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Effects of Feeding Sun-Dried Poultry Dropping Based Diets on Nitrogen Balance of Growing Yankasa Rams Consuming Sorghum Stover

A.A. Bello[1] and D.N. Tsado[2]

[1]Postgraduate student, Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. B.S.K.K.V. Dapoli, Pin: 415 712 Dist: Ratnagiri, Maharashtra, India
[2]Department of Animal Production, Federal University of Technology, P.M.B.65, Minna, Nigeria
E-mail: [1]aabello2003@yahoo.co.uk, [2]tsadonma@yahoo.com

Abstract—*This study was conducted using fifteen growing Yankasa rams weighing 11.5 - 15.5 kg in a complete randomised design to study the effects of feeding sun-dried poultry droppings on nitrogen balance. The animals are randomly allotted to five treatment groups namely T_1, T_2, T_3, T_4, and T_5 comprising of three replicates with one animal per replicate and were fed sorghum stover supplemented with sun-dried poultry droppings (SDPD) such that T_1 were fed 0% SDPD: T_2, 20%; T_3, 40%; T_4, 60%; and T_5, 80%. Positive nitrogen balance was observed across the treatment groups. Nitrogen intake was significantly higher ($P < 0.05$) with increasing level of SDPD in the diets. The same trend was observed for Nitrogen retention. However Urinary nitrogen followed a slightly different trend. The result of study suggests that sun-dried poultry droppings can suitably be included in the diet of the growing Yankasa rams up to 80% level and improves Nitrogen intake, balance and retention*

Keywords*: Nitrogen balance; Sundried poultry droppings; Sorghum Stover; Yankasa Rams.*

1. INTRODUCTION

The problem of insufficiency of protein in diets of ruminant animals can be corrected with the use of readily available non-conventional agricultural waste of animal origin such as poultry droppings. Poultry droppings are wastes from poultry production enterprise which usually pose environmental and health risks as a result of improper disposal channels, particularly when not used as organic fertilizer in crop farming enterprise. The proximate constituents of poultry droppings, particularly the high nitrogen content (Jordan, 2004; Lanyasunya, *et al.,* 2006 and Adegbola *et al.,* 2010) is a pointer to the fact that nutrients in the waste can be converted into animal products for Man's consumption. Therefore it is a worthy feed for ruminant animals. It has been documented that poultry droppings can be used as protein supplement as well as sole protein source, therefore it can support both maintenance and production needs especially when fed with appropriate energy source. Furthermore, it can be used as a cost-saving ruminant feed as well as solving problem of disposal (Belewu and Adeneye, 1996; Ndubueze *et al*., 2006; Maigandi and Owanikin, 2002; Aduku, 2004; Aro and Tewe, 2007; Abdul *et al.,* 2008; Bello and Tsado, 2014).There are little or no study on the effects of feeding sun-dried poultry dropping on the nitrogen balance on growing rams. This study was therefore undertaken to investigate the effect of feeding sun-dried poultry dropping based diet on nitrogen balance of growing Yankasa rams consuming sorghum stover.

2. MATERIALS AND METHOD

2.1 Experimental site location

The study was carried out at the Animal Production Department Research & Teaching Farm, small ruminant unit of the School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Nigeria. It is sited at the Southern Guinea Savannah agricultural zone of the country (NSADP, 1995, Lanko, 2005). The average monthly temperature is 30.5^{o}C which is observed in the Month of March and August and yearly mean rainfall of 1400mm in the month of July and August prevails. Humidity ranges from 60% to 75% (Danwake, 1999).

2.2 Experimental feed

Fresh poultry manure was obtained from caged layers reared commercially at Abu-Turab poultry farm in Minna. The poultry manure was sun-dried for 5-6 hours daily for 3-5 days to ensure pathogenic microbial safety. The product was thereafter pounded using pestle and mortal and used as feed. Sorghum stover was sourced in Bosso and Chanchaga areas of the town after the grain harvest and chopped using cutlass to 2–3 cm long before feeding as basal feed.

