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**FEEDLOT AND CARCASS STUDIES OF
ANGORA WETHERS**

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DIVISION OF RANGE ANIMAL HUSBANDRY



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Forty-five Angora wethers ranging from yearlings to four-year-olds removed directly from the range to the feedlot and fed on a standard lamb fattening ration during a 100-day period made an average gain of only 0.16 pound per head daily as compared to an average daily gain of 0.31 pound made by a check group of good Rambouillet wether lambs. The Angora wethers required 702 pounds of concentrate and 499 pounds of roughage per 100 pounds gain, while the lambs required 388 pounds of concentrate and 305 pounds of roughage. The lamb ration appeared to be unsuited for fattening Angora goats economically.

The dressed yield of the Angora wethers unshorn basis, with 24 hour shrink, and hot carcass weights was 48.1%, 51.8% and 52.6% for the yearlings, two-year-olds, and three and four-year-olds respectively. On a shorn basis the dressed yield was 50.5%; 54.1%; and 54.5% for the yearlings, two-year-olds, and three and four-year-olds respectively.

Physical composition of carcasses from three of the fatter goats showed an average composition of 56.5 percent lean, 26.1 percent fat, and 16.9 percent bone or a total edible portion of 82.6 percent. Carcasses of fat Rambouillet lambs averaged 55.6 percent lean, 25.9 percent fat, and 18.1 percent bone, or a total edible portion of 81.5 percent.

Chevon (goat meat), when served as chops, barbecue, and chili was scored favorably with respect to tenderness, juiciness, and flavor by forty judges. Results of the palatability studies conducted by the Division of Rural Home Research in a comparison of broiled chops and leg roast revealed but little difference in tenderness or flavor but a rather marked difference in juiciness in favor of the broiled chops.

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FEEDLOT AND CARCASS STUDIES OF ANGORA WETHERS

by

J. C. Miller,¹ J. M. Jones,² and C. R. Burt³

The Angora goat produces fiber of especial utility and economic importance, but has not yet received full recognition as a meat animal.

Goat meat, through the influence of B. M. Halbert of Sonora, Texas, and other influential members of the Sheep and Goat Raisers Association of Texas, was officially named "chevon" on September 8, 1924, by the late Henry C. Wallace, then Secretary of Agriculture (3). Chevon is eaten extensively on a large number of ranches in southwest Texas. It has for years been a popular attraction as a barbecue dish.

Consideration of the meat of the Angora goat is especially timely at present because of the prospective meat shortage brought about as a result of the present world-wide emergency. The Angora goat is adaptable to relatively wide areas, especially in the Southwest, and aside from returning a profit from the mohair produced, surplus animals can be utilized for meat purposes. Limited numbers of Angora goats could be successfully produced in farming areas at present practically devoid of livestock.

Goat meat was in ancient times regarded as an important article of diet (Genesis 27-9). Pegler (7) states that the flesh of the Angora is considered far superior to that of other breeds of goats and quite equal to mutton. He states that in Italy, Spain and the South of France goat meat is in constant demand and all who have lived in Malta and the East Indies can testify to the appreciation of this meat in those countries. Among the Hebrews and Greeks it ranked amongst the most dainty dishes.

Thompson (9) wrote: "The flesh of the Angora goat is exceedingly nutritious and palatable. The flesh of kids is considered fine. Breeders who pasture their goats upon grass as well as upon browse and then fatten them with grain produce a meat so nearly like the best lamb that it requires an expert to detect the difference. The edibility of goat meat is becoming more generally understood and the use is increasing as shown by the number of Angoras slaughtered annually at the principal markets for 1907."

An average of 141,487 goats were slaughtered annually under Federal inspection during the five year period 1916-1920 (12). During that period goat meat quite generally went into the regular mutton trade. At that time Angora wethers, when received in large numbers, sold at approximately 60 percent of what sheep wethers were bringing. The re-

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duced cost to the consumer was an attraction and the quality of the flesh doubtless superior to mutton that could be purchased at the same price. In some parts of the Southwest chevon was formerly used in preference to mutton for salting down for winter use. It was believed that chevon was more easily kept, because it usually contained less fat. Mexican sheep shearers operating in West Texas generally prefer chevon to mutton.

