ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

1942.

ANNUAL REPORT

OF

THE SUDAN VETERINARY SERVICE

FOR THE YEAR 1942.

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S T A F F .

DISTRIBUTION OF BRITISH STAFF AS ON 31st. DECEMBER, 1942.

N A M E	DESIGNATION.	STATION
Lieut.Colonel C.P.Fisher, 4N. M.R.C.V.S.	Director	Khartoum
Dr.S.C.J.Bennett, 4N.,D.Sc., M.R.C.V.S.	Asst. Director and Senior Research Officer	"
Captain T.Menzies, M.R.C.V.S., D.V.S.M.(Vict);	Senior Veterinary Inspector	El Obeid
Major L.E.Prichard, O.B.E., M.R.C.V.S.	"	Wad Medani
Mr.W.H.Glanville, M.R.C.V.S.	"	El Obeid
Mr.J.E.Furney, M.R.C.V.S.	Veterinary Inspector	Wadi Halfa
+ Mr.I.A.Gillespie, M.R.C.V.S	"	
Mr.A.W.Chalmers, M.R.C.V.S.	Veterinary Inspector & Registrar Veterinary School	Khartoum
Mr.P.Durran, M.R.C.V.S.	Veterinary Inspector	El Fasher
+ Mr.J.D.M.Jack, M.R.C.V.S	"	-
+ Mr.J.K.Thomson, M.R.C.V.S.	"	-
+ Mr.P.Z.Mackenzie, D.V.S.M. M.R.C.V.S.	"	-
+ Mr.H.B.Luxmoore, B.Sc.,M.R.C.V.S	"	-
Mr.J.Mckay	Superintendent	Khartoum
Mr.G.M.Anderson	A/Superintendent	"
R E S E A R C H .		
Mr.J.T.R.Evans, B.Sc., M.R.C.V.S.	Veterinary Research officer	Khartoum
Mr.G.C.Brander,B.Sc,M.R.C.V.S.	"	Malakal

+ Released for military service.

ESTABLISHMENT OF NON-BRITISH CLASSIFIED STAFF, 1942.

3 Veterinary Officers.
2 Veterinary Overseers.
2 Animal Husbandry Officers.
2 Laboratory Assistants.
1 Head Clerk.
8 Clerks.
2 Book-keepers
1 Sarraf.
1 Store-keeper.
13 Head Stockmen.
1 Southern Supervisor.
5 Southern Stockmen.

UNCLASSIFIED STAFF AS AT 31st. DECEMBER, 1942 :-

64 Stockmen.
1 Carpenter.
2 Storemen.
3 Motor Drivers.
9 Messengers.
71 Veterinary Attendants.
20 Temporary Veterinary Attendants.
4 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.

During the year Mr.H.B.Luxmoore joined the Staff as Veterinary Inspector and Mr.G.C.Brander as Veterinary Research Officer.

Mr.Luxmoore was later released for Military Service and was commissioned in the Sudan Defence Force.

Mr.Brander, also, was later commissioned in the Sudan Auxilary Defence Force, a part-time military formation for local defence.

In all, five Veterinary Inspectors have been entirely released for military service while four other members of the British staff including the Director and Assistant Director, hold commissions to enable them to do part-time military work. These releases for military service constitute a 50% reduction in the British field Staff; for this reason work has had to be reduced to essentials and more responsibility thrown upon Sudanese Veterinary Officers; long-term policy, not directly connected with the war effort, has had to remain in abeyance.

SECTION I.

DISEASES OF ANIMALS.

1.DISEASES OF CATTLE.

Rinderpest.

The rinderpest situation during the year may be described as normal. The usual thousand, odd, outbreaks occurred and were controlled by the use of serum and vaccine. In the suppression of these outbreaks 126,211 doses of serum and 36,384 doses of vaccine were used, as against 107,345 and 25,455 respectively, used in the previous year.

The record total of 223,775 doses (of 10 c.c.) of vaccine was used in 1942 in order to fulfil the greatly increased demands of the export cattle trade.

It has to be recorded that of the 50,000, odd, vaccinated cattle, that passed through the export quarantines on their way to Egypt to supply meat to the middle East Forces not a single case of rinderpest occurred.

The following is a summary of the rinderpest control work during the year :-

PROVINCE	Out-breaks	Number infected	Deaths	Serumised	Vaccinated
Blue Nile	622	102,181	2,513	42,590	-
Darfur	194	108,850	662.	47.732	16,176
Kassala	69	16,663	710	6,258	3,715
Khartoum	5	1,046	13	902	-
Kordofan	214	49,375	757	28,009	16,483
Northern	2	138	5	129	-
Upper Nile	6	1,231	212	591	-
Total ...	1,112	279,484	4,872	126,211	36,374

The following table gives the comparative incidence and work done during the past 5 years :-

YEAR	Out-breaks	Numbers infected	Deaths	Serumised	Vaccinated
1938	896	319,945	4,942	85,662	54,180
1939	983	290,266	4,113	69,394	132,127
1940	1,184	362,840	5,535	134,453	86,744
1941	1,032	264,659	5,248	107,345	25,455
1942	1,112	279,484	4,872	126,211	36,374

Contagious Bovine Pleuro-Pneumonia.

The incidence of this disease was again low and chiefly confined to merchants' cattle bought in the west and destined either for local slaughter or export to Egypt. French Equatorial Africa still seems to be the chief source of infection, for the disease appears in many cattle from that territory, and most of the Sudan outbreaks occur along the routes taken by these imported cattle.

The following is a summary of the year's work compared with the four previous years :-

The following table shows outbreaks, other than those amongst trade cattle, during 1942 :-

PROVINCE	No. of outbreaks	No. Infected	Deaths	Vaccinated
Blue Nile	16	1,372	58	1,326
Darfur	14	4,413	61	3,509
Kassala	2	805	5	800
Khartoum	-	-	-	-
Kordofan	42	5,187	102	5,013
Northern	-	-	-	-
Upper Nile	3	289	4	284
Total ...	77	12,066	230	10,932

Comparative table for the last 5 years :-

YEAR	No. of outbreaks	No. Infected	Deaths	Vaccinated
1938	72	21,785	605	15,728
1939	76	13,133	173	11,905
1940	102	16,073	249	13,741
1941	96	24,195	299	18,117
1942	77	12,066	230	10,932

Including the vaccine given to cattle for the meat trade, the total number of doses used was 42,525 as against 71,050 in the previous year.

FOOT & MOUTH DISEASE.

