Centre de développement du porc du Québec inc.

DESCHAMBAULT SWINE TEST STATION

23rd and 24th station trials

EVALUATION OF THE TERMINAL LINES:

DUROC, PIC 280 and ROCK-Y

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Deschambault swine testing station program
Trials 23 and 24 – Entry of animals in November 2007 and May 2008

Evaluation of the terminal lines: Duroc, PIC 280, ROCK-Y

INTRODUCTION

The Deschambault test station for pigs is a tool used by Quebec's swine industry to answer some of its important questions and certain production needs. In the strategic plan of the *Quebec swine industry round table* (*Table filière porcine du Québec)*, productivity gain, meat quality and market development are among the priorities set out to ensure the competitiveness of the swine sector. Thus, commercial producers and other stakeholders of Quebec's swine sector must know the performances of the different terminal sire lines available to address these issues. The results of station trials at Deschambault constitute official performances, obtained through the strict supervision of the *Centre de développement du porc du Québec inc*. Furthermore, by improving their knowledge of the genetic lines available, the breeding companies better target their breeding objectives, while validating their efforts relatively to the needs of Quebec's swine sector.

The results of previous station trials described with complete objectivity the performances of eight terminal lines (trials 19-20: Duroc, P76, PIC 337, Vivanda 300 and trials 21-22: Duroc Sogéporc, EB5®, Genex Duroc, QBX™). In continuity with these trials, here are the results from the evaluation of the following terminal lines: Duroc, PIC 280 and ROCK-Y.

OBJECTIVE OF THE PROJECT

This project aimed at measuring, in a controlled and non-limiting environment, the zootechnical performances as well as the carcass and meat quality performances of commercial pigs born from terminal boars representative of genetic lines available in Quebec.

I- DESCRIPTION OF TRIALS

The 23rd and 24th station trials dealt with evaluating three terminal lines, namely boars of the lines Duroc, PIC 280 and ROCK-Y (Table 1). The commercial pigs tested from the breeding between these boars and sows predominantly of the Yorkshire-Landrace (YL) breeds. Trial 23 took place between November 2007 and May 2008, and trial 24, between May and October 2008. If you wish to have a detailed description of the experimental protocol followed for evaluating these three terminal lines, please download the document "Protocole des épreuves 23-24", at the following electronic address:
http://www.cdpqinc.qc.ca/Transfert_fichier_web/cafr/page_telechargement.awp?P1=2

Table 1: Terminal sire lines evaluated at the Deschambault test station

Terminal boars	Participating organizations
Duroc	Alliance Duroc
PIC 280	PIC Canada Ltd.
ROCK-Y	Hypor Inc.

II- PRESENTATION OF RESULTS

In this report, we present results from both the pre-test (nursery) and testing (finishing) periods. The results of the pre-test period are shown without distinction of lines. They give a general survey of this stage of the experiment. On the other hand, the results of the testing period describe the performances observed per sex and per line, and these results correspond to the control period of the trials. For both trials, feeds respected the nutritional specifications required by protocols as the results from laboratory analysis prooves their conformity.

1. PRE-TEST PERIOD

1.1 Zootechnical performances

Table 3 presents the growth and feeding performances of all the piglets studied at the station during the pre-test period and for every feeding phase. These performances include those for about 30 piglets belonging to the Yorkshire control line. The pre-test period lasted 55 days. The piglets weighed an average of 5.2 kg and 32.2 kg at beginning (arrival) and end of the pre-test period, respectively. During this period, we observed an ADG of 498 g/day and a feed conversion (for live animal weight gain) of 1.47.

1.2 Health performances [1]

All piglets from trials 23 and 24 were administered a combination of drugs in feed and water, and by injection in order to prevent health problems (Tables 5 and 6). Moreover, piglets showing clinical signs of disease were administered the appropriate injectable drugs (Table 7).

We find in Table 8 the main causes for health treatment. Drug use is shown in Table 9, according to three indexes: **1)** intensity of use (IU), which represents the ratio between the number of days in treatment cumulative for all animals and the number of days cumulative for all animals in the nursery or the finishing. **2)** the amount of drugs used per pig and **3)** the cost of medication per pig. The main causes of mortality or the main reasons for euthanasia are shown in Table 10. Finally, results of the serological controls carried out at the end of the trials are presented in Table 11. Globally (nursery and finishing (starter, grower and finisher), the health status of the animals from the trial 23 was slightly lower than the status of the animals from the trial 24.

The number of treated animals was the same during the nursery of the trials 23 and 24 and the causes of treatment were appreciably the same (Table 8). Similarly, in the pre-test period, we notice in Table 10 a mortality rate slightly higher for piglets of trial 23 (1.86%) than in those of trial 24 (1.10%).

2. TESTING PERIOD

2.1 Sampling

For the three lines in study, a total of 471 animals began the trials, that is 233 for the trial 23 and 238 for the trial 24. From this number, 452 animals were kept for statistical analysis, that is, 221 from trial 23 and 231 from trial 24.

Table 4 shows the sampling distribution of the pigs kept for statistical analysis. The distribution of pigs per sex is uniform: 52.4% barrows (castrated males) and 47.6% females. Moreover, the distribution of pigs according to their terminal line is as follows: 32.3% from Duroc sires, 34.1% from PIC 280 sires and 33.6% from ROCK-Y sires. The number of sires used varied from 14 to 22 sires per line.

2.2 Data elimination

Among the 19 animals that started the trials but were not kept for statistical analysis, 11 died during trial (8 in trial 23 and 3 in trial 24) and 6 were eliminated for health reasons (4 in trial 23 and 2 in trial 24) and 1 animal turned out to be semi-castrated.

[1] All the health characteristics were calculated for all the tested pigs present in pens. During each of both trials (23 and 24), pens in test contained around thirty addtionnal animals out of test.

2.3 Health performances [2]

Neither group medication, nor any growth promotants were applied during the testing period. Only piglets showing clinical signs of disease were treated, and were so with injectable drugs (Tables 7 and 8).

We notice twice more animals treated during the finishing of the trial 23 (55 animals; 158 DTDA) than during the trial 24 (27 animals; 83 DTDA) (Tables 8 and 9). The results of the serological controls made at the end of the trial 23 confirm the presence of the PRRS virus and the *Mycoplasma hyopneumoniae* in these animals. No serological test was made on the animals from the trial 24 (Table 11). Finally, in the finishing period, the mortality rate was twice higher during the trial 23 (3.41%) than during the trial 24 (1.48%) (Table 10). The mortalities that occurred during the trial 23 were mainly caused by cannibalism.

2.4 Feeding behavior

The computerized equipment used in the trials for the distribution of feeds allows the analysis of the pigs' feeding behavior. Our results were analyzed for each sex, irrespective of the terminal line, for every feeding phase. We did not study the feeding behavior in the nursery. Table 12 presents the feeding behaviour variables that we studied. Only the descriptive statistics are shown, and the differences between them have not been statistically analyzed. Every pig spends an average of 58 minutes per day at the feeder, which accounts for an overall occupation rate of about 50%. This rate varied very little during the growth of pigs. It then seems that the availability of the feeder in the pen is sufficient, on average, considering the number of pigs in each pen. This is also confirmed by the fact that 82% of the occupation period at the feeder takes place during the day (from 4:45 am to 9 pm), which still leaves plenty of time for feeding during the night.

