Annual report of the Sudan Veterinary Service.

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ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

FOR THE YEAR

1947.

McCorquodale & Co. (Sudan), Ltd

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GENERAL.

The year was notable for a marked expansion of veterinary activities throughout the country. For the first time since 1939 the establishment of senior professional staff was almost at full strength and it was possible to re-post veterinary inspectors to a a number of provinces and districts that had been without such representation for several years. Although the issues of biological products from the veterinary laboratories were greater than in any previous year, it was possible, after a lapse of many years, for the laboratory staff to carry out a certain amount of research work. The cadre of classified staff in the department was increased by about 47 percent over that of 1946 while there was an increase in unclassified staff of approximately 91 percent. Expenditure totalled £E. 116,608 (£E. 56,893 in 1946) and revenue amounted to £E. 75,515 (£E. 52,574 in 1946).

Dr. M. H. French, Hides, Skins and Leather Controller, East Africa, who had accepted an invitation to examine and comment on the Sudan's hides and skins industry and offer advice on its future improvement and development, submitted a comprehensive report of inestimable value.

Mr. E. C. Cunningham C.B.E., a meat expert selected for the Sudan Government by the British Ministry of Food arrived towards the end of the year to report on the possibilities of establishing an export trade of meat and meat products.

SECTION I.

STAFF

The expansion of the department necessitated a number of staff changes during the year.

The post of Senior Research Officer was upscaled to that of Assistant Director (Research). A new post of Assistant Director (Administration) was created and occupied by Mr. J.E. Furney. Messrs A. W. Chalmers, P. Durran and J. D. M. Jack were promoted to Senior Veterinary Inspectors.

Other notable staff changes were the promotion of three Sudanese veterinarians—Ibrahim Eff. Mohammed Khalil to Veterinary Inspector and El Amin Eff. Abdalla El Karib and Mohammed Eff. Ali Mihemied to Assistant Veterinary Research Officers.

Four Veterinary Inspectors, two Veterinary Research Officers an Inspector of Hides and a Pasture Research Officer arrived from the United Kingdom on first appointment. One Veterinary Inspector post and the post of Entomologist remained vacant.

DISTRIBUTION OF CLASSIFIED TECHNICAL STAFF ON 31st DECEMBER, 1947.

Designation	Name	Station
Director	W. H. Glanville, 4N., M.R.C.V.S.	Khartoum
Asst. Director (Admn)	J. E. Furney, 4N., M.R.C.V.S.	Khartoum
Senior Veterinary Inspector	Capt. T. Menzies, O.B.E., 4N., M.R.C.V.S., D.V.S.M.	El Obeid
,, ,, ,,	I. A. Gillespie, M.R..V.S.	El Fasher
,, ,, ,, and Dean Khartoum Veterinary School	A. W. Chalmers, M.R.C.V.S.	Khartoum
Senior Veterinary Inspector	P. Durran, M.R.C.V.S.	Nyala
,, ,, ,,	J. D. M. Jack, M.R.C.V.S.	Wad Medani
Veterinary Inspector	J. K. Thomson, M.R.C.V.S., D.V.S.M.	Malakal
,, ,,	P. Z. Mackenzie, M.B.E., M.R.C.V.S.	Wau
,, ,,	H. B. Luxmoore, B.Sc., M.R.C.V.S.	Khartoum
,, ,,	D. G. Clow, M.R.C.V.S.	Malakal
,, ,,	T. Stewart, M.R.C.V.S.	Wad Medani
,, ,,	C. P. Williams, M.R.C.V.S.	Khartoum
,, ,,	C. N. Chappel, M.R.C.V.S.	Kosti
,, ,,	Ibrahim Mohd Khalil, Dip. Vet. Sci.	Shendi
,, ,,	M. J. Henigan, M.R.C.V.S.	El Obeid
,, ,,	J. S. Robertson, M.R.C.V.S.	Wad Medani
Veterinary Officer	Ahmed Magdoub Abdoun, Dip.Vet.Sci.	El Obeid
,, ,,	Hussein Hassan Abbo, Dip. Vet. Sci...	
,, ,,	Zein El Abdin Mahmoud, Dip. Vet. Sci.	Wadi Halfa
Superintendent	J. McKay	Khartoum
Asst./Superintendent	G. M. Anderson	Khartoum
Inspector of Hides	E. Knew, Dip. Leathersellers Coll.	Omdurman.
RESEARCH		
Asst. Director (Research)	J. T. R. Evans, B.Sc., M.R.C.V.S.	Khartoum
Veterinary Research Officer	A. Mackay, B.Sc., M.R.C.V.S.	Nyala
,, ,, ,,	F. W. Priestley, M.R.C.V.S. Dip. Bact. (Lond)	Khartoum
Asst. Veterinary Research Officer	El Amin Abdalla El Karib, Dip. Vet. Sci.	in U.K. on Study course
Asst. Veterinary Research Officer	Mohd Ali Miheimeid, Dip. Vet. Sci.	Malakal
Veterinary Officer	El Nazeer Dafalla, Dip. Vet. Sci.	Khartoum
,, ,,	Saad Mahanna Ahmed, Dip. Vet. Sci.	Khartoum
Pasture Research Officer	M. N Harrison, B.Sc. (Agric)	Khartoum

The Establishment of the Classified Staff on 31.12.47 was 1 Headclerk, 9 Clerks, 3 Bookkeepers, 1 Sarraf, 1 Storkeeper, 16 Veterinary Assistants, 2 Laboratory Assistants, 27 Head Stockmen, 1 Southern Supervisor and 13 Southern Stockmen.

