WATER INTAKE OF GROWING YANKASA RAMS FED SORGHUM STOVER SUPPLEMENTED WITH DIFFERENT LEVELS OF DRIED POULTRY DROPPINGS

ABDULWAHEED ADEYEMI BELLO

Abstract: Thirty Yankasa rams aged 9-12 months, weighing 11.5-15.5 kg were randomly allotted into five treatment groups designated T_1, T_2, T_3, T_4 and T_5 comprising of three replicates with two animals per replicate. Chopped sorghum Stover was offered across the treatment groups' *ad libitum* and dried poultry droppings based diet was offered at 2% of body weight with 0%, 20%, 40%, 60% and 80% inclusion levels. Water was offered at 5 kg per ram daily. Water refusal and left-over feed were recorded separately on a daily basis before feeding in the morning. Samples of feed and feaces were analyzed for proximate constituents. Live weight changes were also measured. Results showed that ram offered higher levels of feed drank more water than the rams on other treatments. Although there was no significant differences ($P>0.05$) in water intake between T_2, T_3 and T_4, but treatment T_5 was significantly different ($P<0.05$) from treatment 1, 2, 3 and 4 respectively. Also, treatment 2, 3 and 4 were significantly different ($P<0.05$) from treatment 1. Daily water intake of the experimental rams was 3.5, 2.9, 2.8, 2.8 and 2.2 kg per head respectively. Yankasa rams fed sorghum Stover supplemented with high levels of dried poultry dropping based diets needs about 4 litres of water per head per day for optimum utilization of the feed.

Keywords: Water intake, growing Yankasa rams, sorghum Stover, dried poultry droppings.

Introduction: Water is the cheapest and most available nutrient. It is 65-75% of animal body at birth, 45-55% body weight at market, 90-95% of blood, 87% of milk, 17% of honey, 74% of whole egg and 72% of muscles [3]. Water is not just a nutrient; it also regulates body temperature, and is vital for organ functions such as digestion, waste removal and the absorption of nutrients [22]. It also functions to give the body its shape and turbidity, it is a constituent of all living cells and it is also required for specific production need [17].

The daily water requirement of livestock varies significantly among the animal species. The animal's size and growth stage will have a strong influence on daily water intake [22]. Water consumption of animals depends on several factors such as activity, environmental temperature, dryness of feed, type of production like lactation which requires much water, relative humidity [3], [22] providing adequate amount of balanced ration to the animals is not a yardstick for its utilization if clean water is not provided in the required quantity, hence providing enough quality water is essential for good livestock husbandry.

Sorghum Stover supplemented with poultry litter as feed for ruminants is becoming popular among farmers in savannah middle belt. Poultry litters use as protein supplement has been investigated in Nigeria [10],[7],[13],[15],[1],[14]. They reiterated that it can be fed as a sole protein supplement, leads to increase in weight gain hence it can support ruminants maintenance and production needs. But all studies did not take into cognizance water intake as it influences the utilization of the feed by the animals. Therefore, this study was designed to evaluate the water intake of growing Yankasa rams fed sorghum Stover supplemented with different levels of dried poultry droppings.

Materials and Methods:

Location of Experimental Site: The experiment was carried out at the Animal Production, Teaching and Research Farm of the School of Agriculture and Agricultural Technology of the Federal University of Technology, Main Campus, Gidan-Kwano along Minna – Bida Road, Minna is located within latitudes $09^{o}31^{I}$ and $09^{o}42^{I}$ North and longitudes $06^{o}29^{I}$ and $06^{o}41^{I}$ East with an altitude of 260 (853ft) above sea level. It is bounded by River Niger running the North-West flank down to the South Western part of the state. It falls within the Southern Guinea Savannah agro-ecological zone of the country [16], [11]. The town experiences mean monthly temperature of 30.5^{o}C with the highest in the month of March and the lowest in August, 22^{o} C – 30^{o} C. The raining season lasts for a period of five months on the average with annual average rainfall of 1400 mm in the month of July and August relative humidity ranged between 60% and 75% [8].