San Antonio is the leading goat market in the United States. Receipts of sheep and goats on that market have increased over 400 percent since 1938 (8). Because of the volume and importance of goat marketing and slaughtering at the San Antonio Central Market, the U.S.D.A. ordered goats counted separately from sheep effective August 1, 1942. From August 1 through December 1942, 72,113 goats were received on the San Antonio market.

Since Texas produces, mainly in the Edwards Plateau region, approximately 85 percent of the 4,544,000 Angora goats in the United States (10) Angora goat raisers have urged that studies be undertaken at the Texas Station aimed at a more complete evaluation of chevon as an article of diet.

During the course of the experiment herein reported, Angora goats sold for slaughter purposes at \$3.25 per cwt. on the San Antonio market, a figure considerably under lamb, mutton and beef prices. Slaughter Angora goats during the past several months have advanced to \$7.50 per cwt. live weight on the San Antonio market, one of the few in the country to quote prices on Angora goats. This is the first recent indication of an increased demand for chevon. If the trade generally realized that chevon is available at such a relatively low cost per pound, no doubt the demand would become more brisk. With the present limited Angora goat production, the available supply of chevon would be readily absorbed, but ranchmen well understand the means by which the supply can be rapidly increased. This potential source of meat supply does afford possibilities well worth the consideration not only of large operators interested in the promotion of chevon but of small farmers whose holdings are adapted to the production of a few goats.

Feeding Angora Wethers in Dry Lot

Forty-five Angora wether goats ranging in age from one to four years were fed in dry lot on a concentrate ration consisting of 9 parts whole yellow shelled corn to one part of 43% crude protein cottonseed meal, and in addition as much No. 2 alfalfa hay as they would consume, during a 100-day finishing period. They were fed in three groups of 15 each comprised respectively of yearling, two-year-old, and three to four-year-old goats. Fifteen range-bred smooth body Rambouillet lambs which originated in the Del Rio area were fed as a check on the performance of the Angora goats. The Angora goats were shipped direct to the feedlots at College Station from a range near Sonora in Sutton County.

The average initial weights of the respective groups were as follows: Yearling goats 51 pounds; two-year-old goats 63 pounds; three and four-year-old goats 76 pounds; and Rambouillet lambs 61 pounds.

All lots were placed on feed October 17, 1940, and fed during a 100-day period. Representative animals used in this test are shown in Figure 1.



Figure 1. Representative Angora wethers, unshorn, at close of fattening period.

The average daily ration consumed by the yearling goats consisted of 1.1 pounds concentrates and 0.73 pound of alfalfa hay. The two-year-old goats consumed 1 pound of concentrates and 0.76 pound of alfalfa hay, and the three to four-year-old goats consumed 1.2 pounds of concentrates and 0.9 pound alfalfa hay. The average daily feed consumed by the group of check lambs was 1.2 pounds concentrates and 1 pound alfalfa hay.

During the 100-day feeding period the average gains per head basis feedlot weights in the respective groups were yearling goats 19 pounds, or 0.19 pound daily; two-year-old goats 12 pounds, or 0.12 pound daily; three and four-year-old goats 16 pounds, or 0.16 pound daily. The check group of Rambouillet lambs gained 31 pounds per head or 0.31 pound daily—twice the gain made by the Angora wethers.

Table 1 shows the initial and final weights and gains of goats and lambs, and slaughter records of the goats used in this trial. In a five months' growth of mohair fleece, the yearling Angora goats with 24-hour shrink averaged 63.2 pounds; the two-year-old goats, 67.7 pounds; and the three and four-year-old goats, 88.2 pounds, and on a basis of hot carcass weights yielded 48.1%, 51.9%, and 52.6% respectively. Based on final feedlot weights, unshorn basis, the dressed yields were 43.4%, 46.9% and 50.3% respectively for the yearlings, two-year-olds, and three and four-year-olds. On a sheared basis 24-hour shrink with fleece weights of 3 pounds, 2.71 pounds, and 3.1 pounds deducted from the unshorn weights the dressed yields were 50.5%, 54.1%, and 54.5% respectively for the yearling, two-year-old, and three and four-year-old goats. Figure 2 shows the appearance of the goats after shearing. The dressed yields of the Angora wethers unshorn basis compared favorably with those

