

# How Benchmark Database are Used as a Decision-Making Tool

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## ■ Introduction

The use of benchmark results is not a new concept in swine production but has been minimally utilized in nursery and grow-finish pig production. Measuring nursery and growing pig performance is of paramount importance for a number of reasons. These include:

- identifying strengths, weaknesses and opportunities compared to defined targets;
- performing corrective diagnostics;
- assessing plans and progress, either technical or financial;
- assessing the value of a business proposal; and most importantly,
- to compare and benchmark.

Benchmarking tools incorporating technical and financial metrics are also useful for validating the on-farm effect of new technologies and feeding strategies, including those derived from growth simulation models. This paper will highlight the power of benchmarking and describe experiences with a proprietary system, Compiporc®.

## ■ Compiporc® Overview

Close-out results for nursery and grow-finish pigs are entered into the Compiporc® system according to the farm details. Wean-to-finish performances are not currently included, but will be part of future enhancements. Currently the Compiporc® database contains close-out data since 2000 which includes over 8,000,000 nursery and G-F pigs. It was originally used only in Quebec but is now available across Canada.

Each close-out is characterized by numerous details including: structure, lot number, type of farm, mill, entry and end date, pig flow, number of sources, time to fill, number of pigs entered, weight in, weaning age, number of dead pigs, number of culls + weight, days in nursery or grow-finish, health or disease status, amount of feed per phase as well as energy, protein, phosphorus, phytase and ractopamine content of feed, feed texture, feed and medication costs, floor space, type of floor, type of finisher barn, genotype of dam and sire, feeder type, space, drinker numbers, number of pigs/pen, ventilation type and capacity, index of slaughter pigs, carcass weight, number of pigs dead in transport, kg condemned and some abattoir information (% ideal, back fat).

Sorting criteria for close-out data include the following: average daily gain, average daily feed intake, feed to gain ratio, mortality, entry weight and potential margin. Potential margin is actually a standardized calculation making all close-out comparable in time with standardized feed cost, fixed cost, pork price and adjusted performances. In summary, this potential margin attempts to quantify the gross profit of each close out. As for any other form of standardization, it has biases and limitations but its usefulness over the years has allowed it to categorize the best and poorest performers with realistic projections as exemplified in **Table 1 and 2**.

Each user can benchmark their own performances "on line and real time" with all other results entered in the database. Confidentiality of data is assured by allowing only the production data of an individual close-out to be used within the specific "domain" of the user. The domain hierarchy is as follows: a "farm" within a client, a client within a "sales domain" (dealer, province), a "sales domain" within a region (West, Ontario, Quebec, Atlantic), a region within Canada. An individual client's data will be included in the whole database but results shown will only be for the specific client's domain. The comparative data shown depends on the client's choice of filters which are used to produce the report.

Various reports can be produced for Nursery and Grow-Finish including: a general benchmark report, a technical and economical report per period, a nutrient management report and a slaughterhouse report.

**Table 1. Benchmark performance in nursery pigs (July 2005 - June 2006)**

Selection	All	Top			Bottom		
		10%	25%	50%	50%	25%	10%
Number of close outs	1,511	173	397	746	765	412	193
Weaning weight (kg)	5.65	5.95	5.80	5.72	5.59	5.55	5.52
Days in nursery	49.1	45.8	47.3	48.1	50.0	50.9	51.1
Total number sold	2,610,972	258,970	650,921	1,306,914	1,304,058	651,579	259,672
Mortality (%)	3.36	1.67	1.92	2.20	4.50	5.83	7.99
End weight (kg)	26.00	27.78	27.56	27.04	24.95	24.46	23.59
Feed/Gain	1.49	1.40	1.43	1.45	1.53	1.56	1.59
Feed per piglet (kg)	30.33	30.67	31.06	30.95	29.71	29.54	28.75
A.D.G. (g/d)	415	477	460	443	387	372	354
A.D.F.I. (g/d)	618	669	657	643	594	581	563
Feed cost/piglet (\$)	\$11.88	11.95 \$	12.00 \$	11.97 \$	11.79 \$	11.84 \$	11.72 \$
Cost/kg of gain (\$)	\$0.58	0.55 \$	0.55 \$	0.56 \$	0.61 \$	0.63 \$	0.65 \$
Potential Margin (\$/pig)	\$4.48	8.14 \$	7.09 \$	6.18 \$	\$2.84	\$1.58	-\$0.21

