Annual report of the Sudan Veterinary Service.

ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

1939.

ANNUAL REPORT
OF
THE SUDAN VETERINARY SERVICE
FOR THE YEAR 1939

CONTENTS

S T A F F

DISTRIBUTION OF BRITISH STAFF ON 31ST DECEMBER, 1939.

NAME	DESIGNATION	STATION
Captain H.B. Williams, O.B.E., M.R.C.V.S.	Director	Khartoum
Dr. S.C.J. Bennett, D.Sc., M.R.C.V.S.	Asst. Director and Senior Research Officer	Khartoum
Mr. J.T.R. Evans, B.Sc., M.R.C.V.S.	Veterinary Research Officer	Malakal
Captain C.P. Fisher, M.R.C.V.S.	Senior Veterinary Inspector	Khartoum
Captain T. Menzies, M.R.C.V.S. D.V.S.M. (Vict.)	"	El Fasher
Captain L.E. Prichard, O.B.E., M.R.C.V.S.	"	Wad Medani
Mr. W.H. Glanville, M.R.C.V.S.	Veterinary Inspector, Headquarters and Registrar Veterinary School	Khartoum
Mr. J.E. Furney, M.R.C.V.S.	Veterinary Inspector	Kassala
Mr. I.A. Gillespie, M.R.C.V.S.	"	El Obeid
Mr. A.W. Chalmers, M.R.C.V.S.	"	Kosti
Mr. P. Durran, M.R.C.V.S.	"	Shendi
Mr. J.D.M. Jack, M.R.C.V.S.	"	Malakal
Mr. J.K. Thomson, M.R.C.V.S., D.V.S.M.	"	Wad Medani
Mr. P.Z. Mackenzie, M.R.C.V.S.		El Obeid
Mr. H.A. McLoghry	Superintendent	Khartoum
Mr. P.A.C. Kennedy, F.R.M.S.	Laboratory Assistant	Khartoum
Mr. C.B. Barrett.	Chief Storekeeper	Khartoum

ESTABLISHMENT OF NON-BRITISH CLASSIFIED STAFF, 1939.

2	Veterinary Overseers
2	Animal Husbandry Officers
1	Head Clerk
8	Clerks
3	Book-keepers
1	Sarraf
1	Store-keeper
14	Head Stockmen
1	Southern Supervisor
4	Southern Stockmen.

UNCLASSIFIED STAFF AS AT 31.12.1939.

61	Stockmen
1	Carpenter
2	Storemen
4	Motor Drivers
9	Messengers
70	Veterinary Attendants
5	Shoeing Smiths
2	Pump Drivers
1	Ghaffir

In addition to the above there are large numbers of Tribal Veterinary Retainers, chiefly in the Native Administrations, who are supervised by Province Veterinary Inspectors.

Mr. H. Kieran was engaged on first appointment on 9.1.1939 and was posted to Kordofan Province. At the outbreak of War his request to be allowed to resign was granted, and he proceeded on final leave in November. The vacant post in Kordofan was filled by Mr. P.Z. Mackenzie, who arrived in the Sudan on first appointment on 21st October, 1939.

In December, Mr. R.C. Couldrey, the President of the Sudan Resources Board, accompanied by Captain H.B. Williams, Director Sudan Veterinary Service, visited Egypt and there, amongst other matters, discussed with the Egyptian Authorities concerned a scheme for regularising and improving the conditions governing the supply and sale of Sudan live-stock in Egypt.

Captain Williams also proceeded to Palestine to examine the possibility of opening up a trade in Sudan live-stock to that country. The Palestinian Authorities have agreed to lift the embargo on Sudan cattle, instituting in its place permission to import for immediate slaughter, and trade negotiations are now proceeding between the Palestinian importers and the Sudan Chamber of Commerce.

SECTION I

DISEASES OF ANIMALS.

I. DISEASES OF CATTLE

Cattle Plague

Although of a low virulence the disease was widespread. Reports of outbreaks were received from all cattle rearing districts except those of Northern Province.

In all cases where outbreaks were immediately reported to Veterinary representatives, thus making it possible to enforce routine methods of control, i.e. serumisation of all in-contacts followed by deliberate mixing of serumised and diseased beasts and vaccination of a circle of cattle round the infected herd, the mortality was light and the disease was prevented from spreading further afield.

The Senior Veterinary Inspector, Kordofan Province, reports that :-

"Rinderpest vaccine is very popular with most tribes. The Messeria claim that they have improved on the technique of vaccination. Towards the end of the prescribed period, as the temporary immunity fades, they put their cattle in contact with infected beasts. Natural infection results in many cases and permanent immunity follows. It is said that the death rate is very low as a result of this practice. The inhabitants of the Nuba Mountains are gradually gaining confidence in veterinary activities, but owners are still suspicious in many hills and reports of outbreaks often come in too late to be of any use. However, more extensive use is being made of prophylactics by chiefs and heads of communities, usually for the benefit of their private herds, but no doubt the practice will spread to their people later on."

The following summarises the activities of this Service in the control of outbreaks of Cattle Plague during 1935.

Province	Out-breaks	Infected	Deaths	Serumised	Vaccinated
Kordofan	286	96989	1723	13642	59630
Darfur	189	85643	731	26974	63515
Gezira	184	20264	239	1926	5234
White Nile Area	250	70330	1058	19624	1914
Northern	1	150	1	116	-
Khartoum	5	1515	37	-	1428
Kassala	52	9008	269	2420	15
Upper Nile	16	2367	28	1692	391
Total	983	290266	4113	69394	132127

The mortality in the above outbreaks was approximately 1.4 per cent.

In addition to that used at the actual seat of outbreaks, approximately 40,000 doses of cattle plague serum and over 30,000 doses of cattle plague vaccine were used prophylactically for immunising cattle for export, for safeguarding Government and Mission herds and, in many instances, for creating barriers of immune cattle round outbreaks in those districts where cattle were of sufficient economic value to justify the cost of using large quantities of prophylactics.

In the face of difficulty in obtaining an adequate supply of the Upper Nile Province cattle, which for many reasons are the most suitable for serum making, the Research Officer and his staff at Malakal did excellent work, and far exceeded expectations, in producing over 113,000 doses of serum, whilst the Khartoum Laboratory staff under the Senior Research Officer in turning out a record of nearly 165,000 doses of vaccine, provided sufficient for normal requirements and for use in substitution of a large portion of the 1936 serum which was discarded for technical reasons.

Contagious Bovine Pleuro-pneumonia.

The incidence was everywhere light and, as was the case last year in the Northern Sudan, was chiefly confined to merchant-owned trade cattle. Only Northern Province, where there are no trade cattle to spread the disease, remained free of infection. In Kassala Province, which up to January of this year had been free of disease for six years, the Veterinary Inspector attributed the five reported outbreaks to infection brought in by trade cattle en route to Eritrea.

The following table shows outbreaks other than those amongst trade cattle :-

Province	Outbreaks	Infected	Deaths	Vaccinated
Kordofan	34	549	39	-
Darfur	2	220	-	220
Gezira	22	2279	67	2125
White Nile Area	9	3373	18	3356
Northern	-	-	-	-
Khartoum	-	-	-	-
Kassala	5	1046	40	674
Upper Nile	4	714	9	603
Total	76	13133	173	11905

Approximately 35,000 doses of vaccine were used, 11,905 on the cattle of infected herds, 8,950 on trade cattle registered for export and the remainder on the protection of animals of economic importance.

Foot-and-Mouth Disease.

The routine artificial infection of all cattle intended for export to Egypt was carried out in the early rains and in consequence no case of foot-and-mouth disease was seen in the quarantines throughout the year.

Anthrax.

No positive case was observed in the Sudan in 1938, but the Egyptian Authorities reported a case in a Sudanese sheep at Alexandria Quarantine. This animal had left the Sudan some weeks previously.

Trypanosomiasis.

The Veterinary Inspector, Upper Nile Province, reports :-

"This disease is more extensive in the Upper Nile than was previously supposed. In the early part of the year investigations were carried out in the north of Bor district following large number of deaths from an unknown disease. Symptoms of sick animals indicated trypanosomiasis, and T.uniforme was discovered in blood smears submitted to the Laboratory. No tse-tse fly was discovered in the district."