Table 1. Summary of feeding trial and slaughter data

	Yearling goats	Two- year-old goats	Three- and four- year-old goats	All goats	Check* lambs
Average initial weight.....	51.3	62.8	76.1	63.4	61.2
Average final weight in fleece (feed lot) ..	70.1	74.9	92.3	79.1	92.4
Average slaughter weight (24-hour shrink).....	63.2	67.7	88.2	73.0	---
Average total gain.....	18.8	12.1	16.2	15.7	31.2
Average daily gain.....	0.188	0.121	0.162	0.157	0.312
Average daily ration					
Concentrate (corn 9, c.s.c 1).....	1.09	1.01	1.22	1.10	1.21
Alfalfa hay.....	0.73	0.76	0.87	0.78	0.95
Feed per 100 lbs. gain					
Concentrate.....	580.2	832.1	751.1	702.1	388.4
Alfalfa hay.....	386.7	628.2	537.3	499.4	305.4
Feed cost per 100 lbs. gain ¹	\$9.05	\$13.42	\$11.93	\$11.15	\$6.34
Shrinkage, feedlot to slaughter weight, lbs.....	6.9	7.2	4.1		
Average fleece weight, approximately 5 months, lbs.....	3.0	2.71	3.1		
Average weight carcasses, hot, lbs.....	30.4	35.1	46.4		
Dressing percentages:					
1. Basis final feedlot weights in fleece.....	43.37	46.86	50.27		
2. Basis final feedlot weights, fleece removed.....	45.31	48.62	52.02		
3. Basis 24-hour shrink in fleece.....	48.10	51.85	52.61		
4. Basis 24-hour shrink, fleece removed.....	50.50	54.08	54.52		

¹Corn valued at \$22.77 per ton, cottonseed cake at \$28.00 per ton, and alfalfa hay at \$12.00 per ton.

*None of the lambs were slaughtered locally because of the availability of slaughter data on comparable lambs.

of good to choice Rambouillet lambs in fleece which in numerous Texas Station and other tests (2, 5, 11) have ranged between 48 and 52 per cent yield.

Carcass and Palatability Studies

Three of the fattest and three of the leanest goats were used in carcass and palatability studies. A half carcass from each age group was mechanically separated into lean, fat and bone portion. The same procedure of mechanical separation was followed as that which has been employed in studies with lamb carcasses at this Station.

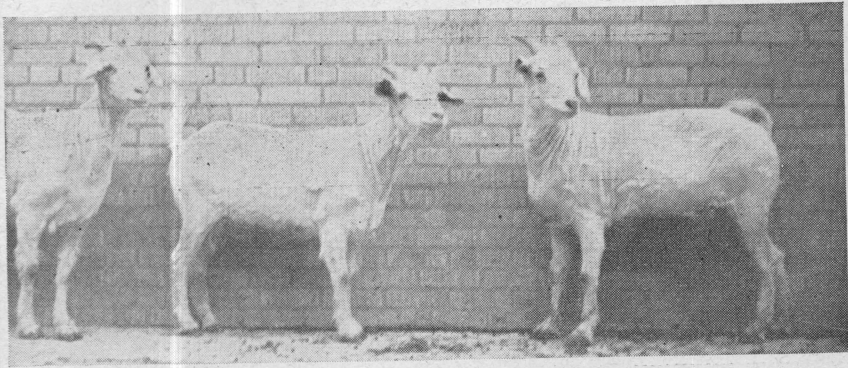


Figure 2. The same Angora wethers after shearing.

