

FEEDING STRATEGY AND PERFORMANCE OF INDIGENOUS CATTLE UNDER RESTRICTED GRAZING AT THE DAIRY FARM UNIVERSITY OF IBADAN

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Abstract

This study was conducted to estimate the quantity and quality of feed available to indigenous cattle raised at the Dairy Farm of the University of Ibadan between July and October 2014. The performance of cattle within this period was also evaluated. The total number of animals evaluated at this period was 62; comprising 54 Sokoto Gudali and 8 Ndama cattle. Adult cattle were 40 while calves were 22. Total animal units (a.u.) were estimated to be 42. The average area grazed by these cattle varied between 0.98 and 1.19 ha and herbage on offer was estimated to be 107 kg/day. Pasture grazed consisted of grasses (64%), herbaceous legumes (3%), tree legumes (22%), Mexican sunflower (5%) and weeds (6%). The pasture was analyzed to contain 26.8% dry matter (DM), 9.7% crude protein (CP), 60.2% neutral detergent fibre (NDF) and 34.4% acid detergent fibre (ADF) within the 4-month period. Typical diet for cattle during study consisted of pasture (9.7% CP), composite silage (10.8% CP), concentrate (16.5% CP) and dried cassava peel (5.0% CP). Dry matter intake of cattle was estimated to be 1.99, 2.64, 0.23 and 1.57 kg/day for pasture, silage, concentrate and cassava peel respectively. Total DM intake per cattle per day was 6.41 kg corresponding to 2.59% of animal body weight. Average daily gain of adult cattle was 0.23 kg/day while calves gained 0.42 kg/day. Additional feed offered at barn enhanced the performance of indigenous cattle raised at the Dairy Farm, University of Ibadan.

Keywords: cattle, grazing, intake, pasture, weight gain

Introduction

The genetic potential of indigenous cattle in Nigeria is often underexploited by poor management practices and inadequate nutrition (Olorunnisomo *et al.*, 2013). Provision of adequate nutrition for cattle in Nigeria is generally elusive due to the low quality of native pastures and scarcity of feed during the dry season. Additional feed offered at barn could greatly enhance productivity of indigenous cattle grazing on low quality pastures.

The Dairy Farm at the University of Ibadan was established in the early 1960s with different stocks of German Brown, Holstein Friesian, White Fulani cattle and their crosses (L.O. Ngere, personal communication). Management was fairly intensive and based on a combination of grazing and stall-feeding. However, from the early 1980s to the 1990s, there was gradual decimation in number of exotic cattle on the farm due to health challenges and poor management. By the late 1990s, all exotic cattle have disappeared and population of indigenous cattle has dwindled to less than ten. Infrastructure was also grossly dilapidated. The Dairy Farm was renovated and restocked with 68 Sokoto Gudali cows in 2012 with the intervention of the Education Trust Fund (ETF). This was with the aim of kick-starting dairy production at the University (Olorunnisomo *et al.*, 2013). Initial

health and adaptation problems, coupled with poor feeding led to mortalities among these animals. Feeding was hampered by reduced grazing areas occasioned by development of physical structures on land that was erstwhile designated for grazing. Hence, it became necessary to evolve strategies that will combine grazing of cattle on small and restricted areas with other available feed resources. The feeding strategy adopted for indigenous cattle at the Dairy Farm between July and October 2014 combined grazing with feeding of silage, concentrates and agro-industrial byproducts. This paper therefore describes the composition of animals and pasture, and feeding strategy adopted for indigenous cattle under restricted grazing at the Dairy Farm of the University of Ibadan within the period highlighted above.

Materials and Methods

This study was conducted at the Dairy Farm of the University of Ibadan, Nigeria, located within 7°27'N and 3°45'E, at 220m above sea level. Annual rainfall varies between 1150 and 1500mm with mean daily temperature of 27.5°C. The study lasted for 4 months between July 1 and October 31, 2014.

