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RESEARCH ARTICLE :

Effect of feeding shea nut cake based diets on growth and carcass characteristics in nellore x deccani ram lambs

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SUMMARY : Thirty experimental lambs (2-3 months old) with average body weight of 12.02 ± 0.27 were procured from local sandies and distributed randomly in to 5 equal groups in complete randomized design (RBD). The first group was control group these animals were given feed without Sheanut cake. The other two groups were given with concentrate mixture containing 20% and 40% sheanut cake, respectively. The 4th and 5th group would be fed with concentrate mixture with 20 and 40% sheanut cake and supplemented with probiotics. The experiment was carried for a period of 120 days. Growth trial was conducted and finally sheep were slaughtered for carcass characteristics. The average slaughter weights were 23.70^{a}±0.24, 23.60^{a}±0.21, 24.30^{ab}±0.27, 24.90^{b}±0.20, and 25.00^{b}±0.35 for T_1, T_2, T_3, T_4 and T_5 experimental diets.The dressing percentage on slaughter weight was significantly (P>0.05) higher in T_5 group when compared with other four experimental rations. The dressing per cent on slaughter weight was increased as the sheanut cake per cent increased in the diets. Dressing per cent was more in T_3 and T_5 containing probiotic when compared to T_2 and T_4, indicates that inclusion of probiotics in the diets containing sheanut cake has increased dressing percentage.

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BACKGROUND AND OBJECTIVES

India is having 74 millions of sheep (FAO, 2010). Sheep and goat are the species of economic value to the small and marginal farmers and landless laborers in rural India. The most of sheep are reared by shepherds, who are mostly illiterate and superstitious nomads. Sheep are traditionally reared on grazing lands which provide very less amount of nutrients for production in addition to maintenance. Lack of adequate balanced feeding is the main constraint in obtaining maximum productivity in small ruminants. Under these circumstances it is an opportunity to utilize the agro-industrial by-products in the rations of small ruminants by appropriate processing and preparing complete rations. In those agro-industrial by-products, shea nut

cake is the one as alternate feed ingredient. The green fruit of Shea (*Butryospermum parkii*) tree has a pulp that covers the seed or nut. The harvest follows 3 to 5 years cycle and yields 80 kg of nuts and from these nuts, oil will be extracted and leaving the residue Abidemi *et al.*, (2009); Kumar*et al.*, (2010). Sheanut meal is now receiving increased attention as a potential feed ingredient due to the increased amounts that are available as a result of high demand for shea fat for cosmetics and as a cocoa butter substitute in chocolate Lipp and Anklam (1998). The production of Shea nut cake is approximately 18,000 tons per year from M/s. Foods, Fats and Fertilizers Pvt. Ltd which is Multi National Company located in West Godavari District A.P. It is the only industry that is importing Sheanut cake in Andhra Pradesh.

RESOURCES AND METHODS

The experiment was conducted for 120days at Livestock Research Institute, Rajendranagar, Sri Venkateswara Veterinary University, The feed ingredients were purchased from the local market and the shea nut cake is procured from M/s. Foods, Fats and Fertilizers Pvt. Ltd which is Multi National Company located in West Godavari District A.P. The experimental rations were processed into mash by grinding through 8 mm sieve in a hammer mill.

The experimental diets were offered randomly to the five experimental groups. Hybrid Napier fodder was chaffed and offered *ad-libitum* to five groups of animals under intensive system to meet the nutrient requirements of animals. The residues, if any, were weighed on the next day morning. Thus, the exact quantity of feed and fodder consumed by each experimental animal group was recorded throughout the experimental period. Clean, fresh and wholesome drinking water was made available throughout the experimental period. All the groups were housed in well ventilated experimental sheds under hygienic condition.

The animals were slaughtered by "Halal" method after overnight starving. The live weights of animals were recorded before slaughter. The stripping, legging, dressing and evisceration were performed by adopting the standard procedure described by Gerrard (1964).

The weights of hot carcass, edible (liver, heart, testes, diaphragm, kidney and spleen) and non-edible organs (lungs, trachea, stomach and intestines) were recorded.

The carcass was then divided into 5 cuts *viz.*, leg, loin, rack, shoulder and neck and fore shank and brisket as suggested by the National Livestock and Meat Board of United States of America (Brandly *et al.*, 1968).The experimental data were subjected to statistical analysis as per Snedecor and Cochran (1994).

