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Effects of Supplementing Finger Millet (*Eleusine coracana*) Straw with Dried Poultry Dropping Based Diet on the Performance of Konkan Kanyal Goats

Research Article

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ABSTRACT

This experimental trial was conducted to study the effects of dried poultry dropping based diets on the dry matter intake, live weight changes, nutrient digestibility and N-balanceof Konkan Kanyal goats. Thirty Konkan Kanyal goats aged between 9-12 months and with average weight of 13.66 kg were used in a randomized block design (RBD) experiment. The experimental goats were randomly assigned to five treatments (TI-T5). T1 were goats fed with 0% dried poultry droppings based diets (DPDBD), T2 were fed with 20% dried poultry droppings based diets (DPDBD), T3 were fed with 40% dried poultry droppings based diets (DPDBD), T4 were fed with 60% dried poultry droppings based diets (DPDBD), T5 were fed with 80% dried poultry droppings based diets (DPDBD). Mean dry matter intake (kg) was higher in treatment groups supplemented with dried poultry droppings based diet T2, (572.99±18.12), T3, (614.09±27.76), T4, (605.37±32.79), T5 (619.24±9.15) in comparison to the control treatment group T1, (571.47±28.86). The final live body weight (kg) was significantly ($P<0.05$) higher in T5 (19.4±1.27) than T_1 (14.72±1.02), T2 (15.45±0.88), T3 (16.03±0.48) and slightly higher than T4 (18.28±1.19). Similarly in feed conversion efficiency T5 (9.0±0.28) and (8.34±0.44) T4 performed significantly ($P<0.05$) better compared to other treatment groups: T3 (3.53±0.29), T2 (2.88±0.48) and T1 (2.89±0.34). Nutrient digestibility was significantly higher ($P<0.05$) in T5 in all parameters measured, N-balance was positive across the treatment groups with significant differences across the board. The results of this study suggests that feeding of dried poultry droppings based diets up to 80% inclusion to Konkan Kanyal goats consuming finger millet straw as basal diet would improve the feed value and give satisfactorily performance.

KEY WORDS dried poultry droppings, finger millet straw, Konkan Kanyal goats.

INTRODUCTION

Feed represents the largest single expense input for livestock production. Livestock farmers search for inexpensive feed alternatives, especially when conventional feeds are expensive. Many of these alternative feed are by-products and waste products from the processing of various food and fibre crops, or crop residues, tree leaves, farm animal wastes etc. These alternatives feed can fit into a feeding program as the protein supplement, fibre, energy sources, as a substitute for portion of the ration (Prasad and Rao, 2013). There is a need to explore the possibility of utilizing novel feed stuffs, agricultural crop residues, and agro-industrial by-products as complete feed allowance in comprehensive feeding scheme to reduce the feed deficiency and to economize the production (Sudheer Babu *et al.* 2013). One of such usable crop residues as ruminant animal feed is Finger millet straw. Finger millet straw (FMS) consists of dry stems and leaves. FMS is the by-product obtained after harvesting the crop and can be used as ruminant feed as source of roughage (Malisetty *et al.* 2013). The straw is available after harvesting and threshing of the grains for human consumption. FMS is considered to have high nutritive value better than slender straw such as from rice and wheat (Subba Rao *et al.* 1995).

Finger millet straws are coarse, high-fibre, low-protein and low-digestibility roughages, they play a significant role as filler and have some value as a energy source for feeding ruminant animals provided they are adequately supplemented (Heuze and Trans, 2013). FMS just like other cereal straws is highly fibrous (neutral detergent fiber (NDF) over and above 70% dry matter) and yet inferior in protein than the green forage (about 5% DM). Its nutritive value can be improved by ammonia and urea treatment (Deshmukh and Toro, 1995; Ramachandra, 1997). Since FMS is of poor nutritive value it must therefore be supplemented with nitrogen and energy sources to meet maintenance and or production requirements (Heuze and Trans, 2013).

Finger millet straw is readily available especially during the dry season, after the year's harvest, cheaper to cure and preserved, consequently, it could be fed to ruminant animals like goat as a basal feed. Above all, it may offer reductions in feed costs and hence has an enormous influence on the overall expense of livestock production enterprise.

Poultry litter is an important by-product of poultry enterprise, which consists of poultry excreta, bedding material, feathers, spilled feed, etc. Poultry litter contains higher crude protein level, varying from 15 to 35% of dry matter content.

