

Factors Associated with Sow Stayability

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Summary and Implications

The purpose of this study was to determine the association of production factors with stayability to parity 4 (STAY 4), defined as the ability of a sow to reach 4th parity. Data was from the National Pork Producers Council Maternal Line National Genetic Evaluation Program, which included 6 genetic lines and consisted of 3,283 female pigs. Factors significant for STAY 4 included: farm, entry date, age at first farrowing, average daily gain, gilt backfat, and lactation prior to removal, feed intake, number born alive, and lactation length. Age at first farrowing and lactation feed intake in the lactation prior to removal had the greatest phenotypic relationships with sow longevity across genetic lines. A younger age at first farrowing under a uniform environment was positively related to length of productive life. Genetically, selection for a reduced age at first farrowing should increase sow longevity. However, a sow that is older at first farrowing may also be favorable for sow longevity. Commercial producers should strive to increase lactation feed intake through good management to ensure sow longevity.

Introduction

Sow longevity can be increased by improving both genetics and management. Heritability estimates for sow longevity indicate genetic selection for longevity is possible. However, direct genetic selection in nucleus herds for sow longevity is difficult. In order to maximize genetic progress, females are frequently culled before their genetic potential for longevity is reached. Traits measured on sows before their maximum longevity is reached may be used to indirectly select for sow longevity given a favorable genetic correlation exists. Therefore, it is important to know the genetic and phenotypic associations between sow longevity and other traits that can be measured earlier in a sow's life and potentially used to direct management decisions. The purpose of this study was to evaluate the phenotypic association of factors influencing stayability 4, defined as the ability of a sow to reach 4th parity, and to identify important factors related to sow longevity.

Material and Methods

The National Pork Producers Council Maternal Line National Genetic Evaluation Program (MLP) was initiated

to provide pork producers with unbiased information about differences in reproduction, growth, carcass, and meat quality traits in commercially available maternal genetic lines. Participation was open to all genetic lines and the following six genetic lines participated in the program: Newsham Hybrid (NH), National Swine Registry (NSR), American Diamond Swine Genetics (ADSG), Danbred (DAN), and two Dekalb-Monsanto lines (DK 44 and GPK 347). Entry and removal procedures were standardized in the MLP. Gilts entered 1 of 3 wean-to-finish barns on 3 separate entry dates. From the wean-to-finish barns, gilts were allocated evenly by genetic line to 1 of 2 new and identical breed-gestation-farrowing units. Upon arrival at the units, 10th rib, off midline, backfat thickness and loin depth were measured on all gilts using A-mode ultrasound (600 Series, A-Scan Plus, Sonic Industries, Ithaca, NY). Gilts that never farrowed were excluded from the analysis as they did not have lactation information. Crossfostering of piglets between litters occurred within 48 h of birth. Sows were removed if they failed to exhibit 2 estrus periods before 300 days of age, show estrus within 50 days of their last litter, or conceive in 3 mating periods. No sows were culled due to poor performance (i.e., litter size, litter weight) through 4 parities.

Stayability 4, defined as the ability of a sow to reach 4th parity, was the binary response variable. Categorical explanatory effects in the original model included arrival date to the wean-to-finish unit (entry date) and breed-gestation-farrowing facility (farm). Continuous explanatory effects gilt backfat (gilt BF), loin depth (LD), average daily gain (ADG), age at puberty (PUB), age at first farrowing (AFF), and lactation prior to removal pre-farrow backfat (BFIN), number born alive (NBA), number weaned (NW), weaning weight (WW), feed intake (LFI), backfat loss (BFLOSS), and lactation length (LL) were included in the model for the analysis of the traits evaluated. Quadratic terms were added where appropriate. All effects were nested within genetic line. The variables BFLOSS, BFIN, and LD were not significant in the original model, and thus were excluded from the final model. The mean of each continuous effect was subtracted from each observation in order to obtain interpretable non-linear regression coefficients.

Results and Discussion

Although the conditions between the two farms were very similar, farm had a significant effect across genetic lines. Sows tended to survive better on farm 1. These results are in agreement with those reported by the National Pork Producers Council (2000) where more ($P < 0.05$) sows reached the fourth parity from farm 1 (55.8%) than farm 2 (51.9%). The same study found that sows from farm 1 had

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lower ($P < 0.05$) gestation feed intake (2.20 vs. 2.27 kg) and higher ($P < 0.05$) lactation feed intake (5.31 vs. 5.13 kg) when compared to sows from farm 2. Although the National Pork Producers Council (2000) found lower gestation feed intake favorable for longevity, below some level of gestational feed intake is detrimental to longevity. There appears to be an intermediate optimum gestation feed intake level in relation to sow longevity.

Regression coefficients in the odds scale for gilt and sow traits are shown in Table 1.

Regression coefficients for age at first farrowing with stayability 4 were significantly different from zero for the NH, NSR, AD SG, DK 44, GPK 347, and DAN genetic lines (-0.014, -0.022, -0.017, -0.016, -0.011, and -0.021, respectively). Based on these results, an older age at first

farrowing may indicate return to estrus and/or other reproductive problems later in life. Age at puberty was not significant for stayability 4. However, when age at first farrowing was removed from the model, age at puberty was significant in a similar manner to age at first farrowing.

Regression coefficients for feed intake in the lactation prior to removal with stayability 4 were different from zero ($P < 0.05$) for the NH, NSR, AD SG, DK 44, GPK 347, and DAN genetic lines (0.043, 0.049, 0.051, 0.061, 0.120, and 0.097, respectively). In the present study, low lactation feed intake resulted in poorer stayability. It appears evident that sows should be managed to improve lactation feed intake within the range evaluated in order to improve sow longevity.

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Table 1. Estimates of regression coefficients for stayability 4 in the odds scale^a from the National Pork Producers Council Maternal Line National Genetic Evaluation Program.

Genetic line ^b	AFF, d ^c	LFI, kg/d ^c	ADG, kg/d ^c	LL, d ^c	LL*LL ^c	NBA ^c	Gilt BF, cm ^c
NH	-0.014 ***	0.043 **	-0.216	0.098 **	-0.035 **	0.078 **	38.6 **
NSR	-0.022 ***	0.049 **	-0.003	0.122 **	-0.016	0.010	44.5 **
ADSG	-0.017 ***	0.051 **	-1.329 ***	0.051	-0.030 **	0.099 ***	-13.0
DK 44	-0.016 ***	0.061 ***	0.229	0.013	-0.059 ***	0.012	68.1 ***
GPK 347	-0.011 **	0.120 ***	-1.421 ***	-0.002	-0.006	-0.006	13.7
DAN	-0.021 ***	0.097 ***	-1.365 ***	0.060	-0.067 ***	0.093 **	1.5

Intercept= 1.0898.

^aP < 0.10, **P < 0.05, ***P < 0.01.

^bNH= Newsham Hybrids, NSR= National Swine Registry, ADSG= American Diamond Swine Genetics,

DK 44= Dekalb-Monsanto DK 44, GPK 347= Dekalb-Monsanto GPK 347, and DAN= Danbred.

^cAFF= age at first farrow, LFI= lactation feed intake, ADG= average daily gain, LL= lactation length,

LL*LL= lactation length*lactation length (quadratic term) NBA= number born alive, and Gilt BF= gilt backfat.