# MYTHS AND REALITIES OF MAKING GENETIC IMPROVEMENT IN SHEEP IN THE U.S.

Dave Thomas, Department of Meat and Animal Science, University of Wisconsin-Madison

*BUYING GENETIC VALUE? DON'T BE FOOLED.*
*PRODUCING GENETIC VALUE? DON'T FOOL YOURSELF.*

## GENETIC PRINCIPLES

1. Performance differences between animals are caused primarily by non-genetic factors (age, health, feed, etc.).
2. Only 10 to 30% of the performance differences between animals are due to differences in their genetic make-up.
3. Genetic change is a slow process - maximum change is 1 to 2% improvement per year with total selection on 1 trait.
4. However, genetic improvement in an animal is permanent and cumulative over generations.
5. 70 to 80% of genetic improvement is attributed to ram selection due to fewer rams than ewes needed for replacements.
6. If you purchase your rams, the genetic improvement in your flock is largely dependent upon the genetic improvement in the flock from which your rams are purchased.

## GENETIC IMPROVEMENT REALITIES

1. Most commercial flocks purchase purebred rams from breeders of registered sheep
2. With very few exceptions, selection in registered flocks has been on "show ring" standards, i.e. type, conformation, length, height, structural soundness, with no attempt at obtaining estimates of genetic value for important traits.
3. Most registered (and commercial) flocks which do keep performance records are not able to obtain an accurate estimate of genetic value.
4. Most registered (and commercial) flocks which support performance recording through their actions still buy stud rams from "show" flocks that are playing games.
5. The National Sheep Improvement Program (NSIP) gives the most accurate estimates of genetic value available.
6. Present impact of NSIP is limited due to low participation and within flock estimates of genetic value.

7. Limited use of A.I. and embryo transfer in sheep does not allow the rapid spread of superior genetics once they are identified.
8. Ram test stations in the Midwest are not effective in ranking rams for genetic value for growth rate.
9. No U.S. breed association ranks genetic value as a high priority.

*WHAT TO DO? IS THE SITUATION HOPELESS?*
*NO. (WELL, MAYBE NOT YET)*

## GENETIC IMPROVEMENT IN COMMERCIAL FLOCKS

1. Use breeds which will get you to your production goals the fastest. Breeds can be ranked accurately for most performance traits.
2. Use a crossbreeding system in which all lambs and ewes are crossbreds, all ewes are sired by "ewe" breeds and the majority of the market lambs are sired by "ram" breeds.
3. Maintain a simple set of production records (no. of lambs born, age adjusted lamb weaning weights, lamb survival, ewe health, total weight of lamb weaned per ewe).
4. Select ewe lamb replacements based upon dam's no. of lambs born and total weight of lamb weaned, and cull ewes for low performance for the same traits.
5. Purchase rams from flocks that:
    a. are enrolled in NSIP
    b. select sheep in their flock for traits that are important to you
    c. do not show, or if they do show, it is a sideline to their performance breeding program rather than the goal of their breeding program

*WHAT IF FLOCKS LIKE THIS DO NOT EXIST?*
*LOWER YOUR STANDARDS - A LITTLE?*

## HOW TO OBTAIN RAMS OF HIGH GENETIC VALUE

1. Encourage registered breeders to get serious about estimating genetic value
    a. ask for NSIP records when inquiring about ram
    b. be willing to pay for genetic value
    c. lobby breed associations to issue "performance pedigrees"
    d. lobby state and national sheep organizations to require estimates of genetic value for sheep in sales and ram tests
    e. work for across-flock genetic evaluations
2. Purchase rams from ram test stations because breeders consign their "best" rams.
3. Select replacements from your own ram lambs if you have a larger flock (100+ ewes), well-defined selection goals, and high performing sheep. Introduce a "good" outside ram every few years to check your progress and to reduce inbreeding.
4. Combine efforts with other producers that have similar breeding stock needs (cooperative breeding scheme)

A. Open Nucleus Group Breeding Scheme
    a. Initial screening to identify top 10% of ewes in each flock
    b. Screened ewes moved to a nucleus flock
    c. Initial rams used in the nucleus from cooperators or from outside the scheme
    d. All subsequent rams used are from the nucleus - best rams used in the nucleus and next best rams used by cooperators or best rams used via A.I. in both nucleus and by cooperators
    e. Most ewe replacements for cooperators produced within their own flock but some may come from the nucleus f.1/2 of ewe replacements in nucleus come from nucleus and other 1/2 come from the cooperators (open nucleus concept
B. No-Nucleus Group Breeding Scheme
    a. Early Years: share top rams or sons of top rams across flocks for 2 to 3 years to genetically tie flocks together
    b. Subsequent Years: 1/2 of rams needed by all cooperators should be top rams with progeny in cooperator flocks and other 1/2 should be top young rams from cooperator flocks
    c. Rams will be selected on the basis of records
    d. Selected rams will be brought to a central location
    e. Cooperators select their rams from the pool of proven and young rams

*What is needed to make a scheme work?*

1. Cooperators must be able to cooperate;
2. have the same or similar type of sheep;
3. be producing under similar environmental and management conditions
4. have the primary goal of developing a more productive sheep for the group's use, as contrasted to competing with fellow producers in selling breeding stock to the public;
5. have similar selection goals which are production-oriented as contrasted to visual or showing standards;
6. have a record-keeping and genetic evaluation program which provides accurate estimates of genetic value for the traits under selection;
7. have written rules and procedures (legal document?) which all cooperators agree to follow including procedures by which a cooperator can leave or be expelled from the scheme; and
8. be willing to take a long-term view.

*How to get started?*

1. Start with a group of people who can cooperate.
2. Define the type of sheep to be produced in the scheme (the selection goal).
3. Select the traits that will be recorded by all cooperators in order to reach the goal.

4. Enroll in the National Sheep Improvement Program in order to obtain the most accurate estimates of genetic value available.
5. Define the obligations of each cooperator.
6. Develop rules and procedures of operation including voluntary leaving of the scheme or expulsion from the scheme.
7. Write everything down and decide if a legal document is necessary.
8. Meet on a regular basis to review progress, fine-tune the scheme and resolve conflicts.

David L. Thomas
Professor of Sheep Genetics and Management
Department of Animal Sciences
University of Wisconsin-Madison
1675 Observatory Dr.
Madison, WI 53706
608-263-4306
fax: 608-262-5157
dlthomas@wiscmail.wisc.edu