (1951) believes that dogs may become infected by eating infected foetal membranes and thus serve as a source of infection for man. Under laboratory conditions the yolk-sacs of infected chicken embryos also contain the rickettsias in a very high concentration and are no doubt responsible for many cases of laboratory infection.(Robbins and Rustigian, 1946). The milk of an infected animal is infected to a much lower degree; even the urine and faeces of an infected animal may be positive for *R. burneti* (Bell, Parker and Stoenner, 1949; Lennette and Clark, 1951).

Birds apparently also play a role in propagating *R. burneti,* and several cases of Q fever have been observed in human beings following association with pigeons (Robbins, Gauld and Warner, 1946; Babudieri, 1951).

Q fever has the habit of turning up at most unexpected and improbable places e.g. in a barber's shop (Slavin, 1952). In Italy it appeared among soldiers sleeping in a loft and in other soldiers stationed out in the open. There was no evidence of any association with livestock. Another outbreak occurred on a trans-Pacific cargo boat. Pregnant goats comprising part of the cargo were found to be the source of infection (Clark, Lennette and Romer, 1951a.) Stoker and Thompson (1953) reported an explosive outbreak on a dairy farm in Great Britain where no evidence of infection from cows could be found — pigs were believed to be a possible source of infection.

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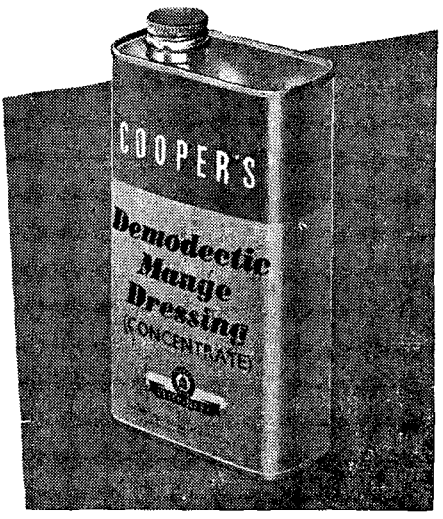

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TRANSMISSION

(See tables II, III, and IV). Under certain conditions ticks probably play an important role in the dissemination of the infection and in its transmission to domestic animals. Several species of ticks from different parts of the world have been shown to be infected and at one time ticks were believed to be the main vectors of the infection. But many outbreaks of Q fever have been reported when ticks and other arthropods, had to be excluded as vectors of *R. burneti* in livestock. Lennette, Holmes and Abinanti (1952) do not think that ticks can be held responsible for the dissemination of the infection among domestic animals in California. Infection is now believed to be mainly by inhalation.

The importance of ticks as vectors was revived when Hengel, Kausche and Sheris (1950) discovered that infected ticks could be brought in by dogs. During the study of an epidemic in Germany they freed dogs of ticks and sent them back into the fields. On the return of the dogs the fresh ticks removed from the dogs were found to be infected with *R. burneti.*

In some outbreaks where many of the patients did not have direct contact with livestock there is generally some evidence pointing to the ingestion of suspected raw milk or of living in the proximity of a dairy, a stock-yard, a slaughter-house or along a road frequented by livestock. Sometimes there has been an association with a laboratory or with laboratory workers. Beeman (1950) reported two cases where the infection was introduced into a house by a laboratory worker. Percutaneous infection through the unbroken skin is also possible. (Philip, 1948; Derrick, 1953). Infected cows, sheep and goats may cause the atmosphere surrounding them to be charged with *R. burneti* thus providing many opportunities for the projection of infected particles into the air inhaled by exposed persons and animals. Delay, Lennette and de Ome (1950) and Lennette and Welsh (1951) have succeeded in isolating *R. burneti* from the dust-laden air emanating from pens, sheds or barns used for cows, sheep or goats. Sigel, Scott, Henle and Janton (1950) reported outbreaks traced to dust from wool and hair processed in a factory. The dissemination of *R. burneti* in the dust probably accounts for many of the cryptic outbreaks sometimes encountered.

During the last war many outbreaks of Q fever occurred in allied troops stationed along the Mediterranean. The possibility of arthropod transmission was unlikely. In some of the outbreaks there was evidence of an association with animal life (rats, mice, pigeons, cattle) but in one outbreak in particular, the dust from an attic, or from the hay or the straw, was incriminated as the source of infection. During the period of 1940-1950 between ten and fifteen thousand cases were reported in Italy — and in only one case was there evidence of transmission by ticks. Inhalation of dust was regarded as the most important method of infection. In Ancona about 80 per cent of the inhabitants living in two streets along which infected cattle were driven became infected (Babudieri, 1951).

Blanc, Bruneau, Poitrot and Delage (1948) proved experimentally that Q fever could be transmitted by the inhalation of infected suspensions of the rickettsia.

Although not a common method of transmission, several examples of case-to-case infection in man have been reported (Whittick 1950; Deutsch and Petersen, 1950; Siegert, Sinirock and Stroeder, 1950). Moreover Siegert et alii (1950) have demonstrated that the sputum of an infected patient may contain *R. burneti* for long periods and thus remain infective to persons with whom he came into contact.

As already pointed out Giroud and Jadin (1950b) have shown that the human body louse can also become a source of infection.

Symptoms. (Hornibrook, Nelson, Dyer, Topping and Bengtson, 1940; Robbins and Ragan, 1946; Feinstein and Yesner, 1946; Harman, 1949; Hengel, Kausche and Sheris, 1950). Q fever is a clinical disease of man only. Although domestic animals are often infected, *R. burneti* causes no apparent disturbance in them. Nevertheless the disease may set up an acute rickettsiaemia leading to the elimination of large numbers of rickettsias through the milk, the urine, the faeces, the saliva, and especially through the placenta and the post partum uterine evacuations. These are the main sources of infection for man. Moreover, sheep and guinea-pigs may readily infect their young by means of infected milk.

