SHORT COMMUNICATION

Effect of Feeding Concentrate Mixture Containing Varying Levels of Cashew Nut Kernel Meal on Nutrient Utilization in Ram Lambs

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Abstract

The present study was conducted to assess the effect of feeding concentrate mixture containing varying levels of cashew nut kernel meal (CNKM) on nutrient utilization in ram lambs. Eighteen ram lambs were randomly divided into three equal groups of six each and allotted to three dietary treatments (T1 to T3) comprising of green fodder viz., Super Napier and concentrate mixture (20% CP) containing CNKM at 0, 10 and 20%, respectively. The average DMI of ram lambs was comparable among treatments. Significantly higher ($P<0.05$) digestibility (%) of DM, OM, CP, EE, CF, NFE, NDF, ADF and cellulose was observed in ram lambs of group T3 compared to control, while the difference in hemicellulose was non-significant. The TDN content expressed as % in diet consumed was higher ($p<0.05$) in T_3 compared to control, while the difference in DCP (%) in the diet consumed was not significant. The estimated DE and ME intakes (Mcal/d) increased ($p<0.05$) with increased level of CNKM in the concentrate mixture, while there was no significant difference in the intakes of DM, DCP, TDN and ME per $kgW^{0.75}$.

Key words: Concentrate mixture, Cashew nut kernel meal (CNKM), Nutrient digestibility, Ram lambs.

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Introduction

The aim of animal production is to produce high-quality protein in the form of meat, milk and eggs for human nutrition which requires adequate feeding in terms of quality and quantity. Livestock farmers in developing countries face various challenges due to high cost of conventional feed ingredients, which adversely affects production (Ocheja *et al*., 2016). The attempt to mitigate high cost of feed has prompted the continuous search for alternatives or additional feedstuffs. Cashew (*Anacardiaceae*) nut is receiving the attention of scientists as a viable additional protein feed resource. Brazil and India are the two major producers of cashew nuts. The third-largest global source is Africa. Of the raw cashew nuts being processed in many of the producing countries (Spore, 1997; Olunloyo, 1996), only about 60-65 % are suitable for edible purposes, while the rest are discarded as broken or scorched kernels. (Odunsi, 2002). Recently, the extension of cashew nut from human consumption to the feeding of livestock has received the attention of scientists (Akande *et al*., 2015) as a potential feedstuff. During processing, large quantities of the kernels are discarded because they are not suitable for sale; although not suitable for sale, these reject cashew kernels has found application in animal feeding. (Akande *et al*., 2015). Cashew nut industry produces annually large amounts of biomass available as potential animal feed such as cashew apple waste (CAW), cashew nut shell (CNS), cashew nut shell liquid (CNSL), cashew nut testa (CNT) and cashew nut meal/cashew nut kernel meal (CNM/CNKM). Recently Cashew nut meal is gaining greater importance. The discarded nut is said to contain a significant quantity of high protein material, which is particularly used for feeding of animals (Sogunle *et al*., 2009). It is a valuable and potential by-product that can be utilized as an alternative energy and protein source for growing ruminants

However, there was paucity of information regarding the use of cashew nut in animal feed, the utilization of cashew nuts meal in diets of Ram Lambs has received little

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or no attention after over a decade of research.. Hence, the objectives of this study was to examine the effect of addition of cashew nut kernel meal (CNKM) in concentrate mixture.

Materials and Methods

The study was carried out at Krishi Vigyan Kendra, Lam, Guntur (Andhra Pradesh, India), Analytical work was done at the Department of Animal Nutrition, NTR College of Veterinary Science, Gannavaram. Cashew nut kernel meal used in the present study was procured from M/S Index International, Virudh Nagar, Tamil Nadu. Feed ingredients like maize, DORB (De Oiled Rice Bran), gingelly cake, soybean meal, mineral mixture, and salt were procured from the local market. Green fodder *viz.,* Super Napier was procured from Krishi Vigyan Kendra, Lam, Guntur. The ingredient composition of experimental concentrate mixtures fed to ram lambs during growth trial in T1 was Maize (35%), DORB (35%). Gingelly Cake (9%), Soybean meal (18 %), Mineral mixture (2%) and salt (1%) ; in T2 and T3 Cashew nut kernel was added @ 10 and 20 % of the feed by replacing Maize, DORB and Soybean meal 4,2,4 % in T2 and 7,5 and 8 % in T3 with Cashew nut.

