National Sheep Improvement Program 2005 Genetic Evaluation Report Documents Long Term Improvement in Performance

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The tables, figures and analyses of this report were created by Dr Dave Notter of Virginia Tech and his research team of Larry Kuehn, Bindu Vanimisetti and Randy Borg.

The National Sheep Improvement Program (NSIP) released its 2005 genetic analysis report earlier this year in April 2005. Since the 1999-2000 year, when Dr Dave Notter of Virginia Tech was contracted to direct the NSIP Genetic Evaluation Center, implementation of several new procedures and analyses have dramatically increased NSIP's ability to provide quality genetic analyses that producers and seedstock producers use to improve their genetics for meat and wool production.

Prior to 2000, flocks received genetic evaluations that could only be compared within a flock. Now, using across-flock EPDs NSIP participants can compare the performance of sires in multiple flocks for key production traits. With increased accuracy, buyers and participants select genetics that will complement and or improve the performance of their animals. Making more accurate selection and culling decisions is key to profitability.

Depending on the breed, flocks submitting data receive expected progeny differences (EPDs) from a range of several traits. All flocks receive EPDs for number born, 60 day weaning weight, 60 day maternal milk and 120 day postweaning gain. Range breeds also receive EPDs for fleece traits and yearling performance (Table 1). EPDs are tailored to the common production system(s) for each breed.

Currently flocks from eight breeds of sheep submit data to NSIP. These include, Targhee, Columbia, Suffolk, Polypay, Katahdin, Rambouillet, Romney, and Dorset. Later this year, we expect to analyze data from a group of Hampshire breeders. Several breeds of sheep have provided data from substantial numbers of lambs over the past 15-20 years. Other breeds, such as the Romney (2004) and Rambouillet (2002) initiated their participation in NSIP in the last three years have more limited genetic analyses. The numbers of flocks, animals, dams and rams with data in the cumulative NSIP data base for each participating breed are included in Table 3. Current levels of participation and data submission are presented in Table 2. Except for breeds with the most recent enrollment, genetic analyses of superior sires are based on data from several thousand animals.

Several breeds exhibit long term increases in key production traits. Graphs in Figures 1-8 document changes in performance occurring for the breeds and flocks involved in NSIP. In figures, 1-8, the trend graphs for the five breeds with the longest involvement, Dorset, Polypay, Suffolk, Columbia and Targhee are plotted. The average EPDs for the flocks involved increased significantly over the years. Each point in a graph represents the average EPD of all animals born in that year. Readers can look at each of the graphs for all the breeds, individually, but examining two breeds will demonstrate key important trends observed for all NSIP breeds that have actively participated for 15-20 years. The Targhee flocks in NSIP increased the genetic potential for number born, growth rate and

milk traits while improving fleece genetics. Targhee NSIP breeders have decreased the micron diameter of the fleece while maintaining fleece weight of their stock. This documents the utility of cross-flock EPDs to increase meat production traits while improving the quality of fleeces.

A closer look at the Polypay trends is also warranted. Patterns of change in Polypay EPDs since establishment of NSIP in 1986 are shown in Figure 2. These results document the traits that have received emphasis in participating Polypay flocks. Each point represents the average EPD of all animals born in each year since 1986. Since 1990, consistent and significant changes have been observed for 60-day weaning weight, maternal milk, and 120-day postweaning weight EPDs. EPDs for number of lambs born changed less rapidly over this period, but have had a consistent positive trend since 1997. More exciting is the accelerating rate of genetic change observed since establishment of the Polypay across-flock genetic evaluation in 1996. Since 1996, weaning weight EPDs have increased by 0.23% per year, maternal milk EPDs have increased by 0.13% per year, and 120-day postweaning weights have increased by 0.33 % per year. The increase in percentage lamb crop of 0.17% per year over this period is likewise substantial. As discussed before in this Notebook series, these values could be increased further by more intense selection, but represent gradual and consistent changes in the breed that are appropriate to its role as a general purpose maternal breed.

