Why Using NSIP is an Essential Tool for Bettering Your Flock

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Introduction

At the forefront of every serious sheep producer's mind is how to increase profit and efficiency of his or her flock. This is an essential question that must be answered for any business to be successful. The hard part is finding cost efficient tools and knowing what will be beneficial to each flock. The most obvious tools for increasing productivity and profitability in the sheep business involve management and genetics. Assuming the management system is acceptable, how can flock genetics be improved so productivity is maximized within that system? The answer may be as simple as basing selection decisions on estimates of genetic merit provided by the National Sheep Improvement Program for traits deemed economically important in a particular flock.

National Sheep Improvement Program

The National Sheep Improvement Program (NSIP) was formed in 1986 to help American sheep producers improve productivity using genetic information. The goal was to collect pedigree and performance data and generate Estimated Breeding Values (EBVs) for economically important traits on animals enrolled in the program. It was time for the sheep industry to follow the lead of beef and swine and begin to make use of quantitative genetic selection tools to improve productivity.

> ***"To provide predictable, economically important genetic evaluation information to the American sheep industry by converting performance records into relevant decision-making tools."***
>
> ***-Mission of NSIP***

Only a small number of producers enrolled in NSIP during its early years and genetic progress was slow. But, in 2013 that began to change. The American sheep industry made quantitative genetic selection a priority and the effort to enroll flocks in NSIP became serious. As a result, both seedstock and commercial producers have begun to see results. In the May, 2017 issue of NSIP News ("NSIP Certified" Program Helps Market Genetics for Profit), NSIP Program Director, Rusty Burgett stated, "The main breeds that have used the technology effectively have made considerable commercially relevant progress." He cited 10 years of data from NSIP-adopting breeds to prove his point. In the Polypay breed, for example, total weight of lambs weaned per ewe has increased by an average of 10 pounds. Significant improvements in productivity have also been achieved in Suffolk, Targhee, and Katahdin sheep during the last decade.

Co-author, C. Shaylyn Burton checking breeding ewes at the U.K. Sheep Unit

Recently, a producer-driven field study in Utah showed just how beneficial NSIP could be in improving lamb profitability (Better Genetics Equals More Profit, Sheep Industry News, November, 2016). This study started with the purchase of 14 ram lambs and three yearling rams with NSIP EBV data. Another 14 ram lambs and three yearlings, purchased from the same Suffolk flock but without NSIP data, comprised the control sires. Then, a band of 1,100 commercial, white faced ewes was randomly divided into two equal groups and sent to similar pastures. One group of ewes was mated to rams with EBVs and the other group was mated to control rams. Ewes in both groups were managed the same way to ensure there were no differences in environment. Thus, lambs were sired, born, and raised in as near identical conditions as possible. At weaning, lambs sired by NSIP Suffolk rams weighed an average of 105 lb. The non-NSIP Suffolk sired lambs weighed an average of 102 lb.

Lambs sired by NSIP rams were 3 lb heavier, on the average, at weaning than the non-NSIP sired lambs, so producers in the

study concluded that selecting for EBVs made a difference. Even more convincing to the producer who supplied the rams was that the "(NSIP) rams did what their records said they would do." The NSIP rams had an average weaning weight EBV of 3.3 lb. If we assume the non-NSIP rams were average (meaning their weaning weight EBV would have been zero) and both groups of rams were mated to ewes of equal genetic merit, the expected difference in progeny weaning weight would have been 1.65 lb (that is, one-half the average EBV of the NSIP sires). Thus, the difference in average lamb weaning weight, 105 versus 102, was a fair representation of the genetic differences expressed by the EBVs when used in a management system like the one described here.

EBVs are predictions of genetic value derived from application of genetic theory and statistics to performance records. The expected difference between average performance of an individual's progeny and average performance of all progeny (assuming equal mates) is equal to one-half the individual's breeding value for the trait. In other words, a parent transmits, on the average, one-half its breeding value to its offspring.

With additional calculations, the monetary value of the rams in the Utah study was determined. At the time of the study, the average price of 102- to 105-lb lambs was $1.44 per pound. Thus, the 3-lb advantage of the NSIP-sired lambs meant an additional $4.32 per lamb. Spread across all lambs weaned, the producers estimated that each of the NSIP sires added more than $100 lamb value over the non-NSIP sires.

Using NSIP

The technology of EBVs provides sheep producers with vast amounts of knowledge that wouldn't be available without the help of NSIP. Producers enrolled in the program submit records for reproduction, growth, and(or) wool production. EBVs are then calculated using all known sources of variation for each trait.

Consider an individual ram. In order to get an EBV for weaning weight, we would start with the weaning weights of his sire and dam (if they are known) and then combine those records with the actual weaning weight of the ram. Weaning weights of all the other lambs that were raised at the same time and under the same management would also be included. Those data would be standardized based on known fixed effects of environmental variation (for example, sex of lamb, age of dam, type of birth and rearing). Records of all the other sheep related to this ram (even those that are in other flocks or that might have died) would be added next. Genetic relationships among these individuals (for example, full sib, half sib, grandsire, granddam) as well as

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scorrelations among traits would be determined. Finally, using some complex equations, we would obtain an estimate of the genetic merit (in the form of an EBV) for the ram in question. This EBV would tell us the ram's potential to pass on genes for heavier weaning weight to his offspring. It would be based on all available performance and pedigree information. Comparing his EBV to EBVs of other rams, we could make accurate selection decisions. On the other hand, if all we had to base selection decisions on was actual weaning weight data, we might make wrong selection decisions because they would be based on incomplete information.

The good news for producers is that NSIP takes care of calculating all this information. All producers have to do is submit animal performance and pedigree data.