Although the infected cow usually remains well and its milk production remains unimpaired, it may excrete rickettsias in its milk for several months or years. A rickettsiaemia often precedes the localization of *R. burneti* in the placenta and the mammary gland. *R. burneti* has a predilection for the mammae and the placentas of animals. When sheep are responsible for the infection the incidence of the disease in man is seasonal and it is associated with the lambing. This is not so in cattle and infection in the cow may be present for many months or years. But in spite of the high concentrations of the parasites in the placenta of the cow, the ewe and the goat, abortion is apparently confined to the goat only (Caminopetros, 1948; Kilchsperger and Wiesmann, 1949).

Luoto and Huebner (1950) could not find any evidence showing that the large numbers of *R. burneti* in the placenta of the cow interfered with the nutrition of the foetus. Caminopetros has also reported broncho-pneumonia in sheep and goats in Greece.

The incubation period in man varies from 14 to 26 days and the onset of the disease is sudden, the most important symptoms being a severe headache, myalgia, hyperthermia, chills, anorexia often accompanied by nausea. The severe headache is appropriately called by the Germans "Quälender Kopfschmerz". On about the fifth day a dry cough with pains in the chest develops. The sputum becomes blood-stained. Evidence of pulmonary involvement, as evidenced by roentgenograms, is nearly always present, even in mild cases where medical aid is not ordinarily sought. The fever may last for one to ten days or more. As the temperature drops the appetite readily returns to normal

and recovery is usually uneventful. There is no rash or local lesion on the skin as in the other human rickettsioses.

The febrile stage is often associated with a rickettsiaemia and the organisms may be present in the urine and the sputum. But inapparent affections may be common and can be detected only by a subsequent serological test.

The disease is apparently more severe with increasing age. The duration of the clinical symptoms may vary from a few days to several months. But usually the course is short and a solid immunity is conferred. Pruritus of the scrotum and perineum is common at the end of an attack. (Babudieri 1951).

Complications and secondary infections are rare, and there are no sequelae, but sometimes the patient remains weak for several weeks. The mortality is very low. Not one was recorded in over a thousand patients studied during the last war in the allied troops. But under certain conditions, where the patients are kept under unfavourable environmental conditions some deaths are liable to occur.

In the cow the infection may persist for many months or years — and *R. burneti* may be excreted with the milk for more than three years (Slavin, 1952).

DIAGNOSIS

The sudden occurrence of an influenza-like disease in man following an association with cattle, sheep or goats, or with their carcases, hides, tissues, excretions, or following an autopsy, should be regarded as presumptive evidence of infection. But neither the history nor the clinical picture is enough to prove the presence of Q fever. A definite diagnosis can be established only by serological methods or by the isolation of the causal agent.

A **serological diagnosis,** either by the agglutination or the complement fixation test — provides a very reliable means of recognizing the existence of the disease or of determining the presence of immune bodies in inapparent and clinical cases as well as in recovered cases. Complement-fixing antibodies are detectable from the seventh day onwards an the maximum titre is reached at about the 21st day (Robbins, Rustigian, Snyder and Smadel, 1946). These antibodies persist in high titre for a number of months and are still detectable in small amounts years after infection. Agglutinins, however, rarely appear before the ninth day and as much as four weeks may elapse before all the animals react. (The Commission on Acute Respiratory Diseases, 1946). The serological reactions of Q fever are highly specific and there are no cross reactions with other rickettsial diseases. Positive sera are invariably negative to the Weil-Felix test.

There is a close relationship between serum and whey antibodies. As in brucella infection higher antibody titres are usually found in milk with which the causal agent is discharged. The detection of *R. burneti* antibodies in whey is a reliable method of tracing infected cows and the whey test is much simpler than the blood test.

The direct agglutination test for whey is remarkably sensitive,

and the sensitivity of the test can be enhanced by the centrifugalization and the resuspension of the rickettsias in normal serum or saline (Stoker and Marmion, 1952).

The sera from infected goats seem to have a surprisingly low titre and bull sera are apparently devoid of antibodies.

In infected sheep positive fixation of the complement reactions are obtained for a long time using blood serum or whey. But positive results are obtained with the whey only in those cases where rickettsias are discharged in the milk. (Baldelli, 1951).

In his survey of the incidence of Q fever in Great Britain, Slavin (1952) employed the haemolytic complement-fixation test. The material tested comprised blood samples from cattle sent in for routine testing, guinea-pigs that had been inoculated in various laboratories with milk for the presence of tuberculosis, and milk samples preserved in 0.5 per cent boric acid.

The antigen is prepared from a suspension of yolk-sac tissue in buffered saline solutions containing 0.5 per cent formalin (Plotz, Bennett, Wertman, Snyder and Gauld, 1948; Bengtson, 1951b). Slavin (1952) reports that the antigen must be carefully selected and prepared as some antigens may not be truly specific owing to the presence of extraneous matter.

Minett (1952) also warns that "one has to be extremely careful with the interpretation of the results, because of the frequency of false positives with the fixation of the complement test."

