UNITED STATES LAMB RESOURCE CENTER

Increasing Your Lamb Crop Series

Select for Prolific Genetics

Introduction

Increasing prolificacy is one of the most effective strategies for improving production efficiency and profitability. Prolificacy is the number of lambs produced per ewe per year in a management system where each ewe has one opportunity to lamb. Spreading the ewe's cost across more lambs increases profit. Prolificacy is generally measured in percentages. A 140% lamb crop means that 100 ewes produced 140 lambs.

There are ewes that can raise twins, even in challenging environments. Figure 1 shows the distribution of number of lambs weaned per ewe from ages 2 through 4 in a pasture lambing research flock with an average lamb crop of 140% born and 120% weaned. The most productive 25% of the ewes weaned 4 or more lambs over the 3-year period. The least productive 37% weaned 2 or fewer lambs over the 3-year period. Selection for greater prolificacy can lead to an increase in lamb production over the current average in a given environment. The aim of selection is to have a flock that has more ewes in the top end of the distribution.

Genetics and environment

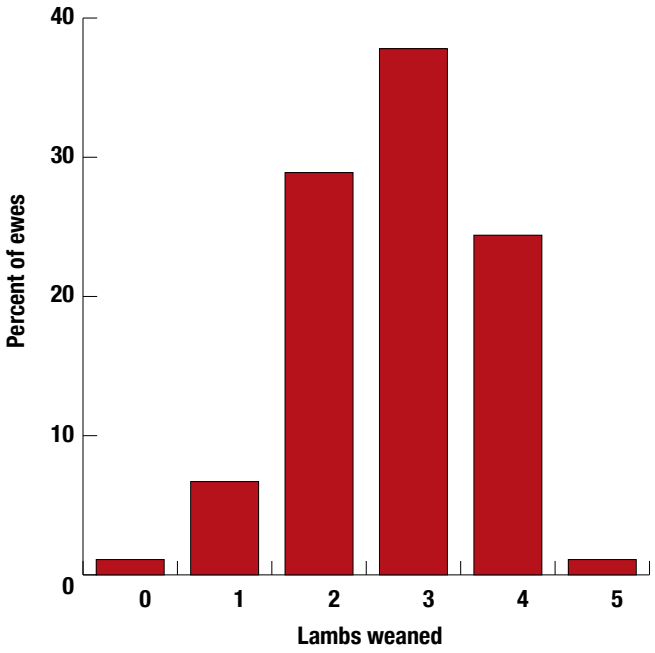
Prolificacy is affected by genetics and environment. Effective selection for prolificacy is challenging because the number of lambs produced can only be observed in breeding-age ewes and is affected by a combination of genetic and non-genetic factors. Some of the non-genetic, or environmental, factors are nutrition, age, season of year and health. Effective selection must separate the genetic and environmental factors.

Breeders who want to improve prolificacy, but do not have comprehensive records, have practiced a selection method of choosing replacements born as twins. Because of the environmental factors that affect prolificacy, selecting twins is less accurate at identifying genetic merit than a method which takes environmental conditions into account. Therefore, progress from selecting only replacements born as twins is limited.

Using estimated breeding values

The U.S. lamb crop increased by only .04 % per year from 1966 to 2015 (USDA National Ag Statistics Service). In contrast, the genetic trend among Targhee flocks using National Sheep Improvement Program's (NSIP) estimated breeding values

Figure 1. Distribution of number of lambs weaned per ewe from 3 lambings.



(EBVs) was .7% per year from 2006 to 2015. Even greater rates of progress are possible when more emphasis is placed on increasing prolificacy by selection. Even though .7% per year may seem small, when selection is practiced over several years, the gains accumulate. The cumulative increase can make a substantial difference in flock production. The use of EBVs gives flock owners the opportunity to identify genetic merit by using performance and pedigree records.

Selection for prolific genetics in a flock can be accomplished by obtaining breeding stock from flocks with superior genetic merit for prolificacy, or a producer can select from within his own flock.

Pedigree records

Most genetic improvement in a flock comes through ram selection, because a ram can produce several times as many offspring as a ewe will produce in her lifetime. However, prolificacy is only observed as a trait of the ewes. Therefore, pedigree records are

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Pedigree records (cont.)

essential to identify genetic superiority for prolificacy for potential breeding rams. If a management system does not maintain pedigree records, selection for increased prolificacy will be limited. Selection for prolificacy in this instance can be accomplished by obtaining breeding rams from breeders who use NSIP for calculating breeding values. Using rams that are genetically superior for prolificacy will increase the flock's prolificacy when their daughters make up a larger share of the flock.

If pedigree records are maintained for the flock, selecting for prolificacy from within this flock can be effective. Because there are several environmental factors that affect the number of lambs a ewe produces, estimating genetic merit for prolificacy involves a process to separate genetic merit from environmental factors. Combining multiple years of lambing records and pedigree records allows for the separation of environmental effects from genetic effects. The genetic merit of young rams can be predicted from the performance of all his female relatives that have records. The complex calculations result in the best prediction of each animal's genetic merit. NSIP has a system in place to calculate genetic merit for prolificacy. Such calculations are better predictors of genetic merit than merely knowing if a ram was born as a twin or a single.

Selecting or purchasing stock

Determining whether to buy superior breeding stock, or select from within a home flock, depends on several factors, including:

- The ability to identify genetic superiority in young males
- The availability of genetically superior males with suitable genetic merit for other economically important traits
- The potential for selling breeding stock

Producers may prefer to select breeding stock from within their own flocks when their sheep have desirable performance for other traits and prolific genetics may not be available to purchase from other breeders. Selection within a flock leads to genetic improvements that accumulate and are passed on to the next generations.

Selection within a population does not produce an abrupt change. Therefore, management can evolve as the prolificacy increases. An abrupt change in prolificacy frequently requires an abrupt change in management.

Prolificacy can also be changed via crossbreeding, managing environmental factors, such as increased nutrition or treatment with hormones. Each of these factors requires continued inputs.

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More information

U.S. Lamb Resource Center
http://lambresourcecenter.com/production-resources/productivity/

National Sheep Improvement Program
http://www.nsip.org

U.S. Sheep Industry Roadmap
http://lambresourcecenter.com/reports-studies/roadmap/

Literature cited

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Dickerson, G.E. 1996. Economic importance of prolificacy in sheep. In: Prolific Sheep, (Fahmy, Ed). University Press, Cambridge, UK.