Each half carcass was separated into five cuts, viz., shoulder, breast, rack, loin, and leg. The cuts were made as follows: the half carcass was divided immediately back of the twelfth rib. Then a cut was made from a point even with the lower end of the thirteenth rib to the middle of the fore arm, thus removing the breast. Next, cutting between the fifth and sixth ribs, the shoulder and rack were separated. The loin was then separated from the leg at a point half way between the aitch-bone and the rise in the pelvic arch and at right angles to the extended shank. The leg was separated from the shank at the hock joint. The mechanical separation of fat and lean was done at a temperature of 35° F. to prevent excessive loss of moisture. The results of the mechanical separation into lean, fat, bone and edible portions for three fat and three of the leaner goats are recorded in Table 2. Similar records are also included for Rambouillet lambs studied in the 1939-40 tests by the Texas Agricultural Experiment Station (2).

It will be observed that there is little difference in percent of bone in Angora goat and lamb carcasses in comparable condition. The proportion of lean in the edible portion of the fat goat carcasses was slightly above the percentage of lean in the fat lambs. However, the proportion of lean in the edible portion of the leaner lamb carcasses was 78.5 percent compared to 73.4 percent of the leaner goat carcasses.

The results of the physical separation of Angora goat carcasses used in this study compare favorably with findings reported by Hankins, et al., (4) covering edible portion of prime lamb carcasses. The medium or lean goat carcasses were similar in physical composition to that in lambs which Hankins and associates graded as good.

Carcasses of a representative three-year-old, two-year-old, and yearling goat are shown in Figure 3. The rib-eye of those carcasses is compared in Figure 4 with the rib-eye of a prime lamb. Cuts were made between the twelfth and thirteenth ribs.

Cooking and Palatability Tests: Determinations of tenderness, juiciness, and palatability on one Angora goat carcass of each age were made

Table 2. Physical composition of Angora wether and lamb carcasses*

Carcass cut	Percentage of cut				Percentage of edible portion			
	Fat Goat	Fat Lamb	Leaner Goat	Leaner Lamb	Fat Goat	Fat Lamb	Leaner Goat	Leaner Lamb
Shoulder								
Lean-----	62.5	61.1	63.1	64.1	77.2	78.1	81.8	84.7
Fat-----	18.4	17.1	14.1	11.5	22.8	21.9	18.2	15.3
Bone-----	18.5	21.3	21.4	23.9				
Edible portion-----	80.9	78.2	77.2	75.6	100.0	100.0	100.0	100.0
Breast								
Lean-----	51.4	57.5	48.2	60.0	65.2	73.7	69.6	81.3
Fat-----	27.4	20.5	21.0	13.8	34.8	26.3	30.4	18.7
Bone-----	20.4	21.4	26.9	25.5				
Edible portion-----	78.8	78.0	69.2	73.8	100.0	100.0	100.0	100.0
Rack								
Lean-----	50.7	47.5	52.6	55.5	62.4	58.2	74.7	73.2
Fat-----	30.6	34.1	17.8	20.3	37.6	41.8	25.3	26.8
Bone-----	18.3	18.1	29.2	23.7				
Edible portion-----	81.3	81.6	70.4	75.8	100.0	100.0	100.0	100.0
Loin								
Lean-----	49.4	43.4	46.4	52.7	55.3	48.7	55.1	62.5
Fat-----	40.0	45.7	37.8	31.6	44.7	51.3	44.9	37.5
Bone-----	10.0	10.6	15.3	15.2				
Edible portion-----	89.4	89.1	84.2	84.3	100.0	100.0	100.0	100.0
Leg								
Lean-----	67.2	68.7	68.0	72.6	76.6	75.6	80.6	84.7
Fat-----	20.5	18.3	16.4	13.1	23.4	24.4	19.4	15.3
Bone-----	11.9	12.6	14.6	13.7				
Edible portion-----	87.7	87.0	84.4	85.7	100.0	100.0	100.0	100.0
Half Carcass								
Lean-----	56.5	55.6	56.0	61.1	68.4	68.2	73.4	78.5
Fat-----	26.1	25.9	20.4	16.8	31.6	31.8	26.6	21.5
Bone-----	16.9	18.1	21.7	21.7				
Edible portion-----	82.6	81.5	76.4	77.9	100.0	100.0	100.0	100.0

*Figures given are based on averages of the half-carcasses of three of the fattest goats and three of the thinnest goats used in this study. Figures on lambs are averages of five fat lambs and five thinner lambs used in Texas Agricultural Experiment Station Project 402 (1940).

by the Division of Rural Home Research with five judges participating, on leg roast and loin chops. The meat from the two remaining carcasses from each of the three age groups was served at the A. and M. College mess hall to a committee of 35 cadets who had not been previously informed as to the identity of the meat they were to pass upon.