Consequently, poultry litter could be use as a supplier of nitrogen in ruminant diets and the possibly digestible nitrogenous compounds in the litter are very dissolvable and are very quickly vulgarized to ammonia in the rumen. In view of the above, this study therefore seek to balance the lack of N in finger millet straw with poultry litter in order to improve its feed value and its impacts on dry matter intake, live weight changes, nutrient digestibility and N-balance in Konkan Kanyal goats.

MATERIALS AND METHODS

Experimental site, climatic and weather conditions

The trials were conducted at the Institutional livestock farm, goat unit, Department of Animal Husbandry and Dairy Science, College of Agriculture, Dapoli, District Ratnagiri, Maharashtra, India.

The Institutional livestock farm, goat unit of Department of Animal Husbandry and Dairy Science farm, College of Agriculture, Dapoli is located at 280 meters above mean sea level (MSL) and in the subtropical region at 17˚ 45' North latitude and 13˚ 12' East longitude. The area is characterized by hilly terrain. The soil is lateritic and acidic in nature. The soil is low in fertility, having poor water holding capacity. The climate is warm and humid with 3500 mm average annual rainfall. The maximum temperature at Dapoli is about 33.4 ˚C in summer and 21.1 ˚C in winter while, relative humidity ranges from 55 to 96 per cent.

Experimental animals

Thirty Konkan Kanyal goats aged 9-12 months and with average weight of 13.66 kg were used in present investigation. The goats were randomly assigned to five treatments designated T_1-T_5 comprising of three replicates with two animals per replicate. The animals were kept in individually designed pens. The experimental animals were sprayed against ectoparasites, dewormed orally against endoparasites and were treated with wide-ranging antibiotic to prevent bacterial infections. Thereafter the animals were randomly assigned into five experimental groups and fed for three weeks for acclimatization to the experimental diets before data collection. Clean fresh water was offered daily throughout the duration of the trial. The feeding trial was conducted for a period of 90 days. The animals were raised in individual compartment under confinement.

Experimental feeds and treatments

Three experimental feeds were used for the study, finger millet straw, green fodder as basal diets and concentrate diets. Five concentrate mixtures were used comprising dried poultry dropping (battery cage) at a rate of 0% (T1), 20% (T2), 40% (T3), 60% (T4), and 80% (T5) in addition to other feed ingredients of maize crumbs, rice bran, groundnut cake, mineral mixtures and salt.

T1- Finger millet straw + 0% dried poultry droppings + 100% concentrate

T2- Finger millet straw + 20% dried poultry droppings concentrate based diet

T3- Finger millet straw + 40% dried poultry droppings concentrate based diet

T4- Finger millet straw + 60% dried poultry droppings concentrate based diet

T5- Finger millet straw + 80% dried poultry droppings concentrate based diet

All ingredients were mixed manually to make homogenous isonitrogenous and isocaloric diets. The proximate compositions of the experimental feeds, concentrate diets and ingredient compositions of the concentrate diets are presented Tables 1, 2 and 3.

Table 1 Proximate chemical composition of experimental feeds (% DM basis)

Items	Finger millet straw	Green fodder	Poultry droppings	Maize crumbs	Groundnut cake	Rice bran
Organic matter (OM), %	88.12	93.00	87.54	90.60	89.88	88.66
Dry matter (DM), %	98.55	23.30	98.25	90.15	92.24	91.82
Crude protein (CP), %	5.35	7.90	29.86	9.02	40.07	12.20
Ether extract (EE), %	0.86	1.90	1.34	3.95	5.61	1.38
Crude fibre (CF), %	33.72	28.70	2.8	4.70	6.79	10.92
Nitrogen free extract (NFE), %	48.19	54.50	53.54	72.93	37.41	64.20
Total ash (TA)	11.88	7.00	12.46	9.40	10.12	11.34
Nitrogen free extract (N), %	0.86	1.26	4.78	1.44	6.41	1.95
Gross energy (GE) (kcal/g)	2.23	2.67	3.46	3.63	3.60	3.18
Minerals						
Calcium (Ca), %	0.10	3.60	2.19	0.24	0.56	0.54
Phosphorus (P), %	0.08	2.10	0.16	0.15	0.20	0.18