An extensive outbreak occurred in the Upper Nile Province in the middle of the year which necessitated the closing of that district. Infection trickled as far as Kosti where it spent itself artificial infection was practised in the infected herds, and the export trade was not interrupted in any way.

Anthrax.

Following reports from export quarantines a focus of infection was found to exist at Kashgeil in Kordofan Province. In all, 93 cases occurred in cattle, distributed as follows :-

Kashgeil	47
Khartoum North Quarantine	37
Halfa Quarantine	8
Khartoum North District	1
	93

In addition 12 donkeys died at Kashgeil and 16 sheep in the Halfa Quarantine.

The Kashgeil district was closed to export for a time and the occurrences ceased.

Black Quarter.

Two outbreaks were reported; one at Gedaref, where 60 deaths occurred; the other, in the Rashad district of Kordofan, where 890 deaths are said to have occurred.

Tuberculosis.

One case was discovered and confirmed by Laboratory tests in a beast from Equatoria slaughtered in the El Obeid abattoir. The disease, for practical purposes, may be considered as non-existent in the Sudan.

Psoroptic Mange.

Extremely common amongst the working oxen of the tenants of the Sudan Plantations Syndicate. It is rarely met with in the native village herds and has not been seen outside the irrigated area.

DISEASES OF CAMELS.

Trypanosomiasis.

Demands for Antrypol continue to increase; 22,671 doses were issued. Camels are such a good price that the Arab does not mind spending 25 P.T. (5/-) if he thinks his animal likely to be infected The supply of the drug was not quite equal to the demand as a consignment was lost at sea through enemy action.

Mange.

Sarcoptic mange is very common. It was reported during the year in Government camels from Darfur, Kordofan, Kassala, Khartoum, and the Gezira Provinces. Native herds in Kassala Province were also heavily infected.

DISEASES OF EQUINES.

Horse Sickness.

1,418 military and civil equines were vaccinated; 14 deaths are reported, all amongst military animals.

Epizootic Lymphangitis.

231 horses and mules were destroyed during the year; 74 of these were military animals. The disease is very common and uncontrolled in Abyssinia and Eritrea and many infected animals found their way to the Sudan during and after the 1941 Campaign.

The disease is wide-spread throughout the Northern Sudan but only on the eastern frontier does it assume any serious proportions.

Equine encephalo-myelitis.

Reported for the first time in the Sudan amongst military mules imported from Abyssinia (see report of Senior Veterinary Research Officer which follows); 35 mules either died or were destroyed.

DISEASES OF CANINES.

Rabies.

Of the 188 specimens submitted to the Stack Medical Research Laboratories for diagnosis 51 were returned as positive : distribution was as follows :-

Province	Dogs	Calf	Horses	Donkeys	Goats	Total
Kordofan	1	-	-	-	1	2
Gezira	30	1	1	1	2	35
Equatoria	4	-	-	-	-	4
Upper Nile	-	-	-	-	-	-
Kassala	2	-	-	-	-	2
Khartoum	7	-	-	-	-	7
Darfur	1	-	-	-	-	1
Total	45	1	1	1	3	51

SECTION II.

1. TRADE IN LIVESTOCK AND LIVESTOCK PRODUCTS.

Cattle.

The total export of cattle was 50,089; an increase of 20,958 over the previous year. A similar output is expected next year, for, as time goes on, the demand for fresh meat by the Middle East Forces increases. It is a demand which will continue long after hostilities have ceased, and even when the Army demand has disappeared there will still be big civil markets to be supplied in Egypt and Palestine. Palestine, which before the war imported many cattle from Europe, should be very ready to receive Sudan cattle, for their only other external source of supply would be Iraq, a country which produces a lower grade animal than the Sudan.

The entire output of cattle and sheep continues to be handed over to the British Army at Shellal at fixed prices per live Kilo. The prices have been reduced three times during the year, twice in the case of sheep and once for cattle, and at the close of the year stood at 40 Milliemes (9.8d) for sheep and 23 Milliemes (5.6d) for cattle per Kilo, live weight. The hides, skins, and offal, are also at the disposal of the Army; a considerable item since a hide is worth 45 shillings.

The weight of cattle and sheep at Shellal have averaged 383.29 Kilos (845 lbs) for cattle and 46.63 Kilos (102¾ lbs) for sheep, which gives for the whole year an average value at Shellal of LE.9.266% for cattle and L.E.2.066% for sheep. At the close of the year, on account of the reduction of prices these values were LE.8.800% for cattle and LE.1.860% for sheep.

Of the total exports of cattle the Southern Sudan contributed 4,350 head, which is fairly satisfactory considering that an outbreak of foot-and-mouth disease in the Upper Nile Province necessitated the closing of that area from June to the end of the year.

The best cattle in the territory come from the Upper Nile Province where a good pocket of grazing-land produces an animal that turns the scale at over 400 Kilos (900lbs). There is a big variation in the weights of these ungraded cattle of the Sudan; exceptional beasts have been as much as 575 Kilos (1267½ lbs), but the usual thing is 800 to 900 lbs. according to the season of the year.

The cattle and sheep potential of the country is quite unknown; taxation figures are not a very reliable guide; perhaps the nearest guess is made by the exporters who think that they can keep up an output of 5,000 cattle and 12,000 sheep a month, throughout the year, for an almost indefinite period. These figures represent what the traders think can be done under the present system of voluntary sale at the present Shellal price. To commandeer would be extremely difficult.

The development of an export trade in cattle from the Southern Sudan is a slow process. There are many difficulties, physical and political; physical, on account of the absence of river transport, the super abundance of rain in some parts, and its dearth in others; political, on account of the undesirability of disturbing the economic equilibrium of primitive folk by introducing them too suddenly to the outside world market.

It has been found in practice that northern merhcants must be used if cattle are to be got in any numbers. The local merchant, although fulfilling a very important role as a collector and a liquidator of the various forms of barter currency, is quite incapable of handling an export trade; he has neither the capital nor the business knowledge to manage it.

Sheep.

The total export of sheep, 151,782, shows an increase of 89,308 over the previous year. It was a very hard summer on sheep. Rains in the previous three years were scanty and grazing conditions in 1942 had reached a low-level mark which must have been very near the limit of what the Sudan climate can do in such matters. Considering this, it is remarkable that the weight of export sheep never fell below 43,98 kilos, live weight; the highest weight, recorded in February, was 49.27 kilos. Good rains in August changed matters considerably and the grazing prospects for the summer of 1943 are brighter than they have been for several years.