**Table 2. Benchmark performance in grow-finish pigs (July 2005 - June 2006)**

	All	Top 10 %	Top 25 %	Top 50 %	Bot. 50 %	Bot. 25 %	Bot. 10 %
Number pigs sold	1,623,398	161,330	405,441	812,051	811,347	402,210	161,905
Number close-outs	1,561	159	405	802	759	389	170
Average index	108.38	110.38	109.97	109.51	107.25	105.75	103.94
Days on feed	103.1	97.1	99.0	100.5	105.7	106.4	106.5
Weight in (kg)	26.33	27.33	27.21	26.83	25.85	25.66	25.72
Carcass weight (kg)	88.57	91.83	91.28	90.45	86.70	85.54	84.51
Mortality (%)	6.78	3.17	3.84	4.65	8.83	9.70	10.65
Feed/Gain	2.64	2.48	2.54	2.58	2.71	2.74	2.78
A.D.G. (g/d)	815	895	873	854	778	763	749
A.D.F.I. (kg/d)	2.16	2.23	2.22	2.21	2.11	2.09	2.08
Feed/pig (kg)	222.19	216.12	219.43	221.65	222.73	221.82	221.79
Feed/pig (\$)	\$53.34	\$55.21	\$54.90	\$54.54	\$52.14	\$51.69	\$51.57
Cost/kg gain (\$)	\$0.63	\$0.63	\$0.64	\$0.64	\$0.63	\$0.64	\$0.65
Potential Margin/pig (\$)	\$10.17	\$21.68	\$18.85	\$15.97	\$4.35	\$0.30	-\$4.51

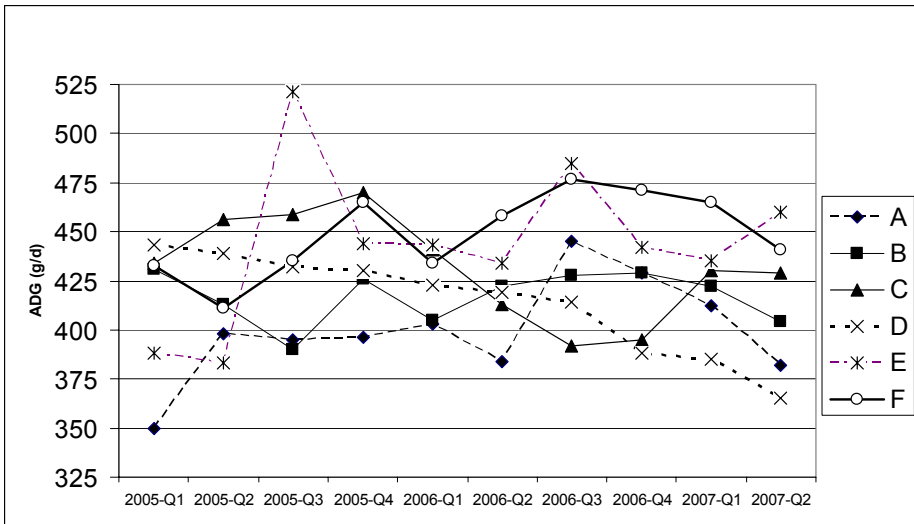
## ■ Examples of using Compiporc® for Nursery Production

Post-weaning feeding and management of piglets are critical components of the whole wean to market program because the rate and efficiency of gain during this stage will directly impact on cost of production and space requirements in the finishing period.

