

Annual report of the Sudan Veterinary Service.

Contributors

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ANNUAL REPORT

OF THE

SUDAN VETERINARY SERVICE

FOR THE YEAR

1952/53.





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**ANNUAL REPORT
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I. GENERAL.

The year under review was a very satisfactory one for livestock. The pastoral areas had a good rainy season and grazing was almost universally better than average. Losses from diseases were relatively very low and the cumulative effects of mass immunisation against rinderpest and contagious bovine pleuro-pneumonia, started a few years earlier, were evident in the general increase in the size of the herds.

Continued prosperity amongst a section of the people as a result of high cotton prices had the effect of increasing slightly the volume of internal trade in livestock and of maintaining the high livestock prices of the preceding year. The export trade of cattle and camels dropped appreciably because of price control of meat in Egypt, but the trade in sheep increased because of greater demands from Saudi Arabia. The opening of a meat processing factory at Kosti, capable of dealing with a hundred thousand cattle a year, was a welcome event in the plan for utilising the growing surplus of stock.

The provision of an improved animal health service made it possible to plan great expansion of the department so that fuller development of the livestock resources of the country could be carried out. This was agreed to by the Government committees concerned but at the end of the period under review the reorganisation and increase of staff necessary were still under consideration. Implementation of the expansion proposals had therefore to be postponed.

II. STAFF.

Retirements.

Mr. W. H. Glanville retired on pension from the post of Director in December 1952 and was succeeded by Mr. J. T. R. Evans. Mr. Glanville joined the Service in 1928 and after a wide experience as a field officer, with an intervening period of four years as Registrar of the (then) newly created Khartoum Veterinary School, he became Director in 1944. He will be long remembered by the pastoral tribesmen of the many provinces in which he served and particularly in the Upper Nile where, as the first Veterinary Inspector to be posted to the Southern Sudan, he did great work in introducing the use of prophylactics to the conservative and suspicious stockowners. During his term of office as Director considerable changes in the policy of the Service were effected and important steps taken in the fuller development of the potential livestock wealth of the country.

Mr. H. B. Luxmoore resigned his post as Senior Veterinary Inspector and returned to the United Kingdom. Immediately after his appointment in 1942 Mr. Luxmoore was seconded for military duties with the Sudan Defence Force in which he

remained until the cessation of hostilities. He was afterwards posted as the first Veterinary Inspector in Equatoria Province where he did much pioneering work under difficult conditions.

Mr. J. McKay, M.B.E., Inspector at Headquarters, left on final leave pending retirement in April 1953. He joined the Sudan Civil Service in 1929 and was transferred to the Veterinary Service in 1940. He was outstandingly efficient and during staff shortages he was frequently given responsibilities far greater than would normally have been the case. He always accepted them cheerfully and was an exemplary official.

Decorations.

Mr. I. A. Gillespie was made an Officer of the Order of the British Empire. El Shafie Eff. Mohammed was awarded the British Empire Medal.

New Appointments.

The new appointments made consisted of Mr. F. W. Priestley*, M.R.C.V.S., Dip. Bact. (London), as Chief Veterinary Research Officer, Mr. K. Horlyck as Veterinary Inspector, Mr. N. A. Hancock, B.Sc., A.R.C.S., as Field Zoologist, Mr. W. H. Foster, B.Sc. (Agric.), as Pasture Research Officer, Mr. P. Blasdale, B.A., as Veterinary Entomologist, Mr. P. J. Henshaw as Field Officer (Tsetse Survey and Reclamation) and seven Veterinary Officers newly qualified from the University College of Khartoum.

Promotions.

Veterinary Officers Ahmed Magdoub Abdoun, Dip. Vet. Sci., Saad Mehanna, Dip. Vet. Sci. and Gaafar Karrar B.V.Sc. (Cairo) were promoted to Veterinary Inspectors, Veterinary Officer Nazeer Dafalla, Dip. Vet. Sci., Dip. Bact. (Manchester) was promoted to Veterinary Research Officer.

Establishment and Distribution.

The establishment of technical staff and the distribution of the senior members on 30th June, 1953 are shown in Appendix No. 1.

III. ANIMAL HEALTH. DISEASE CONTROL.

Rinderpest.

Departmental policy is directed towards the eradication of this disease. Over a million cattle were vaccinated during the year and although the disease continued to be widespread its incidence was the lowest recorded since biological control was practised and the losses from it were negligible. Apart from a few thousand inoculated with glycerinised lymphoidal tissue

* Mr. Priestley resigned from the post of Veterinary Research Officer during the preceding year.

vaccine, the cattle were vaccinated with goat attenuated virus and rabbit attenuated virus. The use of the last named was limited to calves in the southern provinces as these had proved to be too susceptible for goat attenuated virus to be used on them. These attenuated viruses, which universally gave good results, were purchased from the Director of Veterinary Services, Kenya and his cooperation in supplying all our demands is acknowledged with gratitude.

Contagious Bovine Pleuro-Pneumonia.

