Lamb selection by index
by Leslie O Williamson

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the degree of Master of Science in Animal Industry
Montana State University

Abstract:
The lamb selection index developed by the Bureau of Animal Industry was applied to 254 purebred Rambouillet weanling lambs at the Montana State College Agricultural Experiment Station* The objective was to raise more accurate and systematic comparisons between individual lambs and groups of lambs than had been possible by the usual unsystematized methods. The index takes into consideration those environmental factors that are continually masking the genetic merit of an animal. Comparitons were made between selecting by index, and selecting by the scoring method. The scoring method consists of giving the Iamb an overall score of from one to five, the lower score being the superior animal. Selection differentials were calculated for both methods of selection on six traits. The index was more regid in selecting for open faces, smoothness and for potential nature weight. The scoring method was more rigid in selecting for staple length, weaning weight, type and condition. The number of lambs used in the experiment proved to be too small to rake the selection differentials an accurate indicator of the true merit of each system. The index was used to compare the lines and tho progeny groups. The 3000 line ewes had the heaviest lambs, the best in type and moot free of nook folds. They also had the highest index score. The 3000 line ewes had tho lightest lambs, the poorest in type and tho shortest stapled. The 2000 line had the most covered faces and the lowest index score. The 6000 line showed the most neck folds and was the highest conditioned. The 5000 line runs had the highest ram index score and the 4000 line the lowest. The index when applied to sire progeny groups, showed considerable variation between those groups. In the 2000 line, the progeny of ram B2007 showed higher merit by index score than the other progeny group in that line. There was only minor differences in the Index score between the sire progeny groups in the 3000 line. Ram 35076 showed considerable superiority in its progeny over the other progeny groups in the 5000 line as shown by its progeny index scores. The progeny of ram D47489 had a much higher average index score than did the progeny of DL7319 the other sire in the 3000 line.

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ABSTRACT

The lamb selection index developed by the Bureau of Animal Industry was applied to 254 purebred Rambouillet weanling lambs at the Montana State College Agricultural Experiment Station. The objective was to make more accurate and systematic comparisons between individual lambs and groups of lambs than had been possible by the usual unsystematized methods. The index takes into consideration those environmental factors that are continually masking the genetic merit of an animal. Comparisons were made between selecting by index, and selecting by the scoring method. The scoring method consists of giving the lamb an overall score of from one to five, the lower score being the superior animal. Selection differentials were calculated for both methods of selection on six traits. The index was more rigid in selecting for open faces, smoothness and for potential mature weight. The scoring method was more rigid in selecting for staple length, weaning weight, type and condition. The number of lambs used in the experiment proved to be too small to make the selection differentials an accurate indicator of the true merit of each system. The index was used to compare the lines and the progeny groups. The 8000 line ewes had the heaviest lambs, the best in type and most free of neck folds. They also had the highest index score. The 3000 line ewes had the lightest lambs, the poorest in type and the shortest stapled. The 2000 line had the most covered faces and the lowest index score. The 6000 line showed the most neck folds and was the highest conditioned. The 5000 line rams had the highest ram index score and the 4000 line the lowest. The index when

applied to sire progeny groups, showed considerable variation between those groups. In the 2000 line, the progeny of ram B2007 showed higher merit by index score than the other progeny group in that line. There was only minor differences in the index scores between the sire progeny groups in the 3000 line. Ram S5076 showed considerable superiority in its progeny over the other progeny groups in the 5000 line as shown by its progeny index scores. The progeny of ram DL7439 had a much higher average index score than did the progeny of DL7319 the other sire in the 6000 line.

LAMB SELECTION BY INDEX

INTRODUCTION

Selection indexes are not new. Some form of measuring the net merit of domestic animals has been practiced since the beginning of the science of animal breeding itself. There are many different types of indexes. Some indexes select for one trait while others select for several traits simultaneously. Their sources of information may differ also. There are those which derive their information from ancestors only, while others depend on the performance of the animal itself. There is still another type that depends mainly on the progeny for its source of information. Pedigree indexes used in selecting dairy cattle for milk and butterfat production is a typical example of one deriving its information from ancestors.

Black and Knapp (1936) developed an index for selecting beef cattle using the progeny as the basis for selection.

Hazel (1943) developed a selection index for hogs which acquires most of its information from the phenotype but takes into consideration the genetic and economic importance of the various traits also.

Each type of index had a definite shortcoming which made it inconvenient for practical use. The pedigree index proved to us that too many times, like does not beget like. The progeny testing type index resulted in slow progress in animal improvement. The animals in question were far into their productive life before they were proven.

Even the most accurately constructed index taking into consideration the genetic and economic importance of the various traits, speeded progress only slightly over the previous methods of selection.

The complex gene make up of our animals makes it impossible for us to select an animal with only desirable genetic characteristics.

In selecting a superior animal we also keep many undesirable genes because the animal is the smallest unit we can reject or select. This is one of the major reasons progress in animal improvement is so slow.

Another factor responsible for retarding progress is the masking of an animal's true genetic merit by effects of environment. We so many times confuse environmental advantage with genetic gain. Environment may duplicate or hide the effects of certain gene combinations, causing the breeder to select some animals that he should discard and discard some animals that he would otherwise select.

Rice (1942) shows there is a tendency in lamb selection to select lambs born as singles over those born as twins. To select those born early over those born late, and to select those which were heavier at birth over the lighter lambs. This would tend to select against twinning. We would also lose considerable desirable genetic material by culling late lambs, twins, and lambs from two year old ewes.

Workers in the Bureau of Animal Industry at the Western Sheep Breeding Laboratory (1946) developed a lamb index taking into consideration the genetic and economic importance of several traits and in addition attempts to correct for the following environmental differences.

1. Age of lamb at time of selection.
2. Type of birth (twin or single).
3. Age of dam (2 year old or mature).

It is this index that is used throughout this study.

The purpose of applying this index to lambs at the Montana State College Experiment Station is to better enable the workers to make more accurate and systematic comparisons between sire groups, between lines and also between individual lambs.