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AN ASSESSMENT OF THE INTEGRATION OF MUTURU CATTLE (*Bos brachyceros*) INTO THE FARMING SYSTEM OF SOUTHERN GUINEA SAVANNA OF BENUE STATE, NIGERIA

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Target Audience: Animal scientists, policy makers, farmers.

ABSTRACT

A study was conducted to assess the integration of traditionally village-managed Muturu cattle into the farming system of the Southern Guinea Savanna of Benue State, Nigeria. The study covered a total of 394 herds involving 2336 head of Muturu cattle made up of 49.% cows, 22.6 % bulls, 26.1% calves and 1.3% castrates. An overwhelming majority of Muturu owners (90.9%) kept other livestock such as goats, pigs, sheep and poultry. Majority of Muturu owners (80.2%) reported problems of crop damage by free- roaming cattle during the dry season. The Muturu did not seem to have much utility value as 74.4% of the farmers did not apply cattle manure on crop farms while an overwhelming majority of the farmers (87.6%) did not use Muturu cattle for traction.

All Muturu owners cultivated crops which was a more important enterprise to them than keeping Muturu cattle or other livestock. Majority (66.1%) fed tuber and cereal crop residues to their cattle that depended mainly on grazing natural pasture all year-round. Chemical analysis revealed that the native grasses (*Andropogen spp., Hyparrhenia spp., Panicum spp. and Pennisetum pedicellatum were highly fibrous,* low in crude protein (CP) and deficient in phosphorus (P) and magnesium (Mg) during the wet and dry season crop residues (yam peels, cassava peels, sorghum stover, maize stover, rice straw, soyabean haulms and groundnut haulms) were also found to be deficient nutritively when they occurred in the dry season. Similarly, blood samples collected from a total of 253 Muturu cattle showed that the serum Total Protein (TP) levels in these animals were low throughout the year. It was concluded that Muturu cattle were not completely integrated in the mixed farming system in Benue State and that protein, phosphorus and magnesium were limiting in the diets of these traditionally managed cattle.

Keywords: Integration, Muturu cattle, farming system.

DESCRIPTION OF PROBLEM

The farming culture of Benue State is mixed farming in which farmers cultivate crops as well as keep livestock which is subsidiary to crop husbandry. Crop-Livestock integration is an important farming system as it is expected

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that there would be mutual benefits from integration. Crops would provide crop residues as an important dry-season feed reserve as well as money to enable the farmer buy concentrate feed, drugs and vaccines for his animal. Similarly, animals could provide manure for crops and power for cultivation and transportation of crops as well as income for procurement of pesticides for use on crops. An important issue to address therefore is whether these famers are able to integrate raising of the Muturu into their major cropping activities in order to enchance crop and livestock productivity and increase their income.

MATERIALS AND METHODS

The study area which lies between latitude 6.8^0 - 8.3^0N and longitude 8.2 - 9.8^0 E is made up of Gboko, Gwer, Katsina-Ala, Kwande and Ushongo Local Government Areas (LGAs). Annual rainfall is from 1105-1600mm spread over a period of 160 days. Temperatures range from 21-32^0C. The climatic conditions are ideal for supply of water and pasture and for the growth of crops.

Data on herd composition, herd size, other livestock types kept, problems of crop damage, utility value and crop residues fed to Muturu cattle were obtained through the administration of questionnaires to 394 owners of herds made up of 2336 heads of Muturu cattle as previously described(1).

Forage and crop residues commonly grazed by Muturu cattle were randomly collected from Gboko, Gwer, Katsina-Ala, Kwande and Ushongo LGAs during the dry and rainy seasons. Cattle rearers were taken out to the rangelands to identify the forages usually grazed by Muturu. Forage samples were collected during the dry and rainy seasons. A representative sample of each forage type was collected according to the sampling procedures described(2). All samples were washed with water, air dried, packed in polythene bags and stored in the refrigerator (to prevent undue loss of moisture) until they were analysed. Crop residues were randomly collected during the dry season for nutritive component analysis.These consisted of yam peels, cassava peels, sorghum stover, maize stover and rice straw, soyabean haulms and groundnut haulms.

