

GENETIC TRENDS FOR LITTER AND PERFORMANCE TRAITS IN THREE GGP SWINE FARMS VIETNAM

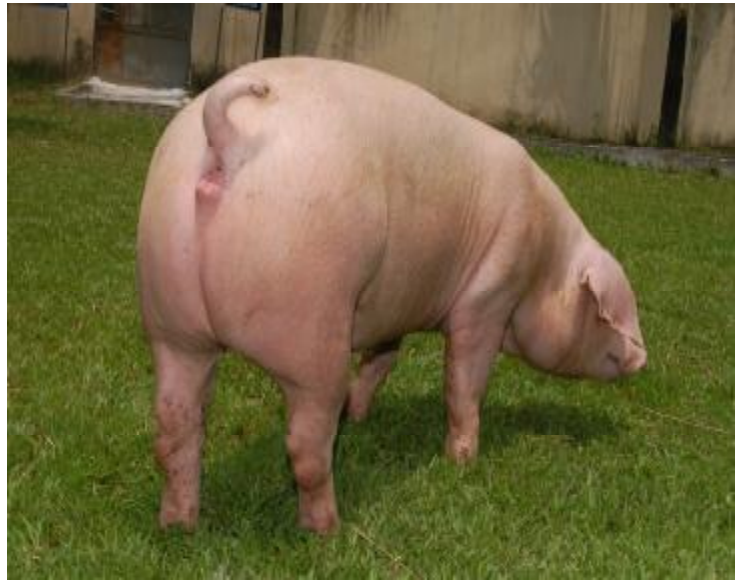
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INTRODUCTION

The estimation of genetic trends is crucial to optimize animal breeding schemes and to obtain optimal response to selection for any animal breeding program. In Vietnam, the program for genetic evaluation in swine has run at some GGP farms by Institute of Agricultural Sciences for Southern Vietnam since 2005. Therefore, selected lines like Yorkshire, Landrace and Duroc can be used to study the genetic trends of reproduction and performance traits, including number born alive, litter weight at 21-day, days to 90kg liveweight and backfat at 90kg liveweight.

DATA COLLECTION

Data sets of reproduction and production traits were obtained in the pure breeds of Yorkshire, Landrace and Duroc pigs born between 2000 and 2011 at three GGP stocks in Vietnam, including Binh Thang, Dong A and Thuy Phuong farms. Genetic linkages across breeding farms have been presented through the annual genetic exchange among farms. Litter records were adjusted to number of piglets born alive (NBA) and litter weight (kg) at 21-days (LW21) based on parity, age



weaned and number of weaned piglets. Performance test records were adjusted to days to 90kg (D90) and backfat (mm) at 90kg liveweight (BF90) based on age finished, weight finished, backfat at age finished and sex. After adjusting for all measurements using the recommendations of National Swine Improvement Federation, United States (NSIF, 2002), data structure is indicated as in Table 1. The breeding values (EBV) were estimated by BLUP using PEST software (Groeneveld, 2003) by the mixed animal models.

Table 1. Data structure of Yorkshire, Landrace and Duroc pigs born between 2000 and 2011

Items	Landrace	Yorkshire	Duroc
Litter traits			
- Number of litters	4,256	4,068	1,759
- Number of parities per sow	3.4	3.6	3.1
- NBA (piglet, Mean \pm SD)	9.85 \pm 2.62	9.87 \pm 2.89	7.95 \pm 2.78
- LW21 (kg, Mean \pm SD)	58.92 \pm 9.83	57.86 \pm 8.25	54.41 \pm 7.91
Performance traits			
- Number of tested pigs	9,468	7,559	5,079
- D90 (day, Mean \pm SD)	180.6 \pm 17.4	180.7 \pm 18.3	176.6 \pm 16.2
- BF90 (mm, Mean \pm SD)	9.81 \pm 2.32	9.93 \pm 2.13	9.95 \pm 2.38

Genetic trends for litter and performance traits

Between 2000 and 2004, the period of without program for BLUP genetic evaluation applied, the genetic trends of NBA and LW21 were improved unreliably in all of Yorkshire, Landrace and Duroc pigs.



