

# *Targhee*

## NSIP Notebook

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### **The 2007 Targhee Genetic Evaluations**

#### **Introduction**

The US National Sheep Improvement Program (NSIP) is pleased to provide this summary of the 2007 Targhee genetic evaluation. The dominant activity for NSIP in 2007 has been a major new software rewrite. As a result, 2007 has been a year of challenges for both the Processing Center and our clients. A section discussing the new rewrite is provided at the end of this Notebook to give you some additional information on this process and prospects for the future. Also, along the way, NSIP recorded its **50,000<sup>th</sup>** Targhee animal in 2007, so despite the trials of the past year, a very significant milestone was passed.

#### **The Data**

Data for the 2006 lamb crop included records on 1,950 breeding ewes from 18 flocks: 12 from Montana, two from Iowa, and one each from Michigan, Minnesota, Oregon, and Wisconsin. Records were received for 2,745 live lambs produced by 71 Targhee rams. Following editing, valid records for 2006-born lambs were received for 1,117 60-day weaning and/or preweaning weights, 2,130 120-d weaning weights, and 350 yearling gains, 385 yearling fleece weights, 158 fiber diameter (fleece grade) measurements, 330 staple lengths, and 1,860 litter sizes. Fleece records for lambs born in 2005 added an additional 671 fleece weights, 355 fleece grades, and 532 staple lengths.

The entire NSIP Targhee across-flock database now contains records from 43 flocks with 16,547 60-day weaning and preweaning weights, 31,473 120-day weaning weights, 6,208 yearling gain records, 15,755 fleece weights, 11,491 fiber diameter measurements, 9,897 staple lengths, and 26,888 litter sizes. EPDs were calculated for a total of 51,019 animals, including 10,531 ewes with recorded litters and 921 sires.

Means for reported traits are shown below. Weaning and preweaning weights (both 60- and 120-day) were adjusted to a twin birth and rearing, adult dam, and ewe lamb basis. Yearling gains were not adjusted, but male and female lambs were placed in separate contemporary groups. Yearling fleece weights and staple lengths were adjusted to an age of 365 days. Fleece weights and staple lengths for older animals were adjusted to an adult animal and 365-day shearing interval basis. Fleece grades for yearlings did not receive any adjustments. Fleece grades for older animals were adjusted to an adult animal basis. For fleece traits, yearling and older animals, and males and females were placed in separate contemporary groups. Litter sizes were adjusted to an adult ewe basis.

The mean 60-day weaning weight in the table is lower than that reported in past years because of a change in the weaning weight adjustment procedures. The 'standard' for the adjusted weaning weight is now a twin lamb, whereas in the past, weaning weights were adjusted to a single-lamb basis. The reasons for this change are discussed below. For Targhees, single lambs are, on average, about 23% heavier than twin lambs, so the mean weaning weight of 44.8 lb at 60 days and 71.3 lb at 120 days for twin lambs shown below would correspond to mean single-lamb weaning weights of approximately 55.1 lb at 60 days and 87.7 lb at 120 days.

Trait	Mean
60-day adjusted weaning/preweaning weight	44.8 lb
120-day adjusted weaning weight	71.3 lb
Yearling gain (120 to 365 days)	.28 lb/day
Fleece weight	8.7 lb
Fiber diameter	22.0 microns
Staple length	3.4 in
Litter size	1.80 lambs

## EPD Reports

This year's EPD report has essentially the same format as last year's report. Animals in the spreadsheet are listed in the following order: breeding ewes, yearling ewes, breeding rams, and yearling rams. The listing should contain all breeding animals listed on the preprinted data entry spreadsheet, any breeding animals that were added to inventory, and all surviving lambs from the current lamb crop. Animals that were culled or died will be identified; EPDs will be provided for these animals, but they will not appear on next year's spreadsheet.

