COMPARING THE PERFORMANCE OF AUSTRALIAN AND VIETNAMESE PIG BREEDS

Prof Dr Le Thanh Hai, Che Quang Tuyen, Le Pham Dai, Vu Lan Phuong, Nguyen van Cuong and Dr Cam McPhee[1]

Institute of Agricultural Sciences of South Vietnam, 121 Nguyen Binh Khiem Str, Dist. I, Ho Chi Minh City, Vietnam
[1]Department of Primary Industries, Animal Research Institute, Yeerongpilly, Queensland, 4105 Australia

SUMMARY: As part of Australian Centre for International Agricultural Research supported project 'Breeding and feeding pigs in Australia and Vietnam', herds of Australian Yorkshire or Large White (AY) and Duroc (AD) were bred from Australian breeding stock sent to the Institute of Agricultural Sciences of South Vietnam's Pig Research Centre at Binh Thang in 1995. Comparisons were made between Australian and Vietnamese stock in performance and reproductive traits. Used both as pure and cross, the Australian breeds showed significant advantage over Vietnamese breeds in growth, efficiency and carcass lean and in littering performance.

Introduction

Herds of Australian Yorkshire and Duroc were established at the Binh Thang Research Centre from introductions made in 1995. The number of young stock and number of breeding animals in the herd in December 2000 are given in Table 1. This paper gives the results of grower performance comparisons made between Australian and Vietnamese stock in the research centre and on farms. It also compares the littering performance of Australian sows and Vietnamese sows mated with semen from Australian boars used in artificial insemination. An economic benefit from using the Australian stock is estimated.

Table 1. The number of young stock imported from Australia in October 1995 and number of breeding animals in the herd in December 2000

Breeds	October 1995			December 2000		
	Gilts	Boars	Total	Gilts	Boars	Total
Yorkshire	6	11	17	65	8	73
Duroc	6	10	16	26	5	31
Total	12	21	33	91	13	104

Australian pure Yorkshire (AY) and Duroc (AD) were crossed with Vietnamese Yorkshire (VY) and Duroc (VD) at the Binh Thang Center, and the numbers of progeny supplied to farms are given in Table 2. A total of 1375 animals have been sent to breeding farms, AI Stations and commercial farms in 17 provinces.

Table 2. Numbers of Australian pure and crossbred stock supplied to farms for breeding

Breed	Sow		Boar		Total
	Pure	Cross	Pure	Cross	
Yorkshire	198	334	210	205	947
Duroc	103	54	172	99	428
	301	388	382	304	
Total	689		686		1375

Performance traits

Grower performance

Growth rate, food conversion efficiency, carcass quality

A comparison of growth rates and food conversion ratios of individually performance tested VY and AY and their crossbreds AVY are given in the Table 3.

Table 3: 14 week post-weaning growth rates and food conversion ratios of individually performance tested boars of Australian and Vietnamese Yorkshire and their crosses

	Breed			
Trait	**VY**	**AY**	**AVY**	**Signif. p**
ADG (g)	635.56 ± 19.7	687.72 ± 2.8	685.15 ± 21.2	0.09
FCR (unit)	3.2	3.	3.1	0.10

Pure Australian pigs and crosses between Australian Yorkshire and Vietnamese Yorkshire grow faster, and use feed more efficiently than pure Vietnamese Yorkshire.

The results of performance comparisons of crosses between Australian and Vietnamese Yorkshire (AVY) and between Vietnamese Local (Thuoc Nhieu) and Vietnamese Yorkshire (LVY) are given in the Table 4.

Table 4: Growth and carcass lean (%) of crosses between Vietnamese Yorkshire and Australian Yorkshire(AVY) and a local breed (LVY)

Trait	**LVY**	**AVY**
ADG (g)	532	600-675
FCR (unit)	3.07	2.88
Carcass lean (%)	45 – 49	56 - 57

From Table 4 we can see that the cross between Australian and Vietnam Yorkshire grow faster than that of the local cross and the FCR is also lower. Also the average carcass lean percentage of the Australian cross is considerably higher than the local cross. Due to the superiority in growth rate and food conversion efficiency, the Yorkshire cross was 6-12% more profitable than the local breed cross. The carcase lean content of the former also gave them a considerable market advantage.