The fluctuations of genetic trends for NBA reflected the situation that these GGP swine farms could apply little selection for this traits or no selective response for this period (figure 1). Similarly for LW21 trait, due to little interest in selection during the past years, the genetic trend of this trait was very slightly improved between 2000 and 2004 (figure 2). Another reason maybe for this status is very low

heritability for litter traits. So, conventional selection procedures based only on phenotypic evaluation did not result in any genetic improvement for NBA and LW21 traits.

For performance traits as shown in figure 3 and 4, generally, the rate of genetic improvement for both D90 and BF90 was positive and rather steady from 2000 to 2004, even though without program for BLUP genetic evaluation applied. In this period, the average rate of genetic improvement was around 0.4 day per year for D90 and 0.03 mm per year for BF90 traits. Because of high and medium heritability, the traits of BF90 and D90 can be improved more clearly than litter traits by individual selection based on phenotypic evaluation.

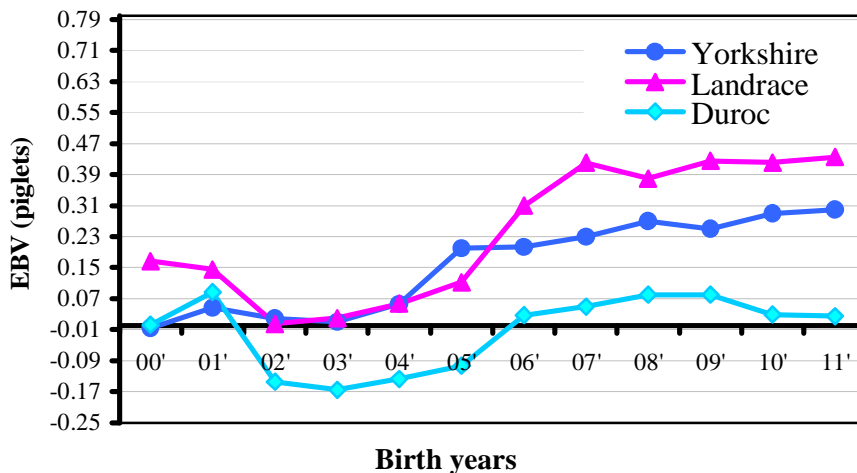


Figure 1. Genetic trends for number born alive

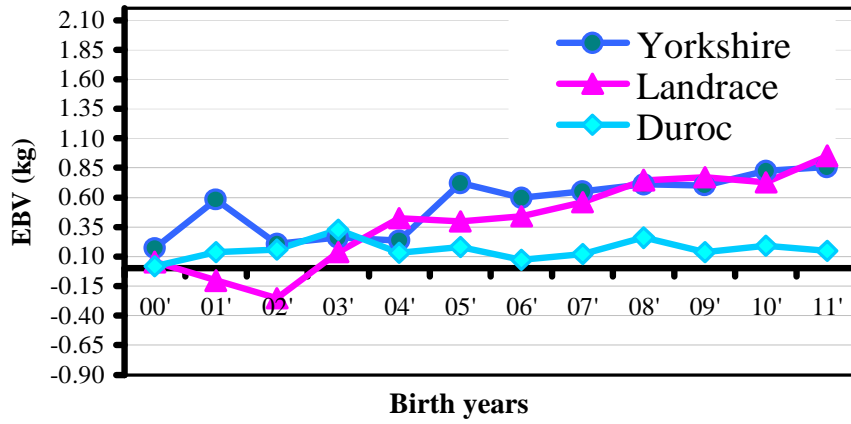


Figure 2. Genetic trends for litter weight at 21 days

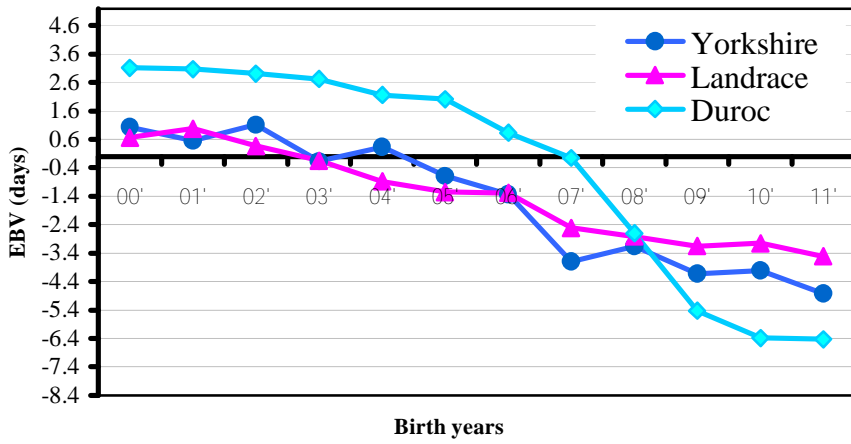


Figure 3. Genetic trends for days to 90kg

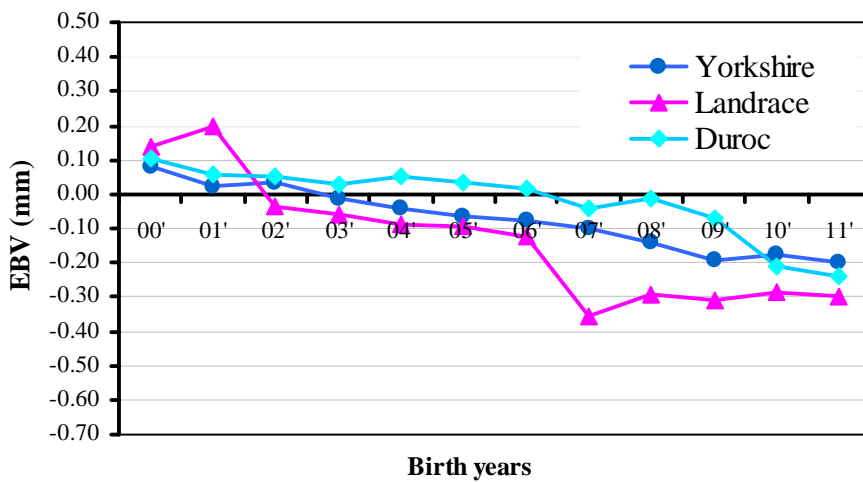


Figure 4. Genetic trends for backfat at 90kg