In Gezira Province isolated cases occurred near the Dinder river in Sennar district.

Three cases of T.congolense were diagnosed in the station transport bulls at Kadugli, Nuba Mountains.

Mange.

Psoroptic mange was prevalent amongst the working oxen of the Gezira cotton growing areas. The policy is to destroy those severely affected and only undertake the treatment of minor cases.

Liver Fluke.

That this disease was more prevalent than usual in Upper Nile Province following the heavy rains of 1938 was shown by the number of cases reported from Malakal slaughter house, where, of 752 cattle slaughtered 181 were infected with liver fluke.

In the drier pastoral areas of Northern Sudan these parasites are rarely seen in slaughtered cattle.

H o v e n.

The lateness of the rains in the cotton growing areas of Gezira Province caused many deaths amongst animals, particularly sheep, and numbers of those that survived the famine period when grazing was practically non-existent died of hoven from eating ravenously of the green fodder available after the ripening of the early grain crops.

Blackquarter.

This disease was reported from Soderi, Talodi and Dilling areas of Kordofan Province. Laboratory reports on smears from Hawazma cattle dead of the disease confirmed the diagnosis.

Bovine Farcy.

Commonly observed in Nuba cattle and Arab owned animals grazing in the Nuba Mountains districts of Kordofan Province.

2. DISEASES OF CAMELS.

Trypanosomiasis.

Rainfalls well above the average in most camel rearing areas during 1938 and 1939 resulted in more cases of trypanosomiasis than usual being brought to our notice.

That infection was particularly high amongst Government-owned camels in Kassala and Gezira Provinces can only be attributed to the keeping of those animals for the performance of their duties during the rains in areas where fly vectors are prevalent. Nomad camel owners who move their herds slowly Northwards to fly-free areas at the onset of the rains escape heavy infection.

The following remarks by the Senior Veterinary Inspector, Kordofan Province, on Naganol treatment in his Province are of interest :-

"Naganol was not made available to native camel owners in the Province until 1934.

"Despite the fact that the drug had been in use for the treatment of Army and Police camels over a period of years, and that the Arab camel owners, therefore, must have known of its use, there was no great eagerness at first to bring camels for treatment.

"In October, 1934, the drug was introduced to the Kabbabish and then to the Kawahla tribe at Um Gozein. Thirty-four camels were produced by the two Nazirs for treatment as a demonstration. All except two proved to be suffering from trypanosomiasis and were duly treated. The efficacy of the new drug was at once apparent and demands gradually increased. At first the treatment was carried out in distant areas by the Veterinary Inspector personally and by the Head Stockman at tribal gatherings, or special visits were made by arrangement with the tribal authorities to various centres after the rains. After a time the needs of the camel owners could not be satisfied in this way as there was a constant demand over the greater part of the year. Stockmen in the camel owning areas were trained in the administration of the drug and now Naganol is available at El Obeid, Bara, Soderi, Nahud and Um Ruaba.

"During the first few years it was noticed that the camels brought for treatment were nearly all genuine trypanosome cases. During the last two years tests have shown that many camels are not infected at all. It is little use telling a camel owner that his camel is not suffering from trypanosomiasis, as he has supreme confidence in his own diagnosis and the popularity of Naganol has suffered in no way. Despite the fact that supplies were interrupted owing to the war and that no treatment was given for two months the total issues for the year have been greater than ever, over 9,000 doses."

Sales of Naganol to Arab camel owners once more show a large expansion despite the fact that for a period of some weeks after the outbreak of War all demands for treatment could not be met owing to delay in delivery of a consignment of the drug on order at the time.

The figure given in the following table show how increasingly popular this successful form of treatment for trypanosomiasis is becoming :-

Sale of Naganol on Payment

	Doses.	
1936	9,000	(approx.)
1937	10,813	
1938	13,440	
1939	17,818	

M a n g e.

The fact that there has for some years been a continued decrease in the number of cases of psoroptic mange reported in Government owned camels shows that our camel policemen are gradually learning that it pays to look out for skin disease and have it promptly treated.

Strongylosis.

Many cases of infestation with Haemonchus longistipes were observed amongst the police camels of the irrigated areas of Gezira Province and little success was obtained with medical treatment until nicotine sulphate was used. All cases, unless of very debilitated animals, are said to respond well to treatment with this drug.

DISEASES OF EQUINES.

Horse sickness.

Since there were no deaths from horse sickness amongst the 335 horses and 182 mules vaccinated in Gezira Province, the Senior Veterinary Inspector of the Province is abundantly justified in reporting that "the disease is now completely under control." It certainly is a very different state of affairs to pre-vaccination days when the mortality amongst the animals owned by the staff of the Sudan Plantations Syndicate and Kassala Cotton Company was particularly heavy, and proves that the vaccine must have a strong potency against the particular strain or strains of virus responsible for horse sickness in the Gezira Province.

In Port Sudan, which one would consider less likely to be visited by this disease than any other town in the Sudan, six of the very small number of horses kept there died of horse sickness in January.

In Darfur Province, which is the centre of the horse breeding industry, few cases were reported during the year, but in Kordofan Province two of twenty-three horses and mules vaccinated died. Deaths of vaccinated animals during their owners' absence on leave may occur through syces not observing the early symptoms and carrying on with exercise, with fatal results.

Nine cases in horses and five cases in mules occurred in Khartoum and Omdurman and in addition many deaths were reported from outlying districts. Losses have not been so heavy for a great number of years, which is remarkable in view of the poor rainfall this year.

Epizootic Lymphangitis.

In 1937 following the Unit's visit to the Fung districts of Gezira Province cases of epizootic lymphangitis were observed amongst the animals of the Sudan Horse on its return to Shendi and in practically all instances the affected animals showed eye lesions. Despite the endeavours of the Veterinary Inspector and the co-operation of the Army Officers it was found impossible to prevent the occurrence of new cases, although they were few in number, or to find a satisfactory explanation for the continued appearance of eye lesions.

4. DISEASES OF CANINES.

Rabies.

The campaign against uncared for and stray dogs has been intensified, and in Gezira Province alone 2,570 dogs were accounted for. In addition vermin in the shape of hyenas and jackals - amongst the commonest carriers of this dreaded disease - have been destroyed in large numbers.

Of the 134 specimens submitted to the Stack Memorial Research Laboratory for diagnosis 38 were from positive cases : 25 dogs, 7 donkeys, 2 goats, 1 mule, 1 cat and 2 camels.

The following table shows the seasonal and topographical distribution of cases :-

Province	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Northern	-	-	-	1	-	-	-	-	-	-	4	-	5
Kassala	-	-	-	-	-	1	3	-	-	2	-	-	6
Khartoum	-	-	-	-	2	-	-	-	-	-	-	-	2
Gezira	1	-	-	1	1	2	3	-	3	1	1	-	13
Kordofan	-	-	-	-	1	1	-	-	-	-	-	-	2
Darfur	-	1	1	-	1	-	-	-	-	-	-	1	4
Upper Nile	-	-	-	-	-	-	-	-	-	-	2	-	2
Equatoria	-	-	-	-	1	1	1	-	-	-	-	1	4
Total.	1	1	1	2	6	5	7	-	3	3	7	2	38

SECTION II.

TRADE IN LIVESTOCK AND LIVESTOCK PRODUCTS

1. EXPORT AND IMPORT TRADE.

Cattle.

Total exports of cattle via Wadi Halfa and Port Sudan Veterinary Quarantine Stations, at 8,057 valued at £.33,987, show a welcome increase of 801 and £.437 over those for 1938. For the first eight months of the year with cotton prices at a low level in Egypt trade was sluggish, but soon after the outbreak of war, when other sources of supply became uncertain, there were slightly increased demands, which at the end of the year appeared to have settled down to a steady trade of three full consignments of 350 head each a month, half to Cairo and half to Alexandria.

Since trade became normal after the unsettled period following the 1914-18 war the Sudan has annually supplied approximately half the beef imported into Egypt on hoof, and when on the outbreak of hostilities in September of this year supplies from other sources ceased it appeared probable that the Sudan's exports would increase 100%, but this has not proved to be the case, probably because in sympathy with a depressed market for Egyptian Cotton, the price of beef fell at the end of the summer to such a low level that many Egyptian producers did not sell their marketable stock of cattle. Later on, however, after the outbreak of War prices improved and these cattle were marketed in addition to the normal sales of slaughter cattle, to the exclusion of a percentage of imported beasts. Any further rise in beef prices may also tempt Egyptian breeders to sell some of their breeding stock and so further extend the period during which imports will be affected.

