

The UK pig industry has traditionally used a Large White terminal sire over a Large White X Landrace dam but more recently there has been increased use of three way crosses with Hampshire or Pietrain boars as the terminal sire.

The attraction of these breeds initially arose because certain sire lines have been associated with increased piglet vigour, improved response to weaning, faster growth rates and lower mortality in all phases; this could suggest that offspring are less susceptible to PMWS.

A large scale study conducted by the Pig Development Centre now provides an independent comparison of the performance of piglets from each of the three breed crosses on the same commercially-based research farm and an impartial assessment of the major intrinsic differences between modern sire breeds for the use of British farmers.

Each of the following areas was studied, providing information which can be used in determining appropriate breeding strategies:

PRE-WEANING PERFORMANCE

For this part of the study results were obtained for a total of 425 cross-bred litters (140 Hampshire type, 145 Large White, 140 Pietrain type).

- There were few differences between piglets from different sire lines
- Sire breed did not affect the numbers of piglets born per litter, nor the numbers of stillbirths or mummies

	Hampshire type	Large White type	Pietrain type	P-value
Live born	11.15	11.05	11.27	0.901

- Piglets of all crosses had similar birth and weaning weights

	Hampshire type	Large White type	Pietrain type	P-value
Average piglet weight after 24h (kg)	1.55	1.49	1.56	0.167
Average piglet weight at weaning (kg)	8.1	7.9	8.0	0.499

- Three breed crosses had higher survival rates during the first 24h hours of life, however post 24h there were no significant differences in survival between breeds

	Hampshire type	Large White type	Pietrain type	P-value
Deaths in first 24h	0.65	1.1	0.48	<0.001
Deaths 24h to weaning	0.71	0.59	0.91	0.117

WEANER PERFORMANCE

For this part of the study results were obtained for a total of 708 piglets (234 Hampshire type, 240 Large White type and 234 Pietrain type).

- Genotype did not affect piglet growth rate in the first two weeks of the experiment or over the whole 20 day trial period
- However by the third week Hampshire type and Large White type piglets were growing more rapidly than Pietrain type piglets

	Hampshire type	Large White type	Pietrain type	P-value
Overall LWG (g/pig/d)	303	298	289	NS
Week 3 LWG (g/pig/d)	457	462	392	<0.001

- Feed intakes were similar between genotypes throughout; but Pietrain types had better feed conversion

	Hampshire type	Large White type	Pietrain type	P-value
FCR	1.15	1.19	1.13	<0.05

- There was no difference between genotypes in the numbers of pigs that were recorded as sick, scouring or lame throughout the trial
- There were no differences in lysine requirement between breeds

GROWER PERFORMANCE

For this part of the study results were obtained for a total of 894 pigs (306 Hampshire type, 268 Large White type, 320 Pietrain type).

- Hampshire type pigs grew more rapidly than either of the other two crosses, due to greater feed intake

	Hampshire type	Large White type	Pietrain type	P-value
Growth rate (g/d)	677	632	645	0.020

- Although Large White type pigs had the lowest feed intake and growth rate, they had the best feed efficiency

	Hampshire type	Large White type	Pietrain type	P-value
FCR	1.70	1.61	1.64	0.092

The three breed crosses were more robust

	Hampshire type	Large White type	Pietrain type	P-value
Sick (%)	0.73	3.70	0.67	0.013

- There were no differences in lysine requirement between breeds, with all three genotypes responding similarly to changing lysine concentration
- Optimum performance was achieved at lysine concentrations above 1.07g digestible lysine/MJ NE

FINISHER PERFORMANCE

For this part of the study results were obtained for a total of 990 pigs (320 Hampshire type, 340 Large White type, 330 Pietrain type).

- Hampshire type crosses had the greatest feed intake, grew most rapidly and reached slaughter weight over a week earlier than the other two crosses

	Hampshire type	Large White type	Pietrain type	P-value
Growth rate (g/d)	765	723	710	<0.001
Age at average slaughter weight of 102.3 kg (d)	164.8 ^a	172.3 ^b	173.6 ^b	<0.001

- Large White type pigs had the lowest feed intake but best feed efficiency

	Hampshire type	Large White type	Pietrain type	P-value
FCR	2.62	2.40	2.51	0.004

- The Pietrain and Hampshire type pigs were more robust than the Large White type pigs with half as many pigs having to be removed from the trial

	Hampshire type	Large White type	Pietrain type	P-value
Off trial	4.4%	8.5%	4.9%	0.116

- There were no differences in lysine requirement between breeds, with all three genotypes responding similarly to changing lysine concentration
- Optimum performance was achieved at lysine concentrations of 0.86g digestible lysine/MJ NE and above

CARCASE COMPOSITION & MEAT QUALITY

For this part of the study results were obtained for a total of 1595 pigs (593 Hampshire type, 483 Large White type, 519 Pietrain type).

- Large White type pigs were leanest as assessed by MLC backfat measurement
- Pietrain type carcasses produced the heaviest carcasses and the greatest yield when assessed on the basis of lean meat yield

Corrected to a slaughter weight of 102.3 kg	Hampshire type	Large White type	Pietrain type	P-value
MLC P2 (mm)	9.96 ^a	9.59 ^b	10.3 ^c	<0.001
Lean meat %	63.0 ^a	63.9 ^b	64.5 ^c	<0.001

- Although the Hampshire type pigs had the highest daily liveweight gain (P<0.001), in terms of the rate of gain of lean meat (the edible part of the carcass) there was very little difference between the three crossbreeds, however the Pietrain type pigs had the fastest gain and the Large White types the slowest (P=0.019)
- The muscle from the Pietrain type pigs showed no sign of PSE

- Pietrain type pigs had significantly thicker ‘eye’ muscles than the Hampshire type pigs
- The Hampshire type pigs produced the most tender meat (griddled loin steaks) but there were no other significant differences on eating quality between the three crossbreeds

	Hampshire type	Large White type	Pietrain type	P-value
‘Eye’ muscle depth (mm)	55.4 ^b	57.5 ^{ab}	60.6 ^a	0.001
Tenderness (scale 1-8)	4.28	4.06	4.06	0.019
Terminal pH	5.47 ^b	5.55 ^a	5.47 ^b	<0.001

SUMMARY

Based on each part of this study the following characteristics can be attributed to the three breed crosses:

Hampshire types

- Rapid growth
- High feed intake
- Reduced days to slaughter - particularly suitable for attaining higher slaughter weights
- Robust
- Tender meat

Large White types

- Moderate growth
- Low feed intake
- Good carcass composition - particularly for conventional payment method
- Good FCR on daily basis

Pietrain types

- Moderate growth
- High feed intake
- Robust
- Good carcass composition
- High lean meat yield, especially prime cuts - particularly suitable for outlets interested in better yield or using the autofom

You can use the results from this study to help assess the economic significance of each factor in terms of your production system. The BPEX Feeding Herd Calculator will allow you to estimate the effects of feed costs and other costs, slaughter weight and sale value on net margins. It will also allow you to change the FCR to match your system. (<http://www.bpex.org.uk/PracticalAdvice/ProducerKt/KtTeam/Feedherdcalc.aspx>). The BPEX Breeding Herd Calculator allows you to estimate the effects of changes in sow productivity, feed and other costs on the net margin per weaner pig sold on for growing and finishing (<http://www.bpex.org.uk/PracticalAdvice/ProducerKt/KtTeam/Breedherdcalc.aspx>).

The information from this research should not be used as the sole basis for determining your breeding strategy but in conjunction with discussions with your nutritionist, marketing company and breeding company.