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Lamb carcass evaluation guidelines

H.G. Dolezal and J.D. Tatum[1/]

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Quick Facts

- Lamb carcass evaluation is a valuable tool to maximize overall production efficiency and is used most effectively with performance testing programs.
- USDA quality and yield grades are recommended to assess qualitative and quantitative traits.
- Quality grades are determined visually by evaluating differences in maturity, lean quality and carcass conformation.
- Yield grades indicate the percentage of boneless, closely-trimmed retail cuts. Adjusted fat thickness, estimated percent kidney and pelvic fat and leg conformation score are used to calculate yield.
- Carcass contests are an important education tool and provide information for future livestock selection and management decisions.

An ultimate objective of all sheep production systems is efficient production of high yielding and acceptable quality lamb carcasses. Lamb carcass evaluation is a valuable tool for commercial and purebred sheep producers to maximize overall production efficiency. It is used most effectively with performance testing programs.

The following lamb carcass evaluation guidelines are based on recommendations prepared by the American Meat Science Association in cooperation with the American Sheep Producers Council and the National Livestock and Meat Board's lamb committee.

Carcass Evaluation

The U.S. Department of Agriculture (USDA) grades, quality and yield, for lamb, yearling mutton and mutton are recommended to assess qualitative and quantitative lamb carcass traits.

Quality

USDA quality grades for lamb are Prime, Choice, Good, Utility, and Cull and are used to reflect expected differences in cooked meat palatability (tenderness, juiciness and flavor). Grades are determined visually by evaluating differences in maturity, lean quality and carcass conformation.

Maturity is determined using the break or spool joints on the foreshanks, shape of the ribs and lean color and texture. Three maturity groups are recognized for grading purposes: lamb, yearling mutton and mutton. Typical carcass characteristics for each maturity group are shown in Table 1.

Table 1: Maturity determination descriptions.

Maturity classification	Foreshank condition	Rib shape	Lean color	Lean texture
Lamb (A Maturity)	break joints	moderately narrow, slightly flat	slightly dark pink	fine
Lamb (B Maturity)	break joints	slightly wide, moderately flat	light red	fine
Yearling mutton	break joints or spool joints	moderately wide, tend to be flat	slightly dark red	slightly coarse
Mutton	spool joints	wide and flat	dark red	coarse

Table 2: Approximate relationship between USDA maturity classification and chronological age.

Maturity	Approximate age
Lamb (A)	3 to 8 months
Lamb (B)	8 to 14 months
Yearling mutton	14 to 24 months
Mutton	over 24 months

Lean Quality is based on a combined assessment of fat deposition between the ribs (feathering), fat deposition on and in the primary and secondary flank muscles (flank streaking) and firmness of the fat and lean in the flank region (flank firmness). Each trait is assigned a score. A preliminary quality grade is determined by combining the lean quality scores with maturity.

Table 3: Minimum grade requirements for "A" maturity lamb[a].

Quality grade	Feathering	Flank streaking	Flank firmness[b]
Low Prime	modest	small	TMF
Low Choice	slight	traces	TSF
Low Good	traces	practically none	STS
Low Utility	practically none	none	SSW

[a]For "B" maturity lamb carcasses increase each minimum grade requirement 1 full score.

[b]TMF = tends to be moderately full and firm;
TSF = tends to be slightly full and firm;
STS = slightly thin and soft;
SSW = slightly soft and watery.

[1/]H.G. Dolezal, CSU graduate student, animal sciences; J.D. Tatum, CSU assistant professor, animal sciences and extension meats specialist (5/1/82)

Conformation is evaluated as width in relation to length. Desirable conformation reflects a high ratio of edible portion to bone. Descriptions for each conformation score follow:

Prime: Moderately wide in relation to length
Moderately plump and full legs
Moderately wide and thick backs
Moderately thick and full shoulders

Choice: Tend to be slightly wide and thick in relation to length
Tend to have slightly plump and full legs
Tend to have slightly wide and thick backs
Tend to have slightly thick and full shoulders

Good: Moderately narrow in relation to length
Slightly thin and tapering legs
Slightly narrow and thin backs
Slightly narrow and thin shoulders

Utility: Very angular and very narrow in relation to length
Thin and slightly concave legs
Very narrow and sunken backs
Narrow and sharp shoulders
Hip and shoulder joints are plainly visible

Cull: Extremely angular and extremely narrow in relation to length
Extremely thin-fleshed throughout
Extremely thin and concave legs
Extremely sunken and thin backs
Very thin and sharp shoulders
Hip and shoulder joints, ribs and bones of the spinal column are clearly outlined

The preliminary quality grade and conformation score are then combined to give the final USDA quality grade. For additional information, consult the "Official United States Standards for Grades of Lamb, Yearling Mutton and Mutton Carcasses," a USDA publication available through Agricultural Marketing Service, USDA, Washington, D.C. 20250.

Yield

Yield grades for lamb range from 1 to 5 and indicate the percentage of boneless, closely-trimmed leg, loin, rack and shoulder. Adjusted fat thickness, estimated percent kidney and pelvic fat and leg conformation score are used to calculate yield.

