Veterinary Services.

Dr. R.A. Alexander, Director of Veterinary Services.

This report covers the period 1 July, 1953, to 30 June, 1954. As in the past, the report is divided into two sections, viz (a) Research and (b) Field Work.

A. – Research.

The following table shows the number of doses of vaccines and laboratory products issued during the year, as compared with those issued the previous year, as well as the number of tests conducted and specimens examined at the Onderstepoort and Allerton (Pietermaritzburg) laboratories.

Comparative Table of Issues of Vaccines and Laboratory Products.

<table>
<thead>
<tr>
<th>Product.</th>
<th>1.7.52 to 30.6.53</th>
<th>1.7.53 to 30.6.54</th>
<th>Increase.</th>
<th>Decrease.</th>
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<tbody>
<tr>
<td>Blackquarter vaccine</td>
<td>1,668,910</td>
<td>1,956,545</td>
<td>287,653</td>
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<tr>
<td>Bluetongue vaccine</td>
<td>9,284,450</td>
<td>14,174,330</td>
<td>4,889,880</td>
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<tr>
<td>Contagious abortion vaccine</td>
<td>230,337</td>
<td>346,603</td>
<td>116,266</td>
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<tr>
<td>Anthrax vaccine</td>
<td>8,931,440</td>
<td>9,646,900</td>
<td>715,460</td>
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<tr>
<td>Gall sickness vaccine (Onderste-</td>
<td>313,381</td>
<td>290,231</td>
<td>---</td>
<td>23,150</td>
</tr>
<tr>
<td>poort)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Gall sickness vaccine (Pieter-</td>
<td>52,651</td>
<td>50,158</td>
<td>---</td>
<td>2,493</td>
</tr>
<tr>
<td>maritzburg)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Paratyphoid vaccine</td>
<td>294,649</td>
<td>330,997</td>
<td>36,348</td>
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<tr>
<td>Fowl typhoid vaccine (Pieter-</td>
<td>622,800</td>
<td>1,583,862</td>
<td>961,062</td>
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<tr>
<td>maritzburg)</td>
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<tr>
<td>Horsesickness vaccine</td>
<td>113,824</td>
<td>158,759</td>
<td>44,935</td>
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<td>Fowl pox vaccine (Onderstepo-</td>
<td>2,785,100</td>
<td>2,995,600</td>
<td>210,500</td>
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<td>poort)</td>
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<tr>
<td>Bloedpens (lamb dysentery)</td>
<td>251,915</td>
<td>237,375</td>
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<td>14,540</td>
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<tr>
<td>vaccine</td>
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<tr>
<td>Lamsiekte vaccine</td>
<td>2,535,790</td>
<td>2,372,840</td>
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<td>Enterotoxaemia vaccine</td>
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<td>7,589,333</td>
<td>1,826,835</td>
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<td>Distemper vaccine</td>
<td>12,350</td>
<td>14,530</td>
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<td>Newcastle disease vaccine</td>
<td>1,114,800</td>
<td>513,100</td>
<td>---</td>
<td>601,700</td>
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<tr>
<td>(Onderstepoort)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Newcastle disease vaccine</td>
<td>91,700</td>
<td>185,700</td>
<td>94,000</td>
<td>---</td>
</tr>
<tr>
<td>(Pietermaritzburg)</td>
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<tr>
<td>Rift Valley fever vaccine</td>
<td>81,455</td>
<td>35,810</td>
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<td>45,645</td>
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<tr>
<td>Rabies vaccine</td>
<td>11,113</td>
<td>38,481</td>
<td>27,368</td>
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</tr>
<tr>
<td>Heartwater blood (Onderstepo-</td>
<td>7,896</td>
<td>11,297</td>
<td>3,401</td>
<td>---</td>
</tr>
<tr>
<td>poort)</td>
<td></td>
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</tr>
<tr>
<td>Heartwater blood (East Londen)</td>
<td>1,429</td>
<td>1,592</td>
<td>163</td>
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<tr>
<td>Heartwater blood (Grahamstown)</td>
<td>7,612</td>
<td>6,202</td>
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<td>1,410</td>
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<tr>
<td>Tuberculin</td>
<td>62,880</td>
<td>78,460</td>
<td>15,580</td>
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<tr>
<td>Mallein</td>
<td>157</td>
<td>128</td>
<td>---</td>
<td>29</td>
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<tr>
<td>Pregnant mare serum</td>
<td>8,380</td>
<td>10,860</td>
<td>2,480</td>
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<tr>
<td>Antigen (Pietermaritzburg)</td>
<td>48,981</td>
<td>69,619</td>
<td>20,638</td>
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Protozoal Diseases.

Nagana (Zululand)

The last spraying contract with a private company in respect of the Hluhluwe Game Reserve was renewed on 1 August, 1953, and successfully concluded towards the end of January, 1954. The spraying operations were continued with the four Piper Cruisers and two Super Cubs which were substituted for the helicopter. Spraying operations with B.H.C. were confined to the Hluhluwe Game Reserve.

The fly surveys were continued uninterruptedly with bait cattle. All Harris traps were withdrawn in January 1954. No *G. pallidipes* or *G. brevipalpis* were caught in any of the game reserves in the course of the year.

*G. austeni* still occurs from the False Bay forest in the south up to the Mozambique border in the north, but is confined to the low-lying wooded coastal regions. *G. brevipalpis* is still found to some extent in the Ndumu Game Reserve and is the cause of several cases of Nagana which occur every year in the Native territory bordering on the Ndumu Game Reserve.

Apart from these instances, nos cases of Nagana were diagnosed in Zululand, and the general position, therefore, still remains most satisfactory.

A total of 3,618 vehicles, which passed through the deflying station at the Hluhluwe Game Reserve was sprayed without any tsetse fly being collected from them.

Anaplasmosis.

The demand for vaccine for use against this disease has been approximately the same as that of the two previous years. The vaccine imparts lifelong protection against the pernicious form of gallsickness. The number of doses issued from Onderstepoort totalled 290,231.
Redwater (Babesiosis of Cattle).