A performance comparison was also carried out in North Vietnam between smallholder and state farm strains of Yorkshire both pure and crossed artificially with Australian Yorkshire (AY). The best for growth rate, food efficiency and carcase quality was the AY x state farm breed cross.

Reproductive traits

Boar Performance

Artificial Insemination Centres

Artificial Insemination centres for pigs have been opened in five provinces with ACIAR and AUSAID support. A typical one is the centre opened in Nov 2000 at Binh Thuan. It houses 10 Australian Yorkshire boars selected from the nucleus herds at the Binh Thang Centre. Semen is collected early in the morning and sent out to district agents. Farmers buy the doses from the agents and inseminate their own sows on the same day of collection. A single 50 ml dose costing $2 (value of a pack of cigarettes) is used per mating achieving a conception rate of around 80%. Natural matings from a travelling boar cost $8 and are in decline. The centre also has a 50-sow multiplier herd, producing crossbred sows for local farmers.

Semen Quality

From Table 5 it can be seen that Australian Yorkshire boars can produced from 3-5 doses per collection more than local boars so that the price of one semen dose of Australian Yorkshire boars is 5-10% cheaper than that of a Vietnamese boar.

Table 5. Volume, viability and density characteristics of the semen of Australian and Vietnamese Yorkshire (AY, VY) and the number of insemination does per collection

Breed of boar	**V (ml)**	**A (%)**	**C (millions)**	**VAC**	**Number of doses**
Local Yorkshire	160	82	180	236	8-10
Aust Yorkshire	180	87	200	313	10-15

Because of high semen quality, the conception rate of sows inseminated by Australian boars was higher than those inseminated by Vietnamese boars as seen in Table 6.

Table 6: Rates of conception in sows artificially inseminated by Australian and Vietnamese boars

Breed of boar	Sows inseminated	No of Conceptions	%
Local VN Yorkshire	2,500	1,900	76
Aust Yorkshire	1,500	1,215	81

Number of piglets per litter

The number of piglets born alive/litter from sows inseminated by Australian boars was from 1-2.5 higher than from sows inseminated by Vietnamese boars, and the weaners/litter/sow was 0.8-1.6 greater.

Due to this advantage, the litter of a sow inseminated by an Australian boar is 100,000-200,000 VND more profitable that the litter of the sow inseminated by a VN boar.

Sow performance

Littering traits

Litter indices (LI: litters/sow/yr) for sows of the Australian (AY, AD) and Vietnamese breeds (VY, VD) and their crosses are given in Table 7.

Table 7. Litter indexes of pure and cross Australian and Vietnamese Yorkshire (AY, VY) and Duroc (AD, VD) sows on state farms

Yorkshire

Years	96- 97		1998		1999		2000	
	Sow No	LI	Sow No	LI	Sow No	LI	Sow No	LI
AY	25	1.91	33	1.94	42	1.98	55	2.08
AY x VY	5	1.95	25	1.98	35	2.06	42	2.14
VY	45	1.92	32	1.94	23	1.96	15	2.00
AD	14	1.88	20	1.89	22	1.86	30	1.98
AD x VD	6	1.86	12	1.88	18	1.90	22	1.95
VD	18	1.80	12	1.85	10	1.92	10	1.90

The Litter index is highest for AY, AD and AY x VY. The LI of Yorkshire sows is higher than Duroc. The LI of Crossbred sows (AY x VY) is higher than that of purebreds (AY, VY)and improved from 2.06 in 1999 to 2.14 in 2000. The LI of AD sows is a little lower than AY but higher than VD and AD x VD sows.

Other littering traits measured on Australian and Vietnamese Yorkshire and Duroc and their crosses are given in Tables 8 and 9.