2.3 Experimental animals and their management

Fifteen Yankasa rams less than 12 Months old with mean weight of 13.5kg was used for this study. The animals were

kept in pens. The floor of the pen was covered with sawdust for animal's comfort. The animals were treated against ectoparasites, dewormed against endoparasites and were administered with broad antibiotic to prevent bacterial infections. Thereafter the animals were shared into five experimental groups and fed for one week for acclimatization to the experimental diets before data collection. Salt-licks were supplied during the experiment. Water was supplied *ad-libitum*.

2.4 Experimental design

The experimental rams were grouped into five treatments (T_1-T_5) consisting of three replicates with one animal per replicate in a complete randomized design. Treatment one (T_1) had 0 % sun-dried poultry droppings (SDPD) inclusion, T_2 had 20 % (SDPD), T_3 had 40 % (SDPD), T_4 had 60 % (SDPD) and T_5 had 80 % (SDPD).

2.5 Animal feeding

The Yankasa rams were fed sun-dried poultry dropping maize bran blended ration (Table 1). Treatment one (T_1) were rams fed 0 % sun-dried poultry droppings (SDPD), T_2 were fed with 20 % (SDPD), T_3 were fed with 40 % (SDPD), T_4 were fed with 60 % (SDPD) and T_5 were fed with 80 % (SDPD). Feeds were offered twice daily at 8.00 and 16.00 hours. Fresh clean water was also supplied to each animal *ad libitum* daily. The experimental animals were fed at 3% and 2% of body weight on dry matter basis respectively. The diet formulation, proximate and nutrient constituents are showed in Table 1, 2 and 3 respectively.

Table 1: Ingredient composition of the experimental on dry matter basis (g)

Ingredients	T_1	T_2	T_3	T_4	T_5
Sorghum Stover	600	600	600	600	600
Maize Bran	100	80	60	40	20
Dried Poultry Droppings	-	20	40	60	80

Table 2: Proximate Composition (% DM Basis) of Supplementary Diets fed to Yankasa Rams

Composition	T_1	T_2	T_3	T_4	T_5
Dry matter	84.20	88.60	92.20	85.80	92.80
Crude protein	7.00	13.13	13.60	14.00	15.40
Crude fibre	3.20	6.70	9.30	12.50	8.00
Ash	5.50	12.00	12.50	16.50	25.00
Ether extract	5.00	20.00	12.50	12.50	17.50
Nitrogen free extract	63.50	36.77	44.30	30.30	26.9
Energy (kcal/g	2.27	2.53	2.81	3.90	4.23

Table 3: Proximate composition of experimental feeds

Parameters	Sorghum Stover	Maize Bran	Dried Poultry Droppings
Dry matter (%)	94.09	84.20	93.00
Crude protein (%)	3.50	7.00	21.88
Crude fibre (%)	31.20	3.20	20.67
Ash (%)	3.90	5.50	33.00
Ether extract (%)	1.11	5.00	3.30
Nitrogen free extract (%)	54.39	63.50	14.15
Gross E (Kcal/g)	2.02	3.90	2.65

2.6 Digestibility study

The experimental animals were placed in an individual metabolic cage with slatted floors adapted for faecal and urine collection. An adjustment period of 7 days was allowed before the faecal and urine outputs were measured for the subsequent seven days. Urine production was collected daily into a graduated plastic container containing 100ml of 50 % Hydrochloric Acid (HCl). A 10 % aliquot of total urine output per day was removed each day and stored in a freezer (-4^{o}C) until required for analysis. Faeces from animals on each treatment were bulked thoroughly mixed and sub- sampled taken. Feed intake was measured by finding the difference between the amount of feed offered and the amount refused. Feed and faecal samples were dried at 65^{o}C to constant weight, milled and kept in air tight containers until required for analysis. Nitrogen content of feed; faeces and urine were determined by the Kjeldahl method (AOAC, 1990). Apparent digestibility of the diets was calculated as the difference between nutrient intake and excretion in the faeces expressed as a percentage of the nutrient intake (Maynard, *et al.*, 1979). Nitrogen retained by the animals was calculated as the difference between nitrogen intake and nitrogen excreted, N retained = N intake–(Faecal N + Urinary N) (Sebata *et al.*, 2005; Olorunnisomo, *et al.*, 2010).