This disease was widespread in the western and southern Sudan and was the most serious obstacle to livestock development. Although over a million doses of attenuated culture vaccine were administered, the results obtained were not entirely satisfactory. The energies of the Research staff were largely concentrated on a search for a more effective vaccine.

The avianised vaccine introduced by Piercy and Sheriff in Kenya gave promising results initially but after a large field trial it was found that the immunity produced was of too short a duration to be of much practical value.

Bovine Trypanosomiasis.

The position regarding this disease continued to show improvement even though about 30,000 cattle were brought up for treatment. The policy was to treat clinical cases with dimidium bromide reserving the use of antrycide for mass treatment should the incidence increase sufficiently to warrant such a procedure.

About a thousand milking cattle were successfully protected against trypanosomiasis within the main tsetse belt by inoculation with antrycide pro-salt at intervals of two months. Some of these cattle had been protected in this way for over three years without showing any ill-effects following the injections except rows of small unsightly swellings at the inoculation sites.

Anthrax.

Normally this disease is of little significance and only a few sporadic cases are reported. This year, however, two serious outbreaks occurred in Darfur and Upper Nile Provinces where also several cases of human infection were reported. A quarter of a million cattle were vaccinated and at the end of the year the outbreaks appeared to have been effectively controlled.

Foot and Mouth Disease.

This disease was present in the Upper Nile and Bahr El Ghazal Provinces in July and many malignant cases were found. It spread northwards and by September cattle destined for export to Egypt were found to be infected at Kosti and El Obeid. This necessitated suspension of the trade for three weeks while all the export cattle *en route* were artificially infected with the two types of foot and mouth disease virus hitherto known to exist in the country and allowed to recover.

A month later the disease was discovered in cattle that had recovered from artificial infection with these two types of virus and it was evident that a third type existed. Subsequently this type was isolated and included in the inoculum used for artificial infection. By June the areas from which the export cattle were drawn had been free of the disease for several weeks and artificial infection of the cattle became unnecessary.

Camel Trypanosomiasis.

This disease was less common than usual and as a rule treatment with antrypol was effective. In some areas, notably in Kassala Province, infection with strains of trypanosomes resistant to the action of antrypol were encountered. Camels so infected were successfully treated with antrycide methyl sulphate.

Rabies.

This disease, which is enzootic over most of the country, flared up in the urban areas of Khartoum, Khartoum North and Omdurman and caused serious concern for several months. A vigorous campaign against stray dogs and cats was instituted and altogether 13,255 dogs and 1,372 cats were destroyed in the three towns and neighbouring rural areas. Steps were taken to ensure that the Registration of Dogs Order was enforced and that all registered dogs were vaccinated with avianised rabies vaccine (Lederle). The situation at the end of the period under review was very much improved and early relaxation of the movement restriction of dogs was anticipated.

The incidence of the disease over the rest of the country was fairly normal. Histological examination of brains of suspected cases was carried out by the Stack Medical Research Laboratories and the following table gives the numbers of positive cases sent in from the various provinces.

PROVINCE	Dogs	Cats	Donkeys	Horses	Cattle	Sheep	Goats	Camels	Total
Bahr El Ghazal ...	3	—	—	—	—	—	—	—	3
Blue Nile ...	39	1	5	1	1	—	2	—	49
Darfur ...	2	—	1	—	—	—	—	—	3
Equatoria ...	1	—	—	—	—	—	—	—	1
Kassala ...	6	—	2	—	2	—	—	—	10
Khartoum ...	51	4	4	1	2	1	7	1	71
Kordefan ...	7	—	1	—	1	1	—	—	10
Northern ...	—	—	—	—	—	—	—	—	—
Upper Nile ...	1	—	—	—	—	—	—	—	1
TOTAL ...	110	5	13	2	6	2	9	1	148

Brucellosis.

The diagnosis of a number of cases of brucellosis in humans in and around Wad Medani led to an investigation of the incidence of the disease among domestic animals from which milk supplies were obtained. Positive reactors to agglutination tests were found amongst cattle, sheep and goats and *Brucella melitensis* was isolated from milk from each of the three species. All positive cases were destroyed.

Other Diseases.

Haemorrhagic septicaemia in cattle was reported from small isolated areas in the central and southern provinces and some twenty thousand cattle were vaccinated against it. *Bovine farcy* was common amongst the Hawazma and Tegali cattle in Kordofan Province; it caused few casualties but much economic loss on account of the poor condition of many of the animals infected and the reduced quality of the hides. *Blackquarter* occurred in a few areas in Kordofan and Blue Nile Provinces. Some cases of *East Coast Fever* were reported from near the border with Uganda and Kenya. *Caseous lymphadenitis* was common amongst the desert sheep of Kordofan Province. *Fascioliasis* (liver fluke) was very prevalent along the White Nile in Kosti District where some 72,000 doses of hexachloroethane were distributed with very effective results. *Camel mange* was common in the central provinces but it was of little significance as the owners dealt with it effectively with gamatox dip; over two tons of this powder were distributed. Many cases of *epizootic lymphangitis* were seen in Blue Nile and Kordofan Provinces. A few unvaccinated horses were reported to have died of *African Horse Sickness* amongst the Ingessana tribe in Blue Nile Province. *Newcastle disease* caused heavy losses amongst poultry before it could be controlled by vaccination. In addition there occurred *spirochaetosis*, *fowl diphtheria*, *infectious laryngo-tracheitis*, *fowl typhoid*, and *fowl paralysis*.

