Factors Affecting Milk Production in Lactating Ewes

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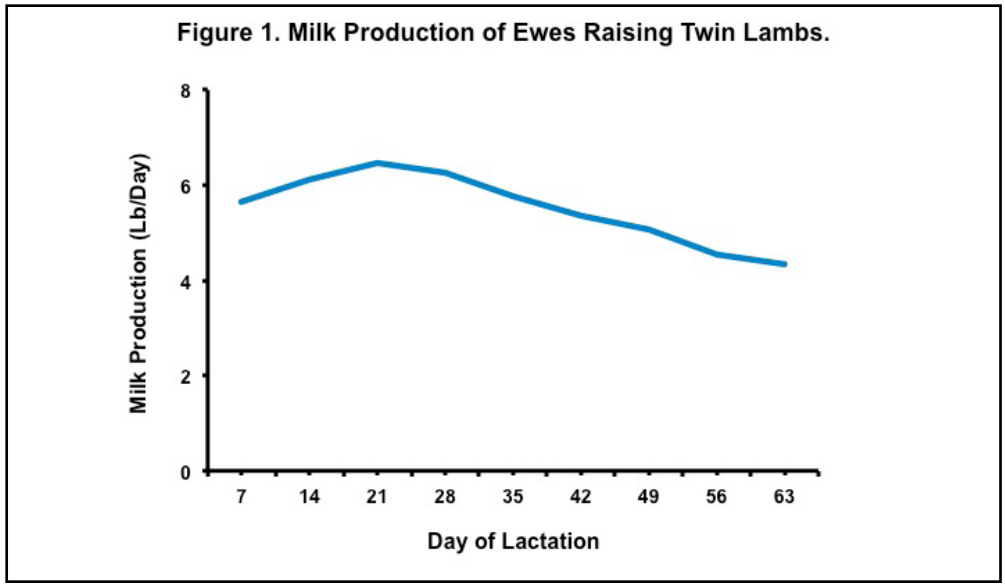
Sheep producers, today, expect ewes to drop and raise two lambs annually. Producers using highly prolific breeds in crossbreeding systems may expect even more. As a result, the importance of ewe milk production has escalated. The health and growth of these twin- and triplet-born lambs, especially during the first few weeks of life, depends on the quality and quantity of milk consumed. Although some ewes are able to raise three lambs, many can only raise two, and some barely produce enough milk for a single lamb. ***Why?*** Answering this question is the purpose of this article and, as you will read, it involves more than just genetics. So, instead of *genetically speaking*, we might call this article *lactationally speaking.*



First Things First: The Milk Production Curve and Lamb Growth

Before addressing factors that may affect milk production in lactating ewes, it is important to look at a typical lactation curve and to discuss its relationship to lamb growth. Milk production data complied from several studies at the University of Kentucky are graphed in Figure 1. These data represent average daily milk yields, in pounds, for mature Polypay ewes suckling twin lambs. All ewes were fed a standard alfalfa hay/corn lactation diet (62.5% roughage, 37.5% concentrate) at approximately 5 to 6% of body weight. For these ewes, average milk production increased to a maximum at 21 days postpartum and then decreased through approximately 60 days (weaning). Curves of similar shape have been reported by other researchers using various meat-type breeds. Generally, ewe milk production peaks 21 to 35 days postpartum and then declines steadily thereafter. If the milk production data in Figure 1 had been collected through 120 days of lactation, milk

Figure 2. Growth of Suckling Twin Lambs to Weaning.

