Asian Journal of Agricultural Research 1 (3): 137-141, 2007
ISSN 1819-1894


# Research Note: Over Night Faecal Production by Bunaji Cattle Grazing Natural Pastures in the Northern Guinea Savanna Zone of Nigeria

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**Abstract:** Study to determine the quantity and quality of over night faeces produced by Bunaji cattle was carried out in the Northern Guinea Savanna zone of Nigeria. There was no significant difference ($p>0.05$) in faecal output between the bulls and the cow. Non-supplement cow produced 1.62 and 1.60 kg dry faeces day$^{-1}$ during the wet and dry season respectively. The corresponding values for the bulls are 1.68 and 1.66 kg dry faeces day$^{-1}$. Supplemented cow voided about 2.08 and 1.98 kg dry faeces during the wet and dry season while the bulls produced 2.13 and 2.05 kg dry faeces head$^{-1}$ day$^{-1}$. Supplementation of the cattle significantly increased the quantity of faeces produced by 21.68 and 19.35% during the wet and dry respectively. Nitrogen, Phosphorus and Potassium content of the faeces from non supplemented cattle are 1.79, 0.46 and 0.65%, the corresponding value for the supplemented cattle are 2.27, 0.52 and 0.74%. Adult Bunaji cattle grazing the native range or crop residue without any form of supplementation produced 598.26 kg dry faeces year$^{-1}$. This contained 13.56 kg N, 4.10 kg P and 3.86 kg K. With supplementation, the yearly faecal output increased to 751.9 kg and the corresponding N, P and K value were 17.56, 5.53 and 3.87 kg. Fertilizer cost for crop production can be significantly reduced if cow faeces are properly harnessed into the cropping system.

**Key words:** Bunaji cattle, faecal production, natural pastures, Northern Guinea Savanna

## INTRODUCTION

The population of cattle in Nigeria stood at 19.8 million (Ariyo, 2002), majority of which is found in the Northern Guinea Savanna Zone of Nigerian, this Zone coincidentally is the major grain producing belt in the country. The use of inorganic fertilizer in grain production became well established practice among arable farmers especially during the last 10-15 years when the inorganic fertilizer was highly subsidized by the Government. However, the recent withdrawal of subsidy on inorganic fertilizer couple with inconsistency in price as well as its erratic availability has affected its use (Odunze and Ogunwole, 2002). This has rekindled the interest of farmers in the use of animal manure through crop-livestock integration.

The use of animal faeces reduces cost of production, ameliorate the soil, improves its physical properties (Osuhor *et al*., 2002) and remain viable beyond one cropping season and its ensure sustainable soil improvement better than inorganic fertilizer (Odunze and Ogunwole, 2002). In addition to macro nutrients (N, P, K, Ca and S) supplied by inorganic fertilizer (Yaro *et al*., 1997; Osuhor *et al*., 2002), organic fertilizer will provide micro element such as Fe, Mn, Zn and Cu (Lupwayi *et al*., 2000).

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The primary purpose of keeping cattle is for meat, milk and traction; the cow faeces could also represent a substantial income to the farmer directly by selling the manure or indirectly by applying to the crops. The high population of cattle in this zone is an indication that large quantity of faeces if properly managed could be used to increase crop production at relatively cheaper rate.

This study was conducted to determine the quantity and quality of faeces produced by cattle grazing the range with and without supplementation in a view to expose the potentials of these by product in order to renew the interest in its utilization for cropping by farmers.

## MATERIALS AND METHODS

The trials were carried out at the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika-Zaria, Nigeria. The area is located within the Northern Guinea Savanna ecological zone (Latitude of 11 and 12° N and longitudes 7 and 8° E) and it is about 640 m above the sea level. The mean annual rainfall is about 1100 mm and it starts in April/May, stabilizes by June and ends in mid October.

