

Profitable Production - 1998 Sheep Day Report

Critical Success Factors For Profitable Sheep Production

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Many factors affect profitability of farm enterprises. These factors are either things the manager can control, the management decisions he makes, or things that are out of his control, for example weather or imports of competing product. The effect on profit of each of these factors can range from large to small. There is a limited amount of time that a manager can spend on any given farm enterprise. Since there is almost a limitless number of potential factors that a manager can measure and use in decision making, the first step a prudent manager should take is to decide what factors are in his control, and then decide which factors in his control will have the greatest impact on the profitability in this enterprise. If a manager can focus his management skills on the most critical factors affecting the profitability of the enterprise his management time can be expended in measuring, analyzing and making decisions from the resulting information in the best possible and most efficient manner.

Management decisions can be thought of as the bridge between where the enterprise is and where the manager wishes it to be, in other words his goal. This goal often may be the maximum profit from the enterprise under consideration. The present state of the enterprise, where I am, is often more difficult to define. Some type of records are necessary to determine the state of the enterprise that decisions are being made for. If a producer knows where the enterprise is and has a defined goal, then the next step is to make management decisions, to build a bridge so to speak, that will allow the enterprise to move towards the goal. This is where knowing the critical success factors is important. Having this knowledge allows the producer to focus his or her attention on the things that have the greatest effect on progress towards the goal.

This research identifies the critical success factors for profitable sheep production. Information from producers in the North Dakota Sheep Development Project was analyzed to identify the management parameters that had the largest effect on the profitability of the enterprise. Some surprising results emerged. Many of the factors we commonly accept as crucial to profit in the sheep business did not survive a hard look at their true contribution to profitability. The analysis instead shows producers that there are other management decision points that bear more close scrutiny than the traditional measures of lambing rate and death loss.

The identified critical success factors are 1) having a low unit cost of production, 2) having enough size to be efficient, 3) adding value to the base production of the flock and 4) a mathematical measurement of year-around management level. At first glance these four factors seem fairly simple and hardly worth a research project. Lets exam them in more detail.

Unit cost of production is a ratio of all production from the flock and all costs associated with the flock.

It is a powerful number embodying all activities of the flock in one measurement. Not surprisingly the study showed that profits were enhanced by having a low unit cost of production. The next measurement is having enough size to be efficient. This was measured as the gross dollar output of the flock. Again, not surprisingly the larger volume flocks tended to be more profitable. Adding value to the flocks basic production, defined as feeding lambs to weights heavier than traditional weaning weights was identified as a positive influence on profitability. Finally a measure of management level throughout the entire production year, defined as a relationship between flock size and lambing season length was identified as important to profit.

Lets discuss these factors individually. Unit cost of production (UCOP) is a measure of the average cost of producing one unit of final product. Said another way it is the total cost incurred by the flock divided by the total hundredweights of lamb equivalent sold. Since UCOP is a measure of all things it is very powerful as a measurement tool, but less useful as a day to day management measure. Looking at the factors that management can affect that have the most influence on UCOP may be more useful. UCOP can be represented mathematically with the equation

$$\text{UCOP} = \text{Intercept} + \text{FEED COST} - \text{WEAN WEIGHTS} - \text{POST WEANING WEIGHT GAIN} \\ + \text{POST WEANING WEIGHT GAIN}^2$$

This equation tells us that UCOP is most affected by three factors that we control. They are feed cost, total weaning weight and the total amount of post weaning weight gain in lambs. As you look at the equation you can see that adding feed cost to the operation raises the average unit cost of production, increasing the weaning weight decreases average cost of production and adding post weaning gain, at least up to a certain point, lowers average cost of production. The second value added term is in the equation as a squared term and has an opposite sign to the non-squared term. This indicates that as lambs become too heavy the total cost of production rises.