Blood samples randomly collected from a total of 253 Muturu cattle from Gboko, Gwer, Katsina Ala, Kwande and Ushongo LGAs were processed into serum and plasma respectively. Serum was stored in plain plastic tubes at -15^0c until analysed for serum TP, calcium (Ca), P, and Mg,. The heparinized plasma samples were immediately used for determination of haemoglobin (Hb) concentration and packed cell volume (PCV).

Analytical Methods

Forage and crop residue samples were oven dried at 100^0c for 24 hours and ground to pass through 2mm sieve. The samples were analysed for DM, ash and CP using standard procedures (3) while NDF and ADF analyses were by the method described (4). Calcium and magnesium contents were

determined by subjecting samples in duplicate to wet oxidation with a mixture of nitric, perchloric and sulphuric acids and read at wave- lengths of 4227 A^0 and 2852 A^0 for calcium and magnesium respectively, using Atomic Absorption Spectrophotometer(5). Phosphorus content was determined by wet oxidation, to develop a yellow solution with molybdovanade reagent whose absorbance was measured at 430nm using Spectronic 20(6). The nitrogen content was determined by the Micro-Kjeldahl method (3).

Haemoglobin (Hb) concentrations and PCV were determined by the visual colour comparison method and the microhaematocrit method respectively (7). The Total Protein (TP) content of the serum was determined as described(8) while Ca and Mg contents of the serum were determined using Atomic Absorption Spectrophotometer(5).

Data obtained from administration of questionnaires were subjected to simple frequency contingency table analysis and descriptive statistics computing means and percentages.

Chemical composition data on the varieties of grasses collected were analysed by least squares analysis of variance procedure (9) which fitted LGA, season and LGA by season interaction as fixed effects. Data on various types of crop residues were similarly analysed by fitting type of residue as a fixed effect.

SAS(10) was the package used for the procedure in examining the various factors affecting some of the blood parameters measured. The factors included LGA where samples were collected and season of the year when samples were collected.

RESULTS AND DISCUSSION

The herd composition of 2336 heads of Muturu cattle surveyed showed 49.0% cows, 23.6% bulls, 26.1% calves and 1.3% castrates while the herd size was small, 1-5 animal kept mainly semi-intensively. The high proportions of bulls in the herd may represent those animals that were kept for commercial purposes that is, to generate income (1). Most Muturu cattle owners (90.9%) kept other livestock such as goats, pigs, sheep and poultry probably as quick means of generating income to meet household needs.

During the dry season when animals were allowed to roam freely, majority of muturu owners (80.2%) reported problems of crop damage by their cattle (Table 1). This did not favour integration into the faming system due to conflicts and might also have contributed to the dwindling population of muturu cattle because Muturu owners were compelled to sell off their animals in order to lessen the conflicts (which were often bloody) that arose as a result of crop damage(11). The muturu did not seem to have much utility value as 74.4% of the farmers did not apply cattle manure on crop farms probably due to ignorance while an overwhelming majority (87.6%) did not use Muturu cattle for traction (Table 2).

Table 1: Problems of crop damage by free roaming Muturu cattle.

Response	No.of respondents	Percent
Yes	316	80.2
No	20	5.1
No response	58	14.7
Total	394	100.0

If the farmers applied cattle manure on crop farms, this could have lessened their dependence on inorganic fertilizer which is expensive and most times unavailable. The findings in this study that Muturu cattle were hardly used for traction probably because farmers were unaware of this farming technique, agrees with an earlier report (12). However, in recognizing the value of the West African Shorthorn cattle to Africa, Stewart (13) stated that the development of mixed faming would be impossible without them as the cattle provide the pesant farmer with his draught oxen, his manure and little milk. The N'dama cattle which resemble the Muturu were often used successfully (14). On the other hand trypanotolerant cattle have been dismissed as being of limited usefulness for traction because of their small sizes(15). However, farmers who wished to employ animal traction would make use of whichever competent animals that were available locally and whose quality of harness and equipment as by the breed of cattle used(16).

