ANNUAL REPORT

1966 - 1967

VETERINARY SERVICES
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1. INTRODUCTION

The adverse climatic and drought conditions of the previous years extended through spring and early summer of the year under review. The first general rains being recorded in December. As a result of the serious conditions being prolonged over many years, natural veld became denuded of grass and edible bushes, causing a serious shortage of grazing during early summer, especially in the winter rainfall area, Highveld Region, North Western Transvaal and North Western Cape. Many farmers found themselves in a desperate position and were forced to sell animals, including valuable breeding stock, in very poor conditions. More fortunate farmers were able to obtain grazing at reasonable prices in the Eastern Free State, Natal and Eastern Transvaal, and although serious losses due to plant poisoning, Red Water, Gall Sickness and Heart Water occurred in these animals, the greater number were saved.

Copious rains were experienced from December resulting in a remarkable recovery and regeneration of the denuded veld, enabling farmers to restock their depleted herds and bumper crops are now being reaped.

Due to the abundant rains, however, serious outbreaks of Bluetongue, Three-day Stiff Sickness, Horse Sickness and Lumpy-skin Disease were encountered even in areas where these diseases do not usually occur, stressing the necessity for regular and early inoculation against them. Ideal conditions also developed for Geeldikkop and one of the most widespread and severe outbreaks of this condition occurred, causing the death of thousands of sheep in the Karoo and South Western Free State.

During the early part of the year while drought conditions prevailed, internal parasites did not cause any serious problems. After the rainy spell, during summer and autumn, conditions were ideal for parasitic infestations and many farmers suffered severe losses. Farmers are now appreciating the importance of tactical, strategic and "offensive" dosing of stock together with rotational grazing and have demonstrated the benefits resulting from the control of internal parasites wireworm, conical fluke, liver fluke, bancruptworm and nodular worm head the list of parasites causing serious losses.

Serious outbreaks of, and losses due to plant poisoning were encountered. In the North Western Kalahari severe losses occurred due to crotalaria poisoning with liver damage being the outstanding feature. Crotalaria plants or "Geelertjie" has established itself as "opslag" during the drought with just enough rain for it to reach the seeding stage when, due to scarcity of feed, animals were forced to eat almost anything. Other poisonous plants causing severe losses were gousiekte, gifblaar, slangkop, tulp, pachystigma, senecio and lantana.
During the last quarter of the year, a serious epidemic of the mesogenic form of Newcastle Disease in poultry was recorded in two magisterial districts of the Western Cape. These outbreaks are indeed a serious threat to the poultry industry of the region which is concentrated in the Western Cape area, where it is a multimillion rand industry. Active steps to combat the outbreak have been instituted entailing the drafting of extra personnel, large-scale vaccination campaigns and the costly elimination of infected birds.

During February, the lentogenic form of Newcastle Disease was diagnosed in a large broiler farm in the Witwatersrand area during the investigation of a serious drop in weight in broilers. Positive reactions to the H.I. test were confirmed by the isolation of N.C.D. virus. Though mortality as a result of this form of the disease is minimal, the economic impact of such severely retarded growth and the possible decrease in egg production which is known to occur in susceptible hens, were regarded as sufficiently serious to warrant the institution of state veterinary control measures. Step were immediately taken to conduct a survey to determine the extent of spread of the disease while appropriate measures were enforced to contain the infection in all infected foci by means of quarantine and disinfection.

The Onderstepoort Research Institute still plays a vital role in the rendering of diagnostic services, but all routine diagnostic procedures are being carried out at the regional laboratories in the field and Onderstepoort assists with aspects which require attention of a more specialised nature. In the field 18 laboratories are in operation where, during the year, 12 588 post mortem examinations were conducted and 153 946 different specimens examined and tested. In addition to routine regional diagnosis the regional laboratories play an important role in animal disease control, veterinary extension work, animal disease surveys, disease eradication schemes and in the execution of research projects in co-operation with the Central Research Institute.

With the acquisition of four atomic absorption spectrophotometers for use at Regional Diagnostic Laboratories in different ecological areas, work commenced to conduct a survey, the results of which will enable farmers to apply corrective measures against the problems arising from mineral imbalances.

A condition known as hip displasia in bovines has been found in the Jersey, Afrikaner, Susses and Hereford breeds. This condition was previously unknown and further work is being done to establish the extent and significance of the problem.

The Onderstepoort Research Institute has been designated the world reference centre for African Horse Sickness and Bluetongue by the Office International Epizootique.

During the year research work on 3 new vaccines was completed and vaccines against Colibacillosis in calves, Colisepticaemia in pigs and E. Coli air sac infections in poultry were added to the existing 26 vaccines prepared and issued by the Onderstepoort Research Institute. A total number of 91 906 436 doses of vaccines were issued. This represents an increase of 9% over the previous year. An experimental inactivated vaccine against
Leptospirosis in bovines, pigs and dogs has also been produced and will be released for field trials in the near future. Work is also continuing on the production of an experimental vaccine against Vibriosis in cattle.

2. NOTIFIABLE DISEASES

(a) Foot and Mouth Disease

There were no outbreaks of foot and mouth disease in the Republic of South Africa during the year under review. Due to outbreaks of this disease in the adjoining territories of Mozambique, Rhodesia and Botswana, as well as the constant danger from the Kruger National Park, it was necessary to maintain strict precautionary measures along the border. These measures included short interval inspection of all susceptible stock and quarantine restrictions together with regular patrol and repairs of the international border fences.

A constant watch was kept for animals straying or illegally introduced across the border, to prevent the introduction and dissemination of the disease. These measures necessitated the destruction of 87 goats, 3 sheep and 24 cattles with a total value of R1 186,00. These animals crossed the border illegally. In addition to the above, susceptible animals were kept away from border fences during the danger periods and river grazing and watering was prohibited.

Fencing along the Republic of South Africa/Swaziland border in the Kamshlubana Kop area in the Barberton district was completed while the existing buffer fence along the border between Barberton and Mozambique was renewed and resited. On the eastern boundary of Swaziland, in the Ingwavuma district, fencing from the Ingwavuma village to the Pongola River at Shemula was completed. The Ingwavuma district border with Swaziland is still unfenced as the exact boundary needs to be defined.

In the Western Cape the greatest proportion of cattle slaughtered are derived from South West Africa, and because of the potential Foot and Mouth risk through imported stock, continued vigilance and inspection of all ruminants imported from South West Africa was maintained. In addition, precautionary inspections of all stock passing through De Aar by rail was done.

(b) Rabies

During the year a total of 749 specimens were submitted to the Veterinary Diagnostic Centre at Onderstepoort for laboratory diagnosis. Of these 237 (32%) were found to be positive. Although this is a slight decrease in the total number of positive cases compared with the previous year, the position in South Africa has not undergone any material change. The large number of specimens submitted for examination illustrates the increased awareness of the public as the result of active publicity and propaganda as well as stricter
enforcement of control measures. Confirmed positive cases were recorded in the following animals:

Dogs ................................................................................................................ 80
Cats .................................................................................................................. 6
Meercat .......................................................... 75
Jackal ............................................................ 13
Cattle ............................................................ 52
Other animals ............................................................ 11

To reduce the demands on space and personnel the routine biological test has been discontinued on all specimens unquestionably positive on the Fluorescent Antibody (F.A.) examination. Further improvements have been made in the F.A. technique and an accuracy of about 98% is now achieved.

In the field, officers of the Department inoculated 205,684 dogs and 91 cats using the L.E.P. egg adapted Flury virus vaccine. Some problems were encountered with the potency of the vaccine after distribution from Onderstepoort but this has been solved by packing in ice and better cooling facilities at remote vaccination centres to ensure that supplies of vaccines could always be kept at under 4 degrees Centigrade.

The successful culture of the virulent virus on pig kidney tissue cultures, proved promising for future improvements of the vaccine.

Field studies on the ecology of the disease in viverridae are continuing and mobile units are employed to destroy populations of viverridae and jackal in known infected areas. During previous years cyanogas was mainly used but promising results with "Phostoxin" were obtained which unfortunately appeared to be a rather cruel method. Efforts were therefore, concentrated on the utilisation of carbon monoxide. Portable engines, producing 23% - 25% concentrations of carbon monoxide are now being used on an experimental basis. Both methods, however, still require too much manpower and are also too slow. Trials with baits and poisons have been disappointing so far in that no effectively attractive bait has been discovered. Vomition appears to be a major problem.

Eradication of viverridae was undertaken on 150 farms comprising 133,962 morgan in the infected areas 28,741 colonies with 81,375 single holes were treated and 5,590 dead meercat were recovered.

(c) Anthrax

There was a considerable decrease in the number of confirmed anthrax outbreaks during the year with 16 bovine and 24 sheep deaths in 14 outbreaks of the disease. No known cases were discovered in game in the Kruger National Park where 120 blood smears from 85 game animals were examined.
Due to problems with inspection and inoculations in the Sekhukuniland area of Lydenburg in the Eastern Transvaal, the exact number of anthrax cases in cattle in that area could not be determined but 135 human cases of cutaneous anthrax were treated at the Jane Furse Memorial Hospital. With the appointment of a Bantu Assistant Stock Inspector in this area a full immunisation coverage will be maintained.

Although serious drought conditions hampered the compulsory annual vaccination scheme a total of 5 726 155 cattle, 108 214 small stock, 6 560 horse and 568 pigs were inoculated by or under the supervision of stock inspectors. This represents a considerable increase over the previous year illustrating the excellent co-operation of owners.

(d) East Cost Fever and Related Diseases

Although no outbreaks of East Coast Fever have occurred in South Africa during the past 13 years vigilance is nevertheless still maintained in the potential danger areas by regular examination of spleen smears from all cattle which die or are slaughtered. Out of 451 203 cattle deaths in these areas, 425 911 spleen smears were recovered and examined revealing 7 outbreaks with 20 deaths of Buffalo Disease ("Corridor Disease"), *Theileria lawrencii* and 62 outbreaks of *Benign Bovine Theileriosis*.

Control of these diseases, which are related to East Coast Fever, is based on precautionary quarantine and intensified dipping.

In the Kruger National Park blood smears from impala and buffaloes revealed a disease related to East Coast Fever in cattle. The significance of the findings is being investigated.

(e) Tuberculosis

Voluntary herd accreditation and interim schemes together with diagnostic tests and testing of animals for export were continued.

The statistics of the various tests are as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Number of herds</th>
<th>Animals</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>I.N.H.</td>
<td>18</td>
<td>3 593</td>
<td>435</td>
</tr>
<tr>
<td>Import &amp; Export</td>
<td>342</td>
<td>17 769</td>
<td>90</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>369</td>
<td>16 616</td>
<td>280</td>
</tr>
<tr>
<td>Interim</td>
<td>735</td>
<td>72 480</td>
<td>1 040</td>
</tr>
<tr>
<td>Accreditation</td>
<td>400</td>
<td>51 585</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 864</strong></td>
<td><strong>162 043</strong></td>
<td><strong>1 853</strong></td>
</tr>
</tbody>
</table>

The total tests, excluding accredited herds, were as follows:

Number of herds ............................................................. 1 454
The total animals tested represents an increase of 35 468 over last year. With the exclusion of animals tested under the accredited herd scheme the figures reflect an incidence of 1.67% positive and 9.04% suspicious cases.

During the year 1.53% of the total number of cattle in South Africa were subjected to the Tuberculin test.

The incidence of tuberculosis in poultry, is very low. In pigs slaughtered at abattoirs the incidence of tuberculosis caused considerable losses as the result of condemnation. Out of 56 270 pigs slaughtered at an abattoir in the Western Cape 106 showed lesions of T.B. while at an abattoir in Natal, where 103 737 pigs were slaughtered, no less than 3 110 showed lesions.

In the Eastern Cape tuberculosis was again diagnosed in kudu with a high incidence in certain areas. Further investigations into the significance of these findings together with a survey to establish the effect of this infection in game on cattle is in progress.

Onderstepoort produced 236 810 units of bovine tuberculin and 68 630 units of avian tuberculin, the latter was mainly used in comparative tests. The production of P.P.D. tuberculin was improved by substituting heat sterilisation of media with filter sterilisation which avoids hydrolysis of amino acids.

The tuberculocidal properties of 16 commercial disinfectants were tested bacteriologically. It was shown that concentrations given on the instructions for each product were generally too weak to destroy T.B. bacilli. The quarternary ammonium compounds and hexachlorophene were ineffective, phenolic compounds were effective in a dilution of 1:50 and iodine compounds with phosphoric acid were effective in dilutions of 1:50 or 1:100.

(f) Brucellosis

This infection in cattle, sheep and goats remains a problem of great importance. The following tests to establish the incidence of the disease were undertaken by the Regional Diagnostic Centres.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number tested</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Cattle</td>
<td>47 900</td>
<td>4 467 (9.3%)</td>
</tr>
<tr>
<td>Sheep</td>
<td>2 194</td>
<td>69 (3.1%)</td>
</tr>
<tr>
<td>Goats</td>
<td>170</td>
<td>19 (11.1%)</td>
</tr>
</tbody>
</table>
These figures reflect a considerable increase in the number of tests done and the results show a high incidence of positive cases. This may be due to the indiscriminate vaccination of adult cattle which react positively to the serological test. Abortion storms and active outbreaks of the disease were however, limited to isolated cases.

In a survey done in the Sibasa district, in Bantu-owned stock, which has probably never been inoculated, an incidence of 21% reactors out of 566 tests done was revealed. This alarming figure is probably due to natural infection and spread of the disease amongst susceptible stock.

It can be accepted that the disease is present in the hippopotamus and buffalo of the Kruger National Park. Attempts were made to isolate and type the organism in game to determine the significance of this infection in relation to the possible effect and transmission to domestic animals.

Prophylactic use of Strain 19 vaccine against contagious abortion in cattle and Rev. 1 vaccine in small stock has kept both diseases under control. With the use of Strain 19 the serum agglutinins stimulated by inoculation cannot be readily differentiated from those produced by natural infection and for this reason work on the use of inactivated vaccine with Strain 45/20 was continued. By using this type of vaccine agglutinin antibodies disappear sooner after inoculation, an advantage in differentiating between reactions due to natural infection and those of inoculation.

During the year 544 798 doses of Strain 19 vaccine and 338 234 doses of Rev. 1 vaccine were produced and issued by Onderstepoort. A total number of 953 herds with 120 955 cattle were inoculated by the inspectorate staff of the Division.

(g) Trypanosomiasis

(i) Nagana

No cases of Nagana occurred during the year under review.

In Rhodesia, 6 spraying units each with 4 pressure pumps, sprayed a total area of 1 568.7 miles of rivers, valleys, streams and contacts using 8 000 gallon Dieldrex concentrate (15 t) giving a total of 48 180 gallon 3.1% emulsion. The Republic contributed 2 000 gallon Dieldrex concentrate and the use of four 3-ton trucks, three four-wheel drive vehicles together with 5 European officers. Three spraying units cleared the area south of the Lundi River to the Mozambique border. After spraying this area, the units operated in the new danger area north of the Lundi River together with the three other units in the area between the Lundi and Sabi Rivers from their junction to Chipinda Pools.
In Mozambique a total of 376,6 miles of valleys, roads and contact areas were sprayed as compared with 276 miles during the previous year. Only one spraying unit, with an additional unit during the final 10 days was used. A total of 1 750 gallon Dieldrex (15 t) of which 1 200 gallon was contributed by South Africa was used. An area of approximately 100 miles from the Rhodesia-Mozambique border along the Save River was sprayed.