The following unclassified Staff were on the Strength at the end of the year :— 143 Stockmen, 178 Attendants, 4 Shoeing Smiths, 2 Farriers, 1 Carpenter, 4 Pump Drivers, 8 Motor Car Drivers, 3 Storemen, 1 Ghafir and 10 Messengers.

SECTION II

DISEASES OF ANIMALS.

Cattle Plague.

The first large scale vaccination campaign to be undertaken against cattle plague in the Sudan started in the Southern District of Darfur Province in September. Initially, vaccination centres were established in the northern grazing areas but later when the nomadic herds moved south on their annual migration, additional centres were established along the migratory routes and in the southern grazing areas. By the end of the year over 150,000 cattle had been vaccinated at the centres. This figure was less than anticipated and the main reason for the lack of response was undoubtedly the large number of immune cattle in herds that were involved in the widespread outbreaks of 1946. Another factor was the reluctance on the part of some owners to disclose the number of cattle they owned.

Early in the year cattle plague was fairly widespread in the Southern District of Darfur Province. For the remainder of the dry season sporadic outbreaks appeared in all districts. With the rains the incidence decreased but small local outbreaks reappeared later. It was feared that the concentrations of cattle at the inoculation centres would lead to increased spread with much difficulty in control but this did not occur. Additional to the vaccine used at inoculation centres 26,000 doses of vaccine and 72,000 doses of serum were used in Darfur Province in the control of the disease.

There was a marked increased incidence of the disease in the White Nile Area of the Blue Nile Province but elsewhere there was little change from the position in 1946. 35,000 doses of vaccine and 52,000 doses of serum were used to control outbreaks. Over 2,600 working bulls of the Gezira Scheme were immunised by the serum-virus method.

Veterinary Inspector, Equatoria Province was of the opinion that probably about half of the cattle born in the province never reach maturity on account of cattle plague. Severe outbreaks occurred in March, April and May. Owing to the vast numbers of cattle, the distances involved, the delay in receiving news of outbreaks and the unsatisfactory work of native administration inoculators, control of the disease was extremely difficult. 49,000 doses of vaccine and 20,000 doses of serum were administered.

Small sporadic outbreaks occurred throughout the year in Kassala Province where 29,000 doses of vaccine and 7,500 doses of serum were used to control the disease.

In Khartoum Province the incidence of the disease was slightly greater than last year but was never serious. 2,000 cattle were serumised during outbreaks whilst 2,500 were vaccinated prophylactically.

Outbreaks occurred in all districts of Kordofan, the highest incidence being in the districts of Western Kordofan and Western Jebels. 60,000 doses of serum and 20,000 doses of vaccine were used to control outbreaks and it is estimated that 284,000 cattle were vaccinated prophylactically.

Very severe outbreaks occurred in Northern Province among working cattle. The disease was most serious in Dongola District where losses were very heavy. In many cases outbreaks were not reported until owners had lost most of their susceptible cattle and in some places owners refused to have their healthy cattle vaccinated. Measures for compulsory vaccination were considered by the rural district councils and received their support. A permanent quarantine was established at Debba to keep a check on imported Kordofan cattle, which are usually responsible for the entry of the disease into Northern Province. 2,500 cattle were serumised and 17,000 vaccinated as control measures.

The incidence of the disease was low in the Upper Nile Province where 43,000 doses of vaccine and 24,000 doses of serum were administered.

Contagious Bovine Pleuro-Pneumonia.

With the exception of Equatoria Province no serious extension of this disease was reported. The disease was present in small areas of all the Dinka districts of Equatoria Province. Attempts to induce owners to slaughter infected animals were almost entirely without success. Great difficulty was encountered in obtaining fresh supplies of vaccine with enough time left for administration before the expiry date. 15,500 doses were administered.

In the Blue Nile Province the disease was not a major problem and the reported incidence was confined to sporadic outbreaks, never exceeding three in any one month. 2,200 cattle were vaccinated.

