Carcass Characteristics of Goats Fed Ammoniated Neem (*Azadirachta indica*) Seed Kernel Cake

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ABSTRACT : The present investigation was carried out to study the affect of feeding urea ammoniated neem kernel meal on carcass characteristics and organoleptic properties of the meat in goats. Eight local weaned kids of 3-4 months age with mean body weight of 7.85±0.42 kg were assigned to two groups of four each in a completely randomised design and were offered diets containing isonitrogenous concentrate mixtures containing either peanut meal or urea ammoniated neem (*Azadirachta indica*) seed kernel meal (UANSKM) along with *ad libitium* oat hay or green sorghum as roughage for 13 fortnights. The animals were slaughtered at the end of the experimental period and the carcass characteristics and organoleptic evaluation of the meat was carried out. The carcass characteristics in terms of dressing percentage, meat bone ratio, percent edible and inedible did not differ between the treatments. Similarly the organoleptic characteristics and cooking loss were comparable between the treatments implying that UANSKM can be substituted for peanut meal in goat diets to alleviate the shortage and high cost of peanut meal without affecting meat quality. ***(Asian-Aust. J. Anim. Sci. 2003. Vol 16, No. 10 : 1451-1454)***

Key Words : Goats, Ammoniated Neem Seed Kernel, Protein Supplement, Carcass Characteristics

INTRODUCTION

Traditional oil meals like peanut meal and rapeseed meal constitutes the major protein supplements and they are in high demand due to better alternate uses and export potential. Non traditional oil seeds like neem (*Azadirachta indica*), Karanja (*Pongamia glabra*), Mahua (*Madhuca indica*) and Kosum (*Schleira oleosa*) are available in abundance and can substitute for conventional protein supplements in India. Neem seed kernel meal a by product of neem oil industry is rich in protein and the annual availability of neem seeds is to the tune of 3.5 million tons in India alone (Bringi and Thakur, 1987). The bitter and toxic triterpenoids salannin, azadirachtin and deacetyl nimbin in the neem cake have restricted its use as animal feed and a number of treatments, including water washing (Nath et al., 1983, Agrawal et al., 1987), alkali treatment (Katiyar et al., 1991) and ammoniation (Reddy 1992, Musalia et al., 2002) have been tried. Traditionally most of the studies evaluate the suitability of newer feed resources based on their ability to support a desired level of production, effect on digestibility and balance of nutrients. Very few studies have attempted to evaluate newer feed resources based on its effect on carcass characteristics or milk composition and organoleptic characteristics of the end products which have profound effect on the acceptance of the products. Hence the present study was undertaken to study the affect on carcass and organoleptic characteristics in goats fed neem seed kernel meal.

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MATERIALS AND METHODS

Animals and housing

Eight apparently healthy weaned local goats of 3-4 months age were randomly allotted to two groups of four each in a completely randomized design. All animals were housed in a well ventilated shed with provision for individual feeding and were reared under uniform managerial conditions throughout the experimental period.

Feeds and feeding

Neem seed kernel meal (NSKM) was ensiled with water in 1:1.2 proportion containing fertilizer grade urea (2.5% of the meal) in an air tight metallic drum for five days. The contents were mixed once daily to ensure uniform ammoniation. The sun dried and ground urea ammoniated neem kernel meal (UANSKM) was used to prepare experimental concentrate mixture (maize 69.5, UANSKM 22.5 wheat bran 5, mineral mix 2 and salt 1) which was isonitrogenous to control concentrate (maize 70, peanut meal 22, wheat bran 5, mineral mix 2 and salt 1) mixture containing peanut meal. The crude protein content of UANSKM (40.3%) was quite close to the crude protein content of peanut meal (43.5%). The isonitrogenous concentrate mixtures were offered to meet 90% of the CP requirements recommended by the NRC (1981) to the respective groups based on their fortnightly body weight changes. Oat (*Avena sativa*) hay was offered *ad libitum* during 1-8 fortnights and green sorghum (*Sorghum vulgare*) was offered during 9-13 fortnights to both the groups as per the seasonal availability. The animals had access to clean