The financial contributions of the three countries were as follows:

<table>
<thead>
<tr>
<th>R.S.A.</th>
<th>RHODESIA</th>
<th>MOZAMBIQUE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>R19 082,44</td>
<td>R63 118</td>
<td>R12 352</td>
<td>R94 752,44</td>
</tr>
</tbody>
</table>

In the four test herds placed in the treated area in 1963 no cases of Nagana were diagnosed. The tsetse fly was not only forced back for 30 - 50 miles along a front of 250 miles, but surveys also indicated a low incidence of tsetse fly in large areas previously infested.

The spraying programme in the Caprivi Strip was again financed by the Department of Bantu Administration while the Division organised the operations. 750 Gallon Dieldrex concentrate was used by a single spraying unit along a front of 65 miles at a total expenditure of R6 000. Operations were mainly directed against re-infestation after previous spraying along the Kwando River. More cattle have been introduced into the Sibindo area while two test herds were placed at Masida, 20 miles further west. No cases of Nagana occurred in these herds and the Sibindo and Masida areas are considered free of tsetse fly.

(ii) **Dourine**

589 Blood samples from areas in the Republic of South Africa were tested during the year of which 4 were positive, 2 positive animals were destroyed while 1 was sent to Onderstepoort for experimental purposes and the last was a gelding. For control and diagnoses of the disease blood samples were taken from all horses intended for export and for breeding to valuable sires. In addition to the above 674 specimens from neighbouring territories were tested of which 30 were positive.

(h) **Lumpy-Skin Disease**

This condition occurred fairly extensively throughout Natal and Zululand. The outbreaks were of the mild type and 105 farms with a total of 50 716 cattle of which 855 showed lesions were infected in these regions.

A general increase of this disease was noticed in other areas due most probably, to the copious rains. Factual statistics, however, are not
available as all cases are not reported to the Department and many farmers do their own inoculations. A total of 458 farms with 90,280 cattle of which 2,038 showed lesions were infected during the year and 352 farms with 66,518 cattle were vaccinated.

Onderstepoort issued 663,048 doses of Lumpy-Skin Disease vaccine which is a considerably increase over the previous year.

Studies on and rearing of intermediate hosts were continued. Although attempts to rear the species of Musca found to be associated with cattle at Onderstepoort were unsuccessful, the study of the morphology and taxonomy of the immature stages of these species were nearly completed. This study is a prerequisite to later ecological investigations on the species.

(i) **Sheep Scab**

No outbreaks of Sheep Scab occurred during the year, but vigilance was maintained in all border areas.

The infection in experimental sheep at Onderstepoort was maintained and dipping trials were conducted to evaluate the efficiency of Bromophos and a combination of Bromophos and B.H.C. on active infestations. Bromophos proved to be ineffective at a concentration of 0.05% Bromophosethyl while the combination of Bromophos and gamma B.H.C., each at a concentration of 0.015% proved fully effective. It is doubtful whether any synergistic effect is present and the conclusion was reached that only the B.H.C. component was responsible for the cure.

(j) **Mange**

As in previous years, sporadic cases of mange in cattle, goats, equines and pigs were diagnosed. These were controlled by appropriate treatment and dipping of infested and contact stock. The following outbreaks occurred:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Outbreaks</th>
<th>Animals infected</th>
<th>Animals on infected farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>23</td>
<td>160</td>
<td>10,391</td>
</tr>
<tr>
<td>Goats</td>
<td>27</td>
<td>322</td>
<td>29,158</td>
</tr>
<tr>
<td>Equines</td>
<td>4</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Pigs</td>
<td>27</td>
<td>1,576</td>
<td>2,398</td>
</tr>
</tbody>
</table>

(k) **Swine Fever**

No cases of African Swine Fever were diagnosed during the year. European Swine Fever does not occur in the Republic of South Africa. The occurrence of the disease is restricted to a small area in the Northern and Eastern Transvaal where bush pigs and warthogs are found. This area is a declared Wine Fever area and is regarded as an
enzootic infected area, from which only animals from approved piggeries are allowed to be removed to specific quarantine abattoirs. At present there are 373 such piggeries conforming to requirements for marketing concessions and strict monthly inspection on these premises were maintained during the year.

(l) **Swine Erysipelas**

Four cases of this disease were reported during the year. A single outbreak occurred in the Western Cape region which was controlled by prompt action including preventative antibiotic treatment and disinfection. At the Port Elizabeth abattoir a single case was recorded in a pig from a farm in the Upington district. No further cases occurred on the farm of origin. Two confirmed cases were recorded from the Ixopo district and a further two cases in the Estcourt district, but the latter were not confirmed. Strict hygienic measures and antibiotic treatment controlled the infection and prevented further spread of the disease.

(m) **Epizootic Lymphangitis**

Although a single case of this disease was diagnosed last year no further cases occurred during the year under review.

(n) **Johne's Disease**

Five cases of this disease were recorded during the year.

A single case in an imported cow from America was diagnosed at post mortem examination in the Nelspruit district. The affected herd was isolated and is undergoing a series of allergic and serological tests to identify infected animals.

One case in an imported cow was diagnosed in the Lady Grey district.

In Natal, an outbreak, involving three clinical cases occurred in the Pietermaritzburg district. Serological tests plus comparative tuberculin tests were done. Regular inspection and testing of the herd is being maintained.

(o) **Infectious Laryngotracheitis**

Only once case of this disease was diagnosed, in the Wesselsbron district. All poultry on the infected farm were slaughtered for human consumption and the farm restocked a month later. No further outbreaks occurred.

In Natal where the disease occurred on a poultry farm with 300 000 birds during the previous year, vaccinations were carried out. Although
I.L.T. appeared simultaneously with Infectious Coryza which was responsible for a drastic drop in egg production, it was concluded that the vaccination may have helped to destroy the infection. The I.L.T. apparently only made itself felt when a severe outbreak of Infectious Coryza was superimposed. Further trials with the vaccine are considered necessary before a definite opinion can be expressed.

(p) **Rinderpest**

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

(q) **Bacillary White Diarrhoea**

No outbreaks occurred. Tests were carried out on 190 poultry farms with the following results:

<table>
<thead>
<tr>
<th>Farms tested</th>
<th>190</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowls tested</td>
<td>680 513</td>
</tr>
<tr>
<td>Positive reactors</td>
<td>11</td>
</tr>
<tr>
<td>Suspicious reactors</td>
<td>326</td>
</tr>
</tbody>
</table>

At present there are 186 B.W.D.-free certificate holders with a total of 2 685 867 fowls on the premises.

(r) **Fowl Typhoid**

This disease usually occurs only in premises where strict precautionary measures are not practised. Outbreaks on 17 farms with 7 438 fowls with 97 deaths were recorded during the year, mainly in small back yard breeders.

Onderstepoort issued 1 460 200 doses of vaccine during the year, the use of which, together with strict hygienic measures on the large poultry holdings no doubt resulting in the low incidence of the disease.

(s) **Psittacosis**

No cases were diagnosed during the year.

(t) **Newcastle Disease**

During February the lentogenic farm of N.C.D. was diagnosed on a broiler farm at Muldersdrift on the Witwatersrand. A general survey of the whole area was launched during which representative blood samples were taken for the H.I. test at Onderstepoort. This survey was concentrated on the area surrounding the infected farm, the supply farms, farms to which chickens from the infected farm were sent, the neighbouring bigger poultry premises in the area and some random
tests on small holding in back yard premises. Ten further foci of infection were found and were dealt with as follows:

(i) **Farmers selling day old chicks**

Three infected farms. All eggs in incubators and young birds not fit for table use were destroyed with compensation. All marketable poultry were slaughtered by the owner, but the offal was destroyed.

(ii) **Broiler farms**

Broilers were slaughtered under supervision and the offal destroyed. Strict quarantine and isolation measures were enforced.

(iii) **Commercial farms**

Eggs were allowed to be sold for table purposes. The gradual slaughtering of all birds was undertaken.

On one farm all the birds used for hatching egg production, were vaccinated on an experimental basis.

In all 627 holdings, representing 2,554,425 birds from which 43,170 blood samples were taken, were tested.

On 9 April 1967 the more serious mesogenic form of N.C.D was diagnosed in the Phillipi area of the Wynberg district in the Cape Province. This was confirmed by Onderstepoort on 18 April 1967. The origin of the outbreak and subsequent outbreaks is obscure but it can be assumed that hawkers and traders in poultry may have played a role in the dissemination or spreading of infection.

Local field staff and extra personnel from other areas were drafted for large scale vaccinations and inspections. The disease was discovered on seven separate holdings involving 263,782 birds. Infected birds on these premises were destroyed with compensation. Birds at risk were vaccinated and all poultry farms in the immediate vicinity of the infection were given priority vaccination.

The following figures indicate the extent of the organisation involved:

Number of birds vaccinated .............................................. 1,172,314
Number of birds destroyed ............................................... 42,969
Poultry (all species) inspected .......................................... 114,388
Owners involved ............................................................. 3,431

(u) **Other Notifiable Diseases**

No other scheduled diseases were recorded during the year.
3. NON-SCHEDULED DISEASES

(a) Nutritional

The severe drought conditions experienced throughout the country necessitate the supplementary feeding of all livestock. Food being scarce, farmers were compelled to use whatever was available, often resulting in serious metabolic disturbances such as mineral and trace element deficiencies, pregnancy toxaemia, anorexia and poisoning.

In the Western Cape more and more farmers are becoming convinced of the economic feasibility of establishing pastures. The establishment of dry land Lucerne pastures has led to metabolic disturbances as a result of monoculture and various imbalances, and particularly the deleterious effects of the high estrogenic contents of some of these pastures, were demonstrated. With the acquisition of an atomic absorption spectrophotometer a survey is being done to supply farmers with correct advice on the problems of mineral imbalances.

In the Orange Free State, magnesium deficiency occurred in sheep grazing on wintergreens. This together with additional licks caused a heavy deposit of calcium in the circulatory and renal systems.

Vitamin A deficiency occurred in stock throughout the country due to lack of green grazing.

It appears that Aphosphorosis may often be present in a sub clinical form, and zinc deficiency could possibly play an important role in the cause of reduced fertility in the Eastern Transvaal.

In the past year there was a surge of intensified animal production and as a result there is an increased interest in feeding methods and related problems. There were frequent requested by organised groups for special lectures on nutritional, health, disease, supplementary feeding and production matters.

Experiments were conducted which showed that pig rations consisting primarily of maize meal, Lucerne meal, oil cake meal and fish meal have adequate quantities of Riboflavin, Niacin and Pantothenic acid and that supplementation has no measurable value. The addition of synthetic lysine, however, resulted in a beneficial response by improving the rate of conversion of feed to animal products.

The practice of feeding cattle and sheep in small feedlots under intensified conditions has increased considerably resulting in serious losses due to overeating and metabolic disturbances.

In calcium-phosphorous-magnesium studies in horses it was shown that imbalanced feeding of the three main macro-elements found in bone tissue resulted in clinical changes. Elevated levels of phosphate
resulted in the characteristic swellings of *osteodystrophia fibrosa* of the nasal region while an elevation of calcium causes clinically recognisable changes in the third phalanx and hoof region resulting in the hooves taking a square vertical shape.

In trials associated with copper deficiency it was determined that the suppressing effect of molybdenum on copper, resulting in copper deficiency symptoms in sheep, is also reflected in a delay in the breeding age of ewes and rams. Fertility however is not completely suppressed though foetal death, abortion and ewe mortality in advanced pregnancy are evident.

As the fluorine content of drinking water in certain area of the country exceeds the safe limits, further studies were undertaken to reduce the fluorine content in these waters to make them safe for human and animal consumption. It was shown that, by the addition of di-sodium-phosphate, and depending on the calcium content of the water, di-calcium-phosphate can be precipitated. If calcium is present in sufficient quantities, only phosphate need be added to the drinking water, and if deficient in calcium, this can be increased by the addition of calcium chloride. By using this method, water with a fluorine content of 12 p.p.m. was reduced to a safe 4 p.p.m.

Further studies on neuro-muscular disorders in ewes grazing on green oats have included grazing experiments over 12 months. No neuro-muscular disturbances could be established experimentally, and blood studies could not confirm a decrease of magnesium or other minerals, even with an increased potassium intake. Further investigations are being instituted.

(b) Poisoning

(i) Malicious and accidental poisoning

Malicious and accidental poisoning of cattle and dogs with arsenic and strychnine were unfortunately still too common during the year. Careless dosing of the organophosphate vermicides and the indiscriminate spraying of orchards and crops with these preparations caused serious losses. Ignorance and carelessness with the use of urea as an additive to stock feeds was also the cause of severe losses.

Although many specimens are examined at the Regional Diagnostic Centres, 2 927 specimens, submitted from 1 167 sources, were received by the Research Institute at Onderstepoort for specialised analysis. The results of these analysis are as follows:

<table>
<thead>
<tr>
<th>Element</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>47</td>
</tr>
<tr>
<td>Lead</td>
<td>13</td>
</tr>
<tr>
<td>NaCl</td>
<td>7</td>
</tr>
<tr>
<td>H.C.N.</td>
<td>7</td>
</tr>
</tbody>
</table>
A further decrease in the number of cases of arsenical poisoning has again been noticed and is probably due to a decrease in the use of arsenic as a dip wash where the new organic insecticides are gaining popularity. The following annual figures of arsenical poisoning illustrate this point:

- 1963 - 1964: 108 cases
- 1964 - 1965: 85 cases
- 1965 - 1966: 52 cases
- 1966 - 1967: 47 cases

Thirteen instances of lead poisoning were investigated and it was found that car batteries were the cause in 12 of them. Investigations proved that 2 tablespoonful of fine lead was sufficient to cause death in adult cattle and this may explain the large number of deaths due to a single battery.

Two cases of acute Copper poisoning occurred after the farmers used pure copper as a pre-medication to stock dosing in place of the 10% solution.

A case of Vanadium poisoning occurred in cattle at a mine near Pretoria where the animals had access to the soluble salt. A severe watery diarrhoea was the main symptom.

(ii) Plant poisoning

During the year 355 specimens of various plants were received by Onderstepoort, for identification. 35 of these were subjected to tests and 9 were found to be toxic.

Due to the severe drought during the previous years, followed by copious rains, severe losses occurred from plant poisoning, as animals were exposed to toxic plants in areas where grazing was scarce. Mortality occurred from plants such as slangkop, *Senecio*, tulp, *Sarcostemma*, *Solanum*, *Crotalaria*, *Matricaria*, "gousiekbos", *Lantana*, *Buphane*, *Chinkerinchee*, gifblaar, *Gaigeria* and *Cucumis* species.

Tulp poisoning took a heavy toll in the Orange Free State and Vryburg areas. A new problem in the form of chronic nitrite poisoning with its accompanying methaemoglobinemia developed, and was found in sheep grazing on frost damaged wheat and oats.
Crotalaria poisoning became a serious problem in the North Western Kalahari where many farmers suffered severe losses. Numerous cases were investigated and cirrhosis of the liver was the predominant symptom. Microscopic examination confirmed the diagnosis of Crotolariosis.