Experimental Rams and their Management: Thirty Yankasa rams aged 9-12 months and weighing 11.5 – 15.5 kg was used for the study. The rams were sourced from Mariga and Beji markets. The animals were housed in individual pen with corrugated iron roof and a concrete floor. Wood shavings were used as bedding materials to protect the animals from dampness and or cold and were changed on weekly basis. The animals were quarantined for two weeks

during which they were neck-tagged (for identification), treated against ectoparasites, using *ivermectin* injection, dewormed with *Albendazole* Bolus and injected intra-muscularly with *Oxytetracycline*-long acting broad spectrum antibiotic. The animals were later allotted into treatment groups and fed for a pre-treatment period of two weeks to enable them adapt to the experimental diets and the environment before the commencement of data collection. Equal amount of clean water was supplied at 5 kg per ram; salt-lick was also provided *adlibitum*.

Experimental Design: The experimental design used was the complete randomized design. Thirty Yankasa rams aged 9-12 months and weighing 11.5 – 15.5 kg was used for this study. The rams were randomly assigned to five treatments designated T_1-T_5 comprising of three replicates with two animals per replicate.

Experimental Diets: Two experimental diets were prepared for the study, basal and supplementary diets. Chopped sorghum Stover was fed as basal diet across the treatment group's *adlibitum*. Five supplementary diets were also prepared and fed. The supplements consist of the following; maize bran (MB) alone (100%), maize bran (MB) + dried poultry manure (MB + DPM) (80:20), maize bran (MB + DPM) (60:40), maize bran (MB + DPM) (40:60), maize bran (MB) + dried poultry manure (MB + DPM) (20:80). The supplementary diets were offered at the rate of 2% of the body weight. The composition of the experimental diet is shown in Table II.

Feeding trials of animals: Animals were divided into five groups according to their weight and they were housed in replicates in pens provided with feeding and watering troughs randomly assigned to one of the five experimental diets. Feed was offered twice daily at 800 hours and 1700 hours. Equal amount of clean water was offered at 5 kg per ram in individual feeding trial which lasted 106 days; salt-lick was provided *adlibitum*. Water and feed refusals were recorded each morning before feeding. While live weight changes were also recorded on a weekly basis. Weight gain was worked out as the difference between the initial and final live weight measurements.

Proximate Analysis of Feed Samples: The experimental feed samples were analyzed for dry matter (DM), Crude protein (CP), Crude fibre (CF), Ash, Nitrogen free extract (NFE), Ether extract (EE) according to[5] methods.

Statistical Analysis: All data generated were subjected to analysis of variance (ANOVA) using the general linear model (GLM) procedure of SAS [20]. Significant means were separated using least significant difference (LSD) test of the same package.

Results:

Climatic Condition: Table I shows the climatic condition under which the experiment was conducted.

Table I: Climatic Condition

Months	Average daily rainfall (mm)	Temperature (°o) Max.	Min.	Average Relative Humidity (%)
January	2	35	20	24
February	7	36	22	21
March	14	37	24	30
April	62	35	24	44
May	120	33	23	58
June	175	31	22	66

Source: FUT, Minna Weather Station Report, (2011)

Proximate composition of experimental feeds: The proximate compositions of experimental feeds are presented in Table II. The dry matter (DM) content of the feeds ranges between 84.20% and 94.10% in maize bran and sorghum Stover respectively. The crude protein (CP) of the feeds varied from 3.50% in sorghum Stover to 21.88% in poultry droppings. The crude fibre (CF) values were between 3.20% in maize bran to 31.20% in sorghum Stover respectively. The ash values ranges from 3.90% in sorghum Stover to 33.00% in poultry droppings. The Ether extract (EE) values ranged between 1.11% in sorghum Stover to 5.00% in maize bran. Nitrogen fibre extract (NFE) values were between 14.15% in poultry droppings and 63.50% in maize bran and gross energy values ranges between 2.02 kcal/g to 3.90 kcal/g in sorghum Stover and dried poultry droppings respectively.