By comparison, genetic trends in six of the largest beef cattle breeds (Angus, Hereford, Charolais, Limousin, Red Angus, and Simmental) over the past 20 years have averaged about 0.2% per year for weaning weight and yearling weight and 0.1% per year for maternal milk. The Angus breed is the industry leader, with relative genetic trends of 0.26% per year for weaning weight, 0.30% per year for yearling weight, and 0.16% per year for maternal milk. Thus since beginning the across-flock genetic evaluation program, relative rates of genetic improvement in growth and maternal performance in the breed have equaled those being achieved by the beef industry. We knew this was possible: sheep have a higher reproductive rate and a shorter generation interval and are capable of more rapid genetic change than cattle. However, given the very limited use of artificial insemination in the sheep industry, this is a tremendous accomplishment and a testimonial to the use of performance records and EPDs by Polypay NSIP breeders.

Currently, Dr Dave Notter and his research team are developing new traits of interest for the industry. New traits in development or on the drawing board include an accelerated lambing EPD, fecal egg count EPD and carcass trait EPDs using ultrasound scanning technology. The NSIP Genetic Evaluation Center is also branching out to other species requiring quality genetic analyses. The first data EPDs for the Boer Goats were calculated 9 months ago. In the next, year NSIP will provide fiber trait analyses for Alpaca breeders.

If you as a commercial or registered sheep breeder need to increase weaning weight, number born or other traits, buy your next ram from an NSIP participant or plan to enroll in NSIP with your next lamb crop. If your breed is not receiving genetic evaluations from NSIP, you can contact Jim Morgan or Alan Culham for more information.

NSIP Board of Directors thanks Professor Dave Notter for his continuing work at NSIP Genetic Evaluation Center. For more information on NSIP, contact Jim Morgan, 479-444-6075, jlmm@earthlink.net of Fayetteville, Arkansas or Alan Culham, (517) 521-4870, ovineepd@aol.com of Webberville Michigan. Examples of ranked sires can be viewed at the following websites. Suffolks: http://www.members.aol.com/suffnsip/ovineepd.htm. Polypays: http://www.fmctc.com/gallery/wcfarm/siresum.html.

Table 1.
Traits Currently Evaluated by NSIP

- No. born—all
- 60-day weaning wt—all
- 60-day maternal milk - all
- 120-day weaning wt--TA, CO, RA
- 120-day maternal milk – TA, CO, RA
- 120-day postweaning wt--SU, PP, CO, DO, KT
- Yearling wt—TA
- Yearling gain--RA
- Fleece wt and grade--TA, CO, RA
- Staple length--TA, CO, RA
- OFDA fleece measurements—stored for RA, TA
- Ewe Productivity trait, % Weaned - KT

CO – Columbia, DO – Dorset, KT – Katahdin,
RA – Rambouillet, RO – Romney, SU – Suffolk,
TA – Targhee

Table 2. Estimated numbers of ewes and lambs processed for 2004 Lamb Crop

No. of:	TA	SU	PP**	CO*	DO	KT	RA	RO
Flocks	15 (0%)	23 (+10%)	14 (-26%)	7 (-30%)	7 (-12%)	19 (+14%)	1	2
Ewes	1,614 (-8%)	1,114 (+5%)	963 (-19%)	378 (-17%)	284 (-4%)	1,076 (+3%)	133 (-5%)	139
Lambs	2,598 (+4%)	1,891 (+4%)	1,931 (-3)**	603 (-11%)	403 (-17%)	1,985 (+4%)	196 (+3%)	222

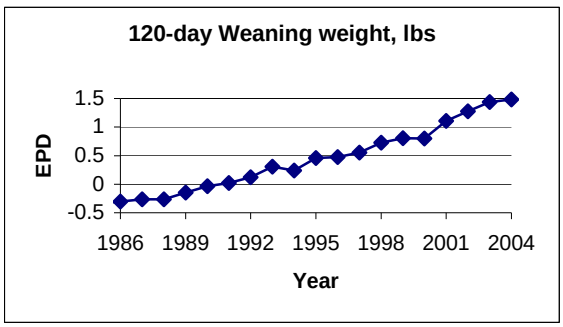
*2003 value. The 2004 Lamb Crop is still being processed.
** **Approximate because of accelerated lambing

