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For more general information, [click here](#)
1. **INTRODUCTION**

During the year under review the resources of the Division of Veterinary Services were strained to the utmost. Not only had personnel from all over the Republic to be drafted to the Western Cape area to combat the severe Newcastle Disease outbreak, but the stock farming areas bordering on the southern and western boundaries of the Kruger National Park had to be safeguarded against the threat of spread of Foot and Mouth Disease from the Park. This entailed the drafting of additional personnel for intensified patrolling of the approximately 400 miles of gameproof fencing on the Park boundaries, and intensified stock inspections in the adjacent farming areas. That the control measures against Foot and Mouth Disease were successful, is evidenced by the fact that the disease spread to domestic animals on farms at only three points, one each in the districts of Barberton, Letaba and Sibasa. In each instance the infection was contained on the originally infected farms.

Sheep Scab reappeared in areas from which it had been eradicated years before. With a staff already depleted by the Newcastle and Foot and Mouth Disease campaigns, the Division had to contend with outbreaks in the Pietersburg district of Transvaal, and the districts of Mafeking, Kenhardt, Gordonia, Calvinia, Clanwilliam and Tulbagh in the Cape Province.

Two outbreaks of Scrapie, both in the Eastern Cape, were confirmed during the year. Both the infected sheep flocks were officially slaughtered out, and a close watch is being kept on all flocks to which potentially infected sheep have been introduced.

For the first time bracken poisoning in cattle was established, in the Estcourt area of Natal. Subsequently cases have been confirmed in the Ixopo and Vryheid districts.

Other forms of plant poisoning took their normal toll, especially in the Natal and O.F.S. Regions.

During the year the Research Institute, Onderstepoort, issued a record number of the existing 26 vaccines viz. 108,594,005. This represents an increase of 18% over the total issue of the previous year.

As a result of production problems, the three new vaccines against colibacillosis in calves, colisepticaemia in lambs and coli airsac infections in poultry, mentioned in the previous report, could not be issued. At the concentration of living bacteria experimentally shown to be essential to afford protection, the vaccine could not be freeze-dried efficiently. Further tests have shown, however, that a lower concentration of living bacteria will afford sufficient protection provided that a certain percentage of dead bacteria are also present. Under these circumstances the production of a freeze-dried vaccine is a practical possibility. As soon as additional freeze-drying facilities become available shortly, large scale production of these vaccines will commence.
The work on the experimental vaccine against Leptospirosis mentioned in the previous report, is being continued. This vaccine for cattle, pigs and dogs has evoked satisfactory antibody response in guinea pigs, but long term tests to establish the actual protective value in cattle, dogs and pigs have not yet been completed.

In laboratory tests an experimental vaccine against Vibriosis in cattle also produced good antibody response, as good as that of overseas vaccines. Long term tests are now in progress to assess the actual protective value of the vaccine in cattle.

An experimental vaccine against Three Day Stiffsickness of cattle has been tested. Very promising results have been obtained with a living, attenuated strain of the virus, injected subcutaneously in an oily suspension. Additional field tests of this vaccine will now have to be carried out.

2. NOTIFIABLE DISEASES

(1) Foot and Mouth Disease

Immediately Foot and Mouth Disease had been established in the southern part of the Kruger national park on 4 October 1967 and one week later in the northern portion, control measures against the disease were tightened. This included implementation of border fence patrols, intensification of stock inspections in adjacent areas, and an embargo on stock movements in these areas.

Between 5 December 1967 and 24 January 1968 Foot and Mouth infection was found on three farms in each of the Barberton and Letaba districts, and in two dipping tank areas in the Sibasa district. All these infected areas were immediately adjacent to the Kruger National Park.

Control measures on infected properties included the artificial virusing of all susceptible animals with natural virus after the placing of three cordons in dept and the herding by day and kraaling at night of all cattle under official supervision.

Also, in the infected areas, roadblocks were set up on all public roads to ensure that no animal products and other materials capable of transmitting infection, were transported. Similar inspection points were established at all entrances to the Kruger National Park.

All pigs on the infected farms were destroyed.

Control of the three Foot and Mouth Disease outbreaks was so effective that by 15 July the last of the cordons could be lifted.

The evidence available all points to game poachers being responsible for the transmission of infection to domestic animals in the Barberton and Sibasa outbreaks. Direct transmission from game to susceptible stock most likely accounted for the Letaba outbreak.
Strict precautionary measures against the introduction of Foot and Mouth Disease are continuously being maintained along all the other land borders of the Republic. These include short interval inspections of all susceptible stock and regular patrol and repair of international border fences.

The fence between the town of Nqwavuma on the Swaziland border and the sea, has progressed to approximately 25 miles east of the Pongola River, leaving a further 15-20 miles to be completed.

This fence, which is roughly parallel to and approximately 20 miles distant from the border fence between Natal and Mozambique, is being erected to facilitate the control of cloven-hoofed animals in the area between the two fences, and to enable such animals to be quarantined out prior to being sent for slaughter at the quarantine abattoir in Natal.

The border between Swaziland and the Nqwavuma district is not yet fenced. Negotiations in this connection will have to instituted with Swaziland after attainment of independence on 6th September 1968.

(2) Rabies:

During the year a total of 721 specimens was examined by the Veterinary Diagnostic Centre at Onderstepoort. Of these 223 (30.9%) were positive. Compared with the previous year this represents a slight decrease in both total specimens submitted, and the positive cases, but unfortunately this does not indicate any material improvement in the rabies position in the country as a whole.

The species distribution of the positive diagnoses is the following:

- Meercats ...................... 76
- Dogs .......................... 51
- Cattle ......................... 47
- Cats ........................... 17
- Jackals ....................... 9
- Wild Cats ..................... 8
- Other animals ......... 15

The anti-rabies measures in the Natal and Eastern Transvaal Regions have resulted in a steady decrease in the number of positive cases. In the O.F.S. Region, on the other hand, confirmed cases increased by approximately 50%.

Notwithstanding the large numbers of officers of the Division seconded to special duties outside their normal areas, 220,912 dogs and 579 cats were vaccinated against rabies during the year.

Field studies on various aspects of the disease are being continued. Mobile units are employed to destroy populations of jackals and viverridae in recognised infected areas, to study the habits of these vectors and to carry out tests on methods of eradication.

On 210 farms, comprising 131,344 morgen, in the infected areas, eradication of viverridae was undertaken.
(3) **Anthrax**:  
Thirteen outbreaks, resulting in the mortality of 18 cattle and 87 sheep, occurred during the year, compared to 14 the previous year.  

In one outbreak, 3 cases in game in the northern part of the Kruger National Park were confirmed. In another instance, an unknown number of Bantu in the Eastern Cape succumbed to the disease as a result of the ingestion of infected meat. Only after diagnosis of the disease in the Bantu, was the infection traced back to the farm.  

Due to the absence of so many officers of the Division on campaign duties, only 3,552,154 cattle, 105,056 small stock, 6,985 equines and 173 pigs were vaccinated officially or under official supervision.

(4) **East Coast Fever and Related Diseases**:  
No outbreaks of East Coast Fever have occurred in South Africa since 1954, but in the potential danger areas vigilance is still maintained by the examination of spleen smears from all cattle which die or are slaughtered.  

Out of a total cattle population of 3,125,478 in these areas, 350,096 deaths occurred and 345,993 spleen smears were examined, revealing no East Coast Fever, but 5 outbreaks of Buffalo disease (Theileria lawrencei) with 33 deaths, and 44 cases of Benign Bovine Theileriosis (T. mutans). The latter two diseases are related to East Coast Fever, and are controlled by quarantine and intensified tick eradication.

(5) **Tuberculosis**:  
Voluntary tuberculin testing under the herd accreditation and interim schemes, as well as testing for diagnostic or export purposes, was continued.  

The tests performed are tabulated below:
The total number of animals tested shows a decrease of 16,471 compared to the previous year. This is largely due to the special campaign duties of State Veterinarians interfering with their normal duties in their own areas.

The number of animals tested represents 1.38% of the total cattle population of the Republic while the incidence of reactors – not taking into account tests under the accreditation scheme – is 1.69% positive and 0.64% suspicious.

Only one outbreak of tuberculosis in poultry was recorded, in a backyard flock in the O.F.S. Region.

For the first time tubercular lesions were found in an Impala ram in the Eastern Transvaal, and confirmed as tuberculous on histological examination.

Condemnations – either whole or in part – of pig carcasses at abattoirs continues to cause heavy financial losses.

New light may eventually be shed on this problem by research workers at Onderstepoort who report that during 1966 and 1967 condemnations of pig heads and whole carcasses greatly increased at abattoirs, because of the finding of T.B. – like lesions in glands during meat inspections. Previously, the Section Tuberculosis had isolated and typed many strains of acid fast mycobacteria from pig glands. The cause of the lesions was determined to be an organism closely related to and almost indistinguishable from the avian tubercle bacillus. The Section has now been able to isolate repeatedly the same or very similar organisms from the feedstuff and bedding of pigs before it had come in contact with pigs. The organisms were found in dried milled lucerne, on maize pips, on concentrate rations, on green grass, and in wood-shavings and sawdust. We are now confronted with the strong possibility that free-living acid fast bacteria are the cause of T.B. – like lesions in lymph nodes of pigs. Similar conditions have been reported from Europe and Australia, and no solution to this problem can be offered at the moment.

The Research Institute, Onderstepoort, produced 194,216 units of bovine tuberculin and 57,140 units of avian tuberculin, the latter mainly for use in the comparative test.

Onderstepoort also reports that the tuberculin produced there is the purified protein derivative (PPD) type. An alternation in the preparation of PPD tuberculins has resulted in an increased yield and specificity. The synthetic

<table>
<thead>
<tr>
<th>TEST</th>
<th>NUMBER OF HERBS</th>
<th>ANIMALS TESTED</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.N.H.</td>
<td>15</td>
<td>3,497</td>
<td>319</td>
</tr>
<tr>
<td>Import &amp; Export</td>
<td>279</td>
<td>6,392</td>
<td>28</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>498</td>
<td>27,034</td>
<td>703</td>
</tr>
<tr>
<td>Interim</td>
<td>584</td>
<td>55,731</td>
<td>517</td>
</tr>
<tr>
<td>Accreditation</td>
<td>410</td>
<td>52,981</td>
<td>118</td>
</tr>
<tr>
<td>Total</td>
<td>1,786</td>
<td>145,572</td>
<td>1,685</td>
</tr>
</tbody>
</table>
media on which the bovine and the avian tubercle bacilli are grown, is no longer heated but membrane-filtered for sterilization, thus preventing hydrolysis of amino-acids and caramelization of sugars. The organisms grow faster on this unheated medium, they have higher yield of protein. The end product consists of tubercle-protein almost entirely, and according to field tests it is more specific than previous batches. When used in a comparative test the reaction to the bovine tuberculin is always bigger in tuberculous cattle and the reaction to the avian tuberculin is bigger in cattle sensitized with other, related organisms.

Field trials by Onderstepoort research workers had previously shown in 18 different herds that farmers can permanently cure three-quarters of tuberculous cows by the daily dosing of Isoniazid (10 mg/kg) for an eight-month period. The animals became negative to the tuberculin skin test within 4 years. We then increased the dose by 50% and 100% (15 and 20 mg/kg) in 6 other herds with 358 TB cattle and shortened the dosing period to 6 or 7 months. This was equally effective in the sterilisation of TB lesions and most animals converted to a negative skin test within 3 months.

A further dose increase to 25 and 30 mg/kg Isoniazid was introduced in 1965-67 and the results are now available. 1052 tuberculous cattle in 13 herds were used in a two-phase or intermittent treatment. The first intensive phase of 25 or 30 mg/kg dosing was 2-4 months long and this was followed by the second continuation phase of low daily dosing for another 3 or 4 months. In three herds the second phase consisted of an intermittent dosing 2 or 3 times weekly in order to save time and labour.

The initial intensive phase improved the affectivity of the treatment without increasing the costs unduly (R6 compared to R5). Sterilization of TB lesions was achieved in 80-85% of after removal of some incurable cows, whole herds could be called free of TB within 2-2½ years after start of control measures.

At Onderstepoort large scale trials to test the affectivity of new anti-TB drugs were undertaken, using rabbits, guinea pigs and mice. The relative merits of one drug compared to another was established, especially when they were chemically or biologically related. It was shown that sodium-methane-sulfonate of Isoniazid is inferior to pure Isoniazid. A new antibiotic substance “Rifampicin”, which is a semi-synthetic derivative of “Rifamycin”, was compared with the standard drug Streptomycin at 25 mg/kg, and it was found to be slightly superior to Streptomycin in rabbit TB, but slightly inferior in guinea pig TB. Since this drug is orally effective it may be of great use in the treatment of valuable zoo animals. Another chemical substance Ethambutol Hydrochloride was investigated, especially for use in cases of TB which are resistant to the two major drugs Isoniazid or Streptomycin. At the dose of 15-25 mg/kg the drug proved to be very effective in the treatment of chronic cases of TB. Both drugs, Ethambutol and Rifampicin, are rather expensive and cannot be recommended for use in cattle. They should be non-toxic at the recommended dose in most animal species.

6. **Brucellosis:**

Brucella infection in cattle, sheep and goats remains a problem of great economic significance. A limited survey of the position in Angora goats has so far failed to reveal any infection. Brucellosis has been found in impala and
waterbuck in the Kruger National Park, in addition to the infection in hippopotami and buffalo previously reported.

At the Onderstepoort and Regional Diagnostic Centres the tests tabulated below were undertaken:

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>NUMBER TESTED</th>
<th>RESULT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPECIES</td>
<td></td>
<td>POSITIVE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3,979 (8.9%)</td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td>73 (2.6%)</td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
<td></td>
<td>16 (1.1%)</td>
</tr>
<tr>
<td>Goats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Only isolated abortion storms were reported, so that the high percentage of positive findings reflected above cannot be taken as a true indication of the incidence of the disease. In most cases specimens originate from herds in which it is desired to confirm the suspicion of infection. Results obtained are therefore not based on random sample testing. Adult vaccination of animals further complicates the matter.

Onderstepoort issued 707,784 doses of Strain 19 and 351,190 doses of Rev. 1 vaccine during the year. A total of 342 herds with 37,066 cattle were vaccinated by officers of the Division, as well as 2 flocks, totaling 9,962 sheep.

Research workers at Onderstepoort report that a large scale trial of Rev. 1 vaccine in cattle is nearing completion. This vaccine is usually used to control Brucellosis in sheep and goats but not in cattle. Calves were vaccinated at 6 to 8 months and exposed during pregnancy to high, moderate and low doses of Brucella abortus organisms. Non-vaccinated controls were also exposed to similar doses of the challenge strain.

The results showed that Rev. 1 vaccine affords considerable protection to cattle against contagious abortion and it would appear that the level of immunity produced is similar to that produced by strain 19 vaccine.
Trypanosomiasis:

1. NAGANA

No positive cases of Nagana were diagnosed in the Republic or in the Eastern Caprivi during the year under review.

Beyond the borders of the Republic intensive campaigns for the eradication and control of the tsetse fly were continued within Rhodesia, Mocambique and the Eastern Caprivi. Another joint spraying operation by the Republic, Rhodesia and Mocambique was undertaken in the West Sabi-Lundi area. This is known as the south Eastern tsetse fly front which, with the advanced southerly spread, seriously threatened to re-inflect the Nuanetsi area, the Limpopo valley and the Kruger National Park.

