ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

1941.

ANNUAL REPORT
OF
THE SUDAN VETERINARY SERVICE
FOR THE YEAR 1941

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STAFF.

DISTRIBUTION OF BRITISH STAFF AS ON 31ST. DECEMBER, 1941.

	NAME	designation	Station
	Lieut.Colonel C.P.Fisher M.R.C.V.S.	Director	Khartoum
	Dr. S.C.J. Bennett, B.Sc. M.R.C.V.S.	Asst. Director and Senior Research Officer	Khartoum
	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. J.T.R.L.Evans, B.Sc., [illegible] M.R.C.V.S.	[illegible] Veterinary Research Officer	Malakal
	Mr. W.H.Glanville, M.R.C.V.S.	Senior Veterinary Inspector, Headquarters, and Registrar Vet. School	Khartoum
	Mr. J.E. Furney, M.R.C.V.S.	Veterinary Inspector	Wad Medani
x	Mr. I.A.Gillespie,M.R.C.V.S.	" "	
	Mr. A.W.Chalmers, M.R.C.V.S.	" "	Khartoum
x	Mr. P.Durran, M.R.C.V.S.	" "	
x	Mr. J.D.M.Jack,M.R.C.V.S.	" "	
x	Mr. J.K.Thomson, M.R.C.V.S.	" "	
	Mr. P.Z.Mackenzie,M.R.C.V.S.	" "	El Fasher
	Mr. H.A. McLoghry	Superintendent	Khartoum
	Mr. P.A.C. Kenny	Laboratory Assistant	Khartoum
	Mr. C.B.Barrett	Chief Storekeeper	Khartoum

x Released for military service.

ESTABLISHMENT OF NON-BRITISH CLASSIFIED STAFF, 1941.

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.
12	Head Stockmen.
1	Southern Supervisor.
5	Southern Stockmen.

UNCLASSIFIED STAFF AS AT 31.12.1941:-

64	Stockmen.
1	Carpenter.
2	Storemen.
3	Motor Drivers.
9	Messengers.
71	Veterinary Attendants.
4	Shoeing Smiths.
2	Pump Drivers.
1	Chaffir.

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.

1941 was the war year for the Sudan and military considerations and requirements out-weighed all else. The East African campaign was fought and won, and, although the back of enemy resistance was broken at Keren in the end of March, nothing approaching normal conditions was even in sight at the end of the year.

Five Veterinary Inspectors remain commissioned in the S.D.F. and no new appointments were made.

Early in the year it was decided to organize part of the Service on a military basis so as to utilize local knowledge and experience in a military capacity.

The military veterinary and remount organization is the responsibility of the D.D.V. & R.S., Middle East, who, after a visit to the Sudan, and consultations with the military authorities and the Director, Sudan Civil Veterinary Service, recommended that the veterinary service for the forces in the Sudan should be directed by the existing civil veterinary authority, suitably commissioned for the purpose.

To effect this the Director and Assistant Director were commissioned, both in the British Army and in the S.D.F., and appointed A.D.V. & R.S. and D.A.D.V. & R.S., Troops in the Sudan.

In January, R.A.V.C. reinforcements, which included three Officers, a Veterinary Evacuation Station, and an Advance Base Veterinary Depot, arrived from Egypt. After the fall of Keren and the withdrawal of certain animal units these reinforcements were returned to Middle East.

Towards the end of the year the administration lost a very valued servant in Mr. H.A.McLoghry. He had held the responsible position of Superintendant for twelve years and, in all, had spent twenty-two years in the service. His work was always of the highest order and he made a valuable contribution to our knowledge of poultry husbandry in a publication which has become an authoritative work of reference for all matters pertaining to the keeping of poultry in the Sudan.

He retired on pension, having reached the required age, and was succeeded by Mr. J.McKay.

The three graduates of the Khartoum Veterinary School were absorbed into the service as Veterinary Officers. They are the first fruits of this institution which gives a three years' special course following a two years' science course, all of which is post-secondary education

Mr. C.B.Barrett retired on pension in November. He had held the post of storekeeper since 1927. The post of Storekeeper has been abolished and a new post of Assistant Superintendant has been created which includes storekeeping. Mr.G.M. Anderson has been selected to fill the new post.

Mr. P.A.C.Kenny, Laboratory Assistant, went on final leave, pending retirement on pension after 18 years service. The Senior Research Officer expresses appreciation of his work in his report.

SECTION I.

DISEASES OF ANIMALS.

1. DISEASES OF CATTLE.

Cattle Plague.

The disease although widespread was less in incidence than is usual.

The war situation has affected even cattle plague. Cattle which formerly were of no economic value and remained beyond the orbit of veterinary activities have now suddenly acquired a new importance. Small traders seek them out for purchase, for trade is good, and sooner or later they come under a trade control which means vaccination and immunity. In this way the increased volume of trade may be considered to have had a salutary sterilizing effect.

Although movements of trade cattle on-the-hoof have been greatly increased in all directions the number of outbreaks of cattle plague has been less, and in the quarantine parks, where about 3,000 head of vaccinated cattle are dealt with each month, not one single case of this disease appeared.

Cattle Plague can be subjected to a 100% control wherever the beast becomes of sufficient value to make it worth while.

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

PROVINCE	Out-breaks	Number infected.	Deaths	Serumized	Vaccinated.
Kordofan.	225	45,025	697	26,737	11,000
Darfur.	74	39,912	992	19,550	3,634
Gezira.	634	149,515	3,068	53,395	2,286
Northern	9	6,753	95	-	6,590
Upp.Nile	5	1,508	16	313	856
Khartoum	3	277	17	242	55
Kassala.	82	21,669	363	7,108	1,034
Total...	1,032	264,659	5,248	107,345	25,455

In addition to that used at the actual seat of outbreaks, approximately fifty thousand 20 c.c. doses of vaccine were used for the protection of trade cattle travelling along the trade routes on their way to Egypt.

The total output of vaccine from the laboratories at Khartoum and Malakal amounted to 201,036 doses of 10 c.c.: a notable achievement and far in excess of any previous effort.

There are still difficulties in procuring sufficient large serum producing cattle from the natives of the Upper Nile Province, where the serum is manufactured, and about 20% of the requirements have still to be imported from Equatoria. Perhaps the penetration of Arab cattle traders into this pagan province, which is now permitted for the first time, will in time awaken the native to a consciousness of the need of other things besides cattle; from his point of view one does not know whether to hope so or not; from our point of view we want his cattle.