Sixty two (62) indigenous cattle comprising of 40 adult cattle and 22 calves were used for this study. There were two main breeds of cattle in the herd; Sokoto Gudali (54) and Ndama (8). Since animals

used varied in age and size, animal units (a.u.) was used as the basis for calculating performance indices. Total animal units was estimated with the assumption that adult cattle weighing 200-300 kg equals 1 a.u. and a calf weighing 50- 100 kg equals 0.1 a.u. Area of pasture grazed daily was estimated using a measuring tape while herbage on offer and herbage consumed during grazing was estimated using a 1 x 1 m quadrat. Species composition of pasture was determined by taking representative samples from the quadrat and counting the plant species by categories. Samples taken were also analyzed in the laboratory to determine chemical composition of pasture following the general procedures of AOAC (2005). Animals were fed concentrate; silage and cassava peel at barn after grazing. Daily order of feeding was: grazing (8am-12pm); concentrate (12.30pm); silage (1.30pm) and cassava peels (4pm). Weight of these feed components offered and refused were

determined and used for calculating animal intake at barn. Intake at pasture was estimated using the quadrat. Samples of feed components were taken and analyzed for chemical composition. Weight of selected animals within the breed, sex and size bracket was determined fortnightly and used for estimating weight change within the herd. Data taken were analyzed using simple descriptive statistics.

Results and Discussion

The composition of indigenous cattle at the Dairy Farm and pasture yield between July and October 2012 is presented in Table 1. This table shows that the number of animals used for the study differed from month to month. This was because some animals were culled due to ill health and returned to the herd when they recovered. Bad cases were permanently culled.

Table 1. Composition of grazing animals and estimated yield (DM) of pasture at Dairy Farm University of Ibadan between July and October 2014

Week	Composition of Grazing Animals		
	Adults	Calves	Animal Units (a.u.)
1 - 3	44.1±2.2	21.2±1.8	46.1±4.2
4 - 6	38.0±4.2	22.0±1.8	40.2±3.6
7 - 9	39.2±3.6	22.2±1.7	41.2±3.7
10 - 12	40.2±3.0	22.3±1.6	42.2±3.9
Mean	40.3±3.2	21.8±1.7	42.4±3.8
Pasture yield			
	Mean grazing area per day (m ²)	Herbage on offer per day (kg)	Pasture yield per day (kg/ha)
1 - 3	9840±565	140.3±11.8	142.6±10.4
4 - 6	11875±482	110.4±9.4	93.0±9.2
7 - 9	10880±413	92.3±6.3	84.8±7.8
10 - 12	9978±386	84.6±5.7	84.8±7.8
Mean	10643±461	106.9±8.3	101.3±8.8

Assumptions: 1 adult cow/bull = 1 a.u.; 1 calf = 0.1 a.u.

The size of pasture grazed per day and pasture yield also varied from day to day. This was due to the fact that these animals were grazed extensively without a clear-cut border, hence area grazed per day and estimated pasture yield varied constantly. Variations in pasture yield are suspected to be a reflection of differences in soil fertility between pastures and changes in weather conditions. Generally speaking, the yield of pasture declined as the season progressed toward the dry season.

The species composition and chemical composition of the pastures grazed between July and October 2014 are shown in Table 2. Grasses constituted the bulk of plant species found in the pasture, followed by legumes and other species which were classified as weeds due to refusal by animals to graze them. A significant proportion of

the pasture was also occupied by Mexican sunflower (*Tithonia diversifolia*) which is traditionally classified as a weed in cropping systems. However, because it was grazed by cattle during this study, it was not classified with weeds. It should be noted that the proportion of grass in the pasture declined steadily as the dry season approached while legumes in pasture increased. This was due to the lower yield of grasses as moisture in pasture reduced and the grazing pressure imposed on grass species by cattle. Indigenous cattle have been shown to have higher preference for grasses compared to legumes (Olorunnisomo and Fayomi, 2012). Hence, the faster rate of disappearance of grass species in pasture as dry season approached.

