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Sell 'em Light? Sell 'em Heavy?

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When is the right time to sell lambs? This question is likely to prompt debate among sheep producers. Will you sell finished, ready for slaughter lambs (over 100 lb) in traditional or commercial markets? Will you sell feeder lambs (60 to 100 lb) that require more growth and finish before they are a suitable size and weight for a particular slaughter market? Will you sell lightweight lambs (100 lb or less) destined for slaughter in non-traditional or ethnic markets? There are numerous factors to consider in making this decision. Price is, of course, one important factor. Other factors include size and type of the sheep operation, when lambs are born, availability and cost of feed, facilities available for feeding lambs, and time and management skills. Last, but not least, the decision of when to sell lambs, light or heavy, is influenced by ... **GENETICS**.

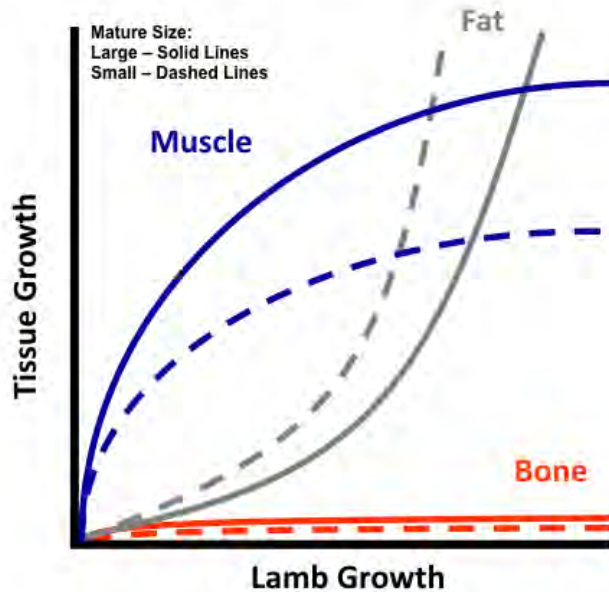
Lambs should be marketed commercially when they have an optimum level of finish or carcass fat. The proportion of carcass fat differs among breeds and sexes but is most affected by degree of maturity at slaughter. Because breeds differ with regard to mature size (weight and frame), the age and weight at which lambs reach optimum finish differs among breeds. This is why genetics play a role in the decision-making process.

Growth Rate, Carcass Composition, and Mature Size

Growth to a specified slaughter weight and carcass composition are closely related to degree of maturity. Degree of maturity refers to the weight at slaughter in relation to mature weight. Lambs from larger mature size breeds grow more rapidly and have leaner carcasses than lambs from smaller breeds if slaughtered at a specified weight. However, there is no underlying association between size and carcass composition if lambs are slaughtered at the same percentage of mature weight.

The relationship between tissue (bone, muscle, and fat) growth and lamb growth is shown in **Figure 1** for large mature size versus

Figure 1. Relationship between Tissue Growth and Lamb Growth.



small mature size sheep breeds. Bone growth is similar regardless of mature size, but growth rates of muscle and fat differ. Larger-framed breeds tend to put on muscle at a faster rate than smaller-framed breeds; therefore, they grow faster. Conversely, increased frame size is associated with a slower rate of fattening. At a specified carcass weight, larger-framed breeds are leaner. This illustrates why early maturing sheep should be slaughtered at lighter weights than later maturing sheep.

Differences among Breeds for Growth Rate and Mature Size

As indicated above, genetic variation exists among sheep breeds for growth rate and mature size. Descriptions of several common breeds are presented in **Table 1**. In the first column, breeds are classified according to their main function or use (SID Sheep Production Handbook, 2015 Edition, Vol. 8). General purpose breeds are those with a good balance between meat and wool production potential, along with adaptability to a range of environmental conditions. Specialized ewe breeds are further classified on wool type: fine, medium, and long. The Finnsheep, a highly prolific breed, may also be classified as a ewe breed. Terminal sire breeds are used primarily in terminal

crossbreeding systems; that is, systems where all crossbred lambs are sent to market and ewe replacements are obtained from other sources. Hair sheep breeds are those whose coats consist of predominately hair fibers rather than wool. The Dorper/White Dorper and Katahdin breeds are actually hair sheep composites, having been developed from crosses between hair and wool breeds. Estimates of average mature ewe weights are given in the next column. Ewe weights are presented because nutritional status, which affects weight at maturity, is likely to be more uniform across breeds and flocks for ewes than for rams. On the average, unselected rams on the same plane of nutrition as ewes are expected to be 35 to 40% heavier than ewes at maturity. However, mature rams in any flock are generally selected for size and are kept on better feed than ewes. As a result, rams typically are 50 to 60% heavier than the average for ewes. Finally, breeds are classified according to potential frame size (large, medium, and small) and growth rate (low, moderate, and high).