During the 1967 spraying campaign in Rhodesia 6 spraying units, each with 4 hand-operated pneumatic sprayers, covered a total of 1,573 miles of riverine, valleys, pans and contacts with selective spraying over an area of 320 sq. miles. A total of 5,925 gallons of Dieldrex 15 (T) concentrate amounting to 35,500 gallons spray emulsion to a dilution of 3.1% was used. The Republic contributed 1,500 gallons Dieldrex concentrate, 1 technician, 4 stock inspectors, four 3-ton trucks with drivers, 3 Landrovers and on ½ ton Chevrolet truck towards this campaign. In Mocambique a total of 602.4 miles of drainage, valleys, pans and contacts were sprayed as compared to 376.6 miles in 1966. A total of 3,075 gallons Dieldrex 15(T) concentrate was used of which the Republic contributed 1,500 gallons in addition to 1 technician, 2 stock inspectors, two 3-ton trucks with drivers and 2 Landrovers.

In Rhodesia a minimum of spraying was done in the South Lundi area which was confined to mopping up operations in the remaining known residual fly foci as was determined by organised fly surveys during the year. The major spraying operations were undertaken in the north Lundi area including all tsetse fly infested country up to the Sabi river. In Mocambique the spraying operations extended from the Rhodesia/Mocambique border, south of the Save river, to approximately 100 miles eastwards to include the Banamana area. In addition to the mopping up operations towards the south all remaining tsetse fly infested country in Mocambique was included up to the Save river extending eastwards to Massangena.

The financial contributions from the respective territories towards the joint spraying operations were as follows:-

<table>
<thead>
<tr>
<th>R.S.A.</th>
<th>RHODESIA</th>
<th>MOCAMBIQUE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>R20,185</td>
<td>R25.778</td>
<td>R25,797</td>
<td>R71,760</td>
</tr>
</tbody>
</table>

The results obtained after the spraying operations were, as in the past, evaluated from organised surveys, the use of cattle test herds, the incidence of trypanosomiasis and observations in the field. From the figures so obtained the results are most encouraging and the indications are that only the minimum amount of mopping up spraying operations remains to be done in Rhodesia south of the Sabi river. Intensive surveys are continuing in the area between the
Sabi and the Lundi rivers for any remaining fly foci where only the isolated tsetse fly is being recorded. In Mocambique additional areas were cleared of tsetse flies and the density greatly reduced in the remaining inaccessible areas where access roads are at present being constructed.

Very satisfactory further progress has therefore been made in all parts of the operations area and it now seems clear that the overall tsetse control problem in the south eastern tsetse fly front has been reduced to the dimensions of a residual “mopping up operation.” The ultimate objective is to completely eradicate the tsetse fly towards the north as far as the Sabi River in Rhodesia and the Save river in Mocambique.

**EASTERN CAPRIVI ZIPFEL**

Funds for the 1967 spraying operations in the Eastern Caprivi were provided by the Department of Bantu Administration and Development and the campaign was organised and controlled by the Division of Veterinary Services. A total of 1,600 gallons of Dieldrex 15(T) was used as a 3.1% spraying emulsion by two spraying teams under the control of 3 stock inspectors. To the east of the Kwando river the spraying operations were confined to a more limited area of 30 miles on the eastern banks of the river. The more extensive spraying operations were undertaken in the as yet unsprayed very high, tsetse fly density areas to the west of the Kwando river. This was made possible by the newly installed pont operating across this river at Congola. Operations extended over a front of approximately 50 miles along the 13 molopo drainages running in a north westerly direction.

The operations are to be extended to the west to control the existing serious threat of a westerly expansion of the tsetse fly front towards the Okavango river through Western Caprivi. The control of the Caprivi tsetse fly complex, involving human sleeping sickness, is being considered on an international basis involving the adjoining territories of Botswana, S.W.A., Angola and Zambia.

In the Eastern Caprivi the tsetse fly has been completely eradicated except for limited areas where tsetse fly disperse across the Kwando river from foci of high fly density on the western banks of the river. Since the spraying operations started in the Eastern Caprivi in 1964 the cattle population has increased from just over 12,000 to over 22,000, while no further cases of sleeping sickness were recorded from the sprayed areas in Eastern Caprivi during the past year.

### 2. DOURINE

Blood specimen examination for dourine was undertaken in connection with all equines intended for export, for breeding to valuable sires, and in several suspected chronic cases.

During the year 590 South African specimens were tested at Onderstepoort. Of the 4 positive reactors, one was sent to Onderstepoort for experimental purposes, one castrated and 2 destroyed.

In addition to the above, 591 specimens from the adjoining territories and Kenya, Zambia and Angola were examined. Of these, 11 from South West Africa and 2 from Botswana proved positive.
(8) **Lumpy Skin Disease:**

During the year Lumpy Skin Disease occurred throughout the Republic. Infection was recorded on 406 farms, with a total of 81,658 cattle, of which 1,775 were affected. In the majority of instances losses were minimal, as only a very small percentage of animals in any herd showed lesions, and the disease ran a mild course in affected animals.

Vaccination of 67,513 cattle on 476 farms was done by or under supervision of the Division’s inspectorate staff.

Onderstepoort issued 1,241,579 doses of vaccine during the year. This represents an increase of 87% over the 1966/67 issue of 663,048 doses.

It is impossible to gauge which had the greater limiting effect on the incidence of the disease: the increased use of the vaccine or the severe drought in so many parts of the country. The hope is however expressed that cattle owners will make increasing use of this very effective aid to loss prevention.

(9) **Sheep Scab:**

In connection with 2 of the 4 outbreaks of Sheep Scab in different parts of the Republic, the origin of the infection could not be traced. In 2 instances it is either certain or reasonably certain that the disease was transmitted by animals, illegally introduced from neighbouring territories.

In the outbreaks in a Bantu Reserve in the Mafeking district of the Highveld Region, and on 11 farms in the Calvinia, Clanwilliam and Tulbagh districts of the Western Cape Region, eradication was accomplished by dipping 56,406 sheep and 41,437 goats in the former case, and 10,297 small stock in the latter.

Of 458 sheep on 2 farms in the Pietersburg district in the Eastern Transvaal Region, 83 were found affected. On the infected and contact farms 4,168 sheep and 1,057 goats were dipped to eradicate the disease.

On 10 farms in the Kenhardt and Gordonia districts of the O.F.S. Region, 4,819 sheep of a total of 23,480 were found infected. To eradicate infection it was necessary to dip 48,121 sheep and 2,988 goats on these farms, and 190,927 sheep and 9,507 goats on 73 potentially infected farms.
(10) **Mange:**

In view of the possibility of transmission to domestic animals, mange in game is being investigated. The mange mites *Psoroptes bovis* have been found on buffalo, and *Sarcoptes scabies* on blue wildebeest and impala.

Sporadic cases of mange in cattle, goats, horses and pigs were recorded, as shown below.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>OUTBREAKS</th>
<th>ANIMALS INFECTED</th>
<th>ANIMALS ON FARMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>36</td>
<td>265</td>
<td>8,860</td>
</tr>
<tr>
<td>Goats</td>
<td>24</td>
<td>400</td>
<td>11,254</td>
</tr>
<tr>
<td>Horses</td>
<td>4</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>Pigs</td>
<td>19</td>
<td>188</td>
<td>416</td>
</tr>
</tbody>
</table>

All these cases were effectively controlled by appropriate treatment and dipping of infected and contact stock.

(11) **Swine Fever:**

The classical European Swine Fever does not occur in the Republic. No cases of African Swine Fever were recorded during the year.

Because the potential carriers of the disease – warthogs and bush pigs – are found there, a small portion of the Northern and Eastern Transvaal is regarded as an enzootic Swine Fever area. Movements of pigs and pork products within and out of this declared area are strictly controlled. Only pigs from approved piggeries which conform to strict specifications and are subject to regular official inspections, are permitted to specific quarantine abattoirs outside the area.

At present there are 435 such officially approved piggeries.

(12) **Swine Erysipelas:**

Two confirmed cases occurred, one in Natal, where antibiotic treatment cleared up infection, and one in the Eastern Transvaal, where a single animal contracted the disease and was destroyed.

A suspected case in the O.F.S. was not confirmed.

(13) **Epizootic Lymphangitis:**

No cases of this disease occurred during the year under review.

(14) **Johne’s Disease:**
One case was confirmed in the Caledon district, in a bull imported from the United Kingdom. One suspected case in the Thaba Nchu district could not be confirmed. In a suspected case in the district of Barberton, the animal in question has been sent to Onderstepoort for further examination.

A ram imported with 5 ewes to the Highveld Region, died of the disease. Repeated examination of the ewes has failed to reveal any infection.

(15) **Infectious Laryngotracheitis:**

Two outbreaks occurred, one in the Transvaal, where 24,000 birds were vaccinated on the premises, and one in the O.F.S., in a broiler establishment. Here attempts are being made to systematically clear the plant of infection, as the owner for financial reasons cannot depopulate all houses simultaneously.

(16) **Rinderpest:**

This disease does not occur in the Republic of South Africa or the neighbouring territories.

(17) **Newcastle Disease:**

The lentogenic form of this disease diagnosed during February 1967 on the Witwatersrand has been eradicated to such an extent that only 6 poultry holdings, all in the Transvaal, are still subject to quarantine and the gradual slaughter of all infected birds.

During the year under review, the far more serious mesogenic outbreak, which started in the Western Cape on 9 April 1967, was at first brought under control so successfully that only 5 further outbreaks occurred, and control measures were partially relaxed. On 31 October 1967, however, the second phase of the outbreak was heralded by the unexpected appearance of the disease on a farm near Kuilsrivier. Immediately all the control measures were re-instituted. These included slaughter of infected flocks, inspection of all poultry for laboratory examination, vaccination of all poultry at risk, quarantine measures and permit control of the movement of all poultry and poultry products.

In spite of these measures the disease not only spread to other flocks in the Western Cape, but isolated outbreaks were found in the Knysna, Mosselbay and Vredendal districts.

For a period of 2½ months during the peak of the outbreak, road blocks for the inspection of all vehicles were set up on all the exit mountain passes from the Western Cape, to prevent the illegal transport of poultry and other infectious material. These inspection points were manned by members of the Armed Forces, on a 24 hours per day basis.

The campaign against Newcastle Disease has been so successful that the last of the 25 outbreaks this year was recorded at the beginning of April 1968.

The extent of the organisation is illustrated by the fact that since January 1968 more than 100 officials of the Division were engaged in the campaign, and covered 663,286 miles during the period January – June 1968.
The amount of work done is reflected by the summarised data presented below.

- Total No. of vaccinations: 18,564,864
- Total No. of birds inspected: 68,696,788
- Total No. of poultry destroyed: 731,601

The Research Institute, Onderstepoort reports that as well as examining 187 specimens, of which 41 proved positive for virulent Newcastle Disease virus, tests were also conducted to compare the safety and efficacy of the present vaccine with that of a live attenuated virus obtained by passage through a varying number of mice. The present Komarov vaccine virus cultured either on incubated eggs or on chicken embryo cells, produced no vaccination reaction in four weeks old chickens, and afforded total protection to exposure the virulent virus. Four different strains of mouse adapted virus also produced no vaccination reaction, but gave a much weaker protection.

(18) **Bacillary White Diarrhoea and Fowl Typhoid:**

During the year 3 outbreaks of B.W.D. and 7 of Fowl Typhoid were recorded, all in flocks on non-certificate holders.

Summarised data of tests performed in connection with these two diseases is listed below.

- Flocks tested: 161
- Birds tested: 763,652
- Positive reactors found: 264
- Suspicious reactors found: 221
- B.W.D. & F.T. Free Certificate holders: 147
- Birds in flocks of Certificate holders: 2,366,134

The decrease in the number of flocks tested and number of certificate holders as compared to the previous year, is due mainly to the fact that no official testing was carried out in the Western Cape. This in turn was the result of the Newcastle Disease epizootic, which made it imperative for all available personnel to confine their activities to eradication of this scourge.

During the year, the Onderstepoort Research Institute issued 1,389,000 doses of Fowl Typhoid vaccine.

(19) **Fowl Cholera:**

No cases of this disease were recorded during the year.
Psittacosis:

Only one outbreak was reported, from the Rustenburg district. Appropriate treatment successfully eradicated the infection.

Other Notifiable Diseases:

1. Scrapie

Both flocks in the Eastern Cape in which Scrapie was diagnosed during the year, were officially slaughtered. Regular inspections are carried out of all flocks to which movements of potentially infected sheep were traced, and all movements from these flocks are subject to permit control.

2. Equine Infectious Anaemia

During the year no cases of this disease were recorded.

3. Glanders and Lungsickness (Bovine Pleuropneumonia)

For many years no cases of these diseases have occurred in the Republic.

NON-NOTIFIABLE DISEASE

1. Deficiency and Nutritional Diseases:

In the most parts of the country, but especially in the Western and Eastern Cape and the Highveld Region, drought necessitated supplementary feeding of stock over long periods. This often resulted in metabolic disturbances or mineral and trace element deficiencies or imbalances.

In the Western Cape where increasing use is being made of artificial pastures, breeding problems are being encountered, especially on pastures with a high clover percentage. In Natal deficiencies of phosphorus, copper, zinc and manganese have been established, as well as an imbalance in the calcium-phosphorus ratio. Naturally occurring rickets has been encountered in the Kruger National Park in lions, young hyenas and wild dogs.

The recent acquisition of several additional atomic absorption spectrophotometers will in the near future lead to an increase in the tempo of investigation into mineral and trace element deficiencies and imbalances.

The Research Institute, Onderstepoort reports that the use of atomic absorption spectroscopy in the nutrition laboratory has resulted in the establishment of an accurate and highly efficient analytical procedure for the evaluation of the mineral status in livestock.

The liver concentrates a large number of minerals in its tissues and samples from this organ, taken in 10% formalin for preservation, are serving as indicators of nutritional patterns on farms and regions.
New “normal” levels are being established from the current work which includes evaluations of copper, zinc, molybdenum, manganese, cobalt and also selenium. The results of these analyses are directly interpreted for application and both deficiencies and excesses are being corrected by the current knowledge of interrelationships of the minerals.

The species which are being studied and on which results are already available are sheep, horses and cattle.

In the course of the year 327 samples of liver, kidneys, blood etc., were analysed for Copper (244), for Cobalt (16), for Manganese (49), for Zinc (7), for molybdenum (3), and for fluorine (3).

The analytical data served as aids in diagnosis of cases of deficiency (76), and others (219). Furthermore, suspected cases of enzootic icterus, and other copper poisoning cases (26) were confirmed.

The need for phosphatic supplements in the feeding of stock on an economic basis, has directed studies on a commercial product, namely mono-ammonium phosphate.

The metabolism data on the utilization of its phosphorus and nitrogen have been obtained for sheep as experimental animals.

Both its value as a dry lick and as a soluble phosphate in drinking water, have been studied.

The preliminary data suggest that the commercial product is very impure, that the nitrogen is poorly metabolised, and that as a source of phosphorus is comparatively moderate.

In an investigation conducted at Onderstepoort it was found that after maintaining Merino ewes on a solitary diet of green oats out from established fields under irrigation, for three consecutive annual periods, no physiological and metabolic disturbances were manifested.

In these studies the influence of high potassium intake, inclement weather conditions, fertilization of oat fields with excessive quantities of N, K and P, had little adverse effects on the metabolism of green oats.

The present studies seemed to support the views that the condition is hypocalcemia rather than a hypomagnesemia.
Poisoning:

1. Mineral Poisoning

Specimens from many cases of malicious and accidental poisoning of livestock investigated by the field staff of the Division were examined at Regional Diagnostic Centres.

Most specimens were, however, examined by Onderstepoort. A report from this Institute states that contrasting with a tendency towards a decrease in the number of cases of arsenic poisoning over the last few years, a considerable increase to 125 cases (compared to 47 the previous year) was encountered. No obvious reason can be found for this.

