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Profitable Artificial Rearing of Lambs

Author: Steven H. Umberger, Extension Animal Scientist, Virginia Tech

Introduction

Other than market price, the biggest variable affecting profitability of sheep production is the number of lambs marketed per ewe per year. The increased emphasis on selection of breeding stock for multiple births and the incorporation of high prolificacy breeds of sheep, such as the Finnsheep and Romanov, into commercial crossbred ewes to increase lambing percentage has resulted in the need to raise more lambs artificially or accept a greater rate of baby lamb mortality. It is economically impractical to invest time, management, and money in a ewe flock only to eliminate a portion of that lamb crop due to poor mothering and starvation. Many producers find it difficult to justify artificial rearing of orphan or bonus lambs because of the relatively high cost of lamb milk replacer, the increased labor requirement associated with artificial rearing, and past bad experiences with high mortality rates of artificially reared lambs. However, advances in the production of high quality commercial lamb milk replacers, techniques that reduce labor through the use of self-feeding equipment, the use of early weaning, and the application of certain well-timed management practices make artificial rearing a practical and profitable alternative. The purpose of this publication is to describe the management and economics of raising lambs artificially.

Bottle Feeding vs Self Feeding

Whenever artificial rearing is considered, most producers envision bottle feeding as their only option. Lambs are fed milk replacer using a bottle and nipple every six hours for the first three to five days of age. Thereafter, they receive milk replacer two to three times daily. Bottle feeding provides a way to control consumption of milk replacer, but is very labor intensive if more than a few lambs are involved. The amount of milk replacer that lambs receive and the time of feeding must not vary from one day to the next, otherwise lambs may die from abomasal bloat or digestive upset. Bottle feeding may also be used as a tool to supplement lambs while they're still on the ewe. The alternative to bottle feeding is self feeding, which is a means of providing a free-choice supply of milk replacer to lambs at all times. Self feeding reduces labor requirements, promotes accelerated lamb gains, and provides a way to successfully handle a large number of lambs at one time. Self-feeding buckets for one or more lambs are commercially available, or producers can construct their own delivery system specific to the needs and size of their operation. Most of the information contained in this publication pertains to the management of artificially-reared lambs using self-feeding techniques. However, with minor modifications, these recommendations can be adapted to a bottle-feeding program.

Equipment and Pens

Two basic types of self-feeding buckets and nipples are commercially available. The major difference between the two buckets is the delivery mechanism for the milk. One bucket uses nipples that are positioned around the top of the bucket with 3/8-inch plastic tubing extending from the nipple into the milk (Figure 1). Lambs must suck milk up through the plastic tubing similar to a straw. Consequently, the initial draws on the nipple consist of air rather than milk. Weak or non-aggressive lambs may quit sucking before receiving milk. To minimize this problem, milk should be kept near nipple level so that lambs obtain it with a minimum of effort. Self-priming nipples are commercially available, but are more difficult to clean. The second bucket design

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Figure 1. Lamb nursing bucket with nipples positioned around the top.

positions nipples around the bottom of the bucket, so that milk is gravity fed into the nipple (Figure 2). Milk is at the end of the nipple on the first suck. As a result, this design has proven to be superior to the top-feeding bucket because of the ease of getting lambs started on milk replacer. Once lambs are fully adapted to self feeding, there is no difference in lamb performance based on bucket design. Nipples made of latex or rubber are commercially available. Although latex nipples are more supple than rubber nipples, lambs do not seem to show any preference for one type over the other, and the useful life of latex nipples is much shorter than that of rubber nipples. Nipple height should be no less than 12 inches and no more than 15 inches above the floor. One nipple should be provided for every three to five lambs.