Contagious Bovine Pleuro-Pneumonia.

The incidence was everywhere low and chiefly confined to merchants' cattle bought in the west and destined either for local slaughter or export to Egypt. French Equatorial Africa seems to be the source of our infection, for the disease appears in many of the cattle imported from that territory, and outbreaks in the Sudan are very largely confined to the districts traversed by these French cattle.

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

PROVINCE	No. of Outbreaks	No. Infected	Deaths	Vaccinated.
Kordofan	54	7,216	120	6,172
Darfur.	21	12,603	98	7,746
Gezira.	6	557	10	553
Northern.	-	-	-	-
Upper Nile.	8	1,698	18	1,591
Khartoum.	-	-	-	-
Kassala.	7	2,121	55	2,055
Total...	96	24,195	299	18,117

Including the trade cattle 71,050 doses of vaccine were used during the year as against 39,685 in the previous year.

Foot & Mouth Disease.

Not reported. When next it makes its appearance it is not likely to receive the same amount of consideration as formerly. It is unlikely that this mild and slow spreading African disease will be allowed to interfere with the supply of such an important item of war requirements as meat

In peace time an outbreak of foot-and-mouth amongst Sudanese cattle destined for export to Egypt meant a complete cessation of the trade for months. The Egyptian Authorities are being asked to relax their restrictions in view of the urgency of the case and the particular characters of the disease in Africa, and to be satisfied with such safeguards as are already in operation in the case of such diseases as Contagious Bovine Pleuro-Pneumonia.

Anthrax.

One small outbreak involving four cattle occurred at Khartoum North.

DISEASES OF CAMELS.

Trypanosomiasis.

Approximately 18,000 doses of antrypol were used during the year, mostly on payment for native-owned camels at 25 P.T. (5/.) a dose.

Infection is practically certain if camels leave their northern grazing grounds and are made to work in districts where the rainfall goes beyond about 12 inches.

Strongylosis.

Common in the Gezira Province but not important as long as the animal remains in good condition. The nicotine sulphate treatment is effective.

DISEASE OF EQUINES.

Horse Sickness.

Vaccination continues to be a routine practice for army and police horses and mules. The results are very satisfactory and enable operations to be carried out by units mounted on these animals in districts where, previous to the use of vaccine, the mortality might have been so high as to immobilise the greater part of the force.

3,674 army animals were vaccinated. Seventy deaths from horse-sickness were reported amongst these animals, but it is at least doubtful if in many cases it really was African Horse-Sickness. To the experienced eye the clinical symptoms and post mortem appearances were far from typical of the disease as it is usually seen in this part of Africa. However, the deaths occurred from some seemingly virus infection and even if they are all accepted as due to African Horse-Sickness the statement that the vaccine continues to give satisfaction still holds good.

The matter is discussed by the Senior Research Officer in his report which follows.

Epizootic Lymphangitis.

Fairly widespread, especially in the Eastern Sudan. During the year 43 affected army horses and mules were destroyed.

It is not regarded as a serious disease, except for the individual concerned for, as a policy, all affected animals are destroyed; from a military point of view it is of minor importance.

DISEASES OF CANINES.

Rabies.

Of the 123 specimens submitted to the Stack Medical Research Laboratories for diagnosis 36 were returned as positive: distribution was as follows :-

PROVINCE	Dogs	Camels	Donkeys	Cats.
Kordofan.	13	1	-	-
Gezira.	10	1	1	-
Equatoria	5	-	-	-
Upper Nile.	2	-	-	1
Kassala.	1	-	-	-
Khartoum.	1	-	-	-
Total....	32	2	1	1

SECTION II.

1. TRADE IN LIVE STOCK AND LIVE STOCK PRODUCTS.

Cattle.

The total exports of cattle were 29,131, an increase of 18,086 over the previous year. This increase was expected in view of the extra demands in the Middle East Area. A further increase is expected in the coming year

The increased demand in Egypt acted as a strong stimulant to the Sudan traders and there was a general rush to get hold of cattle at any price; so much so, that prices at the source were forced up to six and seven pounds a head where normally they were two and three.

A good deal of senseless competitive bidding took place amongst small traders, who thought they saw in the situation an easy way of getting rich quickly on a rising market. To frustrate these activities, and in order to institute a form of price control, the Controller-General of War Supply stepped in and restricted the issue of export licences for cattle and sheep to the larger concerns who had been engaged in the export trade previous to the outbreak of war.

This had a steadying affect on the whole trade and the smaller traders resumed their normal function of collecting cattle and sheep in the outlying districts.

The entry of Japan into the war in early December gave the trade a new importance; for now the Sudan became the sole external source of meat supply for the Middle East Area, Australia and New Zealand for the moment dropping out.

Demands were immediately increased and the Army asked for the output to be stepped-up to 5,000 cattle and 15,000 sheep a month. Furthermore, arrangements were made for the Army to take over the entire output at Shellal at a price per kilo, live weight. The price agreed to was 25 milliemes (6¼ d), per kilo, for cattle, and 50 milliemes (12½ d) for sheep.

These prices are fixed as ceiling prices and may be lowered at any time. No contractors exist, for the supply is always greaterthan the quantities which can be carried on the railway and river transport systems; in such circumstances, where supply exceeds demand, contracts are to be avoided; the best is rarely supplied under contract and it is difficult to get rid of a bad contractor until his term is finished.

The benefit of having a fixed maximum price at Shellal is reflected right back to the source.

The trade is entirely controlled by this Service, even to the extent of receiving, on behalf of the traders, payment from the Army for the stock delivered.

Another attempt to get cattle from the Southern Sudan was made towards the end of the year

Contrary to previous policy, northern traders were given permits to enter Equatoria and Upper Nile Ptovinces. The trade will take some time to develop, but buyers anticipate, that by using the local merchants as collectors, and provided they are given a free hand in the matter of prices, they will succeed in exporting cattle in fair numbers; the fixed price at Shellal is a safeguard against prices going too high at the source.

The getting of the cattle to rail-head is the most difficult part of this venture. No river transport is available and it becomes a matter of crossing wide, waterless tracts, on-the-hoof. A survey of possible routes is being made and the boring of some wells may have to be undertaken.

Sheep :-

The total export of sheep, 62,474, shows an increase of 22,879 over the previous year.

