STUDIES OF PRODUCTION AND CARCASS TRAITS OF THREE EXOTIC PIG BREEDS IN SOUTH VIETNAM

L.T. Hai [1]; N.T. Vien[1] and N.V. Duc [2]

[1] Institute of Agricultural Science of South Vietnam, 121 NBK, Q. 1, HoChiMinh City, Vietnam.
[2*] Animal Genetics and Breeding Unit (AGBU), UNE, Armidale, NSW, 2351,

SUMMARY

Data from 3 piggeries in south Vietnam, with 352 three-breed cross, 75 backcross, 30 F1 and 73 pure Yorkshire pigs have been used for this study. Three-breed cross groups had the lowest fattening period, feed conversion ratios, backfat thickness and highest lifetime and testing period daily gain, dressing percentage, and lean meat percentage, followed by backcross, F1, and straightbred groups. Estimates of heritability of FP, TDG, FCR, DP, LMP and BF were 0.24 ± 0.07, 0.25 ± 0.09, 0.19 ± 0.10, 0.29 ± 0.04, 0.70 ± 0.04 and 0.49 ± 0.05 respectively. A high negative genetic correlation existed between TDG and FP (r = -0.56 ± 0.09), moderate with FCR (r = -0.29 ± 0.07), and low with BF (r = -0.16 ± 0.09). There was a low genetic correlation between FCR and BF (r= 0.21 ± 0.09). LMP and BF had a high negative genetic correlation (r = -0.58 ± 0.08).

Keywords: Pigs, crossbreeding, growth, carcass, heritability, correlation

INTRODUCTION

The importance of the pig industry is undisputed in Vietnam. Pig meat accounts for about 75% of meat production in Vietnam (Cuc 1995). Profits are not being maximised because of inefficiencies and lack of selection for growth rate, feed conversion ratio and lean meat percentage. Selecting for faster growing, leaner, and lower feed conversion ratio pigs is needed for the Vietnamese industry in order to satisfy both the domestic and export demand as well as to increase profitability in the pig industry. The purpose of this study was to compare some important production and carcass performance traits among three exotic breed crosses, backcrosses, F1 and pure Y genotype pigs rearing in south Vietnam.

MATERIALS AND METHODS

Experimental design. Data on 352 three-breed Duroc (DR), Landrace (LR) and Yorkshire (Y) [DRx(YxLR) or (DRxLR)x(YxLR)], 75 backcross [LRx(YxLR)], 30 F1(YxLR) and 73 straightbred (Y) pigs recorded at three piggeries (Phuoc Long, 3/2 and Phu Son around Ho Chi Minh City) bred from 1993 to 1995, were used for determining least square means for fattening period (FP), lifetime average daily gain (ADG), testing period daily gain (TDG), days to market weight (DAY) and feed conversion ratio, kgs feed per kg gain (FCR). The fattening period (FP) was taken at the same age for all breeds (70-180 days) with initial live weight at approximately 21

[*] AGBU is a joint institute of NSW Agriculture and The University of New England.

kg. BF was recorded with ultrasound using the Renco machine (USA) at the end of the test period. From these pigs, 99 were slaughtered at random to study dressing (DP), lean meat percentage (LMP) and backfat thickness *AGBU is a joint Institute of NSW Agriculture and The University of New England. (BF). The experiment was divided into 2 periods 70 - 130 days and 130 - 180 days because of different nutrient requirements for growing and finishing periods.

Statistical analysis. Data were analysed using Least Squares Mixed Model procedure (Harvey 1985). The basic model included the effect of breed genotypes, piggeries, years, and their interaction for different traits.

RESULTS AND DISCUSSIONS

Production. Least squares means and standard errors are presented for the main effect of breed genotypes for FP, TDG, FCR, DP, LMP and BF in Table 1.