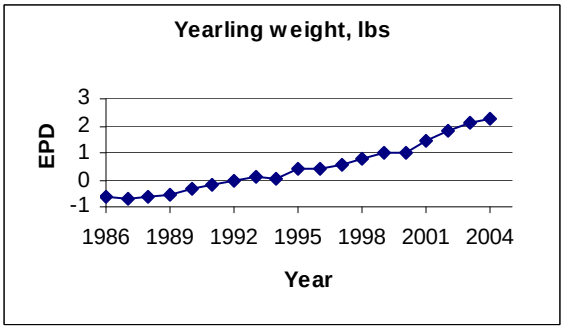
Table 3. Summary of the active NSIP database

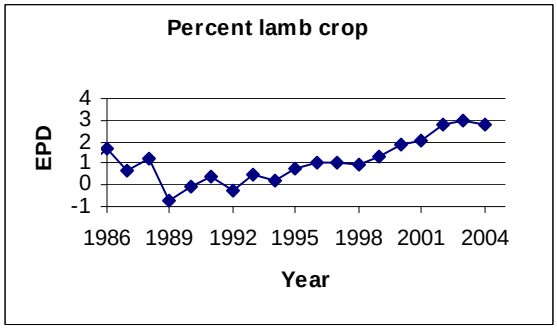
	TA	**SU**	**PP**	**CO***	**DO**	**KT**	**RA**	**RO**	**Sheep Total**
Flocks	41	81	35	10	13	22	1	2	205
Animals	42,223	38,799	28,950	7,478	8,256	9,430	856	1,164	137,156
Dams	11,414	10,903	7,166	2,270	2,300	2,558	382	303	37,296
Sires	902	2,432	821	420	471	381	62	47	5,536

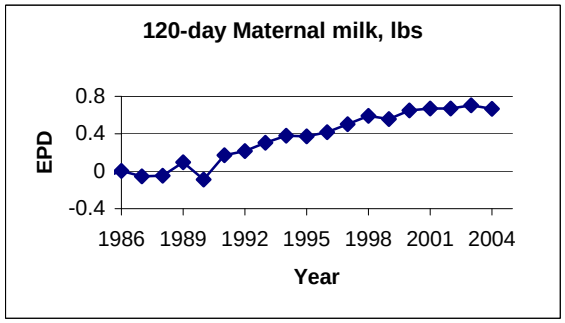
*2003 value. The 2004 Lamb Crop is still being processed.

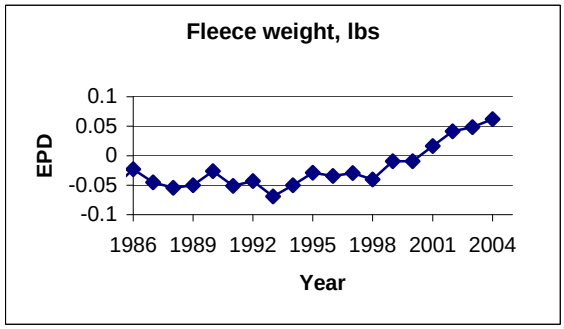
Figure 1. Genetic Trends in Targhee EPDs