BIOLOGICAL DIAGNOSIS

Guinea-pigs, mice and chicken embryos are usually employed in laboratory work. Suspected blood, sputum, tissue, milk or other suspected material is injected intraperitoneally. Guinea-pigs that show a febrile reaction are sacrificed, and their minced spleen suspensions are injected into normal animals. The guinea-pigs may become definitely sick, and often die, even when given highly diluted material. The urine of the guinea-pig contains rickettsias and these organisms may persist for a long time in the tissues and urine of convalescent animals (Parker and Steinhaus, 1943). Mice seldom become obviously sick and die.

Pathological changes may be produced in the internal organs; these include a tumor splenis, an exudate in the peritoneal cavity, small focal granulomatous lesions and perivascular cell infiltrations involving most of the organs.

Confirmation of the presence of the disease depends on the pathology and the microscopical examination of stained preparations from the spleen and the peritoneal exudate for rickettsias.

Many outbreaks of the disease have ben diagnosed on a serological basis only in retrospect, the delay in the diagnosis being probably due to the fact that the patients did not have an occupational association with livestock.

DIFFERENTIAL DIAGNOSIS

Other febrile diseases capable of producing pulmonary changes should be eliminated. These include bacterial pneumonias, psittacosis and atypical pneumonias. When sickness has followed an autopsy, contact with a carcass or the handling of livestock, a disease like Rift Valley fever should be excluded by serological methods and by small animal isolation.

R. burneti stains like *Brucella abortus* and like the causal agents of enzootic abortion in sheep so that the presence of these organisms in suspected foetal membranes may cause some confusion in the diagnosis.

TREATMENT

Antibiotics like aureomycin and streptomycin appear to have a beneficial effect on the patient. (Huebner, Hottle and Robinson, 1948; Wong and Cox, 1948; Lennette, Meiklejohn and Thelan, 1948; Gear, Wolstenholme and Cart, 1950).

PREVENTION AND CONTROL

Wide experience in hospitals has demonstrated that the danger of case to case transmission is so slight that extensive quarantine and isolation precautions are not warranted. Ordinary precautions are usually enough; these include sterilization of the utensils; the sputum and the excreta. (Smadel, 1948).

More stingent pasteurization requirements of milk from suspected herds should be enforced and all persons that are subject to massive exposure e.g. laboratory workers, livestock attendants, and abattoir workers should be vaccinated.

Luoto, Winn and Huebner (1952) reported that the vaccination of cows with killed *R. burneti* gave rise to some resistance to the inoculated animals and resulted in a reduction in the incidence of infection in dairy cattle.

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TABLE I.

Naturally infected Animals and Birds from which *Rickettsia burneti* has been isolated. (After Derrick, 1953).

Animal.	Infected Tissue or Fluid et cetera.	Country.	Authority.
Cow	Milk	U.S.A.	Huebner, Jellison, Beck, Parker and Shepard (1948).
	Milk	England	MacCallum, Marmion and Stoker (1949).
	Milk (zebu)	Congo	Giroud and Jadin (1950a).
	Mammary gland	U.S.A.	Jellison, Bell, Huebner, Parker and Welsh (1948c).
	Placenta	U.S.A.	Luoto and Huebner (1950).
	Urine	Switzerland	Burgdorfer, Geigy, Gsell and Wiesmann (1951).
Sheep	Milk	Greece	Caminopetros (1948).
	Milk	U.S.A.	Lennette, Clark and Dean (1949).
	Placenta	U.S.A.	Welsh, Lennette, Abinanti and Winn (1951).
	"Excreta"	U.S.A.	Clark, Bogucki, Lennette, Dean and Walker (1951).
Goat	Milk	Greece	Caminopetros (1948).
	Milk	U.S.A.	Lennette, Clark and Dean (1949).
	Brain, spleen	Congo	Giroud and Jadin (1950a).
Bandicoot (Isoodon torosus).	Liver, spleen, kidney	Queensland	Derrick and Smith (1940).
Merion (Merionis shawi)	Spleen	Morocco	Blanc, Martin and Maurice (1947).
Pigeon	Kidney	Italy	Babudieri and Moscovici (1952).

TABLE II.

Ticks found naturally infected with *Rickettsia burneti*. (After Derrick, 1953).

Tick.	Relevant Host.	Country.	Authority.
Ixodidae:			
Amblyomma americanum	Goat, cow, dog	U.S.A.	Parker and Kohis (1943)
Amblyomma variegatum	Buffalo	French Equatorial Africa	Blanc, Bruneau and Chabaud (1950)
Dermacentor andersoni		U.S.A.	Davis and Cox (1938).
Dermacentor occidentalis		U.S.A.	Cox (1940)
Haemaphysalis humerosa	Bandicoot	Queensland	Smith and Derrick (1940)
Haemaphysalis leachi	Dog, cattle	Congo	Giroud and Jadin (1950a)
Haemaphysalis leporis-palustris	Rabbits	U.S.A.	Parker, Bell and Stoenner (1949)
Hyalomma dromedarii	Dromedary	Morocco	Blanc, Bruneau, Martin, and Maurice (1948a)
Hyalomma excavatum		Spain	De Prada, Gay and Lorrette (1950)
Hyalomma excavatum lusitanicum	Merion	Morocco	Blanc, Bruneau, Martin, and Maurice (1948a)
Hyalomma marginatum[1]	Calf	Spain	Perez, Gallardo, Clavero, Hernandez and Fernandez (1949)
Hyalomma mauretanicum	Bovines	Algeria	Blanc and Bruneau (1949)
Hyalomma savignyi[1]	Goat, sheep, merion	Morocco	Blanc, Martin and Maurice (1947)
Hyalomma savignyi[1]	Sheep	Spain	Parker, de Prada, Bell, and Lackman (1949)
Ixodes dentatus	Rabbits	U.S.A.	Parker, Bell and Stoenner (1949)
Ixodes ricinus	Dog	Germany	Hengel, Kausche and Sheris (1950)
Rhipicephalus bursa	Calf	Spain	Perez, Gallardo, Clavero, Hernandez and Fernandez (1949)
Rhipicephalis sanguineus	Dog	U.S.A.	Parker and Susman (1949); Montovani and Benazzi (1953)
Rhipicephalis sanguineus		Morocco	Pasteur Institute, Morocco (1948)
Rhipicephalis sanguineus	Dormouse	Spain	Perez, Gallardo, Clavero, Hernandez and Fernandez (1949)
Argasidae:			
Ornithodoros moubata	Cattle	Congo	Jadin (1951)
Octobius megnini		U.S.A.	Jellison, Bell, Huebner, Parker and Welsh (1948a).