During the year Vermeersiekte problems were relatively small and investigations could not be completed due to absence of the plant after the drought period.

The drought conditions also diminished the incidence of Pavetta mortality in the Northern Transvaal.

In the northern and western parts of the country gousiekte poisoning again caused severe losses. In the Mafeking area 2 748 cattle and 1 280 sheep died as a result of this plant. In an experiment on the farm Swartrand in the Venterdsorp district it was shown that in sheep, death followed after animals had received a total mount of the plant equal to $\frac{1}{5}$ of the weight of the animal. In some cases death occurred even after sheep had received 5 lbs. of the plant.

Extracts from the following plants are being testes in an attempt to isolate the active principle.

- Lasiosiphon burchellii ............................. Harpuisbos
- Cotyledon wallichii .............................. Kandelaarbos
- Arthrosolen polycephalus ...................... Januariebos
- Ornithogalum thyrsoides ..................... Tjenkerintjee
- Homeria & Moraea spp ......................... Tulp
- Melianthus comosus ............................ Kruidjie-roer-my-nie

(iii) Toxin poisoning

Further work on fungi in various stock feeds was continued. The toxicity of Diplodia zeae to poultry was proved experimentally using week old chickens. It was found that toxicity of the fungus was evident after culture for at least three months.

A serious outbreak of poisoning in cattle occurred due to Claviceps paspali on the Witwatersrand. Cattle grazing on Paspalum were affected showing nervous symptoms.

Lupin poisoning, showing liver damage, again occurred and from a specimen received from the Swartland area in the Cape, animals were affected experimentally for the first time. It is suspected that a fungus, growing on lupins, may be responsible for the toxic symptoms.

(c) Bacterial Diseases
(i) **Mastitis**

Mastitis still remains the cause of heavy financial losses and may be regarded as one of the most serious erosion diseases. From surveys and tests it appeared that the incidence of the disease was increasing, not only in cattle, but also in sheep. Although *Staphylococcus aureus* is the main causal organism, cases caused by *E. coli* and *Aerobacter aerogenes* have also occurred.

In the extensive ranching areas tick bites, especially the *Hyalommas* and the *Amblyommas* caused severe damage to udders and teats of cows and were the chief cause of the disease. It is interesting to note that the Kruger National Park, heavy tick infestation of buffalo does not cause mastitis.

The indiscriminate use of antibiotics and the incorrect usage thereof, has resulted in the development of resistant strains of *Staphylococcus*, *Streptococcus* and *Pseudomonas* species.

Results obtained with the *Staphylococcus* experimental vaccine were so diverse that it could not be issued as a standard vaccine. In most cases where an improvement was achieved it was found that the incidence of the disease would flare up very soon after administration of the vaccine. Further work on the production of a suitable vaccine is being undertaken. A special Mastitis Research Laboratory with a full time research officer was established at Onderstepoort and 8 737 milk specimens have already been examined for experimental purposes, to establish the causal organisms, incidence in controlled herds and sensitivity tests against available therapeutic remedies.

(ii) **Enterotoxaemia (Pulpy kidney)**

As in previous years severe losses occurred as result of this disease. These losses are avoidable and little sympathy can be felt for those stock owners who annually lose sheep as a result of Pulpy kidney. Despite the fact that State Veterinarians and inspectorate staff are continually propagating the use of the vaccine, which is very cheap and extremely effective, many farmers are still negligent, and must unfortunately pay the price for their failure to take the necessary precautions.

During the year Onderstepoort prepared and issued 37 920 380 doses of Pulpy kidney vaccine.

(iii) **Black Quarter**

Sporadic outbreaks of this disease occurred throughout the country especially in the Bantu areas. The inspectorate staff encouraged Bantu-owners to inoculate their stock and
remarkable results have already been obtained in the Pietersburg and Barberton areas where 19 4000 doses of vaccine were ordered by Bantu stock owners.

In Natal, where smears from all dead animals are examined, severe losses have been recorded as demonstrated by the following figures:

Eshowe ................................................................. 349
Greytown ............................................................ 1 000
Dundee ................................................................. 633
Estcourt ................................................................. 800

Onderstepoort issued 2 862 262 doses of vaccine but the use of the vaccine must be extended to Bantu areas to prevent further losses.

Further studies on the toxic component of Clostridium Novyi, a causal organism of Black Quarter has shown that the cytoplasm contains a certain amount of toxic activity.

(iv) Lamsiekte

Only sporadic cases occurred throughout the country in Sekhukhuniland in the Lydenburg district carcasses of animals that died from poverty during the drought were left unburied resulting in a serious outbreak of Lamsiekte.

In areas known to be deficient in phosphates and where animals develop the well-known "pica" symptoms, animals are inoculated annually against Lamsiekte, in addition to the feeding of bone meal and phosphates, with excellent results. In other areas farmers are not always aware of the danger of the disease and often suffer serious losses before a correct diagnosis can be made. Onderstepoort issued 3 013 690 doses of the vaccine during the year.

(v) Caseous Lymphadenitis

The experimental vaccine, which was made available as a standard vaccine during the previous year, has given excellent protective results and Onderstepoort has already issue 212 860 doses during the year under review. This vaccine, known as Corynebacterium ovis vaccine, prevents the common abscesses in the lungs and glands of sheep.

Corynebacterium pyogenes vaccine, which prevents pneumonia, abscesses and certain cases of mastitis in cattle, sheep
and goats also proved successful 131 440 doses were issued by Onderstepoort.

(vi) Pasteurellosis

The incidence of this disease became important during the year and an increase, especially in Natal, Orange Free State and Western Transvaal was recorded. Numerous cases in sheep and lambs were confirmed at Onderstepoort, from whence 357 000 doses of the vaccine were made available during the year.

Apparently this disease, which is characterised by pneumonia, hepatitis, septicaemia and mastitis, was responsible for serious mortality in lambs. Although the effects of the vaccine when used on a large scale are still awaited, good results in combating the incidence of the disease have been obtained.

(vii) Tetanus

Sporadic outbreaks of the disease were recorded during the year, especially after castration of lambs by means of the elastrator rings and shearing under unhygienic conditions. The new vaccine, issued as a standard vaccine during the year is giving good results and 51 515 doses were issued.

(viii) Colibacillosis

*E. coli* infection in domestic animals was responsible for many problems and mortality in calves, sheep, poultry and pigs. The symptoms varied from enteritis to mastitis, pneumonia and joint ill. Besides *Colibacillosis* infection in calves, an increase was also notice in the incidence of *Colisepticaemia* in lambs and fibrinous pericarditis in poultry which is also caused by *E. coli*.

*Colibacillosis* in calves is the most important disease of calves in South Africa and it is estimated that 60% of mortality in calves is caused by this infection. Although 147 *E. coli* serotypes are known it has been shown that 15 enter pathogenic types of *E. coli* are responsible for 85% of outbreaks of the disease.

Experiments have indicated that inoculation of cows in calf is the most satisfactory means of vaccinations and two or more inoculations of a formalised monovalent or polyvalent vaccine gives satisfactory protection to the calf.

*Colisepticaemia* in lambs was first diagnosed two years ago and has since spread at an alarming rate endangering sheep farming in certain areas. The disease affects lambs up to the age of 8 weeks with the highest incidence in lambs during the first week of life.
Experiments on new vaccines for protection against *Colibacillosis* in calves, *Colisepthaemia* in lambs and *E. coli* airsac infection in broilers have been completed and the vaccines will be available as standard issues in the near future.

(ix) **Leptospirosis**

During the course of a survey, this disease was diagnosed throughout the country and was found to be present in cattle, sheep, horses, pigs and dogs. As a disease entity however, it has thus far been found to be of significance in a few pig herds only. As Leptospira infection can be transmitted via contaminated semen, it is required, inter alia, that new bulls admitted to registered A.I. Centres pass negative tests for *Leptospira* before being used.

During the year 2 879 blood specimens were submitted to the Research Institute at Onderstepoort of which 235 or 8.1% were found to be positive for *Leptospirosis*. It has now been established that isolated cases of bovine abortions were due to this infection.

The most common serotypes diagnosed from the various animals were as follows:

<table>
<thead>
<tr>
<th>Bovine</th>
<th>Pig</th>
<th>Dog</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>L. Pomona</em></td>
<td><em>L. Pomona</em></td>
<td><em>L. icterohaemorrhagiae</em></td>
</tr>
<tr>
<td><em>L. hyos</em></td>
<td><em>L. hyos</em></td>
<td><em>L. canicola</em></td>
</tr>
<tr>
<td><em>L. canicola</em></td>
<td><em>L. icterohaemorrhagiae</em></td>
<td></td>
</tr>
</tbody>
</table>

During the year an inactivated vaccine was prepared by Onderstepoort against *Leptospirosis* in cattle, pigs and dogs on an experimental basis.

In addition to specimens examined by Onderstepoort, a survey to establish the incidence of *Leptospirosis* in the Western Cape region is being carried out and will be completed in the near future. During the year the following blood specimens from various animals were examined by the Regional Diagnostic Centre at Stellenbosch:

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of specimens</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigs</td>
<td>1 270</td>
<td>37</td>
<td>1 233</td>
</tr>
<tr>
<td>Cattle</td>
<td>8 874</td>
<td>302</td>
<td>8 572</td>
</tr>
<tr>
<td>Sheep &amp; Goats</td>
<td>282</td>
<td>-</td>
<td>282</td>
</tr>
<tr>
<td>Horses</td>
<td>92</td>
<td>14</td>
<td>78</td>
</tr>
<tr>
<td>Other</td>
<td>60</td>
<td>18</td>
<td>42</td>
</tr>
<tr>
<td>Human</td>
<td>7</td>
<td>-</td>
<td>7</td>
</tr>
</tbody>
</table>
(x) Vibrionic Dysentery of Pigs

A large number of outbreaks of this disease were recorded in the Pietermaritzburg district. All the outbreaks were successfully controlled by the use of Tylan.

(d) Protozoal Diseases

(i) Babesiosis

A general increase in the incidence of Red Water in cattle was recorded throughout the country. Many delayed outbreaks of the disease occurred in the Orange Free State and Western Transvaal after the return of drought stricken cattle from Natal, and cases of Red Water were reported from areas of the Western Transvaal where the disease had never been present before. The disease is prevalent in the warmer coastal areas of the Eastern Cape where dipping of cattle is being neglected. A particularly virulent form appeared to be present in the Stutterheim district.

In Natal the disease caused serious mortality and the following figures show the number of deaths recorded:

- Pietermaritzburg ...................................................... 755
- Eshowe .............................................................. 1 562
- Ixopo .................................................................... 840
- Port Shepstone ....................................................... 967

In the Eastern Transvaal Red Water due to *B. bovis* caused heavy mortality in cattle and *Biliary* fever in dogs was very prevalent. In the Kruger National Park a mixed infection of *B. canis* and *B. felis* was found in apparently healthy hyenas. Young dogs used in a *trichinella* experiment all developed Babesiosis but made spontaneous recoveries.

(ii) Anaplasmosis

Sporadic outbreaks were recorded and severe mortality occurred in cattle moved from the drought stricken areas.

(iii) Besnoitiosis

This disease appears to be on the increase in the Pietersburg bushveld area and has now also been diagnosed and confirmed on five farms in the Hlabisa district of Natal where 38 cattle was found to be affected. In the Western Transvaal the disease is limited to the Marico district where 132 cases were diagnosed during the year.
The relationship between Besnoitia encountered in blue wildebeest and impale in the Kruger National Park, and B. besnoitia, the cause of Elephant Skin Disease in cattle, was investigated. There was a fairly close relationship between them. Cattle infected with Besnoitia from antelopes developed mild reactions but were subsequently immune to infection with bovine strains. The organisms from antelopes preferred the visceral organs as opposed to the skin preferred by those from cattle. The organism from blue wildebeest, impala and cattle are therefore regarded as distinct strains of B. besnoitia.

(iv) Coccidiosis

Isolated cases were recorded in the Piet Retief, Potgietersrust and Pietersburg districts. At a post mortem examination of an impala in the K.N.P. white raised plaques in the uterus were found to be accumulations of coccidia.

The asexual developmental stages of Hepatozoon canis were found in the internal organs of dogs in the Pretoria district. They have been differentiated from cysts of Toxoplasma gondii which they resemble. The sexual stages have long been known to occur in the blood of dogs. The importance of this infection as a cause of ill health in dogs remains to be determined.

(v) Hepatozoonosis

Hepatozoon species were found in the cheetah (Acinonyx jubatus jubatus) impala (Apyceros melampus) hyena (Crocuta crocuta) and lion (Panthero leo). An attempt is being made to experimentally transmit these parasites to the dog.

(e) Virus Diseases

(i) Bluetongue

As the result of excessive rains during the summer months the natural incidence of the disease was higher than usual. Following upon the period of heavy rainfall, areas of the country in which the disease had not been encountered for many years, experienced sever epizooties. It was a constant feature that non-immunised flocks were most severely affected, whereas in spite of the severity of the epizooties, immunised sheep were generally well protected. The examination of sample of virus from the field, failed to identify any further antigenic types of virus.

With the aid of new developed techniques, the typing of virus strains was facilitated and a considerable saving of time and materials has been brought about. With these new techniques it is now possible to select variants of the virus strains with the view to improvement of the vaccine and to determine the
antibody response of animals to natural exposure as well as artificial infection with virulent and modified strains of virus.

A procedure has been developed to obtain highly purified virus in sufficient quantities to allow chemical analysis and determination of certain physical properties of the virus as well as electron-microscopic study of its morphology.

Severe mortality occurred in the Kenhardt district and the North Western Cape, Karoo area, and the Stellenbosch, Worcester and Calvinia regions due mainly to neglect of timeous immunisation by the stockowners.

Serologically two cases were diagnosed in the Kruger National Park. Two buffalo calves inoculated with live virus showed typical reactions. Later tests showed that they had developed an immunity.

Onderstepoort prepared an issued 25 253 450 doses of the vaccine during the year.

(ii) Horse Sickness

No serious outbreaks were recorded although mortality, due to ideal conditions for the vector after floods and excessive rains, occurred in the Upington, Sterkspruit, Worcester and Standerton districts.

The work on the attenuation of all nine serotypes of African Horse Sickness by serial passage in B.H.K. 21 line cells was continued.

Parallel titrations of freeze-dried tissue culture vaccine (type 9) in horses and in B.H.K. cells showed that the minimum virus dose required to elicit a good serological response in horses is about 10,00 TCID 50.

Multiplication of horse sickness virus was not inhibited by the presence of 5-bromodioxyuridine in the medium, which suggested ribonucleic acid as its nucleic acid component. Replication was, however, markedly inhibited by actinomycin D.

(iii) Heart Water

Heart Water remains one of the biggest decimators of animal life in the enzootic areas despite vaccination and dipping. Movement of susceptible animals into enzootic areas are to a large extent responsible for these losses. In the drought-stricken areas, with a considerable reduction in the tick population, cattle and small stock lost their immunity over the years.
After the good rainfall, when tick life returned to normal, severe mortality occurred in both young and adult stock in the Heart Water enzootic areas.