In December, the Director Sudan Veterinary Service accompanied the President of the Sudan Resources Board to Egypt to discuss with the Egyptian Authorities the cattle trade in general. Meetings were held under the auspices of the Minister of Commerce and Industry.

The one salient point that emerged from discussions at these meetings was that Egypt during the period 1.8.39 to 31.7.40 would require no more than 12,000 head of cattle from the Sudan.

The possibility of effecting sales of Sudan cattle at Cairo and Alexandria on a live weight basis was debated and met the approval of both the Egyptian and Sudan Authorities, but the business men in the trade failed to agree to this, the only innovation which could possibly infuse fresh life into the trade.

The Director, Sudan Veterinary Service, also visited Palestine in December to discuss trade between the two countries in live animals and animal products.

S h e e p.

Compared with 1938, this year's total exports of 15,377 sheep valued at £.13,680 via Wadi Halfa and Port Sudan Veterinary Quarantine Stations was an increase of 13,537 head and £.11,834. There were small demands for sheep in the early part of the year; 1,555 head were exported up to the end of March, but from then until the end of August export ceased entirely. Immediately war broke out, however, not only did normal sources of supply to Egypt fail, but she was also faced with increased demands for the supply of mutton on hoof to new Units stationed within her frontiers. Exports consequently rose from 1,685 in the month of September to 5,454 in December. Fortunately despite increased sales there has been no spectacular rise in sheep prices in the Sudan, and, provided prices can be kept at a reasonable level, Egyptian demands should continue to increase during the coming year. The long-legged fat-tailed haired sheep which constitutes the bulk of those exported can be bought in numbers, in prime condition, and produces good mutton; being also a hardy beast it loses little condition on its long and arduous journey to the Egyptian markets.

A. Numbers and values of cattle and sheep exported via Wadi Halfa and Port Sudan Veterinary Quarantine Stations during the last three years:

Year	Cattle	Sheep	Value at Port of export
1937	8,985	5,417	£E.49,729
1938	7,256	1,840	35,356
1939	8,057	15,377	47,667

B. Numbers of Cattle imported during last three years.

Year	French Equatorial Africa	Abyssinia	Total
1937	1,754	171	1,925
1938	3,024	1	3,025
1939	2,462	11	2,473

C. Origin of cattle exported during the last three years.

Province	1937	1938	1939
Kordofan & Darfur	6,118	5,191	6,963
Gezira	1,044	699	629
Khartoum	202	132	271
Northern	1,945	1,420	196
Total	9,309	7,252	8,059

C a m e l s.

For the first five months of 1939 there was a brisk demand for Sudan camels in Egypt and prices ruled high, the exceptionally fat female camels realising up to £.15. Approximately, 10,300 head were sold during this period, of which 8,200 were fat females. The fact that the hump of the fat female camel is considered a great delicacy and commands a high premium over meat from any other part of the camel's body largely accounts for the high percentage of females sold. In sympathy with a depressed cotton market demands from all centres in Egypt ceased abruptly in June and it was not until October that the trade responded to an upward trend in the prices of cotton and other agricultural products. The news that prices were improving quickly spread to the Sudan and by the end of the year arrivals on the Egyptian markets were exceptionally heavy, over 2,000 camels being sold during the last fourteen days of December. Between January and June 10,320 camels were sold and between October and December 6,867, a total of 17,187 during the year.

Hides and Skins.

During the first eight months of the year there was a marked falling off in demands and prices for both hides and skins owing to lack of confidence in European markets during a period of political unrest. Following the outbreak of war, however, Sudan prices quickly responded to increased demands, particularly from America and Near Eastern countries, and by the end of the year prices of both hides and skins had advanced by fully 30%.

Although demands are now good and prices profitable exporters are faced with shipping difficulties, as it is understood that most hides and skins destined for America are being transhipped en route at a foreign port where they are frequently held for considerable periods. Mails too are uncertain and add to the length of time which it takes to complete sales. Despite these difficulties exporting merchants for the first time for over a year appear satisfied with the profits they are making, although they still assert that the Sudan hides and skins are being sold more cheaply than those of the same quality from any other country. If this is true, and it probably is, the fault must surely lie with those of our exporters who have not in the past rigidly supplied their customers with the quality of goods asked for. Unfortunately, whenever there is a rising market people with little or no knowledge of the technical side of the hide and skin trade come into the exporting trade and despatch consignments which do not come up to specification, and so give our products a bad name on foreign markets. This can only be prevented by a system of Government grading of all hides and skins exported.

Tonj and Aweil districts of Equatoria Province continue to supply well-prepared hides in increasing quantities; a proof of the keen interest taken by the District Commissioners of the respective districts in the campaign for improved methods of hide preparation. The quality of hides arriving from these areas is now well established and they are eagerly sought after by Omdurman buyers for export.

Those arriving from Bor district of Upper Nile Province show a marked improvement, but arrivals from Nasir district where the best cattle in the South are to be found are still of poor quality.

The Veterinary Inspector, Upper Nile Province, reports as follows :-

"The improvement of the Province hides has been given much attention but, so far, tangible results are only apparent in Bor district. Here auctions of hides were held which helped to convince the Dinka that he would get more for a well-prepared hide.

"Although many districts now have considerable numbers of tribesmen trained in the art of flaying (Zeraf Island has over a hundred) there seem to be three main factors retarding the production of a good hide.

(1) "The unwillingness of an owner to allow anyone to flay his beast's hide. And the equal unwillingness of a trained man to flay any hides other than those from his own beasts.

(2) "The complete absence of wood for frames in some districts, especially on the toichs (grazing lands flooded during wet season).

(3) "The fact that small merchants in districts do not make enough, if any, distinction between a well and a badly flayed hide. Most of them say they are willing to give more for a good hide, but very few are prepared to give considerably less for, or even refuse, a hide which can only be classed as rubbish. They say the native will walk to the next shop, and there being so little co-operation between these petty merchants a sale is effected. The merchant wants the trade and very rightly says that he can dispose of any class of hide. If there is only about 15½s per oke difference in the price the small merchant is prepared to offer, then, since I found in several districts the badly prepared hide weighing far more than a similar sized well prepared one, it makes the difference in price too small for the native to consider the extra trouble worth while."

"The following tribesmen were trained at the Hide-flaying school at Malakal during the season November 1938 - May 1939.

Nuers	- Nasir	25
	Fangak	20
	Western Nuer ...	12
Dinka	- Northern District	6
	Bor.....	33
Shilluk	-	19
		115."

When on duty in Khartoum, the Animal Husbandry Officer continues to see all hides and skins coming by steamer from the Southern Provinces. Every parcel of hides or skins is inspected and reported on, and a copy of the report is sent to the place of origin so that suggestions and criticisms can be brought to the notice of producers.

In the Northern Sudan hides from Darfur Province alone show any marked improvement. The Southern district of that Province, where auctions are held and modern methods of preparation are gradually spreading, now produces many good quality hides, but the Arab dislikes any innovation which entails more effort, no matter how slight, and would if the district administrative staff relaxed their efforts at this stage quickly revert to his old careless methods of flaying and preparing hides. Unsettling fluctuations in the hide and skin market make it difficult to convince the Arab that he will eventually profit considerably from the little extra labour that goes to the producing of a first quality article.

Export of Hides and Skins, untanned, during 1939.

Article	Quantities in Kilos		Value		Approximate value per metric ton	
	1939	1938	1939	1938	1939	1938
			£E.	£E.	£E.	£E.
Hides	1160,284	1321,042	43,273	59,546	37.3	45.1
Sheep skins	882,415	790,006	48,151	38,281	54.5	48.4
Goats skins	185,768	104,573	16,033	7,001	86.3	67.0

The following Table shows the weights and prices obtained for air-dried hides prepared at the Veterinary Laboratories during 1939.