2.7 Chemical analysis

The experimental diets were analyzed for dry matter, crude protein, crude fibre and ash according to AOAC (1990). Samples of feed offered, faecal output were analyzed for dry matter, crude protein, crude fibre, ether extract and ash according to AOAC (1990). Similarly, nitrogen content of feed, faeces and urine were also analysed using (A.O.A.C, 1990)

2.8 Statistical analysis

All data generated were subjected to analysis of variance (ANOVA) using the General Linear Model (GLM) procedure of SAS (2008).Means were separated Using Least Significant Difference (LSD) test of the same package

3. RESULT

3.1 Nitrogen Balance

Results indicated that there were significant differences ($P<0.05$) in N intake, between T_5 and T_1, T_5 and T_4, T_3 and T_2. Faecal N output followed the same trend as N intake; however, urinary N output followed a slightly different trend. There was no significant difference ($P>0.05$) in urinary N output between T_2 and T_3. But T_2 and T_3 had significantly ($P<0.05$) higher values than T_1, T_4 and T_5 respectively. In N retained, T_5 was observed with significantly ($P<0.05$) highest values followed by T_4, T_3, T_2 and T_1 respectively. Percent N retained followed a similar trend with N retained (Table 4).

Table 4: Nitrogen balance of growing Yankasa rams fed sorghum stover supplemented with graded levels of dried poultry droppings

	Treatments					
Parameters	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**	**LS**
N intake	6.3^e	11.8^d	18.7^c	22.2^b	22.9^a	*
Faecal N	2.1^e	2.2^d	2.3^c	2.4^b	2.7^a	*
Urinary N	0.67^d	0.84^a	0.84^a	0.77^c	0.83^b	*
N retained	3.5^e	8.8^d	15.6^c	19.0^b	19.4^a	*
N retained (%)	54.4^e	71.4^d	73.9^c	82.8^b	85.7^a	*

abcde: Mean values with the same letters along the row are not significantly different ($P < 0.05$)
LS: Level of Significance
* = Significant difference ($P<0.05$)
NS = not significant ($P>0.05$)

4. DISCUSSION

Results indicate positive nitrogen balance for animals in treatment groups supplemented with sun-dried poultry dropping. This is a pointer that the diets were able to meet the protein needs of the animals' for both maintenance and production needs. From the values obtained in this study, N intake was higher in treatment groups fed sun-dried poultry dropping. The value increases as the level of inclusion increases. The same trend was observed for N retained. This result is in tandem with the findings of Sebata *et al.,* 2005; Betsha and Melaku, 2009; Akinyemi *et al.,* 2010; Khan *et al.,* 2010; Ekeocha and Akinsoyinu, 2014 in their separate studies where they reported that N intake and N retention were higher in supplemented treatment groups than the control groups. Percent N retained also followed the same trend as was observed for both N intake and N retained. However Urinary N followed a slightly different trend.

5. CONCLUSION

This study showed that rams fed sun-dried poultry dropping based diets had the best N intake and N retention. Therefore sun-dried poultry droppings can be suitably included in the diets of growing Yankasa rams up to 80% level and improved N-balance.

REFERENCES

[1] S. B. Abdul, S. M. Yashim and G. E. Jokthan (2008). Effects of supplementing sorghum stover with poultry litter on performances of Wadara cattle. *American-Eurasian Journal of Agronomy* 1(1):16-18.

[2] A. A., Adegbola, O. B Smith, and N. J. Okeudo (2010). Response of West African Dwarf Sheep fed cassava peel and poultry manure based diets. FAO corporate Document Repository produced by ILRI pp: 1-8 http: //www.fao.org/wairdocs/ILRI/x5536 E/x5536e0p.htm

[3] A. O. Aduku (2004). Animal Nutrition in the Tropics. Typeset and published by Davon computer and Business Burreau Zaria, Nigeria. Pp. 10-31.

[4] A. F. Akinyemi, J. A Alokan and A. N. Fajemisin, (2010). Digestibility, nitrogen balance and haematological profile of West African. Dwarf sheep fed dietary levels of *Moringa oleifera* as supplement to *Panicum maximum. Journal of American Science* 6(10) pp. 634-643.

[5] A.O.A.C. (1990). Association of Official Analytical Chemists Official Methods of Analysis 15th Edition, Washington D.C

[6] S. O. Aro, and O. O. Tewe (2007). Performance and carcass yields of barrows fed dried poultry waste as a replacement for palm kernel cake. *African Journal of Biotechnology* vol.6 (4) pp 487-492.

