FEEDLOT PERFORMANCE AND CARCASS CHARACTERISTICS OF ZEBU CATTLE IN THE MALI SAHEL ZONE I. SUPPLEMENTARY FEEDING IN ADDITION TO NATURAL PASTURE

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ABSTRACT

Investigations into the performance of Peulh and Maure Zebu breeds of cattle to supplementary feeding of cotton seed and rice bran in addition to grazing natural pasture during the rainy and dry seasons were conducted in the Sahel zone of Mali Republic. 96 steers made up of Peulh and Maure Zebu breed with age ranging between 30 and 55 months were grouped into five — the control group grazed on natural pasture alone while four test groups were fed supplementary diets in addition to free grazing.

Parameters based mainly on feed intake, rate of gain, feed conversion and carcass characteristics showed Maure gained weight significantly ($P < 0.05$) faster (318.5g/d) than Peulh (292g/d) when a feeding trial which lasted 56 weeks was conducted. All steers on test diets performed better than the control except during the second rainy season when a 'compensatory growth' was recorded for the steers under the control treatment. Younger animals (30 months old) gained weight (337.1g/d) significantly faster ($P < 0.05$) than the older (55 month-old) ones (273.4g/d).

While dressing percentage ranged between 48 and 56, test animals had significantly better dressing percentage of 55.4% ($P < 0.05$) than the control (48.2%). No difference was recorded between the breed or age

groups. Animals fed on pasture alone had 10.7% capacity of rumen content as percentage of carcass weight compared with 7.5% for test diets.

INTRODUCTION

The natural vegetation is the fodder basis for the nomadic cattle keeping in the Sahel zone of Mali Republic. The main problem of utilizing this natural pasture is the seasonal lack of fodder owing to prolonged dry season, lasting over six months thus limiting beef production. The pattern of beef cattle management in the Mali Sahel zone by the nomadic cattle rearers excludes the use of supplementary feeding in the dry season when grazeable forage is low.

Bartha (1968) working with Zebu cattle in the Sahel zone of Niger observed that a liveweight gain of 226g/day could be obtained during the dry season. However, if the pasture is supplemented with 2kg supplementary concentrate, a liveweight gain of 603g/day was recorded. This pattern has also been observed in the Mali Sahel zone except that animals loose weight during the long, dry season. Hill (1964) observed this trend for Ndama and Keteku breeds,

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while in spite of compensatory growth observed by Ruthenberg (1976), the animals did not get to the weight they should be without the set backs. This fluctuation in growth rate is partly responsible for the long time it generally takes the animals to get to the market.

The need to provide adequate nutrition for the beef animals in the Sahel zone of Mali has been generally accepted as the bottleneck to beef production. Although most dairy cattle receive supplementary concentrate feed during the dry season, the beef cattle are simply left to suffer. Bolsen *et al.* (1968) provided evidence that beef cattle can be successfully and profitably finished on diets containing little or no roughage.

This paper attempts to investigate the use of supplementary feeding to natural pasture during the dry and rainy season in the Sahel zone of Mali using Peulh and Maure Zebu cattle.

MATERIALS AND METHODS

Animals and their management:

96 Zebu steers of the Maure and

Paulh breeds with ages ranging between 30 and 55 months, weighing between 200 and 250 kg were used for the experiment which lasted 420 days (Table 1).

The experiment took place in the region of 'Office du Niger' in the Sahel zone of Mali. The experimental period included the following: 1st rainy season through dry season and 2nd rainy season. Zebu-Peulh and Zebu-Maure steers were kept on the paddock and divided into five groups (4 test groups and one control group fed only on pasture). 20 Zebu-Peulh steers each were allocated to groups A and B with the only difference being in age — 30 and 55 months respectively. 18 Zebu-Maure steers were allocated each to Groups C and D with average age of 30 and 55 months respectively. For Group E (the control group fed only on pasture), the 20 steers consisted of 5 steers each of 30 and 55 months old Zebu-Peulh and the same for Zebu-Maure.

For the pasture, each group was allocated 1100 ha having similar quality. The composition of the crops include:

TABLE 1

Distribution of the steers to the different test and control groups^a

	A	B	C	D	E
No. of steer	20	20	18	18	20
Breed	¹ Peulh	Peulh	² Maure	Maure	*
Age (months)	30	55	30	55	*
Average weight (kg)	207.4	229.1	202.2	226.0	204.6

*Groups A — D were fed natural pasture with supplementary feed according to table 1 while Group E (control) was fed natural pasture alone.