Table 2. Species and chemical composition of pasture between July and October 2014

Week	Species composition of pasture (%)				
	Grass	Herbaceous legumes	Tree legumes	Mexican sunflower	Others (weeds)
1 - 3	71.0	2.5	13.5	4.8	8.2
4 - 6	67.2	3.0	18.8	5.0	6.0
7 - 9	60.5	3.8	25.6	4.5	5.6
10 - 12	55.8	4.2	30.8	4.0	5.2
Mean	63.6	3.4	22.2	4.6	6.3
Week	Chemical composition of pasture (%)				
	DM	CP	NDF	ADF	ADL
1 - 3	24.3	8.8	58.0	32.5	10.0
4 - 6	26.0	8.8	58.5	33.8	10.2
7 - 9	28.2	10.2	60.8	35.0	10.6
10 - 12	28.5	10.9	63.5	36.3	11.0
Mean	26.8	9.7	60.2	34.4	10.5

Grass = guinea grass/other grasses; herbaceous legumes = calopogonium/centrosema; tree legume = gliricidia/leucaena

Contrary to expectations, crude protein content of the pasture in this study increased as the dry season approached. This is thought to be due to the higher proportion of legumes in the pasture which was occasioned by the higher grazing pressure imposed on grass species in pasture. If it is assumed that the samples analyzed for chemical composition are a true reflection of animal intake at pasture, it can then be inferred that animals had higher protein intake towards the dry season than mid-wet season. This advantage however, appears to be countered by the higher fibre content of the pasture as dry season approached.

The dry matter intake and weight gain of cattle

during the period of study is presented in Table 3. There was no definite trend in DM intake of cattle from mid to late wet season. This suggests that the cattle had an intrinsic means of balancing DM intake to meet their nutrient demand. The DM intake varied from 2.48 to 2.70 %BW. This is comparable to 2.95 %BW reported for Sahiwal cows (Sebastian *et al.*, 1970) but lower than 3.25-3.50 %BW reported for Kenana cattle (Mahala *et al.*, 2013). Calves in this study had higher weight gain than adult cattle. This was due to the milk consumed by these calves in addition to the feeds offered. Weight gain in adult cattle ranged from 0.20 to 0.28 kg/day; and calves from 0.35 to 0.51 kg/day.

Table 3. Mean dry matter intake and average daily gain per head of indigenous cattle at the Dairy Farm between July and October 2014

Week	DM intake (kg/day)				Total	%BW
	Pasture (9.7% CP)	Silage (10.8% CP)	Concentrate (16.5% CP)	Cassava peel (5.0% CP)		
1 - 3	2.67±0.24	2.05±0.19	-	1.81±0.18	6.53±0.55	2.61±0.21
4 - 6	2.05±0.20	2.64±0.25	0.28±0.02	1.07±0.10	6.04±0.50	2.48±0.19
7 - 9	1.82±0.19	3.00±0.28	0.32±0.03	1.32±0.13	6.46±0.52	2.55±0.19
10 - 12	1.40±0.12	2.85±0.28	0.30±0.03	2.07±0.20	6.62±0.56	2.70±0.22
Mean	1.99±0.18	2.64±0.25	0.23±0.02	1.57±0.16	6.41±0.54	2.59±0.20
Week	Average daily gain (kg/day)				Calves	Mean
	Ndama cows	Ndama bulls	Sokoto Gudali cows	Sokoto Gudali bulls		
1 - 3	0.23±0.02	0.30±0.03	0.18±0.01	0.20±0.01	0.51±0.04	0.28±0.03
4 - 6	0.25±0.02	0.26±0.03	0.23±0.03	0.22±0.01	0.42±0.03	0.28±0.03
7 - 9	0.18±0.01	0.33±0.03	0.20±0.01	0.22±0.01	0.40±0.03	0.27±0.03
10 - 12	0.20±0.01	0.24±0.02	0.17±0.01	0.20±0.01	0.35±0.03	0.23±0.02
Mean	0.22±0.02	0.28±0.03	0.20±0.02	0.21±0.01	0.42±0.03	0.27±0.03

Conclusion

These results show that additional feed offered to cattle at barn assisted in sustaining performance of cattle raised at the Dairy Farm of the University of

Ibadan under restricted grazing.

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