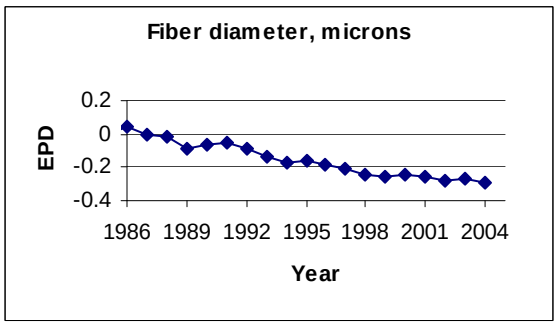












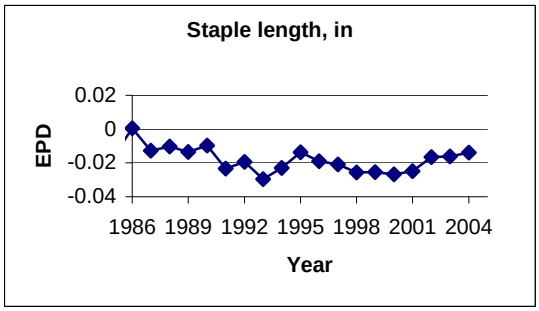


Figure 2. Genetic Trends in NSIP Polypay Flocks

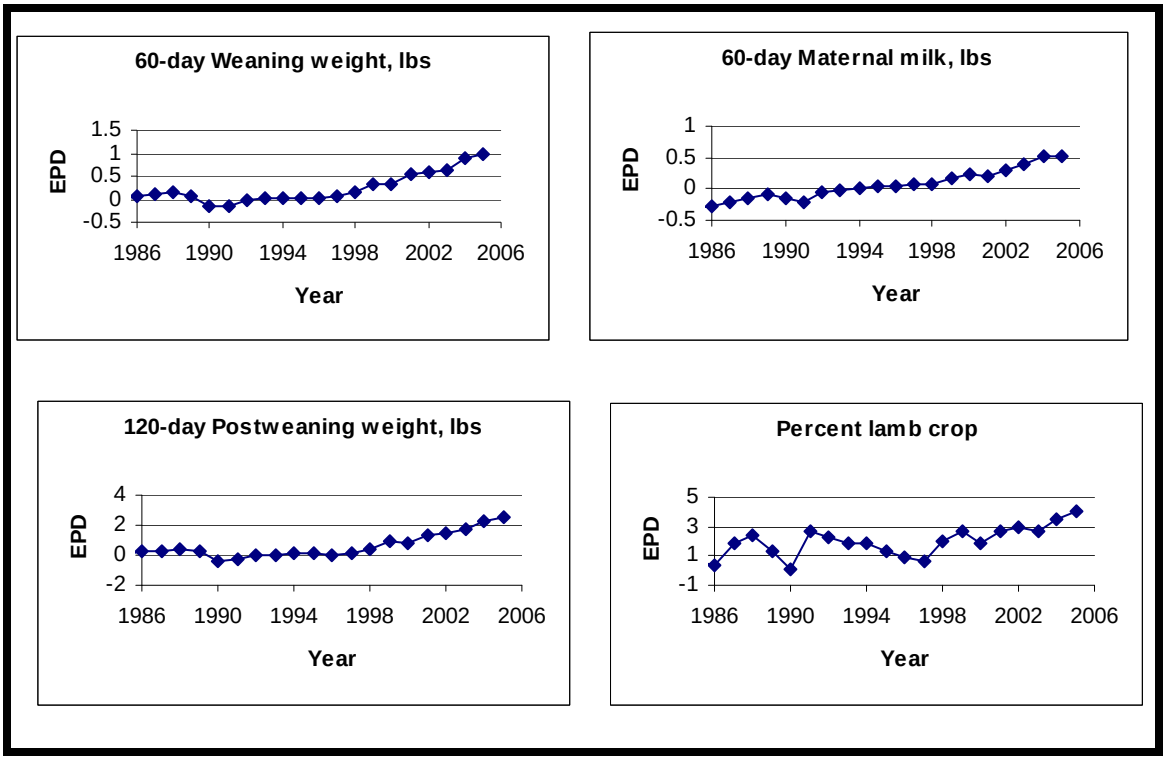


Figure 3. Genetic Trends in NSIP Suffolk Flocks