The disease was reported from all districts of Darfur Province throughout the year. Owners of infected herds did not report the disease in many instances and they were unwilling to slaughter known infected animals. The Senior Veterinary Inspector reported that cattle owners are alive to the danger of this insidious and dangerous disease and will go to the trouble of having their cattle " vaccinated " by the insertion of diseased lung tissue under the skin of the nose. This practice, which was at one time uncommon except among Fellata cattle and those from French Equatorial Africa, appears to have spread to other tribes in the province. Increased supplies of vaccine were made available for the province and it was decided to offer owners the chance of having it injected simultaneously with cattle plague vaccine as the cattle went through the inoculation centres. 26,500 doses were administered compared with 8,200 in 1946.

No case of the disease was reported from Kassala or Northern Province. Imported cattle were kept under close observation as a precautionary measure.

An isolated outbreak in Khartoum Province was quickly suppressed.

In Kordofan Province the incidence of the disease was low and was mainly confined to trade cattle from French Equatorial Africa.

There was very little disease in the Upper Nile Province and large areas remained free of the disease. The Dinka of Bor district agreed to the slaughter of infected animals with the result that the district was reported to be free of the disease at the end of the year. 19,000 doses of vaccine were issued in the province during the year.

The number of cases detected in the export quarantines was slightly greater than last year and amounted to 0.67 percent of the total cattle exported.

Foot and Mouth Disease.

Mild outbreaks were reported from Equatoria, Kordofan and Blue Nile Provinces and caused little inconvenience but during October cases occurred among export cattle at Khartoum North Quarantine and the trade to Egypt was held up for a few weeks.

Trypanosomiasis (Cattle).

In the early months of the year the disease was reported as prevalent in the Kosti district of the Blue Nile Province. In the south of the irrigated area of the Gezira Scheme *T. congolense* was responsible for two deaths and *T. vivax* for one death among working cattle.

In Southern Darfur, where occasional cases are known to occur from time to time, trypanosomiasis assumed epizootic proportions in some areas. Investigations showed that losses in individual herds may have been as high as 21 percent. It was thought that the disease originated in Darfur herds that crossed over into Equatoria Province and mingled with Dinka herds. They may even have penetrated to tsetse fly areas near Raga. The greater incidence of the disease and its more widespread character was probably due to the abnormally heavy rains of 1946 and the consequent increase in biting flies which mechanically spread the disease. Dimidium bromide was successfully used in the treatment of infected herds towards the end of the year.

Veterinary Inspector, Equatoria Province reported that the disease had apparently worked its way westwards across the Dinka cattle areas by mechanical transmission from the Bahr El Jebel and had reached the northern and eastern fringes of the Jur River District. There was no extension of the main tsetse fly belt; in fact it was thought that the north-west edge of the belt had

receded many miles in the past twenty years. Nowhere in the non-tsetse areas did the disease reach epidemic proportions. 400 doses of antimony tartrate and 700 doses of stibophen were used effectively in the treatment of the disease among the small dairy herds in the fly belt.

Exceptionally heavy losses, estimated by the tribes concerned at 40 percent of their herds, were experienced in Dar Messeria of Kordofan Province. Like Southern Darfur the disease originated in Equatoria Province and spread rapidly during the rains. By the time it was possible to organise treatment on a large scale with dimidium bromide the disease had subsided. However 1500 infected cattle were successfully treated. The Awlad Hamid of Tegale district also suffered losses from the disease but on a much smaller scale.

The Assistant Director (Research) in his report deals fully with trypanosomiasis in the Upper Nile Province where large scale treatment with Dimidium bromide was carried out.

Camel Trypanosomiasis.

This disease (*T. evansi*) was more prevalent than usual in the camel rearing areas and there was a big demand for treatment with Antrypol. Losses were negligible.

Trypanosomiasis in other animals.

T. brucei was responsible for the loss of a few horses in Equatoria and Upper Nile Provinces while horse owners in Southern Kordofan reported that they had many losses during the severe epizootic amongst their cattle.

Haemorrhagic Septicaemia.

This disease assumed epizootic proportions in many districts of the Upper and Blue Nile Provinces. Casualties among cattle were heavy and the outbreaks were not brought under control until vaccination on a large scale had been carried out. 9,000 doses of vaccine were issued in the Upper Nile Province and over 6,000 cattle were vaccinated in the Blue Nile Province.

Anthrax.

Only 2 cases occurred amongst the 19,000 cattle and 37,000 sheep accommodated in the export quarantine parks and are the only losses which have occurred since it was decided in 1946 to vaccinate all cattle registered for export. Single outbreaks were reported from both Kordofan and Blue Nile Provinces but were quickly controlled.

African Horse Sickness.

The incidence of this disease was below average and losses among Government animals have been reduced to negligible proportions in recent years by prophylactic vaccination.

Cryptococcus Infections.

Losses among Government horses and mules were less than last year but necessitated the destruction of 35 mules, chiefly in the Fung District of the Blue Nile Province and 19 horses, almost all in the Nuba Mountains districts of Kordofan Province.

Rabies.

