G4.35 Direct genetic, maternal genetic and common environmental effects on Landrace and Duroc piglet growth

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INTRODUCTION

Landrace is excellent in reproduction traits, having more piglet number and large amount of lactation. On the other hand, though **Duroc** is excellent in meat production traits, less in reproduction traits (such as piglet number and lactation.
It is very interesting to clarify what difference exists in sow's maternal genetic and litter environmental effects on the piglet growth of both breeds.

OBJECT

This study investigates direct (h^2) genetic effect, maternal (m^2) genetic effect, and litter common environmental (c^2) effect on early growth for Landrace (L) and Duroc (D) piglet.

MATERIALS AND METHODS

Breed	Piglet number	Sows	Boars
Landrace	2998	70	294
Duroc	2606	100	296

Management

	Creep feeding time	Weaning time
Landrace	2 weeks after birth	5 weeks of age
Duroc	1 week after birth	4 weeks of age

Statistical methods ：Univariate mixed linear animal models were used to estimate variance components of each piglet weight of birth weight, 1, 2, 3, 4, 5 and 8 weeks of age. A mixed linear animal model was used for the analyses. $y=Xb + Z_c c + Z_m m + Z_a a + e$. Where y is the observations on piglet weight,: X and Z are incidence matrices relating the observations to the fixed and random effects, respectively; b is a vector of fixed effects; c is a vector of random litter environmental effects; m is a vector of maternal genetic effects; a is a vector of direct genetic effects of the pigs; and e is a vector of random residual effects. The total number of weaned piglet per litter was fitted as a linear covariable for all piglet traits. Genetic analysis were performed Gibbs sampling method using VCE4.25.

RESULTS

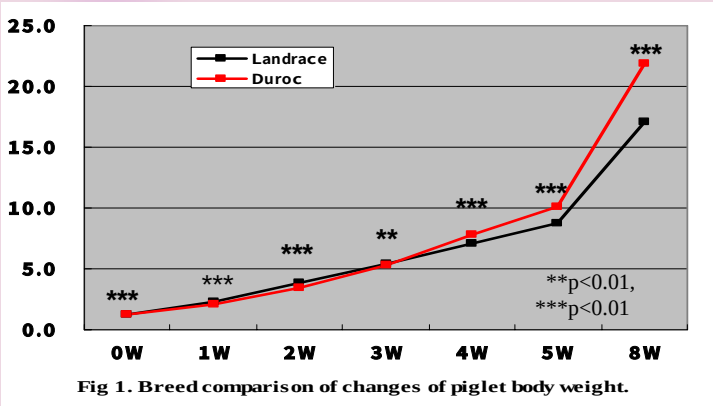

Fig 1. Breed comparison of changes of piglet body weight.

Landrace：Results are as follows.
c^2 : 0.20 ～ 0.34 during birth to 8 weeks).
m^2 decreased with age from 0.20 to 0.05.
h^2 varied from 0.02 ～ 0.13.

Duroc：Piglet weight was influenced mainly by maternal genetic effects until 4 weeks and then, m^2 decreased from 0.37 0.21.
c^2 varied with age (0.12 ～ 0.25) between 0 and 8 weeks.
h^2 increases from 0.09 to 0.39 between birth and 8 weeks.
m^2 and h^2 are reversed after weaning; 6 weeks in Landrace and 5 weeks in Duroc breed. This suggests that the weaning promote the expression of individual direct genetic effect. **(Fig 2.)**

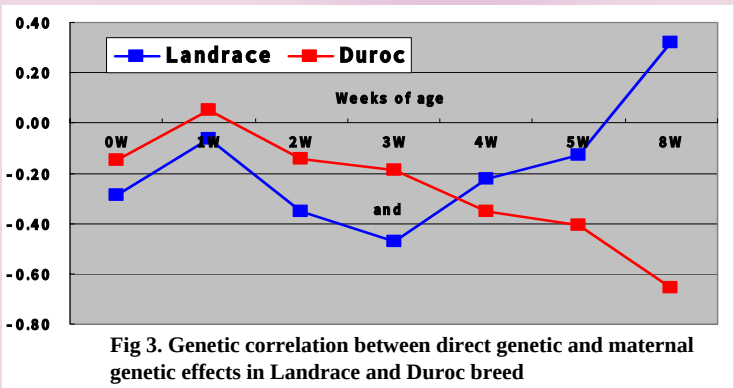

Fig 3. Genetic correlation between direct genetic and maternal genetic effects in Landrace and Duroc breed

Piglet body weights of Duroc at birth were significantly heavier than Landrace. Afterwards, Landrace piglets were heavier than Duroc piglets up to 3 weeks of age. Since 4 weeks of age, Duroc piglets were significantly heavier than Landrace piglets **(Fig 1.)**

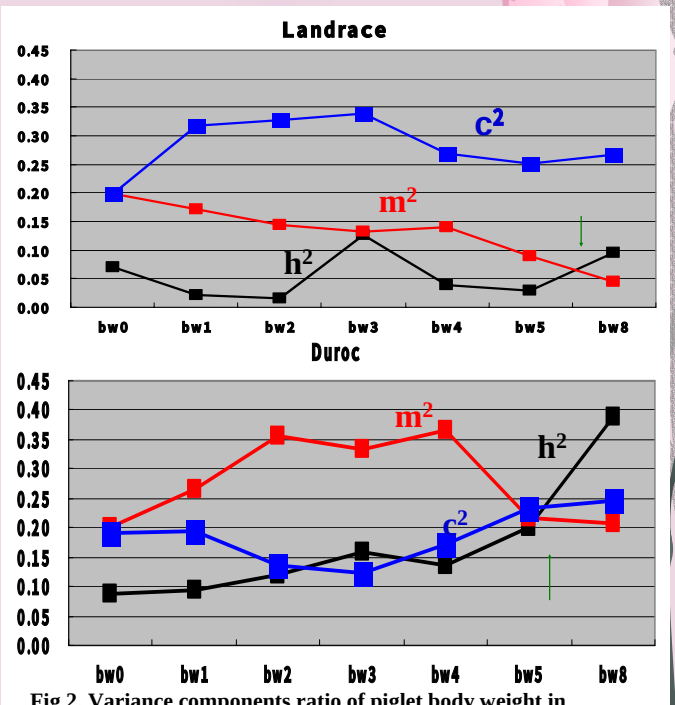

Fig 2. Variance components ratio of piglet body weight in Landrace and Duroc breed.

The genetic correlation between maternal genetic effect and direct genetic effect of both breeds have same tendency and decreased up to 3 weeks of age. In Duroc breed, the correlation decreases afterwards. On the other hand, in Landrace breed, the genetic correlation has changed toward positive up to 8 weeks **(Fig 3.)**. But standard errors of genetic correlation were large in both breeds (0.14 – 0.43). It is necessary to confirm this correlation by a large-scale examination.

CONCLUSION

Unfavorable and favorable correlations between maternal genetic effects and direct genetic effects for piglet growth trait are found in Duroc and Landrace breed, respectively. This seems due to ① the breed difference in amount of milk production of sows and the difference of ② the creep feeding time of both breeds (Landrace: 2 weeks of age, Duroc: 1 week of age).