No. of bundles	Net okes sold	Price per oke	Total price realised	Remarks
		Mms	£E. Mms	
	Sold on 29.3.39			
15	846 ¾	66	55.886	Heavy
15	842 ¼	66½	56.010	Heavy
15	704 ¼	88	61.974	Light
6	327	74½	24.362	Light
5	252 ¼	62½	15.766	Damaged
	Sold on 7.6.39			
15	886 ¾	65	57.622	Heavy
16	967 ½	65½	63.371	Heavy
10	397 ½	76	30.210	Light
3	133 ¼	64	8.512	Slightly damaged
100	5,357 ½	69 7/9	373.713	

1 Oke ..... = 2.75 lbs.
1 Egyptian Pound..... = £1-0-6 Sterling.

These hides were eagerly sought after by exporters and an average price of approximately 69 milliemes an oke in Khartoum was obtained for them this year, whereas the average value of all hides sold to foreign countries was only approximately 49 milliemes an oke, at port of export.

Semn (Clarified Butter).

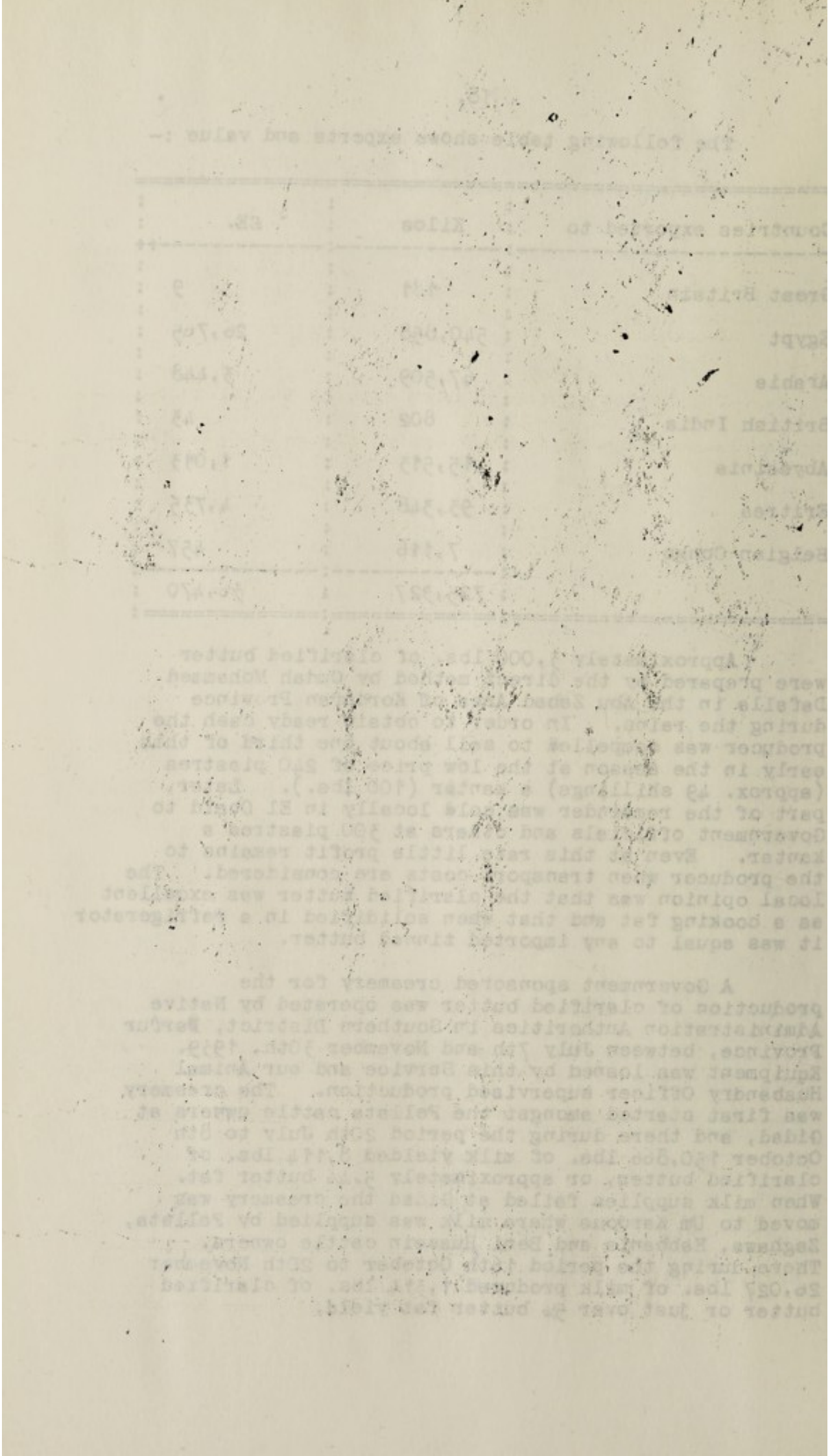
Despite a decrease in value of £E.6 per metric ton, compared with last year's price, exports were up by 134 metric tons and in value by £E.3,211. Egypt increased her purchases by 107 metric tons, Arabia by 27 metric tons and Eritrea by 27 metric tons, whilst British India's purchases fell by over 30 metric tons.

The following table shows exports and value :-

Countries exported to	Kilos	£E.
Great Britain	181	9
Egypt	540,858	26,705
Arabia	67,509	3,448
British India	802	43
Abyssinia	15,513	1,013
Eritrea	93,348	4,735
Belgian Congo	7,116	457
	725,327	36,470

Approximately 3,000 lbs. of clarified butter were prepared by the direct method by Omdah Mohammed Dafalla in the Abu Zabad Area of Kordofan Province during the rains. In order to obtain ready cash the producer was compelled to sell about one third of this early in the season at the low price of 240 piastres (approx. 49 shillings) a kantar (100 lbs.). Later, part of the remainder was sold locally in El Obeid to Government officials and others at 300 piastres a kantar. Even at this rate little profit remains to the producer when transport costs are considered. The local opinion was that the clarified butter was excellent as a cooking fat and that when solidified in a refrigerator it was equal to any imported tinned butter.

A Government sponsored creamery for the production of clarified butter was operated by Native Administration Authorities in Southern District, Darfur Province, between July 7th and November 30th, 1939. Equipment was loaned by this Service and our Animal Husbandry Officer supervised production. The creamery was first started amongst the Fellata cattle owners at Gidad, and there during the period 20th July to 8th October 150,866 lbs. of milk yielded 8,114 lbs. of clarified butter, or approximately 5.4% butter fat. When milk supplies failed at Gidad the creamery was moved to Um Kardous where milk was supplied by Fellata, Zaghawa, Habbania and Beni Hussein cattle owners. There during the period 16th October to 20th November 26,027 lbs. of milk produced 1,314 lbs. of clarified butter or just over 5% butter fat yield.



2. INTERNAL TRADE.

Meat Supplies.

With grazing and water conditions easy in the pastoral areas this year, ample supplies of fat cattle were forthcoming to meet all local slaughter needs.

Poor demands for export sheep up to September caused large numbers to come on the market at reasonable prices for local slaughter. Slaughterings at the largest towns show an increase by 22,425 head compared with last year.

The numbers of animals slaughtered for food in ten of the larger towns during 1939, and the totals for this and the two previous years are given below :-

Town	Camels	Cattle	Sheep	Goats
Khartoum	-	3,260	34,880	-
Khartoum North	-	655	10,372	27
Omdurman	167	5,524	43,934	844
Wad Medani	569	2,373	19,960	363
El Obeid	285	4,287	14,616	273
Atbara	28	1,355	13,598	7
Kassala	218	574	16,492	3,189
Gedaref	404	1,053	5,515	197
Wadi Halfa	4	206	4,100	2
Port Sudan	281	1,234	27,324	3,528
Total for 1939	1,956	20,521	190,791	8,430
Total for 1938	2,854	19,222	168,366	11,657
Total for 1937	2,212	20,240	185,822	7,670

SECTION III.

IMPROVEMENT OF LIVESTOCK

CATTLE.

Propaganda for the elimination of the scrub bull continues, and although many of the more enlightened cattle owners avail themselves of the facilities offered by this Service for the castration of bulls unsuitable for stud purposes, progress has been slow in the true pastoral areas of Kordofan and Darfur where the native, as yet only lightly touched by the advance of education, views with distrust any change in his animal management.