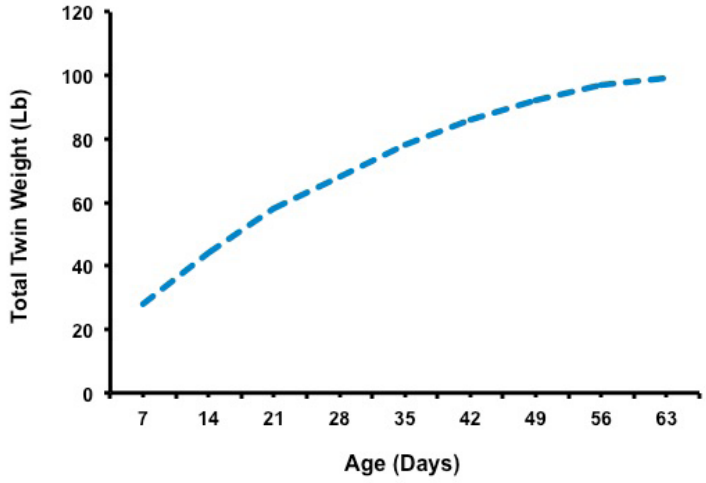
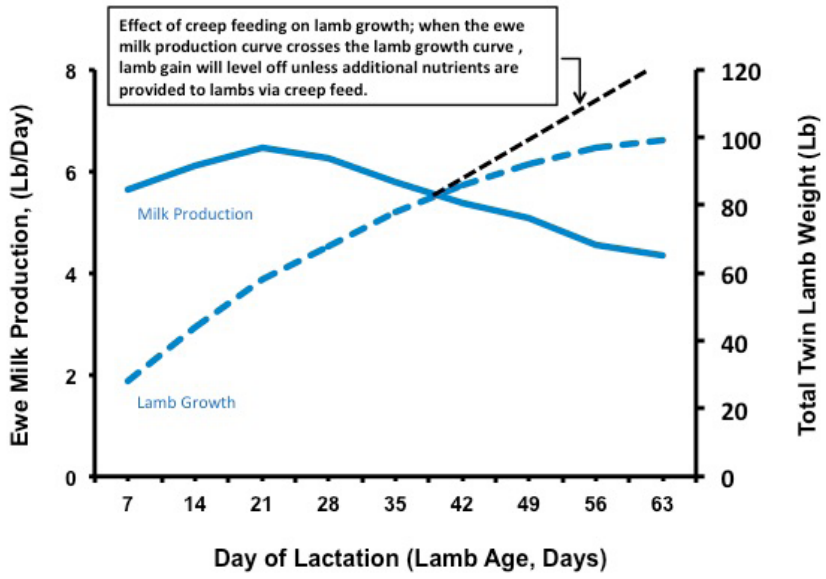


Figure 3. Relationship Between Ewe Milk Production and Twin Lamb Gain to Weaning.



yields would have continued to decline until ewes were producing little or no milk. The curve in Figure 1 shows greater persistency (a measure of how well milk production is maintained after peak) as opposed to the rapidly declining milk production curves frequently described in earlier lactation studies.

Figure 2 depicts growth of suckling twin lamb pairs from birth to weaning at approximately 60 days of age. Lambs did not have access to the ewe's feed and they received no creep feed. Thus, all growth is attributed to nutrients provided by the ewe's milk. As lactation progressed and lamb weight increased, rate of growth declined. By about 35 days of age, the growth curve has begun to level off, indicating a reduction in growth. From this point on, maintenance of the lamb's body was taking an increasingly larger portion of the nutrients consumed. This left fewer nutrients available for additional gain.

Putting together the shape of the milk production curve and the twin lamb growth curve, we see ewe milk production has the greatest effect on lamb gain during the first 5 weeks postpartum (Figure 3). Up through approximately day 35 of lactation, lamb pairs gained approximately 1.15 lb/day. From day 35 to weaning at approximately 60 days, twin lamb ADG decreased to approximately 0.85 lb/day. This illustrates that nutrient use by young lambs is very efficient and every effort should be taken to maximize milk production during this period of time. As lambs get older, however, additional nutrients are needed to supplement the milk they consume. In other words, lambs need creep feed. Remember, lambs providing data for these figures were not creep fed so that twin lamb growth could be assessed solely as a function of ewe milk production. In Figure 3, the black dashed line that extends lamb growth from approximately day 35 to weaning shows the effect of creep feeding. See *News to Ewes*, *HoofPrint, Volume 6, Winter 2012* for more on the importance of creep feeding. In this article, Dr. Don Ely answers the ewe's question, "*Will You Creep Feed My Lambs?*"

The purpose of the remainder of this article, however, is to answer the question, what factors affect milk production in lactating ewes?

Factors Affecting Ewe Milk Production

Several factors affect the shape of the lactation curve. The height of the curve at peak, as well as the persistency of lactation and, hence, total milk yield, may be affected by genetics, nutritional level, and physical status of the ewe. The number of lambs suckled also makes a difference. Even inherent differences among individual lambs may affect the amount of milk a ewe produces.

Genetics of the Ewe

Two options exist for increasing milk production through genetic means: 1) breed selection and/or crossing breeds with high milk production potential and 2) within flock selection for increased lactational performance.

Breed Selection and/or Crossbreeding.