[7] M. A. Belewu, and J. A. Adeneye (1996) .The effects of broiler litter as a protein sources in the performance of Bunaji (White Fulani) bull calves. *Nigeria Journal of Animal Production.* 23: pp 66-71.

[8] A. A. Bello, and D. N. Tsado, (2014). Effects of supplementing sorghum (sorghum bicolor L. Moench) stover with dried poultry dropping based diet on performance of growing Yankasa rams. IOSR Journal of Agriculture and veterinary science vol.7 Issue 1 ver.3 pp 34-39

[9] S. Betsha, and S. Melaku, (2009). Supplementations of *Hyparrhenia rufa* dominated hay with groundnut cake wheat brain mix: effects on feed intake, digestibility and Nitrogen balance of Somali goats. *Tropical Animal health and production* 41:927–933.

[10] T. G Danwake,. (1999). The effect of incorporating rumen ingesta in diets on the growth and carcass characteristics of growing rabbits.A M.Tech Thesis, Department of Animal Production. Federal University of Technology, Minna, Nigeria. Pp. 9-10.

[11] A. H. Ekeocha, and A. O. Akinsoyinu, (2014). Nitrogen balance of growing WAD ewe fed Mexican sunflower leaf meal (MSLM) based diets. International journal of AgriScience vol.4 (6) : 337-343

[12] J. D. Jordan, (2004). The influence of bedding material and collecting period on the feeding value of broiler and layer litter. MSc. Thesis Department of Animal Game and Grassland Science. University of the Free State, South Africa.

[13] S. H., Khan, M. A., Shahzad, M. Nisa, and M. Sarwar, (2010). Nutrients intake, digestibility, nitrogen balance and growth performance of sheep fed different silages with o Ibeawuchi,r without concentrate *Tropical Animal health and production vol 43. Number 4. Pp 795–801.*

[14] A. G. Lanko, (2005). Performance of pullets fed charcoal supplemented diets M. Tech Thesis Department of Animal production. Federal University of Technology Minna, Nigeria pp 12-18.

[15] T. P., Lanyasunya, W. H., Rong, S. A., Abdulrazak, P. K., Kaburu, J. O., Makari, T. A. Onuyago, and D. M Mwangi,. (2006). Factors limiting use of poultry manure as protein supplement for dairy cattle on smallholder farm in Kenya. *International Journal of poultry Science* 5:75-80.

[16] S. A Maigandi, and O. T. Owanikin (2002). Effects of drying methods on the mineral composition of fore stomach digesta (Fsd). Proceedings of 7th Annual Conference of Animal Science Association of Nigeria UNAAB, Abeokuta Nigeria. Pp 196-198.

[17] L. A., Loosli, J. K., H. F Hint,. and R. G. Warner, (1979). Animal Nutrition.7th edition.New Delhi Tata McGraw-Hill publishing company limited.

[18] A. I., Ndubueze, S. N. Ukachukwu, F. O Ahamefule, and J. A. (2006). Milk yield and composition of grazing white Fulani cows fed poultry waste–cassava peel based diets. *Pakistan Journal of Nutrition* 5(5): 436-440.

[19] NSADP (1995). 31st Quarterly Report. January-March 32-33. Niger State Agricultural Development, Project Newsletter 31(2). Pp. 10-13.

[20] O. A. Olorunnisomo, (2010). Utilization of raw, cooked, or fermented cassava-urea meal in a total diet for growing ewe-lambs.*Nigerian Journal of Animal Production.*37(2): 237-246.

[21] SAS, (2008). Statistical Analysis System User's Guide. SAS Institute Inc., Cary, N.C. 27513 U.S.A.

[22] A., Sebata, N. T., Mupangwa, J. F., Ngongoni, I. W. Nyakudya, V.E. Imbaryarwo-Chikosi, and J.S. Dube, (2005). Effects of supplementing native pasture hay with puncture vine *(Tribulus terrestris*) on the intake weight change, nitrogen balance and excretion of purine derivatives of sheep. *Tropical and sub-tropical Agro ecosystem*. 5:123-128.