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# Benchmarking at the global level

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Benchmarking productivity can take a number of approaches and levels. The first is to provide internal benchmarking to compare and monitor improvements in the individual herd. The second is to compare with herds of similar management and resources and provide comparisons for the identification of differences between like herds that can identify individual herd deficiencies. The third level is to compare herds or systems of unlike resources. This allows producers to identify strategic opportunities and deficiencies and enable long-term changes in production methodologies or expansion plans. The last level to analyze is to compare industries in different regions or countries. This allows some analysis of strategic opportunities for improvement, or responses to different resource availability in different areas. Such analyses are rare, often subjective, and difficult to perform. Pig production data, especially grow-finish data, is susceptible to the consumer requirements and the choice and availability of feedstuffs.

For this comparison we chose to examine the reproductive data reported to PigChamp in its datashare program. Approximately 45% of herds that are licensed to use this record-keeping program voluntarily submit their records on an annual basis. Annual average values for production variables related to breeding, farrowing, weaning, and the population was collected from each farm. Herds from Brazil, Canada, Colombia, Mexico, Thailand, and USA were included.

Farms that provided updates of their data on or after October 2001 were considered for analysis. Herds that showed more than 40% fluctuation in breeding herd inventory were excluded from the analysis. The resulting dataset comprised 119 farms from Brazil, 36 farms from Canada, 15 farms from Colombia, 78 farms from Mexico, 23 farms from Thailand, and 105 farms from USA.

Results are listed in Table 1, with superscripts used to signify where the mean levels were found to be different by a one-way ANOVA.

When comparing such data a few caveats must be made. The first is that there is little reason to suggest that the herds that participate in PigChamp are representative of all herds in the country. In reality, this database tends to represent the larger and more technologically adept pro-

ducers. This can be seen in the average lactation length reported in this database. It may also represent slightly different recording methods and inclusion biases that vary by region.

Nonetheless, it is the best method of gaining farm level estimates of productivity over along period. A number of different observations can be made:

- As in all such databases there is a great deal of variation within each grouping. The standard deviations reported represent a wide variation in reproductive performance. As in most cases, as the mean performance improves, so does the standard deviation of performance. This represents opportunities for improvement but also emphasizes that regional differences do not make up a large part of the causal bases for differentiation.
- Statistically, there are a number of differences between the different countries. There are detectable differences in all the variables except for mummies per litter in Table 1. Some are expected, such as differences in herd size, though in this database only Colombia has a significantly smaller herd size.
- What is most distinct is the fact that the USA lags other countries in many reproductive indices. Non-productive sow days are higher, farrowing rate is lower, and sow longevity is lower in comparison with other countries as well.

Most benchmarking is usually done within a country as the expected competition and opportunities should be seen in farm-to-farm comparisons. The opportunity in international comparisons is to drop out distinctive differences that may be the result of differences in priorities, resources, or simple emphasis due to a lack of expectation within the country. Often high temperatures are blamed for many of the problems in reproduction; however, this does not explain the higher levels of mortality and culling rate seen in the US. Indeed, some of the lower levels are seen within hot climates. More likely reasons for higher mortality include a stricter set of regulations for transportation of animals to slaughter, or a lower value for these animals. The combination of high cull rates, often owing to reproductive performance, and the higher nonproductive sow days suggests that labor may be a restrictive resource in

Table 1. Management and production variables in different countries for the year 2002 (Mean±SD)