TABLE III.

Ticks which have been experimentally infected with *Rickettsia burneti* (other than those mentioned in tables I and II). (After Derrick, 1953).

Tick.	Host infected from Tick.	Country.	Authority.
Ixodidae:			
Boophilus annulatus microplus	Cow	Queensland	Derrick, Smith and Brown (1942)
Argasidae:			
Ornithodoros erraticus	Guinea-pig	Morocco	Blanc, Martin and Maurice (1946)
Ornithodoros species, probably gurneyi	Guinea-pig	Queensland	Smith (1942)
Ornithodoros lahorensis	Guinea-pig	Turkey	Payzin (1948)
Ornithodoros turicata	Guinea-pig	U.S.A.	Davis (1940)
Ornithodoros moubata	Man, guinea-pig and mouse	Germany	Weyer (1949)

TABLE IV.

Ticks by which *Rickettsia burneti* has been experimentally transmitted to a mammalian host.

(After Derrick, 1953).

Tick.	Host infected from Tick.	Country.	Authority.
Ixodidae:			
Amblyomma cajennense	Guinea-pig	Panama	De Rodaniche (1949)
Dermacentor andersoni	Guinea-pig	U.S.A.	Parker and Davis (1938)
Haemaphysalis bispinosa	Guinea-pig	Queensland	Smith (1942b)
Haemaphysalis humerosa	Guinea-pig	Queensland	Smith (1940)
Hyalomma rufipes glab-	Guinea-pig	Portugal	Fonseca, Pinto, Colaco, Oliviviera, Branco, da Gama, Franco and Lacerda (1951)
Ixodes holocyclus	Bandicoot	Queensland	Smith (1942a)
Rhipicephalus sanguineus	Guinea-pig	Queensland	Smith (1941)
Argasidae:			
Ornithodoros hermsi	Guinea-pig	U.S.A.	Davis (1943)
Ornithodoros moubata	Guinea-pig	U.S.A.	Davis (1943)
	Guinea-pig and mouse	Germany	Weyer (1949)

XVth INTERNATIONAL VETERINARY CONGRESS STOCKHOLM — 1953

RESOLUTIONS

I. *Fight against epizootics on an international level.*

"The XVth International Veterinary Congress recognizes the necessity for an energetic campaign against epizootics and supports all efforts to establish an international co-ordination of this fight.

The increasing overlapping of international activities during the past few years constitutes for member-states not only a severe financial burden, but also tends to impair the efficiency of all measures taken in this field.

Hence, the XVth International Veterinary Congress is of the opinion that the tasks resulting from the international fight against epizootics should be organized in the main through the O.I.E. and the F.A.O. within the framework of their mutual agreements.

The Permanent Committee for the International Veterinary Congresses is instructed to co-operate with the international organisations concerned."

II. *Revision of the Statutes of the Permanent Committee for the International Veterinary Congresses and of the Bye-Laws of the International Veterinary Congresses.*

"The XVth International Veterinary Congress instructs the Permanent Committee to prepare for the XVIth International Veterinary Congress in 1957 a draft revision of the statutes of the Permanent Committee and of the Bye-Laws of the International Veterinary Congresses.

The Permanent Committee should consider whether a World Federation of Veterinarians in the form of an International Union is desirable."

III. *International standardization of biological products.*

"Recognizing the need of urgent action to establish international standards for biological products for veterinary use, the XVth International Veterinary Congress welcomes the extension of the work of the Committee on Biological Standardization of the World Health Organisation to include such products. It suggests that this Committee be encouraged to extend as soon as possible its work towards the provision of international standards for other suitable veterinary substances, those meriting immediate attention being the *Cl. welchii* (Cl. perfringens) antigens, beta and epsilon, and swine erysipelas antiserum. The XVth International Veterinary Congress also welcomes the word of the O.I.E. on the study of biological products for use in the control of animal diseases and suggests that the office be encouraged to continue its activities on this subject."

IV. *Establishing suitable post-graduate scholarships in the field of veterinary parasitology.*

"In view of the heavy losses arising from parasitic infestations of live stock and the dearth of trained parasitologists throughout the world, the XVth International Veterinary Congress urges the Permanent Committee to seek the co-operation of O.I.E. and F.A.O., and national and inter-

national veterinary bodies to establish suitable post-graduate scholarships in this field."

V. *Information on preventive and curative treatment of parasitic diseases and the practical control of these diseases.*

"On the proposition of the Committee on the Control of Parasitic Diseases, the XVth International Veterinary Congress recommends co-operation to the fullest possible extent with the O.I.E., F.A.O. and other agencies in determining the distribution of the important parasitic diseases of livestock throughout the world, in making available to the veterinary profession the latest and most authentic information on preventive and curative treatment of these diseases and in encouraging the practical control of parasitic diseases throughout the world."