In the laboratory comparison of the leg roast from fat and leaner goats the decision of the judges was definitely in favor of the former from the standpoint of tenderness. From the standpoint of juiciness and flavor the decision favored the leaner goats although there were some inconsistencies in the scores. All meat cuts from each of the three age groups whether fat or medium fat were judged as desirable in flavor. In both the laboratory and mess hall tests the chops were

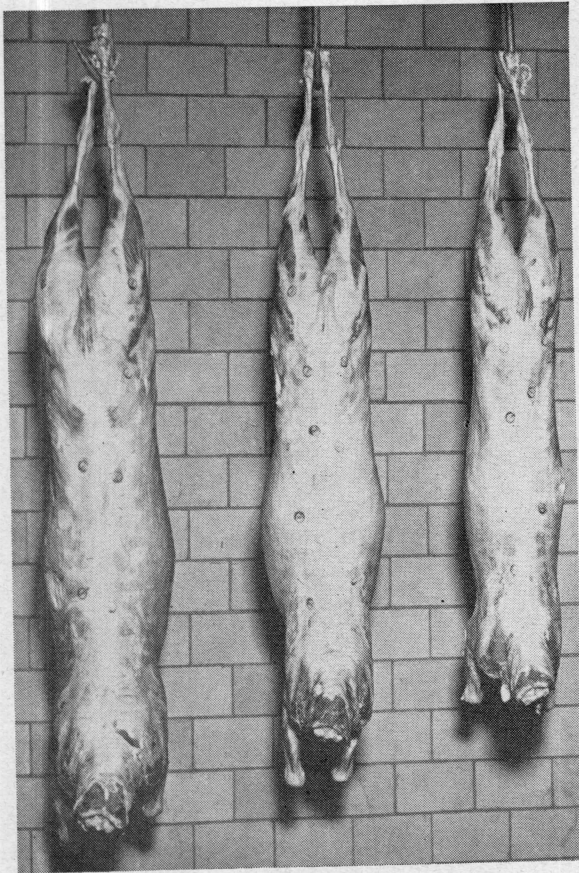


Figure 3. Representative carcasses left to right of a three, a two-year-old, and a yearling Angora wether.

judged as neutral rather than tender or tough. Both sets of judges, however, described the broiled chops as juicy and desirable in flavor. Goat meat served as barbecue to the cadet judges was judged to be tender, juicy and desirable in flavor. Chili made from chevon proved a palatable dish. In the laboratory test leg roasts from the leaner goats were scored between neutral and tough.

Discussion

The fattening ration used in all lots was one which had proved satisfactory for lambs. Since the check group of lambs gained 0.31 pound daily or approximately twice the average daily gain made by the three groups of Angora wethers, and since the goats required 314 pounds

