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Fatty Acid Composition and Palatability of Lamb from Hair Sheep

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Hair sheep originate from tropical regions of Africa, South America and Caribbean. The hair coat, adaptation to tropical climates, and out-of-season breeding of hair sheep offer advantages for improving sheep production in the southeastern U.S. The hair sheep breeds have lower mature weights (70 to 160 lb) and lower growth rates than traditional wool sheep breeds utilized for meat production. Limited information is available on the palatability and fatty acid composition of the muscle from hair sheep breeds and their crosses. This review summarizes available information on Warner-Bratzler shear force (an objective measure of tenderness), trained sensory panel evaluation, muscle cholesterol and fat composition from hair sheep breeds and their crosses.

Shear force values for several research studies comparing hair breeds and crosses are shown in **Table 1**. Warner-Bratzler shear force is an objective measure of tenderness and lower numbers indicate greater tenderness. Our research has shown that shear force values were lower for Dorper-sired than Suffolk-sired or Dorset-sired lambs. Lamb chops from Dorper-sired lambs were also rated more tender by trained sensory panel analyses. Others (Shackelford et al., 2005) did not find any differences between hair sheep (Katahdin, Dorper) and wool sheep (Finnsheep, Romanov, Rambouillet, Suffolk, Texel, Dorset, Composite) sires for slice shear force values and sensory tenderness ratings.

Table 1. Warner Bratzler shear force values for various hair sheep breeds and crosses	
	WBS, lb.
Experiment 1	
Suffolk-sired	8.76
Dorper-sired	6.16
Experiment 2	
Dorset-sired	5.83
Dorper-sired	5.06
Experiment 3	
Barbados Blackbelly	5.57
Katahdin	5.43
St. Croix	5.04

In a comparison of Dorper, St. Croix or wool breed sires on St. Croix or wool breed ewes, Bunch et al. (2004) reported lower shear force values for lamb chops from Dorper-sired, regardless of dam breed, or St. Croix lambs. However, sensory tenderness ratings were higher, more desirable, for chops from St. Croix than other the other crosses. In another study evaluating lambs produced by mating Dorper or St. Croix sires to St. Croix or St. Croix x Romanov ewes, or Katahdin lambs, Burke et al. (2003) reported higher shear force values for lamb chops from Katahdin than Dorper or St. Croix sired. In a comparison of three hair sheep breeds, shear force did not differ between Barbados, Katahdin, or St. Croix. Overall, the shear force values reported for these comparisons are low (50.0 to 5.6 lb) and would be considered to be highly acceptable based on threshold shear force values used for beef (tender < 7.7 lb shear force).

Table 2. Cholesterol content of lamb from various hair sheep breeds.	
	Cholesterol, mg/100g tissue
Experiment 1	
Suffolk-sired	60.60
Dorper-sired	60.55
Experiment 2	
Dorset-sired	69.00
Dorper-sired	70.08
Katahdin	67.48
Barbados x St. Croix	67.87
Suffolk x hair	67.02

Cholesterol content did not differ between Dorper or wool breed sires and averaged 66.1 mg per 100 g of muscle (Table 2). Differences between Dorper and wool breed sires were observed for muscle fatty acid composition (Table 3). Lamb chops from Dorper-sired lambs had greater total fatty acids and conjugated linoleic acid (CLA) content, and lower monounsaturated fatty acid percentage than Suffolk-sired lambs. Dorper-sired lamb also had lower monounsaturated and polyunsaturated, and greater saturated fatty acid as a percent of total fatty acids compared to Dorset-sired lamb. In a comparison of three hair sheep breeds, total fatty acid and monounsaturated fatty acid percentages were greater for Katahdin than Barbados or St. Croix. Barbados lamb chops had greater percentages of polyunsaturated fatty acids than Katahdin or St. Croix (Table 4). Overall, lamb is leaner with a higher concentration of polyunsaturated fatty acids than grain-finished beef products.

Table 3. Fatty acid composition of lamb from Dorper or non-Dorper sired.		
	Dorper-sired	Non Dorper
Experiment 3		
Total fatty acids, %	3.52	4.30
Saturated, %	44.82	44.93
Odd-chain, %	1.29	1.19
Monounsaturated, %	43.85	44.71
Polyunsaturated, %	7.68	7.08
CLA, cis-9 trans-11, %	0.51	0.42
Experiment 4		
Total fatty acids, %	2.26	2.87
Saturated, %	45.11	42.55
Odd-chain, %	1.08	1.14
Monounsaturated, %	48.65	50.46
Polyunsaturated, %	5.17	5.84
CLA, cis-9 trans-11, %	0.46	0.35

In conclusion, these studies indicate that the use of hair sheep sires can alter carcass quality, composition, and palatability depending on the breed of hair sheep utilized. Dorper-sired lambs produce carcasses that are most similar in weight and quality to that of traditional wool sheep breeds but have greater fat thickness when slaughtered at the same age. Advantages of Dorper-sired lamb in tenderness have been reported in some studies. Katahdin-sired lambs typically produce carcasses that are heavier in weight and of higher quality than St. Croix or Barbados Blackbelly when harvested at a similar age.

Table 4. Fatty acid composition of lamb from Barbados Blackbelly, Katahdin and St. Croix hair sheep*.			
	Blackbelly	Katahdin	St. Croix
Total fatty acids, %	1.49	3.04	1.93
Saturated, %	42.14	41.65	43.39
Odd-chain, %	1.13	1.08	1.12
Monounsaturated, %	40.12	44.16	42.32
Polyunsaturated, %	7.60	5.49	5.61
Ratio omega6:omega3	4.28	4.36	3.89
CLA, cis-9 trans-11, %	0.38	0.39	0.38

Literature Cited:

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