VI. *Distribution of the reports of the Congress.*

"The XVth International Veterinary Congress urges the Organizing Committee of the next Congress to make every effort to see that the reports of the papers to be presented at that Congress are in the hands of all delegates at least one month before the opening date of the Congress."

VII. *Veterinary education regarding physiology and pathology of reproduction and lactation.*

"As the prevention and treatment of disturbances in reproduction and lactation and artificial insemination of domestic animals have developed into especially important branches of veterinary science and practice, the XVth International Veterinary Congress recommends that veterinary schools should ensure that students receive adequate instruction in this branch of veterinary work."

VIII. *International Animal Production Organisation.*

1. "In view of the vital contribution which the veterinary profession can make to the important field of animal production, the XVth International Veterinary Congress recommends the formation of a special Animal Production Organisation to deal with Animal Breeding, Animal Nutrition and Animal Husbandry in relation to animal health and animal productivity.

2. This Animal Production Organisation should be affiliated to the International Veterinary Congress Organisation and should have representation on the Permanent Committee."

IX. *International exchange of veterinarians.*

"The XVth International Veterinary Congress proposes that the veterinary organisations of the different countries should organise an exchange of veterinarians in different fields of activity for the purpose of study, gaining practical experience and establishing personal contacts."

X. *The use of vaccines in the fight against infectious diseases and epizootics.*

"The XVth International Veterinary Congress recommends that, when choosing a process of immunization with a view to combating an infectious disease, preference is given to vaccines composed of germs or viruses killed or made inactive, so that they are totally inoffensive. Living germs

or viruses, attenuated or not, should not be used unless no other immunizing method of sufficient value exists.

In that case, the so-called "living" vaccines shall not be used generally unless a profound experimental study has proved the stable character of the viruses of which the vaccines are composed, and has precisely determined the risks which their use involves. The possession and the use of these vaccines should be reserved exclusively to veterinarians."

XI. *Food hygiene and public health.*

1. "The XVth International Veterinary Congress — in view of the importance of veterinary work for public health and public economy — recommends an increased participation of veterinarians in public health and argicultural administrations, especially for combating zoonoses, for the supervision of victuals and for the study of other questions of current interest for human and animal health.

2. As the value and effect of the supervision of victuals depends on the technical training of the supervising veterinarians as well as on their participation in the framework of the administration, it is desirable that in all countries a special training of professional veterinarians takes place in the field of the manufacture and supervision of victuals of animal origin.

3. As an important part of food poisoning is caused by human permanent excreters of salmonlla-bacteria, suitable measures for the removal of germ-carriers from the food trade should be aimed at in all countries.

4. W.H.O., F.A.O., O.I.E. and other international organisations should support individual countries by technical consultation and through the development of international standardized methods of research in the field of zoonoses and food hygiene and in this way facilitate the training of veterinarians for the public health service."

XII. *Control of rabies.*

"The XVth International Veterinary Congress recommends that international organisations such as W.H.O., F.A.O. and O.I.E. should provide all possible technical and material assistance to countries where rabies is enzootic, in an intensified effort to control and eradicate this disease by the application of well proven sanitary measures combined with mass immunization of dogs with a vaccine of proved potency, reinforced, where necessary, by wild-life reduction programmes."

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

Minutes of Meeting of Council held on 13th August, 1953, at 2.15 p.m. at the Residency Hotel, Pretoria.

Present: A. M. Diesel (President), G. D. Sutton (Hon. Treasurer), S. W. J. van Rensburg, M. C. Robinson, E. M. Robinson, P. S. Snyman, R. A. Alexander, A. C. Kirkpatrick (Hon. Life Vice-President), R. Clark, W. D. Malherbe, K. E. Weiss (Hon. Secretary elect), M. de Lange (Hon. Secretary).

Apologies: A. D. Thomas (overseas), P. J. du Toit, H. P. Steyn, G. Pfaff.

1. Minutes of meeting held on 15th May, 1953. Adopted.

2. Arising from these minutes :—

Public Service Structure Committee:

The amended memorandum, which had already been submitted to the above Committee was read and formally accepted by Council. Dr. Alexander explained the new proposed salaries which had received unanimous support from all quarters and would probably be accepted by the Government. He indicated that the existing set up of the Division of Veterinary Services was ideal, with the possible exception of Education, provided adequate staff could be found. This included Research, Production of vaccines and control of Scheduled diseases.

Decided to wait further developments.

3. *Notification of Election of Council for* 1953/54:

Secretary reported that the following had been elected:—

President: Dr. A. M. Diesel.
Vice-President: Dr. A. D. Thomas.
Hon. Secretary: Dr. K. E. Weiss.
Hon. Treasurer: Dr. G. D. Sutton.
Members for 1953/55: Drs. R. A. Alexander, M. H. V. Brown, M. de Lange and M. C. Robinson.
Sitting Members (1952/54: Drs. R. Clark, G. Pfaff, P. S. Snyman and S. W. J. van Rensburg.
Editor: Dr. E. M. Robinson.

President pointed out that just over 30% of members had cast their votes and that this was unsatisfactory.

Then he thanked Drs. Malherbe and Steyn for their assistance and active interest in the affairs of Council and the Association. Dr. Malherbe replied suitably.

President also thanked outgoing Secretary for his services and welcomed Dr. Weiss as the new Secretary.

Drs. de Lange and Weiss replied suitably.

