

Improving the Performance of Trypanosome-Infected Smallstock

Although small ruminants are a significant component of the West African farming system, little attention has been paid to their husbandry, nutritional requirements or disease status. Establishing that nutritional supplementation of ewes is less important than trypanosome control measures should assist in better targeting of limited financial resources on reducing the impact of the disease on rural livelihoods.

Background

Small ruminants such as sheep and goats play a crucial role in West African farming systems. Studies in The Gambia and elsewhere have shown that trypanosomiasis (formerly known as trypanosomiasis), a serious disease spread by the bite of the tsetse fly, can exert deleterious effects on the reproductive performance of both male and female animals. It has also been demonstrated recently that nutritional status can markedly influence the pathogenic impact of the disease. There was, however, a need to examine the influence of nutrition on the productivity and reproductive performance of small ruminants infected with trypanosomes; this could

lead to the development of simple feeding and management strategies for improving their performance in areas of sub-Saharan Africa where the disease is endemic.

Research highlights

Based on a combination of clinical signs and reproductive hormone (progesterone) measurements, a number of useful, general findings were made regarding the impacts of trypanosomiasis on reproductive performance. The disease appeared to have no effect on litter size – or outcomes generally – of pregnancies that were already established at the time of infection. However, trypanosomiasis reduced conception rates at planned breeding times and, under the conditions of the project, nutritional supplementation had no beneficial influence on conception rate or pregnancy rate. Nutritional supplementation did, however, have beneficial effects on litter size and lamb growth rate. Also, it advanced the onset of puberty whilst infection with

trypanosomiasis delayed it. Supplementation of infected animals counteracted some of the adverse effects of infection on age at puberty.

The reduction of reproductive performance caused by trypanosomiasis and the way that performance can be boosted by nutritional supplementation were examined.

West African ewes were fed at maintenance or supplemented with both protein and energy, and half of each group were infected with *Trypanosoma congolense* so that peak parasitaemia occurred at breeding. In samples collected 17, 21 and 26 days after mating, plasma progesterone was elevated, indicating high pregnancy rates in around 80% of the animals in the two uninfected groups. Concentrations of pregnancy-specific protein B (PSPB) at days 21 and 26 were also elevated in these pregnant animals. Progesterone concentrations at 17 and 21 days indicated lower pregnancy rates in the infected ewes – approximately 20% and 40% for the unsupplemented and supplemented treatments respectively. These were confirmed by PSPB concentrations on day 26.

Lambing at term was influenced by supplementation, with all the supplemented uninfected ewes who became pregnant carrying offspring to term, compared with around 40% of

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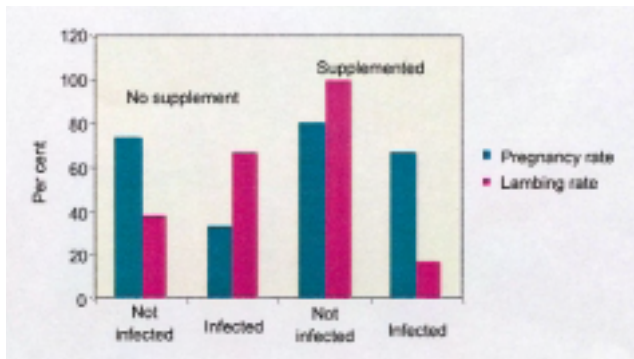
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Small ruminants live closely with the people of West Africa, enhancing livelihoods and providing companionship.



Supplementation of the diet and infection with trypanosomes can have marked but sometimes contradictory impacts on the establishment and maintenance of pregnancy of West African ewes.

ewes in the unsupplemented group. Of the trypanosome-infected animals, lambing rates were better in the unsupplemented group. This may have been due to relatively low levels of parasitaemia or to a degree of trypanotolerance in the experimental animals. Inconsistencies amongst animals in levels of progesterone and PSPB observed in early pregnancy suggested that trypanosomes may reduce PSPB levels and cause embryo loss despite supplementation. Repeated oestrus and very late lambing (up to several months late) in some of the infected group tend to support this view.

Uptake

The project provided original data on the influence of nutrition on the growth and reproductive performance of trypanosome-infected small ruminants. In turn, these findings allowed the identification of potential strategies for improving the performance of small ruminants in trypanosome-endemic areas. Establishing that nutritional supplementation is actually less important during the breeding period than trypanosome control measures

should assist in better targeting of limited financial resources on reducing the impact of the disease on rural livelihoods. In identifying that benefits from nutritional supplementation can accrue during late pregnancy and lactation,

these findings will also facilitate more effective allocation of scarce feed resources at the farm level.

To initiate transfer of the findings to farms, the results have been discussed in seminar programmes within partner research establishments in West Africa and are already being disseminated by these partners to livestock and animal health advisers.

Linkages

The project capitalised on long-standing links between the University of Glasgow and the International Trypanotolerance Centre (ITC). It has offered considerable benefits in terms of strengthening the capacity of local scientists participating in the study to identify and carry out research focused on developmental problems, such as the poor performance of livestock under disease challenge. In addition, the ability of such scientists to capitalise on these strengths will be greatly aided by the infra-structural development of laboratory and other experimental facilities at ITC carried out during the course of the project. Other Livestock Production

Programme (LPP) projects dealing with nutrition/trypanosomosis interactions include R6342 on ruminant nutrition and resistance to trypanosomosis and R6358: Management of nutrition and trypanosomosis in N'Dama cattle.

Relevance to sustainable livelihoods

Regular birth of lambs and kids is particularly important for maintaining cash flow into poor households. The sale of sheep and goats is often used by the poor to pay school fees or unexpected medical bills. The cost of therapeutic drugs for trypanosomosis is relatively high. Therefore, access to low-cost strategies, using locally available resources – in this case feeds – to counter the impact of pathogens on animal performance, has an impact on the livelihoods of the poor reaching far beyond the supply of animal products for household consumption. The LPP continues to invest in research developing low-cost strategies for enhanced disease resistance in livestock.

Selected project publications

- Osaer, S., Goosens, B., Jeffcoate, I.A., Jaitner, J., Kora, S. and Holmes, P.H. (1998) Effects of *Trypanosoma congolense* infection and nutritional supplements on establishment and outcome of pregnancy in trypano-tolerant Djallonke ewes. *Animal Reproduction Science*, **51**: 97–109.

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