Table 2 Proximate chemical composition of concentrate diets (% DM basis)

Items	T1	T2	T3	T4	T5
Organic matter (OM), %	89.32	89.50	89.11	89.20	89.33
Dry matter (DM), %	91.53	91.16	91.90	91.32	91.58
Crude protein (CP), %	13.34	14.05	14.25	14.22	14.39
Ether extract (EE), %	4.34	4.56	4.61	4.40	4.39
Crude fibre (CF), %	3.30	3.50	3.23	3.40	3.31
Nitrogen free extract (NFE), %	68.34	67.39	67.02	67.69	67.24
Total ash (TA)	10.68	10.50	10.89	10.80	10.67
Nitrogen free extract (N), %	2.13	2.25	2.28	2.29	2.30
Gross energy (GE) (kcal/g)	3.66	3.67	3.67	3.67	3.66
Minerals					
Calcium (Ca), %	0.92	1.00	0.95	0.97	0.97
Phosphorus (P), %	0.68	0.78	0.78	0.84	0.85

Table 3 Ingredients composition of the experimental diets

Ingredients (%)	Treatments				
	T1 0%	T2 20%	T3 40%	T4 60%	T5 80%
Maize crumbs	45.00	43.00	39.00	24.00	10.00
Rice bran	40.00	25.00	10.00	9.00	7.00
Groundnut cake	12.00	9.00	8.00	4.00	0.00
Dried poultry dropping	0.00	20	40.00	60.00	80.00
Mineral mixture	2.00	2.00	2.00	2.00	2.00
Salt	1.00	1.00	1.00	1.00	1.00
Total	100.00	100.00	100.00	100.00	100.00

Experimental design

The experimental design used was the randomized block design with two goats per treatment per replicate. Each treatment was replicated thrice. Thirty Konkan Kanyal goats each aged 9-12 months with average weight of 13.66 kg were used for this study. The goats were randomly assigned to five treatments designated T_1, T_2, T_3, T_4 and T_5. The ANOVA comprising of replication, treatment error, sampling error and total was considered in the analysis as was suggested by Rangaswamy (2000).

Management of the experimental animals

Feeding trial

The experimental animals were fed at 3% of their body weight (BW). One-thirds (1/3) were fed as green feed, two-thirds (2/3) were fed as dry feeds while at of out this dry feed two-thirds (2/3) were fed as dry roughages and one-thirds (1/3) were fed as concentrates. The level of inclusion of dried poultry dropping in the treatments are T_1 0%, T_2 20%, T_3 40%, T_4 60% and T_5 80%. Chopped finger millet straw (2 cm long) was offered to the animals as basal diets.

The goats were fed in individually designed pens. 300 g of finger millet straw, 600 g of green fodder and 200 g of concentrate mixtures were offered daily in three feeding regimes the experimental animals were weighed at the start of the experiment, subsequently, weekly. An adaptation period of 21 days was allowed before data was collected for 90 days. The animals were dewormed, dipped against ecto-parasites and dosed with antibiotics as prophylaxis prior to the commencement of the experiment. Fresh clean water was offered throughout the duration of the trial.

Feed preparation

Finger millet straw and green fodder was chopped using chopping machine to 2-3 cm long before feeding as basal feed. The poultry manure from battery cage system was dried under the sun-rays for between 3-5 days to reduce drastically the level of microorganisms therein. The product was thereafter milled using milling machine and was used for formulating the concentrate diet.

Metabolic trial

Three experimental animals were picked at random from each experimental group at the end of the growth study. They were placed in an individual metabolic cage with slatted floors adapted for faecal and urine collection. Experimental diets fed were the same as those used in the growth study. An adaptation grace of five days was allowed before the urine and faecal outputs were determined for the following7 days.

Urine output was collected on a daily basis into a graduated plastic container containing 100 mL of 50% hydrochloric acid (HCl). A 10% aliquot of aggregate urine output per day was taken out daily and stored until required for analysis. Faeces from the experimental goats on each treatment group were quantitatively mixed thoroughly and sub-sampled taken. Feed consumed was computed as the change between the quantity of feed offered and the quantity refused. Feed and faecal samples were dried at 65 ˚C to constant weight, milled and kept in air tight containers until required for analysis.

