

Phenotypic Trends Illustrate Limousin Breeders' Commitment

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North American Limousin Foundation (NALF) members invest considerable time and resources documenting performance and using genetic information to make selection and mating decisions. They undertake all of that to serve commercial customers with seedstock that deliver more valuable calf crops.

Have you ever stopped to think about the observed effect on performance those selection and management decisions make over time? A quick look at the phenotypic trends for the Limousin breed over the last 10 years reveal exactly that.

Phenotype is an individual's observed category or measured level of performance for a trait. Its genotype (genetic merit) and the environment it experiences determine an animal's phenotype. Because genetic selection and environment—including management—drive expressed levels of performance over time, you can determine if genetic selection and management are working by studying annual changes in observed performance.

The tables provide average, adjusted phenotypic performance by birth year for the major traits included in NALF's performance program for all bulls and females recorded from 1997 to 2007. Adjusted weights and measures account

for the effects of age and age of dam on applicable traits.

Weight Watching

The Limousin breed has observed essentially no change in average calving-ease scores or birth weights over the past decade. Further study of calving-ease scores indicated, during the past 10 years, 91.9 percent of first-calf heifers calved unassisted, 5.2 percent required light assistance, 0.1 percent required cesarean section, and 0.3 percent offered various abnormal presentations. Among mature Limousin dams, 99.1 percent calved unassisted. Selection for sensible birth weight has been successful based on both phenotypic and genetic trends.

NALF has documented significant favorable trends in both sexes for weaning and yearling weights. Using 1997 as a benchmark, adjusted weaning weights for 2007-born calves indicate an increase of 40 and 32 pounds for bulls and heifers, respectively. More dramatic are the 97- and 49-pound increases in average adjusted yearling weights for each of the sexes.

At the same time, using 1997- and 2004-born cow data because only cows born in 2004 and earlier have 3-year-old and older weight data recorded, it is worthwhile to note frame size has remained constant, and mature cow

weights have declined by around 40 pounds. Those data indicate Limousin breeders have been successful at improving growth without correlated increases in observed birth weight, mature cow weight or calving difficulty.

Beyond the Balance

The phenotypic trend in adjusted yearling scrotal circumference (SC) represents what can be accomplished in a fairly short period of time through selection when dealing with a moderately heritable trait, the availability of effective selection tools [such as SC expected progeny differences (EPDs)] and breeders who are committed to genetic improvement. From 1997 to 2007, Limousin phenotypic trends document a 2.0-centimeter increase, on average, for Limousin bulls produced over that period. Based on research, you also can expect an associated improvement in age at puberty in their heifer contemporaries.

Similarly, average recorded phenotypes for docility indicate an improvement of 0.25 score units across both sexes over the past 10 years. Lower docility scores are more desirable, with 1 representing calm behavior and 6 described as aggressive. Different from docility scores, EPDs for docility are expressed in units of probability of acceptable behavior (that

Table 1.

Adjusted Phenotypic Means by Birth Year for Limousin, Lim-Flex® Bulls in the NALF Herdbook

	Calving-ease Score	Birth weight (lb.)	Weaning weight (lb.)	Yearling weight (lb.)	Scrotal circumference (cm)	Docility score	Ribeye area (sq. in.)	Intramuscular fat (in.)	Subcutaneous fat (in.)	Frame score
1997	1.06	85.1	606	1,051	32.8	1.64	14.5	2.73	0.17	6.1
1998	1.05	85.0	606	1,050	33.1	1.55	14.6	2.71	0.16	6.1
1999	1.05	85.1	619	1,064	33.0	1.46	14.5	2.70	0.16	6.2
2000	1.05	85.8	620	1,071	33.2	1.42	14.3	2.55	0.16	6.1
2001	1.05	85.8	627	1,071	33.3	1.39	14.4	2.63	0.16	6.1
2002	1.05	85.6	628	1,094	33.4	1.39	14.4	2.52	0.18	6.0
2003	1.05	85.4	634	1,095	34.0	1.39	14.6	2.64	0.18	6.2
2004	1.05	84.9	639	1,112	34.1	1.44	14.4	2.83	0.19	6.2
2005	1.04	84.7	639	1,124	34.1	1.37	14.5	2.86	0.20	6.0
2006	1.05	84.4	647	1,138	34.5	1.42	14.5	2.90	0.22	6.2
2007	1.06	85.2	646	1,148	34.8	1.39	14.8	2.93	0.23	6.0

is, docility scores 1 and 2), with higher EPDs being more desirable.

NALF also studied the phenotypic trends in yearling adjusted ribeye area (REA), percent intramuscular fat (IMF, an indicator of marbling) and subcutaneous fat (FAT) for those ultrasound-measured traits. While documenting phenotypic stability for

REA, encouraging increases in IMF for both sexes appear to be taking shape. The positive trend in observed FAT in both sexes is not necessarily a negative. Earlier compositional maturity and increased fleshing ability are economically desirable for female adaptability and days on feed for finishing, especially during times of high feed costs.

Awesome Advances

Based on documented phenotypic trends, Limousin breeders should take pride in having used selection and management effectively to produce seedstock with improved performance profiles. Commercial users of Limousin genetics are the beneficiaries of those breed improvements. **LW**

Table 2.

Adjusted Phenotypic Means by Birth Year for Limousin, Lim-Flex® Females in the NALF Herdbook

	Calving-ease Score	Birth weight (lb.)	Weaning weight (lb.)	Yearling weight (lb.)	Docility score	Ribeye area (sq. in.)	Intramuscular fat (in.)	Subcutaneous fat (in.)	Frame score	Mature weight
1997	1.02	80.2	552	833	1.69	12.5	3.38	0.20	6.1	1,279
1998	1.02	80.0	553	838	1.59	11.9	3.36	0.20	6.0	1,286
1999	1.02	80.4	562	857	1.54	12.7	3.62	0.26	6.1	1,306
2000	1.02	80.9	564	861	1.51	12.0	3.16	0.20	6.1	1,298
2001	1.02	80.9	570	872	1.47	12.3	3.27	0.23	6.1	1,298
2002	1.02	80.6	572	874	1.46	12.2	3.18	0.22	6.0	1,279
2003	1.02	80.5	580	875	1.46	11.8	3.22	0.20	6.1	1,238
2004	1.02	80.2	584	890	1.49	11.9	3.39	0.21	6.2	1,237
2005	1.02	79.8	581	893	1.45	12.3	3.48	0.25	6.1	1,182
2006	1.02	79.6	587	888	1.44	12.1	3.44	0.24	6.2	n/a
2007	1.03	80.2	584	882	1.43	12.1	3.71	0.26	5.9	n/a