4. *Standing Committees*:

(a) *Finance*: Drs. S. W. J. van Rensburg (Chairman-Convenor), A. D. Thomas, R. A. Alexander, W. D. Malherbe, G. D. Sutton (Sec. Treasurer).

(b) *Editorial*: Drs. E. M. Robinson (Chairman-Convenor), R. Clark, W. D. Malherbe, L. W. v. d. Heever, W. J. Wheeler and M. H. V. Brown.

(c) *Library*: Drs. W. D. Malherbe (Chairman-Convenor), J. D. Coles, G. D. Sutton.

(d) *General Purposes*: Dr. R. Clark (Chairman-Convenor), W. D. Malherbe, M. C. Robinson.

(e) *Book Fund*: Drs. G. D. Sutton (Chairman-Convenor), M. de de Lange, A. D. Thomas.

(f) *Resolutions*: Drs. R. Clark and E. M. Robinson.

5. *Representation National Health Council*: Secretary reported that the above body had been dissolved at the end of 1952, but reconstituted in accordance with the provisions of section 4 of the Public Health Act No. 36 of 1919, as amended by Act No. 44 of 1952.

He also informed Council that Dr. Pullinger had indicated that he would be unable to represent the Association on the new Health Council and that, after consultation with various members, Dr. Diesel had been nominated as representative.

Council formally approved of this action.

Secretary requested to thank Dr. Pullinger for his services in the past.

6. *Finance Report* 1952/53: Read by Treasurer, who indicated that report had already been considered by meeting of Finance Committee.

In the discussion Editor enquired whether Council felt that Journal should be reduced in size for purposes of economy. Council however decided that Journal should continue as at present.

Financial report was accepted by Council with unanimous vote of thanks to Hon. Treasurer.

7. *Correspondence*:

(a) *Status, B.V.Sc. (Pretoria) degree in America*: Letter Secretary of Faculty noted.

(b) *List of Veterinarians on Witwatersrand*: Letter from Chairman, Wits Branch, who had been approached by S.P.C.A. Council decided that there was no objection to S.P.C.A. keeping such a list for the benefit of clients, provided it was kept up-to-date and designation of veterinarians was indicated. Wits Branch to attend to these aspects.

(c) *Letter Cape Eastern Branch*: Deposit accounts of Veterinarians for vaccines at Onderstepoort. Amended form of agreement read. Decided to circularise all branches and inform D.V.S. of views of branch committees.

(d) *Resolution Pharmaceutical Society*: *re* the direction of prescriptions to specify chemists and druggists read. Decided to support resolution and to inform Society accordingly.

The meeting closed at 5.45 p.m.

M. DE LANGE,
Honorary Secretary.

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

Minutes of the 48th General Meeting held at Onderstepoort, on August 18-20, 1953.

Present: Drs. A. M. Diesel (President), L. Abrams, T. Adelaar, R. A. Alexander, J. G. Bekker, C. W. A. Belonje, M. Bergh, G. P. Bishop, N. H. Boardman, J. Bosch, H. J. W. Botes, H. N. Botha, J. W. A. Brookes, J. M. M. Brown, M. H. V. Brown, P. H. Brown, A. S. Canham, R. Clark, C. J. Coetzee, V. Cooper, D. Coles, R. B. Cumming, N. J. G. da Câmara, Major L. Daly, H. A. Davis, J. A. de Kock, P. de la Harpe, G. J. de Wet, Campbell Dickson, Capt. J. L. Dickson, J. Doré, A. J. du Plessis, J. F. du Plooy, P. J. du Toit, R. du Toit, L. T. Edwards, C. J. Erasmus, J. F. Fick, C. H. Flight, P. J. Fourie, J. R. Frean, P. J. Goosen, M. M. Greathead, H. Graf, J. F. W. Grosskopf, J. W. Groenewald, D. A. Haig, L. L. Hansmeyer, R. E. Hartig, Mrs. M. E. Hearn, F. J. D. Hempstead, M. W. Henning, C. F. B. Hofmeyr, H. E. G. Holtz, L. R. Hurter, J. H. Huyser, D. H. G. Irwin, C. E. Isaacs, E. C. Jooste, V. R. Kaschula, A. C. Kirkpatrick, G. Kronsbein, A. B. la Grange, J. M. W. le Roux, A. J. Louw, Jac. Louw, P. L. Louw, T. A. T. Louw, J. G. Louw, B. M. McIntosh, W. D. Malherbe, P. R. Mansvelt, C. Maree, J. H. Mason, M. J. N. Meeser, L. R. Morford, Major D. D. Morton, R. W. Muir, G. L. Muller, W. O. Neitz, D. E. Osbourn, R. B. Osrin, B. T. Paine, B. H. Pappin, J. W. Pols, E. M. Robinson, L. W. Rossiter, J. E. Robinson, K. Schulz, J. Schuss, D. K. Shone, J. D. Smit, P. S. Snyman, N. C. Starke, N. C. F. Steenekamp, S. A. R. Stephen, Prof. D. G. Steyn, Drs. D. G. Steyn, H. P. Steyn, H. J. J. Terblanche, J. A. Thorburn, S. G. Turner, R. C. Tustin, P. L. Uys, L. van den Heever, N. T. van der Linde, J. P. van der Merwe, G. C. van Drimmelen, J. G. van der Wath, J. S. van Heerden, S. W. J. van Rensburg, I. van Schalkwyk, T. Veenstra, F. J. Veldman, N. F. Viljoen, W. C. Viljoen, L. von Maltitz, D. C. L. Wacher, K. E. Weiss, A. L. Wessels, C. C. Wessels, T. C. W. Wessels, W. J. Wheeler, J. G. Williams, P. B. Winterbach, J. S. Dovey, G. D. Sutton (Honorary Treasurer), and M. de Lange (Honorary Secretary).