This vaccine which has been issued since October, 1953, protects cattle against both the African and European forms of the disease. The demand was limited, only 21,974 doses having been issued from Onderstepoort. Good results are obtained if reacting animals are treated in good time with Babesan, Pirevan, Piroplasmin, Gonacrine or Piroflavin.

Dourine.

Of the 1,512 specimens derived from enquiries submitted for examination from the Union, South West Africa, Bechuanaland and Southern Rhodesia 60 proved to be positive. Since the specimens were collected from a relatively small number of animals, it stands to reason that the positively diagnosed cases by no means give a true reflection of the incidence of the disease in Southern Africa.

Globidiosis.

This disease is fairly widespread in the northern parts of the Transvaal and gives rise to thickening of the hide. The cattle lose weight and the hairs come off. Approximately 10 per cent of the diseased cattle succumb. It has also been observed that a considerable percentage of the bulls are rendered sterile by this disease.

It has recently been established that this disease can be transmitted from cattle to rabbits. As a result of this, it will be possible not only to make a thorough study of the life cycle of the parasite, but also to evolve control measures for the prevention and treatment of the disease.

Virus Diseases.

Bluetongue.

During the year a commencement was made with the despatch of freeze-dried vaccine. Since the vaccine keeps very well in this form, it has been possible to build up a large supply, and it is expected that all requirements during the coming season will be able to be met without delay.

Fowl Pox.

As in the past, the vaccine was issued in fluid form. results obtained with freeze-dried vaccine are, however, excellent and for this reason large supplies are being built up with a view to substituting freeze-dried vaccine for fluid vaccine.

Lumpy Skin Disease.

Limited quantities of vaccine were issued during the year, but the results have shown that the immunity it affords is not adequate. A strain of the virus derived from inoculated animals is being further investigated.
Heartwater.
The issue of frozen heartwater blood has been continued. Further research work has been conducted on the possibility of determining whether mechanical coolers operating at temperatures below 40º C could be used in order to establish frozen blood banks in outlying districts.

A considerable amount of work has also been done in an effort to determine the value of various antibiotics in the treatment of this disease.

Distemper.
The demand for freeze-dried vaccine continued. The results were satisfactory.

Rift Valley Fever.
Now new outbreaks of this disease were diagnosed during the year, although quite a number of suspected cases were examined. The immunising properties of vaccines prepared from a virus developed on eggs or mice were compared. It has been established that vaccines prepared from a virus developed on eggs or yielded better results and consequently this type of vaccine was issued. Research work in connection with the freeze-drying of the vaccine is at present being carried out.

Newcastle Disease.
The issue of freeze-dried vaccine prepared from vated on eggs is being continued. The Komarov strain of the virus was transmitted to young mice and test groups of the vaccine made from the brains of infected mice were issued. Preliminary results have shown that a satisfactory antigenic effect is obtained and that the strain is apparently harmless in the case of mature birds. The possibility of using Newcastle disease virus developed on mice as an immunising agent is now being investigated.

Rabies.
Of the 178 specimens received for diagnostic purposes, 78 were positive for rabies, while in 5 cases no diagnosis could be made. During the year a commencement was made with the preparation of a vaccine for use against the disease.

Horsesickness.
The issue of freeze-dried vaccine prepared from viruses propogated on the brains of mice has been continued. The immunological typing of 16 different strains of horsesickness virus derived from cases of horsesickness which occurred in horses that had been immunised has been completed. The scope of the work has been extended so that it includes all the available mice-adapted strains. Altogether 42 horsesickness virus strains were investigated by means of neutralisation tests. The results have shown that, immunologically, there are seven main types.
Infectious Bovine Sterility (Epivag).

Various attempts were made to isolate the virus derived from infected material in eggs or mice, but without success.

The significance of the “Rustenburg” virus that has previously been isolated could not be established. Antibodies against the virus could be detected in sera derived from a number of cattle from various parts of the Union. Sera derived from England and Australia were negative. It was not possible, however, to correlate these antibodies with epivaginitis in cattle.

African Swine Fever.

Thirteen specimens of suspected swine fever were submitted for laboratory examination. A case of swine fever was diagnosed in the Northern Transvaal, while a second was encountered in South West Africa. These outbreaks apparently resulted from contact between domestic pigs and wild pigs.

Sweating Sickness.

It has been established that sweating sickness is transmitted by the “bontpoot” (stripe-legged) tick. This disease is transmitted by the tick in its adult stage. It has been proved conclusively that not only calves but also adult cattle up to the age of 6 years, as well as Merino sheep, are very susceptible to this disease. The symptoms in sheep are very similar to those of bluetongue. In view of our limited knowledge the regular dipping of cattle once a week during the summer and autumn months is the only effective method of control. Experiments are in the progress to evolve a more effective method of treatment.

Bacteriology.

Anthrax.

The demand for vaccine has shown a slight increase. During the year 9,646,900 doses of satisfactory strength were issued. Altogether 188 specimens were examined for anthrax bacilli or germs belonging to the gas gangrene group. Specimens of bonemeal intended for importation are included in this figure. Three specimens of hides proved to be positive for anthrax, while seven were positive for the other germs.

Blackquarter.

Approximately 2,000,000 doses of vaccine of satisfactory strength were issued. Research work was continued on improved methods of production.

Lamb Dysentery.
Research work on the improvement of the vaccine and decreasing the size of the dose was continued. 237,375 doses of the vaccine were issued.

“Dikkop” in Rams.

A commencement was made with the preparation of a vaccine to be used against this disease. Good results were obtained under laboratory conditions, and field experiments are now being conducted.

Blue Udder in Ewes.

The causal organism has now been determined and experiments on the preparation of a vaccine are being carried out.

“Lamsiekte”.

The demand for the vaccine has remained more or less constant. Research work in connection with the improvement of the medium as well as the vaccine is being continued.

Enterotoxaemia.