Barrows (castrated males) appear to ingest their meal faster than females and eat more in each of their visit. For both sexes, the amount of feed consumed per visit (size of meal) and the speed of feed intake increase with the age of the animal. However, the average number of visits to the feeder, of about 15 per day overall, tends to remain constant or to decrease slightly during the finishing period.

Figures 1 and 2 show the evolution of the average daily feed intake per sex for trials 23 and 24, respectively. A curve showing the evolution of the average temperature inside the building has been added to the graph.

[2] All the health characteristics were calculated for all the tested pigs present in pens. During each of both trials (23 and 24), pens in test contained around thirty addtionnal animals out of test.

2.5 Performances

Tables 13 to 16 present the average performances and the differences between animals born from the sire lines Duroc, PIC 280 and ROCK-Y. These results are based on the performances of two repetitive tests in station (nursery and finishing), namely the trials 23 and 24. The means are adjusted with regard to the fixed effects considered in the statistical analysis model. Differences are considered significant if the calculated probability is smaller than 0.05%. When it is significant and judged appropriate, the initial and/or final weights are used as covariables (Tables 18 to 21).

2.5.1 Overall performances

Zootechnical performances

Table 13 shows the overall zootechnical performances. The commercial pigs were slaughtered at an average weight of 116.2 kg. The average age of pigs at slaughter was 151.5 days. More specifically, the pigs started the finishing phase at an average weight of 32.4 kg and this phase lasted 82.8 days. During finishing, the pigs showed an ADG of 1,021 g/d and a feed conversion in live weight gain of 2.42. The zootechnical performances were excellent for these trials. These performances are comparable to those of the previous commercial trials realized in the Deschambault station. As an example, pigs obtained an ADG of 1,039 g/d and a feed conversion of 2.35 in the combined trials 19 and 20 (Rivest *et al.*, 2006), and an ADG of 1,031 g/d and a feed conversion of 2.48 in the combined trials 21 and 22 (*Rivest et al.*, 2008).

Performances *per* feeding phase

Table 14 shows the overall zootechnical performances per feeding phase, as well as measurements taken at the beginning and at the end of each phase. During each trial, the diet was changed twice, that is, when the whole herd reached an average weight of 50 kg and 75 kg. The variables shown refer to these weighings and to the corresponding three phases in animal weight: 30 to 50 kg, 50 to 75 kg and 75 kg to the end of finishing.

Let's remind us that the animals of the same trial all started the trial at the same date. Furthermore, they were all weighed the same day for a given change of diet. However, the weighing performed at the end of each trial was done at different dates, according to the shipping day to the slaughterhouse, specific to each animal. Also, the "30 kg to 50 kg" period refers to the interval between the beginning of the trial and the general weighing carried out at the first change of diet. The duration of this interval is the same for all animals in the same trial. However, the "75 kg – end of finishing" period refers to the period between the second change of diet and slaughter, which differs from one pig to another. The performances observed during these different growth periods are consistent with the overall results.

Carcass quality

The table 15 presents the weight of the primal cuts and their respective yield. The cutting up of carcasses is a standardized practice respecting the charts of primal cuts described in the *Canadian Pork Buyer's Guide*. The carcasses are thus cut into four primal cuts: leg, loin, shoulder and belly.

Meat quality

The overall results for the quality of the loin, ham and belly are given in Table 16. The meat quality data resulting from the present study are showing some differences concerning the lines (Table 16) and sexes (Table 21).

2.5.2 Performances of sire lines

Zootechnical performances

The Table 13 compiles the zootechnical performances of every line, and the significant differences ($P<0.05$) are indicated with the letters A, B and C. The following observations only relate to those significant differences. The PIC 280 obtained a final age lower than Duroc and than ROCK-Y, of 2.7 and 5.3 days respectively, as well as a trial duration lower of 2,6 and 4,9 days. The ROCK-Y had a weight in the beginning of the trial lower to Duroc and to PIC 280, and this difference was 1.38 kg and 1.94 kg respectively. Thus, the piglets of certain lines started the trials with a different average weight, which was taken into account in the data analysis. The planned slaughter weight was respected, namely about 115 kg, and did not differ significantly from one line to another. Nevertheless, note that the differences between the final weights of the lines could reach 1 kg. For the finishing phase, the average daily gain (ADG) was superior for Duroc and PIC 280 compared with the ROCK-Y of 35 g/day and 65 g/day respectively. The feed conversion was better for the PIC 280 compared with Duroc and with ROCK-Y of 0.08. For the total feed intake during the finishing phase, the PIC 280 required a lower quantity of feed than Duroc and ROCK-Y (7.1 kg and 6.6 kg respectively) to reach the slaughter weight. The ROCK-Y obtained a lower daily feed intake compared with the two other lines of about 0.08 kg/day.

The PIC 280 showed a lower hot carcass weight and carcass yield than did the Duroc and ROCK-Y, with differences being, respectively, 0.64 kg and 1.61 kg for the hot carcass weight and 0.84 and 1.38% for the carcass yield. Duroc also demonstrated a hot carcass weight and a carcass yield lower than the ROCK-Y of 0.97 kg and 0.84%. Duroc and ROCK-Y demonstrated a muscle depth (Destron measure in slaughterhouse) superior to the PIC 280 (3.26 and 3.13 mm) and results according to the same tendency were obtained for the measure of muscle depth on the live animal. For the following variables: the backfat depth (live animal and Destron probe in slaughterhouse), the lean yield and the mean index (weight from 85 to 99.9 kg), no significant difference was noticed between the lines. The mean index (weight from 85 to 99.9 kg) corresponds to the slaughter grid of the pigs of strata 5 and 6 of the slaughter payment grid number 188[3].

3 We can access this slaughter grid with the following hyperlink: http://www.fppq.upa.qc.ca/macros/grille_indice.mac/main

Performances *per* feeding phase

More specifically concerning the measures in the weighings of diet change (50 and 75 kg) (Table 14), a lighter weight was observed for the ROCK-Y compared with Duroc and with PIC 280. No significant difference was observed between the lines for the backfat, such as observed at the end of the finishing phase. A higher muscle depth was observed for Duroc compared with the PIC 280 and with the ROCK-Y for 75 kg while only Duroc and PIC 280 obtained different performances for 50 kg. Concerning the performances by period, the daily feed intake was different between Duroc and ROCK-Y for periods 30-50 kg and 50-75 kg. The ADG was lower for the ROCK-Y for the period 30-50 kg compared with the two other lines while only the PIC 280 showed an ADG superior to the ROCK-Y for the period 50-75 kg. For the feed conversion, a difference of performance between the PIC 280 and the two other lines was observed, in favour of the PIC 280, for the last period (75 kg - the end) and a difference between the PIC 280 and the Duroc was observed for period 50-75 kg.

Results of molecular tests

All the boars of every terminal line used for the services in trials 23 and 24 were tested for the presence of the RN and HAL genes. None of the tests was positive: no boar from the lines Duroc, PIC 280 and ROCK-Y carried alleles of the RN and HAL genes, known to be detrimental to the meat quality.

Carcass quality

The significant differences (Table 15) observed between the lines are the weight of the reconstituted half-carcass, the loin eye area, the carcass length, the leg weight and the leg and shoulder yields. The weight and the yield of the loin and the belly are not affected by the effect of the line. Furthermore, concerning the specifications of La référence des marchés québécois (2003), there is a significant difference between the lines for the proportion of the carcasses which meet markets needs for the loin eye area (Table 17). The weight of the reconstituted half-carcass (Table 15) of the PIC 280 line is significantly lower than the one of the line Duroc which is significantly lower than the one of the line ROCK-Y.