^a 5 animals each analogous to groups A, B, C and D

¹ Zebu-Peulh is long-horned, between 110–120 cm height at withers, grey colour, although darker around the mouth. Mature liveweight between 300–400 kg. Distribution around Ke Mareina, Central Delta to the South of Goundam.

² Zebu-Maure is short-horned, between 120–130 cm height at withers, with red and yellow spotted colour. Mature liveweight between 300–450 kg. Distribution similar to Peulh.

TABLE 2.

Components of supplementary feeding to Zebu steers

	1st rainy season	Dry season	2nd rainy season
Rice bran (kg/hd/day)	1.0	2.0	1.0
Cottonseed (kg/hd/day)	1.0	1.5	1.0
Total feed intake (kg/hd/day)	2.0	3.5	2.0
Calculated ME (MJ/kgDM)	9.3	8.6	9.3
Calculated DCP (g/kgDM)	57.5	50.9	57.5

Sclerocarya birrea, *Elionorus elegans*, *Andropogon gayanus*, *Loudetia togoensis*, *Combretum ghasalense* and *Pterocarpus licens*. The consumption of the pasture was *ad libitum*. The distance covered by each animal was between 2 and 6km/day. Water intake was before and after forage intake.

The four test groups received in addition to pasture rice bran and cotton seed depending on the season of the year (Table 2).

Liveweight changes:

Liveweights of three consecutive days were taken prior to the first day of trial followed by monthly weighings. Liveweights were obtained in the morning before feeding and watering.

Carcass evaluation:

At the end of the feeding trial, ten (10) steers per group were transported by road to the abattoir and slaughtering was 24 hours after the last feeding.

Analytical procedure:

The feed was analysed for proximate analysis using the AOAC (1975) methods. Data were subjected to statistical analysis using analysis of variance (Steel and Torrie, 1960) and the Duncan multiple-range test

was used to detect differences among means.

RESULTS AND DISCUSSION

Supplementary Feeding:

The variation in the amount of supplementary feeding between the rainy season and dry season in table 2 was subject to the availability of pasture particularly for the maintenance of the animals. It was not possible to calculate the DM intake from the forage. Therefore, DM intake results were based exclusively on intake from supplementary feeding.

Feedlot Performance:

Dry matter (DM) intake and animal performance data are presented in table 3.

Energy intake (MJME/kg liveweight gain) for all the four test groups were calculated. 55 month-old Maure steers consumed significantly more ($P < 0.05$) energy per liveweight gain (95 MJME/kg liveweight gain) than all the other test diets. 30 month-old Maure breed performed best with 70.2 MJME/kg gain although this was not significantly better ($P < 0.05$) than the Peulh. With regards to both breeds, the younger animals as expected, utilized their energy more effi-

TABLE 3.

Feedlot performance of the Zebu steers

Item	A	B	C	D	E	SEM and significance of difference.
No. of steers	20	20	18	18	20	
Days of expt.	420	420	420	420	420	
Average initial wt (kg)	207.4	229.1	202.2	226.0	204.6	
Average final wt (kg.)	338.1	348.7	351.0	341.3	251.7	
Supplementary feeding (MJME/kg liveweight gain).	81.1b	89.8b	70.2c	95.1 ^a	—	5.4*
gDCP/kg live wt. gain	432.0 ^c	664.0 ^b	372.0 ^t	702.0 ^a	—	82.4*
Avg. daily gain (g/day)	303.8 ^{ab}	280.1 ^{bc}	370.4 _c	266.6 _c	108.5 _d	43.1*
- 1st rainy season	328.0 ^{bc}	248 ^{bc}	517 _z	225 _c	97 _d	78.6*
- dry season (cool)	391.0 ^b	352 _c	461 _a	371 _{bc}	12 _d	83.1*
- dry season (hot)	175.0 ^b	240 _a	153 _b	230 _a	28 _c	37.9*
- 2nd rainy season	321.0 ^{ab}	280.5 _{bc}	350.5 _a	240.5 _c	320 _{ab}	19.1*
Liveweight gain as % of control	280.0 ^{ab}	258 _{bc}	341 _a	246 _c	100 _d	39.03*

*a,b,c,d: Different letters within the same row are significantly ($P < 0.05$) different
SEM: Standard error of mean.

ciently than the older ones. Bartha (1968) obtained a slightly poorer utilization for the Sahel zone of Niger.