Table 8. Littering traits measured on Australian (AY) and Vietnamese (VY) Yorkshire and their crosses

Traits	Genotype	96 –97	1998	1999	2000
		Mean + se			
Total piglets born	AY	9.8 + 1.8	10.3 + 1.3	9.9 + 1.2	10.2 + 1.0
	VY	9.4 + 1.1	9.6 + 1.1	9.5 + 1.4	9.6 + 1.2
	AY x VY	10.0 + 1.8	10.3 + 1.6	10.5 + 1.4	10.8 + 1.3
Number born alive	AY	9.4 + 1.0	9.6 + 0.8	9.5 + 1.1	9.8 + 0.8
	VY	8.9 + 0.8	9.3 + 0.9	9.1 + 1.0	9.2 + 0.9
	AY x VY		9.5 + 0.7	10.1 + 0.7	10.3 + 0.8

Piglet birth weight	AY	1.4 + 0.3	1.45 + 0.3	1.3 + 0.5	1.3 + 0.4
	VY	1.3 + 0.3	1.25 + 0.2	1.3 + 0.3	1.3 + 0.2
	AY x VY		1.35 + 0.4	1.3 + 0.4	1.4 + 0.3
Litter size at 21 days	AY	9.2 + 0.4	9.3 + 0.3	9.2 + 0.3	9.6 + 0.4
	VY	8.7 + 0.3	8.9 + 0.2	8.8 + 0.3	9.0 + 0.3
	AY x VY		9.3 + 0.3	9.5 + 0.2	9.9 + 0.3
Piglet weigh at 21 days	AY	6.0 + 0.6	5.9 + 0.4	6.1 + 0.3	6.1 + 0.4
	VY	5.6 + 0.4	5.5 + 0.3	5.5 + 0.3	5.7 + 0.5
	AY x VY		6.1 + 0.4	6.2 + 0.4	6.0 + 0.4
Weaners/litter	AY	8.9 + 0.3	9.0 + 0.4	9.0 + 0.3	9.3 + 0.3
	VY	8.0 + 0.2	8.3 + 0.3	8.4 + 0.3	8.5 + 0.5
	AY x VY		9.1 + 0.4	9.3 + 0.2	9.5 + 0.4
Piglet weaning weigh	AY	7.5 + 0.2	7.3 + 0.3	7.2 + 0.3	7.4 + 0.3
	VY	6.5 + 0.5	6.6 + 0.3	6.7 + 0.2	6.6 + 0.5
	AY x VY		7.3 + 0.3	7.2 + 0.4	7.5 + 0.3

Table 9 Littering traits measured on Australian (AD) and Vietnamese (VD) Duroc and their crosses.

Traits	Genotype	96 -97	1998	1999	2000
		Mean + se			
Total piglets born	AD	8.3 + 1.0	8.4 + 1.1	8.1 + 1.4	8.4 + 1.1
	VD	8.1 + 0.8	8.0 + 0.7	8.2 + 1.0	8.1 + 1.0
	AD x VD		8.2 + 0.5	8.7 + 0.7	8.6 + 1.2
Number born alive	AD	7.9 + 0.5	8. 0 + 0.4	8.0 + 0.8	8.1 + 0.5
	VD	7.6 + 0.6	7.8 + 0.5	7.8 + 0.7	7.9 + 0.5
	AD x VD		8.1 + 0.7	8.4 + 0.5	8.4 + 0.6
Piglet birth weight	AD	1.5 + 0.4	1.45 + 0.4	1.6 + 0.5	1.5 + 0.4
	VD	1.3 + 0.5	1.35 + 0.3	1.4 + 0.4	1.4 + 0.3
	AD x VD		1.3 + 0.4	1.5 + 0.4	1.3 + 0.5
Litter size at 21 days	AD	7.7 + 1.4	7.9 + 1.0	7.7 + 1.1	7.8 + 1.2
	VD	7.5 + 0.4	7.6 + 0.8	7.5 + 1.0	7.5 + 0.6
	AD x VD		.9 + 1.2	8.0 + 0.7	8.0 + 1.1
Piglet weigh at 21 days	AD	6.1 + 0.3	6.3 + 0.5	6.2 + 0.9	6.3 + 1.0
	VD	5.7 + 1.0	5.7 + 0.7	5.6 + 0.7	5.8 + 0.8
	AD x VD		6.1 + 1.1	6.1 + 0.6	6.0 + 0.5
Weaners/litter	AD	7.5 + 0.5	7.7 + 1.0	7.5 + 0.6	7.6 + 0.7
	VD	7.1 + 1.1	7.0 + 0.7	7.2 + 0.5	7.0 + 0.5
	AD x VD		7.6 + 0.5	7.7 + 0.6	7.6 + 0.6
Weaning weigh/piglet	AD	7.2 + 0.5	7.0 + 0.6	7.1 + 0.6	7.2 + 0.5
	VD	6.5 + 0.4	6.8 + 0.5	6.7 + 0.4	6.8 + 0.6
	AD x VD		7.1 + 0.3	7.2 + 0.5	7.1 + 0.6