Nitrogen compositions of feed; urine and faeces were analyzed by the Kjeldahl method (AOAC, 1995). Apparent digestibility of the diets was calculated as the change between nutrients consumed and excreted in the faeces represented as a fraction of the nutrient intake (Maynard *et al.* 1979; Marshal, 2001; Aduku, 2004).

Nitrogen retained by the experimental animals was computed as the difference between nitrogen intake and nitrogen excreted, Nitrogen retained= nitrogen intake - (faecal nitrogen+urinary nitrogen) (Sebata *et al.* 2005; Olorunnisomo, 2010).

Analysis of feeds and fodder

The samples of the experimental feed, feed ingredients and faeces were analyzed for the proximate principles *viz.*, dry matter (DM) , crude protein (CP) , crude fibre (CF), ether extract (EE), nitrogen free extract (NFE), and total ash (TA) (AOAC, 1995). The nitrogen, calcium and phosphorus content in the urine were analyzed (AOAC, 1995).

Statistical analysis

All data generated were subjected to analysis of variance (ANOVA) with the use of general linear model (GLM) procedure of SAS (2008). Means were separated with the use of least significant difference (LSD) test of the SAS software.

RESULTS AND DISCUSSION

The proximate compositions of the experimental feeds, concentrate diets and ingredient compositions of the concentrate diets are presented in Tables 1, 2 and 3, respectively.

The results of the proximate compositions of the experimental feeds and energy determination are presented in Table 1. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of finger millet straw are 86.67, 5.35, 0.86, 33.72, 48.19, 11.88, 0.86, 2.23, 0.10 and 0.08. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of Green fodder are 23.30, 7.90, 1.90, 28.70, 54.50, 7.00, 1.26, 2.67, 3.60 and 2.10. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of poultry dropping are 98.25, 29.86, 1.43, 2.80, 53.54, 12.46, 4.78, 3.46, 2.19 and 0.16. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of maize crumbs are 90.15, 9.02, 3.95, 4.70, 72.93, 9.40, 1.44, 3.63, 0.24, and 0.15. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of Groundnut cake are 92.24, 40.07, 5.61, 6.79, 37.41, 10.12, 6.41, 3.60, 0.56 and 0.20. The DM, CP, EE, CF, NFE, TA, N, GE, Ca and P content of rice bran are 91.82, 12.20, 1.38, 10.92, 64.20, 11.34, 1.95, 3.18, 0.54 and 0.18, respectively.

The results of proximate analysis and energy determination of concentrate diets are shown in Table 2. The dry matter in concentrate diets ranges between 91.16 % in T2 to 91.90% in T3. The crude protein contents vary between 13.34% in T1 to 14.39% in T5. The ether extract ranged from 4.34 % in T1 to 4.61 % in T3. The crude fibre was highest in T2 (3.50%) and lowest in T3 (3.23%). Nitrogen free extract vary between 67.02% in T_3 to 68.34% in T1. Total ash ranges between 10.50% in T2 to 10.89% in T3. Nitrogen content ranged from 2.13 in T1 to 2.30 in T5. The calculated gross energy ranges from 3.66 to 3.67 respectively across the treatment groups.

Calcium values vary from 0.92% in T1 to 1.00% in T2 while phosphorus values ranges between 0.68% in T1 to 0.85% in T5 respectively.