A. Number and value of cattle and sheep exported during the last five years :-

Y E A R	Cattle	Sheep	Value at port of export in Egyptian pounds.
1938	7,256	1,840	35,396
1939	8,057	15,377	47,667
1940	11,045	39,595	113,133
1941	29,131	62,474	322,561
1942	50,089	151,782	667,033

B. Number of cattle imported during the past five years :-

1938 3,025

1939 2,473

1940 3,386

1941 ;..... 5,434

1942 2,644

Camels.

As anticipated in last years report, the export of camels to Egypt to supply the meat markets greatly increased. Accurate figures are not available, for the animals go to Egypt by road as they please, the trade being unhampered by formalities of any kind. A sign of the times is the high prices which camels now command in the Sudan - the eight pound police camel now fetches sixteen - and owners are so little in need of money that there is little keenness to sell at all. Probably 150,000 went to Egypt by road in 1942.

This question of pastorals becoming glutted with money for which they have little need is a difficult one, and applies to the cattle and sheep tribes as well as to the camel folk, though not so acutely, for the prices of cattle and sheep are subject to a rigid control at Shellal, whereas camels are sold in the open market in Egypt to the highest bidder. Such is the fame of the Egyptian camel-markets that it is difficult to get anybody to attend a camel fair in the Sudan, and when he does, he always imagine that whatever price is offered, the price in Egypt must be far better. Also, there are many itinerant Rashida camel dealers who scour the country and save the Arab the necessity of going to a fair.

It is becoming so difficult to get camels for local police and draught requirements that some restriction on the export may have to be considered in the near future.

Clarified Butter.

The manufacture of clarified butter by Government creameries was continued in Darfur. 152 Kantars (1 Kantar 100 lbs) were made against 240 Kantars in 1941. Difficult conditions were responsible for the decrease; in some districts milk was, for a time, the only diet of the people.

Hides and Skins.

Instruction in flaying and drying continues at the Malakal Laboratory and good quality hides continue to come from the Tonj and Aweil districts of Equatoria Province and from the Bor district of the Upper Nile Province.

The price of hides continued to rise and averaged for the year LE.100.9 per metric ton.

Exports and values for the past two years were as follows :-

	Kilos		Value		Price per tonne	
	1941	1942	1941	1942	1941	1942
			LE.	LE.	LE.	LE.
Hides	2,870,393	2,792,312	206,460	281,743	71.9	100.9
Sheep Skins	674,301	620,430	43,764	50,758	64.9	81.8
Goat "	97,786	87,021	7,579	9,711	77.5	111.6

The weight of dried hides prepared by this Service during 1942 was 8,939 Kilos, which realised, at auction, an average price of LE.106.7 per tonne.

Internal Trade.

The number of animals slaughtered for food as compared with the three previous years is shown below :-

Year	Camels	Cattle	Sheep	Goats
1939	1,956	20,521	190,791	8,430
1940	2,350	23,986	183,439	8,853
1941	2,767	38,899	200,661	21,792
1942	2,203	43,653	182,408	18,225

SECTION III.

IMPROVEMENT OF LIVESTOCK.

Cattle.

With the much depleted British staff little attention could be given to any long-term policy. The very hard summer - the worst of three bad years - underlined once more the importance of sticking as closely as possibleto indigenous types and of resisting the temptation to speed up improvement by the introduction of imported sires.

Stock improvement amongst pastorals is, as a rule, limited to the selection of the best indigenous types and the castration of the remainder. So long as the system of communal land-tenure exists, where no one can introduce an improvement in advance of the slow sense of the mass of his fellows, little progress can be made, either in stock improvement or agriculture, and in this chancy climate, where a normal season is the most rare of all, communal land-tenure is the only workable plan : to get away from this into the field of progress requires either a more reliable rainfall or a system of artificial irrigation.

In the Southern Sudan conditions for improvement of stock are even less favourable than in the North. For a long time to come Veterinary work here, so far as subordinate staff is concerned, must be limited to the immunization of cattle with sera and vaccines wherever it is desirable and possible. Progress in these parts means agricultural progress, to which Veterinary science must be wisely balanced. The general advance must be in line and not attempt should be made by any particular section to push ahead of the general social and economic position.

In the present state of things, these Nuers and Dinkas confront one as primitive peoples with a heavily predominant cattle background, who succeed in raising cattle under extremely difficult conditions by virtue of their ability to tolerate an existence no better than that of the beasts themselves, The individual attention and care these people give to their cattle is quite remarkable and far beyond anything seen in the Arab world. In their way, they are experts, and certain it is that no

European or Arab could raise cattle under such conditions, or even survive himself.

The principal cattle scourges : rinderpest, anthrax, black quarter, pleuro-pneumonia, and various other diseases can now be controlled by immunization; but there still remains the mechanical irritation produced by biting flies, which apart from any disease that may be transmitted, is a more serious menace than is generally appreciated.

Before any scientific animal husbandry can be practised settled agriculture must be established and with it a lifting of the living conditions of man and beast.

Horses.

It was difficult to get horses in Darfur. 200 were required by the Army and Police but it was only possible to buy 124, and this in spite of the fact that no purchases were made in the previous year. It looks as though the policy, indicated by my predecessor, of diluting the existing imported blood will have to be pursued further if the horse population of Darfur is to be maintained, and that subsidies to registered mares, a practice which tends to concentrate imported blood, will have to be discontinued. The Veterinary Inspector in his report of the Id el Ghanam show reports that the the "mares were in splendid condition but the high mortality in foals was very apparent

An interesting set of figures collected at the Abu Salaah, Sibdu, Id el Ghanam, and Nyala horse shows reveals that 54% of the 1942 crop of foals failed to survive long enough to appear with their dams.

Private interest tends to concentrate imported blood and to have as well-bred a foal as possible; but as the chance of survival diminishes in inverse ratio to the amount of imported blood, Government policy should be designed to prevent this tendency going so far as to effect adversely the population.

There is a definite limit to what Darfur can support

in the shape of a horse - it can never be as high as on the river - and any tendency to overstep this limit should be carefully avoided.

The difficult conditions which existed in Darfur this year served as a sharp reminder that in genetic matters the Sudan climate is still master of the situation and that no great liberties can be taken with it.

There are seven Government stallions, five of pure Arabian descent and two of mixed English and Arabian blood. There are also 42 tribal stallions, bred in the country, distributed amongst the horse-breeding tribes. It is on these latter that we must rely for the diffusion of that modicum of imported blood by which it is hoped to effect a mass improvement not out of keeping with the climate and food supply.

In horse breeding, interests sometimes conflict. The individual is concerned to breed the best possible horse, while the Government's object is to produce the greatest possible number of better horses. Only when pastrol conditions give place to settled agriculture can the two aims be made to run parallel, if not coalesce.