	<b>Brazil</b>	<b>Canada</b>	<b>Colombia</b>	<b>Mexico</b>	<b>Thailand</b>	<b>USA</b>
<i>Population</i>						
Avg parity	2.69±0.764 <sup>ac</sup>	2.72±1.033 <sup>ac</sup>	2.98±0.507 <sup>ab</sup>	2.86±0.481 <sup>a</sup>	3.26±0.610 <sup>b</sup>	2.55±0.800 <sup>c</sup>
Culling rate	38.32±11.440 <sup>a</sup>	36.54±14.714 <sup>a</sup>	36.49±8.550 <sup>a</sup>	39.92±10.598 <sup>ab</sup>	32.87±10.203 <sup>a</sup>	44.74±16.922 <sup>c</sup>
Death rate	5.21±2.901 <sup>a</sup>	4.86±2.404 <sup>a</sup>	3.65±1.870 <sup>a</sup>	4.99±2.822 <sup>a</sup>	4.01±1.483 <sup>a</sup>	8.02±4.148 <sup>b</sup>
Average parity of culls	4.01±1.582 <sup>a</sup>	4.51±1.822 <sup>abc</sup>	4.81±1.363 <sup>bc</sup>	4.37±1.323 <sup>abc</sup>	4.82±1.657 <sup>c</sup>	4.06±1.255 <sup>ab</sup>
Avg female inventory	973±828 <sup>a</sup>	930±1077 <sup>a</sup>	337±238 <sup>b</sup>	934±838 <sup>a</sup>	1099±866 <sup>a</sup>	816±645 <sup>a</sup>
Avg gilt pool inventory	64.65±74.092 <sup>a</sup>	25.73±36.798 <sup>bcd</sup>	19.61±16.179 <sup>cd</sup>	56.50±73.388 <sup>a</sup>	59.81±69.131 <sup>acd</sup>	32.32±46.839 <sup>d</sup>
Avg NP sow days	59.79±34.515 <sup>a</sup>	57.90±47.44 <sup>a</sup>	59.74±12.613 <sup>ab</sup>	52.69±15.173 <sup>a</sup>	55.65±20.916 <sup>a</sup>	74.80±28.106 <sup>b</sup>
<i>Breeding</i>						
% repeat services	8.19±3.58 <sup>a</sup>	10.18±7.82 <sup>ab</sup>	7.97±2.539 <sup>ab</sup>	8.27±3.907 <sup>a</sup>	10.96±4.442 <sup>b</sup>	14.75±6.982 <sup>c</sup>
% multiple mating	90.07±27.921 <sup>a</sup>	89.76±8.470 <sup>ab</sup>	98.73±1.177 <sup>a</sup>	94.22±22.030 <sup>a</sup>	98.98±1.209 <sup>a</sup>	81.14±28.934 <sup>b</sup>
Weaning-1 <sup>st</sup> serv int	5.83±0.892 <sup>a</sup>	6.88±1.614 <sup>bde</sup>	9.55±1.75 <sup>c</sup>	5.81±0.802 <sup>a</sup>	6.83±1.585 <sup>de</sup>	7.28±2.359 <sup>e</sup>
<i>Farrowing</i>						
Farrowing interval	143.84±3.255 <sup>a</sup>	146±4.848 <sup>bc</sup>	148.73±2.789 <sup>cde</sup>	143.68±3.06 <sup>a</sup>	148.83±3.916 <sup>de</sup>	149.45±8.805 <sup>e</sup>
Farrowing rate	81.03±8.878 <sup>a</sup>	79.26±13.057 <sup>a</sup>	81.85±3.949 <sup>a</sup>	82.54±4.552 <sup>a</sup>	80.99±4.787 <sup>a</sup>	71.74±8.669 <sup>b</sup>
Avg total pigs/litter	11.34±0.655 <sup>a</sup>	11.68±0.85 <sup>b</sup>	10.73±0.55 <sup>cd</sup>	11.39±0.599 <sup>ad</sup>	10.97±0.641 <sup>d</sup>	11.48±0.728 <sup>ab</sup>
Avg born alive/ litter	10.54±0.561 <sup>a</sup>	10.75±0.751 <sup>a</sup>	9.97±0.516 <sup>bcd</sup>	10.58±0.524 <sup>a</sup>	9.93±0.624 <sup>c</sup>	10.26±0.63 <sup>d</sup>
Litters/mated female/yr	2.48±0.184 <sup>a</sup>	2.42±0.216 <sup>abc</sup>	2.37±0.055 <sup>bcd</sup>	2.46±0.064 <sup>a</sup>	2.38±0.071 <sup>c</sup>	2.30±0.182 <sup>d</sup>
Avg stillborn	0.55±0.201 <sup>a</sup>	0.7±0.202 <sup>bc</sup>	0.49±0.122 <sup>a</sup>	0.56±0.192 <sup>a</sup>	0.8±0.295 <sup>c</sup>	0.98±0.306 <sup>d</sup>
Avg parity at farrowing	3.60±0.850 <sup>a</sup>	3.70±0.895 <sup>ac</sup>	3.93±0.627 <sup>abc</sup>	3.76±0.602 <sup>a</sup>	4.20±0.746 <sup>b</sup>	3.52±0.772 <sup>c</sup>
Avg mummies/ litter	0.25±0.135NS	0.22±0.138 NS	0.27±0.082 NS	0.26±0.14 NS	0.2±0.122 NS	0.24±0.134 NS
Avg lactation length	19.97±1.751 <sup>a</sup>	20.70±3.098 <sup>abc</sup>	21.76±0.378 <sup>bc</sup>	20.15±1.658 <sup>a</sup>	21.86±2.44 <sup>c</sup>	18.70±3.496 <sup>d</sup>

some cases though other methodological differences should be examined as well. Higher stillbirth rates in the US are more difficult to justify. The average herd parity is lower and the temperatures again are lower than in many countries.

Historically, it has been argued that swine production, particularly swine reproduction, is a technologically complex industry in which the United States has had a particular capability. This, as shown in this database, is now questionable. In many cases the United States has exported techniques and skills to provide similar capabilities in many regions of the world. In fact, it appears that these capabilities may, in many cases, exceed the native (i.e., US) production capabilities.