Since 2005, the program for across-herd genetic evaluation using BLUP procedure has been applied for three GGP farms mentioned in this study. For this breeding program, the selection indices based breeding values of litter and performance traits like SPI (combined NBA and LW21 trait) and MLI (combined NBA, LW21, D90 and BF90 trait) had been constructed and applied for gilts and sows selection in pure lines Yorkshire, Landrace and Duroc. Perhaps this genetic evaluation program has sped up the genetic progress of selected traits in breeding objectives. Between 2005 and 2012, average genetic improvements were 0.02 – 0.06 piglets per litter for NBA; 0.1 – 0.5 kg per litter for LW21; 0.4 – 1.0 days per year for D90 and 0.01 – 0.05 mm per year for BF90.

Thus, the high efforts in applying across-herd genetic evaluation program for GGP pig farms in Vietnam had obtained the certain breeding objectives during six past years. However, for each trait, the genetic improvement was not steady for every year during the study period. The reason for this status is that the individually genetic evaluation had been based on selection indices combined by some traits like SPI (sow production index), TSI (terminal sire index) and MLI (maternal line index). Therefore, the program of across-herd genetic evaluation BLUP and also the exchange of genetic resources among GGP pig farms should be supported to maintain for a long time, so that the genetic improvement for litter and performance traits would be sped up more rapidly in Vietnam.