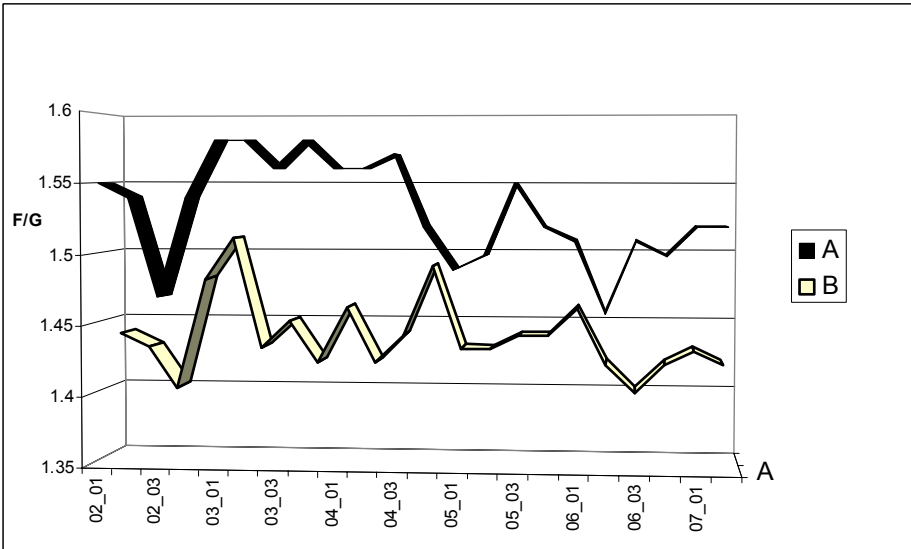
The first example reported concerns the comparative rate of gain of 6 different nursery production systems between Q1-2005 and Q2-2007. The weaning

age, feeding program and diet specification were identical for the first three diets and very similar for the last feeding phase. Other health (PRRS outbreak), management (weaning weight/age) and/or housing factors (all in – all out) were the main sources of difference between the systems. **Figure 1** summarizes the performances of these nurseries. As expected, there were variations over time within each system but there is evidence to show that performance in some nurseries was tracking downwards. With this information it is possible to analyze what are the actual reasons for success or failure and build a solid plan to improve or maintain performance and bottom line.

**Figure 1. Piglet ADG (g/d) of 6 production systems, Q1-2005 - Q2-2007**



The second example compares the F/G ratio from two production systems over a 4.5 years period. Similar to the previous example, the feeding programs were practically identical. Duration of nursery stage was  $49 \pm 2$  days and mortality rates were less than 4.0%. Results of benchmarking showed that System B systematically outperformed System A, with one of the main reasons for this difference being a stricter control of feeder adjustment. When system A improved the management of their feeders towards the end of 2004 and early 2005, there was an improvement in F/G. However, compared to System B there was still excessive feed wastage and therefore further savings to be made.

**Figure 2. Piglet F/G ratio for two production systems, Q1-2002 - Q2-2007**

## ■ Example of using Compiporc® for Grow-Finish Production

As for post-weaning, benchmarking grow-finish performances gives a critical assessment of the results for any type or size of production units. Two examples of the usefulness of a database like Compiporc® are presented.

Is the use of Beta-agonist (ractopamine) actually improving growth performances and providing greater profit per pig? For successful use of this feed additive, commercialized as Paylean® by Elanco, there are some unique nutritional adjustments that need to be made to the diet and additional management practices are required. Using the database in Compiporc® from Q3-2006 to Q3-2007, we extracted the results from those systems where Paylean® was or was not fed. **Table 3** illustrates the summary of the Compiporc® results using the Top 50% producers. It is evident from Table 3, that ractopamine improves the rate of gain and F/G when comparing pigs of similar start-weight receiving a diet of similar energetic density. Carcass weights were slightly higher in ractopamine fed pigs, which suggests that it is possible to ship heavier pigs in a similar grow-out period. Potential margin was in favor of ractopamine fed pigs but this value did not take account the increased cost of the finisher diet which must be subtracted from the margin. Nevertheless, even after deducting the additional cost of the ractopamine-

based diet, there was still a net economic advantage per pig. These kinds of data are extremely useful to validate such technologies and their application.

