

Preliminary observations on the effect of draft work on growth and trypanotolerance of N'Dama oxen

by

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Introduction

There is a general feeling among many farmers, livestock owners and agricultural technicians that the utilization of N'Dama for draft work can adversely affect the growth performance and disease tolerance of the animal. This feeling is based mainly on the slow growth characteristics, small size and the close genetic association of N'Dama with other beef breeds. The belief is also probably due to the general concept that draft work can break down the *trypanotolerance* of N'Dama in areas of tsetse infestation. The prevalence of this belief in Liberia prompted the Central Agricultural Research Institute (CARI), Suakoko, to investigate the actual situation in a very limited way. Animal traction technology is currently only at an experimental stage in Liberia and the only work animals in the country are at CARI. Therefore information gathered here may only relate to N'Dama draft oxen managed on-station.

Materials and methods

Tsetse population (*Glossina palpalis*, *G. pallicera pallicera* and *G. fusca*) and their challenge are considered medium at Suakoko where this investigation was carried out. Tsetse sampling was carried out in the area with biconical traps by the Bong Mine Trypanosomiasis Research Unit of the Tropical Institute, Hamburg, in 1984-1985. Although *Trypanosoma vivax* and *T. brucei* were revealed from blood samples examined in the area, the most

common species generally encountered was *T. congolense*. Positive serological reactions were observed for 80% of the untreated N'Dama cattle examined in 1984.

On August 20, 1984 sixteen young apparently healthy N'Dama castrates aged between 2 to 3 years were selected by draft characteristics to take part in this trial. Initial selection of all animals was also based on the negative findings of trypanosomes in blood samples examined. However, sera from the experimental animals were not checked for antibodies to trypanosomes. Faecal samples from all animals were also screened for parasitic eggs and those found positive were treated with *Thiabendazol* (Merk Sharp Dhome) at the rate of 110 mg per kg body weight ten days prior to the actual starting of the experiment. After the initial body weights for all animals were recorded, they were divided into two equal groups having approximately the same body weights (1/9/84).

Twenty-five acres of signal grass (*Bracharia brizantha*) pasture intercropped with legumes (*Centrocema* and *Stylosanthis*) were used for pasturing the animals. Both groups were managed together in the same field and were allowed free grazing. Animals were permitted to remain in the pasture day and night. They were not sheltered but had access to the barn during rain at their free will. The working group was naturally deprived of grazing for about two hours a day during the training period of 5 weeks and approximately 4 to 5 hours a day for six days a week during the working period of approximately one year. All animals

Table I. Growth rate of working and non-working N'Dama oxen at CARI 1984-85

Date	WORKING GROUP (N=8)				NON-WORKING GROUP (N=8)			
	Live-weight (kg)		Monthly gain (kg)		Live-weight (kg)		Monthly gain (kg)	
	Total	Mean	Total	Mean	Total	Mean	Total	Mean
Sept 84	1456	182			1440	180		
Oct 84	1460	183	4	0.5	1528	191	88	11
Nov 84	1504	188	44	5.5	1568	196	40	5
Dec 84	1592	199	88	11	1616	202	48	6
Jan 85	1704	213	112	14	1696	212	80	10
Feb 85	1808	226	104	13	1768	221	72	9
Mar 85	1920	240	112	14	1856	232	88	11
Apr 85	2046	256	126	16	1912	239	56	7
May 85	2136	267	90	11	1960	245	48	6
June 85	2248	281	112	14	2032	254	72	9
July 85	2368	296	120	15	2096	262	64	8
Aug 85	2464	308	96	12	2176	272	80	10
TOTAL GAIN		1008			736			
PERCENTAGE GAIN		69%			51%			

had access to clean drinking water and mineral licks at all times. Animals in both groups were not provided with supplementary feeds or fodder until the end of the experiment.

The working group of eight animals were trained for agricultural traction as described by Starkey (1981). Ox plowing and harrowing equipment for work was purchased from the Sierra Leone Work Oxen Project. Working of animals was 4 to 5 hours per day, six days a week, and continued till the end of the experimental period of one year. Oxen were always used in pairs and were pulling implements that had a weight of 40 kg at an approximate speed of 2.5 km/hour. Plowing and harrowing of well developed and partially developed upland and swamps were the only work performed by the group.

Animals in both groups received hand spraying of 0.1 to 0.2% *Asuntol* (diethyl phosphorothioate manufactured by Bayer) once every 2 to 3 weeks for external parasites (mainly ticks) and a drench of *Thiabendazol* at the rate of 110 mg/kg body weight once every two months for intestinal nematodes. Animals in both groups

were weighed once every month and their body weights recorded. Blood samples from all animals were collected once every month (before 8 a.m.) for detection of trypanosomes and determination of Packed Cell Volume (PCV) percentage. Examination of blood for trypanosomes was carried out both by Haematocrit Centrifugation Technique (HCT) and by miniature Anion Exchange Centrifugation Technique (mAECT).

