

Variation in Pig Performance: Can We Do Anything About It?

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Introduction

Variation is a cost to producers due to reduced barn utilization and loss of revenue at market. As our barns become larger and more sophisticated in both design and in management, there is an increased focus on variation in pig performance. The implementation of all-in-all-out systems further directs attention to this topic, because the impact of variation on space utilization is much more obvious; in continuous flow barns, sorting at marketing tends to hide the problem.

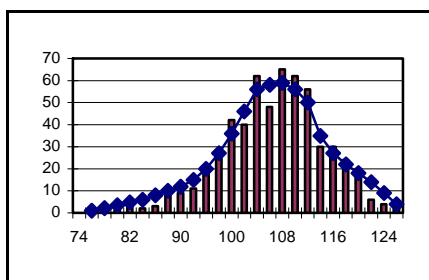
Measuring Variation

Statistically, variation can be defined in a variety of ways; the most common terms are standard deviation (SD) and coefficient of variation (CV). The SD is a measure of dispersion. The more dispersed the weights of pigs, the larger will be the standard deviation. In a normal distribution, 1 standard deviation about the mean will include 68.27% of the pigs in the total group. The CV is calculated by dividing the standard deviation by the mean, and multiplying by 100. Table 1 describes the statistics from groups of pigs at 3 different ages. The CV's shown in Table 1 would be typical of a well-managed herd. Figure 1 is an example of a bell curve of pig weights at 20 weeks of age. Clearly, these data do not show a perfect bell-shaped curve, but it is very close and reflects the range from "ideal" that is seen under commercial conditions.

Causes of Variation

There are many causes of variation, but fundamentally, they can be considered as being in one of two categories:

Figure 1. A plot of pig weights at 20 weeks of age showing the typical normal distribution or "bell" curve



genetic or environmental. Classical genetics defines the genetic make-up of an animal as its "genotype." Other sources of variation specific to an individual pig include birth weight, weaning weight, litter of origin, gender, and the parity of its dam.

In an ideal world, adverse environmental effects are eliminated, so that the performance of the pig reflects its fundamental genetic make-up. In reality, it would be extremely difficult to completely eliminate all negative effects of the environment; nonetheless, a key goal of management is to minimize their influence. Environmental effectors of variation include access to resources, including food and water, exposure to pathogens, and behavioural challenges, such as dominance hierarchy in dynamic and static housing circumstances.

Reducing the Impact Variation

The management practices that can be employed to reduce variation will depend on the size of the CV already existing in the barn. If CV is larger than normal (>15%), then it is likely that certain "resources" are limiting, and addressing these limitations will not only lower variation but probably also im-

prove performance. However, when CV's are in the range of 8 to 12%, people have generally been frustrated in their attempts to further reduce variability.

An alternative approach is to segregate production in some manner. One option is to segregate barrows and gilts; because barrows eat more feed than gilts, they tend to reach market weight 5 to 7 days sooner than gilts. Another form of segregation involves separating a group of animals into two groups; in most instances, the smallest 10 or 15% of the pigs at weaning or nursery exit are split off into a separate barn, or sold altogether. Alternatively, large groups can be split into two, with the heaviest half in one group and the lighter half in the other.

Two research articles focused on vari-

Table 1. Measured variation in body weight at 3 ages within an unselected population.

	Age		
	19	68	140
No. of Pigs	1264	700	632
Weight, kg			
Mean	5.39	29.14	103.72
Median	5.40	29.10	104.4
Mode	5.40	30.95	98.1
Minimum	2.40	23.80	74.4
Maximum	9.20	40.90	124.9
Range	6.80	17.10	50.5
Range, % of mean	121	59	48
Standard Deviation, kg	1.21	3.74	8.31
Coefficient of variation, %	22.4	12.82	8.02

Body weights determined on whole groups of animals without pre-selection at weaning (19 days) nursery exit (68 days of age) and at 20 weeks of age before the first market pull. All were collected at the PSC Elstow Research Farm. The weights were collected at different times, so the three groups of pigs are not related to each other.