Consider the three breeds maintained at the University of Kentucky Sheep Unit: Hampshire, Polypay, and White Dorper. The Hampshire is classified as a terminal sire breed. Hampshire sheep are expected

Table 1. Performance of Selected Sheep Breeds for Mature Weight, Frame Size, and Postweaning Growth Rate.^{a,b}

Breed	Type ^c	Average Mature Ewe Weight (lb) ^d	Frame Size	Postweaning Growth Rate ^e
Barbados Blackbelly	Hair	75 – 100	Small	Low
Cheviot	General Purpose; Terminal Sire	115 - 155	Small	Moderate
Columbia	Medium Wool; General Purpose; Terminal Sire	150 - 210	Large	High
Corriedale	Medium Wool; General Purpose	135 - 180	Medium	Moderate
Dorper/ White Dorper	Hair	170 - 200	Medium	Moderate
Dorset	General Purpose	130 - 180	Medium	Moderate
Finnsheep	Prolific	110 - 150	Small	Low
Hampshire	Terminal Sire	160 - 220	Large	High
Icelandic	Colored	120 - 160	Small	Low
Katahdin	Hair	110 - 160	Medium	Moderate
Oxford	Terminal Sire	150 - 210	Large	High
Polypay	General Purpose	130 - 180	Medium	Moderate
Rambouillet	Fine Wool; Range	140 - 190	Medium	Moderate
St. Croix	Hair	100 - 140	Small	Low
Shetland	Colored	70 – 100	Small	Low
Shropshire	Terminal Sire; General Purpose	150 - 195	Medium	Moderate
Southdown	Terminal Sire	120 - 160	Medium	Moderate
Suffolk	Terminal Sire	170 - 250	Large	High
Texel	Terminal Sire; General Purpose	130 - 190	Medium	Moderate

^a SID Sheep Production Handbook, 2015 Ed., Vol. 8.

^b Assumes all breeds perform in common environment.

^c Main function or use of breed.

^d Assumes moderate to good body condition (Body Condition Score = 3.0 to 3.5).

^e Low < 0.40 lb/d; Moderate = 0.40 to 0.70 lb/d; High > 0.70 lb/d (D.L. Thomas, University of Wisconsin, S. Wildeus, Virginia State University, D. K. Aaron and D. G. Ely, University of Kentucky).

to be large-framed and fast growing. They produce heavyweight slaughter lambs. Like the Columbia, Oxford, Shropshire, and Suffolk, Hampshire sheep are expected to produce leaner carcasses at heavier weights than medium or small breeds. Their larger frame size is associated with a slower rate of fattening (**Figure 1**). The Polypay is classified

as a general purpose breed but is noted for strong maternal characteristics (out of season lambing, prolificacy, milk production, maternal instincts). They are medium-sized with a moderate growth rate. At heavier weights, Polypay lambs would be expected to have fatter carcasses than Hampshire lambs. The White Dorper is considered to

be similar to the Polypay in mature size and growth rate. However, research conducted at the University of Kentucky indicates White Dorper sheep may reach maturity slightly earlier than Polypay sheep, meaning they should be slaughtered at slightly lighter weights.

Of these three breeds, Hampshire, Polypay, and White Dorper, the Hampshire is the most suitable for heavyweight lamb production under intensive management. Polypay and White Dorper sheep can also be managed intensively but are better suited to more extensive management systems. Polypay and White Dorper lambs can be slaughtered at lighter weights. Also, while straightbred Hampshire lambs produce very desirable carcasses, a more efficient production system may be one that uses Polypay ewes mated to Hampshire rams. Crossing the two breeds will produce market lambs that are only slightly less desirable from a carcass standpoint and will generate more total lambs because of the prolificacy and maternal characteristics of the Polypay ewe. Another option, which would eliminate shearing, would be to breed White Dorper ewes to Hampshire rams. In either case, average performance of the crossbred progeny at slaughter would be approximately the average of the parental breeds. This is because there is very little heterosis (hybrid vigor) expressed for carcass traits.

Marketing of Lambs with Uniform Finish

The American Sheep Industry Association (ASI) defines lean lamb as having a backfat thickness at the 12th rib of 0.10 to 0.25 inches. Lambs with more than 0.25 inches of fat thickness are excessively fat. Consumers do not desire lamb meat cuts with excessive external fat, meat retailers have increased labor costs associated with trimming the excess fat, and there is an increased management cost. Increased fat deposition on live lambs increases feed costs to producers. As noted by David L. Thomas, University of Wisconsin, lambs are not born fat; they get fat by being fed too long.

While fat lambs may be the bigger problem in the commercial market, very thin lambs are also undesirable. Lambs with less than 0.10 in of backfat at the 12th rib may have poor eating quality because of a lack of marbling. In addition, carcasses from very thin lambs may have excessive shrinkage during shipping because of insufficient fat cover.

Marketing lambs with uniform finish means that not all lambs will be marketed at the same weight. As described earlier, market lambs of small breeds mature at lighter weights than those of larger breeds. Therefore, lambs of small potential mature size will be marketed at lighter weights than those of large potential mature size. Research conducted by Eric Bradford of the University of California suggests lambs should be marketed between 60 to 70% of the average of the mature weights of ewes of the sire and dam breeds. If taken to a higher degree of maturity, they will tend to be overly fat.

