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# THE VALUE FOR MILK PRODUCTION OF DIFFERENT FEED SUPPLEMENTS: EFFECT OF CEREAL PROTEIN CONCENTRATE, POULTRY LITTER AND OIL SEED MEAL[1]

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Creole cows, tied individually in a completely enclosed building, received: (A) grass and a commercial based concentrate (500 g/kg of milk); (B) grass, molasses 3 kg/d and cottonseed cake(250 g/kg milk); (C) grass and cottonseed cake (250 g/kg milk); (D) a mixture of molasses, bagasse, poultry litter, maize and soyabean meal as a complete feed. Each treatment was replicated 5 times. The experimental period of 60 days was preceded and succeeded by standardisation periods of 30 days each. Milk yield was expressed as persistency = $2\ Y_e/Y_{s_1} + Y_{s_2}$ where $Y_e$ = daily milk yield in the experimental period, and $S_1$ and $S_2$ daily yields in the two standardisation periods. There were no significant differences in persistency nor in liveweight change between treatments; mean values for persistency were 1.08, 1.04, 0.95 and 1.13 (SE diff. = ± .075) for treatments A to D. Corresponding values for liveweight gain during the experimental period were 72, 154, -95 and 166 g/d (SE diff. = ± 136). It appears that a complete feed based on molasses, bagasse and poultry litter is as effective as a ration consisting of a basal diet of cut grass with supplements of either cottonseed cake or a cereal-rich concentrate mixture. The use of cottonseed cake as the sole supplement to grass appeared however to be the most economical diet.

Key words: milk production, cattle, molasses, poultry litter, protein supplements

The use of poultry litter as a source of non-protein nitrogen in ruminant rations is receiving wide spread acceptance in terms of utilisation of waste products and in decreasing feed costs. Good results were obtained in fattening bulls when it was mixed into a molasses diet (Boodoo et al 1979), however this feed combination had not been given to milking cattle. An earlier trial with a molasses/sugarcane bagasse feed supplement,showed that for milk production it was inferior to a commercial cereal-based concentrate and to a straight oil seed meal (groundnut cake) (Mapoon et al 1977).

The following trial was set up with milking cattle to assess the nutritive value of a complete feed based on molasses, sugarcane bagasse and poultry litter. Another objective was to test the hypothesis that feed supplements based on protein-rich oilseed meals tend to be both better sources of protein and of glucose precourses, than combinations of animal protein by-products and cereals.

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## Materials and Methods

*Treatments, design and animals:* The treatments,in a randomized block design with 5 replications, were as follows: (A) Freshly cut grass (mainly *Setaria kazangula*) given ad libitum, and a cereal - rich concentrate given at 500 g/kg milk; (B) Freshly cut grass ad libtium , 3 kg molasses/d and cottonseed cake at 250 g/kg of milk; (C) Freshly cut grass ad libitum and cottonseed cake at 250 g/kg milk; (D) A com - plete feed of final molasses, dried bagasse pith, poultry litter,maize, soyabean meal and minerals and vitmains fed ad libitum. The composi - tion of the cereal concentrate and complete feed are given in Table 1.

*Table 1:*
*Composition (g/100 g) of the cereal concentrate and the complete feed mixture*

| Cereal concentrate | | Concentrate feed | |
|---|---|---|---|
| Maize meal | 20 | Dehydrated bagasse pith | 10 |
| Rice bran | 10 | Molasses | 27.5 |
| Molasses | 30 | Maize meal | 26.3 |
| Wheat bran | 12.3 | Poultry litter | 25.0 |
| Cottonseed cake | 25 | Soyabean meal | 10.0 |
| Dicalcium phosphate | 1.5 | Salt | 1.0 |
| Salt | 1.0 | Vitmain Premix | .2 |
| Vitamin supplement | 0.2 | | |

Table 2 shows the analysis of the forage supplements and complete feed used.