In the riverain districts villagers have in some instances been persuaded, and it has taken a great deal of persuasion too, to club together and purchase stud bulls for their village herds.

In 1930, efforts were made to encourage the cattle-owning tribes of Southern Darfur and Southern Kordofan to infuse fresh blood into their herds, and since the original stocks in these areas were of Western origin it was decided to look to the east for fresh blood. Forty excellent stud bulls were purchased in White Nile Province and distributed half in Southern Darfur and half in Southern Kordofan. Of these issues the Director, Sudan Veterinary Service, wrote at the time :-

> "Some time will elapse before it will be possible to assess the true value of the results of the introduction of these bulls but, if these are good and sufficiently striking to impress the natives concerned, it is possible they may suffice to encourage the tribal authorities to undertake further importations of stud bulls from the White Nile Province on their own responsibility."

In August of this year, the District Commissioner, Southern Darfur District, reported as follows on the imported bulls :-

> "Their progency have done well; the products of crosses with the local cattle being distinguished in shape and giving a better yield of milk without seeming to be any less hardy. I have been asked by various cattle owners if they could purchase more of these bulls this season."

Shortly after this the District Commissioner wrote to say that funds were available for the purchase of stud bulls. Ten were bought by this Service in White Nile districts and were despatched on hoof to Darfur.

Easier grazing and watering conditions have tended to produce in the White Nile districts a better milker and beef animal than is to be found in Darfur. Therefore, the improved beast produced in Darfur by crossing the White Nile bull with the Southern Darfur district cow can only be expected to do well in those parts of the district most favourable to stock raising or where the owner is prepared to give a supplementary ration, as it cannot be expected to be as resistant to lack of grass and hard conditions as the indigenous animal.

The ill affects of localised inbreeding could be overcome by the exchange of herd bulls between local tribes, but the District Commissioner says that this is unpopular.

The Veterinary Inspector, Northern Province, reports that :-

> "At Shendi Agricultural Show about 120 pairs of bulls, entered for the ploughing competition, were afterwards judged for the best pair of working animals and the best breeding bull, and about twenty consolation prizes were also awarded. The prize-winners were of a very high standard. The local type of animal is an excellent one and improvement is entirely concerned with efforts at encouraging better management and feeding.
>
> "Entries at the Merowe Agricultural Show were small, but good types of animals were seen. Inbreeding and generations of under-nourishment have resulted in the production of very under-sized and poor quality animals on the cultivations of Halfa Digheim and Debeira in Halfa District. Introduction of outside blood is a necessity and a start was made when the Omdas of these places each purchased a pair of good bulls at the Shendi Show."

H o r s e s.

A policy of mechanisation continues in the Sudan Defence Force, and this year the horses of yet another mounted Unit were replaced by balloon tyred motor vehicles. The majority of the horses of this mechanised Unit became available as remounts for other Units, and it was at one time feared that the Sudan Defence Force would require few if any young remount horses from the Arab breeders of Darfur Province. Fortunately the Army and Civil Government Authorities, realising the hardship that would result from such an unlooked for happening, sanctioned purchases in excess of normal requirements at the 1939-40 Horse Shows.

Of the sires in Darfur at the end of the year, nine were imported stallions, government syced and fed, five were imported horses boarded out at a cheep rate with reliable men of the horse breeding tribes and thirty-three were country-breds stationed with the local tribesmen in return for small cash allowances. Two of the nine in the first category who are getting on in age are due to be weeded out during the coming year and will not be replaced.

In Kordofan Province there were seven country-bred tribal stallions and one imported Arab stallion.

The riverain horse breeders were catered for by three Arab stallions stationed at Khartoum and one at Shendi. There is now no thoroughbred stallion in the Sudan. The last one "Singlass", a small compact thoroughbred of good quality, presented to the Government by Mr. J. Gibson some years ago, became unfit for service during the year and was put down.

The following information was obtained from the Senior Veterinary Inspector, Darfur Province's reports on the four horse shows held during 1939.

The two early shows were held at Idd El Ghanam (Beni Helba, Ta'aisha and Gimr Tribes) January 10th-15th and at Nyala (Fur, Messeria, Birgid, Dagu and Turgam Tribes) January 18th - 22nd.

The horses at these shows were on the whole in very good condition despite scarcity of grain and fodder due to widespread losses from locusts : In fact only at Idd El Ghanam was there any noticeable falling off in the standard of condition of any section of those shown - the mares there not being quite as fat as usual.

The tribes that attend these shows are almost sedentary and so the young stock benefits from not having to make the long seasonal marches which fall to the lot of the youngsters reared by the Tribes attending the Southern shows. The foals and yearlings were in excellent condition, particularly those seen at Nyala.

The policy of giving subsidies to owners of mares such as are considered suitable to mate with Arab stallions for the production of a supply of country-bred sires continues to give good results. Over fifty subsidies were paid out at these shows.

Of the one hundred horses purchased fifty-four were sired by Government sires and from the latter four of outstanding merit were selected as tribal stallions.

The two late shows were held at Sibdu (Rizeigat and Maalia Tribes) November 27th - December 2nd and at Abu Sala'a (Habbania, Fellata, Messalat and Beigo Tribes) December 3rd - 9th.

The general condition of the animals was again good although it was a poor grain year. Foals, yearlings and two-year-olds sired by imported and country-bred sires totalling over 1,200 were paraded in good condition and appeared well grown.

Fifty-four horses were purchased, thirty-one for the Sudan Defence Force, eleven for the Police, seven for Officials and five outstanding horses for use as tribal stallions.

SECTION IV.

Education.

The school year was divided into two terms of twelve and twenty -one weeks respectively, the first lasting from 7th January to 30th March and the second from 22nd July to 14th December. The three students under tuition, in December successfully passed their professional examinations in pathology, materia medica, nutrition and dietetics, and hygiene and stable management. The external examiner in pathology favourably commented on the general excellence of the students' work in this subject.

While seeing practice with the Senior Veterinary Inspector, Kordofan Province, during the summer vacation the students toured widely amongst the cattle, sheep and camel owning tribes in the pastoral areas, and in December accompanied the Veterinary Inspector, Kosti, through the cattle and sheep raising areas of Kosti and Dueim districts.

SECTION V.

MISCELLANEOUS.

Grazing and Watering.

Following the good rains and high Nile of 1938 conditions were generally favourable for live-stock during the first half of 1939, but during the latter half almost famine conditions prevailed in the Northern Sudan which suffered from poor and ill-spaced rains and en exceptionally low Nile. The true pastoral areas, however, lying between latitude 12° and 16°, with few localised exceptions provided excellent grazing and water in plenty throughout the year, and the condition of live-stock remained so good that it was possible to export fat cattle to Egypt during every month of the year.

The Veterinary Inspector, Northern Province, reports :-

> "Early in the year the Province was enjoying excellent feeding conditions in the riverain districts as a result of the high Nile of 1938. Extensive lubia crops, besides a good natural growth of grass in the basins, were to be seen in all districts.
>
> "The condition of animals in Merowe and Dongola districts was seen in January to be well above the standard of a year previously. Again, their condition in June, although poor, was still benefitting from the plentiful lubia supplies and the usual summer starvation period was to some extent postponed. Unfortunately, the temporary improvement in feeding conditions was soon to be followed in all districts by a very lean time as a result of the exceptionally low Nile of this year. By the end of the year grazing was scarce in the basins and also in the pastoral areas away from the Nile where the rains were light and ill-spaced.".

Grazing in Khartoum Province was well above the average for the first six months of the year, but this autumn, following light rains (only three inches in the vicinity of Khartoum compared with eighteen inches last year) has brought famine conditions for stock. Serious losses are to be expected amongst the flocks of sheep and goats which supply the native population of Khartoum, Khartoum North and Omdurman with milk, as their owners are mostly poor people who during a sequence of good grazing years have collected far more animals than they will be able to buy food stuffs for now that free grazing is unobtainable.

The Senior Veterinary Inspector, Kordofan Province, writes as follows on conditions in his Province :-

"Heavy rains during 1938 resulted in exceptionally good grazing conditions throughout the spring of 1938. The Northern area of Dar Humr was an exception and there grain was scarce. A reflection of this was the poor condition of the horses at this year's Humr Show.

