

PRT: PROGRESS REPORT : AUGUST 1996**Executive Summary**

32/04: Digestive physiology and metabolism aspects of animal nutrition: A comparative study of the physiological adaptation of different cattle breeds fed a low-quality roughage.

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AIM

The objectives of this project are to determine whether Nguni cattle have developed physiological adaptive mechanisms to perform better on low-quality pastures, by measuring:

1. Digestion, nutrient utilization and water metabolism
2. Nitrogen and glucose metabolism and kidney function, in three cattle breeds.

BACKGROUND

Ten cows, eighteen months old, of each breed viz. Nguni (Sanga), Simmentaler (*Bos Taurus*) and Brahman (*Bos Indicus*) have been purchased. They will be adapted to deseeded *Eragrostis curvula* with a crude protein content of 5%. The cows will be divided into two groups, A and B. The experiment consists of two identical phases, 1 and 2. In Phase 1, group A will receive 50% of their *ad libitum* water intake, whereas water will be freely available for group B. In Phase 2, group B will be restricted and group A will have water freely available.

Eight cows of each breed will be housed individually. In each phase the animals will receive 3 separate jugular infusions; a pulse dose of ^{14}C -urea, ^{51}Cr -EDTA and ^{14}C glucose, to determine nitrogen metabolism, kidney function and glucose metabolism, respectively. Samples of the urine and blood will be taken. Two separate intrauminal infusions will be used to determine firstly, the digestibility of the hay using ^{51}Cr -EDTA as a reference marker, whereas secondly the irreversible loss of CO_2 will be determined using $\text{NaH}^{14}\text{CO}_3$. Ruminal, faecal and blood samples will be taken.

PROGRESS

As yet no results have been obtained. The animals have been treated for all necessary parasites, have spent a month in quarantine and have been successfully cannulated in the rumen. One cow died during cannulation. Sixty tons of deseeded *Eragrostis curvula* with a crude protein content of 5% has been obtained. The cows are all 18 months of age and have been fed tef hay and lucerne while in quarantine. The cows are all in the same body condition (visual body condition score of 2.5).

SETBACKS

Two setbacks occurred causing a delay of 2 months in total; the project should however, still be completed within the original timespan. The first delay was caused by theft of the original

animals to be purchased, from the farmer the day before delivery. This required sourcing and obtaining new animals. A further complication was caused by a delay in radioactive approval. The Atomic Energy Corporation had certain queries. Approval was obtained in July with certain conditions including that the floor of the stalls be painted. This has been completed and the stalls have been adapted for measuring water intake. This caused a delay of a month.

Furthermore, in order to meet the requirements for radioactivity disposal, as well as to complete the project within the original timespan, the format and time-schedule have changed. Basically, all 24 cows will be involved in the experiment simultaneously, instead of 12 at a time and repeating the procedure with the other twelve. A phase will last 12 instead of 10 weeks to allow radioactivity to dissipate.

FUTURE PROSPECTS

Depending on the results, future work could include investigating whether these mechanisms exist in sheep and goats, specifically indigenous sheep and goat breeds. Follow up actions and procedures will include extensive field trials to determine the viability as well as to verify the recommendations.

Further research with regard to indigenous cattle would focus on plant species selection. It became clear from a previous study that the only method of determining plant species selection and composition of herbage consumed would be via oesophageally cannulated animals. Another aspect that could be investigated is the effect of kraaling the animals nightly, on performance and behaviour. The latter aspect is of importance since this is the most common type of management in practise.

PUBLICATION

The end products of this project are scientific articles, popular articles and presentations at Congresses and Information days. A network for the utilisation of indigenous livestock was initiated at a workshop in August 1996. The purpose of this network is information exchange and the first objective of this workshop is the establishment of a newsletter. The groups involved in this network include Universities, Departments of Agriculture, extension officers, farmer's unions and farmers. This network would be used to disseminate practical information to end users. The emphasis will be to ensure that this information is disseminated through the network of agricultural personnel, in order to have an impact on the industry.

Through publishing the results of this project in both the scientific and popular press as well as presenting the results at congresses and information days it is hoped that researchers, extension officers and farmers will implement either the strategic use of indigenous cattle in their herds, strategic water supply or strategic feed supplementation in order to reduce additional winter feed costs.