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D.M. Marshall
South Dakota State University

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INTERPRETING EXPERIMENTAL RESULTS

D. M. Marshall[1]
Department of Animal and Range Sciences

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A typical experimental format involves evaluating the response caused by application of different treatments to experimental subjects (animals, carcasses, pens, pastures, etc.). The effect of a given treatment might be evaluated by comparison to a control group or to one or more other treatment groups. However, a problem with animal research (and other types as well) is that variation not due to treatments often exists among experimental subjects.

For example, suppose that animals receiving ration A grow faster than animals receiving ration B. Was the observed difference in growth rates actually due to differences in the rations or to other factors (i.e., genetics, age, sex, etc.) or some of each? Statistical analyses evaluate the amount of variation between treatment groups relative to the amount of variation within treatment groups. In addition, variation caused by factors other than treatments can sometimes be eliminated by the statistical analysis.

The statement "the difference was statistically significant (P = .05)" indicates the probability of a difference of that magnitude occurring from chance rather than from the research treatment is about 5%.

A correlation coefficient provides an indication of the relationship between two factors and can range from -1 to +1. A strong, positive correlation (close to 1) indicates that as one factor increases the other factor tends to increase, also. For example, several studies have shown a positive correlation between cow milk yield and calf weaning weight. A strong negative correlation (close to -1) indicates that as one factor increases the other factor tends to decrease. A correlation near zero indicates the two factors are unrelated.

Several of the reports in this publication refer to least squares means. In balanced experimental designs, least squares means are often the same as the simple raw means. However, when numbers of experimental subjects are not evenly distributed across treatments, adjustments to the means are needed. Appropriate adjustments are made by least squares procedures. In addition, least squares means are sometimes adjusted for extraneous sources of variation through a so-called analysis of variance.

Means (averages), correlations and other statistics presented in research results are sometimes followed by ± some figure known as the standard error. The standard error provides an indication of the possible error with which the statistic was measured. The size of the standard error of a treatment mean depends on the animal to animal variation within a treatment group and on the number of animals in the group.

All other factors being equal, the greater the number of animals and(or) replications per treatment, the smaller the difference required to achieve a given value for probability of significance. Stated another way, increasing the number of animals or replications increases the likelihood of detecting differences due to treatments when such differences do indeed exist.

Several of the research reports in this publication contain statistical terminology. Although such terms might be unfamiliar to some readers, the statistical analyses allow for more appropriate interpretation of results and make the reports more useful.

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[1]Associate Professor.