Two trials were conducted during the early dry season (late Oct.-Nov.) of 2004 and during the late wet season (late Sept.-Early Oct.) of the same year for a period of 30 day each. During the early dry season trial, 16 Bunaji cattle (8 bulls and 8 cows) of average liveweight 235.38±5.0 kg were divided into two groups of 4 bulls and 4 cows each and were grazed on the range for 8 h and watered. One group was supplemented with concentrate diet made from 60% maize offal and 40% whole cottonseed. The concentrate was offered at 2 kg head$^{-1}$ day$^{-1}$. During the late wet season, 16 cattle (8 bulls and 8 cows) were also grazed on the range for 8 h as in above. One group of 4 bulls and cows was offered concentrate. The concentrate was fed at 2 kg head$^{-1}$ day$^{-1}$. The cattle were confined separately overnight and in the following morning the cattle were removed and the faeces voided were removed and weighed and about 10% of the daily faeces produce taken and oven dried at 65°C for 24 h. The data were analysis using the General Linear Model (GLM) procedure of the Statistical Analysis System (SAS, 1988) to study the effect of supplementation and season on faecal output and treatment means were compared using the Duncan's Multiple Range Test (DMRT) as modified by Gomez and Gomez (1984). All statistical tests were done at the 5% probability level.

Proximate composition of the faeces was determined using the AOAC (1990) procedure. The cell wall contents were determined using the Van Soest (1991) procedure. The mineral contents of the faeces were determined using the Atomic Absorption Spectrophotometer.

## RESULTS AND DISCUSSION

The nutrient composition of the supplement offered to the cattle contains about 14% Cp and 4.27 kcal of gross energy (Table 1). The animals were also provided mineral salt lick. The composition of the range and forage available to the animals changed with season. During the wet season, there was abundant of forage species like *Stylosanthes hamata*, *Cynodon dactylon*, *Penncetun pedicelatum*, *Hyperrhenia rufa* and *Dolichus biforus*. During the dry season, the forage which was abundant was *Pennisetum pediselatum*, *Hyperrhenia rufa*, *Cida acuta* and *Sporobolus pyramidalis*. The nitrogen content of the range forage sampled during the wet season (August-September) was 1.06% and about 0.54% during he dry season (November-December). The animals grazed crop residue (0.43% N) mainly during the dry season.

Table 1: Nutrient composition (%) of the supplement offered to the cattle

| Nutrient | DM | CP | CF | EE | OM | ADF | NDF | Ash | GE (Mcal kg$^{-1}$) |
|---|---|---|---|---|---|---|---|---|---|
| Composition | 91.18 | 14.53 | 21.18 | 14.02 | 86.89 | 30.07 | 35.60 | 4.92 | 4.27 |

Table 2: Effect of seasons on the overnight faecal production of cattle grazing the range with and without supplementation

| | Non supplemented cattle | | | Supplemented cattle | | |
|---|---|---|---|---|---|---|
| Gender | Wet season (kg head$^{-1}$ day$^{-1}$) | Dry season (kg head$^{-1}$ day$^{-1}$) | SEM | Wet season (kg head$^{-1}$ day$^{-1}$) | Dry season (kg head$^{-1}$ day$^{-1}$) | SEM |
| Bulls | 1.68 | 1.66 | 0.25 | 2.13 | 2.05 | 1.00 |
| Cows | 1.62 | 1.60 | 0.36 | 2.08 | 1.98 | 1.05 |
| SEM | 0.31 | 0.15 | | 0.79 | 1.30 | |

Table 3: Effect of supplementation on overnight faecal production (kg DM head$^{-1}$ day$^{-1}$) of cattle during the wet and dry season

| Season | Supplemented cattle | Non supplemented cattle | SEM |
|---|---|---|---|
| Wet | 2.11$^{a}$ | 1.65$^{b}$ | 1.95 |
| Dry | 2.02$^{a}$ | 1.63$^{b}$ | 0.86 |

$^{ab}$: Means with different superscripts along the row differ significantly ($p<0.05$)