SECTION IV.

Education.

The three students at the Khartoum Veterinary School completed their second year of studies and passed the examination.

The course provided is adapted to the special needs of the territory and takes five years, two at the School of Science, and three at the Khartoum Veterinary School; prominence is given to tropical epizootology and animal industry.

SECTION V.

MISCELLANEOUS.

The good rains of 1942 ended a series of bad years and grazing should last well into the summer of 1943.

The out-put of 50,000 cattle, 150,000 sheep and 150,000 camels should also serve to make pastrol conditions easier.

Veterinary Hospitals.

Khartoum Veterinary Hospital and Forge.

In-Patients		376
Out-Patients attendances		8,860
Pairs of shoes fitted	(a) Hand made	1,560
	(b) Machine made	468
Hoof trimming, etc.		290

Wad Medani Veterinary Hospital.

In-Patients	315
Out-Patients attendances	21,300

The Sudan Defence Force.

The strength of the S.D.F. at the beginning of the year was :-

Horses	901
Mules	1,632
Camels	35

Epizootic Lympangitis has again been the most prominent disease amongst Army animals. Abyssinia is a heavily infected country and many of the mules captured there were infected and had to be destroyed. 42 of the 376 mules taken over from the Italian garrison of Chilga had to be shot out-of-hand and, as segregation was not possible, there is little doubt that the subsequent outbreak amongst S.D.F. mules resulted from the enforced contact. Pulmonary cases were a common feature when the outbreak was at its height.

The disease was eventually controlled by the removal for a time of the infected unit to another station and the application of the necessary sterilizing measures; 42 mules were destroyed.

The remount depot of Wad Medani also had the disease in the early part of the year; also introduced by captured mules from Eritrea and Abyssinia; 32 mules were destroyed and the disease eradicated.

Exposed equines of the Sudan Defence Force are vaccinated against African Horse Sickness. 14 deaths from the disease occurred, a loss of 0.5%, which is considered satisfactory.

Equine Encephalo-Myclitiøs was recorded for the first time in the Sudan (see the report of the Senior Veterinary Research Officer which follows); 35 either died or were destroyed.

During the year 180 horses and 1200 mules were transferred to the Middle East Forces and five Veterinary Officers were transferred from the Sudan Defence Force Veterinary Corps to combatant units.

ACKNOWLEDGEMENT.

My thanks are due, not only to the members of my own staff for their more than generous service under increased pressure and trying conditions, but also to those members of other services for the help they have unfailingly given when called upon: it has been much appreciated.

(Sgd.) W. F. Fisher.

DIRECTOR,
SUDAN VETERINARY SERVICE.

K.M.

APPENDIX 1.

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

	1940	1941	1942
	£	£	£
1. REVENUE	13,027	21,208	35,207
2. EXPENDITURE:-			
Chapter I.- Personnel and Personnel Allowance	24,482	22,452	23,615
Chapter II. Services	11,265	10,036	14,533
Chapter III. Extraordinary Expenditure	64	-	248
TOTAL	35,811	32,488	38,396

K.M.

DIRECTOR,
SUDAN VETERINARY SERVICE.

ANNUAL REPORT

OF THE SENIOR RESEARCH OFFICER

SUDAN VETERINARY SERVICE

FOR THE YEAR ENDING 31ST. DECEMBER, 1942.

A. STAFF

The only significant staff change has been the appointment of a second Research Officer (hors cadre) in anticipation of the vacancy shortly to be caused by the present Senior Research Officer's retirement. Mr. G.C. Brander arrived to occupy this post on 23.4.42 and has been posted to the Malakal Veterinary Laboratory. Mr. J.T.R. Evans, who has been in charge of the Malakal laboratory since 1930, has been transferred to Khartoum.

B. ROUTINE WORK

The main items of routine work have, as usual, been as follows:-

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

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

IV. Preparation and issue of contagious bovine pleuropneumonia vaccine (Khartoum).

V. Issue of diagnostic materials (for the mercuric chloride test) and of antrypol (naganol) for the control of camel trypanosomiasis (Khartoum)

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

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

The following are short notes on each of the above:-

I. CATTLE PLAGUE SERUM

Output.

The maximum possible output of the Malakal laboratory is reckoned to be 6,000 litres, but on one occasion only has this total been reached (in 1936). In the past season 5887.8 litres were prepared. In earlier years this would have been calculated as 117,750 "doses" of 50 c.c., but as from January 1st., 1942, it has been decided to reduce the standard dose for an adult ox from 50 c.c. to 30 c.c. The season's output is thus to be calculated as 196,260 "doses". It must, however, be realized that, when serum is used for cutting short outbreaks of cattle plague, very few beasts receive a full dose. The disease visits most herds in the country every few years, and the fully adult members of these herds, known to be survivors of earlier outbreaks, are not usually given serum. Thus the distribution of nearly 200,000 doses, used almost entirely on young stock, implies the protection of probably over 300,000 head.

The above reduction of dosage was foreshadowed in the observation, recorded in recent Annual Reports, that consistently high potency titres have coincided with the preservation of the serum with 1-50,000 acriflavine in addition to the usual 0.5 per cent. phenol. During 1941,

Veterinary Inspectors in the field (see this Report for 1941) had been advised to reduce their routine dosage by one third and observe results. These proved so consistently good that in 1942 the dosage was officially reduced by two-fifths, with equally good results. It is not proposed to push this field-scale titration to an end-point, partly because laboratory-scale tests have shown that the end-point has approximately been reached, and partly because the 66 per cent. increase in prophylactic range already gained makes the laboratory's output of serum quite adequate for all demands.

Sterility.

It was stated in last year's Report that cultural tests on stock bottles opened at random after various periods of storage showed that the serum was probably absolutely sterile; the few bacteria that grew were thought to have gained access accidentally in the course of removing the crown caps with which the bottles are sealed. This year a few samples, taken from stock bottles stored for periods up to one year, have been transferred to plugged flasks and stored for a few days before submitting to cultural test. Such samples have proved to be absolutely sterile, and there is little doubt that this complete freedom from micro-organisms contributes substantially to the maintenance of high prophylactic titre.

Cattle supply.