Twenty cases of lead poisoning were diagnosed during the year – green paint was the cause in one instance. An exceptional case also occurred of chromium poisoning as a result of paint in which zinc chromate was the colouring agent.

Strychnine poisoning still occurs relatively frequently and 214 positive cases were diagnosed, which is 25% more than during the previous year and represents an increase of 100% over 1965/66.

A great advance during the year was the refinement and adaptation of methods of determining the chlorinated hydrocarbons – even in organs – by thin layer chromatography. This method is very sensitive and 19 outbreaks of poisoning by Dieldrin, Thiodan, BHC, DDT and other chlorinated compounds were diagnosed. Dieldrin poisoning was especially prominent and it is alarming that this extremely poisonous substance which persists for very long periods in nature in an unchanged form, is so often and so freely used without due care. Experiments at Onderstepoort have shown that this substance can after a year be isolated in active form from sheep and cattle organs.

The Research Institute further reports that poisoning by water with a high mineral content still remains a problem and in S.W.A. on the spot investigations in collaboration with the C.S.I.R. are being energetically pursued. There was a strong suspicion that a variety of problems encountered in the Carletonville area could be ascribed to water with a high salt content which resulted from mining activities in the vicinity. Thorough investigation could however show no direct correlation.

2. Plant Poisoning:

At the Research Institute, Onderstepoort, a total of 248 plant species were received for identification, of which 21 species were tested for toxicity and 13 found poisonous – the following 5 for the first time:

(a) *Geigeria burkei* - a type of “vermeerbos” which had caused mortality in cattle in the Klerksdorp area.
(b) *Senecio angustifolius* – from the Worcester district and experimentally producing typical seneciosis.
(c) **Crotalaria sparticides** – the cause of the so-called Molteno straining disease syndrome (Chronic seneciosis) in the Kuruman district where no *Senecio* plants occur.

(d) **Trichocaulon marlothii** – one of the spineless nghaap species which caused poisoning of Coloured children, and which proved to contain a rare nerve poison.

(e) **Morea natalensis** – a species of tulp from Ixopo.

Chinkerinchee poisoning (*Ornithogalum thyroids*) caused heavy losses this year in horses in the Western Cape, where it was mowed together with oats and in this way distributed to various stables.

An exceptional outbreak of “Slangkop” poisoning (*Urginea sanguina*) occurred in the Vryburg district, where one farmer lost 63 cattle. The remarkable feature was that the animals grazed the plant during March, while the problem is actually confined to spring exclusively.

Contamination of grains (especially mealies) with the seeds of poisonous plants, especially thornapple (*Datura spp.*) and a *Crotalaria* sp. As a result of the present day mechanical harvesting, was a problem the presented itself. The feeding of such grain is to be condemned entirely, and such grain can be decontaminated by better cleaning processes. The toxicity of these two types of seed is being examined.

Bracken poisoning (*Pterydium aquilinum*) occurred in the Estcourt district, where 55 cattle were affected on one farm, and 28 died.

From field reports received, it would appear that the types of plant poisoning that took the heaviest toll were seneciosis in parts of the Highveld, Eastern Cape and Transvaal Regions; tulp poisoning in portions of the Highveld, Natal, O.F.S. and Transvaal Regions, and Gousiekte in some Natal and Transvaal areas.

In connection with research on the “Big Lamb” problem, Onderstepoort reports that the project was at first aimed at determining the cause of the extended pregnancy in sheep. This was established late year as being due to ingestion of an Old Man Saltbush (*Salsole* sp.). During the current year it was determined that the most vulnerable stage of pregnancy is the last 50 days. Pregnant ewes fed the plan in question during this period, showed an increase in the length of gestation. Ewes fed the plant during the first 100 days of pregnancy on the other hand showed no appreciable extension of gestation time. It would therefore appear that the incidence of “Big Lamb” disease could possibly be decreased by preventing or limiting the ingestion of the plant in question during the last 50 days of pregnancy. According to studies over the past few years it also appears that the plant probably affects certain brain centres regulating the most important endocrine glands and sexual functions.

3. **Toxins**

Onderstepoort Research Institute states that contrary to expectation, few problems were experienced with fungus poisoning.
After carrying out thorough testing, a very large consignment of kaffir corn which was to a limited extent mouldy, was made available as stock feed under certain specified conditions.

A very interesting syndrome with chronic liver damage and photosensitization, identical to the “Facial Eczema” appearing in New Zealand and Australia, was found in the Humansdorp area. Attempts are being made to establish the causal fungus.

The Division of Plant Protection reports that research into the possible toxicity of *Diplodia zeae* begun in 1967, was continued. An isolate of *Diplodia zeae* that proved toxin producing in preliminary dosing trials, was cultured on mealie grains and fed to day old chicks at intervals of two weeks. The cultures were grown up to 32 weeks and dosed. The results of the last few tests are not yet available, but the tests show that the toxin content of the cultures vary with length of growth. It has been found that the toxin index rises up till 12 weeks, and then decreases.

The poisoning of stock in the Malmesbury, Mooreesburg and Piketberg area by lupines is being investigated. A fungus growing in the dry lupine hay is suspected as being responsible for the poisoning. A sample of hay received from Piketberg and known to the toxic, was examined mycologically. As expected a wide spectrum of fungi was isolated. From the hay a suspension of spores was made and used to inoculate toxin free lupine hay. The inoculated hay was then fed to sheep. This test was repeated. In both cases the hay was overgrown with known saprophytic moulds and the result of the dosing test negative.

During December 1967 the problem areas were visited. Suspected toxic as well as non-toxic hay was collected. Although dosing tests with the suspected toxic hay produced no positive results a difference was found in the microflora of the two types of hay. The fungus found on the suspicious but not on the non-poisonous hay, was isolated but has not been identified.

As soon as apparatus for the sterilisation of hay by chemical methods instead of heat is in working order, the toxigenicity of this fungus type will be tested.

The Division of Plant Protection further reports that early in 1968 a disease condition in sheep closely resembling Facial Eczema was reported from the Port Elizabeth district. The Facial Eczema occurring in Australia is indirectly caused by the fungus *Pithomyces chartarum*, which has not been found in South Africa.

Samples from various grazing lands were therefore examined mycologically. So far a widely divergent fungal flora has been found. Identification has not been completed, but is being continued. When a mould of moulds are suspected of being responsible, an inoculum will be prepared and dosing trials started.

(3) **Bacterial Diseases**

1. **Mastitis**

Although “Blue Udder” in sheep does occur in sporadic outbreaks which may cause heavy losses in individual flocks, mastitis in cattle can be regarded as one
of the most serious erosion diseases, causing very considerable financial losses on a country wide basis.

The very serious manpower shortage in the Division, in both the professional and technical fields, has prevented the launching of an organised campaign against mastitis. At most of the Diagnostic Centres, however, antibiogram tests have been conducted in an effort to prescribe the best possible treatment in every case, and discourage the indiscriminate use of the most readily available treatments, which so often fail to produce the desired results.

The Mastitis Laboratory of the Research Institute, Onderstepoort reports that during the year a total of 19,366 milk samples were subjected to cytological and cultural examinations.

An investigation into the influence of an experimental vaccine against *Staphylococcus aureus* (consisting of toxoid and cell membrane material) showed that there was no appreciable reaction on the tissues of healthy as well as *Staphylococcus* and *Streptococcus* infected quarters. Cell counts and chemical composition of the secretion were not affected by the parental administration of the vaccine, and the original infection could easily be cultured repeatedly from the secretion.

An investigation into mastitis in certain problem herds which had been treated for mastitis over long periods, showed that infection of the udder tissues with yeasts and moulds often occurred. A wide variety of species was isolated and identified, and a hitherto undescribed *Candida* sp. was also found. The extent of blastomycotic mastitis in south Africa appears to be of importance, and indiscriminate use of mastitis remedies can largely be held responsible for this.

A heavily infected dairy herd was at the owner’s request included in a mastitis control trial to determine the efficacy of an udder health scheme based on regular testing and rationalisation of treatment and management. Of 240 cows only 185 quarters were sound originally. After 10 months 674 were mastitis free and the daily milk production per cow had increased from 22.07 to 29.08 lbs. During the same period the percentage of mastitis infected cows had decreased from 54.9% to 4.2%.

A comparison between the bacterial content of aseptically drawn teat milk samples and samples drawn directly from the milk cistern, illustrated the amount of care essential to avoid contamination of test samples. This also emphasized the importance of simultaneous cytological examination in order to make an accurate diagnosis.

2. **Enterotoxaemia**

As in previous years, Pulpy Kidney Disease claimed its toll from the flocks of those farmers who do not believe that prevention is better than cure or who do not conscientiously carry out vaccination instructions and inoculation programmes. With an inexpensive and thoroughly proven preventative vaccine at their disposal, no farmers need ever suffer any losses as a result of this disease, and not much sympathy can be felt for those who do.

During the year the Research Institute issued 38,535,200 doses of the vaccine.
3. **Blackquarter**

The attitude of many farmers towards preventative vaccination against this disease is the same as that displayed towards enterotoxaemia, notwithstanding official propaganda efforts. In some Bantu areas losses due to Blackquarter are considerable, and much time and effort will be needed to improve the position.

The fact that the 3,854,600 doses of vaccine issued by Onderstepoort represents a 35% increase over the issue for the previous year, may indicate that a gradual break-through is being made by the continued propaganda efforts.

4. **“Lamsiekte”**

Although no heavy mortalities in any herds or flocks, or in any localities, were reported, sporadic cases of the disease occurred.

Preventative vaccination is very effective, and 3,899,285 doses were issued during the year. This represents an increase of 29% over the 1966/67 issue.

According to the Onderstepoort Research Institute two rather serious outbreaks of botulism as a result of feed which had in some or other way become contaminated with the toxin, were diagnosed. In one case involving good quality lucern hay 33 sheep and 2 horses died. The specific symptom complex of “lamsiekte” in sheep was pertinently underlined: in contrast to the bovine which is usually unable to rise, the sheep can do so till practically just before death. Salivation is prominent, paresis of the neck is pronounced and the sheep carries the head low and noddingly, the animal urinates frequently and switches the tail to and fro in a characteristic manner. The animal usually dies after pronounced dyspnoea resulting from paralysis of the respiratory muscles.

5. **Corynebacteriosis**

At this early stage no definite evaluation of the vaccines against *Corynebacterium pyogenes* and *C. ovis* as applied in practice, is possible.

Some regional reports emphasize that both the lung and gland abscesses in sheep caused by *C. ovis* and the abscesses, pneumonia, arthritis and septicemia in sheep, goats and cattle caused by *C. pyogenes* are on the increase. Whether this is the case in vaccinated or unvaccinated flocks and herds is not indicated. This apparent increase could conceivably also be due to an increased awareness of these infections amongst farmers resulting in more numerous determinations of the causal agent.

During the year Onderstepoort issued 188,540 doses of *C. pyogenes* and 377,210 doses of *C. ovis* vaccine.

From the Institute it is reported that a technique has been developed for obtaining and purifying the protoplasmic toxin of *C. ovis*. Cells are mechanically ruptured and the protoplasm consecutively treated with streptomycin, ammonium sulfate and ethanol. Final purification is by exclusion chromatography. This procedure yields a toxic material which is electrophoretically pure.
Further studies on the different antigens of *C. ovis* should lead to the development of a serological test which is indicative immunity.

The Research Institute also reports that Corynebacteriosis of sheep is a chronic non fatal infection and immunity experiments which employ death of experimental animals as an index of immunity are therefore unsatisfactory.

A technique has been developed whereby a chronic infection can be established in mice. The degree of resistance of immunized animals can be accurately assessed by determining the bacterial population of the spleen.

It has been demonstrated that mice can be solidly immunized with small doses of vaccine when it is administered in conjunction with Freund’s complete adjuvant.

Further experiments are being undertaken to find whether vaccine without adjuvant is equally effective and to determine the nature and duration of immunity in both sheep and mice.

6. **Pasteurellosis**

   In those parts of the Republic most heavily hit by this disease during 1966/67, the incidence showed a definite decline. In no other areas was there any pronounced increase. Whether this was due to the increased use of vaccine, of which 446,520 doses were issued by Onderstepoort, or to prevailing climatic conditions, cannot be judged at this stage.

   Onderstepoort reports that by means of the indirect haemagglutination test some 30 strains of *P. haemolytica* from different areas in South Africa have been typed. Distribution appears to be random but the most common serotype found thus far are types 1, 6 and 7. These serotypes are now incorporated in the vaccine.

   Considerable difficulty has been experienced with the production of *P. multocida* typing sera. The experiments are nevertheless being continued and will hopefully yield results in the near future.

7. **Tetanus**

   Only sporadic cases were reported. In the majority of instances the disease made its appearance after shearing under unhygienic conditions or after castrating by the elastrator method.

   Onderstepoort issued 58,760 doses of the vaccine during the year.

8. **Colibacillosis**

   In a survey conducted in Natal, colisepticaemia was found to be the greatest single factor in perinatal lamb mortality. This condition also caused heavy losses in the Eastern Highveld areas and Western parts of Transvaal, as well as the O.F.S., while losses from colibacillosis in calves also caused alarm in these areas.
As soon as the production problems in connection with the colibacillosis vaccines, discussed in the Introduction, have been overcome, yet another weapon to counter losses, will be available to stock owners.

9. **Leptospirosis**

During the year 122 blood specimens were examined at the Diagnostic Centre, Onderstepoort, of which 7 were found positive for leptospirosis.

At the Diagnostic Centre, Stellenbosch, the specimens listed below were examined:

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>NO. OF SPECIMENS</th>
<th>POSITIVE</th>
<th>NEGATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs</td>
<td>211</td>
<td>6</td>
<td>205</td>
</tr>
<tr>
<td>Cattle</td>
<td>5,165</td>
<td>69</td>
<td>5,096</td>
</tr>
<tr>
<td>Sheep and goats</td>
<td>165</td>
<td>-</td>
<td>165</td>
</tr>
<tr>
<td>Horses</td>
<td>39</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td>Other animals</td>
<td>33</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>Humans</td>
<td>9</td>
<td>-</td>
<td>9</td>
</tr>
</tbody>
</table>

Although leptospirosis was found in pigs, horses, cattle and other animals, not a single case in which infection produced a disease entity was encountered.

According to a report from the Onderstepoort Institute the antibodies formed when rabbits are artificially infected with Leptospira organisms, as well as those produced by natural infection in the human being, were studied by the fluorescent antibody as well as other serological methods. This work was aimed at comparing the former method with the others, and establishing its reliability in diagnosing the disease. In favour of the fluorescent antibody method it was found to show a positive reaction much earlier in the course of the disease. Another advantage of this method is that it is so sensitive and thus capable of indicating small amounts of antibody. On the other hand there are indications that care in the interpretation of the results is imperative.

A practical problem of leptospirosis, especially in domestic animals, is our eager knowledge of the type of antibody actually responsible for the protection of the host, and the fact that this is not readily determined by known methods. The study of the value of the fluorescent antibody method in this connection is the immediate aim.

The Research Institute also reports that during the year progress was made by developing an experimental inactivated, polyvalent vaccine which contained four serotypes that have been identified in this country.
Immunization trials were carried out on hamsters, guinea pigs, pigs and cattle. Effective protection was registered against a homologous exposure. The immunity appeared two weeks after inoculation and lasted for 1 year.

The sero-diagnostic value of the complement fixation and fluorescent antibody tests was investigated. These tests were found to be inferior to the agglutination-lysis test with living antigen.

10. **Vibronic Dysentery of Pigs**

In Natal Vibronic Dysentry has established itself as an important erosion disease of pigs. Infection was readily controlled by treatment and adequate hygienic measures.

