

ANNUAL REPORT

OF

The Imperial Bacteriological Laboratory, Muktesar

FOR THE YEAR ENDING THE 31ST MARCH, 1918.

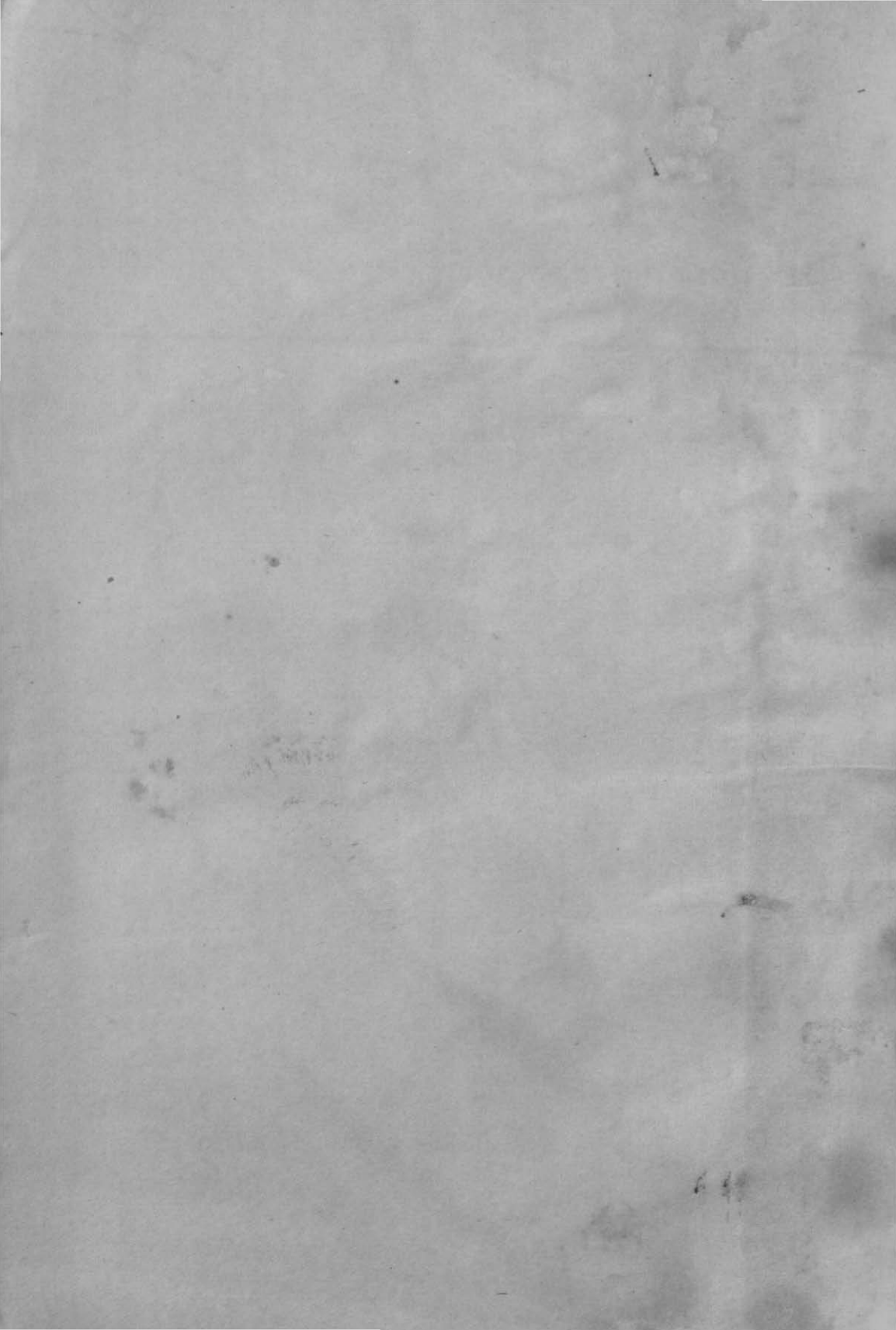


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CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1918

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FOR THE YEAR ENDING THE 31ST MARCH, 1918.

(A. LESLIE SHEATHER, B.Sc., M.R.C.V.S.)

I. ADMINISTRATION.

Staff. I remained in charge of the office of Director and First Bacteriologist* throughout the year, and Mr. Shilston held the post of Second Bacteriologist* except between the 14th June and 8th October, 1917, when his services were placed at the disposal of the Army Department for special duty in Mesopotamia. Lieut. E. C. Bowes, A.V.C., officiated for him during this interval.

The posts of Pathologist and Physiological Chemist remained vacant during the year under report. Lieut. Bowes officiated as Pathologist between the 9th October and 30th November, 1917, on special duty.

