

# A NOTE ON THE EFFECT OF FEEDING DIFFERENT LEVELS OF PROTEIN ON THE GROWTH OF WEANED CALVES ON PASTURE

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## ABSTRACT

IN the experiment reported, the effect of feeding different levels of protein, on the performance of young growing calves on pasture, was investigated. Thirty-six calves, mainly Friesian x Bunaji Zebu crosses, of age 3 — 4 months were divided into 3 groups for the concentrate treatments used. The 3 treatments were high protein: low grain feed (HPF), medium protein: medium grain feed (MPF) and low protein: high grain feed (LPF). The dietary protein: grain levels were obtained by mixing groundnut cake (GNC) and sorghum grain, by weight, in the ratios of 75:25; 50:50; and 25:75; respectively. Calves received 1kg DM of concentrate mixture plus free access to Rhodes grass (*Chloris gayana*) grazing. The average daily live-weight gains of calves were 0.84, 0.75 and 0.87kg for treatments 1,2 and 3 respectively. These did not differ significantly when tested statistically. The results indicate that the lowest of the three protein levels was adequate for the calves for optimum performance in this experiment.

## INTRODUCTION

It is important to feed animals adequately in order to obtain maximum production, either in terms of milk yield or growth. The National Research Council (U.S.A., 1963, 1970), the Agricultural Research Council (U.K., 1965) and Morrison (1956) have developed feeding standards for growing animals. At Shika Research Station, any of the above mentioned standards could be used for feeding the animals.

Calves at the station are weaned at about 3 months of age, when they must have attained the weight of 75 — 100kg. At this stage, the animals require about 2.8kg DM of feed and 250 — 300g DCP/day (A.R.C., 1965) to gain about 0.65kg/head/day. Some workers have indicated that calves can be reared satisfac-

torily on a ration containing 25 percent (Mudgal and Ray, 1965) or 40 percent (Rathee and Yadava, 1970) DCP lower than that recommended by Morrison (1956). In their trials calves that ranged in age between 12 and 18 months were used.

At Shika, it has been shown that daily gains of steers and heifers (150 — 250kg liveweight) are between 0.10 and 0.3kg on shrub Savanna and between 0.30 and 0.45kg on sown Digitaria and Chloris pasture, (Brinckman, 1972).

The results of the experiment conducted by Brinckman in 1972, with young animals grazing three types of pasture (Stylo, Sown pasture and Savanna rangeland) with or without *ad libitum* cottonseed supplement showed an additional gain/head/day of 0.09, 0.33 and 0.49kg response to cottonseed respectively for the different pastures. It was concluded that to achieve daily wet season growth rates of 0.50 to 0.75kg in young stock it would either be proper to develop large areas of rangeland with minimum investment per hectare and high inputs per animal for concentrates or to invest quite reasonably in restricted land development (sown pastures, fertilizers) combined with low concentrate investment. The objective of the present trial was to investigate further the latter conclusion, but using much younger calves. An experiment was therefore planned to determine the effect of feeding rations containing three different levels of protein on the performance of 3 — 4 months old calves grazing *Chloris gayana* pasture.



# WEANED CALVES ON DIFFERENT PROTEIN LEVELS

## MATERIALS AND METHODS

Thirty Friesian x Bunaji (Zebu) cross calves (9 steers and 21 heifers), and 6 Bunaji calves (3 steers and 3 heifers), were divided into three groups, and balanced for breed, sex and body weights. The three main treatments used and superimposed on grazing of predominantly *Chloris gayana* pasture were HPF to LPF ratios of 75:25, 50:50 and 25:75, of GNC and sorghum grain respectively. The minimum protein level of 250g DCP/day for each calf to gain about 0.7kg/day was met from the appropriate mixtures of GNC and sorghum grain and from pasture (Table 1). The DCP content of *Chloris gayana* has been shown to vary quite considerably depending on season and location. Digestibility trials conducted on the grass at different stages of growth in Rhodesia (Elliot and Fokkema, 1960) and in Australia (Milford, 1960) indicated that DCP maintained a considerably higher level than that of natural pasture. French (1945) in Tanganyika found that the DCP content of *Chloris*

*gayana* was 6.6% in the first cut and 4.5% in the second cut. However, Miller and Blair Rains (1963) working at Shika, Nigeria, have shown *Chloris gayana* cut at late maturity to contain between 1.4 and 3.0% DCP on dry matter basis. In the southern parts of Nigeria where rainfall is higher, Oyenuga (1957) has reported analytical data which indicate that a high nutritive value is maintained even at late stages of growth of *Chloris gayana*. It is on the basis of the findings of these workers that the value of 4 — 6% DCP was assumed for the pasture during the period, of this experiment.