Some two million doses more of vaccine were issued than during the previous year. From enquiries it is clear that stock farmers are becoming increasingly alive to the danger of enterotoxaemia and the demand for this vaccine will possibly increase. Research work aimed at improving the vaccine is being continued.

Contagious Abortion.

(a)  *Brocullosis.*  By means of the shake-flask method considerably larger quantities of the vaccine can now be manufactured. 346,603 doses were issued during the year, as against 230,337 last year.

Progress has also been made with the study an improvement of the medium, and attention has been mainly confined to the improvement of the keeping quality of the vaccine by means of freeze-drying. Considerable success has been achieved with the concentration of the vaccine, and there is every prospect that a constant supply of ampoules containing 10 doses will be maintained. A large quantity of dry vaccine (51,710 doses) was prepared and this was eagerly purchased by adjoining territories. The use of this dried vaccine in die distantly situated and warm parts of the country is being greatly recommended.

More than 17,000 tube tests were carried out, 11 percent of which proved positive to brucellosis. The test is applied from brucellosis and for cattle intended for export, as it is now being generally recommended that all heifers and cows be inoculated the disease. the milkring test has also been conducted on a large number of milk samples.
Examination of specimens of semen derived from bulls as well as specimens of abortions has greatly increased. Instances of *Vibrio foetus* and *Trichnomonas* infection and putrefactive bacteria have been established, indicating that the underlying causes of abortion and sterility in South Africa constitute a varied problem.

(b) *Vibriosis.* -- A great deal of time was devoted to the propagation of *Vibrio* organisms for the preparation of antigen for diagnostic work. However, this venture has not been very successful.

**Tuberculosis.**

Research work on tuberculosis was continued, consisting chiefly of the production of P.P.D. tuberculin, diagnosing suspected specimens, serological test, etc. It has been proved that sheep and goats which have been artificially infected with tuberculosis germs are definitely badly infected with the bovine types, but only temporarily with the human and avian types of tuberculosis. A commencement was made during the year with the classing of tuberculosis strains, isolated from pig lesions obtained from the abattoirs in Pretoria and Johannesburg. More than 100 specimens have been received and the strains isolated thus for all belong to the bovine type.

**Paratyphoid.**

Considerably more vaccine was issued during the year. It consisted of vaccine intended for cows as well as for calves. The examination of specimens in connection with calf diseases, as well as cultures of salmonellas, has been continued.

Various methods of immunisation of calves against paratyphoid are being investigated. These include the examination of the sera of immunised cows and calves for antibodies. Research work is also in progress in regard to the digestive processes taking place in the abomasum of young calves, including the factors that have a bearing on the secretion of gastric juices and saliva. Investigation on the composition of saliva and gastric juices and their effect on various feeds is being continued.

**Poultry Section.**

1,343 consignments of sick and dead poultry were received for examination during the year.

There were instances of all diseases that are common to poultry. However, chronic respiratory disease (C.R.D.) seems to be on the increase, probably as a result of the phenomenal growth of the broiler industry. There is also an increase in the number of turkeys infected with sinisitus caused by the same germ as C.R.D.

Epidemic tremor was diagnosed for the first time in South Africa towards the end of the year under review. There is little doubt that the disease was introduced in 1952 from the United States of America by means of eggs for incubation purposes. There seems to have been a few outbreaks of this disease during the 1953 hatching
season, but unfortunately no suitable specimens were submitted for examination. In our campaign against this disease we are hampered by the complete lack of vaccine or remedy against the disease as well as of any tests to locate carriers of the disease. In fact, there is very little that can be done to check the spread of the disease, since infection is usually transmitted through the eggs. The five important infectious poultry diseases in South Africa which are known to be spread through the eggs are B.W.D., fowl typhoid, paratyphoid, C.R.D. and epidemic tremor. It is, therefore, the duty of poultrymen and breeders to buy only chicks that are free from disease, while buyers should not content themselves with the seller’s B.W.D.-free certificate. The time is overdue for breeders to rely only on sound veterinary advice and thus be in a position to promote their clients’ interests.

At the beginning of July, 1953, a total embargo was imposed on the importation of poultry and eggs, for hatching into the Union. There are still a number of highly undesirable poultry diseases in overseas countries that are completely unknown in the Union of South Africa, and we should do everything in our power to keep these diseases away from our shores.

Parasitology.

Entomology.

Tsetse Fly Control in Zululand. -- The tsetse fly eradication campaign launched in 1954 proved to be singularly successful, with the complete destruction of *Glossina pallidipes*, the tsetse fly which had been responsible for the widespread outbreaks of Nagana in the past. These flies have not been encountered in the Hluhluwe Game Reserve since May, 1953. B.H.C. spraying with aircraft was abandoned in January, 1954, but fly surveys with bait animals will be continued until the end of 1955.

During September, 1953, Southern Rhodesia was given advice on the eradication of tsetse fly (*G. morsitans*) and as result of this a spraying campaign was started in that territory in November, 1953.

Blowfly Research. -- Work in connection with the protection of woolled sheep by means of the latest insecticides has been continued. Experiments on a small scale with the phosphorus-containing-insecticides have proved that certain substances impart a great deal of protection to sheep. Extensive field experiments are being planned for next summer in order to bear out this theory.

Research work on the application of the synthetic insecticides in the form of a powder and the saving of costs has been continued.

Tick Control. -- Further research on the testing of the latest synthetic insecticides under veld conditions in the Eastern Cape Province as well as at Onderstepoort was conducted. Detailed articles on an improved dipping tank for cattle, specially intended for use of the latest remedies and on an improved spray race in the case of larger animals were submitted for publication.

The Sheep Paralysis Tick. -- A field research station with a veterinary officer in charge has been established at New Bethesda in the Karoo to conduct research work on the biology of the karoo paralysis ticks. Good progress has been made and the work is being continued.
“Austrian Itch”. -- During the past few years this skin condition in sheep has assumed great economic proportions and intensive research has resulted in the discovery on sheep of a small mite, *Psorergates ovis* which has already been described in Australia. This mite seems to be responsible for the condition and therefore offers the opportunity of investigating the aspects of control of this problem.