**Table 3. Using ractopamine in late finisher diets, Q3-2006 - Q3-2007**

Selection	All	Top 50 %	
		- Ractopamine	+ Ractopamine
Number pigs sold	283,362	185,325	98,875
Number close-outs	263	177	90
Average index	109.76	109.58	109.96
Days on feed	100.8	100.1	100.7
Weight in (kg)	27.09	27.50	26.60
Carcass weight (kg)	92.47	91.99	92.97
Mortality (%)	3.46	3.44	3.43
Feed/Gain	2.55	2.58	2.51
A.D.G.(g/d)	873	869	884
A.D.F.I. (kg/d)	2.23	2.24	2.22
Feed/pig (kg)	224.34	224.27	223.87
Feed/pig (\$)	\$58.34	57.37 \$	59.64 \$
Cost/kg gain (\$)	\$0.66	0.66 \$	0.67 \$
Potential Margin/pig (\$)	\$18.74	\$17.77	*20.03 \$

\* The cost of feeding Paylean is not included in the calculation of this margin, so need to be deducted

## ■ Example of Genetic Comparisons

Are all terminal boars delivering similar commercial results? The choice of semen used to produce the terminal cross is still of paramount importance to the financial success of the pork production unit. Genetic improvement in various performance traits has led to improvements in production efficiency. However, if this potential improvement is to be attained, then nutrition, health and management must improve. However, sometimes it is difficult to access sufficient data from commercial operations to assess what is the relative value of different types of terminal boars. As the identity of the sire line is attached to any Compiporc® close-out of finisher pigs, it is possible to extract performance data for those currently in use. In Table 4, four different terminal boar lines were compared with the compound average from Q1-2006 to Q3-2007. All close-out were of similar entry weight, and diet energetic density. As in the previous example, only the Top 50 % (based on potential margin) results are reported. To preserve the identity of each genotype, they are identified with a letter and the size of the sample is not mentioned, but the minimum number of close-outs for a particular sire line is 10. Size of the whole sample is mentioned in the first column of the table. These results clearly show differences between different sires. However, users should always be prudent when assessing such data because some results could be associated with the differences between production systems and, sometimes, management practices (pricing of feeds, etc.). Nevertheless, there is great value in having

these comparative data on hand, even if it requires professionalism in their use and interpretation. To date, these types of results have been used to make genetic choices depending on the production context and targets for our clients. Judicious use of such a dataset will always be required. Finally, these results can be used to prepare various feeding and management scenarios into personalized prospective analysis.

**Table 4. Benchmark performance in grow-finish pigs for different terminal boar lines**

Sire line	All	Top 50 %			
		A	B	C	D
Number pigs sold	258,349				
Number close-outs	250				
Average index	109.71	110.19	109.52	109.57	108.88
Days on feed	99.0	105.2	99.3	97.6	100.5
Weight in (kg)	27.52	28.15	27.75	27.75	26.64
Carcass weight (kg)	91.14	91.05	91.09	92.61	91.25
Mortality (%)	3.74	3.65	3.96	3.15	3.33
Feed/Gain	2.58	2.64	2.58	2.56	2.61
A.D.G.(g/d)	868	810	863	897	866
A.D.FI. (kg/d)	2.24	2.14	2.22	2.29	2.26
Feed/pig (kg)	221.36	224.90	220.78	223.64	226.94
Feed/pig (\$)	\$55.13	\$59.58	\$56.38	\$59.53	\$54.30
Cost/kg gain (\$)	\$0.64	\$0.70	\$0.66	\$0.68	\$0.62
Potential Margin/pig (\$)	\$17.60	\$15.64	\$17.58	\$18.68	\$15.28

## ■ Conclusion

The use of benchmarking data to support decision-making processes has always and will continue to be of crucial importance in pork production. This paper has illustrated a few examples of how it has been and could be used but there are endless other ways of mining the data to improve performance and profitability.