In a completely randomized design (CRD), 18 ram lambs (9-11kg) of about 3-4 months age were divided into three equal groups of six each. All the ram lambs were offered respective diets (T1 to T3, Table 1) daily two times *i.e* 9.00 am and 2.00 pm. Super Napier was provided between 9.00 am and 3.00 pm and made available all through the day *ad libitum*. Animals were not allowed for grazing. After 45 days of the preliminary feeding period, a 6 day collection period was carried out to assess the digestibility of nutrients. Animals harnessed with faeces collection bags were kept in well-ventilated hygienic stalls two days prior to collection for adaptation so as to reach their normal feed consumption. During the digestion trial, daily feed intake, residue, and faeces voided during 24 hour was recorded. Representative samples of the feeds, residues and faeces were collected and

Table 1: Ingredient of concentrate mixtures fed to ram lambs during growth trial

Feed Ingredient	*T1*	*T2*	*T3*
Maize	35	31	28
DORB	35	33	30
Gingelly Cake	9	9	9
Cashew nut kernel meal	0	10	20
Soybean meal	18	14	10
Mineral mixture	2	2	2
Salt	1	1	1
Total	100	100	100
Cost/Kg feed	23.56	23.18	22.82

Table 2: Performance of ram lambs fed concentrate mixtures containing varying levels of Cashew nut kernel meal

Parameter	*T1*	*T2*	*T3*
Dry Matter Intake (% BW)	4.00	4.07	3.94
Intake of nutrients (g/W kg$^{0.75}$)^{NS}			
DM	83.53 ± 2.40	84.76 ± 2.85	83.66 ± 1.26
DCP	9.74 ± 0.09	10.02 ± 0.35	10.16 ± 0.46
TDN	49.07 ± 1.33	51.10 ± 1.58	52.36 ± 1.30
ME	0.17 ± 0.00	0.18 ± 0.00	0.18 ± 0.00
Nutritive value (%)			
DCP^{NS}	11.69 ± 0.27	11.82 ± 0.18	12.14 ± 0.47
TDN*	58.77 ± 0.42^{a}	60.33 ± 0.65^{a}	62.55 ± 0.88^{b}
DE (Mcal/kg)*	1.98 ± 0.03^{a}	2.06 ± 0.06^{a}	2.19 ± 0.07^{b}
ME (Mcal/kg)*	1.62 ± 0.03^{a}	1.68 ± 0.05^{a}	1.79 ± 0.06^{b}
Nutrient Digestibility (%)			
Dry Matter*	59.31 ± 0.98^{a}	60.37 ± 0.77^{ab}	62.07 ± 0.78^{b}
Organic Matter*	61.61 ± 0.83^{a}	63.45 ± 0.72^{ab}	65.30 ± 0.51^{b}
Crude Protein*	57.81 ± 1.68^{a}	58.93 ± 0.89^{ab}	62.55 ± 1.70^{b}
Ether Extract*	60.60 ± 1.12^{a}	64.45 ± 0.74^{b}	69.51 ± 0.53^{c}
Crude Fibre*	49.99 ±2.04^{a}	53.66 ± 1.84^{ab}	55.89 ±1.49^{b}
Nitrogen Free Extract*	63.88 ± 0.29^{a}	64.76 ± 0.63^{ab}	67.73± 1.19^{b}
Neutral Detergent Fibre*	59.32 ± 0.93^{a}	61.20 ± 0.73^{ab}	62.92 ± 0.63^{b}
Acid Detergent Fibre*	53.10 ± 1.35^{a}	54.65 ± 1.33^{ab}	57.66 ± 0.66^{b}
Hemi-cellulose^{NS}	53.71 ± 1.37	54.86 ± 0.49	56.15 ± 0.74
Cellulose*	63.20 ± 1.02^{a}	64.69 ±0.90^{ab}	66.80 ± 0.37^{b}

^{NS}Non significant, Each value is a mean of six observations, *P<0.05.

pooled for 6 days and later ground separately in a laboratory Wiley mill and preserved in air tight bottles for subsequent analysis.