The rate of gains for both breeds of animals have been separated into rainy and dry seasons. The dry season has been further separated into hot and cool periods. During the first rainy season (rainfall about 900mm), 30 month-old Maure steers gained 517g/day which was significantly better ($P < 0.05$) than the others. Although there was no significant difference between the older animals, the 30 month-old Peulh steers gained weight significantly ($P < 0.05$) faster (328g/day) than the 55 month-old steers (236.5g/day) of both breeds. Animals under the control diet gained only 97g/day. For the dry, cool season (250mm rainfall, temperature between 17° and 36°C), the control steers lost weight (-12g/day) while the 30 month-old Maure gained 461g/day significantly better ($P < 0.05$) than the others. This pattern is quite similar to the first rainy season. However, animals under the control treatment gained an average of 28g/day during the hot, dry season (rainfall below 100mm, temperature between 24° and 40°C). It is surprising why this is so. Generally, the pattern

of liveweight changes during this period was different from the others. For instance, 55 month-old Peulh and Maure steers had daily gains of 240g and 230g respectively better than 175g and 153g obtained for the younger animals. Whereas while the nutrition was good and ambient temperature fair, Maure steers performed better than Peulh, the reverse was the case when nutrition became poorer and environment harsh. Also, older animals reacted better under harsh environment than younger ones.

During the second rainy season, the animals returned to their earlier pattern except that the liveweight gains for the control treatment (animals on pasture alone) was better than the test diets. This phenomenon is probably called 'compensation growth'. Smith and Hodnett (1962) found the highest liveweight gains during the dry season. Carroll *et al.* (1963), Ruthenberg (1976) reported similar results. The results of Walker (1969) showed that the supplementary feeding of hay to beef cattle during the last period of the dry season had no significant effect on increasing the final body weight because there was a higher 'compensatory growth' during the rainy season with regard to animals without

TABLE 4

Carcass characteristics of Zebu steers

Item	A	B	C	D	E	SEM and significance of difference.
No. of steers	10	10	10	10	10	
Avg. liveweight (kg)	338.1	348.7	351.0	341.3	251.7	
Liveweight after transportation and fasting (kg).	317.1	321.8 ^{ab}	324.5	317.4	233.6	
Shrinkage (%)	6.2 ^c	7.5 ^{ab}	7.5 ^{ab}	7.0 ^{abc}	7.2 ^{abc}	0.26*
Avg. carcass weight (hot) - kg	177.4	180.1 ^b	184.2	176.8	115.2	
Cooling loss after 24 hrs. (%)	1.7 ^{ab}	1.3 ^b	1.4 ^b	1.8 ^{ab}	2.1 ^a	0.14*
Dressing %	55.0 ^a	55.8 ^a	56.0 ^a	54.6 ^a	48.2 ^b	1.45*
Capacity of rumen content as % of carcass weight	8.2 ^{ab}	7.1 ^b	7.6 ^b	6.9 ^b	10.7	0.69*

a,b,c,d. Different letters within the same row are significantly ($P < 0.05$) different
 S.E.M: Standard error of mean.

hay supplements.

Generally the younger animals performed better than the older ones while Maure steers gained weight significantly ($P < 0.05$) faster (318.5/day) than Peulh (292.g/d). Despite a higher supplementation during the dry season, the steers gained weight faster during the rainy season.

Carcass Characteristics:

Results of the carcass parameter studied are shown in table 4.

Losses due to fasting was heavier in the older animals or animals on low nutrition plane than the younger ones. There was no difference between the two breeds as regards this parameter. Dressing percentage ranged between 48 and 55. The dressing percentage of all animals in the rest groups (55.4%) were not different but significantly higher ($P < 0.05$) than the control 48.2%. Since the diet of animals under the control treatment was mainly pasture, the 10.7% capacity of content as percentage of carcass weight compared with 7.5% for test diets was quite expected.

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