Table 2: Utility value of Muturu cattle in Benue State.

Response	Use of Manure on Crop Farms	Use for Traction
Yes	100 (25.4)	12 (3.0)
No	293 (74.4)	345(87.6)
No response	(0.2)	37 (9.4)
Total	394 (100.00)	394 (100.00)

* Figures in parenthesis are percentages.

The hiring of tractor for farming is very popular among the farmers in Benue State even though these tractors are expensive and their supply often erratic and unreliable due to small numbers. In view of these shortcomings, it is suggested that research on the use of Muturu cattle for traction be carried out with emphasis on the design, quality of harness and equipment to fit the small body size of the muturu.

All Muturu owners cultivated crops and majority (66.1%) fed tuber (58.9%) and cereal; (41.1%) crop residues to their cattle (Table 3) that depended mainly on grazing natural pastures all year round. The fact that majority of Muturu owners in Benue State feed crop residues to thier Muturu cattle is an indication

that the crop resiedues which are by-products of thier crops are not wasted. It points to a crop-livestock integration in feeding the Muturu cattle. The observation that tuber residues (yam and cassava peels) were mostly fed (58.9%) than the commonly used cereal crop residues of guinea corn, maize, rice, soyabeans and groundnut (41.1%), is an indication that the Muturu cattle were usually raised in very close proximity to homes and easily fed kitchen waste. Cereal crops, however, were usually grown far away from homes and access to them may therefore be limited.

Table 3: Crop residues fed to Muturu cattle

Crop Residue	Percent Respondents
Yam peels	38.8
Cassava peels	20.1
Guinea corn stover	13.5
Maize stover	10.3
Rice straw	9.1
Soyabean haulms	6.4
Groundnut haulms	1.8
Total	100.0

The native grasses (Table 4) and crop residues (Table 5) fed to the Muturu cattle were highly fibrous, low in CP and deficient in P and Mg. Similarly, the serum TP levels in the Muturu cattle were low (Table 6). The mean CP level (4.4%DM) was below the recommended value of 8% for cattle maintenance (17) similarly, mean P and Mg levels(0.04 and 0.1% respectively) were far below the estimated maintenance need of 0.12% and 0.20% for P and Mg respectively for tropical breeds of cattle (18). This confirms earlier findings that many tropical grasses and crop residues were low in protein and minerals and high in lignocellulosic compounds(19,20). These factors lead to their poor utilization (low intake and digestibility) by livestock (21,22,23) and the consequent negative effect on animal productivity (24).

The serum TP value of 3.4 -4.7g/100ml obtained for the Muturu cattle were lower than the normal value of 5.7-8.60g/100ml reported for tropical breeds of cattle (25,26,27). This low value was either a peculiarity of Muturu cattle or a reflection of low Cp of the native grasses and crop residues which were the main diet of the Muturu cattle under the traditional village management system. Earlier works have shown that a reduction in the protein level of the feed resulted in reduced Hb, PCV and serum protein values of zebu heifers(26). In this study however, Hb and PCV levels were not reduced probably due to haemoconcentration when animals were under range condition.

Table 4: Chemical composition of grasses grazed by Muturu cattle during the dry and wet seasons.