Bluetongue. -- Research work on the origin on natural bluetongue virus in animals other than sheep has proved that the virus is present in cattle which have become naturally infected under veld conditions.

Routine Work. -- Research work is being continued in connection with the identification of ticks, specially as regards the Union’s tick survey, as well as of identifications of ticks outside the Union.

**Helminthology.**

Remedies. -- Comparative trials with tetrachlorehylene (tetram) and phenothiazine were continued. It has been proved that the former is more effective in the control of hook worms and bankrupt worms, provided that the animal swallows it down to the abomasum. With 10 per cent of the animals this is not the case, with the result that they should be treated at least twice at short intervals. The same applies to hook worms. Phenothiazine is, however, the better remedy in the case of hook worms, being almost 100 per cent effective, irrespective of whether the remedy is deposited in the abomasum or the rumen. For this reason farmers are now advised to dose with phenothiazine without first administering a little copper sulphate solution.

Biology. -- (a) Further studies on the life cycle of the bilharzia worm were continued. Difficulty is still being experienced in the breeding of indigenous snails, and attempts to infect them again proved unsuccessful. Several live snails of a South African species were, however, obtained from overseas and these were bred with success. Their offspring were readily infected with the young stage of the human intestinal bilharzia worm, and the entire life cycle has been successfully completed. White mice were used as final host.

(b) It has further been established that the danger of tape worm infection is almost eliminated when measly meat is made into biltong. Measles in beef biltong were swallowed by a human on three different occasions without serious consequences.

(c) Research into conical flukes is being continued. Sheep were successfully infected with the cercariae derived from the snail *Bulinus tropicus*; the snail itself was infected with material derived from sheep. In the past all material used was derived from cattle and this probably accounted for the failures to infect sheep. A thorough morphological study had therefore to be made of the conical flukes derived from both sheep and cattle. The results thus far obtained seem to indicate that there are two different types and that it is not one and the same kind as has been believed until a short time ago.
Chemistry and Bio-Chemistry.

Research.

(1) Nutritional Requirements of Pathogenic Bacteria. -- In a study on the nutritional requirements of the bloedpens (lamb dysentery) organism, the following constituents were found to be necessary in a synthetic medium: the amino-acids glycine, arginine, histidine, glutamine, leucine, phenylalanine, threonine, tryptophane, tyrosine, valine and serine; the vitamins panthothenic acid, nicotinic acid, pyridoxamine and biotin; the minerals magnesium, iron and phosphorus, and glucose. However, a synthetic medium containing only the above-mentioned ingredients yields only 70 per cent of the toxin produced by the growth of the germ in a meat medium. If a specific concentration is exceeded the calcium ion has a retarding effect on the formation of toxin.

(2) The Amino-Acid Content of Grasses. -- By means of microbiological methods 11 amino-acids in a number of grasses were determined at various stages of growth. From this could be deducted that the proteins of various grasses show a striking resemblance in their composition and that the biological value of these proteins are fairly high. Furthermore, it has been found that while there is no difference between spring and summer grasses, the amino-acid composition of winter grass points to a decline in the biological value of the proteins at this time of the year.

(3) Paper Electrophoresis of Proteins. -- A commendement was made with attempts to divide mixtures of various proteins with the aid of electrophoresis on paper and the use of locally constructed apparatus. It is hoped that the separation of antigen and anti-body in sera, for example, would be accomplished in this way.

(4) Trace Element Survey of South African Pastures. -- This project is not progressing satisfactorily as yet. The main apparatus, however, has already been installed and calibrated. In view of an investigation conducted, a decision could be taken on some of the methods of analysis which will be followed, with the result that the actual analysis could be commenced with.

(5) Superphosphate-Fluorine-Drinking Water Experiment. -- 75 per cent on an average of the heifers in the various groups of the experiment which were reported on in the previous annual report, calved. This additional strain to which the animals were subjected, seems to have brought about no change so far in the effect of the various concentrations of fluorine on the health and productivity of the animals. Discoloration of and wearing down of the teeth are common in the group drinking water containing 12 parts per million of fluorine. On the other hand, the animals receivingly 5 parts per million of fluorine are more or less free from these harmful effects. At the same there is no marked difference in the growth and production of the animals in the various groups, despite the fact that the experiment has been in progress for three years.

It would appear that the higher fluorine intake has not resulted in extra fluorine being excreted in the milk of the animals.
(6) Bone Meal vs. Superphosphate in Drinking Water Test. -- The experiment has already been running for the past 18 months at Vryburg, and thus far no difference has been observed in the growth of the animals receiving bone meal and those getting an equivalent amount of phosphate in the form of superphosphate in the drinking water.

(7) Digestibility Trials with Cattle. -- The study of factors having an effect on the digestibility of roughage, the main feed of ruminants, has been continued.

Routine. -- A large number of analyses which are connected with advice to farmers, research work of other sections of the Division and the trials at Kaalplaats and Armoedsvlakte again took up a great deal of time.

Nutrition.

Research.

(1) From the results obtained by further trials with the application of antibiotics in stock feeds, a recommendation could be made to the effect that these products would be of value in the rations of piglets, chicks and calves. Recommendations regarding methods of consumption and registrations have already been published.

(2) Research work was carried out on the potential susceptibility to virus diseases of mice which were subjected to various nutritional deficiencies. The susceptibility to virus diseases of sheep kept a certain level of nutrition was investigated. The results so far have been disappointing.

(3) In collaboration with the C.S.I.R. sheep from Bredasdorp were fed a copper supplement. The improvement in respect of wool quality which could be ascribed to a trace of copper is worthy of mention. There is little doubt that the application of trace elements is of great economic importance in certain coastal regions.

(4) Work on the economical fattening of steers indicates the importance of endeavouring to create an optimum ration as regards the total intake of leguminous hay, silage and grain so as to ensure the best action of the intestinal bacteria. If these conditions are complied with, a saving could be effected on the total feed intake.