The number of confirmed cases of the disease among animals was slightly greater than last year. 63 cases occurred—49 in dogs, 9 in donkeys, 2 in cattle and 1 each in cats, horses and sheep. Blue Nile, Khartoum and Kordofan Provinces continued to be responsible for the majority of the cases. Measures to destroy stray dogs and cats as well as wild carnivores were intensified during the year. These measures included the destruction of 6933 dogs in the Blue Nile, 614 cats in Khartoum and 89 jackals and 68 hyaenas in Kassala Province.

Other Diseases.

Diseases of rather lesser importance which received attention during the year included the following :—

Blackquarter in cattle.

Tetanus in cattle and donkeys.

Actinomycosis in cattle.

Theileriasis in cattle.

Mange in cattle, camels and goats.

Helminth diseases including fascioliasis in cattle, sheep and goats.

Contagious necrosis in camels.

Sheep pox.

Contagious pneumonia in goats.

Ringworm in horses and mules.

Piroplasmosis in horses.

Strangles in horses.

Equine encephalomyelitis.

Feline enteritis and influenza.

Avian diseases including tuberculosis, spirochaetosis, fowl pox, fowl diphtheria and fowl cholera.

SECTION III.

TRADE IN LIVESTOCK AND LIVESTOCK PRODUCTS.

EXTERNAL TRADE.

GENERAL

There was a large decrease in the numbers of cattle and sheep exported but as there was an increase in exports of camels and hides, the total value of livestock and livestock products exported, amounting to almost £E. 2 million, was approximately the same as last year.

When the cattle and sheep trade was allowed to return to conditions of free trade during the second half of 1946, traders in Malta and Palestine turned to the Sudan as a possible source of cheap meat. On account of the presence in the Sudan of diseases such as cattle plague, contagious bovine pleuro-pneumonia and foot and mouth disease, the veterinary authorities of these countries were most reluctant to allow the import of Sudan cattle. However traders in Malta eventually persuaded the Malta Government to allow import and two consignments totalling 733 cattle were shipped from Port Sudan. On arrival in Malta (the second consignment arrived on 1st January 1947) cases of cattle plague were diagnosed post-mortem amongst both batches. These two shipments of cattle had been subjected to the same immunisation and quarantine regulations in the Sudan as cattle for the Egyptian export markets, where no cases of cattle plague had been reported among Sudanese cattle ever since glycerinised lymphoidal tissue vaccine was first used as a routine immunisation measure in 1935. The Director, Sudan Veterinary Service, visited Malta as soon as the disease was reported and carried out an inspection of the imported cattle. Although a number of them were showing symptoms of fever, not a single case was typical of cattle plague. However typical lesions of the disease were observed on post-mortem examination. A full investigation into the cause of this outbreak of cattle plague among export cattle was carried out in the Sudan but its results were inconclusive. The most probable explanation is that these vaccinated animals came into contact with cattle plague sometime before they entered the quarantine parks and their immunity although sufficient to prevent the appearance of the disease in quarantine (a minimum period of 10 days) was not sufficient to protect them during the voyage to Malta. It is difficult to understand why similar outbreaks had not occurred in export cattle en route to Egypt or in quarantine in Egypt during the past seven years. It is possible that some of the cattle exported to Malta may not have been vaccinated against cattle plague and that the exporters substituted unregistered cattle for registered cattle and branded them with a false brand before they entered the quarantine parks. In February a batch of 28 cattle, destined for Egypt were retained in Khartoum North Quarantine park on suspicion of having false brands on them. A police investigation followed with the result that the owner was found guilty and imprisoned for two years.

An unusual export this year was that of 30 young camels (10 male and 20 female) to the United States of America for distribution in Zoological Gardens.

Cattle and Sheep.

The total number of cattle exported was 19,001 valued at £E. 277,538, compared with 30,314 valued at £E. 352,217 in 1946. Sheep exports totalled 36,906 valued at £E. 111,922, compared with 62,744 at £E. 162,077 in 1946.

A large number of factors were responsible for the marked decrease in the exports of cattle and sheep. There was no longer the military demands in Egypt for a regular supply of cattle and sheep such as existed during the war years. Egyptian quarantine fees were increased and animal prices in Egypt continued to decline to such an extent that there was little or no profit to Sudanese exporters. To meet this situation the Sudan Government reduced the high freight and quarantine charges which had been imposed in 1946. Navigational difficulties due to the low river on the Wadi Halfa/Shellal reach during the summer months, inadequacy of river transport, the railway strike and the appearance of foot and mouth disease in the quarantine parks were other factors which interfered with the export trade. Export to Egypt via Port Sudan which had been suspended during the war years was resumed but was on a very small scale owing to the difficulties of obtaining sea transport.

Camels.

It is estimated that 50,000 camels valued at £E. 1,200,000 were exported by overland routes to Egypt compared with 45,000 valued at £E. 1,080,000 in 1946. There was a steady demand for export camels in the markets of the main camel rearing provinces of the Sudan at prices varying between £E. 20—30.