Mr. Andrews was in charge of the electric installation and other plants during the year under report, except from the 12th October to 18th November, 1917, when he was on deputation to the N.-W. Railway.

Mr. N. K. Vacha was appointed on probation to the second post of Veterinary Deputy Superintendent sanctioned by

* The designation of Imperial Bacteriologist was changed to Director and First Bacteriologist under Government Notification No. 5-C., dated 6th November, 1917, and that of Assistant Bacteriologist to Second Bacteriologist, *vide* Notification No. 992-73-3, dated 5th September, 1917.

Government for the inoculation of cattle in the Military Dairies, and in his place Mr. Sathe was appointed as a Veterinary Inspector in this laboratory establishment.

Tours. Between 16th and 21st of September, 1917, I visited Simla to see the Agricultural Adviser to the Government of India, and between 7th and 17th of December, 1917, accompanied by Mr. Shilston, attended the meeting of the Board of Agriculture at Poona.

The serum-making at Kargaina (Bareilly) was started by the Second Bacteriologist on October 29th after his return from special duty in Mesopotamia, and at the request of the Director of Veterinary Services in India he visited Karachi between the 17th and 29th December, 1917, to investigate an outbreak of glanders among mules newly landed there.

Training. During the past year Mr. R. V. Pillai, Laboratory Assistant, Bengal Veterinary College, and Mohammad Yusuf, Veterinary Assistant, Kashmir State, underwent a course of training at this laboratory.

Fodder and grain supply. The arrangements for obtaining hay and grain were as in previous years and were found satisfactory.

Forests. During the past year sufficient fuel was obtained from our own forest now worked under the new Working Plan, and its administration was carried on satisfactorily.

Water supply. The new electrical pumping project to augment the water supply at Muktesar is still in the course of construction and will, it is hoped, be completed during the year 1918-19.

Owing to the almost continuous rain during the summer months in 1917, the question of water supply did not become very acute. It was found necessary, however, to issue water tickets for some weeks, and a considerable amount of labour had to be employed in obtaining and distributing water during this period.

Electric centrifuges. Reference to the statement regarding the increased output of the laboratory will indicate the pressing necessity of the new centrifuges which are on order. The existing machines were run continuously. There was no opportunity of thoroughly overhauling them and

no stand-by in the event of a breakdown which fortunately did not occur.

Supply of hill bulls and plains animals. The cost of these animals had to be raised slightly and the demand was fulfilled without any difficulty under the existing arrangements.

Bareilly Branch Laboratory. To meet the increasing demands for anti-rinderpest serum and to maintain rinderpest virus for use in the inoculation of animals at the Government Military Dairies, it was found necessary to open the Branch Laboratory at Kargaina (Bareilly) during the winter months, and to maintain between 150 and 200 serum-making animals there. The experience gained shows that the accommodation and area of land available at Kargaina are quite insufficient for the work that has to be carried on there. A number of temporary grass *chappars* (sheds) were erected for the animals, but these proved to be very unsatisfactory owing to their fragile nature and to the impossibility of disinfecting them.

The lack of ground area and housing accommodation was felt the more seriously owing to the successive appearances of foot-and-mouth disease, hæmorrhagic septicæmia and black quarter among the serum-making animals. It was also a matter of difficulty to isolate animals required as controls.

The total amount of anti-rinderpest serum prepared at and despatched from Kargaina up to the end of March, 1918, was 404,847 doses.

Financial aspect. It is very satisfactory to note that with effect from 1st September, 1917, the Government of India have sanctioned charges for all routine products of this laboratory.

It would not be out of place to mention that during the year 1917-18, the total value of different products, calculated on the basis fixed by Government, amounts to Rs. 4,15,080 against an expenditure of Rs. 3,36,481.*

General remarks. Foot-and-mouth disease was present among the animals in the outkraals during the whole year, with the exception of a period of six weeks in April and May, but, by constructing temporary sheds for segrega-

* Includes an expenditure of Rs. 7,591-15-3 incurred in connection with the inoculation in Military Dairies.

tion as well as for healthy animals, the disease was kept under control.

During the past year on two occasions, (i) end of June, 1917, and (ii) on the 8th October, 1917, relapsing fever broke out among our coolies and *gwalas* (cattlemen). The second outbreak, being of a serious nature, caused panic among them and a large number ran away.

Scarcity of labour was a source of great anxiety during the latter part of the year. Arrangements had to be made for transport of the laboratory products through contractors, local labour had to be obtained for farm work, and for a time serum-making animals had to be kept in outkraals as there was not sufficient low caste labour to attend to them in the inner sheds.

During the year under review, the output of the products of this laboratory was increased to nearly double that of last year. To minimize the strain imposed on the staff two temporary dressers and four bearers were appointed.