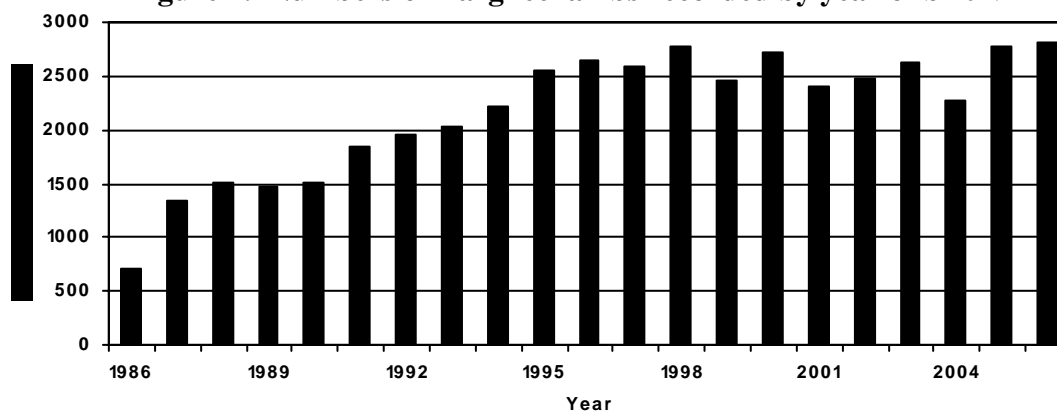
## The 2007 Targhee Sire Summary

The 2007 NSIP Targhee Sire Summary is also now available for distribution to breeders and other interested parties. In order to be eligible for the Sire Summary, a ram must have at least five progeny with weaning weight records or at least 10 daughters with litter size records. Rams listed in the Sire Summary must also have prediction errors that did not exceed 1.7 lb for weaning weight, 1.1 lb for maternal milk, 3.2 lb for yearling weight, 0.2 lb for fleece weight, 0.3 microns for fiber diameter, or 0.09 in for staple length. These listing criteria are slightly different from those used in the past, and the number of listed sires may have changed slightly. For this year's sire summary, 364 rams met the accuracy requirements. Of these, 99 were born after January 1, 1998 and appear in the main sire summary listing.

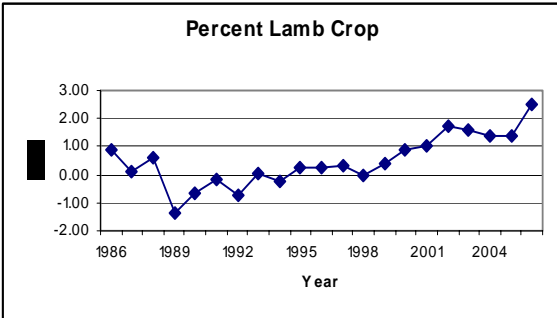
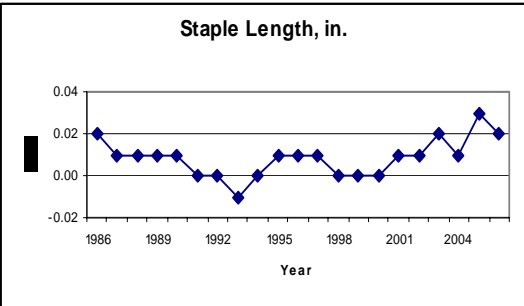
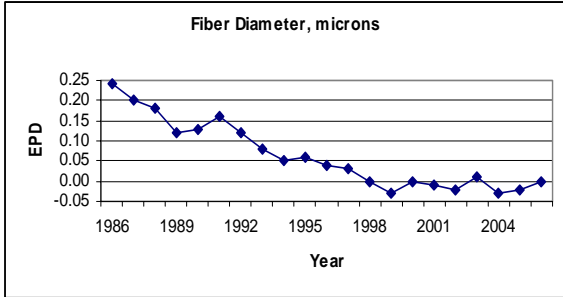
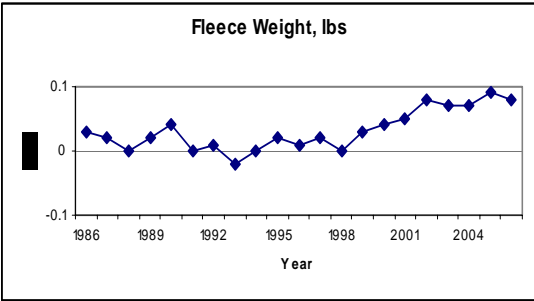
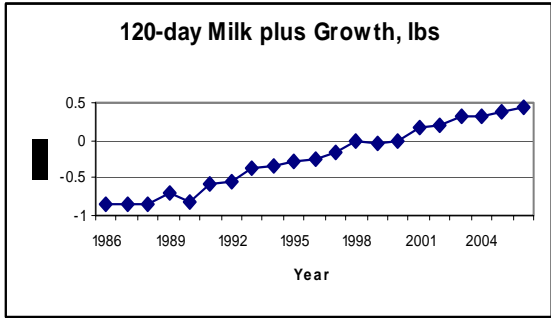
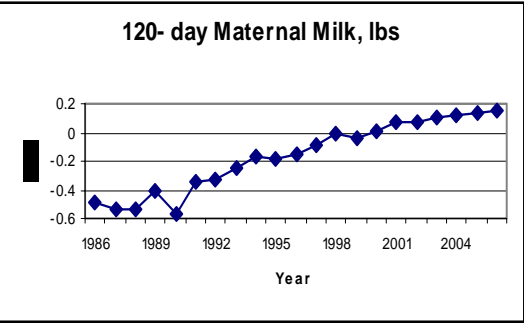
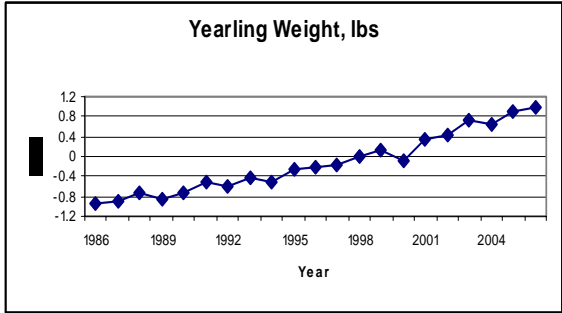
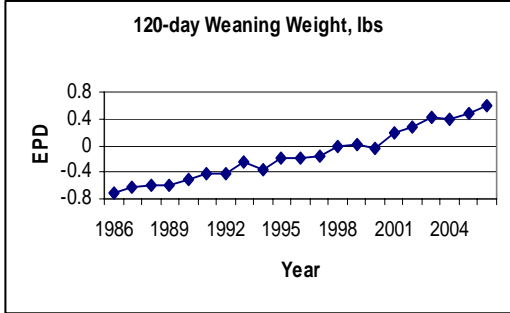
## Genetic Trends in the Targhee Breed