TSETSE SURVEY AND RECLAMATION.

The Tsetse survey and Reclamation Team created in 1951 to carry out a tsetse survey of about 150,000 square miles of cattle rearing country in the Southern Sudan and to reclaim infected areas where practicable, completed the survey of about 15,000 square miles in the northern part of the Bahr El Ghazal Province. This survey defined the northern boundary of the main tsetse belt in that region and three "islands" of tsetse (*Glossina morsitans ugandensis* only) covering about 600 square miles, in the Jur Narrows Area. These "islands" are situated close to seasonal migratory routes of about a quarter of a million cattle and undoubtedly play a very important role in the spread of bovine trypanosomiasis.

It was decided that these "islands" should be cleared of tsetse and that the only practicable economic method of doing so was by the eviction of all game animals. Operations were started in the first "island" in January and despite great difficulties in recruiting and training native hunters and in obtaining rifles, 168 buffalo, 208 baboons, 81 monkeys and 1175 other game had been shot by the end of June.

IV. ANIMAL INDUSTRY.

INTERNAL TRADE.

Sales of Livestock.

The continued prosperity of a large section of the inhabitants as a result of high cotton prices was responsible for slight increases in the average prices of livestock already at a high level during the preceding year. At the fourteen principal markets 606,949 cattle, sheep, camels and donkeys were sold for £E. 3,430,648. The following table shows a comparison of the numbers and values with those of the preceding year:—

Livestock Sales in The 14 Principal Markets.

	1951—52		1952—53	
	Numbers	Value £E.	Numbers	Value £E.
Cattle	139,579	1,381,305	132,696	1,387,288
Sheep	319,105	1,085,459	383,469	1,400,797
Camels	20,587	410,675	21,618	419,609
Goats	38,751	62,744	54,502	92,972
Donkeys	24,251	132,770	23,664	129,982
TOTAL	542,273	3,072,953	606,949	3,340,648

Some 2,500 trade cattle, protected against trypanosomiasis by inoculation with antrycide prosalt, were sent southwards from Bahr El Ghazal Province for slaughter in the main tsetse belt.

Full scale horse shows were held at Sibdu and Id el Ghanam at which six thousand horsemen paraded. Altogether some 450 horses were offered for sale at these shows and at Abu Salaa and Tullus but only 78 could be bought out of a total requirement of twice that number of remounts, although the price offered averaged over £E. 30. Thirty tribal stallions were purchased by the Government at an average price of nearly £E. 50.

Animals slaughtered for Meat.

There was a slight drop in the number of cattle and sheep slaughtered at the ten main towns. The following table shows an interesting comparison of the numbers slaughtered during this and the preceding year with those during 1939. Although the meat of choice for the townsman is mutton and there has been a great increase in the urban populations during the intervening years, particularly of the labourer class, there has been little increase in the number of sheep slaughtered. The general rise in the cost of living has had the effect of increasing substantially the demand for the relatively much cheaper beef and goat meat.

Animals Slaughtered in The 10 Principal Towns.

Period	Cattle	Sheep	Goats
1939	20,521	190,791	8,430
1951—52	58,697	212,425	28,227
1952—53	55,426	210,538	36,491

Sudan Meat Products Ltd., completed the building of a processing factory at Kosti. Operations were started in November on a small scale and continued until April when they were suspended for the duration of the hot season. Altogether 4,421 cattle were slaughtered. A full time state veterinarian was responsible for the inspection of the cattle, carcasses and processing operations according to regulations approved by the

Ministry of Food of the United Kingdom. The carcasses condemned amounted to 2.6 *per cent.* of the total, three quarters of them being on account of generalised bovine farcy.

EXTERNAL TRADE.

Export of Livestock.

The volume of export trade of livestock to Egypt dropped appreciably during the year, primarily as a result of the imposition of control prices for meat. The export of sheep to that country was virtually suspended but fortunately this loss was compensated by a great increase in the number exported to Saudi Arabia, which country took 40,789 sheep compared with 3,547 in the preceding year; in addition 14 cattle and 134 camels were exported there.

The following table shows a comparison of the numbers and values of the livestock exported during the last two years.

Export of Livestock.

PERIOD	Cattle		Sheep		Camels	
	Numbers	Value £s.	Numbers	Value £s.	Numbers	Value £s.
1951—52	26,075	523,036	28,906	143,490	35,077	1,188,335
1952—53	19,538	390,384	46,040	227,560	29,250	943,873

Export of Hides and Skins.

The drop in world prices for Hides and Skins was of course reflected in the revenue derived from this trade but the loss was to some extent compensated for by the improved quality of the dried hides and sheep skins. The marked increase in the quantity of air dried sheep skins exported was the direct result of the experimental work referred to later in this section.