11. **Pseudomonas Infection**

From the Highveld and O.F.S. Regions pseudomonas infection was reported as causing sporadic outbreaks of “blue udder” and middle ear infections in sheep.

12. **Lamb Dysentry ("Bloedpens")**

Cases of this disease were reported from parts of the Eastern Cape Region, but occurred only on farms where the necessary preventative vaccination had not been carried out.
13. **Actinobacillosis and Actinomycosis**

Only isolated cases of these diseases were reported, mainly from the O.F.S. Region.

14. **Staphylococcus aureus**

The Research Institute reports that by absorption of immune serum with different Staphylococcal antigens and subsequently testing the ability of the sera to promote phagocytosis, it has been shown that antibodies against a specific cell wall antigen play an important role in conferring immunity to Staphylococcus.

Preliminary immunity experiments in rabbits indicate that although they can be protected against a lethal systemic infection, they are not immune to skin infection. This may be due to a simultaneous deleterious hypersensitivity reaction and experiments are at present being done to determine what the basis of this phenomenon is and whether it can be overcome by alteration of the immunizing antigens or by altering the immunization procedure.

15. **New Disease Entities of Poultry**

The Research Institute, Onderstepoort, reports that:

(a) For the first time in the Republic cases of neurotic enteritis have been found from which *Clostridium welchii* was isolated. Further work is required. The outbreaks could be treated effectively.

(b) An infectious hepatitis of fowls, involving a *Streptococcus*, was diagnosed. In one instance the condition could be produced experimentally.

(c) *Haemophilus gallinarum*, the cause of infectious coryza of fowls, can now be readily isolated, and the disease can therefore be differentiated from Mycoplasmos more effectively.

(4) **Protozoal Diseases**

1. **Babesiosis**

The incidence of **Redwater** and consequent loss of cattle was high in the Eastern Transvaal, Eastern Cape, Natal and Transvaal Regions. In the Highveld and O.F.S. Regions only sporadic cases occurred, but the disease is reported to be spreading to hitherto “clean” areas, especially following on the return of stock moved away during the severe drought of 1966/67.

That more efficient tick control can play an important role is evidenced by the fact that the use of more effective dipping materials cut down cattle losses during the year in the Bantu areas in the Ixopo and Polela districts of natal by an estimated 5,000 head.

**Biliary Fever** of dogs was relatively prevalent throughout the Republic, while isolated cases of Equine Biliary Fever were recorded.
At the Research Institute systematic chemotherapeutic studies have shown that the administration of modern preparations (babesan, pirevan, piroparv, berenil, etc.) is followed, with few exceptions, by a complete destruction of the indigenous redwater parasite (*Babesia bigemina*), thereby rendering treated animals fully susceptible. It has also been determined that the immunity following the recovery from a *B. bigemina* reaction, even in untreated animals, is of short duration. It rarely persists for longer than 6 months on farms where systematic tick control by dipping is practiced.

In the cases of the exogenous redwater parasite (*Babesia bovis*) modern preparations bring about a cure which is followed by an immunity which persists for at least 2 years.

2. **Anaplasmosis**

As in previous years this disease was relatively prevalent throughout the Republic. Vaccine issues by Onderstepoort during the past three years have been 246,166, 338,786 and 413,626 doses respectively, indicating a gradually increasing reliance on this aid in combating the disease.

3. **Besnoitiosis**

The disease was less evident this year in the Transvaal and Eastern Transvaal Lowveld. It appeared widespread in the Magudu – Mkuzi – Hluhluwe lowveld areas in Natal, and several outbreaks occurred on the Highveld in the north western O.F.S. and adjacent areas in the Transvaal.

In the Kruger National Park approximately 50% of blue wildebeest were found infected in a survey, while one positive case appeared amongst 33 impala examined.

Recent work by the Research Institute has thrown a good deal of light on the way in which Elephant skin Disease is transmitted in nature. It had been found that if cattle that have had the disease i.e. are chronically infected, are allowed to run with susceptible cattle, the latter sooner or later all contract the disease. In the majority of cases the infection was so mild that special methods had to be employed to diagnose it. The possibility of venereal transmission could be eliminated.

Various possible ways of transmission were then examined. It was determined that a variety of blood sucking insects e.g. tsetse flies, horse flies and stable flies, were capable of transmitting the disease mechanically from chronically infected cattle to cattle and rabbits. The time of survival of the besnoitiosis parasite in the insect was of short duration, and there was no indication that they had multiplied. Even mosquitoes were able to take up infective parasites from the cysts in the skin of chronically infected cattle.

Skin suspensions from chronically infected cattle were found infective for susceptible cattle if introduced into the nasal cavities, but not by mouth, while for rabbits it was infective if introduced via the nose or eye cavity. It is unlikely, however, that natural transmission would take place by these routes.
The finding that chronically infected cattle serve as a reservoir of infection indicated a method of control. All cattle on a heavily infected farm found to be infected by examination of the transparent portion of the conjunctival mucus membrane for cysts, were isolated on a distant part of the farm, and later slaughtered. This diagnostic method is the most reliable method available, but not infallible. Over a period of 7 years the incidence of the disease decreased from 4.6% (114 cases) to 0.08% (1 case) as a result of this policy. Surveys of the incidence of besnoitiosis were made on a further 6 farms in the bushveld. It was found to vary between 2.1 and 49.7%.

A method has been evolved of producing typical cases of heavy infestation experimentally by the intravenous injection of cattle with massive doses of viable parasites grown on tissue cultures. This will be of particular value in the assessment of vaccines against besnoitiosis.

4. Coccidiosis

No severe outbreaks of Coccidiosis were recorded.

The Onderstepoort Institute reports that before May 1967 Coccidiosis in chinchillas was unknown in the Transvaal. During an outbreak then, the causal organism was isolated and described as a new species *Eimeria chinchilla*. On two farms near Pretoria where heavy losses were experienced as a result of the disease, Sulphamezathine in the drinking water was used as treatment. The results were good, but in some subjects side effects were pronounced.

5. Eperythrozoonosis

Infection with this organism was for the first time diagnosed in pigs in Natal.

(5) Virus Diseases

1. Blue Tongue

Few outbreaks occurred during the year, perhaps because the early part of the summer was dry in most sheep farming areas.

The 21,185,200 doses of vaccine issued by Onderstepoort was 16% less than that of 1966/67.

2. Horse sickness

Very few cases were reported, except from the Vryheid district of Natal, where a severe outbreak resulted in the death of approximately 100 horses, including 3 which had been vaccinated.

According to the Research Institute the successful application of the direct fluorescent antibody technique to the study of horse sickness virus was found to depend largely on the quality of the conjugate. Best results were obtained when purified gamma globulin, prepared from a serum containing a high titre of antibodies was used and it was found advisable to remove overconjugated and unconjugated globulin molecules by chromatographic procedures. Highly specific fluorescence could be demonstrated in infected mouse brain and tissue
culture cells, but attempts to use thin sections of various organs from infected horses for diagnostic purposes were, as yet, unsuccessful.

3. **Heartwater**

   In all the enzootic areas, this disease remains one of the biggest curses of the stock farmer. Although losses from heartwater can be minimised by the control of ticks by means of effective dipping and by the immunisation of susceptible cattle and small stock, the disease remains a limiting factor to successful stock farming in these areas.

   Research workers at Onderstepoort report that the causative organism of heartwater was studied with the electron microscope. It appeared as large particles, small particles and possibly intermediate forms, suggesting that it probably has a life cycle. It has many morphological similarities to the agent of tick-borne fever of Europe which at present is classified in a middle-ground position between the genus *Rickettsia* and the psittacosis-lymphogranuloma-thrachoma group of organisms.

4. **Ephemeral Fever (Three Day Stiffsickness)**

   In the Transvaal, Natal and Highveld Regions, outbreaks occurred widespread, causing considerable economic losses, especially in milk production, and even mortalities. In the other Regions, only sporadic cases were seen, mostly of a mild nature.

   In research on this disease at Onderstepoort, cattle were artificially infected with the virus of Ephemeral Fever, and slaughtered at varying intervals after onset of the disease. Pathological changes were found in the joints, tendon sheaths and muscles. These lesions had not previously been studied in detail. The new knowledge gained on these lesions will contribute to a better understanding of the symptoms shown by sick animals and will probably also be of value in the more effective treatment of affected subjects.

   The Research Institute further indicates that the direct fluorescent antibody technique has been applied to the study of ephemeral fever virus with considerable success. Specific fluorescence was observed in experimentally infected mouse brain and baby hamster kidney cells as well as in white blood cells of bovines naturally infected with ephemeral fever virus. This test now provides a rapid and accurate means of diagnosis which was hitherto not available for this disease.

   Fluorescence was invariably observed in the cytoplasm of infected cells which indicated that ephemeral fever virus replication occurs in the cell cytoplasm. This finding could aid electron microscopic studies on the virus.

5. **Fift Valley Fever and Wesselsbron Disease**

   No cases of these two diseases occurred.

6. **Snotsiekte**
Only one case, in the Bethlehem district of the Orange Free State, was diagnosed during the year.

7. **Respiratory Diseases of Poultry**

Infectious Bronchitis is widespread throughout the Republic. It can have a very significant erosive effect, especially where hygiene and management are not satisfactory or where other stress factors e.g. Chronic Respiratory Disease play a role.

8. **Fowl Pox**

Although reported as widespread only by the Transvaal Region, it is known to occur throughout the country.

9. **Jaagsiekte**

Isolated cases or outbreaks were reported from many parts of the Republic, but it would appear that this disease is very widespread in East Griqualand and the North Eastern Orange Free State.

10. **Virus Pneumonia of Pigs**

This disease was reported as being widespread in Natal, but not of any great significance.

11. **Virus Isolation**

Research workers at Onderstepoort report that a virus, designated as equine encephalosis virus, was isolated from horses that died of a hitherto unknown disease. Characterization of the virus revealed the following: a particle diameter of about 70 millimicron; cytoplasmic replication in baby hamster kidney cells, ribonucleic acid (RNA) as genetic material; stability to the action of lipid solvents; lability below pH 6.0.

This virus could not be identified as a previously described virus and in spite of the structural and biochemical similarity between this agent and the viruses of blue tongue and horse sickness, no serological relationship could be demonstrated between these agents.

(6) **Infertility and Venereal Diseases**

The Reproduction and A.I. Section of the Diagnostic Centre at Onderstepoort examined 39 herds that experienced reproductive disorders in various parts of the country, as well as conducting four A.I. Courses, during which 54 candidates were passed as inseminators.

In addition to investigating herds with breeding problems of an infectious nature, State Veterinarians also examined herds in cases where low fertility problems arose from non-specific causes e.g. functional sterility, bad management, avitaminosis, aphorososis, and incorrect or poor feeding.

1. **Vibriosis**
Only limited surveys to determine the incidence of this disease have been conducted, but it does not appear to be very widespread. A total of 7,957 and 344 specimens were examined at the Regional and Onderstepoort Diagnostic Centres respectively.

The Onderstepoort Institute has indicated that because the bacteriological diagnosis of vibriosis in cattle is the most reliable method, this received a good deal of attention.

Great success has been attained by introducing modifications in the taking, transmission and handling of specimens, so that bulls which repeatedly tested negative in the past, were now found positive.

The innocuous *Vibrio bubulus* is found in 40 – 60% of specimens. In view of the fact that there is no obvious difference between the harmful and harmless vibrios, the isolation of *V. fetus* from a specimen containing also harmless vibrios, is a source of worry.

The fluorescent antibody technique gave no reliable results, and work in this connection is being continued.

2. **Trichomoniasis**

The incidence of this disease is very low, although it has been reported from many parts of the Republic.

3. **Infectious Infertility**

Of the 39 herds examined by the Reproduction Section of the Division, *Infectious Pustular Vulvovaginitis* and *Infectious Bovine Rhinotracheitis* infection was found in no less than 25. As these were problem herds and no large scale surveys have been conducted there is at this stage no indication of the incidence of infection.

The establishment of a tissue culture laboratory at Allerton in Natal will enable a greater number of specimens to be examined than could be handled by Onderstepoort alone. A preliminary indication of the incidence may therefore be available in the not too distant future.

The Research Institute reports that to assess the value of vaccination as a means of preventing losses from Infectious Pustular Vulvovaginitis, twelve heifers were immunised by intramuscular inoculation of live I.P.V. virus. Half of these animals were subsequently inseminated and simultaneously challenged by the instillation of live virus into the vagina. The other half were inseminated only and kept as controls. A further twelve heifers were left unvaccinated and treated likewise.

All animals in the two challenge groups showed typical I.P.V. lesions, but the lesions appeared to be less severe in the vaccinated group, being more anterior in the vagina. None of the challenged animals conceived. The immunization procedure thus proved to be of doubtful value.
In connection with infectious infertility of rams, the Onderstepoort Institute states that the usual cause of infectious epididymitis in rams is *Brucella ovis*. Despite the fact that vaccination with Rev. 1 vaccine is generally effective against this condition occasional cases of epididymitis are still found in vaccinated flocks. For this reason it was particularly interesting to find that some cases of epididymitis are associated with the presence of *Actinobacillus seminis*. After the confirmation of this type of infection for the first time in South Africa a number of cases have now been confirmed in the Kimberley and Middelburg (Cape) areas. It is believed, however, that the infection is widespread and a survey is now being carried out to test blood samples of sheep from different parts of the country for complement fixing antibodies against the organism.

(7) **Diseases of Calves**

1. **White Scours**

   This disease, caused by *Escherichia coli* is the most important decimator in South Africa of calves before weaning, and occurs widespread, especially in dairy herds. In Natal the mortality rate due to Colibacillosis is estimated as varying from 12 to 41% depending on the management of the particular herd.

2. **Paratyphoid**

   Sporadic outbreaks of this disease occurred in all parts of the Republic, where farmers neglected to make use of the very effective preventative vaccine available. It is gratifying to record that more calves than ever were protected by a 37% increase in the number of doses of vaccine issued from Onderstepoort during the year.

3. **Coccidiosis**

   Only small scale sporadic outbreaks were reported during the year.

4. **Calf Diptheria**

   In most areas only sporadic cases occurred, but from Natal it was reported as one of the more important causes of calf mortality.

5. **Sweating Sickness**

   From all the lowveld enzootic areas, with the exception of the Ngotshe district of Natal where the incidence was higher, only isolated cases were reported. A rather distressing fact is that the disease was diagnosed in the Vryburg and southern O.F.S. areas, where it was unknown before.

(8) **Internal Parasites**

In most areas, losses due to internal parasitism did not assume the usual proportions. This was due largely to the dry summer. The increased tempo of extension work on all aspects of parasite control has also borne fruit. From the Eastern Cape e.g. it is reported that many farmers are now resorting to well programmed tactical and strategic dosing against parasites.
Tape worms in young stock, and round worms and liver and conical fluke were the main offenders in most Regions. In Natal liver fluke is becoming a serious problem on nearly all artificial pastures. A serious outbreak of schistosomiasis was also recorded in the Empangeni area. The problem of measles in cattle is also assuming alarming proportions throughout Natal: at the Port Shepstone abattoir condemnations for measles have averaged over 6% for years.

From the Western Cape it is reported that at long last the ostrich stomach worm (Libyostrongylus douglasi) can be controlled. The new remedy Tetramisole is apparently almost 100% effective against this parasite.

In the Kruger National Park Trichinella spiralis was found in the warthog, in addition to the lion, hyena, jackal and mouse previously reported. It was also determined that cattle could not be infected by tape worm segments from lions and hyenas, and that the measles of impala and blue wildebeest were not infective for dogs.

During the year 12,420 faeces samples were examined at the various Diagnostic Centres, in surveys and diagnostic services to farmers. During the same period 24,562 specimens from pig carcasses at various abattoirs were found negative for Trichinella spiralis.