Hides, Skins and Leather.

There was an increase in the number of hides exported ; 1062 tons valued at £E. 115,116 compared with 800 tons valued at £E. 70,921 in 1946. Egypt with 508 tons and Cyprus with 175 tons were the principal importers. The wartime control by the Hides Pool ceased on 14th October and the hides section of the Veterinary Department took over the compulsory grading and marking of hides for export on 15th October. A central grading depot was established at Omdurman and a sub-depot at Wadi Halfa for this purpose.

There was a slight increase in the number of sheep and goat skins exported ; 1300 tons valued at £E. 216,223 compared with 1129 tons valued at £E. 269,819 in 1946. The United States of America with 492 tons and the United Kingdom with 332 tons were the main importers.

22,251 kilos of reptile skins (crocodile, snake and lizard) valued at £E. 58,716 were exported, chiefly to Egypt.

120 tons of leather valued at £E. 30,323 compared with 194 tons valued at £E. 109,794 in 1946, were exported. Egypt with 94 tons was the main purchaser.

INTERNAL TRADE.

Livestock Markets and Slaughtering Figures.

There was a slight increase in livestock and meat prices and a large increase in the number of animals slaughtered for internal consumption. The following table of slaughterings in the ten principal towns gives some indication of the increase in local consumption of meat during the past twenty years :—

Year	Sheep	Cattle	Goats	Camels	Total
1927	167,923	21,627	9,152	2,284	200,986
1937	185,822	20,240	7,670	2,212	215,944
1946	193,417	34,546	24,135	1,875	253,973
1947	222,932	40,062	25,136	1,917	290,047

The average price of cattle sold in El Obeid market was £E. 5.360 compared with £E. 4.682 last year.

Hides and Skins.

Mr. E. Knew, who was appointed in February, in addition to inaugurating the export grading scheme for hides, carried out many tours in the provinces demonstrating improved methods of hide production. He also carried out an investigation into the possibility of introducing legislation to regulate the trade in hides and skins.

SECTION IV.

ANIMAL HUSBANDRY AND LIVESTOCK IMPROVEMENT

As a result of the exceptional rains of 1946 there was excellent grazing in most provinces during the first half of the year. In general the 1947 rains were light and during the second half of the year grazing was scanty in some areas. Water supplies were improved in many grazing areas and along trade routes.

The condition of all government animals was generally good throughout the year and casualties low. In most provinces veterinary inspectors were requested to arrange local purchase of replacement requirements. Average prices in Khartoum were as follows :—Camels £E. 25. Mules £E. 17.3, Horses £E. 15.4 and Donkeys £E. 8.6.

Over 11,000 horses attended the four horse shows held in Darfur Province but less than 10 percent were offered for sale. 17 were purchased as tribal stallions, and 82 as remounts. Prices ranged from £E. 10—35 with an average of £E. 18.3 compared with £E. 14.5 the previous season.

In Kordofan stallions were stationed at Abu Haraz, Abu Zabad, Nahud and Muglad and the number of mares served totalled 161. Four new stallions arrived from Darfur Province but owing to the heavy trypanosomiasis casualties amongst the Homr horses, these horses had to be sent to El Odeiya during the rains and were therefore absent from the tribe during the most important months for breeding.

The Arab stallion Registan stationed in Khartoum covered 64 mares.

SECTION V.

EDUCATION

The department continued to provide whole-time and part-time teaching staff for the Khartoum Veterinary School of the Gordon Memorial College.

Training of the large number of newly recruited stockmen and attendants was carried out by province veterinary inspectors throughout the year.

El Amin Eff. Abdulla El Karib, who obtained his diploma in Veterinary Science from the Khartoum Veterinary School in 1941 left the Sudan in July to attend a course of instruction in the Liverpool School of Tropical Medicine. He is the first of a series of Sudanes veterinarians who will be selected for further training in the United Kingdom.

SECTION VI.

MISCELLANEOUS.

Veterinary Hospitals.

There was a large increase in the number of animals brought by their owners to the various veterinary hospitals and dispensaries scattered throughout the country. The number of in-patients at the Khartoum Veterinary Hospital was 371 while out-patients attendances totalled 11,764.

Prevention of Cruelty to Animals.

In the large towns routine inspections of working animals were continued with very satisfactory results as a measure to prevent cruelty to animals.

REVENUE AND EXPENDITURE.

The followiing figures show the actual revenue and expenditure of the Sudan Veterinary Service for the past 3 years :—

		1945	1946	1947
1. Revenue	£E.	38,822	52,574	75,515
2. Expenditure :				
(i) Personnel and Personal Allowances		25,811	29,049	57,582
(ii) Services		22,773	33,247	57,449
(iii) Capital		350	2,327	1,577
TOTAL. ..		48,934	56,893	116,608
3. Development Budget £E.				672

W. H. GLANVILLE, *Director,*
Sudan Veterinary Service

ANNUAL REPORT OF ASSISTANT DIRECTOR (RESEARCH).