The following table shows the comparative weights and values of hides and skins exported during 1951—52 and 1952—53.

Export of Hides and Skins.

Category	1951—52		1952—53	
	Tons	Value £s.	Tons	Value £s.
Hides Dry salted	1,292	218,560	1,105	152,279
„ Air dried	1,775	352,397	1,563	306,912
Sheep skins, Dry salted	823	163,683	636	115,790
„ „ Air dried	92	22,904	217	54,664
Goat Skins, Dry salted	18	3,981	24	4,374
„ „ Air dried	118	38,971	132	34,722
TOTAL	4,118	800,486	3,677	668,741

LIVESTOCK IMPROVEMENT.

Good rains in the summer of 1952 produced better grazing than average over most of the country and this coupled with improved control of disease gave the pastoral people a happier year than usual. The only important exceptions were the Taposa cattle owners near the Kenya and Ethiopia borders where the rains were poor.

The cumulative effects of mass immunisation against rinderpest and contagious bovine pleuro-pneumonia and improved control of trypanosomiasis during the preceding few years brought about a conspicuous increase in the size of herds, particularly in the western provinces. The animal industry was in fact emerging from the first or survival stage of development into the next or quantitative stage and numbers were increasing rapidly. It was obvious that plans should be made without delay to make the best economic use of this added wealth and to guard against numbers increasing beyond the carrying capacity of the land. These plans would aim at increasing the offtake of cattle to keep pace with the higher production rate, at making available the maximum possible grazing and at improving the quality of stock by selective breeding *i.e.* developing the industry into its final or qualitative stage.

Such plans were incorporated in a report submitted by the Service on "Animal Industry in the Sudan with Recommendations for its Expansion." This report recommended that until the qualitative stage was attained veterinarians should be responsible for formulating policy relating to all development of livestock and that the Veterinary Service should be reorganised and expanded in order to be able to deal properly with this work. Proposals were made for the creation of Livestock Improvement and Animal Industry Centres in each of the main cattle rearing regions and of Grassland Experimental Centres in each of the main ecological zones and also for developing poultry and dairy industries and for organising improved marketing of cattle. Although these recommendations were accepted by the Government committees concerned, consideration of staff changes necessary was delayed. Implementation of the new policy was thus not possible and work on the development of livestock was consequently restricted.

The Animal Research Officer toured most of the livestock rearing areas and towards the end of the year began a detailed survey of the Kenana cattle in anticipation of the establishment of a Livestock Improvement and Animal Industry Centre in the Fung District.

The study of the suitability of various exotic breeds of poultry was continued at the small Poultry Farm established at Khartoum North during the preceding year. It became clear that white leghorns were superior to brown leghorns black leghorns and anconas.

IMPROVEMENT OF HIDES AND SKINS.

The drive towards improving the preparation of hides and skins was intensified and attention was directed particularly towards those prepared at slaughterhouses. Working in cooperation with Local Government Councils, more approved slaughterhouses were erected, making a total of 19. Staff of the Hides Section were in attendance at most of these slaughterhouses and out of a total of some 37,000 hides prepared they classified (for flay only) 65 per cent as first class, 30 per cent as second class, 4 per cent as third class and 1 per cent. as reject class. A bonus system introduced during the previous year to encourage proper flaying was extended and gave good results.

Some experimental work to compare the effects of straight drying of sheep and goat skins in the sun and in the shade with that of dry salting them was carried out in cooperation with Dr. J. R. Furlong of the Colonial Products Advisory Bureau. The results showed that the drying of sheep and goat skins in the sun in the hot season was detrimental, particularly in the case of sheep skins, but that they could be dried in the shade without damage. Dry-salting showed no advantage over straight shade drying and in some cases this treatment produced poorer quality skins.

PASTURE SURVEY.

Pasture survey of camel and sheep grazing was carried out thus completing the survey of the whole country. An ecological map was produced showing the distribution of the Desert, Acacia Desert Scrub, Acacia Grass Savannah, Woodland Savannah, Swamp and Forest Zones.

A pilot scheme was started in Dar Rizeigat for the fuller utilization of grazing by provision of water by excavating *hafirs* (earth tanks) and prevention of grass fires. Although the land was largely unfavourable hydrologically for this form of water supply the fifteen hafirs dug proved to be very efficient. Complementary to this work some 200 miles of double fire lines were sited, cleared and marked ready for degrassing after the rains so that the eighty metres wide strip of grass between them could later be burnt. These fire lines intersected an area of about 600 square miles.

V. TECHNICAL EDUCATION.

A Veterinary Training School was opened at Malakal early in 1953 for the purpose of providing courses of instruction to Assistant Stockmen, Stockmen and Veterinary Assistants. One course of three months duration was completed and a second one was started ; each course was attended by twenty Assistant Stockmen.

VI. RESEARCH.

*By F. W. PRIESTLEY,
Chief Veterinary Research Officer.*

The work of the Research Laboratory was hampered this year by the loss of Mr. J. T. R. Evans, Assistant Director (Research) on his appointment to the post of Director of Veterinary Services. His initiative and drive have been and will be greatly missed. It should be mentioned however that the smooth running of the laboratory was in no small part due to the administrative ability of Mr. T. M. Leach who acted as Chief Research Officer for most of the year.

