

What You See is What You Get! Or is it?
Selecting Sheep Breeding Stock
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We often hear, “I have to see it before I will believe it.” Individuals that practice “seeing is believing” have good company throughout history.

Sometimes when talking about sheep selection, I have individuals tell me, “I don’t care about the numbers; I have to see the animal to know if it is any good.”

So, in selecting superior sheep, what does science tell us about “seeing is believing?” How important is visual evaluation in selecting sheep that are superior at producing meat and profit for meat production? We know that the “culture of sheep producers” is highly dependent on visual appraisal. The last NAHMS (National Animal Health Monitor Service, 2002) survey conducted by USDA indicated that over 70% of the sheep ranchers/farmers surveyed used visual selection to identify replacement breeding stock. So, is visual selection of breeding stock an accurate tool?

In the November 1951 issue of “The Shrop”, the Shropshire breed publication, Farrell Shultz said “I would defy anyone to come into my flock to pick out the ewes that raise the big lambs by their conformation or type --- so it looks like records are the answer”.

Why are records the answer? Why does visual selection of sheep breeding stock not identify the best performance? In this article we will discuss why visual selection can be misleading and why records are the answer.

1. **Heritability.** This is the key to understanding why “what you see is **not**” always what you get. All the important meat production traits of the live animal are moderately or lowly heritable. This means that only a portion of the differences you observe between two sheep are due to genetics. By far the greater portion of difference between two sheep for the important meat production traits are not genetic. We can go down the line: 60 day weight, 120 day weight, prolificacy, and weaning percentage are all lowly to moderately heritable (Table 1). We cannot repeat that too often, “only a small proportion of what you see/observe/measure is heritable.” Therefore, selecting only on visual or on the weight of lamb at weaning is not accurate.

Traits	Percentage
Prolificacy	10
% Weaned	12
60 day wt	10
120 day wt	20
240 day wt	40
Carcass Wt	35
Weight of trimmed retail cuts	45

(taken from Sheep Production Handbook, 2002 Edition, Volume 7; % Weaned from Katahdin NSIP Notebook, 2005)

Financially, the four traits mentioned are the most important money traits for commercial operations producing lamb in the USA. Percent weaned is the most important for profitability and growth/weight of the lambs is second. Coat/wool/lamb pelt can be a factor in some markets, but rarely does it matter more than number of lambs weaned/ewe. Research on thousands of Katahdins indicated that 90% of the lbs lamb weaned per ewe is determined by the number weaned. Selecting for maximal rate of weight gain or selecting animals that reach the premium market price runs a poor second place to number of lambs weaned or marketed.

Note: there is very little if anything about prolificacy and weaning percentages that can be evaluated by looking at an animal in the weaning pen or in the show ring. Records are needed.

Summary - Remember that heritability of the key money traits is low to moderate. Programs (such as

the National Sheep Improvement Program) which base breeding value on cumulative performance of the individual and relatives across years and flocks are the most accurate way to identify superior genetics for growth and number weaned. Commercial producers can access this accuracy by buying from seedstock producers that do use these programs.

2. The Replacement Lamb Pen. We all do it (or most of us). Even a numbers/EPD person does it. You can't keep your eye off those healthy robust muscled ewe and ram lambs.

Which lambs are typically going to look best at weaning or at 5 months of age? They are going to be the older single born lambs raised by mature ewes. If the breeder is making any genetic progress it is the lambs out of the yearlings and two year old ewes, if their sires are superior, which should be best. A sheep breeder should incorporate records of number born and number raised into the decision-making process. In fact, a mentor of mine continually says that "the most important selection takes place at the kitchen table". You cannot look at lamb and tell the important maternal traits. Prolificacy and weaning percentage are very important money traits and they cannot be evaluated by looking at the animal. You need individual records or EPDs (expected progeny differences) to realize accurate performance selection.

It is a rare marketing scenario for commercial producers in which a single lamb, no matter how growthy the lamb is, will return more money than two lambs no matter how small they are. Birthing and weaning twins or, if your system and genetics allow it, weaning triplets is where the money is.