The loin eye area of the line PIC 280 is significantly lower than the one of the Duroc and ROCK-Y lines. The carcass length of the ROCK-Y line is significantly lower than the one of the Duroc line. The weight of the leg of the PIC 280 line is significantly lower than the one of the Duroc line which is significantly lower than the one of the ROCK-Y line. The leg yield of the PIC 280 line is significantly lower than the one of the Duroc and ROCK-Y lines. The shoulder yield of the PIC 280 line is significantly superior to the one of the Duroc and ROCK-Y lines.

Meat quality

Except for the loin firmness, for which the line ROCK-Y presents a meat texture significantly firmer than the lines Duroc and the PIC 280, all the quality measurements realized on loin present similar results for the three tested lines (Table 16). The three lines also meet in a similar way the needs of the market (Table 17).

The results of the quality measurements realized on ham are similar between the three tested lines (Table 16).

The measurement of the belly texture of the ROCK-Y line pigs is significantly firmer than the one of the PIC 280 line pigs. The belly firmness of the Duroc line pigs does not present significant difference with the PIC 280 and ROCK-Y lines (Table 16).

2.5.3 Performances of the sexes

Zootechnical performances

No significant difference was noted between sexes concerning the weight at the beginning and at the end of finishing (Table 18). Compared to the females, the barrows expressed a faster growth rate (ADG superior by 70 g/d, shorter finishing period by 5.6 days and lower final age by 5.6 days. On the other hand, females performed better than barrows in regard to the carcass yield (difference of 0.49%), feed conversion (difference of 0.07), total feed intake (difference of 5.6 kg), lean yield (difference of 1.52%) and mean index of pigs slaughtered in the right stratum (difference of 1.72).

Differences were also noticed between sexes with regard for the backfat taken by ultrasounds (males: +2.9 mm) and the backfat and the muscle depth taken in slaughterhouse by using a Destron probe (males: +3.2 mm for the fat and -2.1 mm for the muscle depth).

Performances *per* feeding phase

The differences in performance between feeding phases with regard to sexes are consistent with the overall performances, as it can be seen in Table 19. The backfat measured with an ultrasound machine is inferior in females at every feeding phase. For each phase, the barrows showed a better ADG, just as they do overall. The feed conversion of both sexes is similar at the first feeding period, but is better in females from the second phase. The barrows demonstrate a higher daily feed intake at each phase.

Carcass quality

The comparison of the results for carcass measurements between the castrated males and the females is reported in the table 20. Females have a weight of reconstituted half-carcass (+0.43 kg), a carcass length (0.88 cm) and a leg weight (+0.33 kg) significantly higher than the castrated males. It is the same for the leg yield (+0.55%). However, the castrated males have a shoulder yield significantly higher (+0.39%) than females.

No significant difference between the sexes appears concerning the loin eye area, the weight and the yield of loin and belly.

Meat quality

The castrated males have a loin texture firmer and a marbling score significantly higher than females (Table 21). The characteristics of hams are similar between sexes. The castrated males present a belly texture significantly firmer than females.

2.5.4 Warning on the pertinence of comparing sire line performances between two separate station trials

In this paragraph, we want to emphasize the irrelevance of comparing the performances of the sire lines tested in the present trials 23 and 24 with those of previous trials (for example, comparing the PIC 337 line tested in the trials 19-20 with the PIC 280 tested in trials 23-24). The Table 2 shows that the performances vary appreciably from one trial to another with respect to growth or backfat, and this observation also applies to other traits not presented in this table. We can note, for example, that the mean ADG performances are similar between the trial series, but if we look closely the performances of each trial, they vary greatly. It would then be very hazardous to compare the performances between different lines tested in two separate station trials series, under different conditions. The comparisons of performances between lines tested in the station are accurate and repeatable when they are done inside the same test (trial series).

Table 2: Average performance for growth and backfat for trials 19 to 24 and by trial series

Trait	Result	Trial 19	Trial 20	Trial 21	Trial 22	Trial 23	Trial 24
Average daily gain (g/d)	By trial	1077	1003	1047	1020	1017	1027
	By test (trial series)	1038		1030		1022	
Off-test backfat (US) (mm)	By trial	15.04	13.57	15.14	16.52	15.03	15.35
	By test (trial series)	14.36		15.81		15.19	

Table 3: Piglets performances during pre-test period [1]

Feeding phase	No. of piglets	Age (day)	Duration (days)	Weight (kg)	ADG (g/day)	Feed (kg)	Feed intake (kg)		Feed conversion
							/day	*/piglet*	
1	542	13.8 à 23.7	10	5.2 to 6.4	116	830	0.16	1.53	1.34
2	540	23.7 à 29.2	5.5	6.4 to 8.1	303	1 120	0.38	2.07	1.25
3	539	29.2 à 39.7	10.5	8.1 to 14.1	571	3 833	0.68	7.11	1.19
4	538	39.7 à 68.7	29	14.1 to 32.2	625	15 393[2]	0.99	28.61	1.59
Global	542	13.8 à 68.7	55	5.2 to 32.2	490	21 176	0.72	39.07	1.47

[1] The data of the Yorkshire control line are included in these performances.

[2] Corresponds to 13,051 kg of nursery feed and 2,342 kg of the first "finishing diet"

Table 4: Distribution of sires, litters and genders by line [1]

	Sire line		
	Duroc	PIC 280	ROCK-Y
No. of sires used[2]	21	22	14
No. of litters/sire	1.9	1.8	2.9
No. of litters	40	40	40
No. of herds	18	19	19
No. of litters/herd	2.2	2.1	2.1
No. of animals/litter	3.7	3.9	3.8
Barrow	78	81	78
Female	68	73	74
Total	146	154	152

[1] For the number of piglets introduced in the station for which datas were kept for statistical analysis

[2] Inseminations with a known boar

Table 5: Preventive medication program in the feed during pre-test period (trials 23 and 24)

Feeding phase	Medication	Antibiotic concentration	Weight (kg)	Posology (mg/kg)	Duration (d)	Medicines (g/pig)	Cost ($/pig[5])
1	Chlortetracycline[1] Tiamulin[2]	110 mg/kg 32 mg/kg	6	4 1.1	10	0.30	0.07 $
2	Chlortetracycline[1] Tiamulin[2]	110 mg/kg 32 mg/kg	7	7 2	6	0.38	0.09
3	Sulfonamides[3]	450 mg/kg	11	38.5	10	4.23	0.55
4	Tylosin[4]	44 mg/kg	20	3	23	1.42	0.30
Total for trial 23					**49**	**6.33**	**1.01**
Feeding phase	Medication	Antibiotic concentration	Weight (kg)	Posology (mg/kg)	Duration (d)	Medicines (g/pig)	Cost ($/pig[5])
1	Chlortetracycline[1] Tiamulin[2]	110 mg/kg 32 mg/kg	6	3.9 1.1	10	0.29	0.06
2	Chlortetracycline[1] Tiamulin[2]	110 mg/kg 32 mg/kg	7	6.8 1.9	6	0.38	0.08
3	Sulfonamides[3]	450 mg/kg	11	35.8	11	4.41	0.57
4	Tylosin[4]	44 mg/kg	19	3	24	1.39	0.29
Total for trial 24					**51**	**6.46**	**1.00**