Apologies: Drs. W. P. van Aardt, W. G. Barnard, J. L. Stewart, M. S. Reichert, E. F. d'Abreu, H. Nelson.

TUESDAY, AUGUST 18

9.15 a.m.: President welcomed the visitors, including Dr. B. M. Clark, Deputy City Health Officer, representing the Secretary for Health, Dr. da Câmara of Mocambique, Drs. Boardman, Fick and Schuss of adjoining territories.

Obituaries: Drs. W. H. Andrews and J. Walker, members of the Association passed away during the previous year and President requested members to stand in token of respect.

Presidential Address: Dr. Diesel then delivered his address.

Notification of Election of Council for 1953-54:

The following were elected:—

President: Dr. A. M. Diesel.
Vice-President: Dr. A. D. Thomas.
Honorary Secretary: Dr. K. E. Weiss.
Honorary Treasurer: Dr. G. D. Sutton.

Members for 1953-55:

Drs. R. A. Alexander, M. H. V. Brown, M. de Lange, M. C. Robinson.

Sitting Members 1952-54:

Drs. R. Clark, G. Pfaff, P. S. Snyman, S. W. J. van Rensburg.

Editor: Dr. E. M. Robinson.

Election of New Members, 1953:

The following applicants were recommended by Council: J. Bosch, I. S. Canham, C. J. Coetzee, H. A. Davis, J. Grobler; (Mrs.) J. H. Hofmeyr, P. G. Howell, E. C. Jooste, P. H. le Roux, P. J. Meyer, D. T. Morkel, M. S. Reichert, T. Toms, R. C. Tustin and P. B. Winterbach. On a proposal by Dr. Osrin, seconded by Dr. v. d. Heever, these were unanimously elected to membership of the Association.

Opening of Trade Exhibition:

President welcomed Exhibitors, expressing appreciation for their efforts in contributing towards the success of our Annual Congresses.

Mr. G. W. Holmshaw of Maybakers' replied on behalf of the Medical Exhibitors Association.

The rest of the day, as well as Wednesday, August 19, was spent in the reading and discussion of papers.

THURSDAY, AUGUST 20, 1953

11 *a.m.—Business Meeting of the Association*:

President opened the business meeting by expressing his appreciation for being re-elected. He thereafter thanked the retiring Secretary for his six years' service to the Association, first as Honorary Treasurer and later as Honorary Secretary, and presented him with an honorarium.

Dr. de Lange thanked the President for his kind words and also the Honorary Treasurer and other office bearers and the lady assistants for their help during his period of office.

1. *Minutes of 47th General Meeting* were read and adopted after an objection by Dr. Hofmeyr had been overruled by vote.
2. *Arising from these minutes*:
   (a) *Ethics Committee*: This had been considered by Council during the year and it was decided that the need for such a committee did not exist.
   (b) *Appointment to Directorate of Onderstepoort*:
   President reported an interview with Minister by deputation. The Minister felt that in view of the large proportion of non-veterinarians on the staff, these should also have an avenue for promotion on the directorate.
   (c) *Newsletters to Private Practitioners, etc.*
   Council had considered the meeting's request of the previous year but was unable to offer a satisfactory solution. It was suggested that outbreaks of Scheduled Diseases be reported in the Journal. The president pointed out that such information would be out of date by the time it was published.

Dr. Alexander said that his Division notified its entire staff of all outbreaks of Scheduled Diseases and that this information was gazetted and given wide publicity through the radio and press service. It was not possible for his Division to notify all individual members.

Dr. Turner recorded his appreciation to the staff of the Veterinary Division in his area, who kept him informed of all outbreaks of disease. He felt that all that was required was friendly co-operation between the private practitioners and the State Veterinarian of the area to solve the difficulty.

3. *Resignations*: Lt.-Col. W. P. S. Edwards, Drs. F. D. T. Good, L. O'Dowd, J. G. Bogue and Maj. E. J. Weir had tendered their resignations during the year. Council recommended their acceptance with regret. The meeting agreed to this recommendation.

4. (a) *Financial Report* 1952-53:

As the Balance Sheet, etc., had been distributed to all those present at the meeting, Dr. Alexander formally moved the acceptance of this report. Agreed.

(b) *Editorial Committee*: Dr. Robinson deplored the poor response from members to requests for papers for the General Meeting It had been said that the Conference did not cater for the private practitioner and this criticism was justified but the main reason was that few practitioners came forward to read papers.

The president requested Dr. Robinson to write an Editorial on his suggestions to stimulate members to submit papers on clinical subjects.

5. *Change of Title of the Association*:

Dr. van den Heever asked for further information on Council's decision not to delete the term "Medical" from the Association's title.

President explained that the name could be changed without any difficulty. It was felt, however, that the term "Medical" was originally incorporated to emphasise the scientific nature of the Association and that it should be retained for this reason.

The secretary also pointed out that there was a tendency among bodies of farmers employing veterinarians to call themselves "Veterinary Associations" and that this might lead to confusion.

6. *Badge or Chain of Office*: Dr. Rossiter suggested that the time had come when the President should have a badge or chain of Office. Council was requested to consider this suggestion.

7. *Jubilee Celebrations*: Dr. Hofmeyr suggested that the Association should celebrate its Golden Jubilee in two years time in some special way. Council was requested to consider this suggestion.

