Effect of Breed, Sex and Slaughter Weight on Performance of Canadian Purebred Pigs

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Session 26 – poster 29 Contact : laurence@ccsi.ca

Summary

A study was conducted to evaluate the effect of increasing slaughter weight on various performance traits such as growth, feed efficiency, carcass characteristics and meat quality. A total of 431 purebred pigs from Duroc, Yorkshire and Landrace breeds from 27 breeders across Canada were tested at the Deschambault test station of CDPQ, Québec. The pigs were slaughtered at either the current slaughter weight (107 kg) or at a heavier weight (125 kg). Increase in slaughter weight was associated with significantly higher total feed intake, feed conversion, backfat and loin eye area. Higher slaughter weights also lead to a higher dressing percentage but a lower lean yield. There was some disproportionate muscle deposition in the primal cuts being higher in the loin than in the leg at heavier weight. Changes in meat quality with increasing slaughter weight were relatively small. Very little or no difference was found between breeds on growth and carcass quality traits, whereas large differences were found between sexes, in agreement with previous research. Significant interactions were found, especially between breed and slaughter weight, on several growth and carcass traits. Based on this study, when modern breeds are raised to heavier weights, there are some substantial changes in efficiency and carcass characteristics. Depending on the payment grid in use, a cost-efficiency analysis is required in order to find the optimal slaughter weight and ways to reach it using management practices as well as breed and sex differentiation.

Background

There has been an increased demand from the Canadian packing industry for a higher carcass weight in the pork production sector, with more and more incentives coming from some of the new grading grids put in place in the recent years across the country. This can be a challenging issue as increasing weight could have unfavorable consequences on muscle quality, fat deposition, feed efficiency, etc. This issue has been investigated in many countries for several years, since this trend in increasing slaughter weight exists almost everywhere. In 2004 and 2005, purebred pigs from the Canadian Swine Improvement Program were tested at the Deschambault swine testing station in Québec, to study the impact of increasing slaughter weight on traits such as growth, feed conversion, carcass and meat quality. It allowed to provide up-to-date references for purebred pigs on several economically important traits which are not recorded routinely in the Canadian Swine Improvement Program. The results are presented here for some of the growth, carcass and meat quality characteristics.

Material & Methods

Two batches of purebred pigs were tested at the Deschambault swine testing station in Quebec. In total, 431 purebred piglets provided by 27 breeders from across Canada were tested. They were electronically identified and monitored from nursery to slaughterhouse. Table 1 shows the numbers of pigs with growth, carcass and meat quality records available at the end of the test, by breed and sex. Within each subgroup, half of the pigs were slaughtered at 107 kg live weight and the other half at 125 kg.

Table 1. Number of pigs tested

	Duroc (D)	Landrace (L)	Yorkshire (Y)	All breeds
Catrates (C)	32	39	59	130
Females (F)	36	41	87	164
Males (M)	27	41	69	137
All sexes	95	121	215	431

Results

Tables 2 to 5 show least square means by breed, sex and slaughter weight for growth, carcass quality, primal cuts and loin quality, respectively. Values for which there is a significant difference within breed, sex or slaughter weight are shown in color. Estimates with a different letter are significantly different (P<0.05).

Table 2. Growth traits

	Breed			Gender			Slaughter weight		Significant Interactions
	D	L	Y	C	F	M	107kg	125kg	
Days on test (d)	97.0	97.3	95.6	92.8	100.4	96.7	81.5a	98.7b	B*W
Initial weight (kg)	28.3	29.0	27.4	29.2	29.4	27.7	27.2	27.3	B*W
Final weight (kg)	114.5	115.5	115.2	115.3	115.6	114.6	106.5a	124.8b	-
ADG (g/day)	925.7	913.0	930.3	957.0a	885.0b	926.9a	919.8	929.2	-
Total feed intake (kg)	223.2	224.7	222.0	230.8a	227.4a	211.6b	193.3	254.7	-
Daily feed intake (kg)	2.25	2.25	2.27	2.42a	2.22b	2.13c	2.28a	2.44b	-
FCR (kg/kg)	2.56	2.49	2.48	2.57a	2.54a	2.33b	2.39a	2.57b	B*G