A minimum of two pens and preferably three should be used for artificial rearing. A three-pen system consists of a training pen, intermediate pen, and self-sufficient pen. Lambs are moved from the training pen to the intermediate pen once it is determined that they no longer require assistance on the nipple. They remain in the intermediate pen under close observation for two to three days to ensure they are fully adapted to the nipple. Thereafter, they are placed in the self-sufficient pen where they will remain until weaning. Lambs on slotted or expanded metal floors require 2 square feet of floor space per lamb, while lambs on bedded solid floors require 6 square feet of floor space per lamb . No more than 15 lambs should be kept to a pen.

Figure 2. Lamb nursing bucket with nipples positioned around the bottom.

Lambs should be housed in a well-ventilated, draft-free shelter at temperatures of no less than 35f F. If large numbers of lambs are being raised artificially during the winter, a well-ventilated facility that can be heated to 60f F improves lamb livability and performance.

Colostrum and Milk Replacer

The importance of colostrum for newborn lambs cannot be overstated. Lambs raised on the ewe or raised artificially must have colostrum as a critical ingredient for survival. Colostrum is the first milk produced by the ewe. Not only is it high in energy and protein, but most importantly, it is rich in antibodies and globulins, which are critical for protection of newborn lambs from infectious disease. Lambs must receive colostrum within the first 18 to 24 hours of life. After 24 to 36 hours, the antibodies can no longer be absorbed across the wall of the small intestines. Lambs destined to be reared artificially should be allowed to nurse their mother for up to six hours or be supplemented with colostrum from a bottle or stomach tube. When in doubt, supplement. Newborn lambs should receive 20 ml of colostrum per pound of body weight. It works best if feedings can be split four hours apart. Excess colostrum can be collected from ewes and stored indefinitely by freezing. If a sufficient quantity of ewes' colostrum is not available, cows' colostrum can be obtained from a dairy and frozen. It should be pre-measured and placed in resealable freezer bags, which are stored laying flat in the freezer. To prevent destruction of the antibodies, colostrum should be thawed by indirect rather than direct heat. An example of indirect heat is the placement of a bag of frozen colostrum in a container of hot tap water, which thaws and heats the colostrum at the same time. Never add or mix water with colostrum. A number of colostrum substitutes are marketed commercially. None of these products come close to duplicating the chemical composition or protective value of ewes' or cows' colostrum.

Only milk replacers specifically formulated for lambs should be used for artificial rearing. Calf milk replacers are unacceptable. The fat globules in lamb's milk must be homogenized, and calf milk replacer contains excessive amounts of lactose, which may cause severe scouring and death loss. The compositional breakdown for a high quality lamb milk replacer is as follows: crude protein - 22 to 24%; crude fat - 25 to 35%; crude fiber - 0.5 to 1%; lactose - 22 to 25%; ash 5 to 8%; Vitamin A - 20,000 IU per pound; Vitamin D - 5,000 IU per pound; and Vitamin E-50 to 100 IU per pound. Because of the high fat content in milk replacer powder, it should be mixed in warm water using a hand whisk. Once in suspension, it should be cooled and stored at 35 to 40*f* F. Cold milk at the time of feeding has been shown to reduce spoilage and results in frequent sucking of small amounts of milk replacer, which mimics a lamb's normal nursing behavior. Consequently, problems with abomasal bloat and digestive upsets are minimized. Milk can be kept cold by placing a bottle of frozen water in the milk reservoir twice a day. When cold milk replacer is used, milk containers and nipples should be disassembled and cleaned with warm soap and water once every two to three days. To prevent unnecessary loss of expensive milk replacer, worn and leaking nipples should be replaced immediately from a supply of nipples that were purchased beforehand.

A one-day supply of milk replacer should be prepared the day before feeding and stored under refrigeration. Milk consumption increases with the age and size of the lambs. In a study conducted at Virginia Tech during Fall 1995, average milk consumptions were 1.1, 1.5, and 1.7 qt/d for days 1 to 14, 15 to 21, and 22 to 27, respectively. On average, lambs consumed the equivalent of .93 lb of milk replacer powder per day.