The samples of feed and faeces were analyzed for proximate constituents (AOAC, 2007) and fiber fractions (Van Soest *et al*., 1991). The data were analyzed and tested for significance by Duncan's multiple range test using SPSS (Snedecor and Cochran, 1994).

Results and Discussion

The data on apparent nutrient digestibility (%) in ram lambs fed concentrate containing CNKM at different levels is presented in Table 2.

The increase in TDN content in the treatment group (20%) reflects the improved digestibility of gross nutrients in the ram lambs compared to the control group. The higher TDN values could be an indication of better proportion of energy and protein sources in the diet which may enhance growth performance in goats (Okoruwa and Bamigboye, 2015). The DCP and TDN intakes (g/kg$W^{0.75}$) reported in the present study were similar to the values recommended by (ICAR, 2013). The DE and ME intakes (Mcal) also increased significantly ($P<0.05$). Contrary with the present findings, Cruz *et al.* (2015) reported no significant effect on apparent metabolizable energy in laying hens fed cashew nut meal.

The data reveals that there is no difference in Dry Matter intake (% BW) among the three groups. Also there is no significant difference in intake of nutrients (DM, DCP, TDN, and ME) Nutritive values of TDN, DE and ME were found significantly higher in T3 group as compared to T1 and T2. However, there is no significant changes in DCP. Nutrient Digestibility of Dry Matter, Organic Matter, Crude Protein, Ether Extract, Crude Fiber, Nitrogen Free extract, Neutral Detergent Fiber, and Cellulose were found to be significantly higher in T3 group (20 % CNKM) fed as compared to T1 and T2 group animals. There was an apparent increase in Hemi- Cellulose digestibility but statistically non-significant. Okoruwa and Bamigboye. (2015) reported significantly higher ($p<0.05$) DM values in goats fed diets containing cashew nut shell. Contrary to our findings, Branco *et al*. (2015) reported non-significant changes in DM values in Holstein cows fed cashew nut shell liquid. Our findings on CP, EE, CF and NFE recorded in ram lambs fed CNKM corroborated with the reports of Coutinho *et al*., (2014) and Osmari *et al*., (2017). The significant increase in CF digestibility at both the levels of CNKM may be associated with high CF content in a cashew nut shell and degree of utilization (Okolo *et al*., 2012). Further, the variations in fiber utilization by animals have been reported to be influenced by the physical and chemical composition of the diet, level of feeding, age and weight of the animal, adaptation to fiber diet and individual variation among the animals (Hansen *et al*., 2007). The improved NDF digestibility might be attributed to the adequate microbial efficiency stimulated by various cashew by-products. However, non-significant differences were observed in Holstein steers fed cashew nut shell liquid (Osmari *et al*., 2019). The high digestibility values of cell wall constituents obtained in the treatment group as compared to the control group in the present study might be attributed to the ability of ruminants to degrade structural carbohydrates. (Eniolorunda *et al*., 2008).

No changes in DMI (%) were observed in CNKM fed animals, it indicates that there is no adverse effect on palatability after the addition of CNKM in the feed. Further addition of CNKM to the concentrate mixture was economically cheaper.

Conclusion

The present study indicated that cashew nut kernel meal (CNKM) could be included up to 20 per cent in the diet with beneficial effects on the health of ram lambs. Further, no adverse effect on palatability was recorded and improved digestibility of nutrients and performance of ram lambs. Moreover, the addition of CNKM is cost-effective.

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