Table 1. Carcass characteristics of male goats fed UANSKM as a replacement of peanut meal in concentrate mixture

Slaughter and dressing percentage					
	Pre slaughter Weight (kg)	Dressing (%) on body weight	Dressing (%) on empty body weight	Carcass length (cm)	Loin eye area (cm^2)
Control	13.8±1.08	47.0±1.11	54.8±1.54	51.5±0.96	5.1±0.26
Experimental	13.3±1.29	44.3±1.38	51.1±1.01	50.8±0.96	4.9±0.47
ANOVA	NS	NS	NS	NS	NS
Yield of wholesale cuts (% carcass)					
	Neck	Shoulder	Breast and shank	Rack	Loin
Control	10.6±0.76	16.0±0.45	18.2±1.51	10.4±0.71	10.8±0.71
Experimental	10.1±0.33	18.8±0.99	20.3±81	9.1±0.86	8.7±0.74
ANOVA	NS	NS	NS	NS	NS
Deboning (% carcass)					
	Meat	Fat	Bone	Meat:Bone	
Control	64.4±1.57	5.7±1.95	29.9±2.39	2.2±0.21	
Experimental	62.1±1.79	5.8±1.23	32.1±0.60	1.9±0.09	
ANOVA	NS	NS	NS	NS	
Yield of edibles (% preslaughter weight)					
	Head	Feet	Liver	Heart	Kidney	Testicles
Control	8.9±0.38	2.9±0.18	2.1±0.11	0.5±0.06	0.3±0.01	0.7±0.12
Experimental	9.0±0.48	3.08±0.06	2.1±0.08	0.5±0.05	0.4±0.03	0.8±0.03
ANOVA	NS	NS	NS	NS	NS	NS
Yield of inedible offals (% preslaughter weight)					
	Blood	Empty gut	Gut fill	Skin	Lungs and Trachea
Control	5.1±0.13	8.8±0.81	23.0±0.98	9.2±0.18	2.1±0.03
Experimental	4.8±0.26	10.4±1.04	23.8±2.28	8.7±0.67	2.0±0.02
ANOVA	NS	NS	NS	NS	NS

NS: Not significant.

drinking water twice daily.

Carcass characteristics

The animals were weighed at fortnightly intervals and the concentrate mixtures were increased as per the body weight changes. At the end of the 13th fortnights all the animals were fasted overnight with free access to water and slaughtered after recording the pre-slaughter weight as per the standard procedure in the abattoir of Livestock Products Technology Division of the Institute to assess the carcass characteristics. The parameters included dressing percentage on pre-slaughter weight and empty carcass, carcass length, wholesale cuts, eye muscle area (*longissimus dorsi*), bone-meat-fat ratio and percent edible and inedibles. *Longissimus dorsi* muscles from each carcass were subjected to the proximate analysis as per AOAC (1984).

Organoleptic evaluation

Sensory evaluation of cooked *longissimus dorsi* muscle with (1.5% w/w) and without salt was carried out by a panel of eight semi trained panelists adopting Hedonic scaling as standardized by Livestock Products Technology Division of Indian Veterinary Research Institute. Cooking loss was determined by recording the loss in weight of raw meat on cooking expressed as percent loss of raw muscle weight.

Statistical analysis

The data were tested for statistical significance as per the methods of Snedecor and Cochran (1980) to compare the dietary effects.