Dry matter intake by experimental goats

In the present study, average daily dry matter intake was observed to be 571.47 ± 28.86 g/day in treatment T1, 572.99 ± 18.12 g/day in treatment T2, 614.09 ± 27.76 g/day in treatment T3, 605.37 ± 32.79 g/day in treatment T4 and 619.24 ± 9.15 g/day in treatment T5. Statistically, there were no significant differences between treatment T1 and T2 and between T3 and T5. The daily dry matter intake (g/day) was however higher in values (619.24±9.15 g/day) in treatment T5 compared to the other treatment groups. Daily dry intake showed that, treatment groups supplemented with poultry droppings had higher values for dry matter intake as compared to the treatment group not supplemented. This present findings is in agreement with Almaz *et al.* (2012) in their study with lambs fed finger millet straw supplemented with Atella, noug seed cake and their mixtures, where they reported that supplementation of concentrate to finger millet straw increase the intake of DM and CP of the total feed. The highest intake was observed in supplemented treatment group (T5), Gashu *et al.* (2014) in their study with on effect of supplementation on feed intake and body weight changes of Washera sheep fed urea treated finger millet straw. The authors reported that supplementation of the basal diet increase significantly (P<0.05) the intake of total DM and CP when compared to control, Bello and Tsado (2013) in their study on feed intake and nutrient digestibility of growing Yankasa rams fed sorghum stover supplemented with graded level of dried poultry droppings based diet, observed that the mean feed intake of animals in T1 had lower feed intake (808.80 g day^{-1}). Animals fed sorghum Stover supplemented with dried poultry droppings had higher feed intake (1028.09 to 1661.12 g day^{-1}) compared to the control group (808.80 g day^{-1}). Similarly Mubi *et al*. (2008) in their trial with growing heifer fed sorghum Stover supplemented with poultry litter where they observed, there was significant increase in feed intake of the groups supplemented. The present value observed was lower than the values reported by Bello and Tsado (2013) (1028.09 to 1661.12 g day^{-1}) and (808.80 g day^{-1}), but higher than the values reported by Ukanwoko and Ibeawuchi (2009) (310.03, 291.55, 305.89 and 313.42 g) and Yousuf *et al.* (2013) (351.17, 507.06, 536.88 and 356.72 g).

Body weight changes of experimental goats

The findings on body weight changes of experimental animals fed on different levels of poultry dropping based diet are presented in Table 4.

Prior to the commencement of the experiment, the average initial body weights of animals in each treatment group were 13.12 ± 1.06 kg in T1; 13.85 ± 0.84 kg in T2; 13.93 ± 0.43 kg in T3; 13.38 ± 0.93 kg in T4 and 14.00 ± 1.35 kg in T5, while final body weights at the end of the experiment were 14.72 ± 1.02, 15.45 ± 0.88, 16.03 ± 0.48,18.28 ± 1.19 and19.4 ± 1.27 kg in T1, T2, T3, T4 and T5 treatment groups, respectively.

As elucidated in Table 4, the average daily body weight gain (BWG) of animals in each treatment group's were 16.49 ± 1.97, 16.49 ± 2.77, 21.65 ± 2.05, 50.56 ± 2.69 and 55.67 ± 1.75 g/day and the total body weight gain was 1.6 ± 0.19, 1.6 ± 0.27, 2.1 ± 0.2, 4.9 ± 0.26 and 5.4 ± 0.17 kg in T1, T2, T3, T4 and T5, respectively. The performance in body weight gain was highly significant (P<0.05) in T5 (55.67±1.75 g/day) and T4 (50.56±2.69 g/day) than other treatment groups. The BWG increases across the treatment groups as level of inclusion of poultry dropping based diet increases. This result concur with the earlier report by Njidda (2010) on study the effect of cotton seed cake and dry poultry litter supplementation on performance of grazing sheep in the Sahelian zone of Nigeria. The author reported that there was a significant difference between the supplemented group and control group. Animal fed with dry poultry litter showed significantly (P<0.05) higher daily live gain.

Also, Gashu *et al.* (2014) studied the effect of supplementation on feed intake and body weight change of Washera sheep fed urea treated finger millet straw, reported that supplementation of urea treated finger millet straw promoted higher daily weight gain. Highest daily weight gain was observed with T4 and T5.

The higher performance in body weight gain (BWG) by animals supplemented with 80% poultry droppings in the present studies could be due to increased microbial protein synthesis in the rumen caused by more degradable protein in the form of ammonia nitrogen being available to the rumen microbes as reported by Sayed and Fathy (2010). The result of the present finding was slightly higher than the result reported by Jokthan *et al.* (2013) in their study on effect of cottonseed replacement with broiler litter on performance of Yankasa rams fed maize husk basal diet. The authors reported 25.33, 25.17, 26.00, 26.00, and 25.83 as the BWG (g/day) of the experimental animals studied

Feed conversion efficiency of the experimental goats

The per cent feed conversion efficiency (FCE) of the experimental goats were 2.89 ± 0.34, 2.88 ± 0.48, 3.53 ± 0.29, 8.34 ± 0.44 and 9.0 ± 0.28 in T1, T2, T3, T4 and T5 treatment groups, respectively. The FCE value of T5 was significantly higher than all treatment groups and was closely followed by T4.