Table II: Proximate composition of experimental feeds

Parameters	Sorghum Stover	Maize Bran	Dried Poultry Manure
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

Proximate composition of supplementary diet: The results of the proximate analysis and energy content of the experimental diet are shown in Table III. The dry matter levels of the supplementary diet ranges between 84.20% in treatment 1 to 92.80% in treatment 5. The crude protein in the supplementary diet varied from 7.00% in treatment 1 to 15.40% in treatment 5. The crude fibre levels ranged from 3.20% in treatment 1 to 12.50% in treatment 4. Ash values of 5.50%, 12.00%, 16.50% and 25.00% were recorded for treatments 1 to 5 respectively. The values for Ether extract were between 5.00% in treatment 1 to 17.50% in treatment 5. The Nitrogen free extract values ranges from 26.90% in treatment 5 to 63.50% in treatment 1. The calculated gross energy ranges from 2.2 7kcal/g in treatment 1 to 4.23 kcal/g in treatment 5

Table III: 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

Feed Intake, Water Intake, live weight gain and feed conversion ratio of the experimental rams: Results of the feed intake, water intake, and live weight gain and feed conversion ratio of the experimental rams is presented in Table IV. The rams fed sorghum Stover supplemented with dried poultry droppings diets consumed higher quantities of supplementary diets (P>0.05) than the control group. The rams in the treatment groups that consumed higher quantities of feeds equally consumed more water than the other treatment group. Results indicated that there was no significant difference (P>0.05) in final body weights between T_2, T_3, and T_4. However, T_5 was significantly higher (P<0.05) than the other treatment groups. There were significant differences (P<0.05) across the treatment group in average weekly body weight gain, however, T_2 and T_5 were observed to significantly have higher values in average weekly body weight gain than the other treatment groups. Feed intake and dry matter intake values were observed to increase as the level of supplementation increases. Similarly water intake were observed to increase as the level of supplementation increases T_5 was observed with significantly (P<0.05) highest values. T_3 has significantly (P<0.05) highest values in feed conversion ratio (FCR) compared to other treatment groups.

Treatments

Table IV: Feed Intake, Water Intake, Live Weight Gain and Feed Conversion Ratio of the Experimental Rams

Parameters	T_1	T_2	T_3	T_4	T_5	LSD	LS
Feed intake (kg)	12.9^{c}	14.8^{bc}	18.2^{b}	18.3^{b}	24.0^{a}	3.9	*
Dry matter intake	2.4^{c}	2.7^{b}	2.8^{b}	2.8^{b}	3.3^{a}	0.0	*
WaterIntake, kg/ram/day	2.2^{c}	2.9^{b}	2.8^{b}	2.8^{b}	3.5^{a}	70.3	*
Live Weight Gain, kg							
Initial bodyweight (kg)	11.5	12.4	14.2	14.6	15.3	0.0	NS
Final live weight (kg)	12.8^{c}	15.3^{b}	15.6^{b}	16.9^{b}	17.8^{a}	2.1	*
Weight gain (kg/day)	1.3^{d}	2.9^{a}	1.5^{bc}	2.1^{bc}	2.5^{ab}	2.7	*
Feed conversion ratio	9.9^{b}	5.1^{e}	12.1^{a}	8.7^{d}	$.9.6^{c}$	0.0	*

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

Discussion Climatic Condition: The trial was conducted between the months of February to early March. These falls in the period when rainfall was virtually absent, temperature high and relative humidity low

Proximate composition of experimental feeds: The proximate compositions of experimental feed are presented in Table II. They all have a high dry matter content ranging from 84.20% in maize bran to 94.09% in sorghum Stover. The poultry droppings used in this study has a crude protein of 21.88% higher than 15.40% and 20% [12],[18] and within the range of 19.4 – 23% and 10 – 33% [22],[2]. The variation in the crude protein values of the poultry droppings may be attributed to type of bird, the age of the manure, and the level of feeding the birds. The crude protein (CP) values of the sorghum is low 3.50%, this is in line with the results reported by [4],[1]. This lower value justifies the need for supplementation. The high level of crude fibre

reported for both the poultry manure and sorghum Stover, this should be expected because of the litter material and the lignifications of the sorghum Stover as it mature at harvest. The ash content of 33.0% reported for poultry droppings in this study is lower than 41.6% reported by [23]. The gross energy values of sorghum Stover is 2.02 kcal/g and this is in line with the findings of [6]. This lower value in sorghum Stover energy level justifies the need for inclusion of additional energy source [3],[1].