*Table 2:*
*Composition (%) of forage, supplements and complete feed* ($\bar{x} \pm SE_{\bar{x}}$)

| | Dry matter | In DM | | Ether extract |
|---|---|---|---|---|
| | | N x 6.25 | Crude fibre | |
| Forage | 23.1 ± 1.17 | 4.9 ± 0.47 | 36.7 ± 1.01 | 2.3 ± 0.16 |
| Concentrate | 85.8 ± 0.41 | 19.1 ± 0.44 | 3.1 ± 0.30 | 2.9 ± 0.22 |
| Cottonseed cake | 89.9 ± 0.47 | 48.9 ± 0.29 | 9.0 ± 0.43 | 10.5 ± 0.12 |
| Complete feed | 78.1 ± 0.77 | 18.6 ± 0.22 | 8.8 ± 0.27 | 1.2 ± 0.06 |
| Poultry litter | 86.5 ± 1.42 | 23.5 ± 0.19 | 17.6 ± 0.46 | 0.9 ± 0.03 |
| Molasses | 74.3 ± 1.33 | 5.4 ± 0.20 | °Brix = 85.2 ± 1.09 | |

The experimental variables were persistency of milk yield and change in liveweight. A changeover design was used to measure milk yield persistency. From day 1 to day 30 after calving ($S_1$) the supple

ment was the standard cereal based concentrate; day 31 to 40 ($C_1$) changeover to the experimental feed; day 41 to 100 experimental period (e) when the appropriate treatment was given; day 101 to 110 ($C_2$) changeover from the experimental diet to the standard cereal concentrate supplement; day 111 to 140 ($S_2$) standard cereal concentrate. The milk yield persistency (P) was defined as:

$$P = \frac{2\ Y_e}{Y_{S_1} + Y_{S_2}}$$

where Y = Daily milk yield per cow during the appropriate periods, $S_1$, e and $S_2$.

The 20 cows were of the Creole breed. The animals were allocated to treatments in blocks of 5 taking account of calving date, age, average production in previous lactations and stage of lactation. The first animal to start on the experiment calved in December 1980 and the last one in June 1981.

*Management and feeding:* Cows were machine-milked in the morning between 0700 and 0800 h and hand-milked in the afternnon between 14.00 and 14.30 h. The supplements were fed in two meals daily at 08.30 and 13.30 h respectively. The level of supplementation was calculated at the beginning of each week, based on the average milk yield of the previous week. The freshly cut grass as well as the complete feed were fed in two meals daily. It was not possible to record individual consumption of grass in view of its bulky nature and the proximity of the animals to each other. The average amount offered was approximately 40 kg/d. The cows were confined throughout the experiment in yoke stalls.

## Results and Discussion

Mean values for daily milk yield during the standardisation and experimental periods, milk persistency and daily liveweight change during the experimental period are given in Table 3.

*Table 3:*
*Mean values for milk production, milk yield persistency and change in body weight.*

| | Cereal concentrate | Molasses + CSC[1] | CSC[1] | Complete feed | SE diff. |
|---|---|---|---|---|---|
| Milk yield , kg/d | | | | | |
| Standard ($S_1$) | 10.2 ± .36 | 9.34 ± 1.6 | 8.15 ± 1.4 | 10.2 ± .75 | |
| Experimental (E) | 8.75 ±1.1 | 7.81 ± 1.1 | 6.10 ± 1.4 | 9.06 ± .62 | |
| Standard ($S_2$) | 5.94 ± .73 | 5.94 ± .88 | 4.23 ± .98 | 5.92 ± .30 | |
| Persistency | 1.08 ± .05 | 1.04 ± .07 | 0.95 ± .09 | 1.13 ± .07 | ± 0.075 |
| Weight change (g/d) | 72 ± 186 | 154 ± 46 | -95 ± 57 | 166 ± 186 | ± 136 |

[1]Cottonseed cake

There were no significant differences between treatments in the milk yield persistency and liveweight change of the cows. This shows

that the complete feed comprising molasses, bagasse pith and poultry litter was as good a ration for dairy cows of moderate yield ( about 2500 kg/lactation),as traditional feed of green forage and concentrate supplement. In the complete feed, poultry litter contributed 35% of the dietary nitrogen thus justifying its use as a source of non-protein nitrogen for milk production. This supports the recommendations of Muller (1980).

The results also support the hypothesis that protein-rich oil seed meals (eg cottonseed cake) will support the same level of milk production on a forage-based diet, as twice the amount of a "balanced" cereal-rich concentrate.

There was no significant advantage from giving an additional 3kg /d of molasses with the cottonseed meal, which confirms our earlier communications (Gaya et al 1981), that the metabolizable energy (ME) in molasses is used less efficiently for milk production than the ME in forage.

## Conclusions

For cows of moderate milk yield potential (managed in complete confinement), the most economical feeding system (lowest concentrate usage) appears to be freshly cut forage supplemented with a protein - rich oilseed meal fed at the rate of 250g/kg of milk.

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