Table 1. Estimated means and standard errors of production and carcass performance

Traits	Breeds			
	DR x (YxLR)	LR x (YxLR)	Y x LR	Y x Y
Off-test (kg)	89.05±0.76	85.45±0.79	85.08±1.69	82.41 ± 0.72
ADG (g/d)	486.9±7.9	466.9±11.1	464.9±15.3	450.2±8.7
DAY (days)	182±1.06	189±1.15	190±1.66	194±1.06
TDG (g/d)	616.1±7.6	579.8±9.7	574.5±14.4	556.5±8.8
FCR (kg/kg)	3.35±0.09	3.51±0.10	3.55±0.17	3.65±0.10
DP (%)	82.50±0.45	80.50±0.79	80.22±0.99	79.46±0.84
LMP (%)	56.63±0.52	55.03±0.69	54.61±0.87	53.95±0.58
BF (mm)	14.61±0.56	16.21±0.67	17.00±0.94	17.78±0.66

TDG for these four genotype groups was significantly different. To obtain the market weight (90 kg), a fattening period of 124, 120, 119 and 112 days for pure, F1, backcross and three-breed crosses were needed. Thus, to decrease FP, three-breed crosses with 25 - 50% of DR may be useful. Three-breed crosses had 7 - 8 and 12 days shorter FP for reaching market weight compared with two-breeds and purebreds. The TDG was highest in three-breed cross pigs, followed by backcross pigs, F1 and the lowest was pure Y. The higher TDG in three breed crosses may be due to the contribution of DR breed and/or heterosis. The TDG are highly significant between genotype groups ($p < 0.01$), except for between F1 and backcross groups. The TDG in this study was lower than those found by Young (1995).

FCR was lowest in the three-breed crosses, followed by backcross and F1 with the pure Y breed being the highest. Three-breed crosses had lower FCR's by 0.15 and 0.30 units when compared with two-breed crosses and purebreds. These results are similar to 3.39 - 3.65 (Hai *et al.* 1995) which illustrated the advantage in FCR of the three-breed crosses where they have 25-50% of DR.

However, this value for three-breed crosses was higher than that found by Nghi *et al.* (1995). The estimates of DP of four genotype groups in this experiment were 82.50, 80.50, 80.22 and 79.46%. DP was higher than that of 80.46 - 80.76% (Hai *et al.* 1995) and lower than that found by Nghi *et al.* (1995).

LMP, the percentage of meat content, is one of the most important traits among pig production traits. The three-breed groups were superior in this trait, followed by backcrosses, F1 groups, and pure Y (Table 1). There was a highly significant difference between crosses and purebred ($p < 0.01$), but no significant difference between backcrosses and F1. These estimates were lower than those of 57.7 - 58.3% (Nghi *et al.* 1995).

The BF was least in three-breeds (14.61 mm), two-breed crosses were intermediate (17.00 and 16.21 mm), and pure Y was the highest (17.78 ± 0.06 mm). These differences are highly significant ($p < 0.01$). This estimate agrees with value reported by Nghi *et al.* (1995).

Heritability. The estimate of heritability of TDG of our experiment was 0.25 ± 0.09. Our value was higher than that found by Bidanel *et al.* (1996). Our heritability estimate for FCR was 0.19 ± 0.10. This finding was lower than those found by De Haer and De Vries (1993). The heritability estimates for DAY and DP in this study were 0.24 ± 0.07 and 0.29 ± 0.04. The heritability for day to market weight was lower than those for day to 100 kg live weight found by Li and Kennedy (1994), who found a range of 0.26 to 0.32 in different white breeds.

The estimate of heritability of this experiment for LMP was high, at 0.70 ± 0.04, which was lower than that of 0.80 (Rydhmer *et al.*, 1992), but higher than those of 0.63 ± 0.03 (De Haer and De Vries 1993). Our estimate of heritability for BF was 0.49 ± 0.05 and similar to that from the study by Bidanel *et al.* (1996). Short *et al.* (1994) estimated heritability at 0.51 - 0.55.