Most of sheep come from northern Kordofan, and while the road to Omdurman remains open this district is capable of meeting the demand. During the dry season, from March to June, other sources may have to be drawn upon, particularly Kassala Province.

The resources of the country in sheep are very great and much benefit should accrue from getting rid of the surplus population. Here again, transport to rail-head during the dry season is the difficulty; it is a problem which can best be solved by the traders themselves.

The small, fat, White Nile sheep can walk to rail-head at Kosti at any time of the year, and although, hitherto, they have never been exported, being smaller than the northern sheep, they may now be called upon to play a part in war supply during the dry season when the northern sheep have difficulty getting to rail-head in their accustomed numbers.

The price of 50 milliemes (12½ d) per kilo, live weight, at Shellal is generous and should ensure a continuous supply. The figure may be lowered later on when the habit of selling has become established and the supply assured.

A. Number and values of cattle and sheep exported during the last three years :-

Year	Cattle	Sheep	Value at Port of export
1939	8,057	15,377	£E.47,667
1940	11,045	39,595	113,133
1941	29,131	62,474	322,561

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

1939	....	....	2,473
1940	....	....	3,386
1941	....	....	5,434

Camels :-

It is anticiapted that the export of camels to Egypt will greatly increase during the coming year on account of the shortage of meat in that country.

It is estimated that 100,000 went to Egypt by road in 1941 : precise figures are not available.

Clarified Butter.

Clarified butter was again produced in the Bagara district of southern Darfur, but there was a falling-off as compared with the previous year: 240 Kantars (1 Kantar = 100 lbs) as against 293; and this in spite of the fact that five creameries were operated instead of four.

The province veterinary inspector reports that "none of the five units were ever working at anything like full pressure" on account of the shortage of milk.

It would seem that when the price of native semn is high, as it is at present, many of the people prefer to make semn with their surplus milk rather than go to the trouble of bringing it to the creamery. A bottle of semn is a much easier thing to carry to market on your head than its equivalent in fresh milk - about 22 lbs weight.

The retail price of clarified butter rose from 150 P.T. to 206 P.T. a tin (36 lbs).

Semn.

266,109 Kilos of native made semn, having a total value of £E.15,832, were exported in 1941.

These figures are far below normal; in 1940, 840,673 Kilos, valued at £E.46,795, were exported

Hides and Skins.

Advantage is taken of the facilities offered at the laboratory at Malakal where the country's supply of anti-rinderpest serum is made, for giving instruction to

tribesmen in flaying hides. It is hoped that in this way, in spite of the bewildering effects on the native of market fluctuations, better hides will eventually be prepared.

Tonj and Aweil districts of Equatoria Province continue to supply well prepared hides. The same can be said for Bor district of the Upper Nile Province. An essential factor in the improvement of these hides is the personal interest which the District Commissioners take in the trade and the results achieved in these three districts are very creditable.

Towards the end of the year there was a sharp rise in the value of hides and skins.

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

	Kilos		Value		Price per ton	
	1940	1941	1940	1941	1940	1941
			£.	£.	£.	£.
Hides.	1,265,501	2,870,393	65,264	206,460	51.5	71.9
Sheep skins.	665,907	674,301	41.397	43,764	62.1	64.9
Goat skins.	132,321	97,786	14,149	7,579	107.0	77.5

The following are the weight and value of the dried hides prepared at the Veterinary Laboratories during 1941 :-

Weight in okes.	Price per oke.
5,850	104 m/ms.

£E.1 = £.1 - 0 - 6.   1 Oke = 2.75 lbs.

INTERNAL TRADE.

The number of animals slaughtered for food as compared with the two 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

SECTION III.

IMPROVEMENT OF LIVESTOCK.

CATTLE.

The Sudan is a poor cattle country and the animal husbandry methods taught and practised in Europe cannot, with rare exceptions, be applied to it.

It is a ranching country, and it may be said that, speaking generally, mixed farming is non-existent. White settlers there are none, for the very good reason that the land cannot support a standard of living suitable to their needs.

It is true that in certain cotton growing areas, and on the banks of the Nile, a type of mixed farming exists in which it is possible to develop a higher standard of animal husbandry, but for the country as a whole, nothing short of a miracle can alter in any marked way the character and quality of the stock.

Small improvement may be effected by careful selection of the best indigenous types and by the castration of undesireables, but the substantial and rapid advance associated with mixed farming conditions and the introduction of imported sires, is out of the question; the food supply is not good enough.

The cattle, like their owners, are specialists. In the northern Arab areas they can go for long periods without water; in the south, they and their owners can tolerate a nightly atmosphere so laden with smoke as to be beyond the endurance of most other living things.

No doubt there are times when conditions are good and a better type of animal would thrive, but the carrying capacity of a country must be assessed by its worst periods and not by the best, or even the average; for the bad times, like the good, fall within the range of normal variation and must be expected to recur periodically.

The food problem has not yet been solved in our part of Africa and until it is the stock must remain that hardy, famine-resisting type, which this particular environment has evolved over many centuries; to change it before the food supply is assured is to put the cart before the horse.

Improvement must therefore be limited to selection from the indigenous; and castration. The Burdizzo castrator is entensively used and in the hands of the trained man is an efficient and popular instrument. The method is a great improvement on the brutal native fashion which preceded it.

HORSES.

The purchase of large numbers of remounts towards the end of 1940 practically cleared the horse-breeding districts of serviceable horses.

Sixteen hundred were purchased in the space of a couple of months. These were castrated, posted, and fit for operations before the offensive in Eritrea started in 1941.

The fall of Gondar in November 1941 marked the end of the campaign. At no time was there any shortage of remounts.

For Army requirements it would seem that the most serviceable animal is one in which there is not more than about 25% imported blood, and that preferably Arabian. Anything better than this is difficult to keep in condition under campaign conditions, where grass may be very scarce and very coarse; for war in these parts, where there are few roads and no railways, makes exceptional demands on the supply services and animals in the forward areas have often got to live by their wits.

The wise policy of my predecessor in discontinuing the use of pure English thorough-breds as sires has been fully vindicated and it would seem that the time has come to modify the breeding scheme still further with the idea of creating a wider distribution of the existing imported blood; for it is only in high dilutions that imported blood is really useful in the tribal horse-breeding areas, because, for the first four years of life, the young horse has got to survive native African conditions, and his only chance of doing so is to be richly endowed with that hardiness and resistance to disease which is the special heritage of the indigenous stock.