OBSERVATIONS AND ANALYSIS

The growth trial was conducted and final body weights recorded. At the end of the trial representative animals were slaughtered. The average slaughter weights were $23.70^{a}\pm0.24$, $23.60^{a}\pm0.21$, $24.30^{ab}\pm0.27$, $24.90^{b}\pm0.20$, and $25.00^{b}\pm0.35$ for T_1, T_2, T_3, T_4 and T_5 experimental diets, respectively (Table 3). The dressing percentage on slaughter weight was significantly higher in T5 group when compared with other four experimental rations. The present experiment results were similar to the Prasad *et al.* (1981), who reported higher hot carcass weight in native and crossbred lambs fed higher proportion of concentrate in the diets. Petit and Castonguay (1994) reported higher carcass weight in cross bred lambs fed higher proportion of concentrate.

The dressing percentage on pre slaughter weight basis recorded were $48.17^{ab}\pm0.21$, $47.15^{a}\pm0.30$, $49.44^{b}\pm0.35$, $49.735^{b}\pm0.62$ and $52.23^{c}\pm0.91$ for the treatments T_1, T_2, T_3, T_4 and T_5 experimental diets, respectively (Table 3). The dressing per cent on slaughter weight was increased as the sheanut cake per cent increased in the diets. Dressing per cent was more in T3 and T5 containing probiotic when compared to T2 and T4, indicates that inclusion of probiotics in the diets containing sheanut cake has increased dressing percentage. In contrast to the present findings higher proportion of concentrate in the diet improved dressing percentage in lambs (Jabbar and Anjum, 2008) and kids (Haddad, 2005).

The dressing percentage on empty live weight basis were 55.81±0.17, 54.42±0.97, 55.85±0.53, 55.61±0.38 and 56.2±1.38, respectively for the experimental groups T_1, T_2, T_3, T_4 and T_5 (Table 3).

The per cent yield of bone, meat and fat and bone, meat ration in different experimental animals were presented in Table 4. As the per cent of sheanut cake increased in the experimental diets there was slight increase in the meat yield in all the rations, this was significantly ($P < 0.05$) higher in T4 ration and the values ranged from $63.23^{a}\pm0.38$ to $63.23^{a}\pm0.38$ in all the

Table 1: Experimental groups

Treatments	Description of groups fed	Number of Animals
T_1	Control	6
T_2	20% sheanut cake	6
T_3	20% sheanut cake with probiotic	6
T_4	40% sheanut cake	6
T_5	40% sheanut cake with probiotic	6

Table 2: Ingredient composition experimental diets

Feed ingredients	Experimental diet T_1	Experimental diet T_2	Experimental diet T_3
	kg	kg	kg
Maize	48.5	37	25.5
Groundnut cake	29	27	25
Sheanut cake	0	20	40
De oilded rice bran	13.5	7	0.5
Urea	1	1	1
Molasses	5	5	5
Salt	1	1	1
Min mix	2	2	2
Total quantity	100	100	100
Probiotic	0	0.1	0.1

Table 3: Carcass characteristics of sheep fed with shea nut cake rations

Ration	Animal No.	Live weight at slaughter (Kg)	Empty body weight (Kg)	Carcass weight (Kg)	Dressing per cent on live weight	Dressing per cent on empty body weight
T_1	1	23.00	19.94	11.10	48.24	55.64
	2	24.00	20.75	11.68	48.68	56.31
	3	23.80	20.41	11.34	47.64	55.56
	4	24.00	20.73	11.55	48.12	55.72
	Mean	23.70^{a}±0.24	20.46^{a}±0.19	11.42^{a}±0.13	48.17^{ab}±0.21	55.81±0.17
T_2	1	23.00	20.97	10.99	47.80	52.42
	2	23.70	21.04	11.22	47.36	53.34
	3	24.00	20.19	11.12	46.35	55.10
	4	23.70	19.64	11.16	47.08	56.80
	Mean	23.60^{a}±0.21	20.46^{a}±0.33	11.13^{a}±0.05	47.15^{a}±0.30	54.42±0.97
T_3	1	23.70	20.79	11.74	49.54	56.48
	2	24.40	21.70	12.28	50.34	56.60
	3	24.10	21.60	11.73	48.68	54.32
	4	25.00	21.96	12.30	49.19	56.00
	Mean	24.30^{ab}±0.27	21.51^{b}±0.25	12.01^{b}±0.16	49.44^{b}±0.35	55.85±0.53
T_4	1	24.9	22.15	12.34	49.54	55.68
	2	25.4	22.98	13.01	51.24	56.64
	3	24.4	22.05	12.18	49.92	55.24
	4	24.9	21.89	12.01	48.24	54.88
	Mean	24.90^{b}±0.20	22.27^{b}±0.24	12.38^{b}±0.21	49.735^{b}±0.62	55.61±0.38
T_5	1	24.2	23.12	12.64	52.25	54.68
	2	24.9	22.60	13.62	54.68	60.24
	3	25.9	24.03	13.03	50.32	54.24
	4	25	23.22	12.92	51.67	55.64
	Mean	25.00^{b}±0.35	23.24^{c}±0.29	13.05^{c}±0.20	52.23^{c}±0.91	56.2±1.38