(9) External Parasites

In most parts of the country climatic conditions were not conducive to a flourishing thick life, so that the tick problem did not assume its normal dimensions.

In collaboration with the Tick Investigation Centre at Onderstepoort, State Veterinarians in Natal sent in thousands of ticks for experimental work. Also, as mentioned under Protozoan Diseases, the use of more effective dips in the Bantu areas there, prevented the loss from Red water of an estimated 5,000 head of cattle in the Ixopo area alone.

In the O.F.S. Region the lack of dipping facilities militates against the control of ticks, so that the blue, bontpoot and red tick appear to be on the increase.

No large scale losses were caused by keds, sheep nasal worm, lice, Australian itch, or sheep maggots. Two parasites which did create problems were biting flies on the North Coast of Natal, and sand tampans in the North West Cape.

At Onderstepoort research was continued into tick resistance to dips. More attention was paid to the testing of engorged females rather than tick larvae as in the past. Engorged ticks, mainly blue ticks (Boophilus decoloratus) and brown earticks (Rhipicephalus appendiculatus), large numbers of which could be collected in the field, were subjected in the laboratory to tests with all the existing dips as well as others which have advanced to the testing stage.
Resistance of the brown eartick does not appear to be as generalized and widespread as that of the blue tick.

The latter especially in the Eastern Cape coastal belt, has been found resistant to a whole series of dipping materials including substances it has not previously been in contact with. Only a few materials are still capable of fully controlling the blue tick in this area. The quest for more effective dipping materials is being continued, in collaboration with private enterprise.

The influence of the time lapse after removal of ticks from the animal, on their usefulness in dipping tests was investigated. It would appear that after three days ticks are less susceptible to dipping materials.

In the course of toxicity experiments with salivary gland secretions of the send tampan, it was found that animals not previously exposed to tampan bites had no resistance to intoxication and readily succumbed. At Onderstepoort a young bull of approximately 300 kilogram weight was exposed for one hour daily to a tampan attack in an artificial “Kalahari” infested with all the stages of the parasite. The animal died on the fourth day, shortly after removal from the camp. Although no bites higher than the hooks had occurred, daily blood sampling before and after exposure indicated a 13% to 22% decrease in blood volume during the tampan feeding. This reduction is probably not due to a total decrease, but rather indicates a condition of shock. Post mortem examination indicated that increased permeability of the vascular system was the primary lesion, and that animals then die of heart failure.

On research into genetic control, Onderstepoort reports that in view of successful control of certain mosquito species by the crossing of strains from widely separated areas and the liberation of the progeny which contain lethal genes to breed with the local species and thereby produce sterile progeny, attempts were made at crossing strains of the eyeless tampan, Ornithodoros moubata from human habitations near Onderstepoort with a strain from the warthog burrows near Lake Kariba in Rhodesia.

Simultaneously these two strains were crossed with the eyed tampan Ornithodoros savignyi, from the Kalahari.

Matings were successful in all cases, spermatophores being implanted in all three species.

Eggs were produced in all cases with the exception of O. moubata (males) with O. savignyi (females).

The eggs produced hatched to produce first stage nymphs in all but two cases, namely O. moubata (males) with O. savignyi (females) and O. moubata (females) with O. savignyi (males) where no crossing had occurred.

The results of the above matings are summarized in the following table where it will be noted that although matings occur between all three species, progeny are produced in all but the cross between O. moubata (Kariba, males) and O. savignyi (females).
The investigation is proceeding.

In connection with the midge problem the Onderstepoort Institute reports that research into the biology of Simulium in the Vaalharts area has shown that, notwithstanding total elimination of the midge population by means of insecticides, re-infestation of the Vaal River occurs within 18 days after a rise in the level of the river. It has now been ascertained that this re-infestation takes place as a result of eggs laid during high water periods, and preserved on stones and vegetation outside the low level area covered by eradication programmes. As soon as the water level rises to such an extent that the eggs are moistened, the larvae hatch almost immediately. How long these eggs can withstand desiccation is not yet known. It has also been determined for the first time that *Simulium chutteri* larvae which are found in the irrigation canals, make use of crabs for transportation. This is apparently on account of the low water velocity, so that by attaching themselves to the crabs the larvae can be brought into contact with vegetable matter in the water, which allows them to be filtered out when the crabs scuttle around.

A visit to the Orange River development project to plan surveys to determine potential midge problems that may arise after completion of the Verwoerd Dam, revealed that two species viz. *Simulium chutteri* and *S. grissicolle* are already present in small numbers. The area where they may be expected to increase is the portion of the Orange River between the wall of the Verwoerd Dam and the upper reaches of Van der Kloof Dam, a distance of approximately 20 miles. Further investigation of this area will indicate whether the environment for a dangerous population increase of midges is likely to be created here.

With reference to work on Culicoides, the Research Institute status that light trap catches of *Culicoides* were recorded for the fifth consecutive year at Onderstepoort and for the third year at Kaalplaas. Usually catches build up to a peak in March but this year a relatively low peak of 18,462 per night was recorded in the first half of October and numbers decreased thereafter with fluctuations around 4,000. The large catches early in the season can probably be attributed to mass over wintering in the larval stage since last season had
record catches right up to the first frosts. Even in the winter *Culicoides* were taken on some nights a catch of 14,090 being recorded on 27 June 1967.

The large catches early in the season were accumulated and hatches containing between 36,000 and 174,000 *Culicoides* were emulsified and injected into sheep to determine the earliest date bluetongue virus can be isolated from *Culicoides*. The first case of bluetongue came from a batch of 153,682 *Culicoides* collected between 28 September 1967 and 11 October 1967 and the second case at the end of October. Five cattle at Kaalplaas were bled at weekly intervals and bluetongue isolated for the first time on 1 November 1967. In previous years bluetongue isolations could only be made from *Culicoides* in December. These results suggest that the virus may always be present in a small percentage of *Culicoides* from the beginning of summer but that vast numbers of *Culicoides* must be collected before this can be shown.

In connection with *Culicoides*, Onderstepoort further reports that in collaboration with the Arbovirus Research Unit of the S.A.I.M.R., *Culicoides* blood-meals were identified by precipitin tests for the third consecutive year. A total of 121 *Culicoides* were tested, 70 of which were positive. *C. distinctipennis* again fed exclusively on birds and cattle, *C. milnei* on horses, cattle and birds, *C. engubandei* on horses and cattle, and *C. gulbenhiani* on horses.

This is the first record of *C. milnei* feeding on birds.

The Onderstepoort Institute also reports that six living blood-sucking larvae of *Auchmeromyia lutcola* received from a medical practitioner in Zululand have been successfully reared and a laboratory colony established. The various stages of the larvae feed satisfactorily on humans and on the ears of rabbits.

Attempts at assessing the capacity of these larvae to transmit certain protozoan parasites e.g. *Besnoitia besnoiti* have so far been unsuccessful.

Word is in progress to use the larvae for the testing of repellents in view of the case of handling those insects as well as for investigations on the factors governing their attraction to both man and animals.

(4) **Other Veterinary Researches**

1. **Basic Research**

   (1) **Reproductive function in normal and aborting Angora Goats**

   Breeding records for the Onderstepoort flock have been finally analyzed to assess the problem more accurately.

   Anoestrus is remarkably absent and the conception rate for normal and aborter ewes is 91 and 81 per cent respectively. Of 245 gestations studied, a viable kid was not produced in 41.2%. Death within 3 days of birth accounted for 8.6%, 3.7% were stillbirths and 29% of the gestations ended in abortion.

   In those does studied for 5 consecutive breeding seasons, the incidence of barrenness from 20 to 7%. The number of does kidding normally decreased
from 66 to 21%, and the rate of abortion increased from 13 to 71%. Abortion is not the rule in “aborter” does, when they do kid normally the kids are heavier and the gestation significantly longer. There is no difference in the sex ratio of aborted foetuses and normal kids.

Further work has confirmed that the mohair fibre diameter is less in aborter than normal ewes. Aborters also tend to produce less mohair. Notable exceptions are the does aborting before two months gestation; they produce much more mohair than normal does. The majority of hormonal glands (anterior and posterior pituitary, thyroid, adrenals) of aborters are heavier than normal, indicating an inherent overactivity rather than weakness in the system. The rate of abortion also increases linearly with body-weight. The majority of foetuses are aborted between 100-110 days gestation, which is soon after they should have commenced rapid growth. They are considerably retarded in growth and the increased size of the adrenals has been reported. Mineral analyses done on the livers of aborted foetuses indicate excessive activity of the adrenal gland. Blood samples taken from foetuses before they were expected to be aborted have proved the existence of severe anaemia. The placenta also tends to be smaller in such animals.

Urinary oestrogenic hormones have been analyzed in order to study placental function prior to abortion. The results show that hormone formation is either excessive, or inhibited virtually completely. Such a finding is consistent with the action of adrenal hormones, small doses of which stimulate and large amounts inhibit tissue activity.

The above observations all confirm the original theories that this problem arose by excessive selection of adrenal hormone-induced production characteristics.

(2) Foetal endocrine factors influencing gestation period

Two serious breeding problems, namely abortion in Angora goats and “grootlamsiekte” in Karakul ewes are being studied; both involve disturbances of gestation duration. These investigations have been hampered by a lack of knowledge of the mechanism determining the normal gestational period for a particular species; the cause of birth is not known. However work on the above-mentioned problems indicate that some glands in the unborn foetus are affected, and these experiments were initiated to clarify their role.

Assays of blood taken from the foetal circulation at various stage of pregnancy showed that the principal hormone from these adrenal glands rises markedly towards the end of pregnancy. At the same time, the levels in the ewe’s blood decreases.

In sheep, total removal of the foetuses’ adrenal glands results in indefinite prolongation of pregnancy, until death from foetal oversize. This effect is not seen if the operation is performed after the foetuses hormonal system has matured, making it viable (about 12 days before term).

Conversely, if excess adrenal hormone is injected into the foetus, premature birth is precipitated. The use of synthetic hormonal derivatives indicates that this action is due to the “gluco corticoid” action of these hormones, and we believe it is essentially a “maturing” effect on the placenta.
In sheep, the placenta maintains pregnancy by producing the necessary hormones. However, in goats this function is performed by the doe’s ovary, and to test the idea that birth in sheep may be due to an hormonal interplay between the foetal glands and placenta, these experiments are being repeated in goats. Thus far it has not been possible to prolong pregnancy by removing the foetal glands, as in sheep, but goat pregnancies are more sensitive to adrenal hormones which terminate the pregnancy readily when injected into the foetus.

The data from these experiments are the first which will make possible more than an empirical investigation into problems of disturbed gestation length.

(3) **Reaction of the adrenal cortex of the bovine to surgical interference**

To assess the influence of surgical interference, it is essential to know what influence narcosis exerts on the animal. To determine this, cattle were placed under pure Fluothane anaesthesia for an hour. The changes in the blood picture were investigated. The blood sugar, electrolytes and cortisol were also determined. Various changes in respect of the above factors were noted after Fluothane narcosis. Evaluation of the changes await only the results of a few tests already completed. The project will be extended to determine the effects of surgical and other trauma on the adrenal cortex.

(4) **The clinical pathology of Geeldikkop and Enzootic Icterus**

The object of this project has been to investigate the cause of these two diseases, study how the symptoms arise and from this work out lines of treatment and control. Excellent progress has been made culminating in a further twelve scientific publications and one monograph in which the biochemistry of the two conditions is fully described. The two conditions are undoubtedly related and it has been established beyond doubt that a low grade selenium intoxication is basically responsible for the two diseases. Selenium analyses have been done using the nuclear reactor at Pelindaba and the distribution of selenium in the bodies of affected sheep has been studied using radioactive selenium isotopes.

The intoxication is due to the presence of excessive amounts of selenium in certain undesirable encroaching plants in the natural grazing. The element accumulates in the liver and kidneys of affected sheep. Other factors must also be reckoned with. The sudden violent attacks of either condition can be brought on by circumstances which place stress on affected sheep. These include sudden changes in the grazing due to climatic conditions, the appearance of diseases like pulpy kidney and bluetongue amongst a flock and movement of animals over long distances on foot or in confined transport space. The outward manifestations of disease are subsequent to disturbances within the bodies of affected sheep, such as disturbances in the handling of pigments derived from chlorophyll or the pigments of bile, disturbances in the storage of copper and iron and a shortening of the life span of the cells of many body tissues notably red blood cells, liver and kidneys. The underlying selenium intoxication is cumulative, i.e. the animals build up dangerous levels of selenium in their bodies over a number of years, and apparently only rid themselves of this poisonous burden very slowly indeed, if removed from the affected areas.
The role of copper in the cause of the two diseases has received much attention. It has now been established by using radioactive copper that copper can be discounted as a possible causative agent.

Work on the two diseases is now nearing completion and is being concentrated on certain selected aspects which require investigation before definite specific methods of treatment and control can be formulated.

(5) **Properties of the Bluetongue virus**

Further research to determine the properties of the virus and its influence on the infected cell has produced interesting results. With the aid of electron microscopy it could be ascertained without any doubt that the virus does not belong to any of the known virus families. A study of the nucleic acid of the virus did however indicate a relationship with a type of virus occurring in humans without producing a specific disease. A new classification to include these groups as well as horse sickness and a few other viruses is being proposed by Onderstepoort. Study of the influence of the virus on the host cell has advanced considerably. It is hoped that this work will contribute considerably to a better understanding and control of viral diseases.

2. **Miscellaneous Research and Projects**

(1) In the Port Elizabeth area a project on ill-thrift of sheep was registered. *Eperythrozoon ovis* has already been incriminated as exerting a deleterious influence on the general health of sheep in this area.

(2) Preliminary work was done at Middelburg (Cape) on the mortality of lambs from service to weaning, and on field studies on infectious infertility of sheep and goats, as well as a survey on the incidence of *Actinobacillus seminis* in sheep. At the same time work was continued on various aspects of the epizootiology, symptomatology, chemical pathology and treatment of both Geeldikkop and Enzootic Icterus.

(3) The lack of sufficient plant material adversely affected the progress of work at Kimberley on the Vermeersiekte problem.

(4) At Upington a trial was initiated to assess the value of injections of pregnant mare serum in increasing the lambing percentage of Karakul ewes.

3. **Research on Diseases of Game**

In the Kruger National Park studies were undertaken on the biology of reproduction of buffalo. A total of 40 animals were marked for the collection of data for the compilation of a schedule of sexual activities.

Data on the productivity of the blue wildebeest was collected by observations on 300 animals, and is in the process of collation.

The persistence of tubal ova in the zebra mare is being investigated.
In the *Trichinella spiralis* survey, 122 specimens from owls, lions, jackals, warthogs, monkeys, blue wildebeest, impala, hyenas and mice were examined. Infection was found in the warthog and hyena.

The presence of the internal parasite *Delafondia vulgaris* in the zebra was confirmed, while parasites of the family Pentastomidae were found in the respiratory organs of the lion and blue wildebeest.

At the Diagnostic Centre, Skukuza, 2,165 post mortem examinations were conducted on wild animals, and 2,441 specimens examined.

A total of 41 live animals were tested for Brucellosis; of these 5 out of 28 buffalo proved positive.

Of 103 animals immobilised, 34 were marked and 10 transported to other areas. The Research Institute reports that investigations in Europe have established that the red water parasite, *Babesia divergens* has a wide host range which includes cattle, deer, rhesus monkeys, chimpanzee and man. These observations prompted investigations to determine whether or not any of the antelopes in the Umfolozi Game Reserve (Natal) can serve as hosts of a *Babesia* sp. Transmissible to sheep. Fresh blood samples, obtained from impalas and blue wildebeests, were injected into several splenectomized sheep. They all failed to react to babesiosis but contracted mild spirochaetosis (*Borrelia theileri* infection).