A summary of breed rankings on litter trait measurements given in Table 8 and 9 are as follows:

Pigs born alive	AY x VY, AY, VY, AD x VD, AD, VD
Birth weight	AD, VD, AY x VY, AD x VD, AY, VY
Pigs weaned	AY x VY, AY, VY, AD, AD x VD, VD
Weaning weight	AY x VY, AY, AD, AD x VD, VD, VY

Estimates of monetary value of Australian Yorkshire in Vietnam

Growth and carcass

Many Vietnamese farmers adopt a rotational crossing program using Yorkshire, Landrace, Duroc and sometimes Belgian Pietrain. As a result of a performance trial carried out at Binh Thang Centre, Australian Yorkshire (AY) have been substituted for Vietnamese Yorkshire (VY) in this rotation. Assuming 50% of the genes in the growers are of Yorkshire origin, it is possible to estimate an economic value (E) of this breed substitution. for traits such as growth rate, backfat and carcase lean by using the equation:

V = b x 0.5 (AY - VY)

where b is the regression of breeding value on phenotypic value. The value of b approximates 0.5, taking into account the number of animals in the breed comparisons carried out at the Binh Thang centre and the performance traits measured. Using the post-weaning growth rates measured on the two breeds at the Binh Thang centre and assuming an average age at turnoff of 180 days gives estimated carcase weights of:

69 kg for VY
75 kg for AY

Carcase dissection results from the Binh Thang Centre breed comparisons gave the following soft tissue compositions for the two breeds:

VY 47 % lean + 33.4% fat
AY 56% lean + 24.4% fat

HCM City wet market price for	lean tissue	= 28,125 Dong / kg
	fat tissue	= 15,975 Dong / kg
VY retail carcase value 69 kg (0.47 x 28,125 + 0.33 x 15,975)		= 1,275,000 Dong
AY retail carcase value 75 kg (0.56 x 3.75 + 0.24 x 2.13)		= 1,470,000 Dong
Value of using AY instead of VY		= 0.5x0.5(1,470,000 - 1,275,000)
		= 48,750 Dong / pig
No of ACIAR sponsored AI Centres		= 5
No of AY boars per centre		= 10
No of litters per boar per year		= 250
No of pigs grown per litter		= 7
No of pigs with 50% AY genes per year		= 5 x 10 x 250 x 7
		= 87,500
Annual value of substituting VY for AY		= 87500 x 48,750 Dong
(Growth + Carcass) benefit		= 4265 million Dong

Reproduction

No of sows mated to AY boars per year	= 5 x 10 x 250/ 2
	= 6250
Increase in size of AY sired litters	= 1 pig
Increase in pigs from AY sired matings	= 6250
Saving in sow numbers (14 pigs/sow/yr)	= 6250/14
	= 447
Pigs forgone (cost of sow = cost of 4 growers)	= 447 x 4
	= 1786
Savings by having AY sired matings	= 1786 x 1.47million Dong
Reproduction benefit	= 2572 million Dong
Total annual value of substituting VY for AY	= 4265 mill. + 2572 mill. Dong
(Growth+Carcass+Reproduction) benefit	= 6838 million Dong