On the river and in the Gezira province, where food is plentiful, it is possible to produce and maintain a higher quality horse, but the number of such is limited; they are more the concern of private than of government enterprise.

At present there are 8 government stallions, 6 of these are of pure Arabian descent and the other 2 are by English thorough-breds. In addition there are 44 tribal stallions distributed to responsible notables of the horse-breeding tribes. A yearly bonus is paid in respect of these tribal stallions if service records are satisfactory and the horse is in good condition. There is also a system of registration for mares, and these also receive an annual bonus if they can show a foal by a government or tribal stallion or evidence that they are in foal to one.

The tribal stallion is the important part of the scheme. He should be an improved horse which has survived native conditions for five years before purchase, and above all, he should be a horse that has shown himself in the

tribal races to be superior to his contemporaries; for horses are required to carry loads and it is rational to breed from those which can do it best.

Without racing, selection is difficult, and at best is only the opinion of the individual in control; granted that he is the best judge in the world his opinion is worth very little compared to the acid test of the race course.

The purchase and castration of so many horses towards the end of 1940 can do nothing but good, and the opportunity should be taken to provide tribal stallions of the right type to replace some of these horses; for there is no doubt that a good deal of indiscriminate breeding has always gone on; the temptation to use the nearest horse is a strong one to the lazy man.

It was only possible to purchase 600 remounts in Darfur out of the total 1,600, which is disappointing, considering the amount of encouragement that has been bestowed on horse-breeding in this province. Allowance of course must be made for the fact that in peacetime Darfur is called upon to supply the S.D.F. requirements annually; a matter of about 100 horses. But even so, one would have expected at least half the remounts to have come from Darfur.

The question arises whether there are so many mares in Darfur as formerly, and if not, is the depletion due to too many deaths amongst those having a high percentage of imported blood. The subject is being studied.

SECTION IV.

EDUCATION.

Three more students entered the Khartoum Veterinary School from the School of Science and completed their first year of special veterinary studies; this is the second batch and they are due to qualify in December 1943.

The first batch, which qualified in December 1940, has now been a year in government employment and is proving a useful adjunct to the veterinary staff.

By accepting only three students every second year there should be no risk of graduates failing to find suitable employment. The value of the stock in the Sudan is so low that veterinary practice is, for the most part, restricted to state service. It is important to regulate the output of graduates in strict relation to state requirements; there is no private practice.

The course provided in the Veterinary School is adapted for the special needs of the territory; prominence is given to such subjects as Epizootology and Animal Industry.

In the present state of the country's development the veterinary problem is more a matter of how best to utilize the existing animal products, to the benefit of the native population, rather than the commercial exploitation of any surplus; the standard of living is still very low.

SECTION V.

MISCELLANEOUS.

1941 was one of the normally bad years in the Sudan; that is to say, rains above the 20 inch belt were not as good as they might have been; grazing in many of the northern districts was very scarce.

The great increase in the export of cattle, sheep, and camels, may have some beneficial effect on the northern districts, for it is from here that most of the animals are drawn. Any decrease in the population should result in more grass being seeded and a future increase in grazing in the normally good years.

VETERINARY HOSPITALS.

Khartoum Veterinary Hospital and Forge.

In-patients.	....	253
Out-patients Attendances.	....	15,498
Pairs of shoes fitted :-		
	(a) hand made.....	1,432
	(b) machine made..	259
Hoof trimming, etc.	....	543

Wad Medani Veterinary Hospital.

In-patients.	....	210
out-patients attendances.	....	19,206

Sudan Defence Force.

The Director and Assistant Director were commissioned as Lt.Colonel and Major respectively in order to carry out the duties of A.D.V. & R.S. and D.A.D.V. & R.S. Troops in the Sudan.

Four Veterinary Inspectors remained commissioned in the S.D.F. and formed the Veterinary Corps for the S.D.F.

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

Horses.	2,467
Mules.	1,138
Camels.	3,306

The Sudan is fortunate in that Mange and Glanders, the two most serious scourges of equines in military history, are not included in the catalogue of its diseases; and this is in spite of the fact that, as in all oriental countries, the conditions under which animals are kept are ideal for the existence of these two plagues; of dirt and starvation there is plenty, yet, Glanders has never been seen and Mange, on the very rare occasions it is met with, is mild and tends to recover.

Not so with Epizootic Lymphangitis. Cases of this disease are constantly being diagnosed. It is, however, of relatively minor military importance, for it is slow spreading and could never hold up operations, as either of the other two might, if they got out of hand.

Sore backs are by far the most common cause of wastage; they occur in direct inverse ratio to the proficency in animal mangement of the personnel.

It is rare now-a-days to find British Officers with the requisite knowledge of animals to make them good commanders of mounted units; the result is that the function of the Veterinary Officer has widened to embrace many details, (such as saddle fitting; the training of recruits; march discipline etc.,) which formerly were the province of the Company Officer.

In this respect the S.D.F. were especially well served, for the Veterinary Officers were men in the highest degree capable, energetic, and experienced; with special knowledge of the country, its language, its animals, and its peoples. The animal transport of "Rackets", a force involving 14,600 camels, and of the Composite Battalion of over 1,000 mules was the direct responsibility of Veterinary Officers, not only in theier technical capacity, but in all other matters pertaining to the organisation and operation of these units.

The principal remount depot was maintained at Wad Medani and a smaller one at El Obeid. Both were managed admirably and operated at a very low cost. Demands for remounts were always promptly and efficiently met and the greatest credit is due to the officers in charge; Major Prichard at Wad Medani and Captain Menzies at El Obeid.

ACKNOWLEDGEMENT.

My thanks are due, not only to the member 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.

M. Said.

Sgd. G.P. FISHER 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 :-

	1939	1940	1941
	£.	£.	£.
1. REVENUE.	9,552	13,027	21,208
2. EXPENDITURE :-			
Chapter I. -Personnel and Personnel Allowances	26,891	24,482	22,452
Chapter II. - Services	11,278	11,265	10,036
Chapter III. Extraordinary Expenditure	65	64	-
	38,234	35,811	32,488

ANNUAL REPORT
OF THE SENIOR RESEARCH OFFICER
SUDAN VETERINARY SERVICE
FOR THE YEAR ENDING 31ST. DECEMBER, 1941.

