



Duroc as a terminal sire line

A review by the Canadian Centre for Swine Improvement



October, 2003

The Durocs

The use of Duroc boars as terminal sires is very popular in several countries. In Canada, the national genetic evaluations and selection for Durocs has resulted in significant improvements over the past years. The Canadian Durocs today offer growth rate, feed efficiency and carcass quality comparable to the top terminal sire lines in the world. Several trials on purebred or crossbred animals have been carried out during the last years, to evaluate the impact of Duroc boars on commercial production in comparison to other terminal sire line choices.

Purebred tests

During the nineties, several projects were carried out on purebred comparisons. The Ontario Pork Carcass Appraisal Project (OPCAP), conducted between 1990 and 1994, provided information on a large number of traits for purebred Duroc animals, compared to Hampshire and Yorkshire. Durocs showed a higher growth rate, a slightly lower lean yield and a similar feed efficiency, whereas their meat had a much smaller drip loss and a higher marbling score. Another purebred trial conducted at the Deschambault test station, in Quebec, in 1998 showed similar performances for growth, feed efficiency and lean yield in Yorkshire, Landrace and Duroc breeds, but a significantly higher meat quality for Duroc pigs. A comparison between Yorkshire, Landrace and Duroc will be conducted at the Deschambault test station in 2004, and will provide updated results.

Commercial tests

It is more interesting to compare market hogs sired by different sire types in commercial production systems. During the last decade, several experiments were conducted involving such comparisons:

- One of the largest tests was the National Genetic Evaluation Program, carried out in 1994 and 1995 by the US National Pork Producers Council. In this test, progeny of Duroc boars ranked above the average on an economic index computed using feed conversion, growth and lean yield, and showed a very high meat quality compared to other terminal breeds.
- More recent experiments, conducted at the Deschambault test station in 2000 and 2001, provided information on market hogs born from different boar lines : Duroc(D), Landrace(L), Yorkshire(Y), D×L and D×Y. No significant difference was shown on growth and carcass performances, but Duroc-sired hogs tend to be better on meat quality traits, especially marbling.

In a test at Michigan State University, progeny of Duroc and Pietrain boars were compared for carcass and meat quality. Hogs from Duroc sires proved to have longer and heavier carcasses, but a lower percentage of lean compared to those from Pietrain boars (Table 1). Meat colour, marbling, firmness and drip loss were much more favourable to progeny from Duroc.

Table 1. Michigan State University, USA

Trait	Sire breed	
	Duroc	Pietrain
Carcass length (cm)	86.9	84.8
Dressing percentage (%)	73.1	74.0
Lean content (%)	50.7	52.6
Loin 24h-pH	5.53	5.48
Loin drip loss (%)	2.88	3.80

Source : Edwards et al, 2003

In a boar comparison study on Prince Edward Island in Canada, progeny from Yorkshire, Landrace and Duroc boars were compared for several traits. The main differences were found on growth, with progeny from Duroc having a higher daily lean deposition rate (Table 2). No difference was detected on meat quality, and pigs born from Duroc sires tended to be less aggressive than the other breeds.

Table 2. Prince Edward Island, Canada

Trait	Sire breed		
	Duroc	Yorkshire	Landrace
Average daily gain (g/d)	1004	940	967
Lean yield (%)	60.80	60.66	60.79
Feed conversion	2.51	2.69	2.51
Loin pH	5.26	5.31	5.26
Loin Marbling (0-5 scale)	2.0	1.6	2.0

Source : Atlantic Swine Research Partnership

- In an experiment conducted at Purdue University in 1998, on progeny of Duroc, Pietrain and Large White boars, half-Duroc hogs had a significantly higher average daily gain, feed intake, marbling score of the loin and belly weight, while half-Pietrain hogs had significantly larger loin eye area (Table 3).

Table 3 : Purdue University, USA

Trait	Sire breed		
	Duroc	Pietrain	Large White
Average daily gain (lb/d)	1.93	1.68	1.69
Daily Feed intake (lb)	6.32	5.58	5.56
Feed efficiency	3.28	3.36	3.29
Dressing percentage (%)	81.1	78.7	77.8
Loin eye area (sq in)	6.84	7.59	6.78
Belly weight (lb)	16.26	15.23	15.94
Loin marbling (1 to 5 scale)	2.41	1.25	1.41

Source : Eggert et al, 1998

- In Europe, a study conducted at University of Madrid, Spain, dealt with the comparison of hogs sired by Duroc, Duroc×Large White and Pietrain×Large White boars on eating quality in pork loin. It was shown that loins from Duroc-sired progeny had less protein and more intramuscular fat than the other two types.
- A study in 2001 by the Danish Meat Research Institute at the Bogildgaard testing station, showed that meat from Duroc-sired hogs was more tender and juicier, and had a higher intramuscular fat content than the meat of progeny from Pietrain and Hampshire×Duroc boars (Table 4). Moreover, Duroc-sired hogs had a significantly higher growth rate.

Table 4 : Danish Meat Research Institute

Trait	Sire breed		
	Duroc	Pietrain	Hampshire×Duroc
Average daily gain (g/d)	987	889	955
Lean content (%)	58.1	59.5	58.7
Loin IMF (%)	2.0	1.6	1.3
Loin drip loss (%)	3.10	4.27	3.61
Tenderness (0-15 scale)	9.4	8.9	8.6

Sources : Hviid et al, 2002; Danske Slagterier, 2002

Summary

The Duroc breed remains one of the best choices for terminal sire lines in commercial production systems. The hybrid vigor is maximal when Duroc boars are used on F1 sows from other breeds, resulting in a positive effect on several traits such as growth and viability. Many trials have shown the advantage of the Duroc breed for growth and feed conversion, and confirmed the advantage of this breed for meat quality. Several sources suggest that this breed also brings interesting advantages on hardiness and social behaviour. Regarding carcass quality, Duroc has shown equivalent or better performances than most of the other sire breeds. Compared to Pietrain and Hampshire, Duroc-sired hogs show slightly lower levels of lean content but higher dressing yield while pork quality is usually in favour of Duroc, especially marbling, tenderness and juiciness. Pork quality is also one of the most important considerations currently, even if producers do not get paid directly for the quality in most countries.

The different Duroc populations selected around the world were submitted to various selection programs, including selection as maternal lines in some cases. The Canadian Genetic Swine Improvement Program has contributed to important genetic gains on growth (-13 days to 100kg in the last 10 years) and carcass quality (+1.7% of lean content in the last 10 years) in the Duroc breed. This high level of performance, combined with the excellent meat quality potential of the breed, results in a very good paternal type for all traits of interest, which mainly explain the popularity of the breed as a sire line in many countries.

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