The Ministry of Agriculture, Cairo, is still being supplied every month with 50,000 doses of anti-rinderpest serum and this will be continued up to December.

The request of the Veterinary Department of Sudan Government to supply them with 200,000 doses of anti-rinderpest serum before September, 1918, is also being complied with.

During the past year the demand for mallein from the Military Department was immensely increased, but all indents were complied with.

All members of the staff worked cheerfully and energetically notwithstanding the heavy strain imposed upon them throughout the year.

II. PREPARATION OF SERUMS AND VACCINES.

Rinderpest serum. During the year 1917-18, 2,146,421 doses of anti-rinderpest serum were prepared as against 1,243,670 doses prepared during the year 1916-17, and 2,069,961 doses issued as against 1,409,220 doses during the previous year.

The Military Department indented 271,420 doses of this serum during the past year as against 154,750 doses supplied during 1916-17.

The results obtained in the field from inoculations with this serum are shown in the subjoined table :—

Province	Number of outbreaks in which inoculation was undertaken	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE			NUMBER OF ANIMALS INOCULATED			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION			Percentage of deaths in inoculated bovines
		Equines	Bovines	Others	Equines	Bovines	Others	Equines	Bovines	Others	
Punjab	358	...	7,843	...	...	70,645	...	...	57	...	...
North-West Frontier Province and North Punjab	34	...	1,250	...	...	9,190	...	...	2	...	...
United Provinces . . .	319	..	4,574	95	...	25,643	581	...	14	4	...
Bengal	373	...	9,755	...	...	52,785	...	...	234	...	...
Assam	621	...	8,956	...	...	38,295	...	...	346	...	...
Bihar and Orissa . . .	544	...	5,551	...	...	53,661	...	...	309	...	...
Central Provinces . . .	481	...	5,297	...	...	58,514	...	...	227	...	...
Bombay	288	...	6,190	...	...	35,380	...	...	154	...	...
Madras	613	...	15,872	...	...	97,388	128	...	391	...	...
Sind, Baluchistan and Rajputana	18	...	339	...	...	2,261	...	...	13	...	...
Burma	172	...	1,429	...	...	12,807	...	...	93	...	...
Bengal Veterinary College	113	...	459	...	...	5,518	...	...	62	...	...
Hissar Cattle Farm . . .	(?)	...	50	...	...	4,286	...	...	23	...	...
Mysore State	47	...	...	...	...	31,374	...	...	...	...	...
TOTAL	3,981	...	67,565	95	...	497,747	709	...	1,925	4	0.38

Two hundred and forty-six (246) animals were inoculated by our staff in Gohna village close by the laboratory. The results have been very satisfactory. No deaths occurred in the inoculated herd and the disease was stamped out immediately.

Anthrax serum. During the year under report *14,175 doses of anthrax serum were manufactured and 19,727 issued as against 11,029 manufactured and 29,069 issued during the year 1916-17.

The following table shows the results of inoculations in the field with anthrax serum :—

Province	Number of outbreaks in which inoculation was undertaken	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE			NUMBER OF ANIMALS INOCULATED			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION			Percentage of deaths in inoculated bovines
		Equines	Bovines	Others	Equines	Bovines	Others	Equines	Bovines	Others	
Bengal	8	7	566	...	109	982	...	...	...	...	...
Assam	70	18	1,197	4	462	5,879	184	...	27	...	...
Bihar and Crissa	23	...	174	...	...	2,157	...	...	1	...	...
Central Provinces	2	...	31	...	...	229	...	...	1	...	...
Bombay	7	...	42	...	...	1,426	...	...	...	...	...
Madras	1	...	8	...	...	144	...	...	...	...	...
TOTAL	111	25	2,018	4	571	10,817	184	...	29	...	0.26

Hæmorrhagic Septicæmia serum and vaccine.

During the past year 216,457 doses of hæmorrhagic septicæmia serum were manufactured and 189,428 issued as against 122,915 doses prepared and 157,065 issued in the year 1916-17.

The number of doses of hæmorrhagic septicæmia vaccine prepared and issued during 1917-18 was 117,124 as against 146,540 doses prepared and issued in the preceding year.

* The manufacture of this serum was maintained in proportion to the demand.