This has again been very satisfactory. The barter system described in last year's Report has provided about 80 per cent. of the small cattle required for virus production, and the large cattle required for serum production have been obtained more easily than formerly because export merchants have been buying in the southern Provinces and have sold a fair number to the laboratory. Had it not been for the purchase of a batch of 200 odd merchants' cattle in exceptional circumstances in Equatoria, it would have been possible to state, for the first time in the history of the Malakal laboratory, that all cattle obtained in 1942 had been obtained in the Upper Nile Province. Owing to the slight general rise in prices produced by war conditions, the cattle have cost rather more than usual, but in consideration of the importance of the export cattle trade, not only to the Sudan but to the Middle East generally, the increase has been infinitesimal.

One small set-back occurred in the form of an outbreak of foot-and-mouth disease, which was apparently brought to Malakal with cattle from the Pibor District, which had in their turn become infected by Abyssinian cattle. The outbreak fortunately occurred in the rainy (non-working) season, and, following the usual practice adopted in Arab areas, all laboratory cattle "farmed-out" in the neighbourhood were deliberately infected so as to get the outbreak over while grass was still green and plentiful. About ten per cent. of them died (43 out of 448, but possibly not all of uncomplicated foot-and-mouth disease) and several others remained in poor condition for some months. The importance of this observation is not so much that production was adversely affected, since the effect, though regrettable, was very slight, but that southern cattle (sanga type) are apparently more severely affected by foot-and-mouth disease than Arab cattle (short-horned zebu type). Foot-and-mouth disease frequently occurs in Arab areas, but the general experience is that not only do cattle not die of it, but they hardly show any ill effects provided

the grass in their grazing grounds is green and soft. Furthermore no young Arab beast out of many experimentally infected in the Khartoum laboratory has ever died, or even been seriously ill.

A few cattle during the working season were found to be suffering from trypanosomiasis, mainly T.congolense and a few T.vivax or T.uniforme, but the number was not large enough to have a serious effect on serum output; and in any case most of them were made to yield some serum by prolonging their lives with injections of tartar emetic.

Miscellaneous.

The health of the Malakal staff remained good, and the local labourers worked well. Grazing conditions, too, were on the whole good. These minor factors all played their part in securing an output of serum that has hitherto been only twice exceeded.

In addition to supplying the Sudan's needs of serum, a small quantity was sold to the Palestine Governments.

II. CATTLE PLAGUE VACCINE

The bulk of the raw material used in making this product came, as usual, from the Malakal laboratory, where advantage was taken of the vaccine-for-cattle barter system to be very lavish with virus producers, and so secure an unusually large quantity of lymphoid tissue. Material originating in the Khartoum laboratory was limited to what was provided by "control" animals to certain experiments and what was recovered from "passage" cattle used to maintain the virus during the Malakal off-season.

A record total of 223,775 doses (10 c.c.) was issued for use in the field as compared with a normal peace-time issue of 100,000 - 120,000. The increased demand was, as in 1941, due to the great expansion in the cattle export trade. Not only were all export cattle vaccinated, but unusually large quantities of vaccine were issued for the control of cattle plague in the grazing areas from which such cattle are, and will continue to be, drawn. In addition, small consignments of vaccine were sold to the Governments of Aden and Palestine.

So far as is known, no beast vaccinated during the year subsequently developed cattle plague; certainly no case was seen among the 50,000 odd cattle exported or among the thousands moved about the country for internal slaughter.

III. CATTLE PLAGUE VIRUS

Very little of this is ever issued, since Sudan conditions generally are unfavourable for practising serum-virus immunization. 2,885 doses only (glycerinized lymphoid tissue kept in cold storage) were issued, as compared with 3,070 last year. Apart from a few hundred doses used for immunizing the stock of a large dairy in Khartoum all this was issued to the Blue Nile Province for the immuization of working oxen.

IV. CONTAGIOUS BOVINE PLEURO-PNEUMONIA VACCINE

Issues of this product fell from 71,050 doses to 42,525

the reason being the suspension of routine vaccination of all cattle destined for export. In normal times, when an interval of several weeks or months elapsed between registration and export, it was reasonable to insist on general vaccination. Now, however, that the interval is often shorter than the period required for immunity to develop, universal vaccination would be wasteful. No definite programme is now in force, but exporting merchants can have cattle vaccinated on request. Generally speaking the plan that is officially encouraged is for them to vaccinate only such cattle as they are likely to keep on hand for some months and to leave those destined for early export unvaccinated.

V. CAMEL TRYPANOSOMIASIS (T.evansi) CONTROL

The demand for antrypol (naganol) continued to increase, 22,671 doses having been issued as against the largest earlier total of 17,953 last year. Supplies again did not quite keep pace with demands, and, although a small reserve of the drug was in hand at the end of the year, issues had occasionally to be suspended for short periods pending the arrival of fresh deliveries. With the growing economic importance of camels under war conditions, the maintenance of regular supplies of antrypol is a matter of some urgency, and it is unfortunate that any demand for treatment should have to be refused. As in earlier years, nearly all antrypol used was employed for the treatment, on payment, of privately-owned camels. Altogether 23,124 doses were so used, treatments in excess of issues being made possible in virtue of small stocks existing in outstations at the beginning of the year. Only 310 Government-owned camels were treated free.

An interesting feature of the widespread demand for treatment of camels on payment is that, as demands for treatment grow, demands for diagnostic materials (for the mercuric chloride test) diminish. The suspicion of native camel owners that their camels are suffering from trypanosomiasis is so nearly always well-founded that they usually prefer, having once made up their minds that treatment is required, to pay their money and secure the treatment rather than wait to have their diagnosis confirmed.

The phenomenon, mentioned in some earlier reports, that if a camel is not cured by a single dose of antrypol of about 1 gm./100 Kg. it will probably be difficult to cure at all, has again been observed. Actually only two such cases came to notice during the year, of which one died and the other recovered following repeated injection of much larger doses. The significant fact about such cases is not that they occur, but that so few occur. It is not pretended that the two brought to one's notice were the only two, but the total must have been extremely small.

VI. HORSE SICKNESS VACCINE

This continued to be purchased from Kenya, being stored in laboratory refrigerators and distributed as required.

Owing to the small number of horses and mules engaged in military operations, the total issued fell from 3,977 last year to 2,314. Of these, only 1,726 were used on military animals; 381 were used on privately-owned horses (on payment), and 207 on Government animals. So far as can be ascertained 14 vaccinated animals died, say 0.6 per cent.