Proximate composition of supplementary diets: Table 3 shows the proximate composition of the supplementary diets. The dry matter content of the diets ranges from 84.20% in the control diet (T_1) to 92.80% in treatment 5. The CP contents of the diets were between 7.00% in treatment 1 (control diet) to 15.40% in treatment 5. With the exception of (T_1) (7.00%) the CP values obtained in this study for other treatments (T_2-T_5), (13.13 – 15.40%) were all higher than the range of (9-14%) reported by [3]. The calculated energy values reported in this present ranges between 2.3 kcal/g in treatment 4 to 4.2 kcal/g in treatment 2. This result is in line with the value reported by [3].

Feed intake, water intake, live weight gain and feed conversion efficiency of the experimental rams: The lower feed intake observed by the control group is in line with the findings of [19] which showed feeds with low CP content are seldom consumed by animals. The higher feed intake recorded by the animals supplemented with dried poultry droppings is in agreement with the findings of [14] who in their trial with growing heifer fed sorghum stover supplemented with poultry litter observed significant increase in feed intake. The higher performance in body weight gain by animals supplemented with 80% Dry poultry droppings could be due to the ability of the supplements to supply necessary nutrients (especially fermentable N) in ensuring optimum microbial biomass as reported by [1]. The final body weight showed that as the level of DPD inclusion increases the body weight also increases. This result was in consonant with the earlier report by [1] that animals fed poultry litter supplements gain weight while those unsupplemented lost weight at the end of their trial.

Water intake of the experimental animals increases as the level of supplementation with dried poultry manure increases across the treatment groups (Table IV). The above trend could be attributed to the fact that the feed was offered dry and the higher level of feeding corresponded with higher level of dry matter intake which was expected to stimulate the animals to drink more water [17]. Although there was no significant difference ($P>0.05$) in water intake between T_2, T_3 and T_4, but treatment T_5 was significantly different ($P<0.05$) from treatments 1, 2, 3 and 4 respectively. Also treatments 2, 3 and 4 were significantly different ($P<0.05$) from treatment 1. Daily water intake of the experimental rams was 3.5, 2.9, 2.8, 2.8 and 2.2 kg per head for treatments 5, 2, 3, 4 and 1 respectively (Table IV). This study reveals that rams offered high levels of dried poultry manure based diet needs about 4 liters of water per head per day for maintenance and production. The above findings are slightly above the value reported by [17] when they fed Yankasa rams with maize Stover lablab mixture. The lowest feed conversion ratio values obtained by animals supplemented with 20 % dried poultry droppings agreed with the findings of [9] the lower the level of fibres in the diets, the better the feed conversion ratio.

Conclusions: This study revealed that rams fed diets supplemented with dried poultry droppings had better feed intake, live weight gain, feed conversion efficiency. Water intake of the experimental animals increases as the level of dry matter intake also increases. Based on the result of this present study, Yankasa rams fed sorghum Stover supplemented with high levels of dried poultry manure based diets needs about 4 litres of water per head per day for optimum utilization of the feed.

References:

1. Abdul, S.B., Yashim S.M and Jokthan, G.E (2008): Effects of supplementing Sorghum Stover with poultry Litter on performances of Wadara cattle. *American-Eurasian Journal of Agronomy* 1(1):16-18.
2. Adewumi, A.A., Adewumi, I.K. and Olaleye, V.F. (2011). Live stocks waste menaced: fish Wealth – solution. *African Journal of Environmental Science and Technology.*vol. 5 (3) Pp 149-154.
3. Aduku, A.O. (2004). Animal Nutrition in the Tropics. Typeset and published by Davon computer and Business Bureau Zaria, Nigeria. Pp. 10-31.
4. Alhassan W.S (1986). Studies on untreated crop residues utilization in Red Sokoto maradi goats. Proceedings of a workshop held in the University of Ile Ife Nigeria. Pp 62-66.
5. A.O.A.C. (1990) Association of Official Analytical Chemists Official Methods of Analysis 15th Edition, Washington D.C.
6. Ayoola, G.B. and Ayoade, J. A. (1992) Socio-economic and policy aspects of using crop residues and agro industrial by products as alternative livestock feed resources in Nigeria. Proceedings of the workshop held in Gaborone,

Botswana. Edited by stares, J.E.S said, A.N. and Kategile J.A African feeds resource network Addis Ababa Ethiopia.