The following table shows the details of the results of inoculations in the field with hæmorrhagic septicæmia serum :—

Province	Number of outbreaks in which inoculation was undertaken	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE			NUMBER OF ANIMALS INOCULATED			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION			Percentage of deaths in inoculated bovines
		Equines	Bovines	Others	Equines	Bovines	Others	Equines	Bovines	Others	
Punjab	158	...	1,525	...	...	29,786	...	...	11	...	...
North-West Frontier Province and North Punjab.	14	...	85	...	...	3,851	...	...	...	...	...
United Provinces	400	...	2,260	36	...	20,844	647	...	2	...	...
Bengal	67	...	507	...	...	9,300	...	...	3	...	...
Bihar and Orissa	187	...	1,119	...	...	22,772	...	...	35	...	...
Central Provinces	29	...	252	...	...	3,420	...	...	10	...	...
Bombay	122	...	1,414	...	...	21,027	...	...	13	...	...
Madras	65	...	1,227	...	...	13,217	...	...	23	...	...
Sind, Baluchistan and Rajputana	38	...	343	...	...	2,762	...	...	9	...	...
Assam	17	...	157	41	20	2,092	147	...	5	...	...
Hissar Cattle Farm	...	...	42	...	...	1,779	...	...	26	...	...
TOTAL	1,097	...	8,981	77	20	130,850	794	...	137	...	0.10

The results of inoculations in the field with hæmorrhagic septicæmia vaccine have been detailed in the subjoined table :—

Province	Number of outbreaks in which inoculation was undertaken	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE			NUMBER OF ANIMALS INOCULATED			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION			Percentage of deaths in inoculated bovines
		Equines	Bovines	Others	Equines	Bovines	Others	Equines	Bovines	Others	
Punjab	146	...	...	...	...	37,868	...	...	...	...	...
Bihar and Orissa	55	...	271	...	...	7,754	...	...	8	...	...
Bombay	34	...	25	...	...	4,784	...	...	1	...	...
TOTAL	235	...	296	...	...	50,406	...	...	9	...	0.01

Black Quarter vaccine. During the year under report as well as during the previous year, no necessity arose to manufacture more black quarter vaccine as the demands were complied with from the stock in hand. Seventeen thousand three hundred and twenty-four (17,324) doses were issued as against 23,350 doses during the preceding year.

The following table furnishes the details of inoculations in the field with black quarter vaccine together with the results of such inoculations :—

Province	Number of outbreaks in which inoculation was undertaken	NUMBER OF ANIMALS WHICH DIED UNINOCULATED IN COURSE OF DISEASE			NUMBER OF ANIMALS INOCULATED			NUMBER OF ANIMALS WHICH DIED AFTER INOCULATION			Percentage of deaths in inoculated bovines
		Equines	Bovines	Others	Equines	Bovines	Others	Equines	Bovines	Others	
Punjab	47	...	...	...	...	2,987	...	...	3	...	...
United Provinces	17	...	105	...	...	1,259	...	...	...	...	...
Bihar and Orissa	14	...	53	...	...	1,131	...	...	...	...	...
Bombay	1	...	...	...	...	78	...	...	...	...	...
Madras	...	...	...	...	...	23	...	...	...	...	...
Hissar Cattle Farm	...	...	8	...	...	1,579	...	...	37*	...	...
Mysore State	16	...	...	...	...	2,378	...	...	...	...	...
TOTAL	95	...	166	...	...	9,435	...	...	40	...	0.42

Mallein. In all 191,747 doses were prepared and 193,147 were issued as against 30,000 doses manufactured and 35,972 issued in the previous year. It will be seen from the table at the end of this report that 185,097 doses were supplied to the Military Department alone.

Strangles serum and vaccine. During the year 1917-18, 8,252 doses of strangles serum were prepared and 10,085 issued as against 4,195 doses prepared and 9,063 issued during 1916-17.

* Enquiry into the deaths of these animals showed that in ten instances only was the period that elapsed between vaccination and death less than six months. The intervals in the cases of the remaining 27 ranged from 6 months to 3 years and 8 months. As the immunity conferred by the black quarter vaccine is valuable for a period which varies between 6 months and one year, it is probable that a very considerable proportion of the animals reported to have died after vaccination had actually ceased to possess any immunity.

In addition to this 2,655 doses of mixed anti-streptococcic and staphylococcic vaccine and 550 doses of anti-streptococcic vaccine were prepared and issued. The demand for these serums and vaccines was chiefly from the Army Department.

Tuberculin. One thousand one hundred and eighty (1,180) doses of tuberculin were prepared and 381 issued against 82 doses prepared and 377 issued during the year 1916-17.

Miscellaneous vaccines. As in the previous year, material from infective conditions, chiefly from horses, was received in the laboratory for the preparation of autogenous vaccines. In all 150 doses were prepared and issued.

The following table compares the amounts of the various products of the laboratory prepared and issued during the year 1917-18 with the average amounts of the preceding 5 years.

Name of product	DOSES PREPARED		DOSES ISSUED	
	1917-18	Average of previous 5 years	1917-18	Average of previous 5 years
Rinderpest serum	2,146,421	1,069,030	2,069,961	1,127,540
Anthrax serum	14,175*	21,623	19,727	25,020
Hæmorrhagic Septicæmia serum	216,457	85,287	189,428	84,311
Hæmorrhagic Septicæmia vaccine	117,124	127,890	117,124	127,890
Black Quarter vaccine . . . . .	...*	10,000	17,324	16,700
Mallein	191,747	25,672	193,147	26,323

Note.—The apparent discrepancies in the average doses issued and prepared during the previous five years are due to the fact that the opening balances of the first year of the period were unusually large.