Most non-dairy breeds of sheep in the U.S. have been selected for either lamb or wool production instead of high milking abilities. However, there are some differences

Genetically Speaking continues on pg. 20

Genetically Speaking continued from pg. 19

among these meat-type (wool) breeds for milk production potential. Dorset, Hampshire, Polypay and Suffolk breeds have all been noted as good milkers. In a study conducted at the U.S. Sheep Experiment Station in Dubois, Idaho, Suffolk ewes with twin lambs produced 13 to 17% more milk than Rambouillet, Polypay or Columbia ewes with twins. The higher total yield of the Suffolk suggests a higher milking potential, which may be related to the larger body weight. The same would be true for Hampshire ewes. On the other hand, work at the University of Kentucky indicates that for their mature weight, Polypay ewes may be the most efficient milkers. Total lactation yields for domestic breeds have been reported to range from 110 to 175 lb over a 60-day lactation. Total milk production (63 days) of the Polypay ewes represented in Figure 1 was approximately 200 lb. Overall, crossbred ewes are generally expected to have better milk production than straightbred ewes.

Within-Flock Selection.

Milking abilities vary among ewes within breeds, and even among crossbred ewes. Some ewes inherently milk better than others. Thus, within-flock selection is the second genetic means for improving milk production. Milk yields *per se* are generally not measured in flocks, but superior milkers can be identified by differences in lamb weight at 30 days. Recall that lamb growth up to this point in life is largely dependent on ewe milk production (Figure 2). Thus, within rearing type (single, twin, triplet), ewes with heavier lambs at 30 days are expected to be better milkers compared with ewes with slower-growing lambs. Furthermore, repeatability of milk production is high. This means the top echelon of producers this year are likely to be in the top echelon next year. Thus, low producers should be culled. The best way to accomplish this is to weigh all lambs at 30 days and plan to cull all ewes, at weaning, that have below average-weight lambs at 30 days of age.

Another trait that reflects milk producing ability is total ewe productivity (pounds of lamb weaned per ewe exposed). This trait combines effects of fertility, prolificacy, lamb survival, milk production and lamb growth into one index of overall productive capacity. In well-managed flocks, where most variation in ewe productivity comes from variation in prolificacy and milk production, selection response can be considerable. Several researchers have reported moderate levels of heritability (15 to 20%) for ewe productivity. Thus, selection for total ewe productivity should result in increased milk production potential.

Nutrition of the Ewe

The ewe's potential for milk production is governed by genetics, but nutrition influences the extent to which she reaches her potential. Within genotype, the shape of the lactation curve is directly related to nutritional status of the ewe. Obviously, ewes that are fed less will give less milk at peak lactation than those ewes fed more of balanced rations. In addition, their milk production will decrease at a more rapid rate than ewes fed adequate amounts of high quality feed. Within genotype, better ewe nutrition increases milk production, especially in early lactation and, consequently, lamb weight at weaning.

Lactation, particularly during the first 6 to 8 weeks, places the highest nutrient demands on the ewe because of requirements for maintenance, milk production and, possibly, growth. Consequently, body reserves and nutrient intake may not be sufficient to support all needs during peak lactation, especially in prolific ewes. This negative nutrient balance may cause lower milk production, decreased lamb performance, and, possibly, metabolic disorders. Therefore, the highest quality feedstuffs should be available in largest amounts during early lactation.

Water is a nutrient that is often overlooked. Ewes must have a continual supply of clean, fresh water at a temperature that will optimize intake. Much of the water consumed by lactating ewes leaves the body via the milk. Significant decreases of water intake occur when environmental temperature drops below 20°F. This can be particularly important for ewes lambing in January and February. If water intake is reduced, significant reductions in milk production can result.

Physical Status of the Ewe at Lambing

Age, size or weight, and body condition score (BCS) at lambing are physical factors that affect milk production. In general, milk production increases with age from 1 year to maturity (3 to 6 years) and then declines for ewes over 6 years of age. As a result, nutritional management may vary among ewes of different ages. This is especially important if young ewes are to reach their milk production potential. Remember, in addition to nutrient requirements for maintenance and lactation, young ewes need nutrients for growth. With respect to size, larger ewes (as a result of breeding and/or maturity) are expected to produce more total milk than smaller ewes. Also, peak milk production is directly influenced by weight gain and body condition in late pregnancy. To achieve maximum milk production, ewes must have adequate body fat at lambing (BCS of 3.0 to 3.5 on a scale of 1=emaciated to 5=obese).