A. STAFF

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

The most important has been the departure on final leave, pending retirement to pension, of Mr. P.A.T.Kenny, British Laboratory Assistant, after approximately eighteen years' service. Mr. Kenny's responsibilities have been greater than the title of his post would indicate, since he has, in most years, had to assume full charge of the Khartoum laboratory for some months during my absence. I wish, therefore, to acknowledge his great dependability and zeal, from which the Service has benefited for so many years.

Mr. Kenny has been replaced by Mohd. Eff. Ali Mehemid, who received his diploma (D.K.V.S.) at the Khartoum Veterinary School at the end of 1940. This official was posted to the Research Section in January 1941 in the grade of Veterinary Officer, and when Mr. Kenny is finally struck off the strength the post of British Laboratory Assistant will lapse.

A second Veterinary Officer, El Amin Eff. Abdalla, D.K.V.S. has been simultaneously posted to the Malakal Veterinary Laboratory. This is the first step in a projected change whereby it is intended not to have a Veterinary Research Officer permanently posted at Malakal, but to transfer the existing one, Mr. J.T.R. Evans, to Khartoum, where the need for a second senior official has been making itself increasingly felt during the past few years. The technical work at the Malakal laboratory has now settled down to a fairly rigidly standardized routine, and it is thought that, with the Veterinary Inspector, Upper Nile Province, to act as a link with the Province staff and ensure a regular supply of cattle, a Sudanese Veterinary Officer should be able to do all the purely laboratory work. This reorganization may, with reasonable luck, be completed in 1942, but throughout the past year the boot has been very much on the other foot, since, owing to the release of a number of Veterinary Inspectors for military service, the Veterinary Research Officer at Malakal has had to carry out the duties of the Province Veterinary Inspector.

In addition to the foregoing changes, two specially selected men, hitherto graded as Head Stockmen in Scale F, have been re-classified as Laboratory Assistants in Scale J, and will act as senior technical assistants at the Khartoum and Malakal laboratories respectively.

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 and Malakal)

III. Issue of cattle plague virus for "serum-simultaneous" immunization (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 antrypol (naganol) for the control of camel trypanosomiasis (Khartoum)

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

VIII. Examination of pathological specimens (Khartoum and Malakal)

The following are short notes on each of the above

I. CATTLE PLAGUE SERUM

Output

The quantity of serum prepared was 5,576.4 litres, or 111,520 "doses" of 50 c.c. It is, however, noteworthy that the serum was of unusually high potency and represented an immunizing factor much higher that would appear from the nett number of doses.

The standard to which our serum is expected to conform is that doses of 5 c.c./100 lb. live weight should protect most cattle from death, and that 10 c.c./100 lb. should prevent the development of any but the mildest symptoms - say, slight fever and catarrh, but not stomatitis or diarrhoea - and that the test animals should continue to feed normally and should not lose any bodily condition. This year two bulk samples were titrated, the first of which was as effective in doses of 5 c.c./100 lb. as would normally be expected of 10 c.c./100 lb. and the second sample very nearly so. Veterinary Inspectors were therefore advised to reduce their routine field dosage by one third, thus increasing their immunizing range by fifty per cent. In consideration of the fact that a large proportion of cattle injected with serum are immature, and thus receive less than a nominal "dose", the yield of 111,000 "doses" of exceptionally good serum would probably serve to protect a full 200,000 head. In actual fact, the whole output has not been used, leaving a very welcome reserve in hand, but, up to the end of the year, no complaints were received that the reduced dose was not as effective as the full dose.

Titre

The unusually high potency of cattle plague serum has now been a constant feature for three successive seasons, and it is interesting to inquire why this should be so. Examinations of all relevant circumstances shows that there is only one constant feature during the past three seasons differing from those of earlier years, namely, the technique of serum preservation. Since the disaster of 1938, when the serum became so heavily contaminated with bacteria that it caused numerous deaths and the whole season's output had to be destroyed, it has been a regular practice to add acriflavine 1-50,000 to the serum in addition to the usual 0.5 per cent. of carbolic acid (see this Report, 1938, pp.38-41). Bulk samples so treated have been regularly examined for bacterial content after some months of storage, and it has been usual for less than half a dozen colonies to grow in agar plates sown with one tenth of a cubic centimetre of serum. Since the serum is dispensed in beer bottles sealed with crown caps, those colonies will most likely have developed from the few bacteria that would almost certainly gain access

during the opening of such a package. In fact, the serum has constantly been, not only for all practical purposes, but probably also in absolute terms, bacteriologically sterile. Experiments in 1938 showed that bacterial contamination not only rendered serum dangerous but also reduced its potency, so that, pending submission of the opinion to a critical test, it is reasonable to assume that prevention of bacterial contamination has been responsible for the high titres recently recorded in stored bulk samples.

Cattle supply.

The greatest single anxiety in earlier seasons, or at least until 1940, has been the supply of suitable cattle. The problem was partly to obtain the necessary numbers, and partly to overcome the difficulty of the progressively increasing number of intended virus producers that were proving to be immune.

If the problem is not yet entirely solved, it appears to be well on the way to solution by the development of a system of option and barter that has been increasingly employed during the past few years. The system is rather complicated entailing a considerable amount of book-keeping, the units of which are large cattle, small cattle, serum and vaccine, instead of the more sophisticated pounds and milliemes. However, it seems to be more acceptable to communities among whom ownership is tribal, and cattle bargains invariably complex, than any simple cash transaction.

In principle a provisional, and somewhat elastic, annual allotment of serum and vaccine is made to the Province, as to all other Provinces. This is made and is subject to *ad hoc* review, by the Director of Veterinary Services, being what in his opinion is its reasonable share of the annual output, based, in general, on economic considerations. Of this allotment, the serum fraction is distributed and stored in Districts, in proportion to the number of cattle each District Commissioner expects his people to *sell* to the laboratory during the year. The vaccine, which is stored at the laboratory, is supplied only on payment, either in cash or cattle. On the whole, it is large cattle, coming from the more northerly Districts of the Province, that are supplied in return for serum, and small cattle, coming almost entirely from Bor District, in exchange for vaccine.