VII. SPECIMENS EXAMINED

The examination of Pathological specimens is one of the minor activities of the laboratories, since most diagnosis is effected by Veterinary Inspectors. The laboratories confirm all cases of anthrax and of cryptococcus infection, but apart from these they are rarely consulted except in cases of doubtful diagnoses or specially interesting specimens. However, 1,478 specimens were examined this year (excluding those examined in the course of routine laboratory work) as against 508 last year, and, although most of these were of no practical interest, a larger number than usual are worthy of short comment. These are:

1. Sheep pox.

This disease has never before come to official notice in the Sudan, although occasional cases have, in the past few years, been reported in Sudan sheep slaughtered in Egyptian abattoirs. Early this year, however, some undoubted cases were detected among export sheep in Khartoum quarantine, diagnosis being confirmed both by transmission experiments (including the use of washed elementary bodies) and by histological examination of natural and experimental lesions. Occasional further cases continued to be seen throughout roughly the first half of the year. The implications will be more fully discussed in the section dealing with research.

2. Anthrax.

Anthrax rarely comes to notice in ordinary times, but this year over 50 cattle and sheep died of it in Khartoum and Wadi Halfa quarantines, and several more cases were detected in Kordofan. Most of the cases in the quarantines occurred in Khartoum in the early part of the year in circumstances indicating that they had been entrained at El Obeid during the incubation stage of infection. Investigations in Kordofan showed that these animals had largely been driven into El Obeid from a grazing centre at Kazgeil, where a number of deaths had occurred. Subsequent deaths occurring at Kazgeil proved to be due to anthrax, and there was no doubt that the soil in this area, hitherto unsuspected, was badly infected and was acting as a focus for dissemination. On taking due steps to eliminate this source of infection the number of cases occurring in the quarantines became negligible. It is possible that the wide area exploited to provide fodder for animals in the quarantines leads to the occasional introduction of infection. A sheep died in the Khartoum Veterinary Research Laboratory that must certainly have been so infected, since the sheep had been in stock for several weeks, no case of anthrax has ever been seen on the premises, and no work entailing the use of anthrax cultures has ever been done there. One cow also died of anthrax in similar circumstances in a dairy farm on the outskirts of Khartoum. Fodder infection probably accounts for the odd cases that occur at Wadi Halfa, since the animals have been in quarantine too long for them to have been in the incubation stage when first admitted at El Obeid or Khartoum. It was at first thought that routine vaccination of all export cattle and sheep might have to be practised before admission to quarantine, but, with the elimination of Kazgeil, anthrax has ceased to be of serious importance.

3. Blackleg.

Until this year, only one case of blackleg has with certainty been diagnosed in the Sudan (see this Report, 1939). This year unusually dense concentrations of cattle at the approaches to El Obeid revealed a centre of blackleg infection

in the neighbourhood of Rashad analogous to the anthrax centre at Kazgeil. It is thought that about 1,000 cattle died before the focus was detected, but since then no cases have been reported. No cases have ever occurred in the quarantines.

4. Tuberculosis.

A case of bovine tuberculosis is always worthy of mention, if only to stress the rarity of this disease in the Sudan. One case of generalized infection was found in a southern (sanga) type beast in El Obeid abattoir. No cases were seen in any other abattoirs and none were reported from Sudan cattle slaughtered in Egypt.

5. Demodectic mange in cattle.

This was never diagnosed in the Sudan until last year (see this Report for 1941). Two more cases have now been detected, both in the South. It is, however, very improbable that more than odd single cases will ever be seen, as the disease has a world-wide distribution and is nowhere very serious.

6. Equine encephalo-myelitis.

No suspicion has hitherto been aroused that equine encephalo-myelitis might exist in the Sudan. A few odd cases of obscure paralysis have, indeed, from time to time been reported, but multiple cases have never occurred in any of the numerous mounted military and police units that have always been widely distributed throughout the country; nor has any animal ever been seen showing the early acute symptoms characteristic of the recognised equine encephalo-myelitises. This year, however, a number of cases, amounting almost to a mild epizootic, occurred at Wad Medani Remount Depot, in which the clinical symptoms left no doubt that a specific encephalo-myelitis, closely resembling the types prevalent in the United States and elsewhere, was at issue. Since the onset and disappearance of acute encephalo-myelitis symptoms are always sudden, no early cases could be observed in the laboratory, but case notes sent by the officer commanding the Remount Depot, recording fever and acute pain, corresponded exactly with the subsequent symptoms of incoordinated movement seen in survivors sent to the laboratory. A subsequent review of all cases occurring in the depot that may have been due to this disease showed that 35 had occurred during the year out of an average strength of about 800, of which 25 died or had to be destroyed, five became fit for further work, and five, with persistent exercise and training, were showing improvement at the end of the year. No attempts were made to isolate and identify the virus, partly because the situation never became serious, but mainly because no facilities exist. It may, however, be concluded from circumstantial evidence that equine encephalo-myelitis exists in the Sudan.

7. Cryptococcus infections.

This year again ample evidence has arisen to confirm the view, often indicated in these Reports, that the term "epizootic lymphangitis" may be dangerously misleading, since it concentrates attention on one only of the innumerable types of lesion that cryptococci regularly produce. Apart from abscesses without accompanying lymphangitis, the following are interesting cases that came to notice during the year:

(a) Cryptococcus conjunctivitis. Nine cases were detected, of which eight had one eye only affected and one case both eyes.

(b) Respiratory infections. Altogether eight cases came to notice, but in all probability more occurred. Six of these were patchy lobular pneumonia, without infection elsewhere in the body or even in the respiratory tract, first diagnosed by finding cryptococci in nasal discharge. The seventh seems to have been a primary infection of the pharynx with extension first to the suprapharyngeal lymphatic glands, which were enormously enlarged, and later to the lungs which showed numerous small foci of infection. This case was also detected by examining smears of nasal discharge. The eighth case was the most interesting of all, being a primary infection of one maxillary sinus, in which an abscess became encapsuled and finally perforated the facial surface of the maxillary bone to produce a sinus opening just under the eye. This case was diagnosed by examining the pus discharging from the sinus.

8. Horse-sickness in zebras.

Two Grant's zebras died in the Khartoum Zoological Gardens of what, on clinical and post-mortem grounds, was certainly horse-sickness. The diagnosis was not confirmed by transmission experiments because of the unsuitability of local horses for such work (see this Report for 1941, p.27). Apart from the fact that this is the first time that zebras appear to have been infected in the Sudan (they were local zebras, captured in Bor District) the observation is of no great importance, since such little literature as exists on the subject shows that zebras are considered to be susceptible. There is, however, the practical corollary that it would be a wise procedure always to vaccinate zebras in zoological gardens if horse-sickness occurs in the neighbourhood.