(5) As a result of the apparent amino-acid (methionine) deficiency in legumes and the detrimental effect such a deficiency may have on the liver, experiments on rats are being conducted in an effort to establish the effect of such deficiencies.

General.

Assistance is being rendered in compiling and conducting digestibility trials. Work on the digestibility of indigenous feeds and mixtures is of primary importance.
Small laboratory animals required a great deal of attention. The following issues were made during the year: Mice 154,453; guinea pigs 7,901; rabbits 699; rats 2,204; ferrets 70; and pigeons 33.

**Physiology and Pharmacology.**

During the year 226 pregnancy tests were conducted on mares as against 346 the previous year. Ten litres of pregnant mare serum were prepared.

**Research.**

Further trials connection with the feeding of urea and molasses to ruminants were conducted at both Onderstepoort and Nooitgedacht. A commencement was made to test the effect of sulphur on urea-containing rations.

The study of metabolism in ruminants has been continued by means of a series of experiments in which the lower organic acids (lactic acid, propionic acid and butyric acid) are administered to animals and the blood subsequently analysed at various times. Interesting results have been obtained. The work which is being conducted in collaboration with the Biochemistry Section will possibly shed some light on the question of ketoses in ruminants (“domsiekte” in sheep and acetonemia in cows).

In collaboration with the Agricultural Research Institute, Pretoria, a commencement has been made with work on the digestibility of milk in calves. Interesting and important results have already been obtained.

**Toxicology.**

During the year 1,893 specimens of suspected poisoning in stock were submitted, compared with 2,158 the previous year. Of these 219 were positive for arsenic, 6 for table salt, 63 for strychnine, 8 for prussic acid, 26 for lead, one for nitrate and one for caustic soda. A large number of feed specimens were also analysed with a view to urea poisoning and it was found that the urea content varied from 3.7 per cent to 41 per cent. Feed mixers add only 2 per cent of urea to their mixtures. This great difference is attributed to the fact that by handling the bags the urea is concentrated in certain parts of the feed.

**Research.**

The following plants were tested for toxicity:—

1. *Tulip species* (Moraca and Homeria spp.).—great stress was laid on treatment; no specific antidote has been found as yet.

2. *Lupinus.* — A great deal of research work has been conducted on cattle as well as sheep: The susceptibility to acute poisoning varies considerably between different groups of animals. The limiting factor in lupin feeding is the methionine deficiency and the alkaloid content.

3. *Dimorphotheca. sp.* has been found to be poisonous. Treatment with hypo is yielding good results.
(4) Nerium oleander is toxic to sheep and guinea pigs. The post mortem examination points to affections of the heart, and abscesses may appear in the abdomen.

(5) Ornithogalum prasinum. – The bulb was tested on rabbits and found to be toxic.

(6) Neorantaniinia ficifolia. -- The bulb is toxic to rabbits. Acute paralysis sets in before death. Neorantaniinia edulis gave negative results.

(7) Rhoicissus cunicifolius proved to be non-toxic to rabbits.

(8) Senecio abruptus was tested on a horse with negative results.

(9) Pavetta harborii is the cause of the so-called “gousiekte” which has been responsible for heavy losses in the Waterberg district.

(10) Other plants such as Senecion inaequidens and stokroos seed were tested with negative results.

(11) Tribulus terrestris. -- Serious outbreaks of geeldikkop which occurred during the year in the Victoria West, Pampoenoport Station and Vosberg areas were investigated. Plants were collected and are awaiting chemical analysis. Sheep should be kept in the shade as much as possible. Actual cases can be treated with good results with molasses.

(12) Vermeerbos or Geigeria africana. - Heavy outbreaks of vermeersiekte in die Griquatown, Campbell and Douglas areas were investigated. The eradication of the shrub and judicious pasture management are at present the only methods recommended as precautionary measures. Actual cases may be treated with an antivomitive such as Chlorpromazine hydrochloride. The administration of vinegar, sugar, molasses or yeast or a little urea, carefully applied, will also serve the purpose.

Minerals etc. --

(1) Arsenic.-- Methods of treatment of arsenical poising were investigated. The combined administration of BAL in the hindquarter muscle and ferric hydroxide through the mouth yields good results.

(2) Nicotene. -- Both the alkaloid and the hydrochloric acid compound have been investigated and the smallest lethal dose for mice determine.

(3) Worm remedies. -- Considerable losses are sustained each year as the result of the administration of worm remedies such as tetrachlorethylene, carbon tetrachloride, trichloro-ethane and phenothiazine. Numerous factors that may be playing a role have been investigated, but no explanation has been found as yet. It is recommended that the remedy be tested first on a small number of inferior animals prior to dosing all the animals.

Surgery, Gynaecology and Radiology.
The following animals were given hospital treatment:--

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equines</td>
<td>781</td>
</tr>
<tr>
<td>Cattle</td>
<td>1,424</td>
</tr>
<tr>
<td>Sheep</td>
<td>21</td>
</tr>
<tr>
<td>Dogs</td>
<td>427</td>
</tr>
<tr>
<td>Goats</td>
<td>5</td>
</tr>
<tr>
<td>Cats</td>
<td>37</td>
</tr>
<tr>
<td>Pigs</td>
<td>3</td>
</tr>
<tr>
<td>Operations performed</td>
<td>301</td>
</tr>
<tr>
<td>X-ray examinations</td>
<td>238</td>
</tr>
<tr>
<td>Ultra-violet treatment</td>
<td>65</td>
</tr>
<tr>
<td>Ultra-sonar treatment</td>
<td>14</td>
</tr>
<tr>
<td>Short-wave diathermy</td>
<td>4</td>
</tr>
<tr>
<td>Test conducted</td>
<td>687</td>
</tr>
<tr>
<td>Injections</td>
<td>2,118</td>
</tr>
<tr>
<td>Ambulatory clinic</td>
<td>445</td>
</tr>
</tbody>
</table>

**Artificial Insemination.**

During the year nine inseminators completed courses at Onderstepoort and technical assistance has been given to the Transvaal A.I. Co-operative. In fact, one of the professional officers was almost exclusively occupied with supervising the quality of bull semen despatched, as well as investigating difficulties experienced in connection with insemination. Some 19,000 inseminations were carried out as compared with 17,000 the previous year. This may be divided into 11,740 first and 7,348 repeat inseminations.