Large-scale flock immunisations have been carried out successfully and have opened up areas for small stock farming which were previously considered as too dangerous.

(iv) Three-day Stiff Sickness

Severe outbreaks, with mortality, occurred in the Lydenburg and to a lesser degree, without mortality in the Standerton and Estcourt districts. Only sporadic cases were reported from other areas.

Following the successful isolation of the virus of this disease in infant mice and in tissue cultures, some of the biophysical and biochemical characteristics of the virus were determined. It was found to be sensitive to lipid solvents and pH but attempts to study the morphology of the virus particles by electron microscopy has not yet succeeded.

During the year an experimental vaccine prepared from a strain attenuated in tissue culture was investigated. The immune response of cattle inoculated with the vaccine was, however, unsatisfactory and further work on the development of a vaccine is in progress.

It has been established that the virus affects the joints, muscles and loose connective tissue of cattle. Blood vessels are also affected and suspicious virus particles have been found in different cells and blood vessels.

(v) Rift Valley Fever and Wesselsbron Disease

Although several suspicious cases of Rift Valley Fever were reported, these could not be confirmed by laboratory tests.

Four cases of Wesselsbron Disease were diagnosed serologically in buffalo in the Kruger National Park.

(vi) Snotsiekte

Cases, with mortality, occurred in the Pietersburg area. The only contact was sheep which possibly acted as carriers of the disease. A few suspicious cases occurred in the Aliwal North district but they were not confirmed.

(vii) Scrapie
After the two outbreaks in the previous year, following importations of Hampshire Down ewes from the United Kingdom, no further cases have been recorded.

Several flocks of Hampshire Downs, as well as all other flocks associated with imports and contacts with the infected premises were subjected to regular inspections at three monthly intervals. All movements from and to these farms are subject to the permit system.

(viii) Respiratory Virus Diseases of horses

Although a number of viruses have been shown to cause respiratory disease in horses in South Africa, it was believed purely on symptomatology and epidemiology that typical equine influenza does not occur in South Africa.

A serological survey was therefore conducted in order to verify this contention. A total of 150 horse serum samples, representative of most of the horse breeding areas in South Africa were tested for haemagglutination inhibition antibodies against *Myxovirus influenzae* A equi 1 and equi 2 respectively. None of these samples contained antibodies which confirmed that equine influenza does not occur in South Africa.

(ix) Respiratory Virus Diseases of poultry

Infectious bronchitis is very widespread throughout the country. Of 22 specimens examined at the Regional Diagnostic Centre at Stellenbosch all were positive. In Natal the strains encountered did not seem to affect the laying birds materially when occurring without other stress factors such as C.R.D.

During the year a new serological method for the diagnosis of Infectious bronchitis was investigated. By using red blood corpuscles from horses and treating these with tannic acid for use in the indirect haemagglutination test an easy serological test was developed.

(x) Fowl Pox

Although the disease is known to occur throughout the country, no cases were reported. In Natal farmers are not using the vaccine as they should with the result that Fowl Pox was very prevalent during the year. Pox was also very severe in racing pigeons and most of the pigeon fanciers are now vaccinating their squabs with Pigeon Pox vaccine.

(xi) Jaagsiekte
Isolated cases were recorded during the year, but no serious outbreaks were reported.

Experiments to determine whether Jaagsiekte was an inherited condition were concluded and it was proved that the disease was not hereditary. Intra-uterine infection does not take place.

Experiments conducted to determine the possible cause of Jaagsiekte i.e. whether it might be of viral aetiology, failed. Jaagsiekte affected lung tissue was minced and suspended in saline and was then filtered through various sized membranes and inoculated into sheep. None of these animals developed jaagsiekte.

An experimental vaccine consisting of formalised infective material was developed. Sheep were immunised and later challenged with infective material on several occasions in an attempt to simulate natural exposure to the infection. Some of the sheep, however, developed jaagsiekte and the attempts at immunisation therefore failed. As there is no known method of determining the concentration of the infective material, it is possible that the challenge doses were too large and overcame the immunity produced by the vaccine (if any).

A Jaagsiekte-infected flock of about 100 sheep is being maintained under natural conditions.

(f) Infertility and Venereal Diseases

Considerable progress was made in improving the fertility of stock although hampered by serious drought conditions. Low fertility and sterility was caused by poor management, deficiency diseases, avitaminosis and poor quality feedstuffs. This complex of diseases is probably the greatest single factor in the economics of the dairy industry while severe losses were also suffered in the beef and sheep breeding areas.

(i) Vibriosis

This is considered to be the most common condition of dairy cattle throughout the country. 90% of herds in the Ixopo district appeared to be infected and the disease is widespread in other areas. Various surveys are at present being done throughout the country and from preliminary results the incidence varies from 7% to 45%. 4,935 Specimens were examined by the various Regional Diagnostic Centres.

Altogether 532 bovines from 64 herds were examined by the Research Institute and of these 61 animals in 14 herds were found to be infected. Experimental work has resulted in the
production of a vaccine which will be tested before being made available to farmers.

(ii) **Trichomoniasis**

Although this disease has been reported from many areas throughout the country the incidence is limited and only sporadic in nature.

(iii) **Infectious Infertility**

This complex of diseases appears to be widespread in Natal, and the Transvaal Highveld areas and has also been diagnosed in various other areas. With improved diagnostic methods, surveys will no doubt uncover more infected herds.

During the year it was conclusively shown that the virus of the *Infectious Bovine Rhinotracheitis* (I.B.R.) and *Infectious Pustular Vulvovaginitis* (I.P.V.) group are a major cause of genital disease in cattle. Over 1 500 specimens from 100 herds were examined and 87% of these herds were found positive, in most cases associated with herd infertility problems. Most of the negative herds were those in which A.I. was practised.

Five new strains of these two viruses have been isolated and it was shown that these strains differ in their disease-producing potential, varying from very acute to mild symptoms. The virus may cause abortion as it has been isolated from a foetus which was negative for *Brucella abortus* organisms.

During the year specimens from more than 50 farms, on which infertility problems occur in cattle, were tested for *Mycoplasma spp.* Thus far 27 isolations of *Mycoplasma* have been made from cows and bulls in problem herds. A *Mycoplasma spp.* was also isolated from vaginal discharges collected from a field outbreak of vaginitis in sheep. Intravaginal inoculation of this strain of *Mycoplasma* produced hyperaemia and discharge in other ewes.

A bacterial specie which has been identified as *Bacterium anitratum* was isolated on several occasions from acute purulent vaginitis in heifers. Acute purulent vaginitis indistinguishable from "Epivag" has been experimentally reproduced using pure cultures of this organism.

(g) **Diseases of Calves**

(i) **White Scours**

This disease, caused by *E. coli*, is the most important disease of young calves in South Africa. Estimates show that 60% of the mortality of calves before weaning age is due to *E. coli* infection.
Colibacillosis affects young calves either as an acute septicaemia with high mortality before the age of 5 days or as a more chronic diarrhoea in older calves. Although 147 *E. coli* serotypes have been identified surveys have shown that 15 serotypes have been responsible for 85% of the outbreaks.

Inoculation of the cow in calf appears to be the most suitable method of vaccination. Two or more inoculations with a formalised monovalent or polyvalent vaccine have given satisfactory protection to natural infection.

(ii) **Paratyphoid**

This disease occurred sporadically throughout the country and was often associated with bad hygienic conditions. The new vaccine is extensively used but the use of milk substitutes containing antibiotics has led to a break down in immunity in the Pietermaritzburg area.

Although the host-specific *S. Dublin* is the most common cause of paratyphoid a considerable increase in the incidence of the non-specific *S. typhimurium* has also been noticed.

(iii) **Coccidiosis**

Occurs sporadically. Outbreaks have been reported from the Ngotshe district in Natal, the Potgietersrust and Mafeking districts.

(iv) **Calf Diphtheria**

Very few cases have been reported and these were usually associated with unhygienic conditions.

(v) **Sporadic Bovine Encephalomyelitis**

No further cases have been reported.

(h) **Internal Parasites**

During the early part of the year and drought period internal parasites did not cause serious problems. After the abundant rains in summer and autumn, conditions became ideal and internal parasites flourished. The new remedies were a boon to stockowners and more and more farmers are becoming husbandry-conscious, making strategic and tactical dosing of stock a routine practice. They have been able to prove the benefits resulting from the control of internal parasites both in sheep and cattle.
Various projects and surveys are under way to determine the seasonal occurrence of the various parasites in the different ecological regions in order to provide information on which more effective preventive measures could be based. For these surveys 12 487 faeces specimens were collected and examined at the various Regional Laboratories.

During the year *Trichinella spiralis* was found in the Kruger National Park. This is the first recorded case of this parasite in South Africa. Although first found in a lion the hyena has proved to be the most frequent host. In addition the parasite has also been found in the jackal and mouse. Surveys in areas adjoining the Kruger National Park have failed to demonstrate the parasites in other animals. In order to safeguard the export meat market a regular examination of pig carcasses has been instituted. During the latter half of the year 13 747 specimens taken from pork at the various abattoirs were examined with negative results.

During the year, *wireworm*, *H. contortus* and conical fluke caused serious mortality in the Orange Free State while *wireworm*, nodular worm and bancrupt worm caused losses in the Transvaal Highveld. Liver fluke in cattle is becoming increasingly important in the foothills of the Drankensberg where farmers do not all appreciate the importance of veld management and rely too heavily on the use of drugs.

At the Research Institute further experiments are being carried out on the importance of the different intermediate hosts of liver fluke, as well as the control of these hosts.

*Schistosomiasis* was diagnosed in game animals during the previous year. The disease has now been found to exist in cattle in the Barberton Lowveld and a survey to establish the life cycles, hosts, intermediate hosts, pathogenesis and treatment of *schistosomiasis* in cattle is being undertaken.

(i) **External Parasites**

The weather conditions were ideal for ticks, but in Natal, in the compulsory dipping areas, excessive rains also prevented regular dipping of cattle with the result that Babesiosis, anaplasmosis, sweating sickness, heart water and tick toxicosis were all too prevalent. In the Orange Free State the blue tick, brown ticks and bontpoot tick were a menace to cattle while the paralysis tick was a cause for grave concern amongst sheep farmers, especially in the Southern districts of the province. In the Western Cape region only Mossel Bay area can be considered as a tick problem area. In the Eastern Transvaal ticks flourished after the late summer rains and were the cause of disease problems. Ticks remain one of the major problems along the coastal belt and warmer river valleys in the Eastern Cape where farmers are
reluctant to use the expensive insecticides and often dip in dip washes below effective strength.

Research in respect of tick-resistance to the various acaricides is being continued at the Research Institute in collaboration with various Regional Diagnostic Centres. During the year 321 samples from dipping tanks were tested together with 252 collections of ticks taken from farms where the required results with certain acaricides could not be obtained.

In taxonomic studies on collections of African ticks and studies on their biology and occurrence in relation to their environment, the larval, nymphal and adult stages of *Boophilus decoloratus*, the Blue tick, *B. microplus*, the tropical blue tick, and of *Margaropus winthemi*, the winter horse tick, have been described in detail and keys have been drawn up for their identification.

In studies on a disease known as "Spring lamb paralysis" in which *R. evertsi* plays an important role, an increase in the serum sodium and phosphate content was found. The disease was artificially transmitted by infected ticks bred at the Research Institute.

A method has been developed to obtain salivary-gland excretions from ticks and it was found that the saliva of the sand tampan contained a potent toxic substance and also a strong anti-coagulant.

Isolated outbreaks of *Australian Itch* occurred in the Orange Free State, Ixopo and Calvina districts but were effectively controlled by using the organophosphate dips.

A plaque of small biting flies was reported from the Lower Tugela district where many cattle showing severe haemorrhages on the legs. Attempts to control the condition with D.D.T. and B.H.C. and other preparations failed.

Light trap catches of *Culicoides* were continued at Onderstepoort and Kaalplaaas during the year. All traps were analysed as regard the species present and *C. pallidipennis* accounted for 90% or more of the catch throughout the year. 23 Species of *Culicoides* were identified in these catches and most of them were tested by the Virology Section for the presence of the Bluetongue virus.

A single infestation of *Demodicosis* in sheep was found in the Standerton district. Attempts at transmitting the infestation to uninfested sheep by close contact and transference of the demodectic mites proved unsuccessful.
By means of a specially devised in-vitro test consisting of the initial determination of the lowest concentration capable of killing first stage blowfly larvae and thereafter determining the residual concentration of insecticide in the wool of sheep treated with the insecticide under test, series of insecticides were subjected to test throughout the year to determine their protective effect on sheep subjected to attack by blowfly.

A biological survey of the Vaalharts area revealed that Simulium larvae inhabit the floors of all canals which are regularly used. These canals were probably the main foci from which re-infection occurred after the eradication programme in the previous year.

4. OTHER VETERINARY RESEARCH

(i) Reproductive Hormones in Mares

Most satisfactory methods for determining hormones secreted by the ovary of the mare have been perfected. The hormones were isolated in a pure state and their structure and identity proved by classical chemical procedures.

(ii) Reproductive Function in Normal and Aborting Angora Goats

In earlier experiments it has been shown that the glands concerned with stress (adrenals) are intimately concerned in the abortion syndrome. A technique was developed to remove the adrenal glands from the unborn foetus. This procedure did not disturb pregnancy when the glands were only manipulated but not removed. When 25 - 28% of glandular tissue was removed, the majority of foetuses continued to grow, but then died and were aborted. Complete removal of the adrenal glands resulted in prolongation of pregnancy.

It was also found that small to moderate injections of adrenal gland hormones given before 110 days gestation, significantly prolonged pregnancy. Where the dams were injected no adverse effects resulted with administration before the 85th day of gestation. Small doses towards the end of pregnancy precipitated premature births.

Further studies are required but it is clear that adrenal gland function may profoundly influence the course of gestation.

(iii) Cyclical Variations in sexual organs of Africander Cattle

A study of the amounts of oestrogens (hormones inducing oestrus or heat) present during the oestrus cycle was completed. Three major peaks at 0, 4 and 14 days after oestrus were identified. These peaks correspond exactly to times when the weight of the uterus is increased. Very high levels were found at 14 days, and in view of the marked
stimulatory action on the uterus, such activity is probably important in the establishment of a successful pregnancy.

An infertility syndrome characterised by prolonged sexual cycles which are associated with small uteri was investigated. The amount of oestrogens in these animals is markedly reduced at all stages studies (4, 16 and 18 days). Progesterone or "pregnancy hormone" is unusually high during the prolonged period of the cycle. These findings will assist in postulating the primary defect.

(iv) Serological tests for Infection with the Chlamydia

The initial experiments were designed to establish the parameters for the diagnostic tests for psittacosis and *miyagawanellosis*. Two type strains of *Chlamydia* were used, the one causing ovine abortion and the other causing sporadic bovine encephalomyelitis. An avian strain of local origin was subsequently added.

By using the three type antigens in complement fixation tests on numerous field specimens, the presence of ovine abortion in South Africa could not be established.

Attempts to establish a fluorescent antibody test for use in the diagnosis of *Psittacosis* was not very satisfactory.