A. STAFF.

A number of changes among the classified staff occurred during the year.

The post of Senior Research Officer (scale C3) was changed to that of Assistant Director (Research) (Scale A9) with effect from 1.1.47.

Two posts of Veterinary Officers (Scale Q) were changed to those of Assistant Veterinary Research Officers (Scale F1), with effect from 1.1.47 and El Amin Eff. Abdalla El Karib and Mohamed Eff. Ali Mihemeid, Diplomates in Veterinary Science of the Gordon Memorial College, Khartoum, were promoted to fill them.

Two new posts of Veterinary Assistants (Scale J) were created and trainees for the posts were appointed.

Two Veterinary Research Officers, Messrs. F.W. Priestley, M.R.C.V.S., Dip. Bact. (Lond.) and A. Mackay, B.SC. M.R.C.V.S., selected in 1946, took up their appointments on 24.2.47 and 2.2.47 respectively.

Mr. M.N. Harrison B.SC. (Agric.) was appointed Pasture Research Officer and started his duties on 31.3.47.

The post of Entomologist, approved in 1946, could not be filled.

The establishment of the technical classified staff of the Research Section at the end of the year was as follows :—

1 Assistant Director (Research)
2 Veterinary Research Officers
2 Assistant Veterinary Research Officers (Sudanese)
2. Veterinary Officers (Sudanese)
1 Pasture Research Officer
1 Entomologist
4 Veterinary Assistants (Sudanese).

B. BUILDINGS.

A mud brick wing consisting of three rooms was added to the main laboratory building at Khartoum. It was completed just before the end of the year and provided some long needed accommodation for the growing volume of vaccines prepared.

A new laboratory was built at Nyala to prepare cattle plague vaccine for the mass immunisation of cattle in the Western Sudan.

C. ROUTINE WORK.

The main items of routine work were, as usual, the following :—

I. Preparation and issue of cattle plague antiserum(Malakal).

II. Preparation and issue of cattle plague vaccine (Khartoum, Malakal and Nyala).

III. Issue of cattle plague virus for "serum-simultaneous" immunisation (Khartoum).

IV. Preparation and issue of contagious bovine pleuro-pneumonia vaccine (Khartoum).

V. Preparation and issue of haemorrhagic septicaemia vaccine (Khartoum).

VI. Issue of diagnostic materials (for the mercuric chloride test) and of antrypol for the control of camel trypanoso. miasis (Khartoum).

VII. Distribution of horse-sickness vaccine purchased from Kenya (Khartoum).

VIII. Preparation and issue of blackleg vaccine (Khartoum).

IX. Issue of foot and mouth disease virus (Khartoum).

X. Distribution of anthrax vaccine purchased from Kenya (Khartoum).

XI. Examination of specimens (Khartoum, Malakal and Nyala).

I. Cattle Plague Antiserum.

A total of 5035.2 litres (167,840 nominal doses of 30 cc.) was prepared. A high incidence of trypanosomiasis amongst the serum producers this year again prevented the output reaching the desired total of six thousand litres.

The shortfall had no serious consequences because a much greater quantity than before of vaccine was produced, and cattle owners, as a rule, prefer vaccination and the resulting virtual certainty of protection for a year, to the more laborious procedure of producing life-long immunity by serumisation and infection with discharges from diseased animals.

The supply of both large and small cattle was again adequate and great credit for this satisfactory state is due to the Veterinary Inspector (Mr. Thomson) who arranged deliveries at specified times.

II. Cattle Plague Vaccine.

Production of vaccine for the mass immunisation campaign began at the new laboratory at Nyala in August and by the end of the year 249,568 doses had been issued.

The rest of the country was supplied with 328,380 doses produced at the Malakal Laboratory. The bulk of this vaccine was, as usual, prepared as a by-product of serum production.

III. Cattle Plague Virus.

The issue of 3,839 doses of virus in the form of glycerinised lymphoid tissue was about one third less than in the previous year. Most of the doses were used for the serum-virus immunisation of working oxen belonging to the Sudan Plantations Syndicate ; a few (104 doses) were used on grade Friesan cattle vaccinated a fortnight previously.

IV. Contagious Bovine Pleuro Pneumonia Vaccine.

This disease became more widespread during the year and the issues of attenuated culture vaccine increased from 57,045 doses in 1946 to 100,665 doses

V. Haemorrhagic Septicaemia Vaccine.

Small sporadic outbreaks of haemorrhagic septicaemia have occurred in most years but little notice has been taken of them as they had usually subsided by the time they were reported. This year, however, there were many serious outbreaks, particularly in the Upper Nile and Blue Nile Provinces. They were satisfactorily controlled by the distribution of 25,580 doses of formolised culture vaccine.

