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Explanation of Statistics Used in This Report

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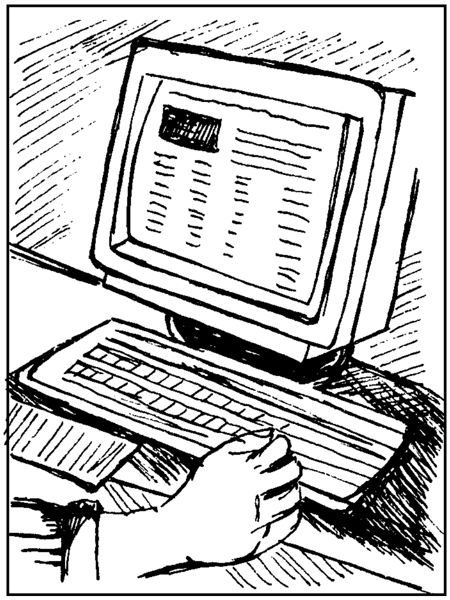
Pigs treated alike vary in performance, due to their different genetic makeup and to environmental effects we cannot completely control. When a group of pigs is randomly allotted to treatments it is nearly impossible to get an “equal” group of pigs on each treatment. The natural variability among pigs and the number of pigs per treatment determine the expected variation among treatment groups due to random sampling.

At the end of an experiment, the experimenter must decide whether observed treatment differences are due to “real” effects of the treatments or to random differences due to the sample of pigs assigned to each treatment. Statistics are a tool used to aid in this decision. They are used to calculate the probability that observed differences between treatments were caused by the luck of the draw when pigs were assigned to treatments. The lower this probability, the greater confidence we have that “real” treatment effects exist. In fact when this probability is less than .05 (denoted **P < .05** in the articles), there is less than a 5 percent chance (less than 1 in 20) that observed treatment differences were due to random sampling. The conclusion, then, is that the treatment effects are “real” and caused different performance for pigs on each treatment. Bear in mind, if the experimenter obtained this result in each of 100 experiments, 5 differences would be declared to be “real” when they were really due to chance. Sometimes, the probability value calculated from a statistical analysis is P < .01. With that figure, the chance that random



sampling caused observed treatment differences is less than 1 in 100. Evidence for real treatment differences, then, is very strong.

It is common to say differences are significant when P <.05 and highly significant when P < .01. However, P values can range anywhere between 0 and 1. Some researchers say there is a tendency for real treatment differences to exist when the value of P is between .05 and .10. “Tendency” is used because we are not as confident the differences are real. The chance that random sampling caused the observed differences is between 1 in 10 and 1 in 20.

Sometimes, researchers report standard errors of means **(SEM)** or standard errors **(SE)**. These are calculated from the measure of variability and the number of pigs in the treatment. A treatment mean may be given as 11 ± .8. The 11 is the mean and the .8 is the SEM. The SEM or SE is added and subtracted from the treatment mean to give a range. If the same treatments were applied to an unlimited number of animals the probability is .68 (1 = complete certainty) that their mean would be in this range. In the example the range is 10.2 to 11.8.

Some researchers report **linear (L)** and **quadratic (Q)** responses to treatments. These effects are tested when the experimenter used increasing increments of a factor as treatments. Examples are increasing amounts of dietary lysine or energy, or increasing ages or weights when measurements are made. The L and Q terms describe the shape of a line drawn to describe treatment means. A straight line is linear and a curved line is quadratic. For example, if finishing pigs were fed diets containing .6, .7 and .8 percent lysine gained 1.6, 1.8 and 2.0 lb/day, respectively we would describe the response to lysine as linear. In contrast, if the daily gains were 1.6, 1.8 and 1.8 lb/day the response to increasing dietary lysine would be quadratic. Probabilities for tests of these effects have the same interpretation as described above. Probabilities always measure the chance that random sampling caused the observed response. Therefore, if P < .01 for the Q effect was found, there is less than a 1 percent chance that random differences between pigs on the treatments caused the observed response.