9. Entero-hepatitis (blackhead) in turkeys.

Turkeys are now being bred in the Sudan, especially in urban areas, on a scale that makes them of some small economic significance, since they require special feeding and attention instead of merely being allowed to run wild as are most domestic poultry. Entro-hepatitis among turkeys has hitherto been unknown in the country, but this year two outbreaks occurred in Khartoum, and, judging from requests for advice received from a few other centres, it seems that several other outbreaks also occurred. The origin of the infection was obscure, but there is little doubt that it was disseminated by the sale and exchange of breeding stock. Fortunately the disease can be fairly well controlled by the administration of sodium arsanilate and allied compounds, which are distributed free.

10. Fowl pox.

This is another disease that has not hitherto been recorded in the Sudan, but in 1942 three outbreaks, one in turkeys, were detected in Khartoum among imported European poultry stock. As in the case of blackhead, the origin of the infection was obscure, but there is no evidence that the disease is likely to become serious. Certainly no immunization campaigns are yet envisaged.

11. Fowl mange (scaly leg).

This disease has probably been in existence in the country for an indefinite period, but the causal acari (Cnemidocoptes mutans) have never been seen in the laboratory until this year.

12. Canine actinomycosis.

It is not usual to pay much attention to the types of organisms causing suppurative conditions in dogs, since such conditions do not seem to differ from those occurring in other animals and are presumably due in most cases to pyogenic cocci. This year, however, three interesting cases were brought to the laboratory's notice in quick succession, all characterized by very large fluid swelling on the side of the neck, which were in the first instance remarkable for having attained the size they had without bursting; all, moreover, appear from available history to have taken several weeks to develop. All three contained, in a state of purity, an actinomyces morphologically indistinguishable from A.farcinicus which is so commonly encountered in this country in cattle. The only difference detectable by microscopic examination was that it was not in the least degree acid-fast, whereas A.farcinicus is fairly strongly so. The organism was easily isolated in the simplest of culture media (plain agar and plain broth) within 24 - 48 hours, but was remarkable in that surface cultures assumed a bacillary form from the outset while liquid culture remained filamentous for several days before becoming bacillary. It has since been shown that bacillary and filamentous forms, Gram-fast but acid-negative, can be produced at will by sowing alternately in solid and liquid culture media respectively. On solid media a yellow pigment is formed, and the bacillary forms are so short that without careful microscopic examination the organism might be mistaken for Staphylococcus aureus. It may be added that post-mortem examinations were made on two of the affected dogs, one of which died while the other was so emaciated and weak that destruction was advised. In neither was any other focus of infection found, and cultural tests of serous fluids and solid tissues all gave negative results.

The isolation of this organism is of more interest than importance, since one knows that there are many normally saprophytic actinomyces that occasionally become pathogenic. The interest is in the identical clinical syndrome in all three cases.

13. Equine actinomycosis.

An actinomyces, in a state of purity, was also seen in a pus smear received in the laboratory from an abscess on a horse's neck in Southern Kordofan. Cultural study was not possible, but morphologically the organism was similar to those seen in the above-mentioned dogs, except that there was a distinct tendency towards segmentation into bacillary elements in the pus. It was Gram-positive and acid-negative. Such organisms have occasionally been seen before, but they come to notice so rarely that when they do appear they are worthy of mention.

14. Cysticercus bovis.

Since Taenia saginata is not infrequently found in human beings in this country, it is remarkable that C.bovis is so rarely seen in the course of meat inspection. Early this year, however, it was stated that it was occasionally seen in Sudan cattle slaughtered in Egypt, and a sample of

flesh containing cysticerci was sent to the laboratory in support of the allegation. In order to determine to what extent future complaints on this score might be justified, a special look-out was arranged in Khartoum and Omdurman abattoirs. By the end of the year about 5,000 beef carcases had been specially inspected without a single cysticercus being seen. In addition several hundred bullock hearts, used for making culture media in the laboratory, and obtained from military slaughterhouses not subject to Civil meat inspection, were carefully examined with equally negative results. It is therefore clear that if Cysticercus bovis occurs in the Sudan, as it undoubtedly does, it is for all practical purposes negligible.

Other less interesting diagnoses included:-

CATTLE : Tryp.congolense, Tryp.vivax, Tryp.uniforme, Theileria annulata, Actinomyces farcinicus, and various septic and helminthic infections.

HORSES : Cryptococcus infections, ulcerative cellulitis (C.ovis), Tryp.brucei, Tryp.congolense, B.caballi, N.equi, microfilariasis, mange (sarcoptic 1 case, psoroptic 2 cases), ringworm, and various septic and helminthic infections.

MULES : Cryptococcus and C.ovis infections, ringworm, and various common septic conditions.

CAMELS : Tryp.evansi

FOWLS : Spirochaetosis.

C. RESEARCH

No research was voluntarily undertaken, and the few inescapable items were dealt with as briefly as possible owing to preoccupation with ever-increasing routine work and lack of laboratory space. Experiments were carried out on sheep pox, cattle plague vaccine, and dried meat production. The following are brief summaries:

I. SHEEP POX

No mention of this disease has been made in the Annual Reports of the Sudan Veterinary Service since the first one was written in 1902. Recent investigations, however, indicate that it has probably existed in the country for many years, since all sheep owners, merchants, etc., claim to know it, and refer to it by the generic Arabic name for all poxes (jedri). One must conclude that it has never been brought to the notice of veterinary officers in the field because in normal times it gives no significant trouble.

Reports had been received from Egypt as early as December, 1939, that cases of sheep pox were being detected among slaughter sheep exported from the Sudan. Some cases were, in fact, shown to the Director, Sudan Veterinary Service, (Capt. H.B.Williams, O.B.E.) when he went to Egypt at that time in connexion with the livestock export trade, but the clinical and epizootiological features of the affection he saw decided him to suspend judgment pending the establishment of a positive diagnosis by some means more certain than mere visual inspection of mild cases. From that time onwards, however, a special look-out was kept in the quarantines at Khartoum and Wadi Halfa, but, although about 50 doubtful cases (probably mainly tick sores) were pulled out

at Halfa during the next eighteen months, it was not until March, 1942, that a few definitely suspicious cases were seen in Khartoum. These were sent to the laboratory for further examination. It is to be noted that the detection of these cases, about which there was little doubt on clinical grounds, coincided with a very steep rise in the numbers being exported to Egypt, so that apart from the interest of effecting a definite diagnosis there was also the question whether, in view of the huge concentrations of sheep herded around entraining points, serious epizootics might not be in the making. From this would arise the further question of possible control by vaccination.