The measure of size of efficiency used in this study was flock gross revenue(GROSS). Adding revenue was positive for flock profit. Two factors had the greatest effect on gross revenue, they are the amount of post-weaning lamb weight gain and the management measure. Represented mathematically the equation for gross revenue is

$$\text{GROSS} = \text{Intercept} + \text{POST WEANING WEIGHT GAIN} - \text{A MANAGEMENT MEASUREMENT}$$

This equation tells us that increasing the amount of weight we add to our lambs after weaning is positive for gross revenue and also positive for net revenue, and that tightening management practices during the year is a positive influence on gross revenue.(the management measurement is recorded as a negative number, thus an increase in the level of management means that the management number becomes smaller which in turn increases the Gross return)

The third critical success factor is the management parameter. This is defined as the lambing season

length minus the number of ewes in the flock. Thus a negative number means that there is at least one ewe lambing every day of the lambing season. A positive number means that there are days in the lambing season where no ewes lamb. A positive number tells us that there are days when the shepherd expends labor checking on ewes and receives no return for that labor. What the management measurement really tells us is the level of attention the ewes receive at other times of the year. Having a concise lambing season implies that all the best management practices were followed during the entire production year to ensure that ewes were ready and able to breed in the shortest time frame.

The management measure can be explained with a two variable equation.

$$\text{MANAGEMENT} = \text{Intercept} - \text{MONTH OF BIRTH} - \text{TOTAL PRODUCTION}$$

Where month is the number of the month (Jan = 1, Feb = 2, etc.) the first lamb is born in and total production is a measure of the flocks total productivity recorded as market lamb equivalents. As the month of lambing moves later in the year the management response becomes smaller. This is probably a biological response from hitting their ewes peak breeding season. As total production rises the management measurement also decreases. This is probably a reflection of better managers having higher production and higher producers being better managers.

Finally the profit equation tells us that profits are enhanced by feeding lambs past weaning weights. Typically many North Dakota lambs have been fed to finish weights elsewhere, this data would indicate that we are missing an opportunity to capture additional profit by not finishing lambs in state. The factors affecting feeding lambs can be explained with a three variable equation:

$$\text{POST WEANING WEIGHT GAIN} = \text{Intercept} - \text{DEATH LOSS} - \text{WEANING WEIGHT} + \text{TOTAL FLOCK PRODUCTION}$$

The equation tells us that as death loss rises producers tend to sell lambs at a lower weights. This is logical since a producer who has already suffered high death loss pre-weaning may be reluctant to risk owning his lambs for a feeding period. As weaning weights rise the ability to add weight to the weaned lambs declines due to the upper limit set on acceptable lamb weights. An finally as total flock production rises so does the amount of weight gain on feeder lambs. Producers who are producing all commodities from the flock at high levels probably have the skills and confidence to finish lambs.

Table 1. Sensitivity of profit to a 1 percent factor change.

	ELASTICITY	PROFIT CHANGE AT WITH 1% CHANGE IN FACTOR
UCOP	1.36	\$25.09
GROSS	1.08	\$19.93

FEED COST	0.73	(\$13.42)
POST WEAN WEIGHT GAIN	0.66	\$12.18
TOTAL PRODUCTION	0.52	\$9.64
WEANING WEIGHTS	0.39	\$7.18
MANAGEMENT	0.19	\$3.41
MONTH	0.16	(\$2.95)
DEATH LOSS	0.05	(\$0.89)

If we look at all these factors together we can measure the effect each one has on net profit and rank them according to that effect. Economists call this effect elasticity. It is a measure of the magnitude of change we see in an output related to a small change in some other factor. Focusing on the factors that have the largest magnitude effect on the outcome we wish to change is the most efficient way to achieve our goal. This ranking is documented in Table 1. From Table 1 we can tell that a one percent change in unit cost of production changes the flock's net profit results by over 1.3 percent. By contrast a 1 percent change in pre-weaning death loss changes net profit by only 0.05 percent. An astute producer will expend more effort on the management factors that have larger effects on net profit.

Summary:

This research shows that the traditionally accepted measurement of success in the sheep industry, lambing rate, is not the best indicator of profit potential for the flock. Producers instead need to focus more energy on the cost side of the operation. Of the five factors with the largest elasticity response to profit, two are cost driven, Unit cost of production and feed cost. The remaining three of the five factors with the largest elasticity are related to size of the operation. Gross returns, post-weaning lamb feeding and total flock output all enhance profitability as size and output increase.

In contrast pre-weaning death loss has little effect on net profit and the lambing rate effect on profit is not significant. This is contrary to conventional belief in the sheep industry and merits further discussion.