Sale of laboratory products. The total amount of bills for sale of anti-rinderpest serum issued during the year and also for other products issued from 1st September, 1917, as sanctioned by the Government of India, amounts to Rs. 2,89,261.† By adding to this Rs. 33,927-8-0, the cost of

* Prepared according to demand.

† Bills amounting to Rs. 36,287 are still awaiting payment and have to be carried over to next year's account.

271,420 doses anti-rinderpest serum supplied free of charge to the Military Department during the year, and Rs. 56,693-8-0 for cost of other products supplied to the same Department from 1st September, 1917, the total revenue from sale of the laboratory products would amount to Rs. 3,79,882 as against Rs. 1,79,364 during the previous year.

III. EXAMINATION OF SPECIMENS AND INOCULATION WORK.

Specimens examined. During the past year 513 specimens were received for examination and report as against 230 in the preceding year.

The following table shows the nature of the specimens :—

	NUMBER OF SPECIMENS		
	Positive	Negative	Doubtful
Epizootic Lymphangitis	2	8	...
Piroplasmosis	4	7	...
Glanders	35	25	26
Black Quarter	1	...	1
Tuberculosis	16	3	7
Anthrax	1	8	...
Dourine	11	201	11
Abortion	1	2	14
Surra	4	25	...
Pleuro-pneumonia . . . . .	...	...	4
Necrosis	4	6	1
Flies	1	...	...
Johne's Disease	1	1	...
Rinderpest . . . . .	...	1	...
Hæmorrhagic Septicæmia	1	1	...
Mange	3	8	...
Ringworm	1	...	...
Miscellaneous	17	27	23
TOTAL	103	323	87

Serum test for diagnosis of Dourine. Owing to the deputation of the Second Bacteriologist to Mesopotamia and the difficulties connected with the preparation and standardization of the necessary reagents, the progress of this investigation was greatly interrupted. In addition to experimental tests, reports were furnished on 284 specimens of serum received from Civil and Army Remount Department Veterinary Officers, as follows :—

Positive	Doubtful	Negative
11	11	201

Sixty-one specimens were received in a condition unsuitable for testing or gave results on which no opinion could be expressed.

Military Dairy inoculations. Mr. Vacha, the Second Veterinary Deputy Superintendent appointed for this work, accompanied Mr. V. R. Phadke during the early part of the season in order to become familiar with the procedure followed ; together they treated the bulls, young, and dry stock at the Peshawar, Sialkot, Malakwal, and Ferozepore farms during November and December, 1917.

Mr. Phadke then proceeded to the Southern Circle and inoculated the cattle at the Poona, Belgaum and Bangalore farms during January, February and March, 1918. Three newly imported Ayrshire bulls were immunized at Bangalore after the young stock had been treated, and later one bull at Poona was protected.

The inoculations of the stock at the Mhow farm were concluded after the close of the year under report, but the details are included in the table given below so that the particulars of the season's work may be complete.

During January and February, 1918, Mr. Vacha treated the stock at the Karnal, Lahore, and Jubbulpore farms. The outbreak of foot-and-mouth disease at Sitapur prevented the inoculation of the stock there, and the same cause necessitated an alteration in the arrangements for treating the animals at the Mhow farm. At the end of March Mr. Vacha went to Bagarji, where the cattle from the Ruk and Quetta farms had been collected. Unfortunately foot-and-mouth disease broke out while the inoculations were in progress, with the result that some animals suffered severely from both this disease and rinderpest simultaneously and eight half-breds died. A number of the animals that had not been protected developed foot-and mouth disease so that

they could not be given immunity except by the injection of serum only.

Twenty-four Ayrshire bulls were inoculated by the simultaneous method; twenty gave marked reactions and recovered, and two failed to react after two injections of virulent blood. The remaining two bulls treated at Bagarji developed foot-and-mouth disease after failing to react to their first injection of virulent blood and so could not be re-inoculated; their immunity being due only to the serum given was therefore temporary.

Ten of the bulls developed piroplasmosis, nine getting the infection from the blood inoculation and one developing it naturally. All were given Trypan-blue and recovered. One bull, however, at Bagarji, which contracted the disease by tick infection, died suddenly a few days after recovery, the cause of death not being ascertained.

A few cases of piroplasmosis occurred among half-bred stock but all recovered under treatment; no trouble was experienced with the country stock.

In the great majority of cases good reactions were obtained without a single death except those mentioned as being due to the additional infection of foot-and-mouth disease at Bagarji.