VI. Camel Trypanosomiasis Control.

Routine treatment with 10 gms of antrypol was continued and 45,760½ doses were issued. A few cases were reported in which repeated injection of the drug failed to effect a cure but, on the whole, treatment was very satisfactory. Some of the resistant camels were successfully treated with pentamidine.

VII. Horse Sickness Vaccine

This vaccine was, as usual, purchased from the Kenya Veterinary Service. The issues were slightly in excess of those for the previous year and totalled 2,006 doses.

VIII. Blackleg Vaccine.

The demands for this vaccine were again low although there are several known infected areas. The total "anaculture" vaccine issued was 1980 doses.

IX. Foot and Mouth Disease Virus.

As usual all cattle registered for export to Egypt were infected by intralingual injection of a mixture of two types of the virus. Sufficient virus to infect 25,280 cattle was issued.

X. Anthrax Vaccine.

This vaccine was purchased from the Kenya Veterinary Service, primarily for the vaccination of cattle registered for export. One outbreak of the disease was reported from Blue Nile Province and about one thousand cattle in the vicinity were vaccinated. Altogether 21,050 doses were issued.

XI. Examination of Specimens

The number of specimens submitted for examination by the field staff was 1,684. The diagnoses were representative of those made almost every year and included :—

CATTLE :	*Tryp. congolense*, *Tryp. vivax*, anthrax, haemorrhagic septicaemia, *Actinomyces farcinicus*, psoroptic mange, demodectic mange, *Babesia bigemina*, *Theileria annulata*, and miscellaneous septic and helminthic infections.
CAMELS :	*Tryp. evansi*, sarcoptic mange.
EQUIDAE :	Cryptococcus infections, ringworm, *Tryp. brucei*. *Babesia caballi*, melanotic sarcoma, *Tryp. congolense* (donkeys).
POULTRY :	Spirochaetosis, *Sarcoptes mutans*, fowl pox, fowl diphtheria, fowl cholera.
OTHER SPECIES :	Ringworm (gazelle), coccidiosis (buffalo).

SALE OF LABORATORY PRODUCTS.

Although a sale price has been fixed for most of the laboratory products free issues are made at the discretion of the field staff. The following table shows the cash values of these preparations.

	Doses issued	Dose	Price per dose	Cash value
			m/ms.	£E. m/ms.
Cattle plague antiserum	167,840	30 cc.	100	16,784,000
Cattle plague vaccine	577,948	10 cc.	50	28,897,400
Haemorrhagic septicaemia vaccine ..	25,580	10 cc.	25	639,500
Blackleg vaccine	1,980	10 cc.	25	49,500
			TOTAL	46,370,400

(£E. 1 —1000m/ms.—£1. 0s. 6d.)

D. RESEARCH.

1. TRYPANOSOMA CONGOLENSE INFECTION IN CATTLE

T. congolense in cattle in non-tsetse areas has developed during the last few years into the country's most serious disease problem. It has spread amongst most of the herds reared on that large part of the valley of the White Nile and its tributaries extending between

parallels 6°N and 13°N. Parts of the Upper Nile Province have become very severely affected and tens of thousands of cattle have died there.

This vast area of over a hundred thousand square miles is unsuited for tsetse flies and none has been found there. It is a hot clayey plain, dry at one season and liable to extensive flooding at another, and its middle is well over a hundred miles from the nearest known tsetse belt. Biting flies, particularly those belonging to the family Tabanidae and to the genera *Stomoxys* and *Liperosia* are, however, abundant during most of the year, and the close herding of the cattle facilitates mechanical transmission of trypanosomes.

2. A few cases of *T. vivax* infection have been found there. This species, however, appears to be less pathogenic than *T. congolense*.

Treatment with dimidium bromide (phenanthridinium 1553)

Following the successful results of the chemotherapeutic trials of dimidium bromide in 1946 (vide Annual Report 1946) it was decided to arrange a field trial of the drug in 1947.

An area was selected in the Southern Sudan, near Malakal, in which a high incidence of trypanosomiasis (about 30 percent) was confirmed by blood examination of representative groups of cattle. All the cattle (both clinically affected and apparently healthy ones) comprising over a thousand in number, were injected intramuscularly in April with a 2 per cent. solution of dimidium bromide at an approximate dosage of 1 mg. per kilo.

The rainy season began shortly afterwards and it became impracticable to carry out any blood examinations during the following four months. The cattle were, however, inspected a few times and the general improvement in the condition of the clinically infected ones, together with the fact that there was not a single report of an infected beast either having died, or having developed symptoms of photosensitisation, was accepted as adequate evidence that the treatment had been successful. The healthy state of the previously infected cattle was in spectacular contrast with that of neighbouring herds where trypanosomiasis continued to take its toll.