Unfortunately the Province, in spite of its enormous cattle population, is still not eager to part with the few hundred head required by the laboratory, but some improvement occurred this year, since only 28 per cent. had to be obtained from Equatoria, as against 47 per cent, in 1940. Of the two types of cattle at issue, a shortage of large cattle is the lesser of two evils, because one is at any rate certain that every one obtained will be suitable for its destined purpose, viz: yielding serum. Thus one at least knows how one stands, and, since deficiencies can always be made up from Equatoria, the only outstanding problem is river transport (now a more than usually serious factor). With small, i.e. young, cattle, however, the case is quite otherwise, since, in addition to the numerical requirement, there is always the question of what proportion of them will be immune, and thus unsuitable for virus production. It is therefore fortunate that small cattle are at least forthcoming in adequate numbers. For this

one's thanks are almost entirely due to Capt. W.A.H. Forbes and his Dinkas in Bor District.

Many of the cattle prove to be immune, but, since they can be replaced in the same way as the original ones were obtained, the technical routine of the laboratory is not hindered. In fact, until the proportion of immune beasts is determined, it is both desirable and possible to infect a somewhat excessive number of them in preparation for the hyperimmunization of each group of serum producers. A plentiful supply of virus is thus ensured for the maximal hyperimmunization policy employed, and any susceptible cattle that may be infected additional to strict requirements are not wasted, but their lymphoid tissue is converted into vaccine (see also the following Section on Cattle Plague Vaccine). The immune cattle, being too small to be worth the trouble of using as serum producers, are either bartered for fresh ones with natives living fairly close to the laboratory, or sold by auction for what they will fetch.

It will be realized that the foregoing system takes no account of the financially authorized sale price for laboratory products in relation to the true market value of the cattle. Except in the case of the small minority of cattle actually bought and sold for cash, the process is one of true barter, and not even a hypothetical book value is entered in respect of the transactions. The system is, in fact, highly irregular, but, of all those hitherto tried, it is the only one that has worked reasonably well.

The following two tables, although they show no direct cattle-for-cattle transactions, will give some idea of the extent to which the barter system is employed:-

1. Small cattle

On charge 1.1.41	368	Bled for virus	516
Purchased for cash	148	Sold by auction	275
Bartered for vaccine	469	On charge 31.12.41	214
Bartered for serum	20		
	1,005		1,005

2. Large cattle

On charge 1.1.41	355	Bled out for serum	609
Purchased for cash	715 x	Died	28
Bartered for vaccine	114	Sold by auction	8
		On charge 31.12.41	539
	1,184		1,184

x Including 232 from Equatoria

Farming out of cattle.

As has been indicated in earlier Reports, it is necessary, in order to lose none of the limited working time available, to obtain during the current season as many as possible of the large cattle required for the next season. In order to conserve the grazing around the laboratory, these cattle are not brought into Malakal but merely vaccinated and then farmed out with cattle owners living some little distance away. A small fee is paid for each beast on delivery in the autumn. The earning of this fee has recently become

very popular among the Shilluk who, during the working season, are employed as casual labourers at the laboratory. Their desire to give satisfaction is shown by the fact that this year they ran 403 large and 33 small cattle with their own herds from June to October, and delivered all but 16 in excellent condition.

Miscellaneous.

The health of the Malakal staff remained "good". That is to say, although every one of the technical assistants developed malaria at one time or another, the spacing-out was such that work was not materially hindered.

The Shilluk labourers worked well and behaved well; they did not consider their usual holiday without pay - a strike - necessary.

Grazing, as usual, began to give out before climatic conditions made it necessary to suspend operations, although the preceding rainy season had been fairly good. There is, indeed, no doubt that the Malakal laboratory is now, and has been for some years, working to its maximum capacity unless one resorts to the costly expedient of supplementary feeding of laboratory animals.

II. CATTLE PLAGUE VACCINE.

There has been no modification in the technique of preparing this product as compared with earlier seasons.

Most of the material for making this vaccine is secured as by-product of serum preparation (lymphoid tissue from bled-out virus producers) and from similar material becoming incidentally available in Khartoum. Usually, however, additional cattle have to be specially used in Khartoum to supply demands arising towards the end of the Malakal off-season. This year it was known in advance that demands would appreciably exceed those of normal years, and arrangements were made to prepare additional quantities of crude material at Malakal. The object of this arrangement was economy, since the barter system described in the preceding section enables one to obtain cattle virtually cost-free. The additional output at Malakal, the volume of which was limited by the amount of extra work that could be done, was not sufficient to cover the whole of the extra demand, but it went a useful way towards doing so, and effected a considerable economy.

The total output of crude material from Malakal was roughly 1,400 litres, sufficient for the final preparation of about 140,000 nominal "doses". This is rather more than the equivalent of a normal year's requirement. Of this total, 1,102 litres were sent to Khartoum for further treatment and the remainder "finished" and issued in the Southern Provinces.

Altogether 201,036 "doses" of 1 c.c. were finally prepared and issued. This is by far the largest quantity that has yet been used, and is an increase of over 60 per cent. on the total of 124,170 issued last year (which was itself a year of more than average requirements).

The increased demand was referable to the very much larger number of merchants' cattle exported to Egypt, and moved about within the Sudan to provide rations for troops and prisoners of war. Not only were all these cattle vaccinated, but vaccine was used with unusual – in peace time one would say uneconomic – liberality in areas from which trade cattle are mainly purchased. So far as is known, no beast vaccinated during the year subsequently contracted cattle plague.

III. CATTLE PLAGUE VIRUS

This is a product for which there is no great demand in the Sudan, since conditions generally are unfavourable to its widespread use for conferring permanent immunity by the serum-virus method. A roughly average total of 3,070 doses were issued, as against 2,880 and 4,540 in the two preceding years. Nearly all of this was issued to Gezira Province for the immunization of working oxen.

IV. CONTAGIOUS BOVINE PLEURO-PNEUMONIA VACCINE

Demands for this product have increased in roughly the same proportion and for the same reason as already recorded in the case of cattle plague vaccine. 71,050 doses were issued as against 39,685 last year.

One has to record one of those regrettable and inexplicable accidents so well known to all workers with pleuro-pneumonia vaccine, namely, the occurrence in the field of large, and occasionally fatal, swellings at the point of injection of a vaccine that laboratory tests had led one to conclude was non-virulent. The circumstances are that a strain of culture-virus had been subcultured in the laboratory for 22 generations and that it then appeared to be safe when tested in large doses on four cattle in the laboratory. By some (fortunate) oversight, probably referable to staff changes, it was not taken into routine use for for a further ten weeks. When used in the field at the 32nd to 34th generations, it caused large swellings in about ten per cent. of vaccinated cattle, and several cattle died. Retests in the laboratory still confirmed the vaccine as "safe", but the use of this particular strain was, of course, suspended.