Table 2 can be used to estimate market weights at which lambs from breeds of different mature sizes are likely to produce carcasses with 0.16 to 0.25 inches of fat

at the 12th rib (USDA Yield Grade 2). These target slaughter weights are calculated by multiplying the average of the mature weights of ewes of the sire and dam breeds by 0.65 (David L. Thomas, University of Wisconsin). This assumes lambs are marketed at 65% of the average of the mature weights of ewes of the sire and dam breeds, which is intermediate to the upper and lower limits recommended above. The row headings are weights of mature ewes of the dam breed and the column headings are weights of mature ewes of the sire breed.

As an example, consider crossbred lambs produced by mating Polypay ewes to Hampshire rams. Assume ewes of the dam breed (Polypay) have an average mature weight of 180 lb (**Table 1**). Mature ewes of the sire breed (Hampshire) average 220 lb (**Table 1**). Thus, lambs should be marketed at approximately 130 lb.

$$\text{Target Slaughter Weight} = \frac{180+220}{2} \times 0.65 = 130 \text{ lb}$$

Notice part of **Table 2** is shaded. The shaded area corresponds to the weight range generally desired by commercial markets. While this desired range changes from year to year and from season to season within a year, generally lambs marketed between 120 and 145 lb will be acceptable. In recent years, the live weight of commercial market lambs has been increasing. According to Julie Stepanek Shiflett [*Market Report*, Sheep Industry News, Vol. 21 (2), February 2017], average lamb weight at harvest in 2016 was 145.24 lb.

If lambs are from breeds of small mature size, they may not have the genetic ability to produce carcasses with the desired finish at these heavier weights. In such cases, one option would be to incorporate a larger breed through crossbreeding. Suppose a producer has a flock of Katahdin ewes with an average mature weight of 160 lb (**Table 1**). If the goal is to market 120 lb lambs that will produce Yield Grade 2 carcasses, ewes should be bred to rams from a breed in which the mature weight of ewes is 210 lb or greater (Hampshire or Suffolk, for

Table 2. Target Slaughter Weights of Lambs Produced from Sire and Dam Breeds of Varying Mature Weights.a,b,c

Ewe Breed Mature Weight (lb)	Sire Breed Mature Weight, lb (Weight of Ewes of the Breed)													
	250	240	230	220	210	200	190	180	170	160	150	140	130	120
250	163	159	156	153	150	146	143	140	137	133	130	127	124	120
240	159	156	153	150	146	143	140	137	133	130	127	124	120	117
230	156	153	150	146	143	140	137	133	130	127	124	120	117	114
220	153	150	146	143	140	137	133	130	127	124	120	117	114	111
210	150	146	143	140	137	133	130	127	124	120	117	114	111	107
200	146	143	140	137	133	130	127	124	120	117	114	111	107	104
190	143	140	137	133	130	127	124	120	117	114	111	107	104	101
180	140	137	133	130	127	124	120	117	114	111	107	104	101	98
170	137	133	130	127	124	120	117	114	111	107	104	101	98	94
160	133	130	127	124	120	117	114	111	107	104	101	98	94	91
150	130	127	124	120	117	114	111	107	104	101	98	94	91	88
140	127	124	120	117	114	111	107	104	101	98	94	91	88	85
130	124	120	117	114	111	107	104	101	98	94	91	88	85	81
120	120	117	114	111	107	104	101	98	94	91	88	85	81	78

a Target slaughter weight = [(Sire Breed Mature Weight + Ewe Breed Mature Weight)/2] H 0.65.

b Yield Grade 2 Carcasses.

c Shaded areas indicate desired live weights for market lambs in most commercial markets.

example). Another option would be to find a niche for the lighter lambs. This is where non-traditional, or ethnic, markets come into play. These would be lightweight lambs destined for slaughter that are marketed through other than mainstream outlets. This also may be the case if lambs are finished on pasture, with supplementation, as opposed to being finished in confinement. Smaller breeds are more likely to reach the desired finish on grass, whereas larger breeds may not.

Back to the Question ...

Deciding when to sell lambs should be part of the overall management plan, rather than a last minute decision. Breeds should be selected for a particular market. If you intend to sell market lambs commercially, straightbred sheep of small mature size should not be used. Likewise, if you intend to sell lambs for direct slaughter in nontraditional or ethnic markets or if lambs are finished primarily on grass, straightbred sheep of larger mature size breeds should not be used. In almost all cases, commercial sheep producers should take advantage of crossbreeding. Crossbreeding allows for manipulation of mature size and optimum slaughter weight, while taking advantage of heterosis and breed complementarity for reproductive and growth traits. Finally, the optimum mature size, and, thus, the best breed or breeds for a particular production system, should be based on the desired carcass weight and finish of the lambs produced. This is why **GENETICS** is an important factor to consider when making marketing decisions.

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