[1] Auréomycine 220 ® by Alpharma; [2] Denagard ® by Novartis; [3] Uniprim ® by Bio-AgriMix; [4] Tylan 40 ® by Elanco;
[5] CDMV cost without taxes

Table 6: Preventive medication program in drinking water and by injection (Inj.) during the nursery period of trials 23 and 24

Way	Medication	Content /dose	Weight (kg)	Dose (mg/kg)	Duration (d)	Medicines (g/pig)	Cost ($/pig[5])
Water	Tiamulin[1]	200 mg/L	5	60	5	1.50	1.43
Inj.	Dectomax[2]	10 mg/ml	15	0.6	1	0.01	0.50
Inj.	CircoFlex[3]	1 dose	10		1	1	2.01
Inj.	Mycoplasma[4] Vaccine	1 dose	15		1	2	0.44
Total per trial					**8**	**4.51**	**4.38**

[1] Denagard® by Novartis; [2] Dectomax® by Pfizer; [3] Circoflex® by Boehringer; [4] Ingelvac M. hyo® by Boehringer;
[5] CDMV cost without taxes

Table 7: Curative medication used for pigs in trials 23 and 24 (standardized by slice of 10 kg)

Way	Medication	Posology	Weight (kg)	Dose (mg/kg)	Duration (d)	Medicines (g/10 kg)	Cost ($/10 kg[7])
Inj.	Ceftiofur (powder)[1]	50 mg/ml	10	7.5	3	0.15	3.67 $
Inj.	Ketoprofen[2]	10 mg/ml	10	3.0	3	0.09	7.62 $
Inj.	Ketoprofen[2]	100 mg/ml	10	3.0	3	0.09	1.17 $
Inj.	Penicillin [3]	300 mg/ml	10	45	3	1.350	0.38 $
Inj.	Trimethoprimsulfa[4]	240 mg/ml	10	16	3	0.396	0.27 $
Inj.	Dexamethasone[5]	2 mg/ml	10	0.133	2	0.003	0.18 $
Inj.	Tylosin[6]	200 mg/ml	10	8.0	3	0.240	0.15 $

[1] Excenel® by Pfizer ; [2] Anafen® by Merial ; [3] Depocillin® by Intervet; [4] Borgal® by Hoechst ; [5] Dexamethasone 2® by Vétoquinol ; [6] Tylan 200® by Elanco; [7] CDMV Cost without taxes

Table 8: Individual treatment causes during nursery and finishing periods

Reason of treatment[11]	**Trial 23**		**Trial 24**	
	Nursery	Finishing	Nursery	Finishing
Bad conditions	7	16	8	15
Locomotion troubles	1	25	2	10
Digestive troubles	2	0	0	0
Respiratory troubles	6	4	4	0
Nervous troubles	0	0	1	0
Epidermitis	0	0	0	0
Others conditions	0	10	1	2
Total number of treated animals	**16**	**55**	**16**	**27**

[1] Animal may be treated several times for different causes.

Table 9: Treatments given to pigs during trials 23 (n = 269) and 24 (n = 273) in the nursery (N) and in the finishing (F)

Period	Administration (justification)	AD[1] (n)	DTDA[2] (n)	IU[3] (%)	Medicines[4] (g/pig)	Cost[5] ($/pig)
N	Feed (preventive)	13246	13014	98.25	6.33	1.01
N	Water (preventive)	13246	1340	10.12	1.50	1.43
N	Injectable (preventive)	13246	795	6.00	3.01	2.95
N	Injectable (curative)	13246	61	0.46	0.05	0.04
F	Injectable (curative)	22815	158	0.69	0.75	0.46
N-F	**Total for trial 23**	**36061**	**13172**	**36.53**	**11.64**	**5.89**
Period	Administration (justification)	AD[1] (n)	DTDA[2] (n)	IU[3] (%)	Medicines[4] (g/pig)	Cost[5] ($/pig)
N	Feed (preventive)	13579	13824	101.80	6.46	1.00
N	Water (preventive)	13579	1365	10.05	1.50	1.43
N	Injectable (preventive)	13579	814	5.99	3.01	2.95
N	Injectable (curative)	13579	58	0.43	0.05	0.05
F	Injectable (curative)	24065	83	0.34	0.41	0.56
N-F	**Total for trial 24**	**37644**	**13907**	**36.94**	**11.43**	**5.99**

[1] Animal – Days (AD). Represents cumulative animal-days in the nursery and finishing.

[2] Daily Therapeutic Dose per Animal (DTDA). This indicates all animal-days (AD) in treatment.

[3] Intensity Used (IU). Represents the ratio between DTDA and AD.

[4] Total medicines taken in the period / average number of pigs for the period (for finishing period: before the first slaughter).

[5] Total costs for each treatment in the period / average number of pigs for the period (for finishing period: before the first slaughter).

Table 10: Mortality causes

Mortality causes	Trial 23		Trial 24	
	Nursery	Finishing	Nursery	Finishing
Bad conditions [1]	0	0	0	0
Wasting	2	1	0	1
Locomotion troubles	0	1	1	0
Respiratory troubles	0	0	0	0
Sudden death	3	1	1	2
Meningitis	0	0	1	0
Others conditons[2]	0	6	0	1
Nombre total (%)	**5/269 (1.86%)**	**9/264 (3.41%)**	**3/273 (1.10%)**	**4/270 (1.48%)**

[1] Piglets in bad conditions at the beginning of the nursery (0-3 days).

[2] During the trial 23, 6 mortalities were caused by tails biting.

Table 11: Serology controls at the end of evalutation period

	Trial 23		Trial 24[4]	
	Tested	Reactors	Tested	Reactors
PRRS[1]	30	24/30 (80%)	---	---
Pleuropneumonia (App1)[2]	30	0/30 (0%)	---	---
Pleuropneumonia (App5)[2]	30	0/30 (0%)	---	---
Mycoplasma Hyopneumoniae[3]	30	2/30 (7%)	---	---

[1] ELISA Idexx Test (Laboratoire FMV); 2: ELISA App Test (Laboratoire FMV); 3: ELISA Dako Test (FMV Laboratory);
[4] No serology was made at the end of the trial 24.

Table 12: Feeding behavior Data

	Total visits duration/ pig/day (min)	*No. of visits/pig/day*	*Average meal size (g) per visit*	*Ingestion speed (g/min)*	*Average duration per visit (min)*	*Feeder occupation time per day (%) before 1st slaughter*	*% of total visit time occuring when light is on*	*% of total visit time occuring from 4h45 to 21 h*
All								
Global	57.7	15.4	209.9	54.5	5.0	50.1	53.9	82.3
30-50 kg	60.9	15.3	151.2	37.1	5.3	51.2	49.8	78.4
50-75 kg	61.8	16.5	189.8	48.5	5.0	51.7	50.4	80.9
75-115 kg	53.0	14.8	258.6	69.1	4.8	47.2	57.6	84.9
Barrows								
Global	59.7	16.3	212.3	55.9	5.0	50.9	52.0	81.0
30-50 kg	61.9	16.5	149.2	38.1	5.2	51.5	48.9	77.7
50-75 kg	64.0	17.1	197.2	49.5	5.1	52.7	48.9	79.6
75-115 kg	55.2	15.7	264.2	72.0	4.8	48.2	55.2	83.4
Females								
Global	55.1	14.2	206.6	52.8	5.0	49.0	56.4	84.1
30-50 kg	59.4	13.6	154.1	35.7	5.5	50.9	51.0	79.5
50-75 kg	58.8	15.6	179.4	47.0	4.9	50.2	52.5	82.6
75-115 kg	50.4	13.7	252.0	65.7	4.8	45.7	60.4	86.7