Although most regrettable, the economic significance of this accident, taking a broad view, is best illustrated by the attitude of a prominent cattle exporter who sustained most of the losses. He called on me and informed me that, although I had just let him in for a loss of about LE.120, he did not wish to complain, because he had derived so much benefit from the vaccination of his cattle in the past, in spite of an occasional accident. This particular merchant has had tens of thousands of cattle vaccinated, and is continuing to have all his stock done.

V. FOOT-AND-MOUTH DISEASE VIRUS

The use of this agent for deliberately infecting all cattle destined for export has been suspended, because, with the greatly increased numbers at issue, it is not possible to

infect all of them at convenient centres at a season when the grass is still green.

The rationale of deliberate infection, as practised in 1939 and 1940, is that Arab cattle develop such mild symptoms of this disease that they will continue feeding if soft green grass is available; consequently they lose hardly any condition. The main reason for deciding on infection was that if the disease appears in a quarantine it causes great delay and economic loss, even though its pathological phenomena are so mild. In the first place it spreads very slowly, no matter how one may try to accelerate its spread by thorough mixing. Unfortunately, also, it spreads very persistently, in spite of efforts to limit its range by segregation into small groups. Short of deliberate infection by artificial means, several weeks or even months may elapse before an infected trainload of cattle can be declared free. It is not, however, economically practicable to practise deliberate infection during the dry season, because the cattle will not eat dry grass while their mouths are sore, and fall away very badly in condition.

Fortunately the areas from which export cattle are mainly drawn have been free from foot-and-mouth disease for over a year, and there is a good chance that they may remain so. If, however, the disease reappears, measures other than either deliberate infection or ordinary quarantine practice will have to be adopted if delays and loss are not to be incurred. Recommendations in this connection have been made, and are at present under consideration.

VI. CAMEL TRYPANOSOMIASIS CONTROL

Although the number of doses of antrypol (naganol) and associated diagnostic items issued was larger than ever before, the total would have been greater still had it not been for the difficulty of securing delivery of supplies of the drug. The actual total was 17,953 as against 17,154 last year. The few hundred additional doses roughly represent a few kilogrammes of German-made naganol captured in Eritrea.

As in 1940 it has been necessary, in virtue of limited supplies, to allot adequate stocks for the treatment of military and police camels, so that any unsatisfied demands will have been those made by private owners. The number of private owners actually turned away has been small, but the news of the shortage of antrypol will have spread, and will have decided many other owners not to make fruitless journeys to treatment centres. Consequently, in spite of the relative shortage, all stations showed small stocks in hand at the end of the year.

VII. HORSE SICKNESS VACCINE

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

Much more was issued than ever before, the total being 3,977 doses as against 983 and 2,874 in the two previous years.

Of this total 9,674 doses were issued for the vaccination of army horses and mules, 248 used on privately-owned horses (on payment), and the remainder used on Government animals.

It may be assumed that all vaccinated animals were exposed to horse-sickness infection and, so far as can be ascertained, about 70 of them subsequently died of the disease -- say about two per cent. This figure, taken at its bare face value, is very satisfactory, but some veterinary officers have expressed doubts whether all fatalities were really due to horse-sickness. Further discussion of this point, and records of a small experiments, will be found under the section dealing with research.

VIII. SPECIMENS EXAMINED

The examination of specimens is one of the minor activities of the laboratories, since most diagnosis is effected by Veterinary Inspectors, and only unusual or doubtful specimens are sent to the Research Officers. Details of 508 are recorded, as against 392 last year, but a good many more examinations were made, since positive diagnoses only were registered at Malakal.

As in other years, most positive diagnoses were of little interest, as they merely confirmed the existence of conditions already well known in the Sudan, but the following are worthy of short comment.

(i) Demodectic mange in cattle. Four cases of this were discovered by Mr. Evans at Malakal. The disease, although probably world-wide in distribution, is of very rare occurrence, and these cases are the first ever recorded, in the Sudan. It is hardly necessary to add that they originated in that pathologist's "lucky dip" the Nuba Mountains area of Southern Kordofan, which can constantly be relied upon to produce something rare and interesting - although usually not very important.

(ii) Equine mange. This is hardly ever seen in the Sudan, but this year, probably for fear of infection spreading to the large numbers of horses and mules engaged in military operations, an unusually sharp look-out seems to have been kept. Three cases of psoroptic and two of sarcoptic were diagnosed. The detection of these cases stimulates one to record a long-standing conviction that equine mange is unlikely ever to be a serious problem in the Sudan. It exists, and native standards of horsemastership afford it every encouragement to spread; nevertheless one only encounters odd cases at long intervals.

(iii) Anthrax. The excuse for mentioning this disease specially is the rareness with which it is usually seen. It was provisionally attributed to a consignment of dry millet stalks imported for feeding purposes from Gezira Province, although no anthrax has been seen for several years in that Province. The usual administrative measures prevented the occurrence of further cases.

(iv) *Gastric habronema tumours.* It is not the practice in this Report to draw particular attention to worm infestations, because as a class they are neither important nor interesting. However, cutaneous infection with habronema larvae is recorded every year, and one may on this one occasion mention the adult worms in order to report on their frequency. Usually one does not examine the stomach for their presence, but this year it was decided to inspect a successive dozen or two old horses destroyed for surgical reasons. Of 21 horses examined at Khartoum and Malakal, twelve had tumours containing *H.megastoma* and probably all (certainly all in which identifications were carried out) had numerous *H.muscae* embedded in the fundic mucus. Rare *H.microstoma* were also identified.

(v) *Taenia pisiformis in a dog.* The excuse for mentioning this is that *Cysticercus pisiformis* in a rabbit was recorded last year, when it was stated that the adult worm had not yet been seen in the Sudan. Now it has been seen.

Other less interesting diagnoses included:-

HORSES : Epizootic lymphangitis, cryptococcus pneumonia, cryptococcus conjunctivitis, ulcerative cellulitis (*C.ovis*), *Tryp.brucei*, *Babesia caballi*, *Nuttallia equi*, cutaneous habronemiasis, ring-worm, lice, and various common septic and helminthic infections.