The important money traits of sheep production are number born, percentage weaned and lbs lamb weaned per ewe. These are lowly heritable (10-12%) and the accuracy provided by performance programs (EPDs from programs like the National Sheep Improvement Program) that incorporate individual records, records of relatives across years and flocks will give that extra accuracy needed to make key genetic progress. Identifying your ewes that twin and raise twins is a good start.

In the replacement pen, what you see is not what you get. As Farrell Shultz stated in 1951, " --- it looks like records are the answer."

3) Meat yield of animal. Can you look at a pen of lambs and tell if which one will yield more meat and have more value to the meat packer? The premise is that a good judge can visually identify animals with superior meat yield and thus the genetics for superior meat yield..

a) A large study reported on in 1980(Parker, 1980) with lambs from three university flocks found that there was basically no visual measurements that could be used to predict superior pounds of meat harvested from a market lamb. This study involved extensive use of a tape measure and included three sire breeds (Suffolk, Columbia and Targhee), three universities (North Dakota State, Illinois and Ohio State), 65 live animal measures and 55 carcass measures from 15,492 lambs out of 825 different sires over 14 years.

In the live lamb, traits commonly used to identify superior animals including length of animal, length of loin, length of rump and diameter of fore shank, had no value in predicting meat yield or value of meat in the carcass. The large study did find that width of the hind leg as viewed from the back was correlated with increased meat yield.

b) A recent study in the 2000s at the US Sheep Experiment Station in Dubois Idaho and The Ohio State University found no relationship between any measurement of length in the live animal and leg measurement with meat yield of the loin or leg in the carcass.

c) Conversations with leading USA sheep researchers (Communications with Dr Dan Morrical, Iowa State; Dr Kreg Leymaster, USDA Meat Animal Research Center, Nebraska; Dr Dave Notter, Virginia Tech; Dr Charles Parker, Emeritus Dept Chair Ohio State & US Sheep Experiment Station) corroborate the lack of relationship between visual measures in the live animal and meat yield. They all agree that the obvious relationship between increased weight and increased meat is important. They also agree that the key live animal measure is ultrasound to determine the area of the loin/rib eye (*longissimus dorsi*) muscle and back fat. Dr Charles Parker points out that only selecting on lean growth and muscling can lead to late maturity and

inefficiency due to large ewe mature weights.

Both Dr Charles Parker and Dr Dan Morrical (personal communications) point out that over the last 20 years, the rib eye area of the champion meat lambs at the Ohio State Fair and Iowa State Fair have not increased, even though lamb weights have increased by 20 lbs. On a per pound basis it can be said that market lambs selected by visual evaluation alone have decreased muscling.

d) Once the lamb is processed, measurements of rib eye area or leg score are predictive of meat yield. Carcass traits are more highly heritable. If each of us could slaughter 10 lambs for each sire and compare meat yields of cuts, we could be accurate in selecting superior meat yield of a sire's progeny. If you are selecting your rams as ram lambs, your best tool for meat yield is to do ultrasound of the loin/rib eye.

One of the biggest myths still being propagated and supported by much of the sheep industry is that traits like length of animal, loin and rump and fore shank diameter are predictive of carcass merit.

Summary - If you are selecting for increased meat yield in your breeding rams, ultrasound of loin/rib eye is best. It needs to be coupled with reproductive efficiency. No matter how meaty the genetics are, lambs that are not alive at marketing (low prolificacy and/or low weaning percentage) cannot be sold.

Since visual selection is not accurate, what should sheep seedstock producers be using to improve the economic return of their flock? As quoted earlier in the article, Farrell Shultz's statement from 1951 is still timely "--- so it looks like records are the answer."

Parker, CF. 1980. Research on Live and Carcass Traits on Lambs for Improving the Breeding Value for Carcass Merit. **National Purebred Sheep Symposium**. Columbus Ohio

The author raises sheep breeding stock in NW Arkansas, direct markets lamb to restaurants and health food stores. The author acknowledges and thanks Drs Dave Notter of VA Tech, Dr Dan Morrical of Iowa State, Dr Kreg Leymaster of USDA-ARS in NE and Dr Charles Parker of Ohio State University for their time and information. Any error in the communicating of their comments is the author's.