Numbers of lambs recorded by birth year since 1986 are shown in Figure 1, and patterns of change in EPDs since establishment of NSIP in 1986 are shown in Figure 2. These results document the traits that have received emphasis in participating Targhee flocks. Each point represents the average EPD of all animals born in each year since 1986. For 2007, the genetic base for reporting genetic trends has been set at 1998. All points in Figure 1 are thus expressed as deviation from the mean EPDs of all animals born in that year. In future years, all reported EPDs will be reported as deviation from the genetic base, and the genetic base will be updated to correspond to the mean of animals born 10 years prior to the current year. This strategy allows current EPDs to better reflect both current production levels and recent genetic trends. See the section below on "What's New for 2007" for additional discussion about definition of the genetic base.

**Figure 1. Numbers of Targhee lambs recorded by year of birth.**



**Figure 2. 2007 Targhee Genetic Trends**



Consistent and significant increases have been observed for weaning weight, yearling weight, maternal milk, and milk plus growth EPDs. Percent lamb crop has likewise trended upwards since 1998. From 1986 to 1998, fiber diameter EPDs decline while EPDs for fleece weight and staple length were maintained with little change. However, after 1998, increases have occurred in fleece weights and staple length EPDs with little associated changes in fiber diameter. This pattern suggests that additional reductions in fiber diameter may no longer be a priority for many breeders. These patterns also reflect the antagonistic genetic relationship between fleece weight and fiber diameter, while demonstrating the ability of EPDs to allow improvement in one of these traits without losses in genetic merit for the others. The observed patterns of change in EPDs are consistent with the primary role of the Targhee as a dual-purpose breed, attempting to make balanced improvement in a number of economically important traits.

One of the advantages of the long history of performance recording in NSIP Targhee flocks is that individual breeders can now begin to assess patterns of genetic changes within their own flocks. For the first time this year, NSIP provided a number of Targhee flocks with flock-specific genetic trends. In order to receive this information, a flock had to have reported data to NSIP for at least the past 8 years and had to have reported weaning weights on at least 90 to 100 lambs per year. Sixteen flocks qualified. We will likely not report these flock-specific genetic trends in every year, but hope to provide them for qualifying flocks at least every 2 to 4 years.