Selection of Lambs

The number of lambs raised artificially should be kept to a minimum. Whenever possible, extra or orphan lambs should be fostered onto ewes that lost lambs or onto ewes with single lambs. With appropriate management, most ewes can raise triplets. However, in cases where there are a large number of triplet births, it is best to have an artificial rearing program in place. Traditionally, the largest, most aggressive lambs were considered to be the best candidates for artificial rearing, leaving the smaller, weaker lambs with the ewe. After careful examination of this practice, it was determined that the strongest lambs provided the highest returns when left on the ewe, while the weaker lambs had a greater chance of survival when reared artificially. Therefore, for ewes with three or more lambs, the two strongest lambs should be left on the ewe, with the remainder of the lambs being raised artificially. Lambs should be identified for artificial rearing within the first two to six hours after birth. Lambs more than one to two days of age are more difficult to adapt to the nipple. Occasionally, lambs from 4 to 10 days of age will show signs of inadequate nutrition. While it is harder to raise these lambs artificially, with persistence they can be acclimated to the nipple. Failure to act quickly with malnourished lambs usually results in death as a result of starvation or disease.

Starting Lambs

Before initiation of artificial rearing, lambs must receive an adequate amount of colostrum. This can be done by allowing lambs to nurse the ewe for four to six hours before removal, or for maximum insurance, the colostrum should be administered directly to the lambs either by bottle or stomach tube. After the last feeding of colostrum, lambs should go for four to five hours without food to encourage a strong sucking stimulus. However, extended periods without food may cause lambs to lose their desire to suck. To prevent white muscle disease, lambs should receive an injection of .25 mg of selenium per 10 lb of body weight. Lambs are started on milk replacer by placing the nipple in their mouth and moving the jaw to stimulate sucking. Initially, lambs may fight the nipple. Therefore, it is helpful to brace the rear of the lamb with a hand to prevent it from backing away. This action also mimics the natural nudging behavior of the ewe during nursing. The training sessions should be repeated every four to six hours until lambs are adjusted to the nipple. Two to three sessions is usually all that is necessary. Lambs left with the ewe for more than two days may require six to eight sessions before accepting the nipple. It is important that lambs nurse on their own and not become dependent on human assistance. If lambs are to be raised on cold milk replacer, they should not be started on warm milk replacer.

Occasionally a lamb may attempt to adopt a larger lamb as its mother by sucking on the larger lamb's navel or scrotum. Lambs developing this habit consume little milk and may eventually die. Therefore, lambs exhibiting this behavior should be removed immediately from the group and fed by themselves until they learn to suck the nipple.

Most lambs remain in the training pen for only one to two days before moving to the intermediate pen. Lambs should be observed closely in the intermediate pen to make sure they are fully adapted to artificial rearing before being placed in the self-sufficient pen. A maximum of 15 lambs should be raised together. Once established in a self-sufficient pen, lambs should not be moved and mixed with other lambs. With proper management, lambs reared artificially should gain 0.65 to 0.75 lb per day while on milk replacer.

Supplemental Feed and Water

In addition to milk replacer, the self-sufficient pen should contain a free choice source of clean water and a highly palatable starter feed, which contains 18 to 20% crude protein on a dry matter basis (Table 1). Because young lambs don't have a functional rumen, the protein portion of the diet must come from all natural protein, with no nonprotein nitrogen contained in the feed. Lambs are more likely to start on feed that is coarsely ground rather than pelleted. However, high quality commercial pellets are acceptable and work well. Even at a very young age, lambs begin to consume small amounts of dry feed. Therefore, it is important that lambs have early access to feed if they are to be weaned at 20 to 28 days of age. The feeder should be constructed so that lambs cannot stand, lay, or play in the feed. A free-choice source of a complete mineral mix specifically formulated for sheep should also be provided.