Each grazing area which was fenced measured 0.83 hectares. Calves were group-fed with concentrate rations in their respective paddocks at the rate of 1kg DM/head/day once in the morning between the hours of 0800 and 0930 daily. The concentrate allowance plus a minimum of 1.8kg DM estimated to come from grazing was aimed at a daily liveweight gain of about 0.7kg/head. At lush stage, *Chloris gayana* is expected to maintain a high nutritive value (Oyenuga,

TABLE 1

Ingredients and levels of digestible crude protein (DCP) in each of the treatments

Treatment		D.M. kg	D.C.P. % DM	D.C.P. g
1	Groundnut cake	0.75	42.0	315.0
	Sorghum grain	0.25	7.4	18.5
	Grazing*	1.80	4-6	72-108
	Total	2.80		405.5-441.5
2	Groundnut cake	0.50	42.0	210.0
	Sorghum grain	0.50	7.4	37.0
	Grazing*	1.80	4-6	72-108
	Total	2.80		319.0-355.0
3	Groundnut cake	0.25	42.0	105.0
	Sorghum grain	0.75	7.4	55.5
	Grazing*	1.80	4-6	72-108
	Total	2.80		232.5-268.5

\* Estimated.



1957), hence the assumption that about 1.8kg DM of pasture was needed by calves to supplement the 1kg DM/head/day of concentrate fed to gain about 0.7kg/head. Mineral mix, salt blocks and water were made available at all times for each group of 12 calves.

Animals were weighed weekly and linear regression analysis of liveweight on days used to calculate their daily liveweight gains. Regular chemical analyses of the concentrate mixtures and grass samples were carried out. The experiment lasted for 70 days.

## RESULTS AND DISCUSSION

The results presented in Table 2 show that the calves under different treatments did not show any significant differences in liveweight gains. The daily liveweight gains under the three treatments were 0.84, 0.75 and 0.87kg respectively for the protein grain ratios of 75: 25, 50:50 and 25:75. When the proportion of protein supplement was restricted as in treatment 3, the growth rate of the animals was not adversely affected, nor was there any better performance shown by animals on treatment 1 with the highest level of protein supplement. Brinckman (1972) show-

ed that with *ad libitum* cottonseed supplement, calves daily liveweight gains on *Digitaria* or *Chloris* pasture did not exceed 0.80kg/head/day. It would appear from the results here that the lowest level of protein used was adequate for the animals or that the pasture had furnished the extra protein required to maintain growth at similar levels in all the 3 treatments. This assertion is further strengthened by the fact that *Chloris gayana* or *Digitaria* pasture alone would maintain weight gain of about 0.30 — 0.50 kg/head/day (Brinckman 1972) depending on the stocking rate of the pasture. Other workers have shown that the normal growth rate of calves can be obtained with less protein (Talpada, Sukla and Patel, 1971) provided the TDN is kept at sufficient level (Mudgal and Ray, 1965).

Results on chemical analyses show that with the concentrate mixtures the CP content of treatment 1 was about twice that of treatment 3. The findings here further confirms the objective that to achieve a wet season growth of about 0.75kg in young stock it would be proper to invest reasonably in restricted land development like sown pastures combined with low concentrate feeding.

TABLE 2

Results of liveweight gains of calves

	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	S.E.
Number of day	70	70	70	—
Average initial liveweight (kg)	109.6	109.5	108.5	—
Average final liveweight (kg)	166.1	159.2	169.1	—
Total gain in 70 days (kg)	58.8	52.50	60.9	—
Kg/head/day	0.84	0.75	0.87	0.232 N.S.

N.S. = Not significant.



TABLE 3

## Chemical Analysis of Supplement and Grazed Herbage

## 1. Concentrate mixture

	T <sub>1</sub> P:G 75:25	T <sub>2</sub> P:G 50:50	T <sub>3</sub> P:G 25:75	S.E.
CP %	37.80	28.63	20.63	4.56**
EE % +	5.37	4.58	4.01	—
CF %	2.80	3.37	1.65	—
Ash %	4.48	3.82	3.42	—
NFE % +	50.18	60.80	72.99	6.60*

+ Means of 3 values; others means of 4 values.

## 2. Herbage samples #

C.P.	14.03	11.47	12.83	1.28	N.S.
E.E.	3.27	2.91	3.21	0.037	N.S.
C.F.	24.71	26.98	25.86	1.134	N.S.
Ash	8.26	8.17	9.32	0.639	N.S.

N.S. = Not significant

\* = P/0.05

\*\* = P/0.01

# = Sampling dates: 1st 9-5-74  
2nd 23-5-74  
3rd 6-6-74  
4th 20-6-74  
5th 4-7-74.

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