Also that sporadic outbreaks of *Babesia trautmanni* have been encountered in the Piet Retief and Soutpansberg districts, Transvaal. Although it was suspected that warthogs may serve as reservoirs, it was only recently that it was determined by means of biological tests on domestic pigs that at least some of the warthogs in the Umfolozi Game Reserve harbour the infectious agents.

According to a report by Onderstepoort, the breeding of elands for meat production has been encouraged during recent years in South Africa. Although these animals are well adapted to African conditions, it has been determined that they may succumb to tick-borne protozoan disease, cytauxzoönosis, not only within the brown tick infested regions of Tanzania and Kenya, but also to a very limited extent in the Loskop Dam and Fyfies Game Reserves in Transvaal. The isolation of a strain of *Cytauxzoon taurotragi* from several elands of the former reserve has made it possible to infect several batches of brown ticks for studies during the ensuing years. This will involve determining the pathogenicity of the protozoan parasite for the eland and others antelopes.

### 4. Blood Group Studies

The Research Institute reports as follows:

**Cattle:** All routine blood typing in cattle has been taken over by the laboratory at Irene but work on the production of reagents and the international comparison of these reagents has continued at Onderstepoort.

A thorough study of the blood groups of Afrikaner cattle has been made, as a basis for further genetic studies and an investigation into the origin of the breed.
Several interesting differences between the blood groups of the Afrikaner and those of the European breeds were found, including the discovery of a new allele in one of the blood group systems.

The relationship between blood factors and milk production was investigated in Friesland, Ayrshire and Jersey cows, and between blood factors and weaning weight in Afrikaner cattle. In both cases several positive correlations were found which stimulate further investigations.

Horses: Work has been started on the production of reagents for performing blood grouping tests on horses. The main purpose of these tests will be to help solve the problem of haemolytic icterus in newborn foals. Several reagents have already been produced and have recently been compared with those of other countries to ensure that they are correct.

A study has been made of various protein fractions in the serum of Basuto ponies. 101 blood samples were tested, and the results gave a strong indication that the Basuto pony can be regarded as an individual breed that has descended mainly from Arab and thoroughbred crosses.

Sheep: Sheep having the A hemoglobin type were found to develop an abnormal type of hemoglobin, namely C, when suffering from geeldikkop. Sheep with hemoglobin type B do not develop this abnormal type. The C hemoglobin was found in sheep 4 months after the acute phase of the disease, and then disappeared gradually over a further period of 3 months. It seems as if the development of this type C in sheep normally having hemoglobin. A may be some form of protective device enabling them to withstand the disease better than sheep of type B.

Pigs: The degree of homozygosity in a herd of Landrace pigs which was regarded as being highly inbred was compared with the degree of homozygosity in a random sample of Landrace pigs by using different inherited serum types. It was found that there was extremely little difference between the “inbred” herd and the random sample. This indicates that the degree of inbreeding in the whole breed is high and that as long as inbreeding is coupled with strict selection and as far as possible the mating of closely related animals is avoided the degree of homozygosity will not easily be further increased.

Vaccine Production

Onderstepoort states that, as indicated in the table below the demand for vaccine again increased considerably. From nearly 92 million doses of 26 vaccines in the previous year, issues rose to more than 108 million doses in the current year, which represents an increase of 18%. This increase is due entirely to the phenomenal demand for more than 19 million doses of Newcastle Disease vaccine used during the year to control the outbreak in poultry in the Western Cape. If Newcastle disease vaccine is left out of account, the total issues of the other vaccines amounted to roughly 89 million, which represents an actual decrease of 1.0%.

Apart from the expected fluctuations in the use of most vaccines, the demand for vaccine against the pus forming organisms Corynebacterium ovis and C.
pyogenes – the latest additions to the list of vaccines – steadily increased. The demand for blackquarter, lamb dysentery, calf paratyphoid and especially lumpy skin disease vaccine also rose considerably.

The reason for the increase in use of distemper vaccine for mink was the introduction of a much more realistic price for this vaccine for use in this growing industry.

There was, on the other hand, a noticeable decrease in the use of some vaccines, especially anthrax, swolled head of rams, bluetongue and horse sickness. There was also a considerable decrease in the demand for diagnostic antigens.

<table>
<thead>
<tr>
<th>BACTERIAL VACCINES</th>
<th>1965/66</th>
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<td>-</td>
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<tr>
<td>Anthrax</td>
<td>10,585,448</td>
<td>10,212,500</td>
<td>8,744,550</td>
</tr>
<tr>
<td>Blackquarter</td>
<td>2,793,552</td>
<td>2,862,262</td>
<td>3,854,600</td>
</tr>
<tr>
<td>Swolled Head of Rams</td>
<td>15,150</td>
<td>5,050</td>
<td>2,350</td>
</tr>
<tr>
<td>Brucella (Bovine)</td>
<td>424,522</td>
<td>544,798</td>
<td>707,784</td>
</tr>
<tr>
<td>Brucella (Ovine)</td>
<td>371,010</td>
<td>338,234</td>
<td>351,190</td>
</tr>
<tr>
<td>Fowl Typhoid</td>
<td>1,566,800</td>
<td>1,460,200</td>
<td>1,389,000</td>
</tr>
<tr>
<td>Calf Paratyphoid</td>
<td>295,932</td>
<td>310,830</td>
<td>426,662</td>
</tr>
<tr>
<td>Tetanus</td>
<td>12,735</td>
<td>51,515</td>
<td>58,760</td>
</tr>
<tr>
<td>Corynebacterium pyogenes</td>
<td>16,500</td>
<td>131,440</td>
<td>188,540</td>
</tr>
<tr>
<td>Corynebacterium ovis</td>
<td>123,780</td>
<td>212,860</td>
<td>377,210</td>
</tr>
<tr>
<td>Pasteurella</td>
<td>62,580</td>
<td>537,000</td>
<td>446,520</td>
</tr>
<tr>
<td><strong>14 Vaccines</strong></td>
<td><strong>55,117,189</strong></td>
<td><strong>57,707,229</strong></td>
<td><strong>59,398,151</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VIRUS VACCINES</th>
<th>1965/66</th>
<th>1966/67</th>
<th>1967/68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluetongue</td>
<td>22,523,200</td>
<td>25,253,450</td>
<td>21,185,200</td>
</tr>
<tr>
<td>Fowl Pox</td>
<td>5,269,600</td>
<td>5,400,700</td>
<td>5,832,500</td>
</tr>
<tr>
<td>Pigeon Pox</td>
<td>-</td>
<td>-</td>
<td>522,980</td>
</tr>
<tr>
<td>Rabies</td>
<td>326,175</td>
<td>218,743</td>
<td>215,469</td>
</tr>
<tr>
<td>Lumpy Skin Disease</td>
<td>535,010</td>
<td>663,048</td>
<td>1,241,579</td>
</tr>
<tr>
<td>Horse sickness</td>
<td>98,448</td>
<td>180,370</td>
<td>120,817</td>
</tr>
<tr>
<td>Distemper</td>
<td>15,241</td>
<td>15,221</td>
<td>15,053</td>
</tr>
<tr>
<td>Distemper (Mink)</td>
<td>-</td>
<td>390</td>
<td>2,990</td>
</tr>
<tr>
<td>Newcastle Disease</td>
<td>320,400</td>
<td>1,765,200</td>
<td>19,531,970</td>
</tr>
<tr>
<td>Rift Valley/Wesselsbron</td>
<td>12,500</td>
<td>23,400</td>
<td>16,950</td>
</tr>
<tr>
<td><strong>9 Vaccines</strong></td>
<td><strong>29,100,574</strong></td>
<td><strong>33,769,222</strong></td>
<td><strong>48,685,508</strong></td>
</tr>
</tbody>
</table>
### OTHER VACCINES

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>1965/66</th>
<th>1966/67</th>
<th>1967/68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heartwaterblood</td>
<td>43,216</td>
<td>40,523</td>
<td>49,612</td>
</tr>
<tr>
<td>Anaplasmosis</td>
<td>246,166</td>
<td>338,786</td>
<td>413,626</td>
</tr>
<tr>
<td>Redwater</td>
<td>49,735</td>
<td>50,676</td>
<td>47,108</td>
</tr>
<tr>
<td><strong>3 Vaccines</strong></td>
<td><strong>339,117</strong></td>
<td><strong>429,985</strong></td>
<td><strong>510,346</strong></td>
</tr>
</tbody>
</table>

### GRAND TOTAL

<table>
<thead>
<tr>
<th>26 VACCINES</th>
<th>1965/66</th>
<th>1966/67</th>
<th>1967/68</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>84,556,880</td>
<td>91,906,436</td>
<td>108,594,005</td>
</tr>
</tbody>
</table>

In addition to the above vaccines issued by the Research Institute, the diagnostic aids listed below were also prepared and/or issued.

<table>
<thead>
<tr>
<th>NUMBER OF UNITS</th>
<th>NUMBER OF UNITS</th>
<th>PERCENTAGE INCREASE/DECREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(26)</td>
<td>(26)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NUMBER OF UNITS</th>
<th>1966/67</th>
<th>1967/68</th>
<th>PERCENTAGE INCREASE/DECREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.W.D. Antigen</td>
<td>42,265</td>
<td>42,475</td>
<td>0.5% +</td>
</tr>
<tr>
<td>Brucella Ring Test Antigen</td>
<td>1,371</td>
<td>774</td>
<td>43% -</td>
</tr>
<tr>
<td>Mallein</td>
<td>95</td>
<td>170</td>
<td>79% +</td>
</tr>
<tr>
<td>Tuberculin (Bovine)</td>
<td>236,810</td>
<td>194,216</td>
<td>18% -</td>
</tr>
<tr>
<td>Tuberculin (Avian)</td>
<td>68,630</td>
<td>57,140</td>
<td>17% -</td>
</tr>
</tbody>
</table>

**Vaccines produced by Regional Diagnostic Centres**

- Anaplasmosis 47,719 doses
- Redwater 12,947 doses
- Heartwater 13,318 doses
- Wart vaccine 17,094 ml.
- Vuilbek vaccine 1,585 ml.

In addition 19,600 ml off Leptospirosis antigen was prepared by the Diagnostic Centre at Stellenbosch.

(6) **Other Veterinary Services**

1. **Diagnostic Services**

By assuming responsibility for the greater share of routine diagnostic services, the Regional Diagnostic Centres have relieved the Research Institute of a heavy load of routine work, thus enabling the Institute to devote more time to basic research, and diagnostic work requiring more specialised techniques and facilities.

In addition to routine diagnostic work the Regional Diagnostic Centres play an important role in the essential furtherance of animal health by means of disease
surveys, veterinary extension work, the implementation of disease eradication schemes and co-operation with the Research Institute in the execution of research projects.

During the year the Central Diagnostic Centre on the premises of the Onderstepoort Institute greatly expanded its activities. Several new sections were created.

At stations other than diagnostic Centres a great deal of diagnostic work was done by State Veterinarians. Not only were disease problems and mortalities investigated and post mortems conducted, but a great number of specimens for analysis were dispatched to the Regional and Central Diagnostic Centres.

During the year the following post mortem examinations were carried out by State Veterinarians of the Division of Veterinary Services:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>729</td>
</tr>
<tr>
<td>Sheep</td>
<td>1,749</td>
</tr>
<tr>
<td>Goats</td>
<td>57</td>
</tr>
<tr>
<td>Equines</td>
<td>14</td>
</tr>
<tr>
<td>Pigs</td>
<td>212</td>
</tr>
<tr>
<td>Dogs</td>
<td>31</td>
</tr>
<tr>
<td>Cats</td>
<td>13</td>
</tr>
<tr>
<td>Poultry</td>
<td>27,484</td>
</tr>
<tr>
<td>Other animals</td>
<td>2,359</td>
</tr>
</tbody>
</table>

(1) At **Regional Diagnostic Centres** the following specimens were examined:

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucella agglutination tests</td>
<td>44,274</td>
</tr>
<tr>
<td>Brucella milkring tests</td>
<td>1,490</td>
</tr>
<tr>
<td>Vibriosis</td>
<td>6,051</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>52,334</td>
</tr>
<tr>
<td>Antibiograms</td>
<td>469</td>
</tr>
<tr>
<td>Scrapings</td>
<td>248</td>
</tr>
<tr>
<td>Faeces examinations</td>
<td>12,420</td>
</tr>
<tr>
<td>Mastitis</td>
<td>1,316</td>
</tr>
<tr>
<td>Semen</td>
<td>3,246</td>
</tr>
<tr>
<td>Haematological</td>
<td>148</td>
</tr>
<tr>
<td>Chemical</td>
<td>7,932</td>
</tr>
<tr>
<td>Poisons</td>
<td>547</td>
</tr>
<tr>
<td>Bacteriological</td>
<td>12,238</td>
</tr>
</tbody>
</table>
Virological 5,269
Biological 163
Trichinella examinations 24,562
Smear examinations 11,814

TOTAL 184,548

(2) The Central Diagnostic centre examined the following specimens:

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriological</td>
<td>5,024</td>
</tr>
<tr>
<td>Virological</td>
<td>1,286</td>
</tr>
<tr>
<td>Poultry</td>
<td>65,737</td>
</tr>
<tr>
<td>Pregnant Mare tests</td>
<td>649</td>
</tr>
<tr>
<td>IPV/IBR</td>
<td>565</td>
</tr>
<tr>
<td>Bone meal</td>
<td>239</td>
</tr>
</tbody>
</table>

(3) At the Research Institute 5,225 Bacteriological specimens were received.

2. Surveys

The surveys in respect of pre- and postnatal mortality of lambs and the examination of pork carcasses for trichinosis, was mentioned earlier. As an all-inclusive list can serve no purpose, only a few of the more important surveys and registered projects which include surveys, will be mentioned here.

In collaboration with Ondersteoort a survey to determine the distribution and incidence of *Aetinobacillus seminis* infection in sheep was commenced in the Highveld, Eastern Cape, Natal, O.F.S. and North West Cape areas.

The extent and exact nature of the deleterious effects of harmful drinking waters of the North West Cape was investigated further in collaboration with the Research Institute.

Surveys to determine the incidences and possible spread of the heartwater and bont tick in the Mafeking area and Eastern Cape respectively, were started during the year.

In the latter area the incidence of fresh water snails was also investigated while in the Eastern Transvaal a study of Schistosomiasis was interrupted by the Foot and Mouth outbreak in those parts.

In Natal an investigation into calf mortality has been launched.

In the Kruger National Park a large number of surveys in connection with wild life have been instituted, and many projects registered thereanent.
3. **Clinical Services**

When not prevented from doing so by their normal duties, State Veterinarians provided essential clinical services to stock owners in all areas where there are no private veterinary practitioners available.

During the year a total amount of R42,028.00 was collected by State Veterinary Offices, of which R24,002.09 was for professional services, R4,298.99 for mileage fees and R13,727.02 for vaccines sold.

As in the past, veterinary services were provided for all State herds and flocks.

4. **Artificial Insemination Services**

Certificates of approval are a prerequisite for the registration of new bulls intended for artificial insemination, and for the annual re-registration of bulls already standing at the various A.I. Co-operatives and breeders.

For these certificates the A.I. Section of the Division conducted examination for tuberculosis, brucellosis, leptospirosis, vibriosis, trichomoniasis and I.P.V./I.B.R. on 66 bulls, of which 3 proved positive for vibriosis and 15 for I.P.V./I.B.R.

At Onderstepoort four training courses in A.I. were given during the year. Of the 55 students attending, 54 were successful in qualifying as inseminators.