ROUTINE WORK.

Table I shows the issues of biological products to the various Provinces during the year.

Rinderpest Tissue Vaccine.

Demands for this vaccine have declined progressively with the increasing use of goat and rabbit attenuated virus. A production target of 80,000 nominal doses was set and attained using 310 bulls.

Rinderpest Antiserum.

During the year it was ruled that no further antiserum should be prepared, since it was falling into disuse in the face of the widespread use of virus vaccines.

Goat Attenuated Rinderpest Virus.

Demands for this product continued at the same high level as last year. In some areas however field staff reported that, as a result of the successful mass immunisation campaigns in recent years, only a few young stock were presented for inoculation.

Rabbit Attenuated Rinderpest Virus.

It has been demonstrated in Kenya that the immunity engendered by this virus persists for at least 2 years, and this may seriously impair the immunity set up by a later injection of goat virus. As a result of this finding the use of rabbit virus has been restricted to the southern Provinces since December, 1952.

TABLE I.

PROVINCE	Blue Nile	Kordofan	Kassala	Darfur	Khartoum	Northern	Upper Nile	Equatoria	Bahr El Ghazal	Total
Rinderpest Tissue Vaccine	Nil	Nil	23,680	Nil	3,600	4,640	240	1,440	1,360	34,960
Goat Attenuated Virus	125,434	309,000	5,500	140,013	186	Nil	135,000	58,424	189,076	962,633
Rabbit Attenuated Virus	Nil	63,850	Nil	1,000	200	Nil	80,000	31,380	192,350	368,780
C.B.P.P. Culture Vaccine	99,350	295,750	800	286,600	3,700	2,250	105,700	94,100	416,250	1,304,500
C.B.P.P. Egg Vaccine	9,100	10,000	Nil	62,100	200	Nil	Nil	13,000	75,500	169,900
Anthrax Vaccine	21,700	36,500	3,900	93,000	11,600	100	30,000	Nil	400	197,200
Black Quarter Vaccine	180	15,240	60	240	60	Nil	Nil	4,200	Nil	19,980
Haemorrhagic Septicaemia Vaccine	2,220	6,300	1,080	6,300	60	Nil	7,500	Nil	180	23,640
Horse Sickness Vaccine	530	340	281	254	15	126	19	12	30	1,607
Fowl Typhoid Vaccine	—	—	—	—	—	—	—	1,000	600	1,600
Newcastle disease Vaccine	1,500	600	1,000	Nil	3,700	Nil	200	100	300	7,400
Rabies Vaccine	1	—	—	—	389	—	—	—	10	400
Fowl Cholera Vaccine	—	—	—	—	—	—	—	—	600	600
Tetanus anti toxin (100 units)	400	60	—	—	60	—	—	—	—	520

Contagious Bovine Pleuro-Pneumonia Vaccine.

In response to demands, production this year was carried to a higher level than ever before, 1,474,400 doses being issued.

During the year, reports from several provinces cast doubt on the immunising ability of the vaccine, as clinical cases were occurring in animals inoculated with vaccine only four to six months previously. All reports agreed, however, that the vaccine was of value in suppressing outbreaks of the disease. In an attempt to overcome the defective immunising ability of the vaccine, seed material was only used for a limited number of generations after the safety point had been reached.

In May and June of this year 133,350 doses of egg pleuro vaccine from Kenya were issued. This figure is included in the total issued for the year, shown above.

Diagnosis of Specimens.

A total of 705 specimens was examined during the year.

In general the specimens were representative of those made in previous years. An unusual organism was a para colon bacillus isolated from the faeces of a cow at the Belgravia Dairy.

The total given above does not include many flocculation tests for contagious bovine pleuro-pneumonia nor does it include the many Brucella agglutination tests carried out with sera from Blue Nile Province.

EXPERIMENTAL WORK.

1. Trypanosomiasis—The Therapeutic Action of Ethidium Bromide.

(El Amin Eff. El Karib and Mr. T. M. Leach).

This work was carried out under the direction of Mr. J. T. R. Evans and was a continuation of his previous work.

Two members of the staff of Boots Pure Drug Co., Mr. E. J. H. Ford, B.Sc., M.R.C.V.S. and Mr. E. C. Wilmshurst, B. Pharm, B.Sc., arrived in Khartoum early in January and collaborated; they stayed in the Sudan for about four months.

The results of the experiments in detail are being published elsewhere. Only a summary is given here.

(a) Therapy of *T. congolense* infection in cattle.

Number treated.	mg/kg.	Period observed	Relapses
7	0.125	16 weeks	2
7	0.25	"	0
7	0.5	"	1
7	1.0	"	0
7	1.5	"	0
7	—	"	all died.

(b) *Therapy of T. vivax infection in cattle.*

Number treated.	mg/kg.	Period observed.	Relapses.
7	0.25	16 weeks	0
8	0.5	"	0
8	1.0	"	0
7	1.5	"	0
7	—	"	2/7 died.