Table 3. Carcasss Traits

	Breed			Gender			Slaughter weight		Significant Interactions
	D	L	Y	C	F	M	107kg	125kg	
Hot carcass wgt (kg)	91.0	90.6	90.8	90.7	91.4	90.3	83.2a	98.9b	-
Carcass length (mm)	82.0a	84.4b	83.6b	82.6a	83.3b	84.1c	80.9a	85.0b	B*G*W
Dressing %	78.3	78.5	78.8	78.6a	79.3b	77.7c	78.0a	79.3b	-
Backfat (mm)	17.23	17.43	16.38	19.10a	16.45b	15.48c	15.98a	17.80b	-
Muscle (mm)	61.17	61.65	61.66	60.69a	63.00b	60.79a	60.32a	62.47b	-
Loin eye area (cm^2)	46.32ab	45.15a	47.11b	44.16a	48.46b	45.96c	44.44	46.68	-
Lean Yield (%)	61.28	61.21	61.73	60.41a	61.71b	62.10c	61.83a	61.09b	-

Table 4. Primal cuts

	Breed			Gender			Slaughter weight		Significant Interactions
	D	L	Y	C	F	M	107kg	125kg	
½ carcass wgt (kg)	39.4	39.5	39.7	39.6a	40.1b	38.9c	36.3a	42.8b	-
% Leg	27.2a	26.3b	26.6b	26.6a	27.0b	26.5a	27.4a	26.0b	B*W, B*G*W
% Loin	26.1a	27.1b	26.7b	26.6	26.9	26.5	25.7a	27.1b	-
% Shoulder	29.1a	28.4b	28.8a	28.6a	27.9b	29.8c	29.2	28.7	-
% Belly	17.7a	18.2b	17.9ab	18.3a	18.3a	17.2b	17.7	18.2	-

Table 5. Loin quality

	Breed			Gender			Slaughter weight		Significant Interactions
	D	L	Y	C	F	M	107kg	125kg	
Ultimate pH	5.67a	5.55b	5.56b	5.59a	5.58a	5.62b	5.57	5.61	-
Reflectance L*	50.71a	53.32b	52.73b	52.89a	52.36ab	51.51bc	52.57	51.27	-
Subjective color	2.82a	2.42b	2.52b	2.50	2.61	2.66	2.45	2.67	-
Marbling score	2.57a	1.85b	1.87b	2.38a	2.11b	1.80c	1.91	2.10	B*G
Drip loss	3.62a	5.74b	5.50b	5.06	5.06	4.74	5.84a	4.47b	B*W

Discussion & Conclusions

- There was relatively little difference between sire (Duroc) and dam lines (Landrace and Yorkshire) for growth and carcass performance, even if the latter are selected less strongly on production traits. However, Landrace and Yorkshire populations in Canada are much larger than the Canadian Duroc population, so even with less emphasis in the selection objectives on growth and carcass traits, higher selection intensities most likely explain this result. In addition, some white breed lines are also selected as sire lines.

- Overall, the results are in agreement with other studies and with recent realized genetic gains in the Canadian Swine Improvement Program. For most traits analyzed, differences among sexes were larger than differences among breeds, especially for carcass traits.

- Boars had significantly better feed efficiency and lean yield compared to females and castrates, with small differences in meat quality. Unfortunately this advantage is unlikely to be used by the industry, especially in a context of increasing slaughter weight. Solutions to reduce boar taint would have a large impact on production efficiency.

- Increasing slaughter weight from 107 to 125 kg had a significant effect on several components of pig performance during growth and at the slaughterhouse.

- Pigs slaughtered heavier had a higher dressing percentage, backfat and lean depth, but a lower lean yield and a higher feed conversion ratio compared to pigs slaughtered around 107 kg.

- There was very little effect of higher slaughter weight on loin meat quality, except a trend on drip loss, marbling and color in favour of higher weights.

- Based on these results, cost-benefit analyses can be done using different scenarios in order to evaluate the interest of increasing slaughter weight. Other factors related to heavier weights should also be considered, such as the need for additional space, potential changes in facilities, need for adapting feed formulation in late finishing, grading grid in place, feed and overhead costs, etc. In some situations, the disadvantages coming from a lower feed efficiency and fatter carcasses might be compensated by new grading grids which favour heavier and not extremely lean carcasses.

This project was supported by the ACAAF Program of Agriculture and Agri-Food Canada