"The rains were again good in 1939 and some rain-fed lakes, Rahad for instance, will carry ample water till the rains of 1940.

"Good grass and plentiful water in the areas frequented by the owners of export cattle have kept their animals in good condition throughout the dry season.

"The Northern wet season grazing grounds of the Humr unfortunately again held light rains, and cattle had to begin to move South to the river far earlier than usual this winter. Round Lake Keilak the rain-fall was plentiful and water and grazing subsequently good."

The decision to delay the opening of the White Nile Dam from Mid-February to mid-March caused a certain amount of alarm amongst local population South of the Dam who feared that there would not be sufficient time between the emptying and filling of the reservoir to allow of them sowing and harvesting even a quick-growing crop, and also, that owing to extended submersion the roots of the grasses and plants which on a low Nile provide grazing for flocks and herds would be destroyed. When the Dam was opened, however, not only were crops grown and harvested on the land exposed as the river fell but also good grazing was provided at the time of the year when it is usually most scarce.

Buildings.

In 1938 the main block of stables at Wad Medani Veterinary Hospital was found to be unsafe and financial approval was obtained for its replacement by a new building containing twenty loose boxes. Building operations started in February and were completed by October.

The architect has successfully embodied in his plans the best of the many suggestions offered by those interested in the erection of stabling designed to meet conditions prevailing in the Gezira, and in the finished building has provided accommodation which is airy and cool in hot weather, protected from cold winds in the winter months, with complete protection against mosquitoes and other flies, and since iron has been used throughout for the construction of doors, windows and other fittings for which wood is usually employed, warping and destruction by white ants have been eliminated.

Veterinary Hospitals.

Khartoum Veterinary Hospital and Forge.

Out-patients	3,587
In-patients	4,194
Pairs of shoes fitted	1,517
Pairs of shoes removed	74
Rasping of feet etc.	601

Mechanisation of Army and Civil Transport has caused a further decrease in the number of horses and mules in Khartoum and thus a corresponding decrease in the number of patients treated at the Veterinary Hospitals.

In order to meet the needs of small owners of mules and horses, used in hired transport work, for a cheap shoe with a long life the Senior Veterinary Inspector, Khartoum, is arranging for the forge staff to make a good hard-wearing shoe from bar iron which will be sold at a reasonable price.

Wad Medani Veterinary Hospital.

Out-patients	15,188
In-patients	470

Lameness and injuries comprised the majority of cases treated during the year.

The Gezira area is the one place in the Sudan where the horse continues to hold its own in the face of advance of mechanised transport, as it is still found to be the most satisfactory form of conveyance for the inspectorate of the Sudan Plantations Syndicate and Kassala Cotton Company in the performance of their duties on the cotton growing lands.

Sudan Defence Force Animals.

Veterinary Inspectors report that the usual high standard of stable management was maintained in all Mounted Units in the Sudan Defence Force. With the exception of the outbreak of epizootic lymphangitis, first noted in the 1938 Annual Report of the Sudan Veterinary Service and which still continues sporadically, there were no outbreaks of disease worth noting and the general condition of the animals throughout the year may be said to have been excellent.

Acknowledgements.

In concluding this summary of the work of the Veterinary Service during the year, I would thank my staff for their good work and for the loyal support which they have never failed to give me.

It is again a pleasure to record an appreciation of the help given to this Service by Provincial Staffs and by all other Departments and Services, when called upon. Their assistance has contributed, largely, to any success that has attended our efforts to control disease and to improve animal management in the Sudan.

Khartoum
28th February, 1940. (Sgd.) H.B. Williams.

Ab. DIRECTOR, SUDAN VETERINARY SERVICE.

APPENDIX I.

The following figures show the actual Revenue and Expenditure of the Sudan Veterinary Service for the past three years :-

	1937	1938	1939
	£E.	£E.	£E.
1. REVENUE	9,030	8,378	9,552
2. EXPENDITURE :			
Chapter I - Personnel & Personal Allowances	26,678	27,493	26,891
Chapter II - Services	10,199	10,157	11,278
Chapter III - Extraordinary Expend.	855	158	65
TOTAL	37,732	37,808	38,234

(Signed) H.B. Williams.

Ab. DIRECTOR, VETERINARY SERVICE.

ANNUAL REPORT

OF

THE SENIOR RESEARCH OFFICER

1939.

A. STAFF AND GENERAL.

Under this section there is nothing new to report, as the constitution of the staff and the purely departmental duties carried out were as in earlier years. Mr. J.T.R. Evans, who was recalled from leave at the outbreak of war, was unable to reopen the Malakal laboratory on account of his return being much earlier than usual, and he was temporarily lent to the Posts and Telegraphs Department where he was engaged in the Censorship Section for about two months. The Senior Research Officer was largely engaged in administrative duties in his additional capacity of Assistant Director, and all other members of the staff were fully occupied with routine duties to the virtual exclusion of research. A few small investigations were undertaken, which can hardly be dignified with the name of research.

The year's work has been exacting and uninteresting, and its general level of intensity has slightly risen. Nevertheless all members of the staff have worked well, and have successfully answered all calls made on them.

B. ROUTINE WORK.

The main items of routine work have been :-

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

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

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

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

V. Issue of foot-and-mouth disease virus (Khartoum).

VI. Issue of diagnostic materials and of Naganol for the control of camel trypanosomiasis (Khartoum).

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

VIII. Examination of pathological specimens (Khartoum and Malakal).

Short notes will be given of each of these.

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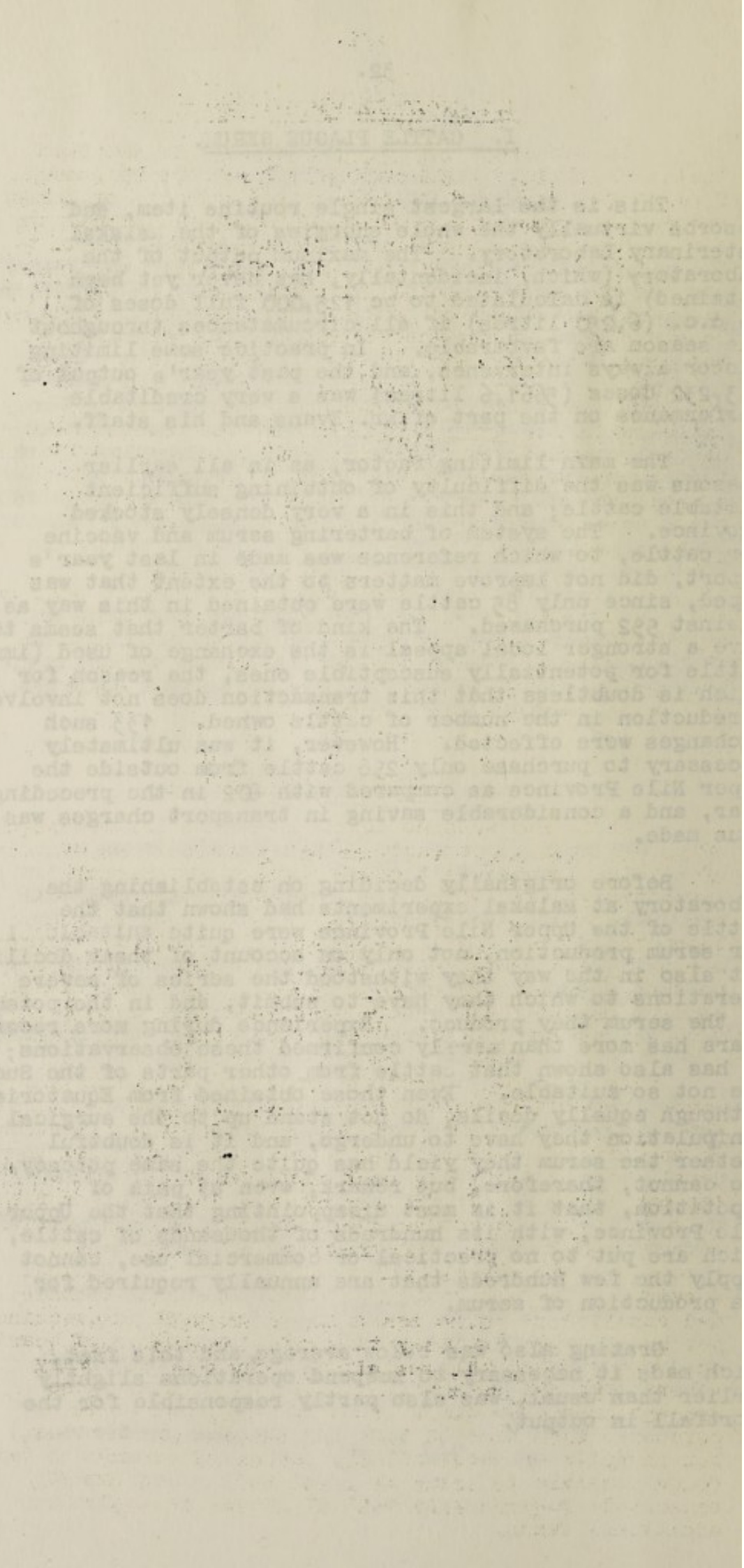
I. CATTLE PLAGUE SERUM.