Estimates of heritability for LMP and BF in our experiment were high, indicating that these traits can be selected for relatively easily. Heritability estimates for TDG, FCR, DAY and DP were moderate indicating these traits may be selected for and gains could also be made by use of heterosis in crossbreds. These findings highly agree with De Haer and De Vries (1993); Short *et al.* (1994); McPhee *et al.* (1995) and Bidanel *et al.* (1996).

Genetic Correlation. In our study, a high negative genetic correlation between TDG and FP was evident ($r = -0.56 \pm 0.09$). This indicates that where pigs grew faster, the FP might be shortened to achieve market weight. By selection for high TDG, the ratio of meat per unit area of housing will be increased and profitability may be also increased.

A moderate negative genetic correlation between TDG with FCR ($r = -0.29 \pm 0.07$), and a low correlation with BF ($r = -0.16 \pm 0.09$) was found in our study. Our estimated values were lower than results found by Pathiraja *et al.* (1990). However, this finding is higher than that of 0.13 found by Bidanel *et al.* (1996). These estimates explain that fast gains tend to be associated with low feed required per unit of gain. The genetic relationship between TDG and FCR as well as between TDG and BF are economically favourable.

The genetic correlation between FCR and BF traits ($r = 0.21 \pm 0.09$) was favourable in our experiment. This indicates that lower FCR genotypes may have lower BF. This finding was lower than the estimates found by Pathiraja *et al.* (1990).

The favourable genetic relationship between LMP and BF is indicated by a large negative correlation between them ($r = -0.58 \pm 0.08$). This indicates that genotypes which have high lean meat percentage have lower BF. This estimate was close to the results of Duc *et al.* (1991). This means that selection to decrease backfat thickness will result in an associated increase in lean meat percentage in the carcass.

In conclusion, based on the main production and carcass traits examined in this study, three-breed genotype pigs was more productive than backcross, F1 and purebred genotypes. Duroc-sired pigs grew faster, had less BF, lower FCR and were younger off-test than Y- or Landrace-sired animals. Therefore, to get more lean, faster growing and higher profitability pigs, three exotic pig crosses, 25 - 50% with DR breed may be useful. By using hybrids with 25 - 50% DR, profitability can be increased by their fatter growing, lower FCR and leaner pigs.

REFERENCES

Bidanel, J.P.; Gruand, J. and Legault, C. (1996) *Genet. Sel.* **28**:103.

Cuc, N.S. (1995) *Nongnghiep Vietnam (1945-95)* [Agriculture of Vietnam]. NXB Thongke. Hanoi.

De Haer, L.C.M. and de Vries, A. G. (1993) *Livest. Prod. Sci.* **36**:223.

Duc, N.V.; Thien, N. and Vinh, N.V. (1991) *KHCNTY.*[Proc. Agr. Tech. Sci]. Hanoi. May, 11-14.

Hai, L.T.; Giai, D.V.; Dai, L.P. and Phuong, V.T.L. (1995) *Pig News and Info.* **16**:61.

Harvey, W.R. (1985) User's Guide for LSMLMW. The Ohio State Univ., Columbus, OH, (Mimeo).

McPhee, C.P.; Macbeth, G.M. and Smith, P.R. (1995) *Proc. Aust. Assoc. Anim. Breed. Genet.* **2**:573.

Nghi, N.; Hai, L.T. and Thao, P.B.N. (1995) *Hoi nghi KHCNTY.* Th 9 p.173. HoChiMinh City.

Pathiraja, N.; Mandisodza, K.T. and Makuza, S.M. (1990) *4th World Congr. Genet. Appl. Livest. Prod.*, **xiv**:383.

Rydhmer, L.; Johansson, K.; Stern, S. and Eliasson-Selling, L. (1992) *Acta. Agric. Scand.*, **42**:211.

Short, T.H.; Wilson, E.R. and McLaren, D.G. (1994) *5th World Congr. Genet. Appl. Livest. Prod.* **17**:413.

Young, L.D. (1995) *J. Anim. Sci.* **73**: 3534.