A total of 1,498 animals were inoculated by the simultaneous method.

The following table shows the numbers of animals treated at the different farms :—

Farms	Ayrshire bulls	Half-bred stock	Country cattle	Buffaloes	Total	Deaths
<i>Northern Circle</i>						
Peshawar	3	18	55	9	85	...
Malakwal	4	16	21	8	49	...
Sialkot . . . . .	...	...	54	25	79	...
Lahore . . . . .	...	13	56	30	99	...
Ferozepore . . . . .	...	3	49	20	72	...
Karnal	4	46	44	41	135	...
<i>Southern Circle</i>						
Bangalore	3	57	51	55	166	...
Belgaum . . . . .	...	...	45	...	45	...
Poona	5	28	71	51	155	...
Bagarji	2	88	155	111	356	8
Mhow	2	35	140	...	177	...
Jubbulpore	1	43	20	16	80	...
TOTAL	24	347	761	366	1,498	8

IV. RESEARCH.

Shortness of staff and increase in routine and administration duties have again seriously limited the time that could be given to research work.

Rinderpest. The question of the vitality of the virus of rinderpest under varying conditions is still under investigation, and a special series of experiments is being carried out with the object of ascertaining the length of time for which hides removed from animals dead of rinderpest remain infective.

Anthrax and Hæmorrhagic Septicæmia. The modifications in the manufacture of these sera foreshadowed in last year's report have been effected and have resulted in a very distinct reduction in the mortality among the serum-making animals, and also in a saving of labour.

The question as to the length of time hides from animals dead of hæmorrhagic septicæmia remain infective is also under investigation.

Contagious Abortion in cattle. A number of attempts were made to isolate the organism responsible for this disease from pathological materials sent to the laboratory, but all failed owing to the presence of numerous contaminating organisms. A culture of the bacillus responsible for the disease in Europe was obtained through the courtesy of Sir John McFadyean of the Royal Veterinary College. This strain is now kept running in the laboratory.

Up to the present the number of tests carried out is too small to warrant any definite opinion, but the results of these tests appear to indicate that the same bacillus is responsible for the disease in India.

Johne's Disease. Reference was made last year to the occurrence of this disease in India and it was stated that two suspected animals were under observation. One of these (a cross-bred cow) was killed when *in extremis* a month after arrival at Muktesar. Post-mortem examination confirmed the diagnosis, and microscopic examinations showed that bacilli were present throughout the length of the intestine, and that they were especially numerous in the terminal part of the small intestine and in the anterior portion of the large intestine. Attempts to obtain cultures of the bacillus failed.

The other * animal under observation (an aged Delhi buffalo) was alive on March 31st, but has since died of peritonitis due to injuries to the stomach and intestines following on the ingestion of some fragments of wire and stones. This animal also proved to be infected with the disease. The lesions were not very conspicuous, and microscopic examination showed that at no place in the intestine were the bacilli at all numerous.

From the time these two animals arrived at Muktesar, they were housed in a temporary wooden shed with a buffalo and a hill bull as contacts. The buffalo contracted rinderpest after having been eight months in contact. Post-mortem and microscopic examinations failed to reveal any evidence that it had contracted Johne's Disease.

A fresh buffalo was placed in contact, and it and the hill bull have remained in the shed ever since. Neither has shown any clinical evidence of infection.

It appears to be advisable to refer to two further cases in which a positive diagnosis has been arrived at although the materials upon which the diagnosis was based were received after the close of the year under report.

The materials in question were portions of the intestines and mesenteric glands from two animals at Poona, and they were sent for confirmatory examination by the Superintendent, C. V. D., Bombay.

As the specimens had been placed in preserving fluid, nothing beyond microscopic examination was possible.

Tuberculosis. Investigations in connection with this disease of necessity make slow progress, as the bacillus grows very slowly in artificial culture, and in animal inoculations periods of weeks or months have to elapse before experiments come to maturity.

A number of strains of tubercle bacilli have been isolated from bovine lesions and these are being studied.

Pleuro-pneumonia of goats. Provision of susceptible animals for experimental work in connection with this disease was made, and a quantity of material from a natural case of the disease was received. Unfortunately pneumonia of a different type broke out among the animals selected for

* Although this animal was alive at the end of the year under report, it has been thought advisable to refer to it here instead of delaying the report of its death until next year.

experiment, and it was found impossible to use the material available with any hope of getting reliable results.

When the outbreak of pneumonia was over efforts to obtain further infective material were unsuccessful.

Publications. No papers recording original work were published during the course of the year.

In view of the detection of cases of Johne's Disease in India it was considered advisable to publish a short account of the disease. This was accordingly done in the *Agricultural Journal of India* (Vol. XIII, Part 1.)