(c) *Treatment of Ethidium Bromide resistant T. congolense in cattle.*

Drug used.	No. treated.	mg/kgm.	Period observed	Relapses.
Antrycide DMS	6	5.0	9 weeks	0
Dimidium bromide	6	1.5	"	6
Ethidium bromide	6	1.0	"	6

(d) *Treatment of Dimidium Bromide resistant T. congolense in cattle.*

Drug used.	No. treated.	mg/kgm.	Period observed	Relapses.
Ethidium bromide	6	1.0	16 weeks	0
"	6	2.0	"	0
"	6	5.0	"	0
Antrycide DMS	5	5.0	"	0
Dimidium bromide	6	1.5	"	6

(e) *Treatment of Antrycide resistant T. congolense in cattle.*

Drug used.	No. treated.	mg/kgm.	Period observed.	Relapses.
Ethidium bromide	6	1.0	10 weeks	6
"	6	2.0	"	0
"	6	5.0	"	0
Antrycide DMS	6	5.0	"	6

Further experiments, not summarised here and not yet completed, indicate that ethidium bromide is not as good a prophylactic agent as antrycide.

Ethidium bromide in doses up to 2 mg/kg. has failed to cure *T. evansi* infection in camels.

2. **Contagious Bovine Pleuro-pneumonia.** (Nazir Eff. Dafalla).

Through the courtesy of the Director of Veterinary Services, Kenya Colony, samples of the freeze-dried egg vaccine, developed by Sheriff and Piercy, were received for local observation. A small preliminary experiment indicated that the vaccine was a safe immunising agent for Sudan cattle. Six hundred cattle were then inoculated in the Bahr El Ghazal Province without ill effect and a further 480 in Kordofan Province of which 12 showed transient swellings and two died. During the last two months over 50,000 doses of this vaccine have been issued each month without untoward incident. Although rather more trouble to handle in the field the egg vaccine, owing to its longer storage life and relative stability, appears to mark a considerable advance over the old culture vaccine. Experiments are now being carried out to determine the maximum periods at various temperatures for which the vaccine can be stored without loss of efficiency.

Experiments have shown that, in 10 per cent Serum broth, the pleuro-pneumonia organism is destroyed by 16.5 per cent. absolute alcohol. Three bulls were inoculated once with such an alcoholised culture in doses of 5, 10 and 15c.c. respectively. Flocculating and bactericidal antibodies were developed. Two months after inoculation these animals together with two controls were tested in the usual way for immunity. The controls developed swellings which led on to death in about one month; the vaccinated animals developed swellings later than the controls but these resolved and all three animals recovered. It was concluded that the alcoholised vaccine had protective properties. This observation, if confirmed on a bigger scale, while being of little practical importance, will be of great importance to an understanding of the immunity process.

There is evidence that the pleuro-pneumonia organism in culture survives better at pH values above 7.6 than at pH 7.6 or below.

Further attempts to devise an *in vitro* test to distinguish virulent from non-virulent strains have failed.

The pleuro-pneumonia organism fails to grow in broth containing concentrations of bile above 1.5 per cent.

An interesting serological finding has been that sera from animals dying of pleuro-pneumonia agglutinate only non-virulent organisms whereas sera from recovered animals agglutinate both virulent and non-virulent organisms. These tests have so far only been carried out with a small number of sera and clearly need confirmation, but if that is forthcoming it will provide yet another factor to a more complete understanding of the immunity process.

The effect of penicillin on pleuro-pneumonia vaccine has been studied by Mr. R. W. White. The value of penicillin in controlling contamination of pleuro-pneumonia cultures has been shown in many ways. Following White's (1952 Br. Vet. J. 108, 111) work, experiments have been carried out on the effect of penicillin on vaccine. A fairly large experiment, carried out at Malakal, has given inconclusive results and it is proposed to extend the work in the coming year.

3. Foot and Mouth Disease. (Mohd. Eff. Ali Mihemied).

In October last year an outbreak of foot and mouth disease occurred amongst trade cattle quarantined at Khartoum North before shipment to Egypt. Because of the prior occurrence of foot and mouth disease, these animals had been artificially infected in Kordofan with the two strains of virus previously recognised in the Sudan (W/M and Kn.Q), shortly before being entrained from El Obeid.

Cross immunity experiments, using virus from lesions in cattle at Khartoum North and the two known strains of virus, demonstrated that a third strain was responsible for this outbreak. This strain has provisionally been labelled NQ.

The three strains of virus have been sent to Dr. I. A. Galloway at Pirbright for typing.

Further experiments showed that:—

- (i) Calves inoculated with a mixture of the two viruses W/M and Kn.Q were immune to the separate components of the mixture when tested 10 days after inoculation.
- (ii) Calves inoculated with infective material recovered from animals previously inoculated with a mixture of the above two viruses were solidly immune to W/M and partially immune to Kn.Q.
- (iii) Calves inoculated with a mixture of the three viruses became solidly immune to the separate components of the mixture when tested 10 days after inoculation.
- (iv) Calves inoculated with infected material recovered from animals previously inoculated with the above mixture became solidly immune to W/M only.

