Drought: Malnutrition and Parasitism

T.J. SCHILLHORN V. VEEN
Dept. Parasitology & Entomology
Fac. Veterinary Medicine
Ahmadu Bello University
Zaria

SUMMARY

The relation between nutrition and parasitism is discussed in short, after which some general observations are given on the drought problem in the Zaria area. Sedentary herds were most severely affected, mainly by secondary effects of the drought, i.e. the breakdown of resistance to parasitic infections.

Cattle and sheep from the drought-affected areas showed high prevalence of helminth infections at the end of dry season.

Some suggestions are given on the prevention of helminthiasis during drought periods, especially in relation to sedentary herds.

INTRODUCTION

General

The relationship between parasitism and nutrition is widely known and has been recently reviewed by Frye (1955), Scrimshaw, Taylor and Gordon (1968), Reveron and Topps (1970) and by Todd, (1971). Basically, the relationship is apparent in two ways:

1. by the influence of nutrition on parasitic infections.
2. by the influence of parasitism on nutrition

The first relationship is evident in most parasitic infections and has been reported in many diseases, parasitic and non-parasitic; low levels of nutrition increase the susceptibility to a natural challenge. Quantitative reduction of the ration, protein deficiency, deficiency of vitamin A and minerals have all been related to a lower resistance of the host to a wide range

of parasites. Of relevance to Nigerian conditions are the reports of lowered resistance in ectoparasitism (Roberts, 1953; O'Kelly and Seifert 1970) trypanosomiasis (MacLennan, 1970), fascioliasis, (Graber, 1971), and gastro-intestinal helminthiasis (Gibson, 1955; Poeschel and Todd, 1969; Gordon, 1964). In the latter two diseases, the 'nutritional' breakdown of resistance that occurs in arid areas is an important feature in the epizootiology of these diseases. The explanation for this nutritional breakdown has been widely studied. Reasons for the phenomenon, given by Bawden (1969), were the decreased ability to repair damage and the breakdown of the immunological status.

The second relationship, the influence of parasitism on nutrition, is especially important in gastro-intestinal parasitism. Intestinal helminths are known to cause considerable depression of the fodder intake, which may reach up to 10 % of the ration (Bawden, 1969). More important in these helminth infections, however, is the depression of the digestive efficacy caused by impaired absorption through the inflamed intestine (Bawden, 1969), by the leakage of the host's protein (Leland, Drudge and Wyant, 1960) and by increased intestinal motility. Besides this direct relationship, indirect causes like disturbance by flies and ticks also reduce the fodder intake in many domestic animals species.

The Nigerian Situation

Undernourishment and deficiency are so common in Nigeria that man and animals have more or less learned to live with it. At the end of the dry season every year, many cattle owners take up the nomadic way of life again due to the lack of fodder and water. The real nomadic Fulani have adapted their husbandry system to the lack of grazing and water during the dry season and move in annual 'circuits' which provide their cattle sufficient fodder and water throughout the year. However, the nutritional stress at the end of dry season is noticed by man and animals throughout the northern States of Nigeria.

The actual difference between a normal and a drought year, considered from a livestock point of view, is academic. The main reasons that the "normal" drought at the end of every dry season did not cause the same clinical signs as the real drought of the last two years is the adaptation of the local villagers and cattle men to this situation. Fatal signs of the annual undernourishment in livestock are only observed in settled and semi-settled herds and in animals under special stress, e.g. young calves. Nomadic Fulani are seldom severely affected as long as they move in time. During these drought periods, they may indirectly be affected when they have to move in unknown areas risking diseases like trypanosomiasis and plant poisoning.

Own Observations in the Zaria Area

In 1973, a so-called drought year, we were able to make some observations of animals in the Zaria area, the southern border of the drought-affected region. The number of animals passing southwards was much higher than in previous years. At the very end of the dry season an especially high number of normally

settled or semi-settled herds were trekking southwards, some for the first time in five or ten years.

Most of the settled and semi-settled herds in the Zaria area did not move far, but the cattle suffered from many more disease problems than normal. In cattle and sheep especially a high prevalence of normally uncommon clinical infections such as lice, eyeworms (*Thelazia*) and intestinal helminths were noticed. The herdsman's complaint was often "samore" (trypanosomiasis) but the prevalence of confirmed trypanosomiasis was actually lower than in the previous years, a trend which has continued this year, possibly related to the effect of the drought on the fly distribution.

In Zaria and Samaru slaughterhouses, many poor-looking animals were slaughtered for low prices during the end of dry season. In July, 1973, we compared some parameters in emaciated cattle versus normal cattle. The emaciated cattle originated mainly from the Katsina/Maradi area, whereas the normal cattle came mainly from the Zaria/Kano area. Of the 50 emaciated cattle examined in Zaria slaughter-house in July, 48 proved to be females; the average age of these female cattle was 12 years with the oldest approximately 16. The results of the blood and faecal examination are given in Tables 1 and 2, and are compared with the figures of cattle in the University Farm, which were in a reasonable condition. The difference between the packed cell volumes was significant ($P < 0.05$). The number infected with trypanosomes was fairly low, which is not so surprising as the animals came mainly from the region north of Zaria which is only partly infested with tsetse. The prevalence of other blood parasites was low and shows no difference with the 'normal' cattle.

TABLE 1

Packed cell Volume, and number of Animals, out of total examined, Infected with Pathogenic blood parasites, comparing Emaciated and Normal Cattle.

	Emaciated cattle	Normal cattle (Zaria)	Normal cattle (University Farm)
Packed cell volume (mean and standard deviation)	26.9 ±6.27	33.0 ±6.19	35.0 ±4.96
Number of cattle infected With trypanosomes out of total number examined	1/50	4/91	0/68

TABLE 2

Results of Faecal Examination of Samples from Emaciated and Normal Cattle (Number infected, out of total number examined).