Table 4 Dry matter intake, live weight gain and feed conversion efficiency of the experimental goats

Parameters	Treatments					SE±	CD 5%
	T1	T2	T3	T4	T5		
Dry matter intake (g/day/head)	571.47±28.86[c]	572.99±18.12[c]	614.09±27.76[a]	605.37±32.79[b]	619.24±9.15[a]	176.8	517.22
Dry matter intake (100 kg/BW)	4.48±0.37[b]	4.23±0.29[c]	4.41±0.14[b]	4.59±0.23[a]	4.59±0.23[a]	1.26	3.39
Initial weight (kg)	13.12±1.06[a]	13.85±0.84[a]	13.93±0.43[a]	13.38±0.93[a]	14.00±1.35[a]	1.17	3.42
Final weight (kg)	14.72±1.02[c]	15.45±0.88[c]	16.03±0.48[b]	18.28±1.19[a]	19.4±1.27[a]	1.12	3.24
Weight gain (kg)	1.6±0.19[c]	1.6±0.27[c]	2.1±0.2[b]	4.9±0.26[a]	5.4±0.17[a]	0.13	1.33
Body weight gain (g/day)	16.49±1.97[c]	16.49±2.77[c]	21.65±2.05[b]	50.56±2.69[a]	55.67±1.75[a]	1.09	3.1
Feed conversion efficiency (%)	2.89±0.34[d]	2.88±0.48[d]	3.53±0.29[c]	8.34±0.44[b]	9.0±0.28[a]	0.80	1.45

The means within the same row with at least one common letter, do not have significant difference (P>0.05).
SE: standard error.
CD: critical difference.

There was no significant (P>0.05) differences between treatment groups T1 and T2, however significant (P<0.05) differences existed between them and other treatment groups. The feed conversion efficiency data showed that T5 (9.0±0.28) is best converter of feed to flesh while T1 and T2 (2.89±0.34, 2.88±0.48) are the least converter of feed to flesh.

The present findings agrees with the reports by Nadeem *et al.* (1993) in their study on the effect of feeding broiler litter on growth and nutrient utilization by Barbari goats where they documented the best FCE for treatment group fed the highest poultry litter (30%) as 12.45. Similarly, Yousuf *et al.* (2013) in their study on the growth performance characteristics of goats fed varied levels of poultry manure in whole cassava plant based concentrate diet reported 10.63 as the best FCE in the treatment group fed highest level of poultry manure (22%).

Nutrient digestibility coefficient of experimental goats

The average dry matter digestibility values in experimental goats in treatment T1 were 80.15 per cent, 85.56 per cent in treatment T2, 87.20 per cent in treatment T3, and 88.10 per cent in treatment T4 and 90.30 per cent in treatment T5. In the present study the crude protein digestibility coefficient values were observed as 74.70 (T1), 82.00 (T2), 83.40 (T3), 84.03 (T4), and 87.60 per cent for treatment group T5, respectively. The digestibility coefficients of ether extract (EE) observed in the present study were 78.02, 86.55, 88.17, 90.41, and 92.59 per cent in T1, T2, T3, T4 and T5 treatment groups, respectively. The average crude fibre (CF) digestibility coefficient values in the present study were observed as 70.04, 80.20, 82.70, 84.58, and 88.20 per cent in treatment T1, T2, T3, T4 and T5, respectively. The average values of nitrogen free extract (NFE) digestibility coefficients were found to be as 94.32, 95.67, 95.88, 96.70, and 97.20 per cent for treatment groups T1, T2, T3, T4 and T5, respectively.

The average dry matter digestibility coefficient was significantly (P<0.05) highest in T5 and lowest in T1. Similar trend was observed in crude protein, ether extract, crude fibre, nitrogen free extract and total ash respectively across the treatment groups in favour of the treatment groups supplemented with dried poultry dropping based concentrate diets.

A comparable result was reported by Bello and Tsado (2013) in their study on the effects of supplementing sorghum stover with dried poultry dropping based diet on performance of growing Yankasa rams. The significantly high values observed in the present study in nutrient digestibility coefficients of all the parameters measured agrees with the earlier work of Njidda (2010), Jokthan *et al.* (2013) and Anigbogu and Nwagbara (2013). The significant digestibility coefficient observed in the present study could be due to increased microbial protein synthesis in the rumen caused by more degradable protein in the form of ammonia nitrogen being available to the rumen microbes as reported by Sayed and Fathy (2010), which is a manifestation of the effect of poultry litter to import soluble N into the rumen of the experimental goats thereby making it possible for the animals to digest the feed substantially as was observed in the present study.