In confirming the diagnosis of sheep pox, the cooperation was invoked of the Asst. Director (Research) Sudan Medical Service (Dr. E.S.Horgan), who has for some years been conducting researches on the human poxes, in the course of which he has evolved certain refinements of technique. Diagnosis was confirmed by isolating and transmitting elementary bodies and by histological examination of the lesions.

Observations on experimentally infected sheep showed that the local hairy breeds register a very high morbidity rate among lambs, but a markedly lower one among adults. It is thought that this phenomenon, taken in conjunction with the results of field inquiries, is referable not to an age factor but to the existence of numerous naturally recovered cases among random-selected older sheep. Although no experimental sheep died (over 50 observed), many were severely affected, both at the site of local inoculation and as regards general systemic disturbance. No generalization of lesions occurred in experimentally infected sheep, but several confluent cases were found on searching merchants' flocks. None of these died while under observation in the laboratory. It is, however, interesting to record that most of the experimental sheep were borrowed from exporting merchants, who willingly lent them since it was to their immediate advantage to have the potential menace assessed. Such sheep were returned after all lesions had completely healed and the sheep appeared, outwardly, to have recovered from the disease in every way. They were rarely returned after a shorter interval than two months from the time of experimental infection, but the merchants reported that they were unable to stand the strain of the journey to Egypt. Of the first dozen or so returned, all are said to have died, and the merchants, after this experience, decided in future to sell all laboratory-discontinued sheep for local slaughter. The same policy was adopted in the case of the few naturally infected sheep that were detected---provided, of course, the local lesions were not sufficiently extensive to warrant their rejection on ante-mortem meat inspection at the local abattoir.

It seems, therefore, that sheep pox must be fairly widespread in pastoral areas, but that, although it may affect some sheep quite severely, it causes no significant losses if the sheep remain undisturbed, and it remains enzootic. As has since been observed, even under conditions of great sheep concentrations, as around export entraining points and in quarantines, it shows no tendency to become epizootic.

Before it was concluded that sheep pox constituted no serious menace, certain immunization experiments were carried out. Although a good deal of contradiction exists in the literature on the subject, the opinion of most reliable workers is fairly unanimous that of all pox products studied none but those of sheep pox will immunize against sheep pox. It was, however, decided, since no work appeared to have been done on the subject, to ascertain whether goat pox was of as

little use as all other heterologous pox products. Goat pox virus was obtained from Palestine, and confirmed (if this is indeed confirmation) to be goat pox by observing its transmissibility to rabbits. As was more or less expected, however, the virus, although universally transmissible to local sheep, proved quite useless. It is therefore clear that if vaccination ever has to be undertaken in the Sudan, there will probably be no practical alternative to "clavelization". Fortunately, however, it does not seem that any form of immunization will be indicated.

At the outset it was intended to do no more than has just been recorded, but the availability of both sheep pox and goat pox virus afforded Dr. Horgan an opportunity for applying some technique of his own devising to cross-immunity experiments between these and vaccinia. Numerous experiments, not strictly relevant to this Report, were carried out, and it is hoped that the results will be published in due course.

II. CATTLE PLAGUE VACCINE

With the greatly increased demand for cattle plague vaccine, that is unlikely to diminish in the near future, a fear arose that supplies of glycerine might fall below requirements. It was therefore decided to test the formalinized type of vaccine that is used in certain other countries. In a publication of mine some years ago (Jl. Comp. Path. & Therap., 1936, XLIX, 1-48) attention was drawn to the fact that the properties of the formalinized vaccine had not been precisely determined, as those of the glycerinized vaccine used in the Sudan had been.. Since this blank had not subsequently been filled in, it was decided to carry out parallel observations on both glycerinized and formalinized types, following the same main lines as had been adopted when originally studying the former.

Briefly, the problem was as follows:-

(i) A single minimal dose of freshly prepared glycerinized vaccine produces a solid immunity in all cattle within a week.

(ii) The same vaccine stored at 37°C retains its full antigenic properties for at least a month, but begins to deteriorate after about two months; when stored at 0°C, it retains its antigenic value for a year or two.

(iii) The immunity produced by this vaccine lasts on an average about a year.

(iv) How does the formalinized vaccine compare?

By the end of the year it was shown that as regards items (i) and (ii) the answer is that if there is any difference in the value of the two vaccines it is very slight. Such very slight difference as was observed was in favour of the glycerinized product, but this would quite likely not be noticeable in field practice. The question of duration of immunity remains to be settled, as the only interval yet tested has been four months---when no difference could be detected.

Final ~~adjust~~judgment must be suspended until the whole series of experiments is completed, but it may already be stated that unless the formalinized product proves to confer

a much more durable immunity than the glycerinized it will certainly not be used, as it is so much more difficult to prepare. Even the small amount of formalin added hardens the tissues so markedly that they can only with great difficulty be ground finely enough to pass through hypodermic needles of relatively large calibre.

It is, incidentally, amusing to record that, contrary to expectation, no difficulty has hitherto been experienced in obtaining as much glycerine as one has wanted, whereas applications for relatively small quantities of formalin have been rejected.

III. DRIED MEAT

In continuation of experiments recorded in last year's Report, it has now been shown that the minimum amount of salt that will absolutely prevent the multiplication of the beetle Dermestes vulpinus in dried meat is about four per cent. As reported last year, this must be evenly worked into strips of fresh lean meat and the meat allowed to steep for several hours (say overnight) before being hung up to dry. Even two per cent. of salt would probably be sufficient in general practice, as only a few larvae will develop in meat so treated and later sown with adult beetles, and these survive for only a few days. However, four per cent. of salt, representing about 16 or 17 per cent. in the dried product, is not unpalatably excessive.

MISCELLANEOUS

1. Hide curing demonstrations.

Sun-drying, suspended on frames, continued to be demonstrated, mainly at Halakal where hides are continuously being dried. During the year just under nine metric tons were prepared and sold, realizing a little over LE.950. A lot sold in April, when the local price of miscellaneous air-dried hides stood firm at about LE.120 per metric ton, realized just over LE.150, but a second lot sold in June, in the rapidly falling market produced by the enemy's last threat to Egypt, realized only LE.95, which was about the average for the month.

2. Publications.

For the third successive year no papers have been published in scientific journals.

SUMMARY

One can merely record a continuation of the tendency of several years past, namely, a progressive increase in routine work at the expense of research. The cramping of research is aggravated by inadequate and unsuitable accommodation in buildings that were never designed for use as a laboratory, but were allotted many years ago to the newly formed Research Section because they were not required for any other purpose.

Sgd. S.C.J.Bennett.
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Khartoum, 20.1.1943.
TBT.