These observations showed that the W/M virus proliferated more rapidly than the others.

Further experiments in this laboratory have indicated that the duration of immunity following lingual inoculation is not anything like as long as has previously been thought.

The following table shows some typical results:—

Bull No.	Virus tested	1st Inoculation		2nd Inoculation	
		Date	Result	Date	Result
604	Kn.Q	13.11.52	+	18.2.53	+
901	"	"	+	"	+
605	W/M	"	+	"	+
693	NQ	"	+	"	—
911	W/M	4.2.53	+	20.6.53	+
941	"	"	+	"	+
905	3 typs.	1.3.53	+	16.6.53	+
943	"	"	+	"	+
960	"	"	+	"	+
962	"	"	+	"	+
963	"	"	+	"	+
966	"	"	+	"	—

Thus of four animals tested only one was immune 97 days after the primary inoculation; of 6 animals only one was immune after 107 days; and of 2 animals one was immune after 136 days.

Experiments on a larger scale designed to confirm this finding are now in progress.

4. Brucellosis.

Following cases of undulant fever among humans at Barakat agglutination tests were carried out on sera from cattle, sheep and goats at Kilo 99 ; these animals had supplied Barakat with milk.

Initial tests showed a number of positive reactors and cultures from the milk of some of the strong reactors showed the presence of *Br. melitensis* in all three species of animal.

Following the isolation of the organism, further agglutination tests were carried out on sera from animals at Kilo 99 and in the surrounding villages. Up-to-date a total of 797 sera have been examined. The results were as follows :—

SITE	Cattle		Sheep		Goats	
	No. Examined	No. Positive	No. Examined	No. Positive	No. Examined	No. Positive
Kilo 99	93	10	119	27	284	32
Gezira Res. Farm	100	0	—	—	—	—
Other Villages ...	83	3	54	0	64	2

The figures showed that there was more infection at Kilo 99 than in the other localities and that infection, in this area, is heavier among sheep (22.7 per cent) than among either cattle (10.8 per cent) or goats (11.3 per cent).

MISCELLANEOUS.

A formal course of instruction for Stockmen has been started. Classes are held two or three times a week. The emphasis now is on elementary laboratory technique and this will gradually lead up to more advanced work. The Stockmen's lack of knowledge of the basic sciences presents a difficulty, but this is offset to some extent by their enthusiasm.

VII. ACKNOWLEDGEMENTS.

The Service welcomed visits by Dr. R. Taylor and Mr. H. Hoogstraal of the United States Medical Research Unit, Cairo, who visited the game eviction area to investigate the possibilities of some game animals acting as reservoirs of infection of certain human diseases and to collect parasitological specimens ; by Dr. Alan Mozley who examined the problem of control of liver fluke infestation in Kosti District ; and by Mr. G. C. Brander of the Cooper Research Station who spent a few days discussing the control of parasitic diseases. Messrs E. J. Ford and E. C. Wilmshurst of Boots Pure Drug Co., spent four months at Khartoum collaborating with the Research staff in experiments to determine the value of ethidium bromide in the treatment of bovine trypanosomiasis.

It is a pleasure to record an appreciation of the help given to the Service by provincial and departmental staff when called upon. Whatever success has been achieved in providing a sound animal health service has to no small extent been due to their willing cooperation.

Finally, I acknowledge with gratitude the good work of my staff and the loyal support they have given to me.

J. T. R. EVANS.

Director, Sudan Veterinary Service.

KHARTOUM.

APPENDIX No. 1.

STAFF.

Distribution of Senior Technical Staff on 30th June, 1953.