During the course of the experiment chemotherapy was not employed for those that developed parasitaemia. This was to help measure the natural duration of parasitaemia, and to observe the animals' ability to overcome anaemia and to eliminate the parasite.

The effect of agricultural traction on the growth rate of the working group was determined by comparing their average weight gain percentage for one year with that of the non-working group. The effect of work on the trypanotolerance of work animals was determined by comparing the intensity of anaemia and the intensity and duration of parasitaemia in natural infections with that of the controls.

Anaemia was estimated by measuring the PCV.

Results and discussion

Reports indicate that N'Dama draft animals can work and thrive under village conditions and that they can sustain an average traction of 14 per cent of their body weight, while the figure for other breeds is 10 to 12 per cent (Starkey, 1984). However, the natural tsetse challenge in such areas is not mentioned.

The management and nutritional requirement of N'Dama draft animals in tsetse-infested areas for varying levels of tractive effort and speed is not clear. In our trial at CARI where the tsetse challenge is medium, the N'Dama oxen aged 2.5-3 years and managed under a good pasture grazing system without supplementary feeds when used for moderate agricultural traction had gained significantly higher body weights in one year compared to non-working animals managed under the same conditions (Table 1).

It was noticed during the initial period of weight recording that the growth rate of draft animals was slower than that of the controls (October, November 1984). This may have been due to the sudden exposure of the animals to training and work, which their subsequent faster weight gains suggests. Weight recordings carried out for a one-year period indicate that work animals had 18% higher body weight gains at the end of the experiment compared to the controls. The actual reason, although not clear, may be the moderate work which improved appetite and thereby the intake of fodder at grazing.

Starkey (1984) has quoted Reh and Horst (1982) that N'Dama draft cows in Sine-Saloum in Senegal had significantly higher carcass weights than females maintained in herds, they had higher dressing-out percentages and they fetched higher live-weight prices from butchers. He further quotes that the improve-

ments in performances of draft cows over traditionally maintained herds are attributable to the higher levels of management, supervision and nutrition given to draft animals. Although the above observation pertains to draft cows under a traditional system of management, it is possible to believe that the same may also hold true for draft oxen. However, in our experiment the level of feeding, attention and supervision was the same for both working and non-working animals.

The trypanotolerance of N'Dama is believed to depend upon the N'Damas' inherent capacity to control and reduce parasitaemia. It is also believed to be related to their superior innate immune response. According to Murray, Trail and Wissocq (1983) trypanotolerance can be supplemented or reduced by a number of factors affecting the host and its environment. The factors include stress (work, pregnancy, parturition, lactation and suckling), intercurrent disease and poor nutrition. According to Murray and his co-workers the most important factor that would affect the stability of trypanotolerance is the severity of trypanosomiasis risk to which animals are exposed. As the level of risk increases the productivity falls and that the N'Dama can suffer severely from disease, leading to stunting, wasting, abortion and even death.

In our experiment two animals each from the control and working groups exhibited parasitaemia (*T. congolense*) during the one-year period. The Haematocrit Centrifugation Technique employed was not enough to reveal trypanosomes in any of the cases. Parasitaemia could not have been detected if miniature Anion Exchange Centrifugation Technique had not been employed. Although none exhibited clinical symptoms, the intensity of parasitaemia and anaemia measured was greater for the controls than for the work oxen. The duration of parasitaemia was also observed to be longer (3 months) for the controls than for the work animals (1 to 2 months).

The better health status of the work animals as evidenced by their higher body weight gains probably helped them to resist the anaemia and to eliminate the trypanosomes more quickly from their blood. However, because sera from these animals were not checked at the outset of the experiment for antibodies to trypanosomes, it was not possible to understand if any of them had previously suffered from the disease. Animals with previous experience of trypanosomiasis are known to eliminate the parasites faster than others. Furthermore, animals revealing parasitaemia were few for both groups and therefore observations made here may not have high statistical significance. Thus from the limited observations made so far, trypanotolerance of work oxen appears superior as evidenced by low parasitaemia and anaemia and their ability for faster elimination of trypanosomes. The experiment continues.

Summary and conclusion

In areas of medium tsetse challenge, N'Dama work oxen gained 18% more body weight in one year than controls maintained under the same pasture grazing system. On the basis of a few observations, the trypanotolerance of work oxen was also noticed to be superior under conditions above as evidenced by their low parasitaemia and anaemia, and their ability for the faster elimination of trypanosomes.

References

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