### **Submitting Data for Next Year**

There will be no major changes in submitting data for next year. Each NSIP Targhee breeder will again receive a preprinted data entry spreadsheet for reporting data. All active animals from the flock, including breeding ewes, ewe lambs, breeding rams, and ram lambs should appear on that spreadsheet. Use of the preprinted spreadsheet to report data is again mandatory. Errors in animal identification (birth dates, tags, registration numbers, parents) can be corrected as needed and newly registered animals can have their registration numbers added. Newly purchased animals can be added at the bottom of the spreadsheet with identification information and performance records.

### **The 2007 NSIP Software Rewrite**

2007 has been a challenging year for the NSIP Processing Center at Virginia Tech. As some of you know, Larry Kuehn, who was the technical 'heart and soul' of NSIP since coming to Virginia Tech in 2000, completed his PhD in 2006 and is now a Research Geneticist at the US Meat Animal Research Center in Clay Center, NE. Larry's departure was followed in early 2007 by the graduations of Drs. Bindu Vaminiseti and Randy Borg, the two doctoral students who held the Processing Center together after Larry's departure. Both are currently employed as biostatisticians at Pfizer Animal Health in Kalamazoo, Michigan. All of these individuals were actively involved in both the generation of EPDs and a variety of studies and programs involving NSIP. Those of you who were fortunate enough to interact with them know how wonderfully talented they all are. Larry's Ph.D. thesis developed methods to assess and evaluate the extent of genetic connectedness among NSIP flocks. Randy's M.S. project was the development of a breeding objective for NSIP Targhee sheep, and his Ph.D. was a study of genetic association between performance and other fitness traits such as ewe size and longevity and baby lamb survival. Bindu's M.S. thesis contributed to development of the Katahdin fecal egg count EPD to evaluate parasite resistance. Her Ph.D. utilized NSIP Polypay data to investigate how best to develop EPDs to improve performance in accelerated lambing systems (this will be the subject of a future issue of the NSIP Notebook). She also assisted in development of the Katahdin ewe productivity EPD.

Joe Emenheiser joined the Processing Center in the fall of 2006. Joe is a new M.S. student with a solid background in commercial and seedstock sheep production. He can shear commercially and process a lamb carcass with the best of them. He is providing leadership for implementation of ultrasonic scanning traits into NSIP, initially involving the Suffolk breed.

Part of this transition was a need to consolidate existing NSIP software to provide more efficient and consistent data processing procedures. Virginia Tech became the primary NSIP Processing Center in 2000. Since then, programs have been continuously modified and enhanced to meet new needs of existing clients and to serve new clients. Unfortunately, the result was an array of breed-specific programs performing slightly different

versions of the same tasks that could not survive the transition to new personnel. As a result, a comprehensive rewrite of all NSIP software was begun in spring, 2007. That rewrite is now complete for the core NSIP traits (weaning weights, maternal milk, postweaning growth, fleece traits, and percent lamb crop). Work continues to finalize new programs for Katahdin fecal egg count EPDs and ultrasonic scanning traits, with a spring target for implementation.

Let me convey my appreciation to all of you who have been forced to endure processing delays and, in a few cases, receive updated EPDs when programming errors came to light. I think we met most of our critical deadlines for events like the wonderfully successful new Center of the Nation sale and the Miles City Ram Sale (the Granddaddy of Them All when it comes to selling EPDs). We have now completed genetic evaluations with the new software for the Targhee, Suffolk, Polypay, Katahdin, Dorset, Hampshire, and Romney breeds. Stephen Shafer, the Romney breed coordinator, is now also managing data for a small group of Dorper, White Dorper, and Coopworth breeders whose data has also been incorporated into the new operating procedures.

After the delays of 2007, we hope to return to our normal target of providing EPDs within 30 days of receiving the data. We were running quite a bit ahead of that goal in 2006, and we hope the new software will assist us in returning to that schedule. So: to everyone who exhibited patience and provided encouragement in 2007, a big **THANK YOU**.

### **What's New for 2007?**

The rewrite has spawned a few changes in NSIP processing and reporting. Most are minor, but a few will be noticeable to the sharp-eyed among you.