MULES : Epizootic lymphangitis, ulcerative cellulitis, ringworm, and various common septic infections.

DONKEYS : As mules.

CATTLE : *Tryp.congolense*, *Tryp.uniforma*, *Theileria annulata*, *Actinomyces farcinicus*, psoroptic mange, septic and helminthic infections.

CAMELS : *Tryp. evansi*, worms.

FOWLS : Spirochaetosis, tapeworms (*Railletina*).

C. RESEARCH

With the great increase in routine work, nothing worthy of the name has been possible. Two small problems, however, connected with horse-sickness vaccination and dried meat preparation, arose and demandedsome *ad hoc* attention. The following are brief summaries of the work done.

I. HORSE SICKNESS VACCINE

The question has been raised whether all deaths from what appears to be horse-sickness among animals vaccinated against this disease are indeed due to horse-sickness. Doubtarises on two counts, namely:

(i) it is said that there is probably a disease closely simulating horse-sickness, against which one could not expect the vaccine to protect, and

(ii) the post-mortem appearances in vaccinated animals which die are frequently not "typical". If this point is tenable, it may support point (i).

As against the above two items, it may be argued that:

(i) further correspondence with Kenya tends to show that if there is a second disease simulating horse-sickness it is certainly very rare, and

(ii) since the animals in which post-mortem appearances are not typical have been vaccinated, it is reasonable to assume that vaccination may have modified the pathological processes of the disease, even if it has not always been able to prevent infection.

In 1939 a few horses were injected with blood from vaccinated animals which had died, and none developed symptoms of horse-sickness. There was, however, still the doubt whether those horses were immune. It seemed improbable, but was always possible (see this Report for 1939, p.39).

This year the Director of Veterinary Services, Kenya, in the course of correspondence on the subject, offered to supply some virulent virus, with a view to confirming, or otherwise, the susceptibility of test horses which withstood the injection of suspected blood samples.

The offer was gratefully accepted, and five further horses were injected with suspected samples, all surviving without development of any symptoms. Unfortunately, however, they also survived subsequent injection with the virus obtained from Kenya, thus leaving the matter still in doubt.

One had hardly expected to find so large a series of immune horses, especially as all had spent their lives in Khartoum, which is relatively (but not absolutely) free from horse-sickness. They were, however, all old horses, and one must presume that, small though the chances are of acquiring the disease in Khartoum, nevertheless a horse can hardly live for several years in the town without acquiring it. The surprising feature, in the light of clinical experience, is that so many immune horses should be found in a place where so few deaths normally occur.

As pointed out eelier in this Report, the matter is hardly worth serious investigation at a time when other duties are so heavy, since it matters little whether two per cent. or so of vaccinated horses die of horse-sickness or whether there is some other unidentified disease that kills a few horses occasionally. The total loss, whatever the cause, is economically negligible.

II. DRIED MEAT

Dried meat, both salted and unsalted, is normally prepared in relatively small quantities in several parts of the Sudan. In the course of military operations against Italian East Africa it was prepared on a very large scale,

and large reserve stocks were stored at convenient centres. It was then found that some of these stocks, while remaining quite free from putrefaction, became heavily infested with "horn beetles" (<u>Dermestes vulpinus</u>) and their larvae, and the problem presented to the laboratory was to prevent this.

A good deal of work was done in preparing experimental samples of dried meat according to various techniques and then adding adult beetles and seeing if larvae would appear. The experiments had to be suspended towards the end of the year, because, with the onset of relatively cool dry weather, the beetles would not breed in "control" samples. Two general conclusions can, however, already be drawn with fair certainty:-

(i) Unsalted meat, although doubtless suitable for preparation on a domestic scale, is quite unsuitable for bulk storage, no matter how thoroughly it is dried. Throughout the greater part of the year horn beetles will get into it and breed at a tremendous rate, soon converting the stock into a seething mass of larvae.

(ii) Salted meat can be prepared according to two techniques:-

(a) Rubbing on salt and immediately hanging up the strips to dry, and

(b) Pickling the strips in salt or strong brine for several hours (usually overnight) before hanging up to dry.

Of these two methods, the first is quite useless if prolonged bulk storage is contemplated, no matter how lavishly the strips be salted. The salt does not penetrate, but the beetles subsequently do, and the strips rapidly become hollow shells filled with larvae. The pickling method allows the salt to penetrate evenly, and prevents the development of larvae in the depth, but has the two objections that it takes more time and that the final product is apt to be unpalatably salt.

The experiment had to be suspended when what remained to be ascertained was the lowest concentration of salt that would prove effective when employing the pickling technique.

<u>D. MISCELLANEOUS</u>

<u>1. Hide Curing demonstrations</u>

A good many hides are saved in the laboratories during the year, and these are used for demonstrating the suspension method of sun curing. Most of this work is done at Malakal, where more hides become available, and where more demonstration is needed, on account of the small size of the field veterinary staff in the Southern Provinces. A comparison between the prices fetched by our hides and the average market price of hides at the time of sale is the final demonstration.

Altogether 7,325 Kg. of hides were sold, all between January and June, for a total price of LE.611 odd, or about LE.83.4 per metric ton.(in Khartoum). The average market price of dried hides at that time (Customs valuation, Wadi Halfa) was LE.67 per metric ton. The final demonstration therefore shows that care in flaying and curing may add anything up to 25 per cent. to the value of a hide. It is regretted that the fact is not more generally taken to heart.

2. Publications.

For the second successive year, great increases in routine work have made it impossible to do any research worthy of publication in scientific journals.

SUMMARY

Last year's summary stated "The volume of routine work, which reached its highest recorded point last year (i.e. 1939), has shown no signs of diminishing. No research has been possible." This year routine work has expanded more than ever. The increase calling for the greatest additional expenditure of effort has been the preparation of cattle plague vaccine. Normally this item would also have called for greatly increased expenditure, but the system of cattle barter described in the body of the Report has made it unnecessary to ask for any increase in budgetary expenditure.

Additional work has been thrown on all members of the staff, but they have regarded it as part of their contribution to the general war effort, and have responded cheerfully.

Sgd. S.C.J.Bennett.
SENIOR RESEARCH OFFICER,
SUDAN VETERINARY SERVICE.

Khartoum,
29.1.1942.

TBT.