(v) Toxicity of Dieldrin

In an experiment to establish the toxicity of Dieldrin for domestic animals when used in the eradication of termites, sheep and cattle were fed on Dieldrin impregnated hay at 25 p.p.m. for a period of 12 months. No clinical, pathological, histopathological or chemical pathological symptoms were observed. Accumulation of Dieldrin could, however, be traced in the fat of the animal.

(vi) Use of Electron Microscope

Further observation by using the Electron Microscope was done on animals having died of Heart Water and showing brain lesions.

(vii) Geeldikkop en Enzootic Icterus

Present studies are directed towards determining the role of an infectious agent in precipitating both conditions. Considerable progress has been made in this respect. Studies are also being made on the nature of the anaemia found in both diseases, the various factors in the filed which lead to the annual appearance of each condition and specific lines of treatment which can be adopted.

(viii) "Congenital Skin Hypoplasia"
This rare condition, encountered in lambs of the Dorset Horn and their crosses e.g. Dorpers, is characterised by a deficiency in the formation of collagen fibrils in the skin and subcutis. Breeding experiments using ewes known to have produced affected lambs have so far failed to reproduce the infection.

(ix) Bloat

Studies revealed the highly important role of plan protein as a very active surface-active agent in foam production, and also the foam stabilising effect of minute traces of nickel, zinc, copper and manganese present in plants. Work is continuing to correlate these findings with clinical frothy bloat.

(x) Metabolic Acidosis

Metabolic acidosis arising from the production of Betahydroxy butyric and Acetoacetic acids in pregnancy ketosis has long been thought to be the cause of the nervous symptoms associated with this metabolic disorder. Short term (10 minutes or 6 hours) infusions of these acids were shown not to give rise to the nervous symptoms.

(xi) Movement of Ingesta and Nutrients in Merino Sheep

Chromic indwelling catheters were successfully inserted and maintained in the Vena portae of 4 Merino sheep. Blood bearing nutrients from the digestive tract could thus be tapped on its way to the liver. A chromic sine-wave electromagnetic probe has now been implanted around the Vena portae with a view to measuring the rate of blood flow. In this way it will be possible to determine the amounts and the rates at which nutrients from the digestive tract enter the liver to be metabolised by the animal. The Vena cava has been successfully occluded in two sheep to allow the passage of a temporary catheter from the Vena jugularis through the heart into the Vena hepatica. The development of these techniques will make it possible to carry out liver perfusions of various nutriments in the intact animal. The perfusate would be introduced via the portal catheter and the result of its passage through the liver would be determined by examining hepatic blood draining the liver. Using red cells labelled with radio chromium, anatomises between the portal and caval blood systems have been located in all sheep examined.

(xii) Studies on the Micro-organisms of the Rumen

More work has been done on the growth of Ruminococcus albus in continuous culture with glucose as limiting nutrient. Studies are being carried out to determine the levels of a number of glycolytic and other enzymes in the bacterium grown at various dilution rates to try to obtain an explanation for these results.
The functional group of rumen bacteria fermenting glucose consists of Gram-positive cocci and Gram-negative curved or straight rods. Most of the former showed a high degree of attachment to solid particles of ingesta whereas the latter were largely free in the ruminal fluid.

The methods used for studying the ecology of the bacteria of the rumen were modified. Greater emphasis has been placed on obtaining representative samples of ruminal ingesta, inclusion of organisms attached to solid ingesta in the viable counts, and closer differentiation between colony forms, cell morphologies and, in the case of the cellulolytic bacteria, the zones of cellulolysis produced. These modified methods ironed out the previous fluctuations in results obtained, and on re-examination with the new methods it was found that the mean cellulolytic counts of ruminal flora in sheep conditioned to poor quality teff hay are ten times higher than those found previously. The predominant cellulolytic organisms were composed of Gram-negative curved rods (30 - 50%), Ruminococcus albus-like cocci (20 - 40%) and cocci producing vaque clearings in cellulose growth media (15 - 30%). Further work showed that in the rumen of sheep fed poor teff hay (C.P. 3%) the lack of branch-chain fatty acids from protein limited the growth of Ruminococcus albus-like cocci, while the low dietary nitrogen per se limited the cocci with vaque clearings.

The effect of a supplement of urea and molasses on the digestibility of wheat straw and on the cellulolytic rumen bacteria digesting the straw was determined in a group of 4 Merino sheep. Before starting these animals were on Lucerne hay for more than 12 weeks, thereafter they were conditioned successively to straw alone, supplemented straw, and again straw alone. Digestibility and bacteriological determinations were made on animals conditioned to their diet for at least 6 weeks. On the first occasion on straw alone the predominating cellulolytic bacteria were present in low concentrations of 0,9 millions per ml. of strained ruminal fluid and consisted almost entirely of Ruminococcus albus-like cocci (93%) similar to those found in animals conditioned to Lucerne hay. On the supplemented straw the concentrations rose to 19 million per ml. and rods appeared in addition to the cocci. The proportions of these two morphological types fluctuated continuously but with a tendency for the rods to preponderate. On conditioning the animals to straw alone for a second time, the nature of the predominating cellulolytic organisms was found to be the same as that on the supplemented straw although the concentrations had fallen to 8 million per ml. From these results it would appear that the ruminal flora failed to equilibrate on the supplemented straw, and only stabilised on the straw alone when the previous diet had been Lucerne hay.

In studies on the urea utilisation by ruminal bacteria it was found that the conversion of urea to bacterial protein in the rumen is enhanced by adding branch-chain volatile fatty acids to the diet. It is the carbon skeleton of these acids which are needed for making certain amino acids by processes of transmutation inside the bacteria. Without these special amino acids the proteins of the bacteria cannot be constructed. Thus it is of importance to know the concentration of these and other...
vital nutrients for the bacteria converting urea into protein. A gas/liquid chromatographic method was developed for determining minute amounts of branch-chain and other fatty acids, as well as alcohols and lactic and succinic acids also of importance to rumen micro-organisms. An analysis of all these different organic compounds can be carried out on one and the same sample in 20 minutes.

The study of the factors influencing the adaptation of sheep to the utilisation of biuret was studied. Two sheep were fed biuret for a long period until their ruminal ingesta showed a steady, high level or biuretolytic activity in vitro.

When biuret was then abruptly withdrawn from the ration, the activity of the ingesta dropped markedly after 1 day in one case and after 3 days in the other, and fell to zero by 6 - 15 days respectively. The rapidity of the initial response to the addition or withdrawal of biuret suggests that biuretase is an inducible enzyme which is synthesised only when biuret is fed, by bacteria normally present in the rumen in fair numbers. The availability of additional nitrogen from biuret enables them to increase in number, particularly when there is also a source of readily available carbohydrate, and this constitutes the second phase of the adaptation period.

Ammonia produced by rapid hydrolysis of urea by the ruminal microorganisms was shown to be taken up rapidly by the rumen bacteria in vitro for 15 - 90 minutes, thereafter the uptake becomes negligible. The indications are that during the phase of rapid uptake the ammonia is being stored as glutamine and asparagines, and is used for the synthesis of amino acids only after the fatty acid skeleton of these have also been taken up by the bacteria. Further work along these lines is proceeding with pure cultures of typical rumen bacteria.

(xiii) Investigation of Equine Mortality of Unknown Etiology

During March 1967 mortality among thoroughbred horses in the Kimberley district was investigated. A virus was isolated from the liver and spleen of the horses. A similar virus was isolated from a horse that died at the Police College in Pretoria. This virus does not resemble any known virus and is chloroform stable, heat stable, acid labile, smaller than 50 μm and contains RNA as its nucleic acid. None of the stabled horses on the infected farm contained antibodies against the virus whereas animals exposed to nocturnal insects were immune. Further investigation proved that a similar virus could be isolated from a disease in horses at Onderstepoort and it therefore appears that the virus, which is probably insect borne, has appeared as a widespread in apparent infection in horses during the past summer.

(xiv) Studies on Internal Parasites of Domestic Animals

Further studies were done on the breeding of the three species of snails acting as intermediate hosts of the two species of liver fluke
found in South Africa. Attempts were made to establish the suitability of each of the snails to act as intermediate hosts of liver fluke.

Studies on the life cycle of a rare species of tapeworm in dogs, *Taenia ovis*, which has sheep and goats as intermediate hosts, were continued. The survey of the incidence of tapeworms in rodents, birds and carnivores is also in progress.

During studies on the incidence of Lungworm infestation in sheep and goats it was established that goats are more susceptible than sheep and that only the mature worms have a detrimental effect on the host. Thiabendazole is an effective remedy against the mature parasites in sheep.

New procedures were developed in the testing of the efficacy of worm remedies by concentrating a large number of parasites in a minimal quantity of intestinal contents. Tests have shown that Banmith (Pfizer) is an excellent new vermicide. Holoxon was tested as a treatment for bilharzias infection, and although good results were obtained, the drug proved to be toxic for sheep.

(xv) Chemical Pathology

In the Karoo region studies on the chemical pathology of Geeldikkop and Enzootic Icterus continued and work is proceeding on the analysis of liver and kidney micro-elements in Merino sheep during severe outbreaks of the disease as compared with similar analysis of specimens during periods when the disease does not occur.

(xvi) Fertility Improvement and Herd Performance Schemes

In the North Eastern Transvaal a fertility improvement scheme was embarked upon in the form of a research project covering the whole region. At first this project was an independent one but is now tied up with the Herd Performance Scheme of the Division of Animal Husbandry. The results have been most encouraging and include the testing of bulls, pregnancy testing of cows, efficient recording scheme, testing for genital diseases and herd management. During the year 279 bulls and 5,844 cows were regularly examined.

(xvii) Research work relating to game

It can be accepted that contagious abortion is endemic in the hippopotamus and buffalo in the Kruger National Park. Attempts are being made to isolate and type the organism. During the past year tests were carried out on impala, gnu, zebra, kudu, elephant, baboon, giraffe, hyena and buffalo. 164 Specimens were tested and only the buffalo was found to show positive reaction.
In studies on abscessation in game animals the bacterium *Gaffkya terragena*, which is associated with abscessation of the oral cavity in the human, was recently isolated from the spleen of a baboon suffering from a deep seated tooth abscess.

*Actinomycosis* was established in the impale, while *Coryne bacterium* species were obtained from sternal abscesses in impala. *Staphylococcus aureus* was isolated from abscesses in the spinal column of impala showing in co-ordination of movement and one apparently healthy hyena harboured this bacterium in the spleen.

Two cases of Bluetongue were diagnosed in buffalo calves and confirmed serologically. Later tests proved that these animals had developed an immunity.

The results of work done on *Besnoitiosis* at Skukuza indicate that the impala and gnu have biologically different strains of *B. besnoitia*.

*Hepatozoon* species were found in the cheetah (*Acinonyx jubatus jubatus*) impale (*Apyceros melampus*) hyena (*Crocuta crocuta*) and lion (*Panthero leo*). Attempts are being made to transmit this parasite to the dog for experimental purposes.

In the Buffalo Reproduction Project material from 100 buffalo in the Kruger National Park were collected at random. Ethological observations are done weekly on a large buffalo herd. Amongst the generalisations which can be made at present are:

(i) There is a defined breeding reason.
(ii) Cows are poly-oestrus, the cycle being 23 days.
(iii) Pregnancy is between 10 and 11 months.
(iv) Oestrus commences at 3 years of age.

In studies on the incidence of internal parasites of game animals the following parasites were demonstrated:

*Delafondia vulgaris* in the Zebra
*Linguatula serrata* in the lion, gnu, buffalo and impala
*Cordophillus sagittus* in the Kudu and bushbuck
*Cysticercosis* in the impala, buffalo and gnu
*Hydatidosis* in zebra, impala, buffalo, hippopotamus, hyena and lion

A check list of internal parasites in the buffalo was made during the buffalo project in the Crocodile River section of the Kruger National Park. A total of 18 parasites of which 13 were found for the first time in South Africa, were identified.

1968 Physiological and Clinical Pathological observations and 434 post mortem examinations were done on game animals in the Kruger
National Park. 85 Game animals were immobilised, 19 were marked and 43, of which 21 were elephants were transported to other areas.

5. VACCINE PRODUCTION

As indicated in the table below there has been a considerable increase in the production of vaccines by the Research Institute. From 84.5 million doses during the previous year to 92 million doses during the present year represents an increase of 9%. 26 Different vaccines were produced. The demand for 3 out of the 4 new vaccines made available during the previous year was so high that it exceeded production. New production methods will exclude these temporary shortages.

The statistics are:

**Bacterial Vaccines Produced**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>1964/65</th>
<th>1965/66</th>
<th>1966/67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulpy kidney</td>
<td>34 111 150</td>
<td>34 903 800</td>
<td>37 920 380</td>
</tr>
<tr>
<td>Bloedpens</td>
<td>384 750</td>
<td>399 450</td>
<td>276 100</td>
</tr>
<tr>
<td>Lamsiekte</td>
<td>4 066 550</td>
<td>3 545 930</td>
<td>3 013 690</td>
</tr>
<tr>
<td>Lamsiekte (mink)</td>
<td>-</td>
<td>-</td>
<td>370</td>
</tr>
<tr>
<td>Anthrax</td>
<td>11 402 940</td>
<td>10 585 448</td>
<td>10 212 500</td>
</tr>
<tr>
<td>Black Quarter</td>
<td>2 791 150</td>
<td>2 793 552</td>
<td>2 862 262</td>
</tr>
<tr>
<td>Dikkopsiekte</td>
<td>3 300</td>
<td>15 150</td>
<td>5 050</td>
</tr>
<tr>
<td>C.A. bovine</td>
<td>495 918</td>
<td>424 522</td>
<td>544 798</td>
</tr>
<tr>
<td>C.A. sheep</td>
<td>313 410</td>
<td>371 010</td>
<td>338 234</td>
</tr>
<tr>
<td>Fowl typhoid</td>
<td>1 285 400</td>
<td>1 566 800</td>
<td>1 460 200</td>
</tr>
<tr>
<td>Paratyphoid</td>
<td>362 874</td>
<td>295 932</td>
<td>310 830</td>
</tr>
<tr>
<td>Tetanus</td>
<td>7 305</td>
<td>12 735</td>
<td>51 515</td>
</tr>
<tr>
<td>Coryne bacterium pyogenes</td>
<td>13 060</td>
<td>16 500</td>
<td>131 440</td>
</tr>
<tr>
<td>Coryne bacterium ovis</td>
<td>114 760</td>
<td>123 780</td>
<td>212 860</td>
</tr>
<tr>
<td>Pasteurella</td>
<td>44 270</td>
<td>62 580</td>
<td>357 000</td>
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<tr>
<td><strong>14 Vaccines</strong></td>
<td>55 396 837</td>
<td>55 117 189</td>
<td>57 707 229</td>
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**Virus Vaccine**