This is the largest single routine item, and absorbs virtually the whole energies of the Malakal Veterinary Laboratory. The maximum output of the laboratory (which, incidentally, has never yet been attained) is calculated to be 125,000 full doses of 50 c.c. (6,250 litres) if all circumstances throughout the season are favourable. In practice some limiting factor always intervenes, and the past year's output of 113,232 doses (5661.6 litres) was a very creditable performance on the part of Mr. Evans and his staff.

The main limiting factor, as in all earlier seasons was the difficulty of obtaining sufficient suitable cattle; and this in a very densely stocked Province. The system of bartering serum and vaccine for cattle, to which reference was made in last year's Report, did not improve matters to the extent that was hoped, since only 85 cattle were obtained in this way as against 992 purchased. The kind of barter that seems to have a stronger local appeal is the exchange of used (immune) cattle for potentially susceptible ones, the reason for which is doubtless that this transaction does not involve a reduction in the number of cattle owned. 133 such exchanges were effected. However, it was ultimately necessary to purchase only 298 cattle from outside the Upper Nile Province as compared with 802 in the preceding year, and a considerable saving in transport charges was thus made.

Before originally deciding on establishing the laboratory at Malakal experiments had shown that the cattle of the Upper Nile Province were quite suitable [illegible] for serum production, not only on account of their docility but also in the way they withstood the series of severe operations to which they have to submit, and in the potency of the serum they produce. Experience during more recent years has more than merely confirmed these observations; it has also shown that cattle from other parts of the Sudan are not so suitable. Even those obtained from Equatoria, although equally docile, do not stand up to the surgical manipulation they have to undergo, and it is doubtful whether the serum they yield has quite the same potency. One cannot, therefore, but remark, even at pain of repetition, that it is most disappointing that the Upper Nile Province, with its hundreds of thousands of cattle, which are put to no practical or commercial use, cannot supply the few hundreds that are annually required for the production of serum.

Grazing also was below average, and this fact, which made it necessary to suspend operations slightly earlier than usual, was also partly responsible for the shortfall in output.



On the other side of the account is the fact that the Shilluk cattlemen did not, strangely enough, feel it incumbent on them to go on strike; at least one strike, usually easily settled, seemed almost to have become established as an annual social event. The health of the Arab technical assistants was also good according to Malakal standards; all, as usual, had at least one attack of malaria, but temporary deficiencies in staff were evenly spaced and did not seriously interfere with the work.

Towards the end of the year the laboratory was included in the units supplied with the recently installed electricity and water systems. Full advantage of the former cannot yet be taken, since a good deal of non-electrical apparatus is still in good working order, but a mains water supply is proving an appreciable convenience.

Since all the batches of serum prepared were of satisfactory potency, and the addition of traces of acriflavine (see last year's Report) to the carbolic acid used as a preservative proved quite efficient in preventing contamination, the season can be appraised, as, on the whole, a satisfactory one.

II. CATTLE PLAGUE VACCINE.

There has been no modification in the technique of preparing this product. It consists of an emulsion of all the lymphoidal tissues (except the mesenteric lymphatic glands, which are invariably infected with bacteria) of beasts slaughtered at the height of the thermal phase of cattle plague, emulsified in a sixty per cent. aqueous solution of glycerine, and adjusted so that a "standard" dose of 10 c.c. represents a tissue content of about one gramme per hundred kilogrammes live weight for the average adult beast of the country.

As in earlier years a large proportion of the tissue incorporated was recovered from virus producers used in the Malakal Veterinary Laboratory and sent to Khartoum in an unfinished state. A rather larger quantity than usual, namely 1,065 litres or sufficient for about 100,000 doses in the finished state, was received from this source. Unfortunately this increase was partially offset by a decrease in the number of young cattle received by the Khartoum laboratory from the Medical Service. In this instance, improvements in technique had resulted in an increased yield of smallpox vaccine per beast, with a consequently smaller number of beasts used and subsequently handed over to the Veterinary Laboratory. A few small cattle, other than those discontinued from other items of work, had to be purchased from time to time for vaccine preparation, but in spite of substantially increased demands it was found possible to issue at least sufficient for all reasonable requirements without having to apply for additional funds.

As was anticipated, in consequence of the necessity for discarding a large portion of the serum prepared in 1938, demands for vaccine were much larger than usual, especially in the earlier months before any current season's serum was available. Calculations had originally been made for an issue of about 100,000 doses, but finally 164,784 doses had to be prepared.

III. CATTLE PLAGUE VIRUS.

As in past years, only small quantities of virus (actually 2,880 doses) have been issued to field officers. Glycerinised lymphoid tissue, maintained in cold storage, is still being used and is continuing to give satisfactory results.

IV. CONTAGIOUS BOVINE PLEURO-PNEUMONIA VACCINE.

Although still widespread, the disease is undoubtedly giving less trouble than it was several years ago. This year 36,450 doses of vaccine were issued, of which nearly a quarter was used on cattle registered for export. While being a slight increase on last year's low total of 30,040 doses, this quantity is markedly less than the 50,000 or more that were regularly issued some years ago.

Judging from reports received from the field, it seems that widespread vaccination over a number of years has so immunised the herds in bad districts that the disease now appears in the form of a few cases here and there rather than as frank outbreaks. With the reduced chances of incurring substantial casualties, cattle owners are becoming less anxious to report its occurrence, since they wish to avoid the imposition of administrative measures - mainly restrictions of free movement. Thus, while there is no prospect of early eradication, there is no doubt that contagious bovine pleuro-pneumonia is reasonably under control, and with vaccination available it should never again get out of hand.

V. FOOT-AND-MOUTH DISEASE VIRUS.

This product is issued for the deliberate infection of all cattle registered for export. The rationale of this procedure was fully explained in last year's Report and need not be repeated. So far as it is known, only one type of virus occurs in the Sudan;

or at any rate no beast infected with the virus now in use has ever contracted the disease on subsequent exposure to natural infection.

About 10,000 doses were used, following which no delay on account of foot-and-mouth disease was incurred among cattle exported to Egypt.

VI. CAMEL TRYPANOSOMIASIS CONTROL.

The steady annual increase in the demands of private owners for Naganol on payment has resulted in larger issues of this drug and of diagnostic materials than ever before. In fact, during the past seven years, in which naganol has been sold in thousands of doses rather than in hundreds as in the earlier years of its use, each year has shown a substantial increase as compared with its predecessor.

The total issues amounted to 17,783 units, as compared with 12,938 and 14,748 in 1937 and 1938 respectively. The proportion of this that was used on privately owned camels can be gauged from the record that 17,815 doses, or 32 more than issued, were sold during the calendar year. (Stocks in hand in outstations were evidently rather smaller at the end of the year than at the beginning).

The outbreak of war occurred when stocks were almost exhausted and a new supply was actually on order from Germany. This supply did not arrive, and arrangements had to be made to find a substitute. Fortunately this was available in the form of the British-made product "antrypol" which is said to be chemically identical, and to differ only in its registered trade name. Some little delay was inevitable in obtaining supplies, but by the end of the year the situation had again reverted to normal.

