

The following is a summary of the operations carried out by the Officer in Charge, Mr. C. S. M. Hopkirk, B.V.Sc. (Melb.) :—

A total of 4,685 specimens were received, as against a total of 3,292 for last year. The majority were milk and blood samples, but some 900 were specimens of a pathological nature, a big increase over previous years. Details of specimens are given below along with experimental work for the year.

#### MASTITIS (MAMMITIS).

During the year 1,835 milk-samples have been examined. Of these, 1,032 (56 per cent.) were considered streptococcic in origin, while the remaining 789 samples were normal. There were fourteen samples, however, which were definitely due to organisms other than streptococci. These organisms were *B. lactis aerogenes*, *Staphylococci*, and *B. hyogenes bovis*. Experimental work was continued whenever possible throughout the year on mastitis.

*B. lactis aerogenes*.—One cow was given an injection of a culture of *B. lactis aerogenes* obtained from a sample forwarded from the Palmerston district, where several cows had died from mastitis. In the experimental case the quarter became intensely inflamed. The cow almost at once became visibly ill, and the temperature remained high. A small amount of thin amber-coloured secretion obtained was full of bacilli in pure culture. The quarter did not become gangrenous, but the organisms present set up such a toxæmia in the patient that she refused food, gave no milk at all, and could scarcely walk. She was finally killed. Besides udder-changes, the liver had developed numerous small necrotic areas throughout, about 2 mm. in diameter. The kidney showed a parenchymatous nephritis, and the heart endocardial hæmorrhages.

*Streptococcus lactis*.—More than one attempt was made to set up a lasting mastitis with *Streptococcus lactis*. This was found to be impossible. A passing inflammation did occur when milk-cultures, pH of 4·7, were placed in the quarter, but this soon cleared. Milk from an infected quarter placed in a second good quarter was found in one case to set up a further slight inflammation, but this was not the result in other trials. One would judge from the result that the saprophytic *Streptococcus lactis*, purely from acidity produced in culture, could set up an inflammatory reaction, but that the organism produced no aggressin with which to cause the tissues of the host to react. A sterile acid fluid was found to be equally effective in producing a passing inflammation of two or three days' duration.

*Longevity of Streptococcal Infection*.—During these experiments it was found that the usual form of streptococcus associated with mastitis had, on occasion, a longevity not before actually noted. In milk-transfer from one cow to another it was found that the streptococci had lasted three years in a quarter, the only sign being a slight leucocytosis in the milk secreted. This shows the prolonged chronicity of the disease and the possibilities arising from this fact make it difficult to give advice to farmers. Where the animal is kept it acts as a reservoir of the organism, and a danger when conditions in the herd become favourable for contagion.

*Udder-flora*.—As mentioned in my last annual report cows of the Laboratory herd were being exhaustively examined for udder-flora. The results showed that in quarters which had at one time been infected with streptococci occasionally streptococci were found, but staphylococci were more numerous than in quarters which had always been normal. Normal quarters were rarely sterile, usually giving a growth of cocci mainly of a type resembling *Staphylococcus epidermidis* of Bergey's classification.

*Cultural Examination of streptococci from cases of mastitis* has continued. Such examination has served to demonstrate the unreliability of reactions in sugar media. The differences in morphology and mode of growth, and in the action on blood-agar plates, also rather serve to make the observer doubt the specificity of the streptococcus.

*Acidity Tests*.—An experiment carried out recently with streptococci from different districts to show whether the acidity produced in the milk in culture might alter the virulence of the disease (a low acid type producing chronic pea-in-the-teat form and a high acid production giving an acute form) resulted in there being very little noticeable difference in the various strains. This must again be attempted, however, with a larger number of cultures.

*Animal Experiments*.—Guinea-pigs were found to get mastitis if inoculated directly into a quarter, but only for a few days. It would appear that the disease is not blood-borne. Cultures of streptococci inoculated intravenously into the jugular, following injury to the quarter with acid, did not result in the streptococci appearing in the quarter. This fact is important. Experimental vaccination has been carried out prophylactically in four herds this past year, but successful prophylaxis has not been apparent.

The Hamilton Vaccine Co. vaccinated one herd in the Manawatu which had recently been examined for mastitis. Two subsequent herd examinations of milk-samples were undertaken—one after the second dose of vaccine, and one a week after the final dose. A graph made by Mr. Gill shows that there has been a marked increase in acute case since vaccination.

#### COMPOSITE MILK-SAMPLES FOR TUBERCLE EXAMINATION.

From dairies supplying fresh milk to towns 295 samples were submitted to the test, with the satisfactory result that none reacted.

#### CONTAGIOUS ABORTION.

A large increase in numbers of blood-samples for the application of the agglutination test were received, the increase being due to the experimental vaccinations carried out during the year. A total of 1,953 were received; 480 (24 per cent.) were positive.

It has been found during the year—more so this year than in previous years, owing possibly to the long-continued hot weather—that a very large number of the samples come in laked, especially if more than twenty-four hours elapsed between taking of the sample and its receipt at the Laboratory. This is caused by hæmolytic bacilli. In other countries whole bloods are not forwarded, but the farmers are instructed to send serum alone. During hot weather this method will, as far as possible, be adopted at Wallaceville. Two bottles will be forwarded, one for whole blood and the other for serum.

The Laboratory clean herd is still unaffected with abortion, and all heifers are now in calf for the second time.

*Agglutination Test*.—The fast method tried last year was repeated where blood-samples were laked, and again gave good results. Laking of the blood masks the reading of the agglutination test very greatly by the formation of a flocculent deposit. On this account many samples have been thrown out as useless.

*Vaccination*.—A large number of heifers were vaccinated this present gestation period with a chloroform-killed bacillus. Last year the seventy heifers cited appeared to have given satisfactory results—a decrease in abortion and an increase in antibody, due, it was considered, to vaccination. This resulted in a larger experiment as follows :—

|                    | Vaccinated. |    |    |    |     | Controls.           |
|--------------------|-------------|----|----|----|-----|---------------------|
| Taranaki .. .. .   | ..          | .. | .. | .. | 393 | 171                 |
| Wairarapa .. .. .  | ..          | .. | .. | .. | 196 | Remainder of herds. |
| Manawatu .. .. .   | ..          | .. | .. | .. | 4   | 3                   |
| Mangatainoka .. .. | ..          | .. | .. | .. | 9   | ..                  |
| Hastings .. .. .   | ..          | .. | .. | .. | 12  | ..                  |
| Total .. .. .      | ..          | .. | .. | .. | 614 | 174 plus remainder. |

Blood-samples have been examined from all these heifers, and almost all were negative. In one herd where several were already pregnant the bloods gave a positive reaction in a few cases, but the possibility existed that such animals were already in calf. This can be verified later. Fifty samples taken at random at each vaccination showed that there was very little antibody formation in the heifers. Already there have been several abortions. Final figures will not be obtained till calving, but it is already evident that this method of vaccination is not a practical one. Antigen used was made exceptionally strong.