A.I. services were rendered to farmers in 17 areas, ten of which were served by full-time and seven by part-time inseminators. One sub-station was closed on account of lack of support and another was taken over by another bull station because of geographical reasons.

Three new sub-stations were opened. Generally speaking, the pregnancy figure varied between 51 per cent and 56 per cent.

**Sterility and Artificial Insemination.**

This work was made possible by the funds made available by the Meat, Dairy and Wool Boards. Research and observations have revealed that there are at least three types of contagious sterility occurring in the Union, viz., (1) Contagious Epididymitis and Vaginitis (Epivaginitis); (2) Vibriosis; and (3) Trichomoniasis.

(1) **Epivaginitis.**-- Observations have shown that the disease may be brought under control simply by applying artificial insemination. Although infected cows may seem to recover, they nevertheless retain the infection and may transmit the disease to an uninfected bull even after two or three years have elapsed. Transmission experiments indicate that the infection may even be transmitted.
Vibriosis is caused by a germ, *vibrio foetus*. It has been found to be largely responsible for sterility in cows and heifers throughout the Union. Research is aimed at the evolution of a reliable diagnostic test and an effective method of treatment.

Trichomoniasis is caused by the germ *Trichomonas foetus* and its presence in dairy herds in some parts of the Union has recently been established. The disease is also transmitted by the bull and there is no effective remedy.

Functional sterility.-- The most important observation made in this field, is the large variety of ovarian disfunctions found in cows infected with some form of contagious sterility. The deviations in the cycle causes a great deal of confusion as regards diagnosis and treatments.

Hypoplasia of the genital organs.-- An examination of the genital organs of animals from an experiment farm has indicated that the genitals were under development to such an extent that all the animals were sterile. Hypoplasia of the testicles of bulls was found. The cause has been investigated and there is a possibility that this may be due to excessive inbreeding.

Artificial insemination.-- The experiment with frozen bull semen imported from Cambridge, England, has been completed. Of the 39 cows which were inseminated 17 gave birth to normal calves. Seven of the cows were sterile, nine did not become pregnant, two aborted at an early stage, one had a stillborn calf and three pregnant cows died from various diseases. The last insemination was conducted when the semen was already 5 months old.

Various experiments were carried out with a view to determining the best way of storing bull semen and at what temperature without a decline in fertility.

To determine whether artificial insemination may also be successfully applied in the case of the beef breeds in controlling contagious sterility, this method of breeding is being applied in the case of two herds under typical bushveld conditions. Whereas the calf crop was about 30 per cent in previous years, it rose to 66 per cent in the first season in the case of one herd, and the pregnancy test during the second season indicated that 75 per cent of the cows were in calf. On being subjected to a pregnancy test 64 per cent of the cows in the second herd were found to be pregnant.

Anatomy.

Routine and Administration.

The year was an abnormal one, in that the chief of the section had been absent on sick leave for a long period, while another member of the staff who had been granted a year’s leave for purposes of study, left for the U.S.A. where he applied himself to histochemical techniques, as well as courses in Endocrinology, Cell Physiology and Biochemistry.

As in the past, the histopathological diagnosis of poultry diseases and consultative histopathological diagnosis of other specimens, especially neoplasma, were undertaken. Some 4,500 microscopical specimens were...
prepared. The card catalogue of these has been concluded and progress has been made with the improvement of classification and storage of the specimens concerned.

**Research.**

A limited research programme in respect of the histopathology, of sweating sickness has been undertaken, with a view to demonstrating inclusions and shedding some light on the pathogenesis.

Hale’s dialised iron-colouring technique for acid muco-polisaccharides has been improved upon and successfully applied to the secretion of apocrine coiled glands of the hides of cattle, to the “mucous” secretion of cells of gliomas of the domestic fowl and to the parasite of globidiosis of cattle. In the case of the latter this method is highly selective.

The officer who went overseas for purposes of study made a study of the histo-chemical reactions of the placenta of sheep.

**Pathology.**

During the year 1,820 routine specimens were examined. Post mortems on outside cases numbered 220, while 687 post mortems were conducted on Onderstepoort animals. A total of 15,420 smears and sections were prepared for microscopical examinations.

**Research.**

1. **Globidiosis.**—The study of the life cycle of the parasite and the changes occurring in a natural infection have been concluded. A number of new outbreaks have been confirmed, confirming the view that the disease is of greater economic importance than generally realised. It may be inferred that treatment is best applied in the early stages of the disease when the parasites still freely occur in the circulation or just after they have penetrated into the cells of the body.

2. **Swine Fever.**—It has been established that the microscopical and macroscopical lesions in some cases differ from those described in the past. Where, according to the lesions, the presence of swine fever is suspected, it is desirable to apply the biological test.

3. **Infectious hepatitis in dogs. (Rubarth’s disease).**—Various samples have been examined and the diagnosis has been established by means of a biological test.

4. **Epidural Abscesses in Cattle.**—A number of new outbreaks have been established. The disease is widespread and is undoubtedly

5. **Brucellosis and Tuberculosis in Guinea-pigs.**—Good progress has been made with the study of histopathological of these two diseases.
(6) Mortality among Horses.-- Affections of the liver in horses are still receiving attention.

(7) Epidemic Tremor in Chicks.-- This disease is receiving attention and an attempt is being made with a view to determining the diagnosis of the condition histologically. The lesions of the local disease differ somewhat from those described in overseas countries. In order to determine the exact relationship between the two, comparative material is being awaited from the U.S.A.

(8) Toxicological-pathological studies.-- Attention has been given to poisonous plants which affect the heart. It has been observed, *inter alia*, that the plant *Pavetta harborii* causes heart lesions and that it is presumably an important cause of mortality among cattle in the Northern Transvaal.