Adjusted fat thickness is figured after carcasses are "ribbed" or divided into a fore and hind saddle between the 12th and 13th ribs. Subcutaneous (just under the hide) fat thickness is measured opposite the center of each ribeye. It is adjusted (either up or down), to reflect unusual fat deposition over other carcass parts.

Estimated percent kidney and pelvic fat is the internal fat deposited in the body cavity estimated and reported as a percentage of carcass weight.

Leg conformation score measures lean to bone ratio. Scores range from Prime (moderately plump and full legs) to Cull (extremely thin and concave legs) and may be coded numerically.

Table 4: Numerical leg conformation scores.

Leg conformation Score	Number	Leg conformation Score	Number
Prime $^{+}$	15	Good $^{-}$	7
Prime ^{0}	14	Utility $^{+}$	6
Prime $^{-}$	13	Utility ^{0}	5
Choice $^{+}$	12	Utility $^{-}$	4
Choice ^{0}	11	Cull $^{+}$	3
Choice $^{-}$	10	Cull ^{0}	2
Good $^{+}$	9	Cull $^{-}$	1
Good ^{0}	8		

Yield grades are calculated using the followin equation:
Yield grade = 1.66 + 6.66 x adjusted fat thickness, inches) + (0.25 x estimated % kidney and pelvic fat) − (0.05 x leg conformtion number).

Yield grades may be converted to percent boneless, closely-trimmed retail yield.

Table 5: Yield grade conversions.

Yield grade	% Yield of cuts	Yield grade	% Yield of cuts
1.0	49.0	3.5	44.6
1.1	48.8	3.6	44.4
1.2	48.7	3.7	44.2
1.3	48.5	3.8	44.0
1.4	48.3	3.9	43.8
1.5	48.2	4.0	43.6
1.6	48.0	4.1	43.4
1.7	47.8	4.2	43.3
1.8	47.6	4.3	43.2
1.9	47.4	4.4	43.0
2.0	47.2	4.5	42.8
2.1	47.0	4.6	42.6
2.2	46.9	4.7	42.4
2.3	46.7	4.8	42.2
2.4	46.5	4.9	42.0
2.5	46.4	5.0	41.8
2.6	46.2	5.1	41.6
2.7	46.0	5.2	41.5
2.8	45.8	5.3	41.3
2.9	45.6	5.4	41.1
3.0	45.4	5.5	41.0
3.1	45.2	5.6	40.8
3.2	45.1	5.7	40.6
3.3	44.9	5.8	40.4
3.4	44.7	5.9	40.2

Carcass Contests

Carcass contests are an important educational tool and provide information for future livestock selection and management decisions. Contest rules should be estabished prior to the competition and based on current, reliable standards. The recommended method for ranking lamb carcasses is provided below.

- Determine yield grade to the nearest 1/10 of a grade and convert it to percentage of boneless, closely-trimmed retail cuts from the leg, loin, rack, and shoulder. (See Table 5.) If possible, all yield grade 4 and 5 carcasses should be disqualified.
- Determine quality grade to the nearest 1/3 of a grade. (See the USDA publication listed earlier.) Disqualify all yearling mutton and mutton carcasses in addition to any lamb carcasses grading Good, Utility or Cull.
- For ranking purposes, add .3 to the estimated yield of retail cuts for each 1/3 grade increase above low Choice. However, no additional credit should be given beyond low Prime.

Example: A high Choice, Yield Grade 2.5 lamb carcass would be calculated as:
Estimated yield of Cuts for YG 2.5 = 46.4%
High Choice QG = .3x2 = .6
Index = 46.4 + .6 = 47.0

Additional factors are often of interest and should be evaluated to aid in ranking.

- All carcasses from intact males or cryptorchids (a ram in which one or both testes has failed to descend normally) should be disqualified unless contest rules state otherwise.
- The accepted minimum adjusted subcutaneous fat thickness for lamb carcasses is .1 inches. Carcasses with less external fat cover generally lack quality and shrink extensively in cooler storage conditions.
- Ribeye area should be measured, if possible, at the 12th and 13th rib interface and recorded in square inches.

Table 6: Weight-based schedule for minimum ribeye area requirements.

Hot carcass weight, pounds	Minimum ribeye area, square inches
Less than 50.0	2.2
50.0 to 54.9	2.3
55.0 to 59.9	2.4
60.0 to 64.9	2.5
65.0 to 69.9	2.6
70.0 or greater	2.7

Any carcasses deficient in ribeye area muscling should be disqualified.

In conclusion, it is preferred that champion carcasses grade low Choice or higher and Yield Grade 3 or better. Champion carcasses should have at least .1 inch of adjusted fat thickness and sufficient ribeye area to meet the weight-based schedule. Cutability percentage may be adjusted for superior quality grades and final index points may be determined for ranking purposes.

However, caution is advised in placing carcasses on objective measures alone. Many times placings between certain carcasses will be very close and difficult to justify with only objective measurements. A qualified judge should interpret the available data and determine the final carcass contest placings.

To convert to metrics, use the following conversions: 1 inch = 2.54 centimeters; 1 pound = .45 kilogram.