Mastitis. Mastitis is an inflammation of the udder. It can be caused by injuries, viral infections and bacterial infections. Mastitis is described as being clinical, meaning the condition is visibly apparent upon observation of the ewe and inspection of the udder, or subclinical, meaning the condition is not observable except by examination of the milk for elevated somatic cell counts.

Nearly all cases of mastitis in ewes begin by entry of bacteria through the teat end. Injured teat ends support the growth of bacteria and reduce the natural resistance offered by the streak canal. Clinical mastitis can be caused by bacteria found on the animal, in the animal, and in the environment. In clinical mastitis, milk appears abnormal and thick with flakes, clots, or chunks. It may have a bad smell. The udder is usually swollen, firm, and hot. The ewe may run a fever, be off feed, and refuse to let her lambs nurse. Her milk flow may even stop until she recovers her appetite. In severe cases, the ewe may die. Occasionally, severe inflammation of the udder may produce gangrene, which is commonly called *bluebag*.

Subclinical mastitis is not visually observable, but may still result in udder inflammation and damage to mammary tissue, resulting in lowered milk production and lamb growth. These infections seem to be most common during early lactation and immediately following weaning. Cases of post-weaning mastitis are not usually

noticed until the next lambing season when the ewe gives birth and has little or no milk in one or both udder halves. Thus, it is important to examine the udder, teats, and milk of ewes at lambing to make sure they appear normal. This practice helps prevent possible lamb starvation or stunted growth.

Environmental sanitation is important in the prevention of mastitis. Dirty housing during gestation and dirty lambing areas contribute to contamination of teats, which, in turn, may lead to mastitis. Lambs may also spread the bacteria. In addition, weaning lambs when ewes are still producing moderate to large amounts of milk appears to increase the incidence of mastitis. Reducing or withholding the ewe's feed and water for 24 to 48 hours following weaning aids in reducing milk production and the accompanying "caking" and edema or swelling that may lead to udder damage and mastitis.

Number of Lambs Being Raised

Milk production responds to the number of lambs suckling until the ewe's genetic capability in producing milk becomes limiting. In general, the quantity of milk produced during early lactation ranks in order with the number of lambs suckled. Total milk yield is estimated to be approximately 30% higher for ewes suckling twins than ewes suckling single lambs. Because this must be divided between two lambs, twins still get less milk than singles, making milking ability even more crucial for ewes raising multiple-born lambs.

Lamb Differences

There are inherent differences among individual lambs in their demand for milk. Some lambs suckle more often than others. Thus, even if milk production of the ewe is increased through genetic or nutritional means, milk consumption and lamb growth rate will be less if voluntary milk intakes are low.

Differences in demand for milk appear to be associated with birth weights and potential growth rates of lambs. Often, this is a breed or genotype effect. Lambs heavier at birth generally nurse more than lambs with lighter birth weights. Likewise, faster-growing, more aggressive lambs tend to suckle more frequently. In either case, the ewe is stimulated to produce more milk. For this reason, milk yield during the first 6 to 8 weeks of lactation is generally higher for ewes suckling crossbred versus straightbred lambs.

If the total demand of the lamb, or lambs, is below the ewe's milk producing capacity, an increase in milk demand can elicit a response in production. At some point in lactation, however, the ewe's milking ability will become the limiting factor of lamb intake and demand for milk will be progressively less satisfied. This stage will be reached sooner in the case of inherently low-producing ewes, undernourished ewes or ewes suckling more than one lamb, compared with ewes with a potential for sustained lactation, well-nourished ewes or ewes suckling a single lamb.

The Bottom Line

The goal of most sheep producers is to wean twin lambs, weighing at least 60 pounds each, at approximately 60 days of age. If lambs are marketed at 100 to 120 pounds at approximately 150 days of age, the preweaning period accounts for 40% of the time from birth to market. Furthermore, 50 to 60% of the lamb's market weight is dependent on ewe milk production. During the first 8 weeks of lactation, twin lamb gain is expected to increase 0.25 pounds for each additional 2 pounds of milk produced by the ewe. Thus, higher milk yields and/or improved persistency in milk production can improve lamb weaning weights and efficiency of lamb production. However, increasing weaning weight of lambs by increasing ewe milk production is likely to be expensive. Research at the University of Kentucky indicates that for each additional 1 pound of weight gain by twin lambs, 12 additional pounds of milk are needed from dams consuming 16 extra pounds of feed.

Producers should do all they can to improve milk production through genetic selection, improved nutritional management during early lactation, and improved health management.

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