It would have been better if more critical tests could have been carried out and more investigation made into the toxicity of the drug. Trypanosomiasis, however, was causing such serious losses in the field that it was decided to embark immediately on large scale treatment on the evidence already available. The plan was to treat *all* cattle in a particular area in order to include all subclinical cases and it was hoped that in this way a trypanosome-free (or virtually free) block of cattle would be formed. Arrangements were made to deal with about a quarter of a million cattle between September and March and by the end of the year 61,783 had been injected.

In dealing with such large numbers of cattle the intramuscular route of injection would have been very laborious and a further trial with the subcutaneous route showed that although swellings usually appeared at the injection sites and were as a rule followed by necrosis of the skin, no serious inconvenience was caused. The latter route was therefore adopted and the injections given well behind the elbow to prevent the ensuing swelling interfering with the movement of the foreleg.

About six weeks after the start of the campaign, and when about 40,000 cattle had been injected, alarming symptoms of photosensitisation began to appear amongst the first group of adult cattle treated. New cases were reported daily and a grave political view was taken.

All the affected cattle were inland from the river and their grazing was scarce and poor in quality. It was thought that the factor predisposing to photosensitisation might either be some particular plant present in this inland grazing but absent in river grazing upon which all the experimental cattle had fed, or that it might simply be inadequate feeding. Immediate steps were taken to remove all treated cattle to the river where there was plenty of green grass. The affected cattle rapidly improved under the new conditions and only very few cases of photosenisitation appeared amongst the remaining treated ones. The final mortality rate was surprisingly low, being less than 1 per cent., and a great relief to all concerned.

After a temporary suspension, the campaign was resumed taking adequate precautions regarding grazing and, up to the time of writing, cases of photosenisitation have been very rare. It is too early yet to assess fully the results but the indications are that the treatment has been a marked success.

2. CONTAGIOUS BOVINE PLEURO PNEUMONIA.

Mr. F. W. Priestley investigated the possibility of devising a practical test for the diagnosis of this disease, and of improving on the attenuated culture vaccine now in use.

Diagnosis. The complement-fixation test was found to be highly accurate but on account of its relatively complex technique it would be unsatisfactory for large scale work.

The ordinary tube agglutination test was found to be unsatisfactory. This may have been due to the antigen not being sufficiently concentrated. Attempts are being made to remedy this and, if successful, the possibility of applying a slide agglutination test, which would be practical for field use, will be investigated.

Vaccination. The chief drawbacks of the present method of vaccination, namely, by the use of attenuated culture, are the long period (four to six weeks) between inoculation and the development of immunity, and the necessity for continuously changing the strain of virus as its antigenic value becomes reduced.

Attempts were made to shorten the period for the development of immunity by introducing virulent culture either intradermally or into the tail.

The former method was not successful. Six cattle were used and they all developed large pleuro-pneumonia swellings and either died or were killed in a moribund condition.

Tail inoculation, as practised in Australia, gave good preliminary results and this line of investigation was being pursued at the end of the year.

An attempt was made to standardise the vaccine by drying a "safe" culture *in vacuo* over phosphorus pentoxide and using this dried virus as seed material when required.

It was found that the virus survived under these conditions, and arrangments were made to test its antigenic value at intervals.

3. CATTLE PLAGUE.

Towards the end of the year some attenuated goat virus was obtained from Kenya and successfully passaged through local goats.

E. PASTURE.

Mr. N. N. Harrison arrived at the end of March on a four years contract to carry out a survey of the grazing areas of the Sudan.

He made preliminary visits to the Blue Nile area as far south as Roseires, to the White Nile area between Kosti and Renk and to that area of the Upper Nile Province likely to be affected by the proposed Jonglei Canal. A more thorough tour was made of Darfur Province paying particular attention to the Southern District.

Grazing plants were collected for botanical identification and the value of grazing ascribed to them by local opinion noted. Ecological distribution was studied and soil samples taken for analysis.

Special attention was paid to the possibility of increasing the number of cattle on particular areas under existing conditions and on other areas if adequate drinking water could be provided by the use of bores.

Measures for the control of soil erosion where overstocking existed were investigated and the possibility of improved technique of management and the artificial establishment of pastures was studied.

No pasture work has previously been undertaken in the Sudan and there is much preliminary work to be completed before concrete and definite results are accomplished. The country is vast, communications difficult and slow and the problems are very different in the diverse areas. The main purpose of the survey will

be to indicate the possibilities of pasture improvement, present a picture of the comparative present state of affairs in the various regions and suggest profitable lines for subsequent work.

F. SUMMARY.

The issues of biological products were greater than in any previous year and most of the energies of the staff were devoted to their preparation.

A new branch laboratory was opened at Nyala to provide cattle plague vaccine for the mass immunisation of western cattle.

Following successful chemotherapeutic trials of dimidium bromide in *T. congolense* infection, mass treatment of all cattle, involving about a quarter of a million animals, was started in the Upper Nile Province.

Khartoum
1st. March 1948.

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