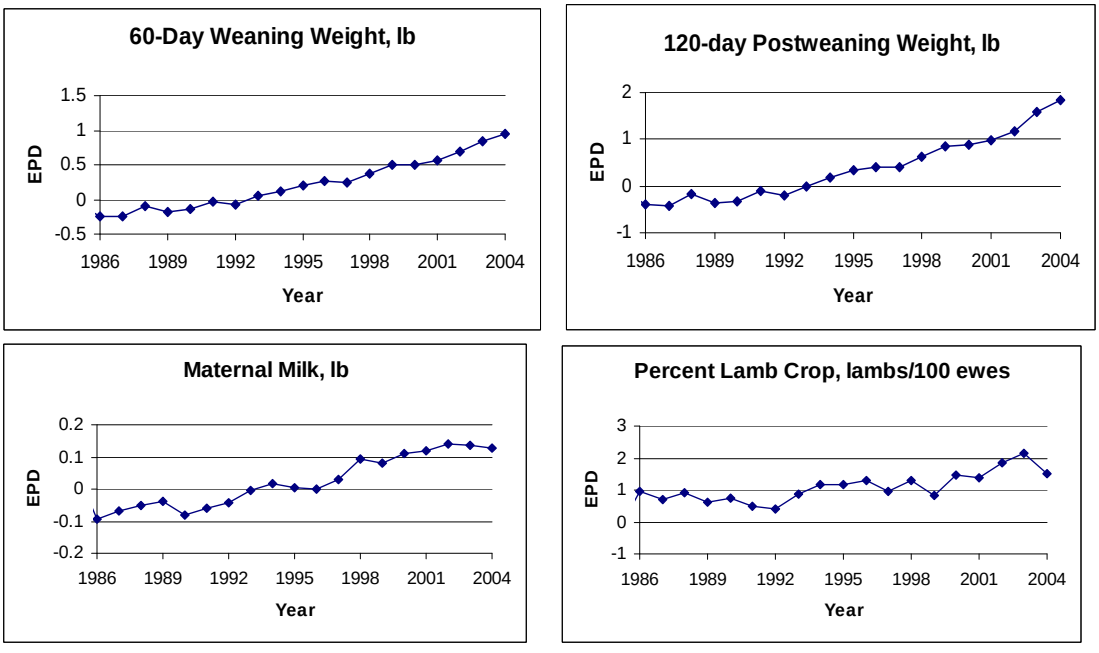
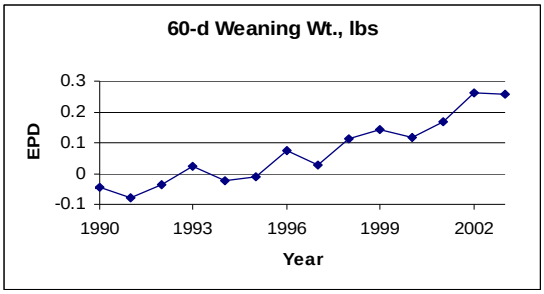
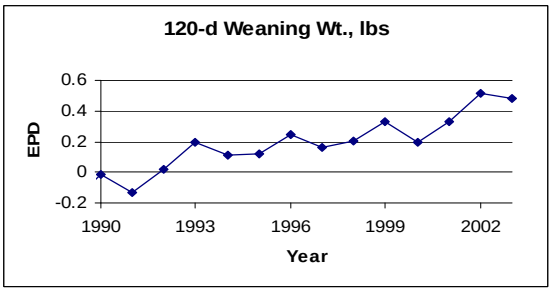
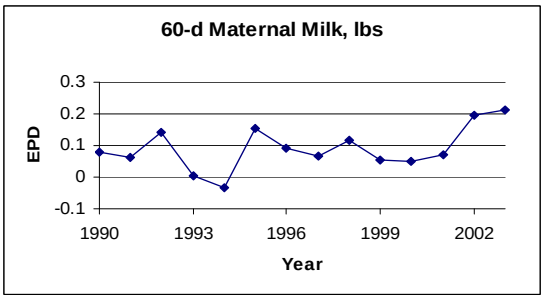
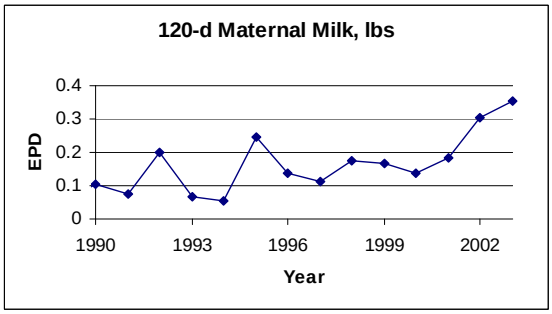