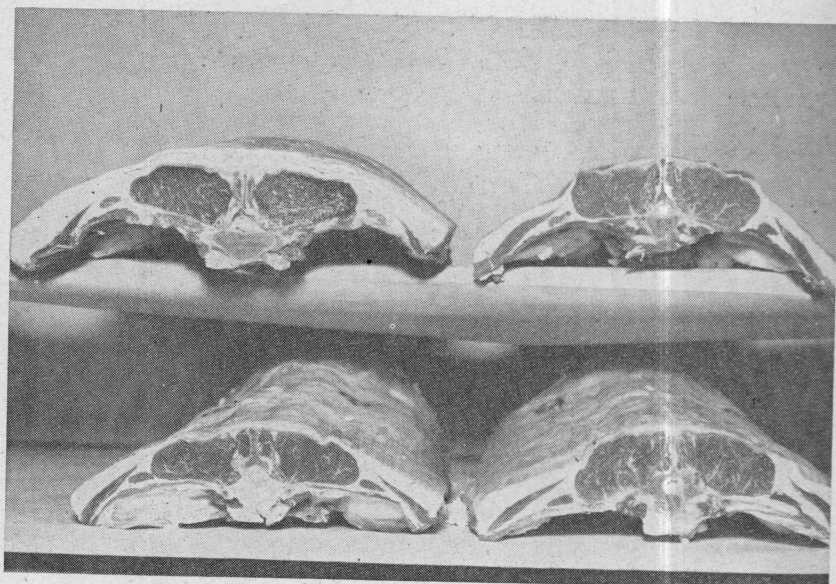


Figure 4. Top, left—fat lamb; top, right—yearling Chevon; bottom, left—two-year-old Chevon; bottom, right—three-year-old Chevon.
NOTE: Rib eye in Chevon cuts compare favorably with rib eye in choice fat lamb.

more concentrate and 194 pounds more hay per hundred pounds gain than was required by the lambs, it would seem to indicate that a lamb fattening ration is not suitable for fattening Angora wethers. At the beginning of the test the Angora goats consumed the unground shelled corn greedily and apparently without mastication. Throughout the fattening period the goats cleaned up their corn in approximately one-half the time required by the lambs. Neither the goats nor the lambs consumed as much roughage as was expected. The goats preferred the stemmy portion of the alfalfa while the lambs preferred the leafier hay. These data and observations suggest that goats require a different fattening ration from the one fed in this study.

Based on the performance of the Angora wethers in this experiment the feeding and finishing of Angora goats in drylot cannot be recommended as an economical practice on the rations fed. Black, (1) however, indicates that Angora goats have been fed profitably on a commercial basis. In dressed carcass yield the Angora wethers fattened in this trial compared favorably with good to choice lambs and exceeded the higher values reported by Miller. (6)

Although as revealed in Table 2, the physical composition of the goat carcasses compared favorably with that of lambs, it should be pointed out that even the best goat carcasses were leggy, and angular, lacking the thickness and plumpness found in medium to good lamb carcasses.

Likewise the fat on the goat carcasses was patchy, being especially heavy and wasty around the kidney and lacking the uniformity of distribution found on medium to good lamb carcasses. However, the percentage of bone and the percentage of edible meat from the goat carcasses was surprisingly comparable to that of lamb carcasses.

The favorable reaction of all judges to chevon in the palatability studies, from the standpoint of juiciness and flavor suggests that most of the existing prejudices against chevon are wholly unfounded. There were some inconsistencies among the judges on tenderness of broiled chops. This was to be expected since chops from all aged goats were served together and it would only seem logical that the chops from the younger goats would be more tender.

Acknowledgments

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Summary

Yearling, two-year-old and three and four-year-old Angora wethers and a check lot of good Rambouillet wether feeder lambs were fed a fattening ration consisting of yellow shelled corn, cottonseed meal, and alfalfa hay during a 100-day period.

The average daily gain made by the three groups of goats based on final feedlot weights was 0.16 pound as compared with 0.31 pound for the lambs.

The average feed consumed per 100 pounds gain by all of the goats was 702 pounds concentrates and 499 pounds roughage as compared with 388 pounds concentrates and 305 pounds roughage by the lambs.

The feeding and finishing of Angora wethers on a standard lamb fattening ration based on the results obtained in this experiment cannot be recommended, however, further research on this phase is warranted. The dressing percentage of the fattened Angora wethers, unshorn basis, ranged from 48 to 52.6 percent and compared favorably with good to choice Rambouillet lambs in fleece. On a shorn basis the average dressed yields were 50.5%, 54.1%, and 54.5% respectively for the yearling, two-year-old, and three and four-year-old goats.

*Resigned, 1941.

Physical separation studies of the Angora goat carcasses showed that the goats were similar in percent of edible meat and bone to fat lambs ranging from choice to prime in grade.

Chevon was reported favorably by judges who scored it as juicy and desirable in flavor. Barbecued chevon was rated high in tenderness; however, the scores on tenderness of the goat chops varied between judges and averaged somewhat lower than for the barbecue.

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