Table 4: Chemical composition of cattle faeces as affected by supplementation

| Composition | Supplemented | Non supplemented |
|---|---|---|
| DM (%) | 24.17 | 24.88 |
| N (%) | 2.27 | 1.79 |
| P (%) | 0.52 | 0.46 |
| K (%) | 0.74 | 0.65 |
| Fe (ppm) | 8850.00 | 72520.00 |
| Mn (ppm) | 250.00 | 232.00 |
| Mo (ppm) | 11.50 | 8.35 |
| Cu (ppm) | 72.00 | 68.00 |

Mean over night faeces produced by the cattle that were grazing the range without supplementation were 1.68 and 1.66 kg dry faeces head$^{-1}$ day$^{-1}$ for the bulls during the wet and dry seasons respectively. The faecal outputs for the non-supplemented cows during the two seasons are 1.62 and 1.60 kg dry faeces head$^{-1}$ day$^{-1}$, respectively. There were no significant differences in faecal output of the cattle between seasons and gender. Bulls that were supplemented in addition to grazing the range produced 2.13 and 2.05 kg dry faeces head$^{-1}$ day$^{-1}$ during the wet and dry season while the supplemented cow voided 2.08 and 1.98 kg dry faeces head$^{-1}$ day$^{-1}$ during the wet and dry season respectively. In the two cases above, the bulls had slightly higher faecal output than the cows, the differences were however not significant (Table 2).

The quantity of faeces produced by the non-supplemented animals were higher than 1.5 kg dry faeces head$^{-1}$ day$^{-1}$ reported by Kallah and Adamu (1988) for non-supplemented Bunaji cattle under the agropastorial system where the animal were kraaled at night without bedding materials. The quantity of faeces available for collection in any livestock enterprise would determined by the species, breed, age and size of the animal, type and nature of food ingested, seasonal variation, length of kraaling and whether or not bedding is used (Kallah and Adamu, 1988; Winks *et al*., 1976). In the present study the animals were individually penned overnight on concrete floor which allow for more accurate collection of the faeces unlike when animals were kraaled on the field and most of the faeces mixed with sand making collection less accurate. The above reason might be responsible for the higher faecal output reported in this study compared to what was reported by Kallah and Adamu (1988). Supplementation of the cattle was observed to significantly ($p<0.05$) increased faecal output by 21.68 and 19.35% during the wet and dry season respectively (Table 3). This observation is in conformity with the findings of Winks *et al*. (1976) who reported about 33% increase in faecal output in cattle grazing natural pasture and supplemented with urea molasses mixture. The supplement provided to the cattle will enhance feed intake.

Although not much research has been published on the quantity and value of cattle manure in the Northern Nigeria, the fertilizer value of the cattle manure reported in the present trial is higher in nitrogen, phosphorus, potassium, iron, manganese and copper than (N 1.55%, P 0.37%, K 0.65%, Fe 0.21, Mn 148.52 ppm and Cu 33.6 ppm) reported by Kallah and Adamu (1998).

The fertilizer value of cattle faeces in terms of providing macro element to crops can be calculated from Table 4. Base on this result, 6.61 kg of dry pure faeces from cattle which graze the range and received supplement which contain about 14% CP will supply the same amount of nitrogen as 1 kg of 15:15:15 NPK inorganic fertilizer. 8.2 kg dry faeces from cattle grazing crop residue without any supplementation will give the same quantity of nitrogen as 1 kg of 15:15:15: NPK commercial. The corresponding quantity of cattle faeces from supplemented and non-supplemented grazing cattle to provide the same amount of P and K as 1 kg 15;15:15 NPK inorganic fertilizer are 29.13 and 20.27 kg dry faeces from supplemented cattle and 32.97 and 26.79 kg dry faeces from non-supplemented cattle respectively (Kang, 1995).