Weaning

Because of the high cost of milk replacer, lambs should be weaned to dry feed as early as possible. As previously stated, lambs should have access to dry feed throughout the artificial rearing process and should consume measurable amounts of feed before weaning. To minimize problems from stress and digestive upset, lambs should be weaned abruptly by removing the source of milk replacer from the pen. For the first 7 to 10 days after abrupt weaning, lambs undergo a growth check (weight loss) as a result of lower feed intake. Consequently, lambs may appear gaunt and exhibit a rough wool coat before full adjustment to dry feed. Lambs can be weaned as early as 15 to 20 days of age, but weight is the most important factor to consider before weaning. To minimize growth check and to ensure their ability to consume dry feed, lambs should weigh a minimum of 20 lb. Lambs undergo less stress at weaning when they are weaned as a group and left in the same pen with the same feed they were receiving before weaning. Lambs should continue to receive a feed containing 18 to 20% crude protein until they reach a minimum body weight of 40 lb. Thereafter, lambs can be switched to a lower protein growing diet or be placed on high quality pasture for grazing. Lambs should be vaccinated with Clostridium perfringens types C & D at three to four weeks of age and boostered three weeks later.

Table 1. Sample starter feed.

Ingredient	Diet (%)
Cracked Corn	62
Soybean Meal (44%)	31
Molasses	4.5
Limestone	2
Trace Mineral Salt With Selenium	.5
Bovatec (30 g per ton)	---

Summary

Artificial rearing of lambs does not have to be labor intensive or accompanied by high levels of lamb death loss. Using results from a Virginia Tech study, the actual time necessary to adjust 50 or fewer lambs to milk replacer, mixing milk replacer, cleaning equipment, and the general observation of lambs for health and thriftiness is approximately 1.5 hours daily. With a retail price of $30 for a 25 lb bag of milk replacer, lambs reared artificially can be successfully weaned to dry feed at an average cost of approximately $25 per head. Using average flock production costs in Virginia, the cost of rearing twin-born lambs on the ewe to the same weaning weight as lambs reared artificially is $25 to $30 per head. Therefore, using the techniques described in this publication, lambs can be successfully reared on milk replacer at a similar cost to rearing on the ewe. Consequently, sheep producers with flocks having a high percentage of multiple births should consider artificial rearing on a self-feeding system as a means to save more lambs and increase profitability through a higher percentage of lambs marketed.

Artificial Rearing Checklist

- Obtain supplies and a source of frozen colostrum well ahead of lambing.
- Select the weaker, less aggressive lambs from ewes with three or more lambs, and malnourished or orphaned lambs from other ewes as candidates for artificial rearing.
- Make sure lambs receive colostrum from the ewe or administer supplemental colostrum directly to lambs within 12 to 18 hours after birth.
- Administer .25 mg selenium per 10 lb of body weight.
- Only use a high quality milk replacer specifically formulated for lambs. Calf milk replacer is unacceptable.
- Use cold milk replacer (35 to 45*f* F) to minimize spoilage and digestive upsets.
- Approximately 4 to 5 hours after the last feeding of colostrum, begin training lambs to the nipple.
- Repeat training sessions every 4 to 6 hours until lambs are sucking on their own. Excessive handling of lambs may cause them to become overly dependent on human assistance.
- Observe lambs closely for the first 3 to 5 days. Make sure all lambs are fully adjusted to the nipple.
- Clean milk feeding equipment every 2 to 3 days with warm soap and water.
- By five days of age, provide lambs with a free-choice source of water and a highly palatable, high protein dry feed.
- Pen wean lambs abruptly at a minimum of 20 lb body weight.
- Vaccinate lambs for Clostridium perfringens types C & D at 3 to 4 weeks of age and booster 3 weeks later.
- Continue feeding high protein dry feed until lambs weigh 40 lb.

At 40 lb body weight, switch lambs to a lower protein growing feed or place lambs on high quality pasture for grazing.

Reviewed by Scott Greiner, Extension specialist, Animal and Poultry Sciences