7. Belewu, M.A. and Adeneye J.A. (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. Danwake, T.G. (1999). The effect of incorporating rumen ingesta in diets on the growth and Carcass characteristic of growing rabbits. A M.Tech Thesis, Department of Animal Production. Federal University of Technology, Minna, Nigeria. Pp. 9-10.
9. DeBlas, J.C., Black, R., and Baymen, A.C. (1986). Micro nutrient deficiency – an underlying causes of morbidity. Bulletin of the World Organization. 8(2):79.
10. Ibeawuchi, J.A. Danjuma, D. and Ogutona, .T. (1993). The value of dried poultry waste as protein supplement for growing Borno White goats. *Discor. Innov* 5(1): 63 -68.
11. Lanko, A.G (2005). Performance of pullets fed charcoal supplemented diets M. Tech Thesis Department of Animal production. Federal University of Technology Minna, Nigeria pp 12-18.
12. Lanyasunya T.P., Rong W.H., Abdulrazak, S.A., Kaburu P.K., Makari, J.O. Onuyago T.A. and Mwangi D.M. (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.
13. Maigandi, S.A. and Owanikin O.T. (2002). Effects of drying methods on the mineral composition of fore stomach ingesta (Fsd). Proceedings of 7th Annual Conference of Animal Science Association of Nigeria UNAAB, Abeokuta Nigeria. Pp 196-198.
14. Mubi, A.A., Kibon A. and Mohammed, I.D. (2008). Utilization of Alkali Treated Sorghum Stover supplemented with poultry litter for growing Heifers in the North East Region of Nigeria. *Asian Journal of Animal and Veterinary Advances 3(3): 183-186.*
15. Ndubueze, A.I. Ukachukwu, S.N. Ahamefule, F.O. and Ibeawuchi, 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.
16. NSADP (1995). 31st Quarterly Report January-March 32-33 Niger State Agricultural Development, Project Newsletter 31(2). Pp. 10-13.
17. Osunhor, C.U., Adamu, A.M. Ehoche, O.W.; and Lakpini, C.A.M. (2009). Performance of growing Yankasa Rams fed maize Stover supplemented with a diet containing maize offal and dry layer litter. 34th Annual Conference of Nigerian Society for Animal Production Uyo, Akwa Ibom State, Nigeria. Pp. 554-556.
18. Owen, O.J., Ngodigha, E.M. and Amakiri, A.O. (2008). Proximate composition of Heat Treated Poultry Litter (Layers).*International Journal of Poultry Science* 7(11): 1033-1035.
19. Reid, R.L. and Klopfenstein (1983). Forage and crop residues. Quality evaluation and system of utilization *J. Anim. Sci.* 57:534-562.
20. SAS, (2008). Statistical Analysis System User's Guide. SAS Institute Inc., Cary, N.C. 27513 U.S.A.
21. Saleh, H.M., Elwan, K.M., El-fouly, H.A., Ibrahim, I.I., Salam, A.M. and El-Ashry, M.A. (2002).The use of poultry waste as a Dietary Supplement for Ruminants. In: Development and field Evaluation of animal feed supplementation packages. Proceedings of the final review meeting of an IAEA Technical Co-operation Regional AFRA Project organized by the joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and held in Cairo, Egypt. 25-29 November, 2000.
22. Ward, D. and Mckague, K. (2007). Water Requirements of Livestock Fact Sheet. Ministry of Agriculture, Food and Rural Affairs Ontario, Canada.
23. Zinn, R.A., Baraja, S.R., Montario, M. and Shen, Y.C. (1996). Protein and Energy value of dehydrated poultry excreta in diets for feedlot cattle.
*Journal of Animal Science.*74: 2331-2335.

***

Postgraduate student / Dept of Animal Husbandry and Dairy Science,
College of Agriculture, Dr. B.S.K.K.V. Agricultural University Dapoli,
Dist: Ratnagiri (Maharashtra) India/ aabello2003@yahoo.co.uk