GENETIC PARAMETERS AND TRENDS FOR WEANING-TO-FIRST SERVICE INTERVAL AND LITTER TRAITS IN A SWINE POPULATION COMPOSED OF LANDRACE, LARGE WHITE, AND THEIR CROSSES IN NORTHERN THAILAND

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SUMMARY
Commercial swine producers in Thailand use production and reproduction phenotypic records to choose replacement animals. However, estimates for WSI and litter traits are lacking in commercial populations composed of purebred and crossbred animals under Thai tropical conditions. The objective was to estimate genetic parameters and trends for WSI and litter traits. Direct and maternal heritabilities for litter traits were low (-0.02 to 0.02). Significant boar and sow genetic trends were low and negative suggesting phenotypic selection was ineffective to identify the best genotypes. Selection based on predicted genetic values would be advantageous to identify the best genotypes and improve genetic trends.

INTRODUCTION
Commercial swine producers in Thailand consider both production and reproduction traits in their genetic improvement programs. Litter traits such as number born alive (NBA), number of piglets at weaning (NPW), litter birth weight (LBW), and litter weaning weight (LWW) are normally used in swine selection programs. In recent years, commercial producers have begun to use weaning-to-first-service interval (WSI) to cull and select dams in commercial swine operations. This trait is economically relevant for the efficiency of commercial operations because it represents a non-existence and period for sows. Thus, swine commercial producers in Thailand need reliable estimates of genetic variability for WSI and litter traits as well as genetic correlations among these traits to carry out effective genetic improvement programs. Reported estimates of heritability in the hot and humid environment are low. In the assessment of WSI, litter traits, and permanent environment, environmental, and phenotypic correlations were computed for all traits. Computations were performed with ASREML.

MATERIAL AND METHODS
Animals, dataset, and traits. Data were collected from 1989 to 2008 in a commercial Landrace-Large White swine population composed of purebred and crossbred animals under Thai tropical conditions. The objective was to estimate genetic parameters and trends for WSI and litter traits in a commercial swine population composed of purebred Landrace, Large White, and reciprocal Landrace x Large White crosses in the province of Chiang Mai, northern Thailand.

Climate, feeding, and management. Mean temperature in northern Thailand was 26.2°C and mean humidity was 71.6%. Thai Meteorological Department, 2009). Seasons were winter (November to February), summer (March to June), and rainy (July to October). Mean temperature and humidity were 23.2°C and 68.7% in winter, 28.3°C and 65.0% in summer, and 27.1°C and 81.2% in the rainy season. Gilts and sows were housed in open barns with foggers (gilts and non-lactating sows) or dippers (nursing sows) activated when the ambient temperature surpassed 33°C. Boars were kept in closed barns with evaporative cooling. Boars, non-lactating sows, and gilts received a diet of 2.5% of estimated energy and 2.5% of protein. Pregnancy sows were kept in a breeding cage until approximately 7 days before parturition, and then returned to individual pens with 8 kg of piglets. Piglets were weaned at roughly 7 kg (28 to 30 kg at age). Estrus of gilts and weaned sows was detected by daily boar exposure. Gilts were inseminated at first estrus at 9 to 10 months of age. Sows were inseminated at the same boar (12 hours after detection of estrus and 12 hours after the first insemination).

RESULTS AND DISCUSSION
Heritabilities for direct genetic effects were low for WSI (0.04 ± 0.02) and litter traits (0.05 ± 0.02 to 0.06 ± 0.02). Most heritabilities for maternal litter traits were between 20% to 50% lower than their direct counterparts. Repatability for WSI was similar to its heritability whereas repeatabilities for litter traits ranged from 0.15 ± 0.02 to 0.18 ± 0.02. Direct genetic, permanent environment, and phenotypic correlations between WSI and litter traits were near zero. Direct genetic correlations among litter traits ranged from 0.06 ± 0.20 to 0.95 ± 0.05, except for near zero trends estimates between NBA and LWW, and LBB and LWW. Maternal, permanent environment, and phenotypic correlations were computed for all environmental and trends estimates in Figure 1, and environmental and trends estimates in Table 1. Boar genetic trends were small and significant (-0.03 to 0.05 kg/yr). Significant boar genetic trends were small, negative, and significant (-0.04 kg/yr) for NBA and 0.06 ± 0.03 for LBW, Pholsing et al., 2009; and 0.01 ± 0.02 for NPW and 0.08 ± 0.03 for LWW, Suwanasopee, 2006). The only available genetic correlations in Thailand were the near zero values between WSI and total number of piglets born in Landrace (-0.07 ± 0.03 for LWW; Imbonta et al., 2007). In addition to genetic parameters, estimation of genetic and phenotypic trends for WSI and litter traits would give information for Thai swine producers on the effectiveness of their genetic improvement and management programs. Published genetic trends in Thailand were for WSI (0.001 ± 0.01 kg/yr) and for total number of piglets born (0.02 ± 0.02 kg/yr) in Landrace (Imbonta et al., 2007). Estimation of genetic and phenotypic correlations between WSI and litter traits, and genetic trends for these traits have not been done in Thai swine populations composed of purebred and crossbred animals. Thus, the objectives of this study were to estimate genetic parameters and trends for WSI and litter traits in a commercial swine population composed of purebred Landrace, Large White, and reciprocal Landrace x Large White crosses in the province of Chiang Mai, northern Thailand.

Although estimates of genetic parameters estimated here for WSI and litter traits were low, they were similar to values found in other swine populations in Thailand and in other countries. However, genetic trends were also low. Thus, the current phenotypic evaluation and selection program would need to be replaced with one based on genetic predictions. One alternative would be to implement a multiple-trait system for litter traits and single-trait system for WSI. It would also be desirable if several farms joined forces to create a larger breeding population. In such an endeavor, the likely increase in the number of animals identified for breeding would be advantageous to the entire country. To identify the best animals, temporary environmental deviations, and litter year last squares means were used to evaluate genetic, permanent, environmental, and environmental trends, respectively.

REFERENCES

CONCLUSIONS
Although estimates of genetic parameters estimated here for WSI and litter traits were low, they were similar to values found in other swine populations in Thailand and other countries. However, genetic trends were also low. Thus, the current phenotypic evaluation and selection program would need to be replaced with one based on genetic predictions. One alternative would be to implement a multiple-trait system for litter traits and single-trait system for WSI. It would also be desirable if several farms joined forces to create a larger breeding population in the region. This would increase the likelihood of identifying outstanding animals, and consequently improving genetic traits in the swine population. This country system may also serve as a model for future regional and national swine genetic improvement programs in Thailand.