Means with different superscripts in a column wise differ significantly $^{*}(P<0.05)$

experimental diets. The yield of bone per cent in all the experimental rations ranged from 24.47±0.61 to 23.10±0.57 and there was slight decrease in the bone per cent as the sheanut cake per cent increased in the diets, which was not significantly different. Fat content of the meat from the experimental sheep ranged from 12.30^{c}±0.24 to 10.65^{a}±0.19, which was significantly ($P < 0.05$) lower in the rations incorporated with shea nut cake diets when compared with control diet. The bone meat ratio of the experimental diets of all the experimental diets ranged from 2.59^{a}±0.08 to 2.85^{b}±0.10 and the values are comparable in the experimental animals fed with T_1, T_2, T_3 and T_5 but significantly higher in the T_4 group animals. Krishna Mohan and Charyulu (1983) observed no significant difference in proportion of bone, meat and fat in the carcasses of crossbred ram lambs fed two complete rations having concentrate to roughage ratio of 60:40 and 50:50.

The yield of wholesale cuts among the experimental diets have shown significant difference as the sheanut cake per cent increased in the diets and the values are presented in the Table 5. The values for the yield of leg per cent and shoulder and neck per cent were in the increasing trend from T_1 to T_5 experimental diet experiments and decreasing trend for the yield of Lion (%), Rack (%) and Fore shank and brisket(%).

Yield of various edible and inedible organs as affected by dietary variation are presented in the Table 6. The per cent of liver yields were ranged from 1.42^{ab}±0.05 to 1.54^{b}±0.05 and significant difference was found due to treatments. Per cent of kidney, Heart and testes were also influenced significantly by the treatments

Table 4: Meat, bone and fat and bone: meat ratios

Ration	Animal No.	Carcass weight (kg)	Proportions of			Bone : Meat ratio
			Lean (%)	Bone (%)	Fat (%)	
T_1	1	11.10	63.21	24.59	12.20	2.57
	2	11.68	64.12	22.87	13.01	2.80
	3	11.34	63.32	24.57	12.11	2.58
	4	11.55	62.28	25.84	11.88	2.41
	Mean	11.42^{a}±0.13	63.23^{a}±0.38	24.47±0.61	12.30^{c}±0.24	2.59^{a}±0.08
	S.E. ±					
T_2	1	10.99	63.92	24.48	11.60	2.61
	2	11.22	65.12	22.76	12.12	2.86
	3	11.12	64.45	24.33	11.22	2.65
	4	11.16	63.88	24.70	11.42	2.59
	Mean	11.13^{a}±0.05	64.34^{ab}±0.29	24.07±0.44	11.59^{b}±0.19	2.68^{ab}±0.06
	S.E. ±					
T_3	1	11.74	64.24	24.46	11.30	2.63
	2	12.28	63.21	25.51	11.28	2.48
	3	11.73	65.54	22.45	12.01	2.92
	4	12.30	64.48	24.86	10.66	2.59
	Mean	12.01^{b}±0.16	64.37^{ab}±0.48	24.32±0.66	11.31^{ab}±0.27	2.65^{ab}±0.09
	S.E. ±					
T_4	1	12.34	64.79	24.01	11.2	2.70
	2	13.01	65.54	23.62	10.84	2.77
	3	12.18	67.23	21.41	11.36	3.14
	4	12.01	65.44	23.34	11.22	2.80
AVG	Mean+SE	12.38^{b}±0.21	63.23^{a}±0.38	23.10±0.57	11.16^{ab}±0.11	2.85^{b}±0.10
T_5	1	12.64	65.56	23.74	10.7	2.76
	2	13.62	66.74	23.14	10.12	2.88
	3	13.03	64.89	24.10	11.01	2.69
	4	12.92	65.23	23.99	10.78	2.72
AVG	Mean+SE	13.05^{c}±0.20	65.61^{bc}±0.40	23.74±0.21	10.65^{a}±0.19	2.76^{ab}±0.04

Means with different superscripts in a column wise differ significantly *(P<0.05)