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<th>1965/66</th>
<th>1966/67</th>
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</thead>
<tbody>
<tr>
<td>Bluetongue</td>
<td>20 575 450</td>
<td>22 523 200</td>
<td>25 253 450</td>
</tr>
<tr>
<td>Fowl Pox</td>
<td>4 858 400</td>
<td>5 269 600</td>
<td>5 400 700</td>
</tr>
<tr>
<td>Pigeon Pox</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rabies</td>
<td>287 727</td>
<td>326 175</td>
<td>218 743</td>
</tr>
<tr>
<td>Lumpy Skin</td>
<td>587 716</td>
<td>535 010</td>
<td>663 048</td>
</tr>
<tr>
<td>Horse Sickness</td>
<td>112 438</td>
<td>98 448</td>
<td>180 370</td>
</tr>
<tr>
<td>Distemper</td>
<td>14 580</td>
<td>15 241</td>
<td>15 221</td>
</tr>
<tr>
<td>Distemper (mink)</td>
<td>-</td>
<td>-</td>
<td>390</td>
</tr>
<tr>
<td>Newcastle</td>
<td>181 100</td>
<td>320 400</td>
<td>1 765 200</td>
</tr>
<tr>
<td>Rift Valley/Wesselsbron</td>
<td>22 000</td>
<td>12 500</td>
<td>23 400</td>
</tr>
<tr>
<td><strong>9 Vaccines</strong></td>
<td>26 639 411</td>
<td>29 100 574</td>
<td>33 769 222</td>
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**Other Vaccines**

<table>
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<th>1965/66</th>
<th>1966/67</th>
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<td>Other Vaccines</td>
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<td>1965/66</td>
<td>1966/67</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Heart Water Blood</td>
<td>44 169</td>
<td>43 216</td>
<td>40 523</td>
</tr>
<tr>
<td>Anaplasmosis</td>
<td>300 755</td>
<td>246 166</td>
<td>338 786</td>
</tr>
<tr>
<td>Red water</td>
<td>51 792</td>
<td>49 735</td>
<td>50 676</td>
</tr>
<tr>
<td>3 Vaccines</td>
<td>396 716</td>
<td>339 117</td>
<td>429 985</td>
</tr>
</tbody>
</table>

Total amount vaccine issued

| 26 Vaccines | 82 432 964 | 84 556 880 | 91 906 436 |

In addition to the above vaccines, the following diagnostic antigens were also prepared and issued:

- B.W.D. antigen ................................................................. 42 265
- Brucella Ring test Antigen ..................................................... 1 371
- Mallein ............................................................................... 95
- Tuberculin (Bovine) ............................................................. 236 810
- Tuberculin (Avian) ............................................................... 68 630
- Total .................................................................................. 349 171

Vaccines produced by the various Regional Diagnostic Centres

- Anaplasmosis ................................................................. 49 224
- Red Water ................................................................. 12 492
- Heart Water .............................................................. 22 573
- Wart Vaccine ............................................................... 7 512
- Vuilbek Vaccine ........................................................... 2 307
- E. Coli vaccine ............................................................ 300

1 520 ml Leptospirosis antigen was prepared by the Regional Diagnostic Centre at Stellenbosch.

6. OTHER VETERINARY SERVICES

(a) Blood Group Studies

In an extensive study on the blood of South African sheep breeds, haemoglobin was studied in relation to electrolytes, such as Potassium. It was shown that all sheep show relatively low Hb\(^A\) frequency. Variations of the hematocrit (packed cell volume) values were observed between the various breeds and between sexes, males having the higher.

The mean values for high K. and low K. estimates varied between the breeds, whereas low K\(^H\) type frequencies were observed in the Merino, German Merino and Dorpers with Dorpers showing a fairly even distribution of both K+ types. In continuation of these studies on sheep blood, further chemical analysis was made possible by the use of an atomic absorption spectrophotometer. In these studies, it is the purpose to ascertain whether a correlation exists between antibody production and electrolyte concentration of the blood.
Routine tests on fatherhood determinations, diagnosis of identical twins and fertility diagnosis of heifers from twin pairs of opposite sexes were undertaken. The research included various aspects of which the production of test sera was the most important. Studies on hereditary differences in serum albumens were also completed.

The initial comparative tests of horse breeds in relation to haemoglobin, transferine, albumen and esterase types were completed. Distinct breed differences were found and it is clear that these methods can be used in fatherhood determinations.

Numerous immunity tests on sheep were done in an attempt to produce antibodies for use as blood group reagents. A series of haematological values were studied which were probably influenced by the immunisations.

(b) Diagnostic Services

The Onderstepoort Research Institute still plays a vital role in the rendering of diagnostic services, but the general trend is that routine diagnostics are carried out at the Regional Diagnostic Centres in the field and that Onderstepoort mainly assists with aspects which require techniques of a more specialised nature. A start was also made with the establishment of a separate Regional Diagnostic unit at Onderstepoort and members of the field personnel commenced to function in this capacity of the Institute. In the field itself 18 laboratories are presently in operation where, during the year, 12 588 post mortem examinations were conducted and 153 946 different specimens examined or tested. In addition to routine regional diagnoses these centres also play an important role in animal disease surveys, veterinary extension work, investigation of animal disease control problems, animal health and disease eradication schemes and in the execution of research projects in co-operation with the Central Research Institute.

Material for Diagnostic Services were dealt with as follows:

(i) Research Institute at Onderstepoort

Specimens received from the Republic of South Africa:

From poultry ............................................................ 1 740
Other ................................................................. 16 311
Total ................................................................. 18 051

Specimens received from outside the Republic:
Grant total of specimens received 18 645.

In addition to the above the clinical departments of the Veterinary Faculty received the following animals and specimens for treatment and/or examination:

<table>
<thead>
<tr>
<th>Animals</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovines</td>
<td>101</td>
</tr>
<tr>
<td>Sheep</td>
<td>80</td>
</tr>
<tr>
<td>Goats</td>
<td>43</td>
</tr>
<tr>
<td>Equines</td>
<td>26</td>
</tr>
<tr>
<td>Pigs</td>
<td>27</td>
</tr>
<tr>
<td>Dogs</td>
<td>2 759</td>
</tr>
<tr>
<td>Cats</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3 114</strong></td>
</tr>
</tbody>
</table>

During the year 13 423 clinical-pathological examinations were done on 1 463 individual cases, and 392 pregnancy tests were done on mares.

(ii) Regional Diagnostic Centres

<table>
<thead>
<tr>
<th>Post Mortems</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goats</th>
<th>Equines</th>
<th>Pigs</th>
<th>Dogs</th>
<th>Other</th>
<th>Poultry</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Regional Centres</td>
<td>511</td>
<td>1 487</td>
<td>21</td>
<td>14</td>
<td>153</td>
<td>39</td>
<td>2 752</td>
<td>7 611</td>
</tr>
<tr>
<td>At other offices</td>
<td>1 017</td>
<td>437</td>
<td>296</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>905</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1 528</td>
<td>1 924</td>
<td>317</td>
<td>21</td>
<td>168</td>
<td>43</td>
<td>3 657</td>
<td>7 616b</td>
</tr>
</tbody>
</table>

Specimens examined at Regional Diagnostic Centres

<table>
<thead>
<tr>
<th>Specimens examined at Regional Diagnostic Centres</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucella agglutination tests</td>
<td>46 113</td>
</tr>
<tr>
<td>Brucella Milk Ring tests</td>
<td>1 284</td>
</tr>
<tr>
<td>Vibriosis</td>
<td>4 935</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>12 076</td>
</tr>
<tr>
<td>Antibigrams</td>
<td>250</td>
</tr>
<tr>
<td>Serapings</td>
<td>243</td>
</tr>
<tr>
<td>Faeces examinations</td>
<td>12 487</td>
</tr>
<tr>
<td>Mastitis</td>
<td>4 716</td>
</tr>
<tr>
<td>Semen</td>
<td>3 378</td>
</tr>
<tr>
<td>Haematological</td>
<td>2 885</td>
</tr>
<tr>
<td>Chemical</td>
<td>14 676</td>
</tr>
<tr>
<td>Poisons</td>
<td>313</td>
</tr>
<tr>
<td>Bacteriological</td>
<td>3 135</td>
</tr>
<tr>
<td>Virus isolations</td>
<td>238</td>
</tr>
<tr>
<td>Serum Virus Neutralisation</td>
<td>-</td>
</tr>
<tr>
<td>Biological</td>
<td>123</td>
</tr>
<tr>
<td>Trichinella examination</td>
<td>1 563</td>
</tr>
<tr>
<td>Fertility</td>
<td>1 911</td>
</tr>
</tbody>
</table>
In addition to the above, 1 586 specimens were submitted to the Research Institute for examinations of a more specialised nature.

7. VETERINARY FIELD SERVICES

(a) Surveys

Various surveys on the incidence of diseases were done throughout the country.

*Myxovirus parainfluenza* - Three has long been recognised as a common respiratory pathogen in man and in recent years it was also shown to be widespread among cattle in various overseas countries. This virus has also lately been incriminated as the causal agent of abortion and sterility in bovines and its isolation from other animals was also reported. A serological survey was therefore conducted in order to determine the presence and distribution of the virus in South Africa. A total of 527 serum samples from domestic animals and 100 samples from game animals were examined, and it was found that the virus was widely prevalent in sheep and cattle and to a lesser extent in dogs and horses. No evidence of the virus could be found in pigs, goats and poultry. The survey also demonstrated the presence of the virus in a large number of wild animal species such as buffalo, kudu, eland, impala, roan antelope, sable antelope, blue wildebeest, waterbuck, reedbuck, hippopotamus, rhinoceros, rock rabbit and monkey.

As a result of the discovery of *Trichinella spiralis* in game animals in the Kruger National Park, a survey is being conducted at all the larger abattoirs on pig carcasses. The technique applied is the "Hot oven" method whereby sections of the diaphragm from every pig slaughtered are digested in distilled water, pepsin, salt and hydrochloric acid. This material is then put through a 300 mesh sieve and the residue is examined under the microscope. During the year 13 747 specimens were examined and no evidence of the parasite in domestic animals were found.

In the winter rainfall area a survey on the incidence of *Leptospirosis* in domestic animals continued. During the year 10 585 specimens from various domestic animals were examined of which 371 were found positive. This survey will eventually include the whole of the winter rainfall area.

In a survey of mineral deficiencies 29 farms in the winter rainfall area were surveyed. The acquisition of the necessary equipment was greatly facilitated this work which will eventually be extended to cover every ecological area of the region.
A survey of fertility in sheep flocks and lamb mortality in the Bredasdorp, Calvinia, Ermelo and Standerton districts continued. Other areas were included in the survey during the year and will eventually cover the whole country. Valuable information on peri-natal mortality of lambs and infertility of sheep flocks has already been gathered.

A country wide survey of Brucella infections in cattle and sheep was undertaken to establish the incidence of this disease and effect of increased prophylactic vaccination.

In the Eastern Transvaal a large scale survey is being conducted in respect of the incidence of diseases such as Vibriosis, Brucellosis, tuberculosis, parasitic infestations in the beef ranching areas.

In most parts of the country special attention was given to the presence of poisonous plants as many of these plants caused serious problems during the drought periods when stock were forced to eat any available material.

(b) Clinical Services

In addition to normal routine duties, State Veterinarians in the field provide clinical services to stock owners in areas where no private veterinary practitioners are available. During the year 26 853 animals were examined and treated for which R26,033.81 was collected and professional services and R7,940.82 charged for mileage fees.

Vaccines sold to stock owners by State Veterinary offices amounted to R26,220.15. This brought the total collections to R60,194.78.

In addition to the above, clinical services were provided to all State owned herds.

In order to supply material for practical training of students the Veterinary Faculty at Onderstepoort provides animals, mainly from the vicinity of Onderstepoort, for students to gain experience. During the year 7,062 cases were presented at the Faculty of which 3,114 specified hereunder, were available for surgical and medical treatment.

<table>
<thead>
<tr>
<th>Animals</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovines</td>
<td>101</td>
</tr>
<tr>
<td>Sheep</td>
<td>80</td>
</tr>
<tr>
<td>Goats</td>
<td>43</td>
</tr>
<tr>
<td>Equines</td>
<td>26</td>
</tr>
<tr>
<td>Pigs</td>
<td>27</td>
</tr>
<tr>
<td>Dogs</td>
<td>2,759</td>
</tr>
<tr>
<td>Cats</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,114</strong></td>
</tr>
</tbody>
</table>
(c) **Artificial Insemination Services**

During the year 8 new bulls were tested and 29 bulls, previously approved were retested for A.I. co-operatives and breeders. Two bulls with high titre antibodies for I.B.R./I.P.V. had to be rejected.

The infertility survey which was started in the previous year was extended across the Transvaal border and several herds in Natal, the Orange Free state and Cape Province have now been included. During the year 60 herds were thoroughly investigated and it was found that the I.B.R./I.P.V. syndrome plays by far the most important role together with Brucellosis to a lesser degree, while Vibriosis and Trichomoniasis are almost insignificant.

During the year three training courses in A.I. were given at Onderste-poort. All of the 42 students who attended were successful. These courses are getting progressively more popular and 40 students have already applied for the next course.

Two short courses in Artificial Insemination for farmers were held at Cedara and 14 at Potchefstroom which were attended by a total of 159 farmers.

(d) **Health Schemes**

Details of the various schemes are as follows:

(i) **Bacillary White Diarrhoea**

<table>
<thead>
<tr>
<th>Region</th>
<th>Farms</th>
<th>Fowls</th>
<th>Positive</th>
<th>Suspicious</th>
<th>Holders</th>
<th>No. of Fowls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Rainfall</td>
<td>33</td>
<td>133900</td>
<td>-</td>
<td>5</td>
<td>31</td>
<td>594165</td>
</tr>
<tr>
<td>Cape East and Karoo</td>
<td>10</td>
<td>25497</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>38997</td>
</tr>
<tr>
<td>Natal</td>
<td>34</td>
<td>159366</td>
<td>1</td>
<td>238</td>
<td>35</td>
<td>250850</td>
</tr>
<tr>
<td>Orange Free State</td>
<td>4</td>
<td>4075</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>13490</td>
</tr>
<tr>
<td>Transvaal</td>
<td>82</td>
<td>220235</td>
<td>10</td>
<td>46</td>
<td>81</td>
<td>1304734</td>
</tr>
<tr>
<td>Highveld</td>
<td>25</td>
<td>135583</td>
<td>-</td>
<td>37</td>
<td>22</td>
<td>487770</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>2</td>
<td>1857</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1857</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>190</td>
<td>680513</td>
<td>11</td>
<td>326</td>
<td>186</td>
<td>2685867</td>
</tr>
</tbody>
</table>

(ii) **P.P.L.O. Scheme for Fowls**

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Certificate holders</th>
<th>Number of Fowls</th>
<th>Other Fowls Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Rainfall</td>
<td>41</td>
<td>58140</td>
<td>-</td>
</tr>
<tr>
<td>Cape East &amp; Karoo</td>
<td>3</td>
<td>26900</td>
<td>-</td>
</tr>
<tr>
<td>Natal</td>
<td>69</td>
<td>157484</td>
<td>62228</td>
</tr>
<tr>
<td>Orange Free State</td>
<td>1</td>
<td>1467</td>
<td>-</td>
</tr>
<tr>
<td>Transvaal</td>
<td>32</td>
<td>201963</td>
<td>-</td>
</tr>
<tr>
<td>Highveld</td>
<td>5</td>
<td>21978</td>
<td>-</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>151</td>
<td>567932</td>
<td>62228</td>
</tr>
</tbody>
</table>
In spite of no P.P.L.O. testing being done in the winter rainfall area during the last quarter of the year due to the outbreak of N.C.D., there was a slight increase in the overall number of participants in this Scheme.