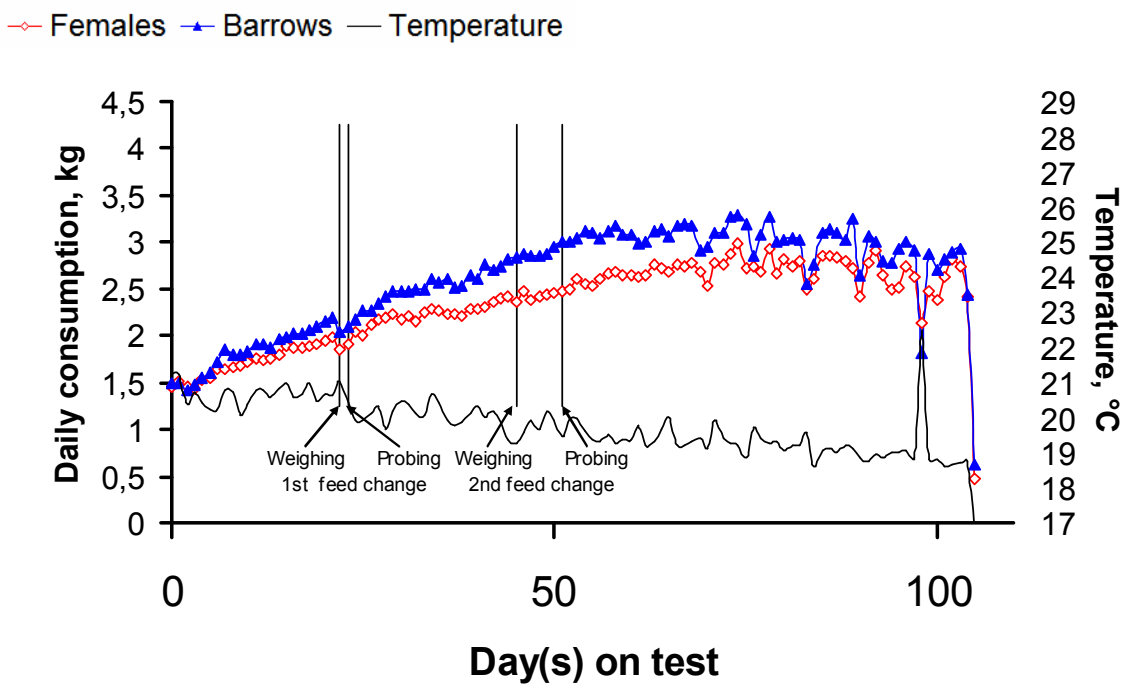

Figure 1: ***Evolution of average feed intake and temperature during trial 23***

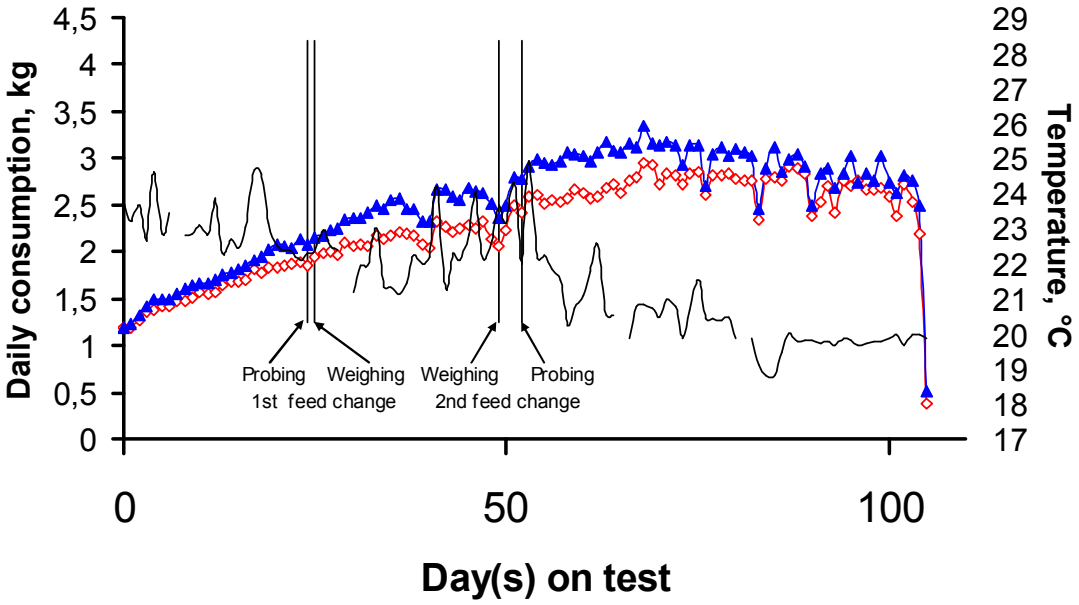

Figure 2: ***Evolution of average feed intake and temperature during trial 24***

Table 13: Line effect on zootechnical performances

Variable	N	Overall average	Line						Std error of differences	Prob
			Duroc		PIC 280		ROCK-Y			
Growth performance										
Final Age, d	451	151.49	151.52	A	148.84	B	154.11	A	1.0772	<.0001
Duration, d	452	82.79	82.90	A	80.30	B	85.16	A	1.0124	<.0001
On-test weight, kg	452	32.38	32.66	A	33.22	A	31.28	B	0.2931	<.0001
Final weight, kg	451	116.18	116.46	A	116.47	A	115.61	A	0.4905	0.1348
ADG, g/d	451	1020.84	1022.55	A	1052.66	A	987.30	B	13.2525	<.0001
Off-test backfat[1], mm	452	15.10	14.82	A	15.00	A	15.47	A	0.5083	0.4408
Off-test muscle depth[1], mm	452	64.85	66.11	A	63.47	B	64.96	AB	0.7138	0.0016
Feed intake performances										
Total feed intake, kg	451	201.86	204.38	A	197.31	B	203.88	A	1.8643	0.0003
Daily feed intake, kg/d	451	2.43	2.46	A	2.45	A	2.38	B	0.0278	0.0174
Feed conversion on live animal weight gain	451	2.42	2.44	A	2.36	B	2.44	A	0.02299	0.0007
Carcass yield										
Hot carcass weight, kg	446	93.63	93.52	B	92.88	C	94.49	A	0.2646	<.0001
Carcass yield, %	446	80.58	80.48	B	79.94	C	81.32	A	0.2264	<.0001
Destron backfat[2], mm	435	17.87	17.53	A	17.72	A	18.35	A	0.5778	0.3609
Destron muscle depth[2], mm	434	66.01	67.14	A	63.88	B	67.01	A	0.9047	0.0008
Lean yield, %	434	61.24	61.46	A	61.19	A	61.06	A	0.2885	0.3807
Mean index (weight 85 to 99.9 kg)	418	111.43	111.76	A	111.42	A	111.10	A	0.3203	0.1334