(9) Deficiency Diseases.—According to investigations regarding mortality among sheep in the Swartland area, it is being generally accepted that the losses are due mainly to a methionin deficiency on lupin grazing. Further research work in this field is being continued.

(10) Museum.-- The work is progressing satisfactorily. 190 new specimens were collected during the year.

(11) Classification of Microscopical Sections.-- Steady progress has been made in this field. The classification of skin sections has been completed and a start has been made with virus diseases.

**Chemical Pathalogy: Dips and Dipping.**

In addition to the analyses of dips submitted by farmers and those derived from veld dipping experiments, the analysis of special samples of synthetic, organic dips sent in by the field staff have now been completed and a report has been submitted. Great difficulty is being experienced in maintaining the prescribed effective concentrations.

The experimental work in connection with the incidence of a blue tick (*Boophilus decoloratus*) which happens to be resistant to B.H.C., but not to arsenical dip washes, has been completed and a second report has been submitted.

Various dipping concentrations have been tested with a view to their value for use in power operated spray races.

Technical advice in regard to the registration of stock dips has been furnished.

In collaboration with the Physiology Section a large number of analysis have been conducted regarding the metabolism in ruminants of various fatty acids.

In collaboration with the Protozoology Section a study is being made of the changes occurring in the blood of cattle which have contracted sweating sickness.
According to circumstances attention is paid to blood analysis in various diseases, particularly as regards plasma proteins.

A series of experiments has been conducted in an attempt to evolve a satisfactory method of treating “lumpy wool” in sheep.

**Medicine and Therapeutics.**

The project of evolving a practical method for the treatment of the Filaroides lung worm in Bull Mastiff dogs progressed to such an extent that a report could be published. A test survey was made of the incidence of the worm *Spirocerca lupi* which causes tumourlike swellings in the oesophagus and aorta of dogs. Since the present methods of diagnosis are inadequate a more effective procedure has been evolved.

The chemotherapy of leptospirosis in dogs has received attention in the past year. It has been found that reinfection can occur after treatment with penicillin, while better results have been obtained with the other antibiotic oxytetracycline and chlortetracycline, irrespective of whether injected into the veins or administered through the mouth.

Further progress has been made with the usual programme of improving methods for the diagnosis of various organic diseases and metabolic disturbances.

Routine work consists largely of instruction to students and advice on the medical problems of both urban and rural populations.

Disease conditions dealt with in the small animal clinic include the following:

<table>
<thead>
<tr>
<th>Disease Conditions</th>
<th>In-patients</th>
<th>Out-patients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestive system</td>
<td>72</td>
<td>88</td>
<td>160</td>
</tr>
<tr>
<td>Respiratory system</td>
<td>36</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>Blood, circulation, lymph glands</td>
<td>16</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>Urinary system</td>
<td>37</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>Nervous system</td>
<td>42</td>
<td>9</td>
<td>51</td>
</tr>
<tr>
<td>Skin and appendages</td>
<td>48</td>
<td>44</td>
<td>92</td>
</tr>
<tr>
<td>Locomotion</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Sense organs</td>
<td>13</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Metabolism</td>
<td>7</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Protozoal diseases</td>
<td>62</td>
<td>290</td>
<td>352</td>
</tr>
<tr>
<td>Virus diseases</td>
<td>37</td>
<td>95</td>
<td>132</td>
</tr>
<tr>
<td>Bacterial diseases</td>
<td>25</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Metazoan diseases</td>
<td>161</td>
<td>106</td>
<td>267</td>
</tr>
<tr>
<td>Rickettsial diseases</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Poisoning</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>70</td>
<td>57</td>
<td>127</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>638</strong></td>
<td><strong>740</strong></td>
<td><strong>1,378</strong></td>
</tr>
</tbody>
</table>

**Hygiene.**

**Cold Storage and Abbatoir.**
Altogether 429 animals were slaughtered during the year. The Meat Board as well as other Divisions availed themselves of the facilities for slaughter tests.

**Research.**

(a) A great deal of attention was paid to the non-specific reactors with the tuberculin test. An article has been published in this connection.

(b) According to reports from abattoirs, pigs are being condemned over various parts of the Union as a result of tuberculosis. In order to ascertain whether it is actually due to tuberculosis is pigs, specimens derived from the abattoirs are being examined in conjunction with the Bacteriology Section in order that the type of organism may also be determined in cases where tuberculosis is determined.

**Wool Research.**

Trichology: The Identification of Hair Fibres.-- The identification of hair specimens submitted for this purpose was continued and the collection which is being built up for purposes of comparison has been considerably supplemented. Attention was directed mainly at improving the technique. A photo collection of a great number of cross-sections has already been prepared with a view to facilitating identification.

Fibre Fineness.-- A further series of specimens derived from indigenous breeds of sheep such as the Ronderib Afrikaner, Namaqua Africander and Letaba as well as from Persian and karakul crosses were analysed for fibre fineness. Determinations were also conducted on specimens derived from experimental sheep at Onderstepoort and Nooitgedacht. Observations were made on wool and sheep presumably infected with “Australian Itch” with good results.

Cases of Trichomoniasis in pigeons were encountered. A number of poultry with subcutaneous tumours showing a great deal of haemorrhage were submitted during the year. In all these cases Haemangioma of the liver was observed and in many instances it was accompanied by internal haemorrhage from broken liver tumours. Several cases of *S. typhi-murium* have also been diagnosed.

As was the case last year, a condition among chicks which closely resembles “Six-day Chick Disease” is a common occurrence. The feeding of antibiotics to young chicks brought about a decrease in mortality. Farmers also maintain that good results will be obtained if fowls suffering from roup are given an Australian antibiotic containing penicillin. Many cases of neuro-lymphomatosis, leucosis and egg yolk peritonitis were encountered.

Only 31 post mortems were conducted on the larger farm animals. Verminosis and paratyphoid were established in calves, while sheep exhibited symptoms of verminosis and enterotoxaemia.