In Natal there was continued support for the scheme and 54 flocks, not yet certified were regularly tested in addition to the other flocks which have already been certified free of the disease.

The poultry industry in Natal is expanding rapidly, mainly due to the expansion of certain farms whose target is put at 100 000 broilers per week. From the diagnostic, bacterial and viral angles this expansion. Of course is increasing the work of the Diagnostic Centre tremendously. When these large farming entities are in full production, the B.W.D. and P.P.L.O. testing will be full time work for at least one man.

No progress was made in other areas of the country because poultry farmers not already in these health schemes lack the necessary interest.

(iii) Pig Recording and Health Scheme

No progress has been made with this health scheme and at present there are 34 participants with a total of 7 617 pigs.

(e) Meat Inspection Services

The following numbers of animals and carcasses were inspected at abattoirs for export purposes, by officers of the Division:

- Cattle ............................................................... 36 863
- Sheep ............................................................. 2 442
- Pigs ............................................................... 154 741

In compliance with the relevant provisions of the Fertilizers, Farm Feeds, Seeds and Remedies Act (Act No. 36 of 1947) the Division also inspected and approved 89 sterilisation plants, which mainly manufacture bone and fish meal.

Studies, in collaboration with the Meat Control Board, were conducted to establish the weight loss of Dorper sheep. Weights of sheep and carcasses slaughtered in the Karoo were compared with weights after slaughter at Onderstepoort. The weight loss of 1,4% is regarded as insignificant for statistical purposes. In the livers and rumen contents however, a weight loss of 14% and 19% respectively was found.

During the year 207 horses, 1 074 sheep and goats, 420 cattle, 143 pigs and 4 010 poultry were slaughtered at the experimental abattoirs at Onderstepoort. In addition 38 cattle and 221 sheep were
slaughtered for the Meat Control Board for experimental purposes, and 16 cattle, 30 sheep and 9 goats for the Experimental farm of the University of Pretoria, 62 cattle from Armoedsvlakte, 30 cattle from Bethlehem, 19 cattle from Mara and 154 cattle from the Research Institute at Irene, giving a grand total of 319 cattle, 251 sheep and 9 goats slaughtered for experimental purposes for other Divisions of the Department.

Research is continuing on the identification of biltong and meat.

(f) **Stock Inspection Services**

The new function of Veterinary Field Services, to provide animal health services, as well as the increasing attention required to eradicate erosion diseases, has necessitated the revision of stock inspection services in the light of modern requirements. The intervals of farm visits are being adjusted in accordance with the potential dangers of epizootic diseases in the particular areas and the health services required.

During routine inspection and visits to farms in order to comply with disease control legislation, the inspectorate staff is also used for the collection of information and specimens for the various surveys which are being conducted.

In the Bantu areas, Bantu Assistant Stock Inspectors, trained at Fort Cox in the basic veterinary requirements, are employed. In general they have proved to be very successful appointments. These Bantu Assistant Stock Inspectors, apart from being used in the various disease eradication schemes, are extremely useful for extension services to their own people.

(g) **Extension Services**

Veterinary extension services have increased considerably during the past year and is a matter of the utmost importance. Lectures have been given at Farmer's Day on a variety of subjects, study groups have been attended and advised, film shows have been organised and schools have been addressed. The closest collaboration and co-operation is maintained with all the other Divisions of the Department engaged on similar functions.

8. **TRAINING**

(a) **Veterinarians**

The following numbers of students were in the process of training in Veterinary Science at Onderstepoort:

<table>
<thead>
<tr>
<th>Course</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.V.Sc II</td>
<td>45</td>
</tr>
<tr>
<td>B.V.Sc III</td>
<td>50</td>
</tr>
<tr>
<td>B.V.Sc IV</td>
<td>44</td>
</tr>
</tbody>
</table>
During the year 39 students obtained their B.V.Sc degree to qualify as veterinarians. In September 1966, two veterinarians obtained the D.V.Sc degree and another three veterinarians qualified for this degree during March 1967.

During the year additional facilities were added to the Faculty complex at Onderstepoort.

(b) Other Veterinary Training

During September 1966 a refresher course of one week was held at Onderstepoort. The main topics of lectures were on peri-natal mortality of lambs and the course was attended by 27 veterinarians from various parts of the country.

Officers of the Department were responsible for the teaching of veterinary subjects at the various agricultural colleges, were the syllabuses are adopted to a one year diploma course. Standardised lectures have been compiled.

Veterinarians are actively concerned with the training of field technicians and syllabuses, in both languages have been standardised and compiled. The technician's specialised Veterinary training, after completion of the basic course, is now being given at Allerton Laboratory in Natal in the form of a programmed course over 4 months.

9. IMPORT AND EXPORT CONTROL

The import and export control requirements were maintained during the year and the following animals and products were involved:

Animals imported for slaughter purposes from Swaziland and South West Africa

<table>
<thead>
<tr>
<th>Animal</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>145 759</td>
</tr>
<tr>
<td>Sheep</td>
<td>131 345</td>
</tr>
<tr>
<td>Goats</td>
<td></td>
</tr>
</tbody>
</table>

Veterinary examination and certification in accordance with requirements of importing countries in respect of the following animals were undertaken for export purposes:

Export of animals

<table>
<thead>
<tr>
<th>Animal</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>20 955</td>
</tr>
<tr>
<td>Sheep</td>
<td>90 216</td>
</tr>
<tr>
<td>Goats</td>
<td>1 464</td>
</tr>
<tr>
<td>Pigs</td>
<td>4 738</td>
</tr>
<tr>
<td>Equines</td>
<td>1 065</td>
</tr>
<tr>
<td>Animal</td>
<td>Quantity</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Poultry</td>
<td>1,010,083</td>
</tr>
<tr>
<td>Birds</td>
<td>335</td>
</tr>
<tr>
<td>Dogs</td>
<td>867</td>
</tr>
<tr>
<td>Cats</td>
<td>114</td>
</tr>
<tr>
<td>Chinchillas</td>
<td>22</td>
</tr>
<tr>
<td>Wild animals</td>
<td>193</td>
</tr>
<tr>
<td>Rabbits</td>
<td>13</td>
</tr>
<tr>
<td>Penguins</td>
<td>30</td>
</tr>
<tr>
<td>Circus animals</td>
<td>3</td>
</tr>
</tbody>
</table>

**Import of animals**

The following animals were imported for farming purposes and had to comply with prescribed safety and quarantine requirements:

<table>
<thead>
<tr>
<th>Animal</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>3,915</td>
</tr>
<tr>
<td>Sheep</td>
<td>24,956</td>
</tr>
<tr>
<td>Goats</td>
<td>3,357</td>
</tr>
<tr>
<td>Pigs</td>
<td>6</td>
</tr>
<tr>
<td>Equines</td>
<td>78</td>
</tr>
<tr>
<td>Dogs</td>
<td>1,213</td>
</tr>
<tr>
<td>Cats</td>
<td>307</td>
</tr>
<tr>
<td>Birds</td>
<td>68,721</td>
</tr>
<tr>
<td>Monkeys and Baboons</td>
<td>97</td>
</tr>
<tr>
<td>Chinchillas</td>
<td>94</td>
</tr>
<tr>
<td>Wild animals</td>
<td>460</td>
</tr>
<tr>
<td>Tropical fish</td>
<td>488,354</td>
</tr>
<tr>
<td>Circus animals</td>
<td>3</td>
</tr>
<tr>
<td>Snakes</td>
<td>15</td>
</tr>
<tr>
<td>Elephants</td>
<td>2</td>
</tr>
</tbody>
</table>

**Export of products**

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>28,447,926 lbs.</td>
</tr>
<tr>
<td>Mutton</td>
<td>130,642 lbs.</td>
</tr>
<tr>
<td>Pork</td>
<td>5,370,564 lbs.</td>
</tr>
<tr>
<td>Poultry</td>
<td>30,478 lbs.</td>
</tr>
<tr>
<td>Ostrich feathers</td>
<td>20,819 lbs.</td>
</tr>
<tr>
<td>Wool</td>
<td>164,383,417 lbs.</td>
</tr>
<tr>
<td>Hides and Skins</td>
<td>11,622,626 units</td>
</tr>
<tr>
<td>Cattle horns</td>
<td>1,851,940 lbs.</td>
</tr>
<tr>
<td>Feathers</td>
<td>8,000 lbs.</td>
</tr>
<tr>
<td>Ostrich Skins</td>
<td>161,897 lbs.</td>
</tr>
<tr>
<td>Cow Tails</td>
<td>77,696 lbs.</td>
</tr>
<tr>
<td>Canned Meat</td>
<td>1,553,020 lbs.</td>
</tr>
<tr>
<td>Karakul Pelts</td>
<td>1,192,113 units</td>
</tr>
<tr>
<td>Mohair</td>
<td>6,333,724 lbs.</td>
</tr>
<tr>
<td>Sausage Casings</td>
<td>270,218 lbs.</td>
</tr>
<tr>
<td>Ox Gall</td>
<td>63,837 lbs.</td>
</tr>
<tr>
<td>Chinchilla Pelts</td>
<td>382 units</td>
</tr>
<tr>
<td>Processed Skins and Trophies</td>
<td>376 units</td>
</tr>
<tr>
<td>Bacon Sides</td>
<td>5,137,517 lbs.</td>
</tr>
<tr>
<td>Product</td>
<td>Quantity</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Whale Meat</td>
<td>222,860 bags</td>
</tr>
<tr>
<td>Equine Meat</td>
<td>477,606 lbs.</td>
</tr>
<tr>
<td>Fish Meal</td>
<td>348,480 lbs.</td>
</tr>
<tr>
<td>Biltong</td>
<td>42 lbs.</td>
</tr>
<tr>
<td>Bone Fertilizer</td>
<td>222,000 lbs.</td>
</tr>
</tbody>
</table>

**Import of products**

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biltong</td>
<td>246,686 lbs.</td>
</tr>
<tr>
<td>Canned Meat</td>
<td>785,140 lbs.</td>
</tr>
<tr>
<td>Frozen Meat</td>
<td>10,329,562 lbs.</td>
</tr>
<tr>
<td>Cream</td>
<td>53,772 gallons</td>
</tr>
<tr>
<td>Skins</td>
<td>9,113 units</td>
</tr>
<tr>
<td>Pelts</td>
<td>7,600 units</td>
</tr>
<tr>
<td>Blood Meal</td>
<td>112,415 lbs.</td>
</tr>
<tr>
<td>Manure</td>
<td>8,600 lbs.</td>
</tr>
<tr>
<td>Carcass Meal</td>
<td>2,324,127 lbs.</td>
</tr>
<tr>
<td>Bone Meal</td>
<td>1,772,900 lbs.</td>
</tr>
<tr>
<td>Skins</td>
<td>2,453,542 lbs.</td>
</tr>
<tr>
<td>Fish Eggs</td>
<td>545,000 units</td>
</tr>
<tr>
<td>Bull Semen</td>
<td>508 doses</td>
</tr>
<tr>
<td>Eggs</td>
<td>182 dozen</td>
</tr>
<tr>
<td>Sausage Casings</td>
<td>1,974,015 lbs.</td>
</tr>
<tr>
<td>Gall</td>
<td>3,829 lbs.</td>
</tr>
<tr>
<td>Bones</td>
<td>270,000 lbs.</td>
</tr>
<tr>
<td>Horns</td>
<td>20,450 lbs.</td>
</tr>
<tr>
<td>Bristles</td>
<td>276,647 lbs.</td>
</tr>
<tr>
<td>Wool</td>
<td>4,932,136 lbs.</td>
</tr>
<tr>
<td>Tallow</td>
<td>1,134,416 lbs.</td>
</tr>
<tr>
<td>Butter</td>
<td>4,572,964 lbs.</td>
</tr>
<tr>
<td>Casein</td>
<td>146,701 lbs.</td>
</tr>
<tr>
<td>Pancreatic Glands</td>
<td>50,452 lbs.</td>
</tr>
<tr>
<td>Feathers</td>
<td>2,260 lbs.</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>167,698,054 lbs.</td>
</tr>
<tr>
<td>Bacon Sides</td>
<td>2,000 lbs.</td>
</tr>
<tr>
<td>Mineral Stock Feed</td>
<td>121,100 lbs.</td>
</tr>
</tbody>
</table>
10. CENSUS OF STOCK

<table>
<thead>
<tr>
<th>Region</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goats</th>
<th>Horses</th>
<th>Donkeys &amp; Mules</th>
<th>Pigs</th>
<th>Dogs</th>
<th>Poultry</th>
<th>Chinchillas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter rainfall</td>
<td>282 004</td>
<td>4 058 791</td>
<td>959 409</td>
<td>456 542</td>
<td>21 668</td>
<td>13 930</td>
<td>109 194</td>
<td>106 139</td>
<td>3 976 056</td>
</tr>
<tr>
<td>Cape East &amp; Karoo</td>
<td>1 035 037</td>
<td>12 015 307</td>
<td>457 433</td>
<td>1 307 003</td>
<td>47 147</td>
<td>25 408</td>
<td>113 318</td>
<td>-</td>
<td>1 365 726</td>
</tr>
<tr>
<td>Natal</td>
<td>2 569 694</td>
<td>1 658 203</td>
<td>240 911</td>
<td>804 831</td>
<td>51 375</td>
<td>47 622</td>
<td>116 496</td>
<td>283 249</td>
<td>3 900 481</td>
</tr>
<tr>
<td>Orange Free State</td>
<td>1 229 157</td>
<td>4 502 656</td>
<td>3 003 446</td>
<td>549 054</td>
<td>62 933</td>
<td>32 883</td>
<td>64 773</td>
<td>61 304</td>
<td>683 920</td>
</tr>
<tr>
<td>Transvaal</td>
<td>2 045 748</td>
<td>2 152 761</td>
<td>5 003 354</td>
<td>388 661</td>
<td>53 657</td>
<td>17 242</td>
<td>284 594</td>
<td>279 204</td>
<td>6 868 632</td>
</tr>
<tr>
<td>Highveld</td>
<td>2 664 907</td>
<td>5 344 556</td>
<td>569 176</td>
<td>260 725</td>
<td>127 212</td>
<td>20 419</td>
<td>126 972</td>
<td>2 714 408</td>
<td>1 610</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>823 588</td>
<td>65 244</td>
<td>248 236</td>
<td>612 301</td>
<td>2 278</td>
<td>46 208</td>
<td>61 542</td>
<td>68 585</td>
<td>674 175</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10 650 135</strong></td>
<td><strong>29 797 518</strong></td>
<td><strong>5 978 965</strong></td>
<td><strong>4 379 117</strong></td>
<td><strong>366 270</strong></td>
<td><strong>183 293</strong></td>
<td><strong>770 336</strong></td>
<td><strong>925 453</strong></td>
<td><strong>20 183 398</strong></td>
</tr>
</tbody>
</table>
Cattle in Bantu and European Areas

<table>
<thead>
<tr>
<th>Region</th>
<th>White Owners</th>
<th>Bantu Owners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White Areas</td>
<td>Bantu Areas</td>
</tr>
<tr>
<td>Winter Rainfall</td>
<td>277,615</td>
<td>4,389</td>
</tr>
<tr>
<td>Cape East &amp; Karoo</td>
<td>760,780</td>
<td>15,320</td>
</tr>
<tr>
<td>Natal</td>
<td>1,014,346</td>
<td>2,586</td>
</tr>
<tr>
<td>Orange Free State</td>
<td>1,123,478</td>
<td>3,778</td>
</tr>
<tr>
<td>Transvaal</td>
<td>1,617,963</td>
<td>10,745</td>
</tr>
<tr>
<td>Highveld</td>
<td>2,380,715</td>
<td>189,634</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>394,530</td>
<td>5,614</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,569,427</strong></td>
<td><strong>227,677</strong></td>
</tr>
</tbody>
</table>

11. SCIENTIFIC PUBLICATIONS

(a) Onderstepoort Research Institute


(xxxiii) Gernecke W.H., 1966. Cytogenetic investigations on normal and Malformed animals, with special reference to intersexes

The Veterinarian, 4, 83 - 95

Jl. Small Anim. Pract., 7, 281 - 301

(xxxvi) Howell C.J., 1966. Collection of salivary gland secretion from the Orgarid Ornithodoros savignyi Avdoin (1827) by the use of a pharmacological stimulant

(xxxvii) Howell P.G., 1966. Multiplication of an attenuated RV II Strain (Type SATl2) of foot and mouth disease virus in sheep

(xxxviii) Howell P.G., 1966. Some aspects of the epizootology of bluetongue
Bull. Off int. Epizoot., 66, 341

(xxxix) Irwin D.H.G., 1966. Tension lines in the skin of the dog
Jl. Small anim. Pract., 7, 593 - 598


(XLI) Malherbe W.D., 1966. Clinico-pathological studies of Babesia canis infection in dogs. V. The influence of the infection on kidney function


   *Tetrahedron*, 22, 3213 - 3220

(XLVII) Naudé T.W., 1966. The isolation and some chemical and pharmacological properties of toxic principles of Homeria glauca (Wood & Evans) N.E. Br.
   *M.Sc. (Agric.) Thesis*, Univ. Pretoria.