[1] Depth taken on live animal by ultrasounds in B mode

[2] Depth taken on carcass by Destron probe

Table 14: Line effect on performances according to the period

Variable	N	Overall average	Line						Std error of differences	Prob
			Duroc		PIC 280		ROCK-Y			
Measurements at weighings										
On-test weight (kg)	452	32.38	32.66	A	33.22	A	31.28	B	0.2931	<.0001
Weight at 1st chang. of diet (kg)	451	54.19	54.47	A	54.58	A	53.52	B	0.3428	0.0054
Weight at 2nd chang. of diet (kg)	451	77.58	77.92	A	78.56	A	76.26	B	0.5965	0.0008
Final weight (kg)	451	116.18	116.46	A	116.47	A	115.61	A	0.4905	0.1348
Backfat[1] 50 kg (mm)	452	8.64	8.56	A	8.58	A	8.78	A	0.2149	0.5648
Backfat[1] 75 kg (mm)	452	11.45	11.25	A	11.42	A	11.66	A	0.3143	0.433
Off-test backfat[1] (mm)	452	15.10	14.82	A	15.00	A	15.47	A	0.5083	0.4408
Muscle depth[1] 50 kg (mm)	452	46.53	47.36	A	46.10	B	46.13	AB	0.4867	0.0129
Muscle depth[1] 75 kg (mm)	452	55.93	57.04	A	55.11	B	55.63	B	0.5473	0.0022
Off-test muscle depth[1] (mm)	452	64.85	66.11	A	63.47	B	64.96	AB	0.7138	0.0016
Performances by period										
Daily feed intake 30-50 kg (kg/j)	451	1.76	1.80	A	1.78	AB	1.72	B	0.0293	0.0236
Daily feed intake 50-75 kg (kg/j)	452	2.34	2.39	A	2.36	AB	2.28	B	0.03813	0.0161
Daily feed intake 75-fin kg (kg/j)	450	2.91	2.93	A	2.96	A	2.83	A	0.07605	0.3315
ADG 30-50 kg (g/j)	448	961.63	973.95	A	978.42	A	932.52	B	14.3731	0.0036
ADG 50-75 kg (g/j)	451	994.02	997.23	AB	1020.36	A	964.49	B	17.1942	0.0087
ADG 75-end kg (g/j)	451	1081.29	1075.91	A	1131.08	A	1036.89	A	41.3403	0.2719
F.C. 30-50 kg	449	1.84	1.85	A	1.82	A	1.84	A	0.02044	0.3643
F.C. 50-75 kg	450	2.36	2.40	A	2.31	B	2.36	AB	0.03499	0.0405
F.C. 75-end kg	449	2.78	2.82	A	2.71	B	2.82	A	0.03105	0.0005

[1] Depth taken on live animal by ultrasounds in B mode

Table 15: Line effect on carcass quality

Variable	N	Overall average	Line						Std error of differences	Prob
			Duroc		PIC 280		ROCK-Y			
Primal cuts										
Reconstituted half-carc. weight (kg)	437	40.52	40.48	B	40.09	C	40.98	A	0.1329	<.0001
Loin eye area (cm²)	434	48.86	50.19	A	46.22	B	50.17	A	0.7706	<.0001
Carcass length (cm)	440	82.84	83.20	A	83.13	AB	82.19	B	0.3763	0.0226
Leg weight (kg)	440	10.81	10.82	B	10.56	C	11.06	A	0.07357	<.0001
Loin weight (kg)	437	11.00	11.04	A	10.80	A	11.14	A	0.1279	0.0856
Shoulder weight (kg)	439	11.17	11.10	A	11.20	A	11.23	A	0.06054	0.1073
Belly weight (kg)	439	7.53	7.55	A	7.52	A	7.52	A	0.0701	0.8731
Leg yield (%)	437	26.69	26.71	A	26.36	B	27.01	A	0.1425	0.0002
Loin yield (%)	437	27.14	27.26	A	26.95	A	27.21	A	0.2488	0.4436
Shoulder yield (%)	437	27.58	27.41	B	27.92	A	27.42	B	0.1413	0.0003
Belly yield (%)	437	18.60	18.66	A	18.75	A	18.39	A	0.1775	0.1255

Table 16: Line effect on meat quality

Variable	N	Overall average	Line						Std error of differences	Prob
			Duroc		PIC 280		ROCK-Y			
Loin										
Ultimate pH 24 h	436	5.67	5.68	A	5.66	A	5.67	A	0.01683	0.7169
Luminosity	439	50.95	51.04	A	50.80	A	51.02	A	0.3743	0.7732
Color	439	3.61	3.64	A	3.65	A	3.53	A	0.05948	0.0871
Marbling - NPPC	438	2.72	2.82	A	2.77	A	2.56	A	0.1572	0.2806
Texture	435	1.65	1.76	A	1.76	A	1.42	B	0.1013	0.0021
Drip loss (%)	441	3.58	3.70	A	3.33	A	3.71	A	0.3251	0.4034
Ham										
Ultimate pH 24 h	436	5.64	5.64	A	5.62	A	5.65	A	0.01496	0.1945
Luminosity	439	50.14	50.68	A	50.10	A	49.64	A	0.4276	0.0659
Color	439	3.58	3.58	A	3.56	A	3.59	A	0.06473	0.8877
Bicolor index	438	1.82	1.81	A	1.78	A	1.86	A	0.07984	0.6286
Tech. yield (%)	438	129.78	129.59	A	130.11	A	129.64	A	0.307	0.1605
Belly										
Texture	433	146.38	145.71	AB	139.93	B	153.51	A	4.9971	0.0396

Table 17: Carcass proportion answering market needs

	Specifications of Quebec market reference (2003), Targeted interval		Line			Prob
	Lower	Higher	Duroc	PIC 280	ROCK-Y	
Carcass weight	85.4 kg	93.6 kg				
Loin eye area	43 cm^2	47 cm^2	0.21 [A]	0.38 [B]	0.20 [A]	0.0002
Loin quality						
Color	3	4	0.95 [A]	0.94 [A]	0.98 [A]	0.1515
Marbling	2	4	0.92 [A]	0.91 [A]	0.88 [A]	0.4549
Backfat	13.6	23.5	0.83 [A]	0.77 [A]	0.83 [A]	0.4026

Table 18: Gender effect on zootechnical performances

Variable	N	Overall average	Cov[3]	Prob. line x sex	Barrows	Females	Diff. sex	Std error of differences	Prob
Growing performances									
Final Age, d	451	151.49	ONWGHT	0.0746	148.69	154.30	-5.61	0.666	<.0001
Trial duration, d	452	82.79	ONWGHT	0.0750	80.01	85.56	-5.55	0.660	<.0001
On-test weight, kg	452	32.38		0.0085	32.81	31.96	0.85	1.096	0.4454
Final weight, kg	451	116.18		0.1559	116.32	116.04	0.28	0.377	0,4543
ADG, g/d	451	1020.84	ONWGHT	0.2392	1055.92	985.75	70.17	7.844	<.0001
Off-test backfat[1], mm	452	15.10	PROBWGHT	0.1770	16.52	13.68	2.85	0.240	<.0001
Off-test muscle depth[1], mm	452	64.85	PROBWGHT	0.8316	64.53	65.16	-0.63	0.327	0.0557
Feed intake performances									
Total feed intake, kg	451	201.86	ONWGHT FNWGHT	0.3637	204.64	199.08	5.56	1.743	0.003
Daily feed intalke, kg/d	451	2.43	ONWGHT FNWGHT	0.0770	2.54	2.32	0.23	0.017	<.0001
Feed conversion on live animal weight gain	451	2.42	ONWGHT	0.4982	2.45	2.38	0.07	0.020	0.0029
Carcass yield									
Hot carcass weight, kg	446	93.63	FNWGHT	0.0601	93.35	93.91	-0.56	0.146	0.0005
Carcass yield, %	446	80.58	FNWGHT	0.0518	80.34	80.82	-0.49	0.127	0.0005
Destron backfat[2], mm	435	17.87	FNWGHT	0.8839	19.48	16.25	3.23	0.270	<.0001
Destron muscle depth[2], mm	434	66.01	FNWGHT	0.3631	64.99	67.04	-2.05	0.521	0.0001
Lean yield, %	434	61.24	FNWGHT	0.7891	60.48	62.00	-1.52	0.126	<.0001
Mean index (weight 85 to 99.9 kg)	418	111.43	FNWGHT	0.1983	110.57	112.29	-1.72	0.184	<.0001