At Cedare two short courses for farmers in the insemination of cattle were held and one at Ixopo. At Potchefstroom 13 cattle and 6 sheep courses, attended by 178 farmers, were presented.

At the latter centre it was found necessary to extend the duration of the course from one week to 10 days.
(7) Health Schemes

1. Bacillary White Diarrhoea

Summarised details of tests are tabulated below:

<table>
<thead>
<tr>
<th>REGION</th>
<th>FARMS</th>
<th>TESTS</th>
<th>CERTIFICATES</th>
<th>NUMBER OF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>FOWLS</td>
<td></td>
<td>HOLDERS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NEG.</td>
<td>POS.</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>9</td>
<td>18,618</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>2</td>
<td>2,867</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Highveld</td>
<td>34</td>
<td>110,428</td>
<td>1</td>
<td>85</td>
</tr>
<tr>
<td>Natal</td>
<td>32</td>
<td>241,274</td>
<td>-</td>
<td>55</td>
</tr>
<tr>
<td>O.F.S.</td>
<td>5</td>
<td>7,913</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transvaal</td>
<td>78</td>
<td>371,498</td>
<td>262</td>
<td>51</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>1</td>
<td>11,064</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>161</td>
<td>763,652</td>
<td>298</td>
<td>191</td>
</tr>
</tbody>
</table>

The decline of 39 in the number of certificate holders compared to that of the previous year, is due almost entirely to the Newcastle Disease outbreak in the Western Cape, where only on test for certification could be carried out.

2. P.P.L.O. Scheme

Details of the tests carried out are summarised below:

<table>
<thead>
<tr>
<th>REGION</th>
<th>CERTIFICATE HOLDER</th>
<th>FOWLS</th>
<th>OTHER FOWLS TESTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>3</td>
<td>26,900</td>
<td>899</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Highveld</td>
<td>5</td>
<td>223,400</td>
<td>-</td>
</tr>
<tr>
<td>Natal</td>
<td>11</td>
<td>53,433</td>
<td>74,541</td>
</tr>
<tr>
<td>O.F.S.</td>
<td>1</td>
<td>1,954</td>
<td>-</td>
</tr>
<tr>
<td>Transvaal</td>
<td>31</td>
<td>51,544</td>
<td>-</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>-</td>
<td>-</td>
<td>30,955</td>
</tr>
<tr>
<td>TOTAL</td>
<td>51</td>
<td>357,231</td>
<td>106,395</td>
</tr>
</tbody>
</table>

The rather sharp decrease in the number of certified flocks is again due largely to the Newcastle Disease in the Western Cape. Also important is that many of the certificate holders who owned small poultry holdings in Natal closed down during the year. As can be concluded from the large number of other birds
tested in this Region, many owners are desirous of certification, but have not attained complete freedom from P.P.L.O.

3. **Pig Recording and Health Scheme**

No progress was made with this scheme, which now has 31 participants with 8,726 pigs.

(8) **Meat Inspection**

Meat and meat products intended for export were inspected at the Johannesburg abattoir, and the bacon factories at Heidelberg, Estcourt and Durbanville.

In the Kruger national Park 53,694 lb of blue wildebeest and 9,561 lb of impala meat were inspected prior to being sold for human consumption.

The Research Institute reports that it is anticipated that the study of the bacteriological, parasitological, chemical and aesthetic aspects of biltong will be completed during 1969.

The nature of a strain of *Staphylococcus aurous* which had caused food poisoning was investigated. It appears to have the ability to survive on artificially infected biltong.

The determination of the most probable number of faecal streptococci to indicate faecal contamination of biltong, appears promising.

Techniques for the determination of nitrate and nitrite values for biltong, have been standardised and standard graphs compiled, so that routine analyses can now be carried out.

Onderstepoort further states that at the request of the S.A. Agricultural Union the transportation of sheep by rail was investigated. Karoo sheep were found to be basically unsuitable for trials, as a result of inherent selenosis, susceptibility to jaundice, and problems in adaptation to foreign feeds. Most sheep originate from the Karoo however, so trials were undertaken.

Even after 5 days uninterrupted travel no signs of exhaustion of muscle glycogen reserves could be ascertained by pH determinations. Urine examination, however, indicated that after only 2 days the majority of adult Merinos showed signs of abnormal metabolism and incipient subclinical “domsiekte”. After 2 days uninterrupted travel the pH was significantly lower than that of the controls. After 24 hours rest, feed and water before slaughter, most sheep regained normality, except that after 5 days uninterrupted travel the ability to recover was noticeably weakened. Carcass weights also showed that after 3 days uninterrupted travel the returns were very significantly lower than that of the controls, while after 2 days travel the loss was not significant.

Trials were also conducted with newly weaned Dorper fat lambs from the Karoo. They are particularly susceptible because of their good condition and the adaptation to be made to foreign feeds. During a 4 day uninterrupted journey lambs suffered an 18.6% loss in live weight, of which only 1/3 could be regained after 24 – 48 hours rest in pens with water and feed. Sixteen serious cases of
“domsiekte” occurred within 6 – 8 hours after arrival at the abattoir. All livers were condemned as a result of fatty degeneration. Nearly all lambs suffered from abnormal metabolism after the journey.

In a trial for determining the adaptation of Karoo sheep (adult Merinos) to a lucerne-maize diet, serious digestive disturbances and a fair number of cases of jaundice occurred, and up to 11.8% loss in live weight was experienced.

It is clear that a case can be well substantiated for the erection in the Karoo of slaughter facilities for sheep, to obviate long distance transport to large city abattoirs. At this stage a change in the present railway regulations re transport of sheep cannot be recommended.

For registration under the Fertilizers, Farm Feeds, Seeds and Remedies Act (Act 36/1947), 82 sterilizing plants, producing mainly bone, carcass and fish meal, were inspected and approved.

(9) STOCK INSPECTION SERVICES

The control and eradication campaigns against Newcastle and Foot and Mouth Disease and Sheep Scab necessitated the seconding of so many members of the inspectorate staff to special duties in the affected areas that only a skeleton staff was left to carry out normal duties in other areas.

That the Division was able to conduct campaigns against three serious outbreaks of epizootic diseases, while at the same time maintaining precautionary short interval inspections in the areas on the borders of the Republic, as well as keeping up essential services in the rest of the country, underlines the value and quality of the services rendered by this devoted body of men.

The success attained by the campaigns, together with the fact that the remaining skeleton staff coped successfully with all other eventualities, is most decidedly worthy of mention. It re-emphasises the absolute indispensability of the inspectorate organisation of the Division to the Division’s aim to protect the stock industry of the Republic.

(10) ANIMAL HEALTH EXTENSION SERVICE

In view of its importance, extension work increased considerably during the year. Lectures were given, very often in collaboration with other Divisions of the Department, to farmers’groups on a wide variety of subjects; study groups were organised or meetings of such groups attended; film shows were presented, while the less spectacular but very effective conversion of individual farmers in private talks to better methods of stock farming, was continued.

(11) IMPORT AND EXPORT CONTROL

1. Import

Control of the importation of animals, products and “things” that could introduce dangerous animal diseases to the Republic, remains one of the most important functions of the Division of Veterinary Services.
All animals imported are subject to prescribed safety and quarantine conditions.

During the year the following were introduced for slaughter from south West Africa, Lesotho and Swaziland:

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>244,618</td>
</tr>
<tr>
<td>Small stock</td>
<td>158,241</td>
</tr>
</tbody>
</table>

The following animals were imported for farming and other commercial purposes:

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>25,278</td>
</tr>
<tr>
<td>Sheep</td>
<td>65,298</td>
</tr>
<tr>
<td>Goats</td>
<td>23,701</td>
</tr>
<tr>
<td>Pigs</td>
<td>127</td>
</tr>
<tr>
<td>Equines</td>
<td>995</td>
</tr>
<tr>
<td>Dogs</td>
<td>685</td>
</tr>
<tr>
<td>Cats</td>
<td>253</td>
</tr>
<tr>
<td>Birds</td>
<td>141,459</td>
</tr>
<tr>
<td>Monkeys and Baboons</td>
<td>16</td>
</tr>
<tr>
<td>Chinchillas</td>
<td>13</td>
</tr>
<tr>
<td>Wild animals</td>
<td>325</td>
</tr>
<tr>
<td>Tropical fish</td>
<td>539,711</td>
</tr>
<tr>
<td>Snakes</td>
<td>26</td>
</tr>
<tr>
<td>Elephants</td>
<td>2</td>
</tr>
<tr>
<td>Rats</td>
<td>40</td>
</tr>
<tr>
<td>Mink</td>
<td>1,687</td>
</tr>
</tbody>
</table>
An indication of the variety and amounts of products imported is given in the following list.

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biltong</td>
<td>865 Lb</td>
</tr>
<tr>
<td>Frozen meat</td>
<td>14,796,495 Lb</td>
</tr>
<tr>
<td>Bacon sides</td>
<td>599,918 Lb</td>
</tr>
<tr>
<td>Sausage casings</td>
<td>577,767 Lb</td>
</tr>
<tr>
<td>Cream</td>
<td>95,235 Gall</td>
</tr>
<tr>
<td>Butter</td>
<td>141,100 Lb</td>
</tr>
<tr>
<td>Hides &amp; Skins</td>
<td>5,658,223 Lb</td>
</tr>
<tr>
<td>Wet salted hides</td>
<td>66,890 Units</td>
</tr>
<tr>
<td>Karakul pelts</td>
<td>1,200 Units</td>
</tr>
<tr>
<td>Bonemeal</td>
<td>4,272,500 Lb</td>
</tr>
<tr>
<td>Bloodmeal</td>
<td>140,500 Lb</td>
</tr>
<tr>
<td>Carcass meal</td>
<td>890,00 Lb</td>
</tr>
<tr>
<td>Bones</td>
<td>80,000 Lb</td>
</tr>
<tr>
<td>Bristles</td>
<td>910,971 Lb</td>
</tr>
<tr>
<td>Wool</td>
<td>4,780,200 Lb</td>
</tr>
<tr>
<td>Eggs</td>
<td>315 Units</td>
</tr>
<tr>
<td>Tallow</td>
<td>559,728 Lb</td>
</tr>
<tr>
<td>Casein</td>
<td>51,150 Lb</td>
</tr>
<tr>
<td>Pancreatic glands</td>
<td>88,515 Lb</td>
</tr>
<tr>
<td>Semen</td>
<td>721 Ampoules</td>
</tr>
<tr>
<td>Fish eggs</td>
<td>265,000 Units</td>
</tr>
<tr>
<td>Feathers</td>
<td>9,051 Lb</td>
</tr>
<tr>
<td>Ox gall</td>
<td>41,000 Lb</td>
</tr>
<tr>
<td>Beeswax</td>
<td>509 Lb</td>
</tr>
<tr>
<td>Animal trophies</td>
<td>148 Units</td>
</tr>
<tr>
<td>Mineral stock feed</td>
<td>40 Drums</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>142,047,402 Lb</td>
</tr>
<tr>
<td>Second hand bags</td>
<td>69,690 Units</td>
</tr>
</tbody>
</table>

2. **Export**
For export purposes, veterinary examination and certification in accordance with the requirements of importing countries were undertaken in respect of the following animals:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>6,514</td>
</tr>
<tr>
<td>Sheep</td>
<td>12,055</td>
</tr>
<tr>
<td>Goats</td>
<td>687</td>
</tr>
<tr>
<td>Pigs</td>
<td>4,548</td>
</tr>
<tr>
<td>Equines</td>
<td>737</td>
</tr>
<tr>
<td>Dogs</td>
<td>1,224</td>
</tr>
<tr>
<td>Cats</td>
<td>169</td>
</tr>
<tr>
<td>Poultry</td>
<td>613,893</td>
</tr>
<tr>
<td>Birds</td>
<td>3,014</td>
</tr>
<tr>
<td>Chinchillas</td>
<td>15</td>
</tr>
<tr>
<td>Wild animals</td>
<td>64</td>
</tr>
<tr>
<td>Other animals</td>
<td>140</td>
</tr>
</tbody>
</table>
The following products were certified for export:

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen meat</td>
<td>10,185,073</td>
<td>Lb</td>
</tr>
<tr>
<td>Canned meat</td>
<td>672,953</td>
<td>Lb</td>
</tr>
<tr>
<td>Bacon</td>
<td>1,948,429</td>
<td>Lb</td>
</tr>
<tr>
<td>Whale meat</td>
<td>223,784</td>
<td>Bags</td>
</tr>
<tr>
<td>Sausage casings</td>
<td>49,152</td>
<td>Lb</td>
</tr>
<tr>
<td>Butter</td>
<td>1,375</td>
<td>Lb</td>
</tr>
<tr>
<td>Hides and Skins</td>
<td>68,598,786</td>
<td>Lb</td>
</tr>
<tr>
<td>Wet salted hides</td>
<td>43,933</td>
<td>Units</td>
</tr>
<tr>
<td>Ostrich skins</td>
<td>129,366</td>
<td>Lb</td>
</tr>
<tr>
<td>Karakul pelts</td>
<td>1,007,180</td>
<td>Units</td>
</tr>
<tr>
<td>Chinchilla pelts</td>
<td>1,339</td>
<td>Units</td>
</tr>
<tr>
<td>Bonemeal</td>
<td>36,000</td>
<td>Lb</td>
</tr>
<tr>
<td>Hoof and Horn meal</td>
<td>45,900</td>
<td>Lb</td>
</tr>
<tr>
<td>Horns</td>
<td>734,829</td>
<td>Lb</td>
</tr>
<tr>
<td>Fishmeal</td>
<td>2,856,480</td>
<td>Lb</td>
</tr>
<tr>
<td>Bristles</td>
<td>11,678</td>
<td>Lb</td>
</tr>
<tr>
<td>Wool</td>
<td>158,574,021</td>
<td>Lb</td>
</tr>
<tr>
<td>Mohair</td>
<td>7,640,587</td>
<td>Lb</td>
</tr>
<tr>
<td>Ostrich feathers</td>
<td>45,682</td>
<td>Lb</td>
</tr>
<tr>
<td>Feathers</td>
<td>14,884</td>
<td>Lb</td>
</tr>
<tr>
<td>Ox gall</td>
<td>57,150</td>
<td>Lb</td>
</tr>
<tr>
<td>Poultry feed</td>
<td>10,892,375</td>
<td>Lb</td>
</tr>
<tr>
<td>Processed skins and trophies</td>
<td>6,620</td>
<td>Units</td>
</tr>
<tr>
<td>Semen</td>
<td>7,949</td>
<td>Doses</td>
</tr>
</tbody>
</table>
TRAINING

1. **Veterinarians**

The training of veterinarians at Onderstepoort on the whole ran its normal course, as, with few exceptions, all teaching staff posts were continually filled. The University has been requested for additional teaching personnel in the clinical departments, as the clinical teachers find it difficult to cope with the large number of clinical cases and the after hours work.

An additional section has been built for the Department of Reproduction and the Department of Surgery, and both will shortly be taken into use. A new laboratory for practical work in Infections Diseases has also been erected. Further extensions to the faculty building and accommodation for students have been planned.

Where possible research was carried on in collaboration with the Veterinary Research Institute. One important joint undertaking is the research on “geeldikkop” and enzootic icterus.

Two Senior Lecturers are at present overseas to better qualify themselves for research and teaching.

Details of the number of students undergoing training at Onderstepoort are set out below:

- B.V.Sc. II  45
- B.V.Sc. III  42
- B.V.Sc. IV  47
- B.V.Sc. V  38
- M.Med. Vet. 14
- D.V.Sc.  10

During the year 43 students obtained their B.V.Sc. degrees, while one D.V.Sc. and one M.Med.Vet. degrees were conferred.