(XLVIII) Neitz, W.O., 1966. A brief review on ovine and caprine viral diseases

(XLIX) Neitz W.O., 1966, Rift Valley Fever

(L) Neitz W.O., 1966. Wesselsbron Disease


(LIII) Osterhoff D.R., 1966. Nuetste resultate van immunogene-tiese navorsing by plaasdiere, veral by skape
   *Jaarboek Karakoeltelersvereniging*, 27

(LIV) Osterhoff D.R. & Gothe R. 1966. The use of red cell antigens for timing breakdown of erythrocytes during digestion in Ornithodoros savignyi (Audourin, 1827)
   *Parasitology*, 56, 613

(LV) Osterhoff D.R., 1966. Bloedgroepnavorsing en Veekunde

(LVII) Sutton G.D., 1967. The effect of Prolonged Rail Transportation on Slaughter Stock. Comparison of Interrupted and Broken Travel


(LIX) Swart P.J., 1967. A Study of the epiderminal structures of the miracidia of Calicophoron calicophorun (Fixhoeder, 1901), Nasmark, 1937 and Paramphistomum microbothrium (Fixhoeder, 1901)


(LXI) Van den Heever L.W. & Giesecke W.H., 1966. The Diagnosis of Mastitis by direct and indirect cytological methods

   Die Suiwelheidsjoernaal, 6, 173 - 175


(LXIV) Van der Walt K., Van Zyl A & Robbins J., 1966. Abnormal thyroglobulin in congenital goiter in cattle
   Endocrinology, 78, 1213 - 1223

(LXV) Van der Walt K. & Van Niekerk O.T., 1967. Paratuberkulose (Johne se siekte) by 'n ingevoerde Duitse Merino ram.

(LXVI) Van Rensburg S.W.J., Van Rensburg S.J. & De Vos W.H., 1966. The significance of the cytoplasmic droplet in the disintegration of semen in Guernsey bulls

(LXVII) Van Rensburg S.J., 1967. Gestation in sheep after foetal adrenalectomy and cortisol acetate administration
   J. Endocr., 38, 83 - 84

(LXVIII) Verster Anna & Collins Marie, 1966. The incidence of Hydatidosis in the Republic of South Africa
   Onderstepoort J. Vet. Res., 33, 49 - 72
(LXIX) Verster Anna & Collins Marie, 1966. The incidence of Hydatidosis in the Republic of South Africa
Onderstepoort J. Vet. Res., 33, 49 - 72

(LXX) Verster Anna, 1966. Cysticercosis, Hydatidosis and Coenuriosis in the Republic of South Africa

(LXXI) Verwoerd D.W., Oellermann, R.A., Broekman J., Weiss K.E., 1967. The serological relationship of South African bovine enterovirus strains (Ecbo S.A. - i and - ii) and the growth characteristics in cell culture of the prototype strain (Ecbo S.A.-1)
Onderstepoort J. Vet. Res., 34, 41 - 52

Onderstepoort J. Vet. Res., 34, 53 - 64

Thesis Univ. Pretoria

(b) **Division of Veterinary Services**

(i) **Du Casse F.W.B.**
Responsibility of the Veterinary Profession

(ii) **Gurnell T.O., Du Plessis J.L., Bigalke R.D.**
An outbreak of toxoplasmosis in chinchillas in South Africa

(iii) **Lambrechts H.B.**
The microscopic vascular pattern of the ruminal wall in Ovis areis
Onderstepoort J. Vet. Res. 33(1) 1966. 233 - 238

(iv) **Lambrechts M.C.**
The Sanitary Position and Methods of Control in the Republic of South Africa
Bull. Off Int. Epiz. 66 1966. 629 - 635

(v) **Lambrechts M.C.**
General study: (a) On the Principles According to which Veterinary Services could be organised for a very efficient control of epizootics of economic importance
(vi) Lambrechts M.C.
Zoo-sanitary Normalisation of International Trade in Animals and Animal Products
Regulations in force in the Republic of South Africa for the Sanitary Control of Importation and Exportation

(vii) Nixon R.C., Kleeberg H.H., Worthington R.W.
Evaluation of isoniasid in the Field Control of Bovine Tuberculosis

(viii) Van Aardt L.W.P.
Case report - Stomatitis caused by the Flowerheads of Hordeum Murinum

(ix) Van der Merwe G.F.
The first occurrence of scrapie in the Republic of South Africa

(x) Van Niekerk J.W., Basson P.A., Kruger S.P., McCully, R.M.
Meningeal Setariosis: Report on two cases in antelopes.

(xi) Van Niekerk J.W., Pienaar U. de V., Young E., Van Wyk P.
Neuroleptic narcosis of large wild herbivores in South African National Parks with the new potent morphine analogues M-99 and M-183

(xii) Van Niekerk J.W., Basson P.A., McCully R.M., Bigalke R.D.
Observations on a Hepatozoon-like parasite in the impala

(xiii) Van Niekerk J.W., Bigalke R.D., Basson P.A., McCully R.M.
Studies on the relationship between Besnoitia of blue wildebeest and impala, and Besnoitia besnoitia of cattle
Onderstepoort J. Vet. Res. 34(1) 1967 7 - 28

(xiv) Van Niekerk J.W., McCully R.M., Basson P.A.
The pathology of Cordophilus sagitus (V. Lonstow, 1907) infestation in the kudu (Tragelaphus strepsieros (Pallas, 1766)) and African buffalo (Syncerus caffer (Sparrman, 1779)) in South Africa
Onderstepoort J. Vet. Res. 34(1) 137 - 160

(xv) Young E., Kruger A.P.
Fatal infestation of the bald ibis, Geronticus calvus with Tropisurus americanus
(xvi) **Young E.**
The use of tranquillisers, muscle relaxants and anaesthetics as an acid in the management of wild carnivores in captivity, 25 case reports.

(xvii) **Young E., Pienaar U. de V., Van Niekerk J.W., Van Wyk P., Fairall N.**
The use of Oripavine hidorcloride (M-99) in the drug-immobilisation and marking of wild African Elephant (*Loxodonta africana* (Blumenbach)) in the Kruger National Park. Koedoe No. 9, 1966

(xviii) **Young E, Lombard C.J.**
Physiological values of the African Elephant (*Loxodonta africana* (Blumenbach)).
The Veterinarian Vol 4, 1967 169 - 172

(xix) **Young E.**
Nutrition of Wild South African felines and some Viverrids
Afr. Wild Life 20 (4) 1967

12. **LEGISLATION**

The following Government Notices were published under the powers of the Animal Diseases and Parasites Act (Act No. 13 of 1956) during the year:

(a) Government Notice No. R.1353 of 9 September 1966 to amend the schedule of Government Notice No. R.1532 of 4 October 1963. The definition of "animal" has thereby been changed to include all amphibians and reptiles.


(c) Government Notice No. R. 1819 of 18 November 1966 to withdraw the following Government Notices dealing with orders and directions imposed, made or given in terms of section 16 of the Diseases of Stock Act (Act No. 14 of 1911), as amended:

* Government Notice No. R.2566 of 20 October 1950 which imposed compulsory inoculations against Newcastle Disease in Natal and Transvaal

* Government Notice No. R.2579 of 10 November 1950 dealing with obligatory inoculations against Newcastle Disease in Transvaal and the Orange Free State

Government Notice No. R.1125 of 11 May 1951 which enforced inoculation and branding of stock during an outbreak of Foot and Mouth Disease

Government Notice No. R.110 of 16 January 1953 which concerned compulsory dipping of equines in the Estcourt district

Government Notice No. R.83 of 14 January 1955 which provided for the marking and inoculation of stock during an outbreak of Foot and Mouth Disease in the Transvaal

Government Notice No. R.1387 of 3 August 1956 in connection with obligatory dipping or horses in the Msinga district

Government Notice No. R.1134 of 26 July 1957 concerning compulsory inoculation of stock during an outbreak of Foot and Mouth Disease in certain districts of the Transvaal province


13. TECHNICAL RELATIONS WITH OTHER COUNTRIES

(a) Liaison and Co-operation with African Territories

A number of scientists from states on the African continent visited the Veterinary Research Institute and the Division. The relevant statistics are:

Mozambique ................................................................. 9
Malawi ................................................................. 7
Rhodesia ............................................................... 4
Lesotho ................................................................. 4
Botswana ............................................................... 3
Angola ................................................................. 3
Zambia ................................................................. 2
Nigeria ......................................................................... 1

Diagnostic services were also rendered by the Research Institute, which dealt with the following numbers of specimens from the specified countries:

Botswana ................................................................. 69
Swaziland ............................................................... 44
During the same period a variety of vaccines and laboratory products were supplied as summarised hereunder:

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>NO. OF VACCINES</th>
<th>NO. OF DOSES</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhodesia</td>
<td>21</td>
<td>1 205 934</td>
<td>R12 626,63</td>
</tr>
<tr>
<td>Botswana</td>
<td>18</td>
<td>81 308</td>
<td>R 2 650,32</td>
</tr>
<tr>
<td>Lesotho</td>
<td>9</td>
<td>160 806</td>
<td>R 1 570,60</td>
</tr>
<tr>
<td>Mozambique</td>
<td>2</td>
<td>15 237</td>
<td>R 1 451,00</td>
</tr>
<tr>
<td>Zambia</td>
<td>8</td>
<td>401 100</td>
<td>R 1 421,75</td>
</tr>
<tr>
<td>Malawi</td>
<td>8</td>
<td>348 707</td>
<td>R 965,94</td>
</tr>
<tr>
<td>Swaziland</td>
<td>18</td>
<td>30 902</td>
<td>R 608,37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2 243 994</strong></td>
<td></td>
<td><strong>R21 294,61</strong></td>
</tr>
</tbody>
</table>

Visits were also paid by South African scientists to some of these countries i.e.

Dr M. de Lange and Dr De Vos represented the Republic at the Fifth Veterinary Congress of Mozambique and Angola at Lorenzo Marques during November 1966, where the theme of discussion was conservation of fauna. The first mentioned also represented South Africa at the First Rhodesian Scientific Conference at Bulawayo during May 1967.

Dr E.B. Kluge visited Mozambique and Rhodesia during July and September 1966, in connection with spraying operations against Tsetse fly. He also attended meetings in Lorenzo Marques in March 1967, and Botswana in May 1967, in connection with tsetse control. Later on in the year he accompanied Dr M.C. Lambrechts to Gaberones in Botswana and Luanda in Angola, where interterritorial discussions and co-operative planning took place.

Dr P.R. Mansvelt visited Botswana in March 1967, in connection with game movements and stock disease control, and Dr E. Young went to Rhodesia to obtain information on game culling and marketing of game products.

(b) **Liaison with other Countries**

A large number of visitors were received from countries outside Africa e.g.
Australia ................................................................. 13
U.S.A. ................................................................. 11
United Kingdom ....................................................... 6
Germany ................................................................. 6
Republic of China ................................................... 6 (Commercial)
Holland ................................................................. 5
Portugal ................................................................. 4
France ................................................................. 3
Belgium ................................................................. 2
Reunion ................................................................. 2
Italy ................................................................. 1
Switzerland ........................................................... 1

Specimens were also received from diagnostic purposes from the following listed countries:

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Doses</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>2</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Australia</td>
<td>1</td>
<td>India</td>
</tr>
<tr>
<td>Canada</td>
<td>1</td>
<td>Sweden</td>
</tr>
<tr>
<td>Denmark</td>
<td>1</td>
<td>Turkey</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As with African State, vaccines and laboratory products were supplied in the following instances:

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Doses</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>50 000</td>
<td>R2 500,00</td>
</tr>
<tr>
<td>Persian Gulf</td>
<td>445</td>
<td>R 222,50</td>
</tr>
<tr>
<td>Israel</td>
<td>1 500</td>
<td>R 75,00</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2 500</td>
<td>R 13,75</td>
</tr>
<tr>
<td>St. Helena</td>
<td>1 210</td>
<td>R 8,25</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>200</td>
<td>R 1,00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56 055</strong></td>
<td><strong>R2 820,50</strong></td>
</tr>
</tbody>
</table>

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

(i) The 1st International Conference on Equine Infections Diseases at Stresa in Italy during July 1966.


(iii) The Subregional Consultation and Information Meeting of Representative of Joday-Clubs and Representatives of Veterinary Services of Western European Countries in Paris.


In addition, and sometimes in combination with attendance at the above gatherings, officials of the Department made different study tours i.e.

  Dr W.L. Jenkins

  Dr A.J.M. Verster

* Import and Export Control, Sheep Diseases and Diagnostic Centres. France. Sept. 1966
  Dr M.C. Lambrechts

  Dr B.J. Erasmus

* Diseases of Sheep & Veterinary Organisations
  Dr K.M. van Heerden

* Methods and Techniques of Immunity-Pathology
  Dr J.L. du Plessis

* Imports and Exports of Animal Products
  Italy & France. May 1967
  Dr M.C. Lambrechts

* Veterinary Training of Students. U.S.A. & Canada
  May - June 1967
  Dr B.C. Jansen