# Swine General Health and Production Tools of Citities Diagnostic dies Continuing ducation of the Continuing Swine Health and Production of the Continuing Swine Swine General Health and The Coduction of the Codu

mange Slaughter Epidemiology Per
cence Sarcoptic mange Slaughter E <sub>l</sub>
cets News from the NPPC PRRS Nu
Computerized records Production <sup>1</sup>
TGE Pork quality Computerized rec
he NPPC PRRS Nutrition Vaccination
Production Tools Practitioners Diagr
Original Research PRRS Nutrition Va
zed records Production Tools Pract
/accinations Reproductive efficienc
itioners Diagnostic Notes Continui
PRRS Nutrition Vaccinations Reprod
ion Tools Practitioners Diagnostic N
Research PRRS Nutrition Vaccinatio
efficiency International markets Ne
Continuing education FDA Immuno
Reproductive efficiency Internation
nostic Notes Continuing education
/accinations Reproductive efficiency
News from the NPPC Disease TGE Pc
ional markets News from the NPPC I
DA Immunofluorescence Sarcopti
ciency International markets News
Disease TGE Pork quality Computeriz
mange Slaughter Epidemiology Per
the NPPC Disease TGE Poli <b>ne</b> ality (
ence Sarcoptic mange Slaughter Ep
LITTICIOL

The Official Journal of the American Association of Swine



# **Contents**

President's message
Letters
Respiratory disease
Panel discussion
Food safety and its impact on domestic and export markets
Peter Davies
Performance, carcass, and meat quality advantages of boars over barrows:
A literature review
JinLiang Xue, Gary D. Dial, James E. Pettigrew
Diagnostic notes:
A simple technique for tracheal culture to detect respiratory pathogens in live pigs
Gloria Solano, Carlos Pijoan
News
AASP Vice-Presidential candidates
Upcoming meetings
Abstracts
What's your interpretation? Inside back cover
Classifieds

# 1.708 1.909 Q) Diet A Diet B

## What's your interpretation?

Many experimental studies compare two groups. This histogram shows the average daily gain (ADG) of two groups of pigs fed different diets. The statistical question of interest is: "What is the probability that the observed difference in ADG of 0.20 lb (0.09 kg) per day between pigs fed diet A and pigs fed diet B could have occurred by chance?" If this probability is small enough, then we may assume that the observed difference is not due to chance and that there is a significant effect of diet on ADG. In addition to the mean ADG for each group, what information is needed to conduct a two-sample t-test for significance?

# WHAT'S YOUR INTERPRETATION?

n this experiment, 100 pigs weighing approximately 150 lb (68 kg) were randomly allocated between two diets, fed for 48 days, then weighed again. Results are summarized in Table 1.

What is the probability that the observed difference in ADG of 0.20 lb (0.09 kg) per day

between pigs fed diet A and pigs fed diet B could have occurred by chance?

To answer this question, we begin with a null hypothesis that the performance of pigs fed diet A and pigs fed diet B is not different. Then we try to show that they are different. In this instance, it is appropriate to use the Student's t-test. This test can be applied where there are two groups to be compared and where the underlying distribution of ADG is approximately normal. We can check this by asking the computer to describe a normal curve over a histogram of the ADG data. (Figure 1)

### Student's t-test:

#### Step 1

Calculate an estimate of the pooled variance for our two populations. For reasons best known to statisticians, this involves squaring the standard deviations, multiplying by sample sizes minus one, then dividing by the "degrees of freedom":

Degrees of Freedom = 
$$(n_a - n_b - 2)$$

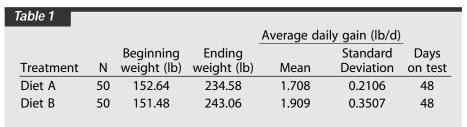
Variance = 
$$\frac{(n_a - 1) \times SD_a^2 + (n_b - 1) \times SD_b^2}{Degrees \text{ of Freedom}}$$

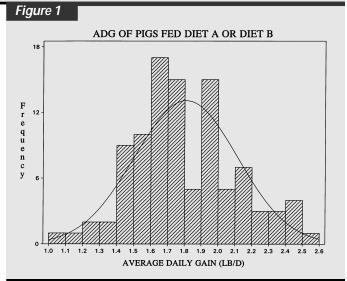
Variance = 
$$\frac{(49 \times 0.044) + (49 \times 0.123)}{(50 + 50 - 2)} = 2.235$$

#### Step 2

Once we have our estimate of variance, we can calculate our t statistic using another impressive-looking formula:

$$t = \frac{ADG_a - ADG_b}{Variance \div \left(\frac{1}{n_a} + \frac{1}{n_b}\right)}$$





$$t = \frac{1.909 - 1.708}{2.235 \div \left(\frac{1}{50} + \frac{1}{50}\right)} = 3.47$$

#### Step 3

Looking up t = 3.47, 98 d.f., in statistical tables, we find P = .00078.

Our interpretation of P = .00078 is that the probability of our observed difference of 0.2 lb per day occurring by chance is very small indeed (78 times in 10,000!). Therefore, we can conclude that our observed difference in ADG between the two groups fed diet A and diet B is statistically significant.

Note that in addition to the mean ADG for each group, we also needed standard deviations and sample sizes  $(n_a, n_b)$  to calculate the t statistic followed by the *P*-value.