DESIGNATION	NAME	STATION
Headquarters.		
Director	J.T.R. Evans, B.Sc., M.R.C.V.S.	Khartoum
Deputy Director	J.D.M. Jack, M.R.C.V.S.	"
Asst. Director	A.W. Chalmers, M.R.C.V.S.	"
Animal Research Officer	Mohd. Said Bayoumi, B.Sc., (Agric.), Ph.D. (Animal Husbandry).	"
Inspector, Headquarter.	J. McKay, M.B.E.	"
Asst. Superintendent	Ibrahim Hassan Ostogan	"
Hides Section.		
Inspector of Hides	E. Knew, Dip. Leathersellers Coll.	Omdurman
Hides Officer	Fuad Hassan Lutfi	"
Field Service.		
Senior Veterinary Inspector	I. A. Gillespie, O.B.E., M.R.C.V.S.	El Obeid
" " "	P. Durran, M.R.C.V.S.	El Fasher
" " "	J. K. Thomson, M.R.C.V.S., D.V.S.M.	Wad Medani
" " "	P. Z. Mackenzie, M.B.E., M.R.C.V.S.	Wau
" " "	H. B. Laxmoore, B.Sc., M.R.C.V.S.	Final Leave
Veterinary Inspector	D. G. Clow, M.R.C.V.S.	Malakal
" " "	Ibrahim Mohd. Khalil, Dip. Vet. Sci.	"
" " "	M. J. Henigan, M.R.C.V.S.	Torit
" " "	D. J. Stewart, M.R.C.V.S.	Kassala
" " "	A. W. Polden, M.R.C.V.S.	Fangak
" " "	R. G. Pearson, M.R.C.V.S.	Khartoum
" " "	J. D. Paterson, M.R.C.V.S., D.V.S.M.	Kosti
" " "	Zein El Abdin Mahmoud, Dip. Vet. Sci.	Nyala
" " "	Hussein Hassan Abbo, Dip. Vet. Sci.	Study leave
" " "	Ahmed Magdoub Abdoun, Dip. Vet. Sci.	Rumbek
" " "	T. G. E. Gibson, M.R.C.V.S.	Kosti
" " "	Saad Muhanna, Dip. Vet. Sci.	Shendi
" " "	Gafar Karar, B.Sc. (Cairo)	El Obeid
" " "	K. Horlyck, Reg. Danish Veterinarian	Singa
Veterinary Officer	Ahmed Mohd. Dahab, Dip. Vet. Sci.	Malakal
" " "	Salah el Din Imbabi, Dip. Vet. Sci.	El Obeid
" " "	Obeid Mohd. Ali Akod, Dip. Vet. Sci.	Malakal
" " "	Saleh Mohd. Gaheen, Dip. Vet. Sci.	Singa
" " "	Mohd. Nasri Hamza, B.V.Sc. (Cairo)	Khartoum
" " "	Ahmed Abdel Gader, Dip. Vet. Sci.	El Obeid

DESIGNATION	NAME	STATION
Veterinary Officer	Salman Bedri, Dip. Vet. Sci.	Kosti
" "	Mohammed El Taber, Dip. Vet. Sci.	Wau
" "	Abbaasher Ali, Dip. Vet. Sci.	El Fasher
" "	Yahia Mohammed Hassan, Dip. Vet. Sci.	El Obeid
" "	Yousef Ibrahim Atabani, Dip. Vet. Sci.	Khartoum
" "	Yassin Hakim Ali, Dip. Vet. Sci.	Malakal
Laboratory Services.		
Chief Research Officer	F. W. Priestley, M.R.C.V.S., Dip. Bact. (London)	Khartoum
Veterinary Research Officer	T. M. Leach, M.R.C.V.S., D.V.S.M.	"
" " "	El Amin Abdalla El Karib, Dip. Vet. Sci.	"
" " "	Mohamed Ali Mehmeid, Dip. Vet. Sci.	"
" " "	El Nazeer Dafalla, Dip. Vet. Sci., Dip. Bact. (Manchester).	"
Laboratory Technician	R. W. White, F.I.M.L.T.	"
" " "	J. A. Aspey, A.I.M.L.T.	"
Pasture Research Officer	M. N. Harrison, B.Sc. (Agric.)	"
" " "	J. H. Davies, B.Sc. (Agric.)	Malakal
" " "	A. W. Peers, B.Sc. (Agric.)	Khartoum
" " "	W. H. Foster, B.Sc. (Agric.)	"
Tsetse Reclamation Officer	T. W. Chorley, M.B.E.	Wau
Veterinary Entomologist	E. T. M. Reid, B.Sc.	"
" " "	P. Blasdale, B.A.	"
Field Officers	A. W. Wild	"
" " "	R. E. Woodhouse	"
" " "	W. I. A. Does	"
" " "	P. J. Henshaw	"
Field Zoologist	N. A. Hancock, B.Sc., A.R.C.S.	"

Establishment of classified Technical Staff on 30th June 1953.

Unit	Establishment	Designation of Post
Headquarters	1	Director.
	1	Deputy Director.
	1	Assistant Director.
	1	Animal Research Officer.
	1	Inspector Headquarters.
	1	Assistant Superintendent.
Hides Section	1	Inspector of Hides.
	1	Hides Officer.
	3	Hide Graders.

Unit	Establishment	Designation of Post
Field Services	5	Senior Veterinary Inspectors.
	16	Veterinary Inspectors.
	13	Veterinary Officers.
	29	Veterinary Assistants.
	37	Head Stockmen.
Laboratory Services	1	Chief Research Officer.
	6	Veterinary Research Officers.
	2	Laboratory Technicians.
	5	Pasture Research Officers.
	1	Tsetse Reclamation Officer.
	3	Veterinary Entomologists.
	4	Field Officers.
	1	Field Zoologist.
	6	Veterinary Assistants.
	7	Head Stockmen.

APPENDIX No. 2.

FINANCE.

The following table shows a comparison of the budgetary revenue and expenditure of the Service in 1952/53 with the actual revenue and expenditure in 1951/52.

	1951/52	1952/53
	£E.	£E.
1. Revenue	88,757	75,370
2. <i>Expenditure</i> :		
(i) Personnel and Personal Allowances	171,778	196,595
(ii) Services	128,035	145,780
(iii) Capital	5,710	12,410
TOTAL	305,523	354,785
3. Development Budget	51,852	75,906

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