Original Work.-- The collection of paintings of poisonous plants in Natal is still being supplemented and progress has been made in the survey of worms in cattle and calves. The mortality survey among calves in Natal has been completed. Further improvements have been effected in the preparation of stained K-antigen. The new
product largely decreases the incidence of reactions which, to the trained observer, are not typical of the actual B.W.D. or typhoid reactor.

The new fowls typhoid vaccine was tested over the whole of the Union. In many cases it stopped an out-break of the disease within on week to ten days. Although it is a dead vaccine it causes a positive reaction in inoculated poultry which may last for a period of three months or longer. This affects the holders of B.W.D.-free certificates who are anxious to sell their chickens as soon as possible.

An attempt was made to transmit Corridor disease (which is prevalent among cattle in the Hluhlwe and Umfolosi reserves) to healthy cattle, sheep and guinea-pigs by injecting them with blood derived from diseased cattle and buffaloes, but this venture was not successful. Ticks collected in these areas were sent to Ondersteepoort and they were used to infect stock with this disease. The work is being continued.

The first instance of Q fever has been encountered in the Union. The victim was a private veterinary surgeon who had removed the placenta of an imported cow at the Durban quarantine station. Specimens of the blood and milk were submitted to the South African Medical Institute in Johannesburg and they proved to be positive to R. Burnetti.

**Nooitgedacht Laboratory, Ermelo.**

Nutrition Experiments.-- Further experiments in connection with the supplementation of winter feeding of ruminants with urea and molasses were continued. The trials were conducted with 3-year-old Africander oxen and full-mouthed Merino ewes.

As far as the cattle are concerned, it has been proved once again that veld hay can be successfully supplemented by the addition of urea and molasses, and supplementary feeding of a small quantity of cowpea hay during the winter months yields excellent results. In the case of sheep the addition of cowpea hay did not prevent a loss in weight, though it was considerably smaller than in the experimental group.

**Short Courses and Demonstrations.**

1. A short training course was held during October, 1953, and 21 stock inspectors successfully completed the course.

2. During October, 1953, a farmer's day was held which was attended by 130 interested persons. The winter-feeding experiments were demonstrated on this occasion.

3. Members of the Grassveld Merino Association paid a visit to the station during April, 1954, and marked interest was shown in the winter feeding experiments.

4. Sixteen farmers attended a one-week course in wool at this institution.

Horse Improvement Scheme.-- One Percheron, two thoroughbreds and one Basuto pony stallions were available under this scheme and 27 mares arrived for service by these stallions. Three of the original six Basuto mares have died already; thusfar the
progeny numbers three fillies and one colt. The stud has, however, been supplemented by five mares which are on loan to the Department from Mr. M.C. Willemse of Memel, for breeding purposes.

**Regional Laboratory, Cape Town.**

As was the case during the previous year, problems in regard to poultry again demanded more attention, although there was also a marked increase in work in connection with other domestic animals.

**A. Poultry Diseases.**

**Bacillary White Diarrhoea.** Three assistant stock inspectors were responsible for the B.W.D. tests. A total of 93,953 tests was conducted as against 7,414 the previous year. In the Cape Western Area there are at present 47 holders of the B.W.D.-free certificate as against 42 the previous year. Only eight outbreaks among chicks were diagnosed.

**Fowl Typhoid.** Fowl typhoid was the most feared disease in poultry in this area, since it was responsible for considerable losses in all diagnosed outbreaks. The mortality figure varied from 50 per cent to 90 per cent. Twenty-seven outbreaks were established each of which was individually controlled by means of slaughtering, inoculation, followed by tests or a combination of all these treatments along with improved hygienic conditions.

**Pullet Disease.** This disease occurred sporadically and in a particularly severe degree. All attempts to transmit it to experimental fowls failed. Various methods of treatment were applied. The best results are obtained by withholding all food from the fowl for one day and giving them only molasses and water (12 lb. per gallon) twice daily. The following day only half the usual quantity of laying mash is fed while the normal quantity is given on the third day. As soon as the disease disappears, pure water is given and only a week later yellow maize may be fed. The incidence of the disease was greatest during the warm months November to February.

**Fowl Pox.** A number of outbreaks occurred, but the use of the vaccine had the desired effect.

**Aspergillosis.** This disease was more widespread than during the previous year. It was established that the deep-litter system had probably been largely responsible for the increased outbreaks.

**Contagious Catarrh and Chronic Respiratory Disease.** These two diseases are often confused and since difficulty is experiences in distinguishing them, they are generally treated as “roup”. Where instances of “roup” occur, it is recommended that hygienic conditions, feeding, ventilation etc. be improved. The American type of fowl run where the ventilation takes place from below upwards is fairly generally used and is regarded as a great improvement on the old type of house in this area.

**Fowl Cholera.** Only two outbreaks were diagnosed as against seven the previous year. It is recommended that all affected fowls be destroyed.
Newcastle Disease.-- No instances of this disease occurred and the use of vaccines has decreased to such an extent that it may be assumed that the poultry through-out the area will be susceptible to the disease should an outbreak occur.

Coccidiosis.-- This disease was widespread and caused mortality among chicks. Treatment with known remedies yielded good results. The use of preventives in the feed gives but poor results, as this causes the disease to becom chronic.

Lymphoid leucosis.-- This disease again occurred generally and was responsible for 75 per cent of the mortality in the egg-laying competition. As long as the commercial poultry farmer continues to use the eggs of pullets for hatching purposes, the disease will increase rather than decrease.

General.-- No cases of tuberculosis or epidemic tremor occurred. Spirochaetosis occurred but was easily controlled by exterminating all tampans. Cases of infestation with internal parasites occurred, but this does not constitute a serious problem. The regular use of B.H.C. and D.D.T. is effective for external parasites.

During the year under review 918 post mortems were conducted on poultry.

**B. Other Domestic Animals.**

Only 30 cases were brought to the laboratory for post mortem. There was, however, an increase in the number of specimens submitted.

Contatious Abortion.-- A marked increase in the number of tests is indicative of greater interest on the part of farmers. During the year 5,489 specimens were tested as against 3,271 the previous year.

[Continued on page 165]