[1] Depth taken on live animal by ultrasounds in B mode

[2] Depth taken on carcass by Destron probe

[3] ONWGHT: on-test weight; FNWGHT: final weight; PROBWGHT: weight at probing at the end of the trial

Table 19: Gender effect on performances by phase

Variable	N	Overall average	Cov[2]	Line prob. x sex	Barrows	Females	Diff. sex	Std error of differences	Prob
Measure in weighed									
On-test weight (kg)	452	32.38		0.0085	32.81	31.96	0.85	1.096	0.4454
1st chang. of diet weight (kg)	451	54.19	ONWGHT	0.0632	54.97	53.41	1.56	0.334	<.0001
2nd chang. of diet weight (kg)	451	77.58	ONWGHT	0.0257	79.10	76.06	3.04	0.401	<.0001
Final weight (kg)	451	116.18		0.1559	116.32	116.04	0.28	0.377	0.4543
Backfat[1] 50 kg (mm)	452	8.64	ONWGHT ONWGHT*LINE	0.3321	8.94	8.34	0.61	0.177	0.0015
Backfat[1] 75 kg (mm)	452	11.45	ONWGHT ONWGHT*LINE	0.0884	12.33	10.57	1.76	0.173	<.0001
Off-test backfat[1] (mm)	452	15.10	PROBWGHT	0.1770	16.52	13.68	2.85	0.240	<.0001
Muscle depth[1] 50 kg (mm)	452	46.53	ONWGHT ONWGHT*SEXE	0.2074	46.43	46.64	-0.21	0.379	0.5883
Muscle depth[1] 75 kg (mm)	452	55.93	ONWGHT	0.7329	55.86	56.00	-0.14	0.369	0.7123
Off-test muscle depth[1] (mm)	452	64.85	PROBWGHT	0.8316	64.53	65.16	-0.63	0.327	0.0557
Performances by period									
Daily feed intake 30-50 kg (kg/j)	451	1.76	ONWGHT	0.0949	1.81	1.71	0.10	0.024	0.0002
Daily feed intake 50-75 kg (kg/j)	452	2.34	ONWGHT	0.0264	2.47	2.21	0.26	0.022	<.0001
Daily feed intake 75-fin kg (kg/j)	450	2.91	ONWGHT	0.4810	3.08	2.73	0.34	0.058	0.0425
ADG 30-50 kg (g/j)	448	961.63	ONWGHT	0.0715	1000.53	922.73	77.80	14.109	<.0001
ADG 50-75 kg (g/j)	451	994.02	ONWGHT	0.2394	1026.42	961.62	64.80	10.702	<.0001
ADG 75-end kg (g/j)	451	1081.29	ONWGHT	0.9621	1121.71	1040.88	80.84	14.186	<.0001
F.C. 30-50 kg	449	1.84	ONWGHT	0.2774	1.82	1.85	-0.03	0.022	0.179
F.C. 50-75 kg	450	2.36	ONWGHT	0.4845	2.41	2.31	0.10	0.023	<.0001
F.C. 75-end kg	449	2.78	ONWGHT	0.7597	2.85	2.71	0.14	0.030	<.0001

[1] Depth taken on live animal by ultrasounds in B mode

[2] ONWGHT: on-test weight; PROBWGHT: weight at probing at the end of the trial.

Table 20: Gender effect in carcass quality

Variable	N	Overall average	Cov[1]	Prob. line x sex	Barrows	Females	Sex diff.	Std error of differences	Prob
Primal cuts									
Reconstituted half-carc. weight (kg)	437	40.52	FNWGHT	0.0135	40.30	40.73	-0.43	0.078	<.0001
Loin eye area (cm²)	434	48.86	FNWGHT	0.2181	47.04	50.68	-3.64	0.671	0.0564
Length (cm)	440	82.84	FNWGHT	0.1414	82.40	83.28	-0.88	0.160	<.0001
Leg weight (kg)	440	10.81	FNWGHT	0.0506	10.65	10.98	-0.33	0.036	<.0001
Loin weight (kg)	437	11.00	FNWGHT	0.6880	10.95	11.04	-0.09	0.096	0.4044
Shoulder weight (kg)	439	11.17	FNWGHT	0.1966	11.20	11.15	0.05	0.047	0.302
Belly weight (kg)	439	7.53	FNWGHT	0.2451	7.52	7.55	-0.03	0.051	0.5334
Leg yield (%)	437	26.69	FNWGHT	0.5155	26.42	26.97	-0.55	0.076	<.0001
Loin yield (%)	437	27.14	FNWGHT	0.5185	27.18	27.10	0.08	0.188	0.6737
Shoulder yield (%)	437	27.58	FNWGHT	0.2363	27.77	27.38	0.39	0.107	0.0003
Belly yield (%)	437	18.60	FNWGHT	0.6604	18.64	18.55	0.09	0.116	0.4356

[1] FNWGHT: final weight

Table 21: Gender effect in meat quality

Variable	N	Overall average	Cov	Prob. line x sex	Barrows	Females	Diff. sex	Std error of differences	Prob
Loin									
Ultimate pH 24 h	436	5.67		0.7124	5.68	5.66	0.01	0.011	0.2801
Luminosity	439	50.95		0.7361	51.16	50.74	0.42	0.258	0.1065
Color	439	3.61		0.9873	3.61	3.61	0.00	0.048	0.993
Marbling - NPPC	438	2.72		0.4955	2.89	2.55	0.33	0.119	0.0388
Texture	435	1.65		0.4181	1.56	1.73	-0.16	0.081	0.0441
Drip loss (%)	441	3.58		0.6299	3.62	3.54	0.08	0.231	0.7423
Ham									
Ultimate pH 24 h	436	5.64		0.8573	5.64	5.63	0.01	0.011	0.2979
Luminosity	439	50.14		0.6468	50.15	50.13	0.01	0.270	0.9585
Color	439	3.58		0.6679	3.62	3.54	0.08	0.044	0.0761
Bicolor index	438	1.82		0.5897	1.81	1.83	-0.02	0.060	0.7487
Tech. yield (%)	438	129.78		0.2686	129.81	129.75	0.06	0.232	0.805
Belly									
Texture	433	146.38	FNWGHT	0.52	158.51	134.26	24.24	3.08	<.0001

3. CONCLUSION

The overall pig performances observed at the test station are judged satisfying considering that the zootechnical performances were excellent and that those of carcass and meat quality were not irregular. The health conditions of these two trials were relatively good, as shown by the low mortality rate. These overall results suggest that the conditions in our station allowed the animals to correctly express their genetic potential.

These trials carried out at the Deschambault station clearly showed the differences in genetic potential between the three terminal lines studied. Significant differences of performance were noticed between the lines at every level, either with regard to the zootechnical performances or to the carcass and meat quality. These results are very useful because they inform both the Quebec's swine sector and the participating organizations on the genetic potential of these three lines and the differences of performances between these lines.