Table showing the doses of different products issued from the

Products	QUANTITY OF SERA							
	Punjab	N.W. F. P. & N. Punjab	South Punjab	United Provinces	Bengal	Assam	Bihar and Orissa	Central Provinces
Rinderpest serum .	45,100	14,300	105,000	73,500	175,000	121,000	165,900	120,000
Anthrax serum . . .	3,012	..	..	..	..	4,000	3,000	2,200
Hæmorrhagic Septicæmia serum	13,374	6,000	14,900	30,600	24,000	..	35,000	11,500
Hæmorrhagic Septicæmia vaccine	24,443	15,050	27,081	..	..	..	41,000	..
Charbon Symptomatique vaccine	1,674	1,150	6,500	500	..	..	1,000	..
Mallein	247	20	180	30	250	..	..	4
Ophthalmic Mallein .	..	..	..	..	..	..	..	..
Tuberculin	24	..	10	..	75	..	..	100
Anti-Streptococcic serum	..	..	..	..	..	..	..	50
Anti-Streptococcic vaccine	..	..	..	10	..	..	..	..
Special vaccine . . .	..	..	..	..	..	..	..	..
Streptococcic and Staphylococcic vaccine (mixed)	..	50	..	..	..	..	..	..
TOTAL	87,874	36,570	153,671	104,400	199,325	125,000	245,900	133,854

Imperial Bacteriological Laboratory during the year 1917-18.

(IN DOSES) ISSUED

Bombay	Madras	Sind, Baluchistan and Rajputana	Burma	Coorg	Military Department	Native States	Foreign Countries	Imperial Bacteriological Laboratory	TOTAL
96,900	243,750	3,000	61,500	4,500	271,420	73,000	477,780	18,311	2,060,961
2,500	..	200	..	200	347	3,400	..	863	19,727
28,000	10,000	4,700	..	..	1,647	4,200	4,000	1,507	189,428
9,000	..	100	..	..	50	200	..	200	117,124
..	..	..	..	..	100	6,200	..	200	17,324
4,350	760	140	420	..	176,747	201	..	23	183,462
..	..	..	..	..	8,350	1,310	..	25	9,685
..	..	2	..	..	152	12	..	6	381
..	..	..	..	..	9,670	..	..	365	10,085
..	..	..	..	..	490	50	..	..	550
..	..	..	..	..	150	..	..	..	150
..	..	..	..	..	2,605	..	..	..	2,655
140,750	254,510	8,142	61,920	4,700	471,728	88,663	481,780	21,505	2,620,532

Table showing main results of the working of the

QUANTITY IN DOSES OF SERA OR ANTI-TOXIN PREPARED AND ISSUED								INSTRUCTION IM- PARTED					
	Name of sera or anti-toxin	Opening balance	Prepared during the year	Returned serum	TOTAL	Issued during the year	Stock in hand	Department or Province	European Officers attending class	Number passed	Indian Veterinary Gradu- ates	Number passed	
1	2	3	4	5	6	7	8	9	10	11	12	13	
	Rinderpest serum (dose = 5 c.c.)	123,200	2,146,421	23,350	2,297,971	2,069,961	228,010						
	Anthrax serum (dose=15 c.c.)	5,650	14,175	2,000	21,825	19,727	2,098						
	Hæmorrhagic Septicæmia serum (dose= 15 c.c.)	16,600	216,457	516	233,573	189,428	44,145						
	Hæmorrhagic Septicæmia vaccine (dose = 5 c.c.)	...	117,124	...	117,124	117,124	...						
	Black Quarter vaccine (dose = 1 pill)	31,050	...	...	31,050	17,324	13,726					
	Mallein (dose= 1 c.c.)	3,620	187,997	1,000	192,617	183,462	9,155	Kashmir State.		...	1	1	
	Ophthalmic Mallein (dose = ½ c.c.)	5,935	3,750	...	9,685	9,685	...						
	Tuberculin (dose=2 c.c.)	1	1,180	...	1,181	381	800						
	Anti-Strepto- coccic serum (dose=15 c.c.)	2,932	8,252	...	11,184	10,085	1,099						
	Anti-Strepto- coccic vaccine (dose=5 c.c.)	...	550	...	550	550	...						
	Special vaccine (dose=1 c.c.)	...	150	...	150	150	...						
	Streptococcic and Staphylo- coccic (mixed) vaccine (dose = 1 c.c.)	...	2,655	...	2,655	2,655	...						
	TOTAL	188,988	2,698,711	31,866	2,919,565	2,620,532	299,033		...	...	1	1

