LACTATIONAL PERFORMANCE OF JERSEY COWS GIVEN NAPIER FODDER (PENNISETUM PURPUREUM) WITH AND WITHOUT PROTEIN CONCENTRATES IN THE SEMI-HUMID TROPICS

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SUMMARY

Two experiments with 12 and 18 lactating Jersey cows respectively were carried out in the coastal semi-humid zone of Kenya to assess the performance arising from the feeding of chopped Napier fodder (Pennisetum purpureum) given ad libitum with and without one of three sources of protein; fishmeal, copra cake and freshly cut Leucaena (Leucaena leucocephala). Each source supplied approximately 300 g crude protein daily. Dry matter intakes of Napier fodder fed alone averaged 7.1 and 5.5 kg in Experiments 1 and 2 respectively. Additional protein did not affect Napier fodder intake, but total intakes of dry matter were higher for the cows receiving the protein supplements, differences which were significant (P < 0.05) in Experiment 2. Average daily milk production from cows fed Napier fodder alone was 6.4 and 4.2 kg in Experiments 1 and 2 respectively. The additional 300 g crude protein increased milk production by 1.0 to 1.6 kg/day, increases which, except that for fishmeal, were significant (P < 0.05). Weight losses of the cows were either reduced or changed to weight gains by the provision of protein. The results are assessed in relation to the energy and protein requirements for milk production.

INTRODUCTION

In the highland subtropics of Kenya smallholder dairy production, using mainly Friesian or Ayrshire cows kept in zero-grazing units, is widespread. Napier grass (Pennisetum purpureum) forms an important part of the forage component of diets which often contain concentrates or crop by-products such as maize bran. In studies carried out in the Kenyan highlands, Anindo and Potter (1986) have shown that Friesian cows fed on Napier fodder ad libitum gave more milk when they were given concentrates. The cows fed only the forage gave 10.5 kg milk daily, while those given 8 kg concentrate along with the forage yielded 15.0 kg. The total feed intake per cow was 3.16 and 4.29 kg DM per 100 kg body weight for the unsupplemented and supplemented cows respectively.

In coastal semi-humid Kenya smallholder dairy development has been limited by the diseases trypanosomosis and East Coast fever and by inadequate feed resources. Research efforts to reduce feed constraints include studies on the agronomy and utilisation of Napier fodder as the principal component of diets based on local resources (Mureithi, 1990). Dairy development in the area is based on crossbred dairy cattle which are derived mainly from the Ayrshire and Sahiwal breeds. These crosses have the capacity to respond to improved planes of nutrition by giving more milk.

Napier fodder grown in coastal semi-humid zones is expected to differ in nutritive value from that in subtropical highland zones through the effect of environmental factors such as climate and soils. In a report on on-farm work carried out in various districts in Kenya where Napier grass was grown under uniform management, crude
protein values of Napier fodder ranged from 59 to 102 g/kg (Wouters, 1987). Napier fodder grown at the coast had the lowest value and this was attributed to the low nitrogen status of the soils. Currently, Napier forage diets for smallholder dairy cattle at the coast are supplemented only by small quantities of crop by-products. Since the Napier fodder is expected to be low in protein, less than 80 g/kg DM, supplements need to be rich in protein.

The experiments reported in this paper assessed the performance, including the voluntary intake, of Jersey cows in coastal semi-humid Kenya when fed Napier fodder* ad libitum* either alone or with protein-rich by-products or a legume forage.

MATERIALS AND METHODS

The experiments were carried out at the Kenya Agricultural Research Institute's Regional Research Centre, Mtwapa. The centre is situated 20 km NW of Mombasa in the coastal lowland coconut-cassava agro-ecological zone (Jaetzold and Schmidt, 1983). During the period of the experiments, April and October, mean monthly minimum and maximum temperatures ranged from 20 to 40°C and 24 to 27°C respectively and relative humidity was high. The experiments coincided with months of good rainfall and fast growth of Napier grass.

Experiment 1

Animals Twelve Jersey cows due to calve within 2 months and with less than 5 previous lactations were selected from a herd grazing natural pastures. One month prior to calving, they were confined between 17.00 and 06.00 hours in a well ventilated zero grazing unit where they were fed chopped Napier fodder. During the day they grazed natural pasture. All cows were treated with the trypanocidal prophylactic drug isometamidium chloride (Samorin) intravenously, and drenched with levamisole hydrochloride/oxyclozanide (Nilzan) against internal parasites. They were sprayed weekly with amitraz a diamidide acaricide (Triatix) to control tick-borne diseases. The average post-partum body weight was 345 kg (s.d. 19 kg).

Diets Napier grass, variety Bana, established during the previous year was harvested daily at a height of 1.5 m and chopped with a manual chaff cutter to about 20 mm length. Fishmeal (343 g/kg crude protein, 890 g/kg dry matter) and copra cake (272 g/kg crude protein, 880 g/kg dry matter) were bought in one batch for the whole experimental period. The fishmeal was bought from a feed miller who uses sundried fish (Engauleycypris) from Lake Victoria mixed with small quantities of rice husks for ease of milling. The copra cake was a by-product of oil extraction by the expeller method. After chemical analysis to determine the protein content, quantities required to provide 300 g crude protein per cow per day were calculated as 1,220 g of copra cake and 980 g of fishmeal. To make up for the difference in weight 240 g of cassava (variety 5543/156) meal harvested and dried on-station was added to the fishmeal. The additional 4 g crude protein from cassava was assumed to be negligible. The fishmeal and copra cake were sampled from all bags and bulked into one sample of each for proximate analysis.

Design of experiment The 12 cows were allocated into 2 groups (with and without a previous lactation) and cows from each group were then assigned to the 3 treatments in a randomised block design after balancing for post-partum body weight. All cows were in good body condition. Milk yields for lactation days 7, 8 and 9 were recorded, averaged and used as a covariate for daily milk yield in the statistical analyses. The experiment began on the tenth day of lactation and lasted 56 days.