Bunaji cattle of about 250 kg of liveweight (1 TLU) grazing the range and/or crop residue without any form of supplementation will produce about 598.26 kg dry faeces year$^{-1}$. This will contain 13.56 kg nitrogen, 4.10 kg P and 3.86 kg K. Cattle that received supplement containing 14% CP in addition to grazing will void about 751.9 kg dry faeces year$^{-1}$, containing 17.03 kg N, 3.87 kg P and 5.53 kg K. In addition to the macro element, cattle faeces also contain micro elements like Mn, Zn, Cu and Fe.

Cattle faeces are much cheaper compared to the inorganic fertilizer. The cost of 50 kg Golden brand of inorganic fertilizer (15:15:15) during the 2006 farming season was N 3000 compared to N 1500 cost of one tons of cattle faeces. One bag of the inorganic fertilizer will provide 15 kg N, while 1 ton of cattle faeces will provide 17.8 kg N. In terms of cost benefit, one ton of cattle faeces is much cheaper and will provide more nitrogen in addition to other micro elements which are lacking in the inorganic fertilizer. It is important therefore to encourage the use of this cheaper but important by product of livestock industry most especially when the whole world is encouraging organic farming which is more environments friendly and less hazardous to the health. Although cattle faeces is bulky, dusty and may attract much cost and effort in transporting it to the farms. Research into areas of reducing the bulkiness of cattle faeces is warranted since the benefit of using the faeces is already known to the farmers.

## CONCLUSION

The result of this trial is added information to the already existing data on the value of cattle faeces for crop production. It also shows the potential of cattle faeces as a supplier of nitrogen which can be use to reduce some of the huge investment that Government incurred on importation of inorganic fertilizer yearly.

## REFERENCES

AOAC., 1990. Official Methods of Analysis. Association of Analytical Chemists. Washington DC.

Ariyo, J.A., 2002. Livestock and Fishery. Atlas of Nigeria, pp: 98-99.

Gomez, K.A. and A.A. Gomez, 1984. Statistical Procedure for Agricultural Research. 2nd Edn., John Wiley and Sons, Inc.

Kallah, M.S. and A.M. Adamu, 1988. The Important of Animal Faeces and Fertilizer. In: Pastoralism in Nigeria Held at the Conference on Pastoralism in Nigeria Held at the National Animal Production Research Institute. Gefu, J.O., I.F. Adu, E.A. Lufadeju, M.S. Kallah and M.O. Awogbade (Eds.), Shika, Zaria, Nigeria, pp: 26-29.

Kang, B.T., 1995. Fertilizer: Definitions and calculator. IITA Research Guide 24 Traiing Program, IITA Ibadan Nigeria

Lupwayi, N.Z., M. Girma and I. Haque, 2000. Plant nutrient contents of cattle manures from small scale farms and experimental stations in the Ethiopia Highlands. International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia. Agric. Ecosyst. Environ., 79: 57-63.

Odunze, A.C. and J.O. Ogunwole, 2002. On-farm soil conservation technology for sustainable fertility management in Northern Nigeria.

Osuhor, C.U., J.P. Alawa and G.N. Akpa, 2002. Research note: Manure production by goats grazing natural pasture in Nigeria. Trop. Grassland, 36: 123-125.

SAS, 1988. SAS/STAT user's guide. 6.03 Edn., Institute Inc. Gray NC, USA.

Van Soest, J.P., 1991. The use of detergents in the analysis of fibrous feeds. Determination of plant cell constituents. J. Assoc. Agric. Chem., 50: 50-55.

Winks, L., A.R. Lang, G.S. Wright and J. Strokoe, 1976. Effect of nitrogen, phosphorus and molasses supplementation on the performance of weak cattle during the dry season. In: North Queensland. J. Aust. Inst. Agric. Sci., 41: 246-251.

Yaro, D.T., E.N.O. Iwuafor, V.O. Chude and B.D. Tarfa, 1997. Use of organic manure and inorganic fertilizer in maize production: A field evaluation. In: Strategy for sustainable maize production in West and central Africa. Proceeding of a Regional Maize Workshop, 21-25th, April, 1997. IITA, Cotonou, Benin Republic.