LGA	Season	Species	DM (%)	Ash (%DM)	NDF (%DM)	ADF (%DM)	CP (%DM)	Mg %	Ca %	P %
GBOKO	Dry	Adropogon gayanus/ Adropogon tectorum	96.5+2.65	10.5+4.47	71.3+9.39	47.3+6.72	4.1+0.96	0.1+0.07	0.7+0.11	0.03+0.01
	Wet	Andropogon scinodis/ Hyparrhenia bagirmica	29.9±2.65	18.3±4.47	62.2±9.39	41.2±6.72	5.1±0.96	0.13±0.07	0.3±0.12	0.04±0.01
GWER	Dry	Pennisetum pedicellatum/ Andropogon tectorum	96.8±2.65	5.8±4.47	75.1±9.39	48.9±0.72	3.4±0.96	0.1±0.07	0.7±0.12	0.05±0.01
	Wet	Andropogon tectorum	25.6±3.5	19.3±6.32	94.1±13.29	41.5±9.49	4.3±1.36	0.1±0.10	0.4±0.17	0.05±0.02
KATSINA-ALA	Dry	Andropogon gayanus	96.2±2.65	6.8±4.47	72.5±6.72	42.1±6.72	3.5±0.96	0.2±0.07	0.8±0.12	0.04±0.01
	Wet	Andropogon tectorum/ Hyparrhenia sp.	29.6±2.65	27.9±4.47	62.6±9.39	45.5±6.72	5.9±0.96	0.1±0.07	0.2±0.12	0.06±0.01
KWANDE	Dry	Andropogon tectorum	95.8±2.65	77.8±4.4	96.5±9.39	44.7±6.72	4.2±0.96	0.2±0.07	0.4±0.12	0.03±0.01
	Wet	Andropogon gayanus	30.7±2.65	25.9±4.47	64.4±9.39	44.7±6.72	4.5±0.96	0.30±0.07	0.2±0.12	0.03±0.01
USHONGO	Dry	Andropogon gayanus	96.4±2.65	8.5±4.47	70.9±9.39	47.2±6.72	3.5±0.96	0.13±0.07	0.9±0.12	0.04±0.01
	Wet	Panicum sp./ Andropogon tectorum	35.7±3.74	34.4±6.32	60.8±13.29	27.3±9.49	5.2±1.35	0.05±0.10	0.6±0.17	0.03±0.02
OVERALL MEAN	Dry		96.3±1.18	7.9±2.00	71.9±9.39	46.0±6.72	3.7±0.96	0.1±0.07	0.69±0.05	0.03±0.01
	Wet		30.2±1.40	25.2±2.36	68.8±10.95	40.0±7.83	5.0±1.12	0.1±0.08	0.34±0.06	0.04±0.01

DM = Dry matter, NDF = Nitrogen detergent fibre, ADF = Acid detergent fibre, CP = Crude protein, Mg = Magnesium, Ca = Calcium
P = Phosphorus

Inspite of these nutritional deficiencies, it was observed that the Muturu cattle appeared to be in good body condition even during the dry season. This might probably be due to lower requirement of the small - sized Muturu cattle. It may also be due to the fact that during the dry season when forage was scarce, animals were allowed to roam freely and had access to browse plants on range which were higher in protein and minerals than the native grasses and crop residues(28). The CP, Mg, Ca and P contents of the main browse plants in Benue State during the dry season have been reported to be 18.61% DM basis, 0.30%, 0.51%, 0.1% respectively(28). These figures are far higher than the maintenance values of 8.0%, 0.20%, 0.20% for CP, Mg, Ca and P respectively. Animals having access to high protein and mineral browse plants could be expected to consume more and show high digestibility of low quality forages by increasing the overall level of digestible nitrogen in the diet.

CONCLUSION AND APPLICATIONS

1 Muturu cattle were not completely integrated into the mixed farming system in Benue State.

2 Protein, P and Mg were limiting in the diets of these traditionally managed cattle.

3 It is suggested that modifications be made in the farming system to effect integration of the Muturu. This could be tried through intercropping of browse species such as *Gliricidia sepium* and *Leucaena leucocephala* with cereal and tuber crops. Leys could be established using forage legumes such as *Stylosanthes guianensis, S. hamata* and centro. With shortening fallow periods, the introduction of alleys and leys into the farming system could help to improve soil quality and provide forage to animals as well as aid in integrating the Muturu into these improved systems.

4 Management of the native pastures could be improved as well as improvement in the nutritive value of crop residues either by treatment methods that increase the availability of nutrients by breaking down the ligno-cellulose constituents or through supplementation methods that add deficient nutrients or correct nutrient imbalances.

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