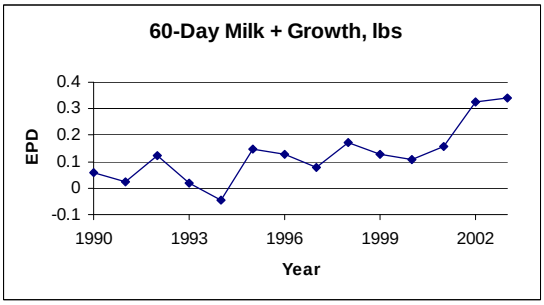
Figure 4. Genetic Trends for Weaning Traits in NSIP Columbia Flocks











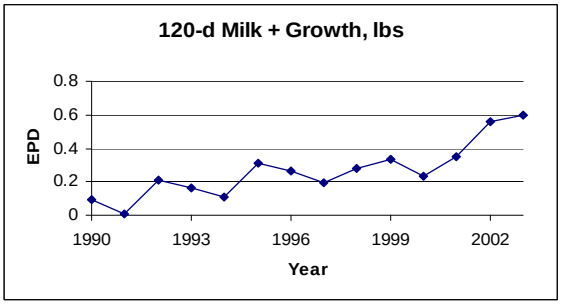
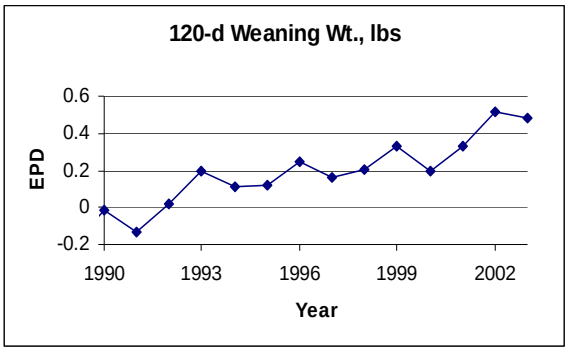


Figure 5. Genetic Trends for Postweaning Weight and Percent Lamb Crop In NSIP Columbia Flocks



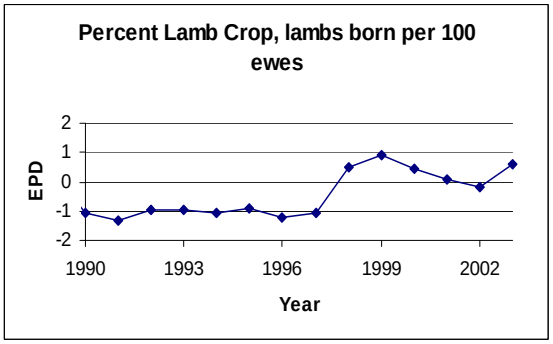
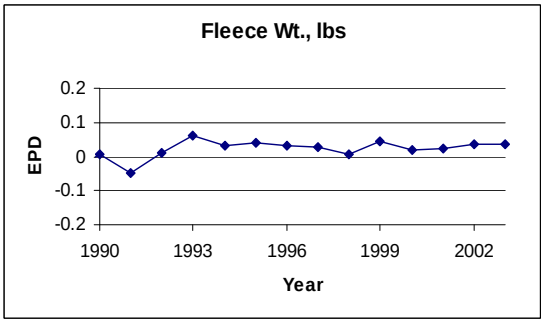
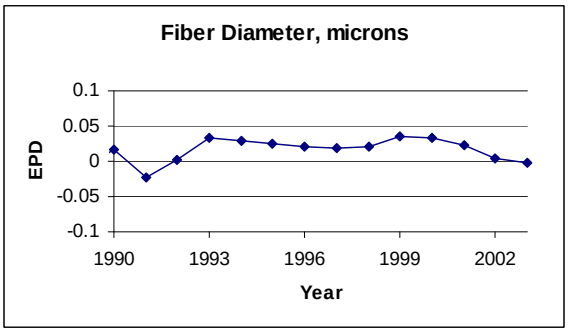