Enrollment in NSIP

So how does a producer get enrolled in NSIP? First, go to the NSIP website (www.nsip.org) and click the "Become a Member" tab.

www.nsip.org

Then click on "2017 Enrollment Form-Youth and First Year Free."

www.nsip.org

This will bring up the 2017 enrollment form: pictured right.

As seen, the form asks for contact information (name, address, email, and phone number) and type of software (PC- or Mac-based) that will be used to submit performance data. Also included on the form is information about the flock (breed and number of ewes). If there are multiple breeds in the flock, their data will need to be submitted separately and each will have a separate NSIP Flock ID. They are kept separate in order to group breeds for comparison with other flocks of the same breed.

NSIP
National Sheep Improvement PROGRAM

2017 Enrollment Form-Youth and First Year Members

Farm/Ranch Name: _____

Individual: _____

Address: _____ City, State, Zip: _____ Email: _____ Phone: _____

If previously enrolled in NSIP, what is your NSIP Flock ID(s)? _____

If you are under 22 as of January 1, 2017 please provide your date of birth: _____

What kind of computer do you have? ☐ PC with Windows ☐ Mac

List breed(s) in your flock: _____

Annual Enrollment Fees:

Fee	Flock Size
Youth Member 22 and under (up to 3 years free)	Number of ewes: _____
New Member 1st year	Number of ewes: _____
New member data fee deposit	$100.00

Annual enrollment fees are waived for the first year for new members and for the first 3 years for members younger than 22 as of January 1, 2017 but all members are responsible for data fees acquired. In 2017, a database fee of $3.00 per animal is due on any animal with post-birth measurement submitted, excluding animals designated as culls or commercials. Enrolled flocks will be invoiced for the database fee and agree to submit the payment to the NSIP office within 30 days of the invoice. The fee covers the lifetime of the animal and is not measured each year. Full Terms & Conditions can be found on www.nsip.org. All new members receiving free enrollment are required to pay a $100 deposit, credited towards database fees as explained in the terms and conditions. If data fees in the first year are less than $100, the remaining balance will carry over to subsequent years.

Make checks payable to National Sheep Improvement Program and return with this form to: NATIONAL SHEEP IMPROVEMENT PROGRAM PO BOX 1258 Ames, IA 50014

I have read and agree to comply with the NSIP full Terms and Conditions

Signature: _____ Date: _____

All new members make a one-time payment of $100. This is a deposit that will be credited toward data base fees. If data base fees are less that $100 in the first year of membership, that balance will be credited toward future years. In addition, there is a data base fee of $3.00 for each animal submitted with a post-birth measurement. This fee will cover the lifetime of the animal.

An NSIP membership includes: (1) software for flock data management and submission, (2) training and mentoring support if requested, (3) calculation of EBVs using sophisticated statistical models, (4) comprehensive reports on both individual animals and breeds, (5) flock (producer) listing on the NSIP website, and (6) news updates via mail. Also, two new tools will soon be available to members: the "Certified NSIP Sires" program and an online searchable database for NSIP animals. More about both of these new programs can be found at www.nsip.org.

Once a membership is established, a link to download the software program (PedigreeMaster Version 2.35) is sent to the email address provided on the enrollment form. Using PedigreeMaster, the following data is entered for each individual animal: ID number, sex, type of birth, rearing type, conception method, lambing ease, status (alive, dead, culled,

etc.), date of birth, birth weight, sire, dam, date of weaning, weaning weight, date of post-weaning weight, and post-weaning weight. Producers enter as much of the data as available. The opportunity to input information on other traits (for example, wool traits and parasite infection data) is possible for some breeds. Each producer chooses the traits that are of economic importance to their flock management system.

After all data are entered, the data set is submitted to NSIP. Submissions can be made twice per month, generally on the 1st and 15th. Producers receive results, via email, 3 to 7 days after submission. Results include reports of new EBVs and sire summaries, a general database summary, and a report on flock genetic trends.

To assist producers, a manual with step-by-step instructions can be found by clicking the "Member Services" tab and selecting PedigreeMaster.

www.nsip.org

Also, if a producer does not have the technology or does not want to enter data themselves, a list of data processors for hire can be found under Member Services (see above).

Once enrolled, producers may find that one of the more beneficial tabs on the NSIP website is "Find Stock with EBVs":

www.nsip.org

Here producers will find a list of all the breeds using NSIP. Once a breed is selected, a map appears with locations and contact information of all breeders enrolled in NSIP for that breed. This allows producers to network with other NSIP members and diversify their flock with seedstock from other sources. Ultimately, this provides greater genetic linkage and better estimates of genetic merit within the breed.

Challenges and Uncertainties

Like most new endeavors, there are challenges and uncertainties for producers considering enrolling in NSIP. Industry leaders, university researchers, and extension specialists all agree NSIP is a needed and valuable resource, but many producers are still skeptical. It is a new concept for some, it requires more recordkeeping for others, and some may still lack confidence in NSIP. With regard to the latter, the more flocks that enroll in NSIP and the more data that are submitted, the greater will be the accuracy of the results. The good news is that membership numbers are on the rise, with about 350 U.S. flocks currently enrolled. This increase in membership and data will lead to a boost in confidence in NSIP.

It may take extra time and work to get involved with NSIP but in the long run these efforts will be rewarded with positive genetic change, and with that, increases in productivity and profitability of the sheep enterprise.

C. Shaylyn Burton *graduated from the University of Kentucky with a B.S. Degree in Animal Science in May, 2017. While a student, Shaylyn worked at the U.K. Sheep Unit. Stimulated by an interest in genetic improvement, Shaylyn enrolled in a special problem course under Dr. Aaron with the goal of learning more about NSIP and ending with enrollment of the Hampshire, Polypay, and White Dorper flocks in NSIP. This article represents a portion of her work.*

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