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DIET EFFECTS ON CARCASS TRAITS, COMPOSITION AND PALATABILITY OF YOUNG GOATS

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BACKGROUND

Goat meat has been one of the major meat sources in many tropical and developing countries (Park, 1990), but has had only minor use in the United States. With the growth of ethnic populations in the United States and consumers seeking variety in their diets, demand for goat meat has increased. This increase in demand has resulted in the need for information on how management practices affect carcass traits and meat quality of goats. Little is known about the effects of feeding (level of intake and diet composition) on carcass composition and meat sensory characteristics such as texture, tenderness and juiciness (Warmington and Kirton, 1990). Information is limited on whether goats must be finished on a high concentrate diet to improve meat quality or if improved pasture is adequate.

OBJECTIVE

The objective of this study was to evaluate the effects of intensive (feedlot) versus semi-intensive (improved pasture plus supplement) management on carcass traits, composition and palatability of meat from young goats.

MATERIALS AND METHODS

Thirty-one goats were produced and raised (in two trials over a two year period) at Florida A & M University (Tallahassee, FL). Does of the Florida native breed were divided into two management groups, intensive and semi-intensive. During the stages of breeding through parturition, the does were kept in these groups. The intensive group was in an enclosed area and individually fed 0.7-0.9 kg/day of a 14% protein complete ration. Hay was available free choice. The semi-intensive group utilized rotational grazing on improved pasture and browse plants. Improved pasture consisted of bahiagrass which was overseeded with rye and ryegrass during the winter months. The group was also given 0.5-0.9 kg of a corn supplement every other day depending on the condition of the goats and the pasture. The kids [intensive, n=18 (I); semi-intensive, n=13 (S)] remained on the same treatment as the does which produced them (intensive remained on the intensive diet and semi-intensive on the semi-intensive diet). Kids in the intensive treatment were individually fed the 14% protein complete ration (0.9 kg/day). The semi-intensive treatment group utilized rotational grazing with a corn supplement every other day.

Animals were slaughtered at eight months of age under standard procedures at the Meat Science Laboratory, University of Florida (Gainesville, FL). Carcasses were chilled for 24 h and evaluated for quality and yield. Quality factors include: skeletal and lean maturity; flank firmness and streaking; feathering between the ribs; marbling within the *longissimus dorsi*; lean color, texture and firmness; and carcass conformation. Yield factors include: leg and carcass conformation; actual and adjusted fat over the ribeye (FOE); ribeye area (REA); and estimated kidney, pelvic and heart fat (KPH).

At 48 h postmortem, one side of each animal was dissected into soft tissue and bone. Soft tissue was ground and mixed twice and sampled for lipid determination by ether extraction and moisture determination by oven drying (AOAC, 1983). Ash was assumed to be one percent and protein was calculated by difference. Also at 48 h, samples were removed from the leg of the side not used for dissection for Warner-Bratzler Shear (WBS) analysis on the *biceps femoris, semimembranosus, adductor and semitendinosus*, which were averaged for an overall combined leg shear force. The loin was removed from the side not used for dissection for sensory panel evaluation. Samples were frozen until analysis could be performed.

For sensory panel evaluation, chops from the loin were roasted in a 325°C oven to a final internal temperature of 75°C. Composite patties were made from the ground soft tissue of the dissected side and cooked nine minutes per side on Farberware grills to a medium degree of doneness. Samples were evaluated by an 8-11 member trained panel using an eight point descriptive scale for juiciness (8=extremely juicy, 1=extremely dry), tenderness (8=extremely tender, 1=extremely tough), flavor intensity (8=extremely intense, 1=extremely bland), and connective tissue (8=none, 1=abundant). Off-flavor was evaluated using a six point scale (6=none, 1=strong off-flavor).

Cholesterol content was determined on cooked leg slices and cooked composite patties by direct saponification (Adams et al., 1986). Lipids were extracted from raw composite patties for determination of fatty acids according to Bligh and Dyer (1959).

Data were analyzed by the least squares procedure of the General Linear Models program of SAS (SAS, 1985). A fixed model of year and diet and appropriate interactions was utilized, however, only diet effects will be discussed.

RESULTS AND DISCUSSION

Table 1 shows the effect of diet on selected carcass traits. Slaughter and carcass weights of goats on intensive diets were higher ($P<0.05$) than those of goats on a semi-intensive diet. Dressing percentages were also higher ($P<0.05$) for goats on the intensive diet at 54.4% versus 52.1% for goats on the semi-intensive diet. Actual and adjusted fat over the ribeye were not different between treatments , however, ribeye area was larger ($P<0.05$) in the intensive group than in the semi-intensive group. The ratios of fat-free lean to bone of the carcasses in each group did not differ ($P>0.05$). Quality indicators such as marbling in the *longissimus*, color,

firmness and texture of the lean, skeletal and lean maturity, flank firmness and feathering between the ribs showed no differences between groups (P>0.05).

Table 1- Effect of diet on carcass traits of goats

Trait	Diet[a]	
	I	S
N	18	13
Slaughter wt., kg	24.2[b]	21.1[c]
Carcass wt., kg	13.1[b]	11.0[c]
Dressing, %	54.4[b]	52.1[c]
Actual FOE, cm	0.04	0.03
Adjusted FOE, cm	0.07	0.07
REA, cm	9.8[b]	8.2[c]

[a]I=Intensive, S=Semi-intensive
[b,c] Means within a row with different superscripts differ (P<0.05)

The effects of diet on carcass composition are found in Table 2. The percentages of fat-free lean, bone and fat in the carcasses were not different (P>0.05) between the intensive and semi-intensive groups. The ratio of fat-free lean to bone were also similar for both diet groups.

Fatty acid analysis performed on raw composite patties showed differences between diet groups in saturated and unsaturated fatty acids. Patties from goats in the intensive group had higher (P<0.05) saturated fat levels of 58.2% versus 56.2% in the semi-intensive group. Further, the semi-intensive group contained higher (P<0.05) percentages of unsaturated fatty acids at 43.8% with the intensive group containing 41.8%. Cholesterol levels were determined in both a cooked leg slice and a cooked composite patty. No differences (P>0.05) between diets were determined for either the leg slices or patties.

Warner-Bratzler Shear analysis revealed no difference (P>0.05) in any of the muscles analyzed or overall leg shear force between treatment groups. This indicates that diet has no effect on tenderness in goats.

The sensory panel detected no difference (P>0.05) in juiciness, flavor intensity, amount of connective tissue, off-flavors or tenderness in the loin chops. The results for tenderness were consistent with the WBS analysis which also indicated no differences between diet treatments. Results from the composite patty also revealed no differences (P>0.05) between flavor intensity or off-flavors.

Table 2- Effect of diet on carcass composition of goats

Component	Diet[a]	
	I	S
N	18	13
Fat-free lean, %	68.5	67.6
Bone, %	20.8	21.0
Fat, %	10.6	11.4

[a]I=Intensive, S=Semi-intensive

CONCLUSION

Diet treatment had little effect on the carcass traits of goats. Slaughter and carcass weights were higher for goats raised on an intensive feeding program. Ribeye area was also larger in these goats. However, no differences were detected between diet groups in the composition of the carcasses. Fat-free lean, bone and fat percentages were similar. There was no difference in cholesterol levels between groups. Meat from the goats in the semi-intensive treatment possessed lower levels of saturated fatty acids. There was no difference in sensory characteristics between groups. Therefore, goats can be raised on improved pasture with supplement and have similar quality attributes to goats in a feedlot. This creates an opportunity for the small rancher to raise goats eliminating the need to finish the goats on high concentrate diets for improved quality.

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