RESULTS AND DISCUSSION

Carcass characteristics

The carcass characteristics of animals slaughtered at the end of the study are presented in Table 1. Dietary treatments did not influence any of the carcass characteristics. The pre-slaughter weights did not differ between the groups suggesting that the UANSKM was as effective as peanut meal in supporting the growth rate in kids. The finding corroborates with the results obtained with water washed NSKM in pigs and goats (Sastry and Agrawal 1992, Verma et al., 1995), alkali and urea treated NSKM in buffaloes (Reddy 1992) and UANSKM in lambs (Musalia et al., 2000). The observed dressing percentage on pre slaughter weight basis in control and experimental groups were within the range, 42.92 to 51.18% reported in different breeds of Indian goats (Kesava Rao et al., 1984; Krishna and Prasad 1988; Sahu and Prasad 1988). The observed dressing percentage on empty body weight basis was similar to the values reported by Reddy and Raghvan (1987) and Kumar et al. (1990) in local Telangana goats and Barbari goats fed on different concentrate to roughage ratio

Table 2. Chemical composition and organoleptic characteristics of *Longissimus dorsi* muscle

Chemical composition and cooking loss (%)					
	Moisture	Crude protein	Ether extract	Ash	Cooking loss
Control	76.6±0.17	19.6±0.29	1.3±0.12	1.3±0.10	41.6±3.21
Experimental	75.6±0.19	19.6±0.25	1.5±0.08	1.3±0.14	45.1±3.54
ANOVA	NS	NS	NS	NS	NS
Sensory evaluation (without salt)					
	Appearance	Flavour	Texture	Overall acceptability	
Control	6.1±0.27	6.1±0.21	5.2±031	5.8±0.44	
Experimental	6.3±0.33	5.9±0.21	5.8±0.31	5.5±0.34	
ANOVA	NS	NS	NS	NS	
Sensory evaluation (with salt)					
Control	6.3±0.21	6.5±0.22	5.5±0.22	6.0±0.7	
Experimental	5.7±0.21	5.8±0.49	5.7±0.21	5.7±0.33	
ANOVA	NS	NS	NS	NS	

NS: Not significant

diets respectively.

Loin eye area and dressing percentage are profoundly influenced by the energy and protein levels of the diet (Martin et al., 1978; Shahjalal et al., 1992). In the present study comparable loin eye area and dressing percentage between the dietary treatments is suggestive of similar plane of nutrition in both the groups. Dietary variation did not significantly influence the yield of primal/wholesale cuts, meat to bone ratio, percent yield of edibles and inedibles. The meat bone ratio obtained in the present study was lower than the range reported in Telangana goats (3.42:1 to 3.91: 1) by Reddy and Raghvan (1987) and Barbari goats (2.60:1 to 3.31:1) by Kumar et al. (1990) probably due to differences in plane of nutrition and breeds.

Chemical composition and cooking loss

The chemical composition in terms of moisture, crude protein, ether extract and ash of *longissimus dorsi* muscle and cooking loss (Table 2) did not differ significantly between the treatments and the present findings are similar to the reports of Reddy (1992) in buffaloes with UANSKM and alkali treated NSKM and Verma et al. (1995) in goats fed water washed NSKM. Diets high in crude protein tends to increase the crude protein content in muscle (Shahjalal et al., 1992) and high energy diets tend to increase the fat deposition resulting in higher ether extract content in the muscle. However as there was no difference in the chemical composition of the muscle in the present study it could be inferred that UANSKM is as effective as peanut meal in providing the energy and protein in goats for meat purpose.

Organoleptic characteristics

Inspite of its bitter taste and pungent odor, organoleptic evaluation of the meat both with and without salt obtained from the goats fed UANSKM in terms of appearance, flavor, texture and overall acceptability revealed that the acceptability of meat was as good as those animals fed peanut meal (Table 2). The present observation revealed that feeding of processed NSKM did not impart any untoward effect in the sensory attributes of chevon meat. Similar results were reported in pigs and goats fed water washed NSKM by Verma (1991) and Sastry and Agrawal (1992).

IMPLICATION

Neem seed kernel meal a protein rich by product of neem oil industry can be effectively utilized by urea ammoniation. Feeding urea ammoniated neem kernel meal in goats resulted in weight gains, carcass characteristics and organoleptic properties of the meat similar to those fed on peanut meal suggesting that UANSKM can be satisfactory substitute for totally replacing peanut meal in goat diets.

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