8. *Natal Branch Resolution*: *Jockey Club Licenses*:
President ruled that this matter was being investigated by Council and that he could not allow a discussion on it at this stage.

9. *Ballot Papers for Council Elections*:
Dr. A. J. Louw indicated that as the ballot papers were numbered the ballot could not be regarded as secret.

The secretary explained that the serial number was merely to preclude the possibility of duplication and that no record was kept of to whom the papers were sent. He assured members that the votes were as secret as possible and that information obtained was not divulged.

10. *Venue of Future General Meetings*:

Secretary drew attention of members to a memorandum published by a sub-committee appointed by Council on the above subject, in which it was indicated that Council felt that the holding of Congresses away from Onderstepoort was not practicable, at this stage.

After a lengthy discussion the matter was put to the vote and the suggestion that no change be made for the present was carried with only two dissentient votes. The matter could again be considered at some future date should the necessity for a change of venue arise.

11. *Resolution*: Prof. D. G. Steyn placed a resolution before the meeting on the use of Anti-biotics in Animal Feeds. His proposal was seconded by Dr. T. C. W. Wessels.

As there was no time for discussion on this very important matter, the meeting felt that Council should investigate and call for evidence. Prof. Steyn would be given the opportunity of putting his case before Council.

12. *Proposal by Dr. N. F. Viljoen, seconded by Dr. A. J. Louw*:

"That the words "General Meeting" at the heading of the notices convening the Annual convocations of this Association be deleted and the words "Congress" in English and "Kongres" in Afrikaans be substituted". Agreed.

13. The President thanked the Dean of the Faculty for the use of the building and other amenities; the Director for permitting the state employees to attend the Conference, and the lady assistants for their help. He welcomed the incoming Council and particularly the new Secretary.

Dr. van den Heever proposed a vote of thanks for the organisers of the dinner and dance.

Dr. Osrin proposed a vote of thanks to the Chair.

The meeting closed at 1.0 p.m.

AUTHOR INDEX
VOL. XXIV

	Page
Brown, M. H. V.	177
Clark, R.	87
Diesel, A. M.	1, 129, 135, 191
Henning, M. W.	33, 155, 219
Hofmeyr, C. F. B.	49, 81, 111, 181
Hurter, L. R.	175
Jansen, B. C.	218
Kaschula, V. R.	163
Louw, D. J.	115
Louw, J. G.	204
Malherbe, W. D.	87, 163
Reinach, N.	204
Robinson, M. C.	65
Robinson, E. M.	97, 141
Rossiter, L. W.	149
Ryksen, W. J.	101
Schulz, K. C. A.	43, 101, 107
Shone, D. K.	172, 173
Sutton, G. D.	31
Thomas, A. D.	107
Thorold, P. W.	215
van Drimmelen, G. C.	13, 197
van der Linde, N. T.	145
van Rensburg, S. W. J.	69, 212
Watson, H. C.	3
Weiss, K. E.	87
Wilson-Jones, G.	25

SUBJECT INDEX
VOL. XXIV

	Page
Activities of the veterinary profession in South Africa, a review of	135
Acute abdomen in a dog, a remarkable cause of	49
Amputation through the shoulder in dogs, indications for, with a note about paralysis of the bronchial plexus	111
Anatomical anomaly	115
Blood replacement with Dextran and Plasmosan in dogs, studies in the effects of repeated	87
Book reviews	61, 124, 187
Brucellosis and some other genital infections in cattle, clinical diagnosis of	197
Case reports	57, 59, 117, 171
Cholecystostomy in a dog	81
Dairy cattle practice in Hong Kong with special reference to tuberculin testing	3
Early Veterinarians of the Cape	191
Editorial	127
Enterotoxaemia (Pulpy Kidney), the association of with other diseases of sheep	31
Ferret breeding report	25
Field campaign against worms in the Ermelo area, a	149
Field Veterinary Services in South Africa	1
Fowl Cholera in Southern Rhodesia, an outbreak of	172
Infertility in cattle and sheep, research into	69
Infertility in cattle and sheep, research into	212
Infusoria in the lungs of a suspected case of enterotoxaemia, incidental occurrence of	101
Leptospirosis in dogs in South Africa	163
Letters to the Editor	53, 123, 185
Malicious poisoning, suspected	215
Mineral deficiencies of natural veld and their supplementation in relation to food production	204

Page

Municipal Veterinary Service 65
Obituaries 62, 121
Pneumonyssus caninum, the frontal sinus and nasal mite of dogs 107
Presidential address 129
Psittacosis in pigeons, and outbreak of 173
Q Fever 219
Rift Valley Fever in the Orange Free State, a recent epidemic of 145
Sand-laden liver in a pig, a unique case of 43
Serological reactors to Brucella abortus, a herd with unexplained 13
South African Veterinary Medical Association, abstracts of Meetings of Councils of 118, 244
South African Veterinary Medical Association, minutes of 48th Annual General Meeting of 246
Spaying of heifer calves and heifers, the 175
Surgeon's case book, from a 177

Page

Three-day sickness (ephemeral fever) of cattle, observations on some complications of and on the differential diagnosis of 181
Trichophyton Gypseum, the isolation of from a clinical case of Dermatomycosis in a horse 218
Tuberculosis, a few cases of 97
Vacancies for veterinarians, etc. 189, 190, 250
Versorging van kalwers, die 155
Veterinary and other institutions in Europe, some impressions obtained during a visit to a number of, in in 1952 33
Veterinary Crossword puzzles 125, 188
Veterinary research, a career in 141
William Horner Andrews, an appreciation 119
XVth International Veterinary Congress, Stockholm, Resolutions 241