VII. HORSE SICKNESS VACCINE.

Demands for this product are not sufficiently large to make it worth while undertaking its preparation locally, and supplies continue to be obtained from Kenya. During the year 983 doses were issued as compared with 507 in 1938, and of these 492 were sold to private horse owners as compared with 389 last year. The results of its use continue to be good, and so far as can be ascertained only five vaccinated horses subsequently died of the disease. No more samples of virus were sent to Kenya for study, since the low casualty rate inspired confidence that all local strains must be covered by the vaccine.

VIII. SPECIMENS EXAMINED.

The number of specimens submitted for examination from outside sources was 538 as against the very low total of 355 in 1938. As usual few of these were of any particular interest, most conditions diagnosed being quite well known. The following are, however, worthy of brief note :-

(i) The continued appearance of cryptococcus infections in which lesions are limited to the conjunctiva - seven such being diagnosed, all in horses.

(ii) Tuberculosis in a bullock slaughtered for food in Khartoum. This disease is so rare in the Sudan that the detection of a case is always worthy of special mention, if only to stress the rarity. The only lesion in the carcase was an old encapsuled abscess in a mesentric lymphatic gland. The breed of the beast could not be accurately determined, but it may at least be said that it was not one of the large-horned, almost humpless, cattle in which the few earlier tuberculous infections have always been found. Cultures are being made from the material, but as it only became available late in the year, no conclusion is yet available as to the type of tubercle bacterium at issue.

(iii) The identification of Trypanosoma uniforme in two cattle in the Upper Nile Province. The only interest in this finding is that it is the first time it has actually been placed on record. Trypanosomes of the T.vivax group are not frequently encountered in the Sudan, and such as have been seen have always hitherto had the large dimensions characteristic of T.vivax itself. Measurements of a dozen individuals (trypanosomes were scanty in both instances) in each of these two specimens showed the average length to be about 17 microns, while no individual exceded 20 microns; there is therefore no doubt as to their having been T.uniforme in a state of purity.

(iv) A case of blackquarter in a yearling bull which died in Kordofan. Since the only material sent for examination was a few smears of muscle exudate, the exact species of bacterium could not be determined. Blackquarter has a world-wide distribution, and the only justification for remarking on this case is that it appears to be the first one recorded in the Sudan.

(v) A case of so-called Globidium infection in a horse. The interest in this case lies in its place of origin. Only about half a dozen such infections have been recorded in this country, all of which, including the one now under mention, have occurred in the Nuba Mountains area of southern Kordofan. The case was diagnosed from skin scrapings sent to Khartoum. The horse has since been sent to Khartoum for further observation.

Other less interesting diagnoses included :-

Horses : Tryp.congolense, Babesia caballi, epizootic lymphangitis, ulcerative cellulitis, ringworm, various septic and helminthic infections.

Mules : Epizootic lymphangitis and other septic infections

Donkeys: Epizootic lymphangitis and other septic infections.

Cattle : Tryp. congolense, Theileria annulata, Actinomyces farcinicus, coccidiosis, miscellaneous septic and helminthic infections.

Camels : Tryp. evansi, coccidiosis.

C. RESEARCH.

Deliberate research again remained entirely in abeyance, but three small items of investigational work were undertaken that may reasonably be recorded under this heading.

NAGANOL AND ANTRYPOL.

In an earlier section of this Report it was stated that the British-made compound antrypol is claimed by the makers to be chemically identical with the German-made naganol. In consideration of the scale on which the treatment of camel trypanosomiasis is carried out on payment, it seemed necessary to confirm its equal curative value. More especially did it seem necessary because a few years ago a sample of antrypol was tested in the field and doubt was expressed as to its equal value. Although it was subsequently discovered that treated camels which appeared to relapse were not beyond suspicion of having been exposed to the

chance of reinfection, no further tests were carried out because the British manufacturers were at that time unable to quote prices that would compete with those quoted from Germany. With the outbreak of war, and with the German-made product finally off the market, it was thus necessary to carry out a new series of tests. These were undertaken in the Veterinary Laboratory at Khartoum, which is definitely situated outside the zone where reinfection can occur.

Eleven camels, suffering from natural or artificial infections with three strains of T. evansi from different sources, were allowed to develop strong positive reactions to the mercuric chloride test. Nine of these were then given a five gramme dose of antrypol and the remaining two (controls) were given a similar amount of naganol. Observations were not concluded by the end of the year, but up to that time (two months after treatment) no trypanosome was detected in the blood of any camel, and the intensity of reaction of all individuals to the mercuric chloride test had markedly waned. It is intended to conclude the experiment by injecting blood from each camel into experimental animals, and until this has given negative results the case cannot be considered proved. Nevertheless, in consideration of the perfect results to date, the sale of antrypol is being continued with confidence.

CAMELS AND FOOT-AND-MOUTH DISEASE.

There has long been some uncertainty as to whether camels are susceptible to foot-and-mouth disease. Certainly no veterinary official at present serving in the Sudan has ever seen a naturally-occurring case, in spite of the close association that frequently occurs between camels and infected cattle, and authorities in certain other countries have denied the camel's susceptibility to artificial infection. Nevertheless, some recently-published text books still leave the unfortunate beast under a cloud of suspicion, and early in the year the movement of camels in Egypt was restricted on account of the existence of foot-and-mouth disease among cattle.

Since the free movement of camels is of the greatest importance to the Sudan, it was thought desirable finally to settle the matter, especially as it could be settled almost without incurring any expenditure by using the camels which are frequently being cast from the Government service.

Altogether ten camels were tested, living virus being injected either subcutaneously (1), into the epithelium of the tongue (7), or at the junction of the toe-nail and the skin (2). In no case did any symptom or lesion, either general or local, appear. All tests included one or two young cattle which were injected with virus either subcutaneously or into the tongue, and in all of these a typical foot-and-mouth infection developed.

It can, therefore, confidently be stated that camels are not susceptible to foot-and-mouth disease, and that there can consequently be no more point in restricting their movement during an outbreak than there would be in immobilising any other insusceptible object.

HORSE SICKNESS.

The few vaccinated horses which subsequently died of natural infection could be easily dismissed by assuming that they represented failures of the vaccine to immunise; in fact it could be taken as cause for satisfaction that the number was so small (5 out of 983). It was, however, recalled that it had been recorded in Kenya that a disease appeared to exist which produced the outward symptoms of horse-sickness but in which the virus could not be demonstrated on the subinoculation of experimental animals; one sample of Sudan material had, in fact, also been the subject of the same observation (see last year's Report). Since one regularly has access to horses which are destined for destruction for surgical or other reasons, it was thought that a few samples of blood from so-called atypical cases of horse sickness, or from vaccinated horses which subsequently died, might usefully be tested on such of these as had no history either of vaccination or of recovery from an earlier attack of the disease. One sample of blood from a vaccinated horse which succumbed, and one from an atypical case were first injected into two apparently clean horses without effect. Later in the year three samples from vaccinated horses which died and three from atypical cases were all injected successively into three horses, again without effect in any case. All the test horses were of pure indigenous breed, and it is known that this type is less susceptible to horse-sickness than the imported types or cross-breds whose deaths were being investigated. Also no opportunity arose to confirm susceptibility with a known virulent horse-sickness virus because none is normally maintained in stock and none

came to hand at an opportune time. The question cannot therefore be regarded as settled, but since it seems improbable that five native horses, all solidly immune to horse sickness, would be encountered in succession, there is at least justification for wondering whether some other disease, closely resembling horse-sickness in its clinical features, is not a good deal commoner than has hitherto been supposed. It is hoped to pursue the matter further in the future.

D. PUBLICATIONS.

Only one paper was published in a scientific journal. Actually this was published so late in 1938 that it could not be noted in the Report for that year.

HOARE, C.A. and BENNETT, S.C.J. Further Observations on the Absence of the Kinetoplast in Trypanosoma evansi. - Parasitology, 1938, Vol.30, pp.529-542.

E. SUMMARY.

The volume of usual routine duties of the Research Section rose in the case of every item as compared with 1938, and the staff was continuously and fully occupied in coping with demands.

No new activities were undertaken.

Deliberate research again remained in abeyance, as for several years past, but three small ad hoc series of observations were carried out on camel trypanosomiasis, foot-and-mouth disease, and horse-sickness respectively.

One scientific paper was published.

(Sgd.) S.C.J. Bennett.

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Ab.