Figure 6. Genetic Trends for Fleece Traits in NSIP Columbia Flocks





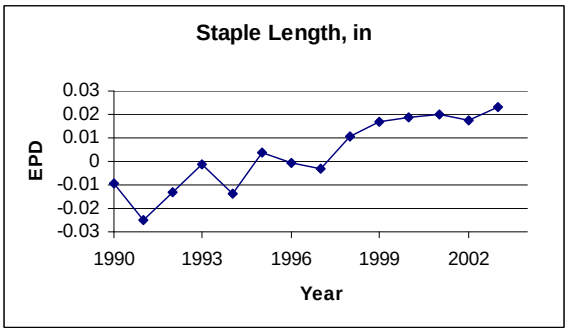
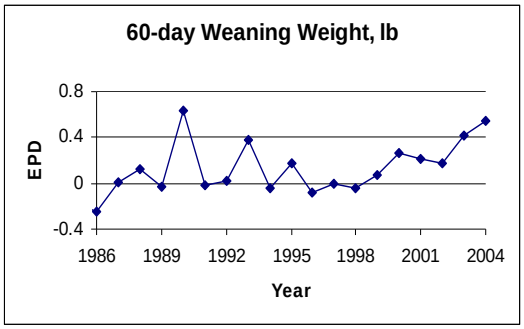
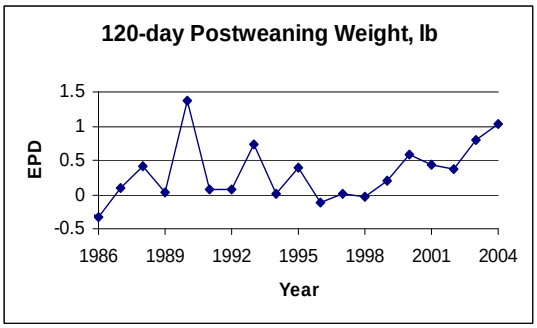
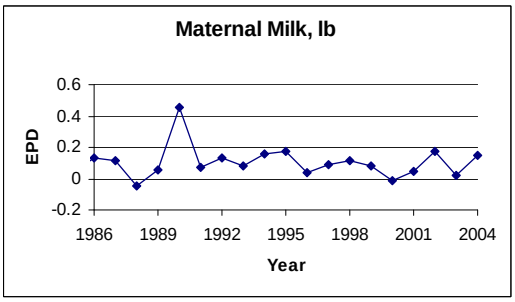


Figure 7. Genetic Trends in NSIP Dorset Flocks







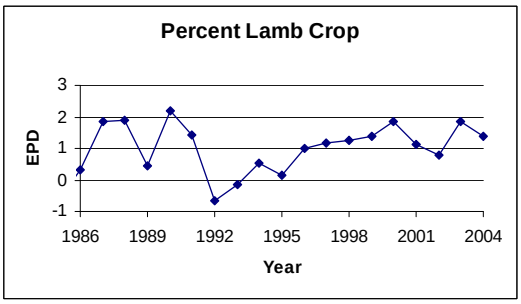


Table 4 - Traits Being Developed for NSIP

- Accelerated Lambing EPD in the Polypays – data collected
- Fecal Egg Count EPD in the Katahdins – data being collected
- Carcass Scanning Traits - on the drawing board