#### **Weaning Weight Adjustments:**

**Lamb weaning weights are now adjusted to a twin-lamb basis.** Our new 'standard' for adjusted weaning weights is thus a **twin ewe lamb born to an adult ewe**. In the past, the standard weaning weight was a **single** ewe lamb born to an adult ewe. The reason for the change is that for all breeds, most lambs are born and raised as twins. If the twin lamb is the standard, we therefore have fewer weights to adjust, and fewer adjustments means less opportunity for error. The reason that the standard was originally set to a single lamb was largely to maximize the resulting adjusted weaning weights. But now that we are using EPDs, the size of the adjusted weaning weight is not so important—as we keep saying, it is the differences that matter. This change will have few obvious effects. The ranges in weaning weight EPDs may constrict a little and genetic trends in weaning weight and maternal milk may be a bit smaller, but this is just a scaling phenomenon reflecting the lower mean adjusted weaning weights.

#### **Specification of the Genetic Base for EPDs (or, What Does an EPD of Zero Really Mean??):**

This issue revolves around the scale used to express EPDs. By the traditional definition, an EPD of zero is supposed to be 'average'. But if you look at the genetic trends for your breed in this Notebook, it is clear that for most breeds and most traits, an EPD of zero is certainly NOT average any more, or is at least not average for today's lambs. So if an EPD of zero is supposed to be 'average', we are led to ask: **the average of what?**

As the EPDs come out of my computer, a zero EPD has a clear meaning. It is the average EPD of the 'founder' animals, and a founder animal is any animal that does not have parents listed in the data. This set of animals that defines the zero EPD point is called the **'genetic base'** for the EPDs.

Thus on the day you first inventoried your flock in NSIP, your founder animals were either the sheep you first put on inventory or, more likely, the sires and dams that you listed for those first animals. But after that it gets complicated. If you bought a ram last year from a non-NSIP flock, he is a founder too, even though he may have entered your flock 20 years after you first enrolled in NSIP. And every time a new flock enrolls, many of its animals become founders and their EPDs become a part of the average that defines the genetic base. So if newly enrolled flocks are inferior to existing flocks, those new flocks dilute the genetic base, 'zero' becomes a little lower than it was before, and the EPDs for the established flocks go up a bit. If newly enrolled flocks are

in some cases superior to existing flocks, then 'zero' goes up a bit, and the EPDs of established flocks edge downward.

For making breeding or purchasing decisions, the genetic base is not an issue. You pick among candidates for purchase or breeding based on the differences in EPDs among the sheep on offer. Pick the best ones, regardless of whether their EPD is +1 or +100. However, you do need to know the average EPD of the currently available sheep. If the average weaning weight EPD for the 2007 lamb crop is +1.0 and the ram you are considering buying is +0.5, then that lamb clearly has an EPD that is below the current breed average. The fact that his EPD is positive only tells you that he is better than the breed **used to be a few years ago** (for whatever that's worth). So when you look at sheep to buy or use, you really only need to know two, or maybe three, things: what is the animal's EPD, what is the current breed average, and, perhaps, what is the current breed range in EPDs (so you can tell how far above, or below, average the animal really is).

NSIP Polypay breeders have recognized the importance of expressing EPDs relative to current performance level for the past several years, by consistently showing EPD averages for the current lamb crop. Beginning next year, the mean EPDs for each trait in the current lamb crop will be included in all NSIP Notebooks.

So the genetic base doesn't really matter too much, but we still have to have one. We can take the default base that comes out of my computer, or we can set something else as the base. The most commonly used 'something else' is the mean EPD of lambs born in some specified year. For the Targhee breed, it was decided to use a 10-year rolling average genetic base. For 2007, the genetic base is the average of all lambs born in 1998. Next year the base will be updated to the average of all lambs born in 1999. With that base, the actual value of an EPD includes the impact of the past decade of selection.

For most other breeds, the default genetic base (the zero EPD point) will be defined as the average of all lambs born in 1996. I chose 1996 because that was the first year we produced across-flock EPDs, and the genetic trends before that time were quite flat. So for most breeds, 1996 was the year when NSIP flocks really began making measurable genetic change. Thus for several other breeds the 1996 EPD on the genetic trend lines is now zero for all traits. However, each breed is free to set its own genetic base and NSIP is encouraging all breeds to think about the genetic base that is right for them.

There is no magic 'right' way to set the genetic base. As long as NSIP is growing, new flocks can affect the base, but as the number of new flocks declines in proportion to the number of existing flocks, that impact will decline. Each breed is encouraged to discuss how they wish to define their genetic base, and we will be happy to discuss the issue in greater detail with the breed coordinators.