* This amount includes Rs. 16,228 realized

† Inclusive of Rs. 7,591-15-3, charges of inoculation

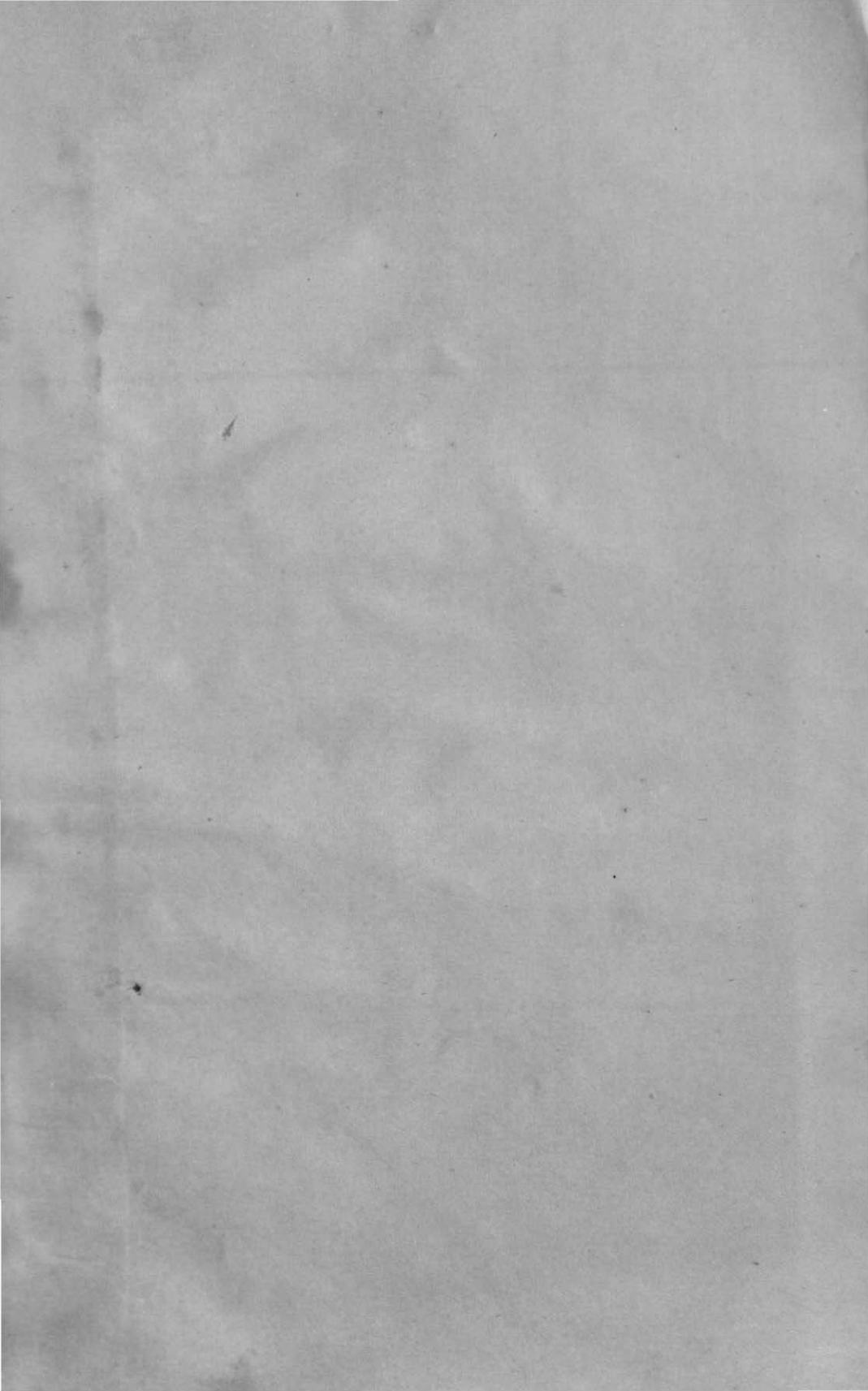
Imperial Bacteriological Laboratory during the year 1917-18.

FINANCIAL RESULTS

RECEIPTS					EXPENDITURE					
Sale of sera, vaccines and other products	Sale of animals	Sale of garden products and Reserved Forests	Other miscellaneous receipts	TOTAL	Salaries and travelling allowances of officers and staff	Feed and keep of animals	Cost of chemicals and apparatus	Other miscellaneous expenditure	Purchase of animals	TOTAL
14	15	16	17	18	19	20	21	22	23	24
Rs. A. P.	R. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
2,60,292 10 0	29 0 0	1,068 10 0	577 0 0	2,70,877 4 0	95,024 2 6	1,23,017 7 2	10,312 6 11	56,767 11 6	51,359 7 0	3,36,481 3 1
2,60,292 10 0	29 0 0	1,068 10 0	577 0 0	2,70,877 4 0	95,024 2 6	1,23,017 7 2	10,312 6 11	56,767 11 6	51,359 7 0	3,36,481 3 1

for the year 1916-17, the Military Dairy Farms.

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