2. **Other Veterinary Training**

At the various Agricultural Colleges officers of the Division were responsible for teaching veterinary subjects.

State Veterinarians were actively engaged in the teaching of veterinary subjects to trainees in both the basic and specialised courses for field technicians.

As a result of the special campaign duties on which so many members of the inspectorate staff were engaged, in-service training, both formal and informal, did not receive the desired attention during the year.
### STOCK CENSUS

<table>
<thead>
<tr>
<th>REGION</th>
<th>CATTLE</th>
<th>SHEEP</th>
<th>GOATS</th>
<th>HORSES</th>
<th>DONKEYS AND MULES</th>
<th>PIGS</th>
<th>POULTRY</th>
<th>DOGS</th>
<th>CHN-CHILLAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>WOOLLED</td>
<td>NON WOOLLED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape East &amp; Karoo</td>
<td>1,006,103</td>
<td>11,858,702</td>
<td>779,195</td>
<td>1,712,136</td>
<td>45,979</td>
<td>24,011</td>
<td>98,179</td>
<td>1,604,531</td>
<td>100,609</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>869,655</td>
<td>92,025</td>
<td>281,504</td>
<td>583,680</td>
<td>2,165</td>
<td>37,113</td>
<td>59,728</td>
<td>674,175</td>
<td>6,061</td>
</tr>
<tr>
<td>Highveld</td>
<td>2,391,970</td>
<td>5,557,482</td>
<td>553,772</td>
<td>247,685</td>
<td>112,477</td>
<td>20,142</td>
<td>213,607</td>
<td>2,968,465</td>
<td>109,481</td>
</tr>
<tr>
<td>Natal</td>
<td>2,564,972</td>
<td>1,593,114</td>
<td>237,528</td>
<td>722,763</td>
<td>52,981</td>
<td>48,978</td>
<td>124,416</td>
<td>5,202,061</td>
<td>277,392</td>
</tr>
<tr>
<td>O.F.S.</td>
<td>1,274,630</td>
<td>4,379,247</td>
<td>3,085,530</td>
<td>540,413</td>
<td>71,400</td>
<td>32,764</td>
<td>64,141</td>
<td>670,625</td>
<td>57,468</td>
</tr>
<tr>
<td>Transvaal</td>
<td>1,947,846</td>
<td>2,080,975</td>
<td>551,561</td>
<td>478,222</td>
<td>65,972</td>
<td>242,285</td>
<td>8,805,858</td>
<td>165,806</td>
<td>1,610</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>284,378</td>
<td>4,139,055</td>
<td>958,299</td>
<td>462,780</td>
<td>24,675</td>
<td>13,383</td>
<td>107,864</td>
<td>1,671,000</td>
<td>106,087</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>10,339,554</td>
<td>29,700,600</td>
<td>6,447,389</td>
<td>4,747,679</td>
<td>375,649</td>
<td>176,391</td>
<td>910,220</td>
<td>21,496,715</td>
<td>822,904</td>
</tr>
</tbody>
</table>
## Cattle in White and Non-White Areas

<table>
<thead>
<tr>
<th>Region</th>
<th>White Owners</th>
<th>Non-White Owners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Areas</td>
<td>Non-White Areas</td>
</tr>
<tr>
<td>Cape East &amp; Karoo</td>
<td>731,112</td>
<td>14,380</td>
</tr>
<tr>
<td>Western Transvaal</td>
<td>420,269</td>
<td>5,641</td>
</tr>
<tr>
<td>Highveld</td>
<td>2,121,061</td>
<td>47</td>
</tr>
<tr>
<td>Natal</td>
<td>1,020,802</td>
<td>2,858</td>
</tr>
<tr>
<td>O.F.S.</td>
<td>1,167,794</td>
<td>154</td>
</tr>
<tr>
<td>Transvaal</td>
<td>1,553,178</td>
<td>811</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>280,565</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,294,781</td>
<td>23,864</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Non-White Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape East &amp; Karoo</td>
<td>38,059</td>
</tr>
<tr>
<td>Western Transvaal</td>
<td>40,916</td>
</tr>
<tr>
<td>Highveld</td>
<td>179,487</td>
</tr>
<tr>
<td>Natal</td>
<td>304,159</td>
</tr>
<tr>
<td>O.F.S.</td>
<td>9,741</td>
</tr>
<tr>
<td>Transvaal</td>
<td>191,705</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>3,813</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>767,880</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>White Areas</th>
<th>Non-White Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape East &amp; Karoo</td>
<td>222,552</td>
<td></td>
</tr>
<tr>
<td>Western Transvaal</td>
<td>402,856</td>
<td></td>
</tr>
<tr>
<td>Highveld</td>
<td>91,375</td>
<td></td>
</tr>
<tr>
<td>Natal</td>
<td>1,237,153</td>
<td></td>
</tr>
<tr>
<td>O.F.S.</td>
<td>96,941</td>
<td></td>
</tr>
<tr>
<td>Transvaal</td>
<td>202,152</td>
<td></td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,253,029</td>
<td></td>
</tr>
</tbody>
</table>
SCIENTIFIC PUBLICATIONS

1. **Research Institute, Onderstepoort**

(a) **In Scientific Journals**


Veterinarian, Lond. 4, 197.


(b) In Departmental Publications


(c) In Non-Departmental Publications


2. DIVISION OF VETERINARY SERVICES

In Scientific Journals


(15) LEGISLATION
During the year the government notices listed below were published under the Animal Diseases and Parasites Act. (Act. 13 of 1956).

(a) Government Notice No. 1553 of 6.10.67 to amend the Schedule to G.N. No. 1534 of 4.10.63 by the addition of infectious agents of a viral, bacterial, protozoal, fungal or yeast nature to the list of things likely to introduce into or spread within the Republic a disease or parasite.

(b) G.N. No. 1554 of 6.10.67 to amend G.N. No. 1536 of 4.10.63 by the addition of infectious agents of a viral, bacterial, protozoal, fungal or yeast nature to the list of infectious things that may not be imported into the Republic, except under authority of a permit.

(c) G.N. No. 1555 of 6.10.67 to amend the Schedule to G.N. No. 1537 of 4.10.63 by the addition of Scrapie to the list of diseases in connection with which no infected animal may be moved except under authority of a permit.

(d) G.N. No. 1556 of 6.10.67 to include Scrapie in the Schedule to G.N. No. 1538 of 4.10.63 of diseases in connection with which no infected animal may be allowed to stray from the land where it is.

(e) G.N. No. 1557 of 6.10.67 to amend the Schedule to G.N. No. 1539 of 4.10.63 to include Scrapie as a disease in connection with which no infected animal shall be impounded in a public pound.

(f) G.N. No. R2118 of 29.12.67 to prohibit the movement of any wild animal except upon the authority of a permit issued by a State Veterinarian.

(g) G.N. No. R72 of 26.4.68 to amend the Standing Regulations under Act 13 of 1956 by including Scrapie in the list of diseases to which the Ace applies.

(h) G.N. No. R920 of 24.5.68 to repeal G.N. No. 250 of 23.2.68 and dealing with movements of poultry and poultry products as well as the inoculations of poultry against Newcastle Disease in 40 specified districts of the South Western Cape Province.

(i) G.N. No. R1094 of 21.6.68 to amend the Schedule to G.N. No. R969 of 24.6.66 to include the Magisterial District of Mount Currie and the European areas in the District of Matatiele in the list of areas in which no cattle – including domesticated buffalo – shall be moved which are not visibly free from live ticks.

(j) G.N. No. R1095 of 21.6.68 to amend the Schedule to G.N. No. R960 of 24.6.66 to include the Magisterial District of Mount Currie and the European areas in the District of Matatiele in the list of areas in which no cattle shall be moved except upon the authority of a permit, and in which the death or slaughter of all cattle shall be reported and a spleen or lymph gland smear submitted.


(l) G.N. No. R1097 of 21.6.68 to make provision for the prevention of the introduction, occurrence or spread of the sheep parasites Melophagus ovinus
(m) G.N. No. R116 of 28.6.68 to amend the Standing Regulations under Act 13 of 1956 by providing for the disposal of any “product” which, in the opinion of the Director of Veterinary Services, came into the Republic in contravention of regulations.

(16) TECHNICAL RELATIONS WITH OTHER COUNTRIES

1. Liaison and Co-operation with African Territories

The numbers of scientists from States on the African Continent who visited the Veterinary Research Institute and the Division are listed below:

- Angola   5
- Botswana 5
- Kenya    4
- Lesotho  1
- Malawi   4
- Mocambique 8
- Rhodesia 6
- 33

From the countries specified, the Research Institute received the following specimens for diagnostic purposes:

- Botswana 64
- Kenya  2
- Lesotho 2
- Mocambique 2
- Nigeria 10
- Rhodesia 101
- Zambia  12
- 193
The vaccines and laboratory products supplied by Onderstepoort to African Territories are summarised below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Product</th>
<th>Amount</th>
<th>Value (in R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>Vaccine</td>
<td>150 doses</td>
<td>1.13</td>
</tr>
<tr>
<td>Botswana</td>
<td>Vaccine</td>
<td>851,120 doses</td>
<td>17.017.28</td>
</tr>
<tr>
<td></td>
<td>Antigens</td>
<td>126 c.c.</td>
<td>12.60</td>
</tr>
<tr>
<td>Congo</td>
<td>Vaccine</td>
<td>262 doses</td>
<td>121.00</td>
</tr>
<tr>
<td>Lesotho</td>
<td>Vaccine</td>
<td>78,151 doses</td>
<td>1,902.11</td>
</tr>
<tr>
<td>Malawi</td>
<td>Vaccine</td>
<td>291,535 doses</td>
<td>1,322.75</td>
</tr>
<tr>
<td></td>
<td>Antigens</td>
<td>500 c.c.</td>
<td>40.00</td>
</tr>
<tr>
<td></td>
<td>Diverse</td>
<td></td>
<td>13.00</td>
</tr>
<tr>
<td>Mocambique</td>
<td>Vaccine</td>
<td>2,039 doses</td>
<td>98.00</td>
</tr>
<tr>
<td></td>
<td>Diverse</td>
<td></td>
<td>126.00</td>
</tr>
<tr>
<td>Rhodesia</td>
<td>Vaccine</td>
<td>1,068,168 doses</td>
<td>15,168.00</td>
</tr>
<tr>
<td></td>
<td>Antigens</td>
<td>1,607 c.c.</td>
<td>582.79</td>
</tr>
<tr>
<td>Swaziland</td>
<td>Vaccine</td>
<td>16,834 doses</td>
<td>641.33</td>
</tr>
<tr>
<td></td>
<td>Antigens</td>
<td>201 c.c.</td>
<td>61.80</td>
</tr>
<tr>
<td></td>
<td>Diverse</td>
<td></td>
<td>317.23</td>
</tr>
<tr>
<td>Zambia</td>
<td>Vaccine</td>
<td>1,304,170 doses</td>
<td>4,106.38</td>
</tr>
<tr>
<td></td>
<td>Antigens</td>
<td>1,660 c.c.</td>
<td>134.80</td>
</tr>
</tbody>
</table>

41,664.20

South African scientists also paid visits to several African States.

Mr. J.A. Minne of the Toxicology Section of the Research Institute visited Mocambique to discuss toxicological problems with the authorities.

Details of the assistance given to neighbouring territories in the tsetse fly control and eradication campaigns were dealt with earlier under Nagana. In planning the various campaigns Drs. E.B. Kluge and M.C. Lambrechts visited Luanda in Angola in October 1967; during November 1967 discussions between the Republic, Mocambique and Rhodesia took place in Pretoria; Dr. Kluge also visited Lourenco Marques in March 1968 to confer with representatives of Mocambique and Rhodesia, while in May 1968 he met the representatives of Angola and South West Africa in the former country.

Dr. M.C. Lambrechts visited Malawi during November 1967 and Botswana during February 1968 as a member of a technical assistance team to these countries. He also paid a visit to the latter country in February 1968 as a member of the Boundary Commission headed by Mr. Justice Cillie.
During June 1968 a meeting of the Interritorial Foot and Mouth Commission was held in Pretoria.

During May 1968 Dr. E.B. Kluge attended the meeting of the First Rhodesian Scientific Association in Bulawayo.

A meeting of SARCCUS, attended by representatives of Angola, Botswana, Lesotho, Malawi, Mozambique, Rhodesia and Swaziland, was held in Pretoria in August 1967.

2. **Liaison with Overseas Countries**

A large number of visits were received from overseas scientists, details of which are set out below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>4</td>
</tr>
<tr>
<td>Argentinia</td>
<td>1</td>
</tr>
<tr>
<td>Bolivia</td>
<td>1</td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
</tr>
<tr>
<td>Denmark</td>
<td>1</td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>6</td>
</tr>
<tr>
<td>Great Britain</td>
<td>4</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
</tr>
<tr>
<td>Japan</td>
<td>1</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4</td>
</tr>
<tr>
<td>Portugal</td>
<td>10</td>
</tr>
<tr>
<td>Turkey</td>
<td>1</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>66</strong></td>
</tr>
</tbody>
</table>

The Research Institute received the following specimens for diagnostic purposes:

<table>
<thead>
<tr>
<th>Country</th>
<th>Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britain</td>
<td>1</td>
</tr>
<tr>
<td>Iran</td>
<td>1</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

Onderstepoort still functions as the world Reference Centre for Blue tongue and Horse sickness.
The laboratory products supplied to overseas countries are listed below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Product</th>
<th>Amount</th>
<th>Value (in R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>Vaccine</td>
<td>200 doses</td>
<td>1.00</td>
</tr>
<tr>
<td>Israel</td>
<td>Vaccine</td>
<td>100 doses</td>
<td>1.00</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Vaccine</td>
<td>1,750 doses</td>
<td>8.75</td>
</tr>
<tr>
<td>Persian Gulf</td>
<td>Vaccine</td>
<td>350 doses</td>
<td>1.75</td>
</tr>
<tr>
<td>St. Helena</td>
<td>Vaccine</td>
<td>1,180 doses</td>
<td>8.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21.00</td>
</tr>
</tbody>
</table>

The Republic was represented at the following overseas meetings and conferences:

Dr. B.C. Jansen attended the World Veterinary Congress, held in Paris during July 1967, and also represented the Republic at the Meeting of the Export Panel on Diseases caused by Anaerobes, at the same venue during the same period.

During September – October 1967 Dr. H.H. Kleeberg attended the International Tuberculosis Conference in Europe and the United Kingdom.

Drs. M.C. Lambrechts and M. de Lange represented the Republic at the 200th Anniversary Celebration of the Veterinary High School, Vienna, in May 1968, and during the same period attended the meeting of the Office International des Epizooties in Paris, accompanied by Dr. W.O. Neitz.

The latter scientist also participated in the Seminar on Tropical Diseases held at the University of West Berlin during May 1968.

In addition to the above, officials made the following study tours:

- Corynebacteriasis, Pasteurellosis & Staphylococcal Mastitis. 
  Dr. C. Mc. Cameron.

- Studies of a Molecular Genetic Nature & Examination of Tissue Cultures. 
  Dr. R.A. Oellermann.

- Methods and Techniques in Immuno-pathology etc.. 
  Dr. J.L. du Plessis.

- Serological Diagnosis and Incidence of Trichinellosis. 
  Dr. A.J.M. Verster.
- Investigation of different aspects of the control of Newcastle Disease.  
  Dr. L. Coetzee.

- Study tour in connection with the Animal Slaughter, Meat and Animal Product Hygiene. 
  Britain & Europe.  March – April 1968. 
  Dr. C.W.A. Belonje & Mr. N.T. Coetzee.

- Consultations re Brucella. 
  Dr. R.W. Worthington.