ANNEX 1 - DEFINITION OF VARIABLES

Variables	Abreviations (Units)	Description
Nursery - Growth performances		
Age	Age (day)	Age at the beginning and the end of the period. For each feeding period and the overall period
Duration	Duration (day)	Date of the beginning and the end of the period. For each feeding period and the overall period
Weight	Weight (kg)	Weight at the beginning and the end of the period. For each feeding period and the overall period
Average daily gain	ADG (g/day)	(Weight at the end – weight at the beginning)/duration. For each feeding period and the overall period
Total feed intake	Feed (kg)	Total feed intake of the piglets during the period. For each feeding period and the overall period
Daily feed intake *	Feed intake/day (kg/day)	Piglets total feed intake per day. For each feeding period and the overall period
Piglet feed intake *	Feed intake/piglet (kg/piglet)	Total feed intake per piglet For each feeding period and the overall period
Feed conversion on live weight gain *	F.C. live weight gain	Total feed intake for all pens / live weight gain of all piglets For each feeding period and the overall period
Trial - Growth performances		
Off-test age	Off-test (day)	Age on the transportation day to the slaughterhouse before feed withdrawal
Duration	Duration (day)	Date at the end of the test – date at the beginning
On-test weight	On-test weight (kg)	Weight at the beginning of the trial
Off-test weight	Off-test weight (kg)	Weight on transportation day to the slaughterhouse before feed withdrawal
Average daily gain	ADG (g/day)	(Weight at the end – weight at the beginning)/duration. For all the trial period and each feeding periods
Backfat depth	Fat (mm)	Measure on live animal (50-75 et 120 kg), of backfat depth between the 3rd and 4th before last ribs with ultrasound technology (mode B)
Muscle depth	Muscle (mm)	Measure on live animal (50-75 et 120 kg), of muscle depth between the 3rd and 4th before last ribs with ultrasound technology (mode B)
Feed intake performances		
Total feed intake	Feed intake (kg)	Total feed intake during the trial
Daily feed intake	Feed intake/day (kg/day)	Hog total feed intake/ duration For all the trial periods and each feeding period
Feed conversion on live weight gain	F.C. on live weight gain	Hog feed intake/live weight gain For all the trial periods and each feeding period
Carcass yield		
Hot carcass weight	Hot weight (kg)	Weight of hot carcass after bloodletting and evisceration with head, tongue, leaf fat, kidneys, jowl, feet and no trimming.
Carcass yield	Carcass yield (%)	(Weight of hot carcass/off-test weight) x 100.
Backfat depth	Destron fat (mm)	Measure of backfat depth between the 3rd and 4th before last ribs on the carcass with Destron probe.
Muscle depth	Destron muscle (mm)	Measure of muscle depth between the 3rd and 4th before last ribs on the carcass with Destron probe.
Lean yield	Lean yield (%)	Carcass lean yield estimated from backfat and muscle depth measured with a Destron probe (prediction equation from Agriculture and Agri-Food Canada).
Index (Quebec slaughter grid) (Optimum index stratum)	Average index	Index obtained by the Quebec carcass grid for a specific carcass interval weight.

* The feed intake at the nursery will be calculated from all piglets feed intake and not from an individual feed intake basis

DEFINITION OF VARIABLES (continued)

Variables	Abreviations (units)	Description
Coupe primaire		
Reconstituted half carcass	Half carcass recons. (kg)	Half carcass weight reconstituted from the 4 following primal cuts : leg (ham), loin, shoulder, and belly
Length of half-carcass	Length (cm)	Measure from the cranial side of the first rib up to the internal point of the pubic bone (Foster rule)
Loin eye area	Loin eye area (cm^2)	Loin eye area measured from a planimeter
Leg weight	Leg weight (kg)	Perpendicular cut at the lower part of leg. Cutting up line at 4.5 cm (1¾ inch) from internal tip of pubic bone. Without back foot and tail.
Loin weight	Loin weight (kg)	Loin is cut off from belly at the end of the shoulder, starts at 4.5 cm (1¾ inch) from the basis of ribs, widen at 10 cm (4 inches) at the center of loin and finishes at the end of the leg running along the tenderloin at 2 cm (¾ inch).
Shoulder weight	Shoulder weight (kg)	See the loin weight description
Belly weight	Belly weight (kg)	See the loin weight description
Leg yield	Leg yield (%)	(Leg weight/reconstituted half carcass weight) x 100
Loin yield	Loin yield (%)	(Loin weight/reconstituted half carcass weight) x 100
Shoulder yield	Shoulder yield (%)	(Shoulder weight/reconstituted half carcass weight) x 100
Belly yield	Belly yield (%)	(Belly weight/reconstituted half carcass weight) x 100
Quebec Market Reference		
Quebec Market Reference	Targeted interval	Specification of the desired range given by the 'Quebec Market Reference 2003' (minimum and maximum)
Quebec Market Reference	% desired in the interval	Percent of carcass within the desired range specified by the 'Quebec Market Reference 2003'

DEFINITION OF VARIABLES (continued)

Variables	Abreviations (units)	Description
Meat quality		
a. Loin : measure taken on longissimus dorsi between the 3rd and 4th before last ribs, 24 hours after slaughtering		
pH 24 hour	pH	pH measurement in two sites in the loin muscle with a pH-meter.
Minolta (L*a*b)	Luminosity	Measurements of the L*a*b in two sites of the loin muscle with a Minolta machine.
Color	Color	Assessment with colour scores of the Japanese scale graded from 1 to 6 (1: pale; 6: dark).
Marbling	Marbling NPPC	Measurement of marbling score according to NPPC scale, graded from 1 to 10 (1: lightly marbled; 10: strongly marbled).
Firmness	Firmness (%)	Subjective measurement taken from meat handling from a 1 to 3 scale (1:firm; 2:medium; 3:soft)
Drip loss (loin)	(%)	Measurement from a muscle sample taken in the loin front part, which has been dripping for 48 hours. (Muscle water loss/ weight of fresh muscle) x 100
b. Leg : measure taken on different muscles, 24 hours after slaughtering		
pH 24 hour	pH	Measurement at the level of *gluteus medius* muscle.
Minolta (L*a*b)	Luminosity	Measurements of the L*a*b at the level of the gluteus medius muscle with a Minolta machine.
Color	Color	Assessment with colour scores of the Japanese scale graded from 1 to 6 (1: pale; 6: dark). The assessment is done with *gluteus superficialis* muscle.
Bicoloration	Bicoloration	Color difference between the *gluteus medius* and the *gluteus profondus* from the Japanese scale.
Ham technological yield	Tech. yield (%)	Estimation from a prediction equation that consider the color and luminosity (L*a*b). The assessment is done with gluteus medius and gluteus profondus muscle.
c. Belly : measure taken on different muscles, 24 hours after slaughtering		
Firmness	Firmness (mm)	Measurement taken from the belly, boneless draping over a metallic rod for a period of 2 minutes (belly bend method)
Halothane and RN genotype		
Halothane status of boars	Status (% (number/total))	Results of Halothane (HAL-1843) gene tests. Percent of boars negative reactor (HAL nm), carrier (HAL mm) and positive reactor (HAL dm).
RN status of boars	Status (% (number/total))	Results of RN gene tests. Percent of boars negative (rn+rn+), carrier (RN-rn+) and positive (RN-RN-).