Table 5: Yield of Wholesale cuts (%) in sheep

Ration	Animal No.	Carcass weight (kg)	Leg (%)	Lion (%)	Rack (%)	Shoulder and neck (%)	Fore shank and brisket (%)
T_1	1	11.10	33.22	12.6	15.22	24.22	14.74
	2	11.68	32.88	12.63	16.12	23.86	14.51
	3	11.34	33.42	12.04	15.34	24.33	14.87
	4	11.55	34.02	13.21	14.98	25.02	12.77
	Mean	11.42	33.39^{a}±0.24	12.62^{b}±0.24	15.42±0.25	24.36^{a}±0.24	14.22^{b}±0.49
	S.E. ±						
T_2	1	10.99	33.54	12.24	14.73	25	14.49
	2	11.22	34.22	13.12	15.22	26.02	11.42
	3	11.12	34.12	12.21	14.48	24.84	14.35
	4	11.16	33.11	11.45	14.24	25.12	16.08
	Mean	11.13	33.75^{ab}±0.26	12.26^{ab}±0.34	14.67±0.21	25.25^{ab}±0.26	14.09^{b}±0.97
	S.E. ±						
T_3	1	11.74	34.32	11.9	15.5	26.04	12.24
	2	12.28	34.54	11.6	16.22	27.12	10.52
	3	11.73	33.98	12.11	15.52	25.89	12.5
	4	12.30	34.66	11.78	14.48	24.98	14.1
	Mean	12.01	34.38^{b}±0.15	11.85^{ab}±0.11	15.43±0.36	26.01^{bc}±0.44	12.34^{ab}±0.73
	S.E. ±						
T_4	1	12.34	34.22	12.32	14.04	26.52	12.9
	2	13.01	34.56	13.11	15.02	27.17	10.14
	3	12.18	33.78	12.12	13.89	25.98	14.23
	4	12.01	34.12	12.03	13.34	26.54	13.97
	Mean±SE	12.39	34.17^{bc}±0.16	12.40^{ab}±0.24	14.07 ±0.35	26.55^{cd}±0.24	12.81^{ab}±0.93
T_5	1	12.64	35.12	11.7	14.5	27.04	11.64
	2	13.62	34.86	12.24	14.44	28.02	10.44
	3	13.03	35.02	11.11	14.13	26.88	12.86
	4	12.92	35.55	11.54	15.12	26.22	11.57
	Mean ±SE	13.052	35.13^{d}±0.15	11.64^{a}±0.23	14.54±0.21	27.04^{d}±0.37	11.63^{a}±0.49

Means with different superscripts in a column wise differ significantly *(P<0.05)

Table 6: Yields of visceral and inedible organs affected by treatments

Parameter	Experimental groups				
	T_1	T_2	T_3	T_4	T_5
Slaughtered Wt.	23.70^{a}±0.24	23.60^{a}±0.21	24.30^{ab}±0.27	24.90^{b}±0.20	25.00^{b}±0.35
Edible Organs					
Carcass Wt.	11.42^{a}±0.13	11.13^{a}±0.05	12.01^{b}±0.16	12.38^{b}±0.21	13.05^{c}±0.20
Liver %	1.42^{ab}±0.05	1.42^{ab}±0.05	1.32^{a}±0.02	1.54^{b}±0.05	1.51^{b}±0.03
Kidney%	0.42^{d}±0.03	0.31^{ab}±0.01	0.27^{a}±0.01	0.34^{bc}±0.01	0.37^{c}±0.02
Heart%	0.48^{b}±0.01	0.46^{b}±0.01	0.39^{a}±0.01	0.46^{b}±0.01	0.48^{b}±0.02
Testes%	0.94^{bc}±0.02	0.92^{b}±0.02	0.85^{a}±0.03	1.00^{c}±0.01	1.00^{c}±0.01
Inedible Organs					
Gut F%	25.12^{b}±0.28	23.23^{a}±0.55	25.00^{ab}±0.58	26.20^{b}±0.55	25.71^{b}±0.72
Spleen%	0.34^{ab}±0.02	0.30^{a}±0.00	0.35^{ab}±0.01	0.33^{ab}±0.02	0.36^{b}±0.02
Lungs & Trachea%	1.62^{b}±0.03	1.59^{b}±0.05	0.69^{a}±0.02	1.72^{b}±0.08	1.72^{b}±0.03
Head(Kg)	1.52±0.04	1.48±0.04	1.55±0.06	1.53±0.01	1.59±0.03
Skin(Kg) (Kg)	2.67±0.01	2.54±0.06	2.66±0.06	2.56±0.07	2.69±0.05
Blood(Kg)	0.71±0.05	0.67±0.01	0.71±0.00	0.72±0.01	0.72±0.01