N-balance of the experimental goats

The average total intake, total excretion and average gross retention of nitrogen were found to be 7.06, 2.29 and 4.77 g/day respectively for T1; 7.92, 2.35 and 5.57 g/day respectively for treatment T2; 7.28, 1.71 and 5.57 g/day respectively for treatment T3; 8.02, 1.60 and 6.42 g/day respectively for treatment T4; 8.37, 1.94 and 6.43 g/day respectively for treatment T5. The average nitrogen intake was significantly higher in treatment T5 (8.37) followed by T4, however, there were no significant differences between T4, and T5 and followed by T2, T3 respectively while the lowest was recorded for T1 (7.06) (Table 5).

Table 5 Nutrient digestibility coefficient, N-balance of goats fed dried poultry dropping based concentrates

Parameters	Treatments					SE±	CD 5%
	T1	T2	T3	T4	T5		
Dry matter (DM)	80.15^e	85.56^d	87.20^c	88.10^b	90.30^a	4.74	9.63
Crude protein (CP)	74.70^e	82.00^d	83.40^c	84.03^b	87.60^a	1.74	3.53
Ether extract (EE)	78.02^e	86.55^d	88.17^c	90.41^b	92.59^a	2.61	4.06
Crude fibre (CF)	70.04^e	80.20^d	82.70^c	84.58^b	88.20^a	0.66	2.34
Nitrogen free extract (NFE)	94.32^e	95.67^d	95.88^c	96.70^b	97.20^a	2.52	5.05
Total ash (TA)	76.00^e	81.00^d	84.20^c	86.23^b	89.74^a	1.55	4.50
Calcium (Ca)	95.52^c	94.60^e	96.30^b	94.81^d	97.45^a	0.15	0.20
Phosphorus (P)	97.07^d	96.71^e	97.22^c	97.34^b	97.88^a	0.12	0.19
N-balance							
N intake	7.06^e	7.92^c	7.28^d	8.02^b	8.37^a	0.23	0.55
Faeces-N	0.79^a	0.75^b	0.71^c	0.70^c	0.74^b	0.09	0.29
Urine-N	1.5^b	1.6^a	1.0^d	0.9^e	1.2^c	0.11	0.34
N-retention	4.77^c	5.57^b	5.57^b	6.42^a	6.43^a	0.11	0.35

The means within the same row with at least one common letter, do not have significant difference (P>0.05).
SE: standard error.
CD: critical difference.

The higher nitrogen intake observed in the treatment groups supplemented with dried poultry dropping based concentrate could be due to the higher crude protein intake by the treatment groups which in turn is a direct consequence of the effect of the protein source (poultry litter). The litter was able to increased microbial protein synthesis in the rumen caused by more degradable protein in the form of ammonia nitrogen being available to the rumen microbes as reported by Sayed and Fathy (2010), which is a manifestation of the effect of poultry litter to import soluble N into the rumen of the experimental goats thereby making it possible for the animals to digest the feed substantially as was observed in the present study, hence, higher intake and gross retention values were significantly (P<0.05) higher in the treatment groups supplemented with dried poultry dropping based concentrate diets as compared to the control treatment group. From the result obtained, it is clear that nitrogen intake increases as the level of inclusion also increases. The present value was lower than the results reported by Jokthan *et al.* (2013) in their study on effect of cottonseed replacement with broiler litter on performance of Yankasa rams fed maize husk basal diet as 8.25, 8.21, 8.37, 8.57 and 8.80. But comparable to the value reported Ukanwoko and Ibeawuchi (2009) in their study with West African dwarf Bucks fed poultry waste-cassava peel based diet as 6.04, 7.12, 7.92 and 8.4, respectively.

CONCLUSION

This study showed that goats fed with dried poultry dropping concentrate based diets had significantly better dry matter intake, body weight gains and feed conversion efficiency. The study further reveals that nutrient digestibility was also improved with the supplementation of dried poultry based diet. From the results of the present study, it is recommended that sun dried poultry dropping concentrate based diet can be used satisfactorily to supplement finger millet straw up to 80 per cent inclusion in the diet and improved goat's growth and production performance.

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