	Emaciated cattle	Normal cattle (Zaria)	Normal cattle (University Farm)
Infected with liverfluke	8/50	46/91	43/68
Infected with gastro-intestinal nematodes.	48/50	82/91	46/68
Infected with g.i. nematodes; faecal egg count over 500 e.p.g.	26/50	21/97	1/68
Infected with g.i. nematodes; faecal egg count over 1000 e.p.g.	15/50	10/91	0/68

The results of the faecal examination showed a low prevalence of liver fluke infections in the emaciated cattle, which may be a proof of the fact that these animals originated from the drier areas in the north which were not infested with *Lymnaea natalensis*, the intermediate snail host of liver flukes. The prevalence rate of 51 % in the other animals is in agreement with other figures from the Zaria/Kano area. The high prevalence in the University Farm is well known and is often found in animals grazing around permanent lakes and other water reservoirs.

More interesting, however are the results of the examination for gastro-intestinal nematode infections. The number of animals showing a faecal egg count of a pathogenic level (Ross and Armour, 1960) was especially high in the emaciated cattle.

The very low number of animals with pathogenic infections in the University Farm, where the animals had not been treated for gastro-intestinal nematode infections, showed that clinical levels of infection can more or less be prevented by good nutrition. In the same period (July) we were also able to examine a flock of sheep, mainly Balami, which were grazing around the Zaria cattle market. This flock of about 50 sheep came from Maradi. The original number of 200 had been reduced during the journey southwards. More than half of these sheep showed oedema (bottle jaw), often observed in final stages of severe gastrointestinal helminthiasis. Faecal examination of these animals revealed a very low or negative egg count in the young lambs and high egg counts in the adult sheep. These egg counts were of pathogenic level as can

be seen in fig. 1, where the trichostrongyle egg counts are compared with the egg counts of other nomadic sheep in the Zaria area and of sheep in the University

Farm during the same time period. The pathogenic level of 750 eggs per gram is based on the criteria given by Ross and Armour (1960).

Fig. 1 — Mean Trichostrongyle Eggcounts of Sheep from Drought Area (Niger), Zaria Area and University Farm During June/July 1973

DISCUSSION

In general, it appeared that the undernourished animals are more often affected by helminth infections than by infections due to blood parasites. It is difficult to

give an explanation, especially since the number of samples is low. It appears, however, that the undernourishment of the animals causes a breakdown of resistance especially in case of the helminth infections. The different response of helminths

- a) (For better understanding of these figures, one should realise that the climatic conditions in N. Nigeria are only favourable for development of the nematode larvae during the rainy season. The only time during which the cattle acquire a new infection is the period between May and October. The egg counts of these animals represent an infection which has been acquired before the beginning of the dry season in the previous year).

compared with blood parasites during undernourishment is also common in human medicine, often explained by different reactions of the immune systems. (Smythe, Brereton, Stiles, Grace, Mafo-yane, Schonland, Roovadia, Loening, Parent and Vos, 1971.)

Also in the Zaria area, it appeared that the settled herds are more affected than the true nomadic herds. Bembello (1970) found the same in Niger which he attributed to the fact that the cattle and the owners are less used to the long distance trekking than the true nomads. In general settled herdsmen are reluctant to move and, in periods of drought, often move too late and do not find enough food or water for their animals on the route southwards. They are also less knowledgeable about the best and safest way to take.

Bembello also found that the animal most affected were the old cows and the young calves. The older cattle were often unable to eat enough food during the dry season due to their worn incisor teeth. The calves suffered from poor milk production of the dams during this period. Moreover, some of the milk normally used to feed the calves was used for human consumption.

Considering these preliminary results, what can be done in the Veterinary field to improve the performance of the cattle during drought conditions? Since under-nutrition affects the resistance of animals against chronic (parasitic) diseases during the dry season, an improvement of the feeding of these animals should first be a requirement. Water supply is in this context less important. Actually, even short term aid projects should not concentrate too much on the provision of water. Water, without proper feeding causes more problems since animals will stay around waterpoints; the area around

these waterpoints will soon be overgrazed which deteriorates the areas and deteriorates the conditions of the cattle up to a point that the diseases "break through". These instances do occur, especially in areas with a low carrying capacity, often along the main cattle route southwards.

Most of the important helminth infections which appear at the end of the dry season can be treated during the dry season before the clinical outbreaks occur. These prophylactic treatments are of much more importance than therapeutic treatments after the animals already show clinical signs of chronic helminthiasis, and recovery may then last for months. Sewell (1966) estimates that every liver fluke in Nigerian cattle reduces the annual weight gain by 7 ounces and calculated an annual loss of 6,000 tons of meat, at that time worth ₦2,600,000. Graber (1971) in Chad, estimated that this loss will be much higher during drought years as the weight loss in cattle infected with the same number of liver flukes was 25% higher in undernourished animals than in those with a normal diet. The same effects occur during chronic nematode infections (Gordon, 1964). All these losses can easily be reduced by a simple anthelmintic treatment costing only ten to fifty kobo per animal (depending on the drug used). This veterinary care should especially be aimed towards the settled and semi-settled cattle owners. Not only because they can easily be approached and possibly accept veterinary help, but also because these herds are more affected by parasitic infections (as well as by other diseases). This is related to the higher stocking rates in these farms and to the fact that the animals stay longer in the same (infected) area. From a practical aspect, most of these anthelmintic treatments are or can be combined with the other treatments such as vaccinations

Veterinary care for those farmers consisting of routine vaccination and routine anthelmintic treatment combined with supplements of some protein and minerals (Cloete, 1972) may in future give the cattle owners more faith in the veterinary assistance than in the number of his animals.

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