and animals in T3 group have shown significantly lesser yields of edible organs when compared to other treatments. Full GI tract yield, spleen and lungs with trachea were also significantly affected due to treatments and higher values were recorded for the sheep reared under T5 treatment. The edible portions (% slaughter weight) were comparable among the ram lambs fed three experimental complete rations. However, there was a significant ($P<0.05$) difference in non edible portion and ratio of edible and non edible portions of lambs fed MS_{70}, MS_{60} and MS_{50} rations as indicated by Venkateswarlu *et al.*,(2012). Contrary to the findings of the present study Bhuyan *et al*. (1996) reported no significant difference in edible and non edible portions.

The weights of head, skin and blood were not affected by the treatments and values ranged from 1.48±0.04 kg to 1.59±0.03 kg, 2.56±0.07 kg to 2.69±0.05 kg and 0.67±0.01 kg to 0.72±0.01 kg, respectively(Table 5). The total yield of edible organs in T_2, T_3 and T_4 treatments were comparable but significantly ($P<0.05$) higher in T_5 rations and the total edible organs ranged from 54.22^{a}±0.31 to 56.54c±0.20 in an increasing trend. The yield of edibles per unit of inedible varied from 2.20^{a}±0.02 to 2.43^{c}±0.02 and values were significantly higher in T_3, T_4 and T_5 treatments when compared to control.

These results concludes that the inclusion of sheanut cake in the diets of sheep have slightly increased the meat yield, reduced the bone yield and not much variation if bone meat ration except in animals fed with 40 per cent sheanut cake. Furthermore, shea nut cake based diets shown effect on dressing percentage either on live weight or empty body weight basis.

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REFERENCES

Abidemi.T.A., Adebayo.O.J., Idowu. O., and Agbotoba.M.O, 2009, Nutrient content and anti-nutritional factors in shea butter (*Butryospermum parkii*) leaves, Afr.J Biotechnol,5885–5890.

Bhuyan.R., Baruah.K.K., and Dass.P.C, 1996. Growth response and carcass characteristics of cross bred kids fed rations having different concentrate to roughage ratio, Indian Journal Animal Nutrition, 13: 167 - 169.

Brandly.P.J., George Migaki., Kenneth.E., and Taylor, 1968, Meat hygiene, 3rd edition, Lea and Febiger, Philadedphia, USA.

FAO STAT., 2010, The FAO Statistical Database. Food and Agriculture Organization, Rome, Italy.

F. Gerrand., (1964). Meat Technology. 3rd edition Leonard Hell Limited, London.

Haddad.S.G,, 2005. Effect of dietary forage: concentrate ratio on growth performance and carcass characteristics of growing Baladi kids, Small Ruminant Research, 57 : 43 - 49.

Jabbar.M.A., and Anjum.M.I, 2008, Effect of diets with different forage to concentrate ratio for fattening of Lohi lambs, Pakistan Veterinary Journal, 28 : 150 - 152.

Krishna Mohan.D.V.G., and Charyulu.E.K, 1983. Studies on growth, nutrient utilization and carcass characteristics in lambs fed rations having different proportions of concentrate to roughage, Indian Journal of Animal Science, 53 : 314.

Kumar.K.M., Sudhakar.K., Nagalakshmi.D., Mahender.M., Gupta.B.R., and Rao.V.S.T, 2010, Performance of lactating Murrah buffaloes on sheanut cake (*Vitellaria paradoxa*) based complete diets, Ind. J Anim Nutr., 27: 389–395.

Lipp.M., and Anklam.E, 1998, Review of cocoa butter and alternative fats for use in chocolate-Part A, Composition data. Food Chem., 62:73–97.

Petit.H.V., and Castonguay.F, 1994, Growth and carcass quality of prolific crossbred lambs fed silage with fish meal or different amounts of concentrate, Journal of Animal Science, 72:1849-1856.

Prasad.U.S.S., Bohra.S.J., and Kamal Kishore, 1981, Note on mutton production potentialities of the new crossbred wool strains, Indian Journal of Animal Science, 51:118.

G.W.Snedecor and W.G.Cochran., (1994). Statistical methods, 8th edition.Iowa State University Press, Ames, Iowa, USA.

Venkateswarlu. M., Ramana Reddy.Y., and Sudhakara Reddy.M, 2013, Effect of feeding crop residue based complete rations on growth in ram lambs. International Journal of Science, Environment and Technology Vol.2, 1:15-19.