Arkansas Animal Science Department Report • 2002

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Editors

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JOHNSON AND KELLOGG

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DIVISION OF AGRICULTURE

ARKANSAS ANIMAL SCIENCE DEPARTMENT REPORT 2002

Edited by

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INTRODUCTION

The faculty and staff of the animal science programs are pleased to present the fifth edition of the Arkansas Animal Science Report.

The highlight of the year was the ranking of the animal and poultry science programs among the top five in the country by Meat and Poultry Magazine. This is a tribute to the dedicated and talented faculty in both departments.

Our capacity to conduct research and teaching programs on swine was significantly enhanced with the completion of our new growing and finishing unit. Dr. Maxwell and his group put pigs in the facility literally the day the facility was completed. The program of depopulating the existing swine herd and replacing those pigs with disease-free lines of modern genetics ensures that our swine research is being conducted with the type of genetics used in the industry today. The crew at the swine unit is to be congratulated and thanked for their tireless efforts to complete the considerable task of construction, renovation, and repopulation.

Private support for animal science programs has been impressive and appreciated. New endowments and contributions to support the equine program and the livestock judging team have added needed base support for both these activities. With the addition of three new courses in the equine area, the expansion of the curriculum to reflect the interests of our changing student body has largely been completed.

The animal science programs (teaching, research, and extension) used a multi-disciplinary approach to collaboratively address many of the most challenging issues facing the Arkansas livestock industry. The extension programs provided a critical bridge between the evolving research and issues faced by Arkansans. Research-based solutions in the areas of beef, dairy, and horse production, forage and grazing management, waste management, plus many other livestock related areas were delivered to our industry stakeholders. On any given day, you could find animal science extension faculty taking forage samples, weighing cattle, presenting educational programs, serving on state, regional and national committees, teaching the youth of Arkansas, or visiting a ranch to help solve a problem.

The animal science extension program experienced a number of retirements this past year. Dr. George Davis, Mr. Bill Wallace, and Mr. Larry Sandage devotedly served the Arkansas livestock industry. Their years of expertise will be missed. Likewise, we will miss the contributions of Dr. Bernie Daniels, who retired from research and teaching in May. During his tenure, Dr. Daniels served in every capacity from assistant professor to interim associate vice president for agriculture.

Financial problems have weighed heavily on our University as they have weighed on most other institutions across the nation. The faculty have reacted by looking at ways to make our programs relevant, competitive and sustainable in this new educational environment. We are confident that they will succeed. The animal science faculty and staff look forward to serving the livestock industry in the coming year.

Sincerely,

Keith Lusby

Keith Lusby
Department Head

Tom Troxel

Tom Troxel
Section Leader

INTERPRETING STATISTICS

Scientists use statistics as a tool to determine which differences among treatments are real (and therefore biologically meaningful) and which differences are probably due to random occurrence (chance) or some other factors not related to the treatment.

Most data will be presented as means or averages of a specific group (usually the treatment). Statements of probability that treatment means differ will be found in most papers in this publication, in tables as well as in the text. These will look like ($P < 0.05$); ($P < 0.01$); or ($P < 0.001$) and mean that the probability (P) that any two treatment means differ entirely due to chance is less than 5, 1, or .1%, respectively. Using the example of $P < 0.05$, there is less than a 5% chance that the differences between the two treatment averages are really the same. Statistical differences among means are often indicated in tables by use of superscript letters. Treatments with any letter in common are not different, while treatments with no common letters are. Another way to report means is as mean ± standard error (e.g. 9.1 ± 1.2). The standard error of the mean (designated SE or SEM) is a measure of how much variation is present in the data – the larger the SE, the more variation. If the difference between two means is less than two times the SE, then the treatments are usually not statistically different from one another. Other authors may report an LSD (least significant difference) value. When the difference between any two means is greater than or equal to the LSD value, then they are statistically different from one another. Another estimate of the amount of variation in a data set that may be used is the coefficient of variation (CV) which is the standard error expressed as a percentage of the mean. Orthogonal contrasts may be used when the interest is in reporting differences between specific combinations of treatments or to determine the type of response to the treatment (i.e. linear, quadratic, cubic, etc.).

Some experiments may report a correlation coefficient (r), which is a measure of the degree of association between two variables. Values can range from –1 to +1. A strong positive correlation (close to +1) between two variables indicates that if one variable has a high value then the other variable is likely to have a high value also. Similarly, low values of one variable tend to be associated with low values of the other variable. In contrast, a strong negative correlation coefficient (close to –1) indicates that high values of one variable tend to be associated with low values of the other variable. A correlation coefficient close to zero indicates that there is not much association between values of the two variables (i.e. the variables are independent). Correlation is merely a measure of association between two variables and does not imply cause and effect.

Other experiments may use similar procedures known as regression analysis to determine treatment differences. The regression coefficient (usually denoted as b) indicates the amount of change in a variable Y for each one-unit increase in a variable X. In its simplest form (i.e. linear regression), the regression coefficient is simply the slope of a straight line. A regression equation can be used to predict the value of the dependent variable Y (e.g. performance) given a value of the independent variable X (e.g. treatment). A more complicated procedure, known as multiple regression, can be used to derive an equation that uses several independent variables to predict a single dependent variable. Associated statistics are r^2, the simple coefficient of determination, and R^2, the multiple coefficient of determination. These statistics indicate the proportion of the variation in the dependent variable that can be accounted for by the independent variables. Some authors may report the square root of the Mean Square for Error (RMSE) as an estimate of the standard deviation of the dependent variable.

Genetic studies may report estimates of heritability (h^2) or genetic correlation (r_g). Heritability estimates refer to that portion of the phenotypic variance in a population that is due to heredity. A genetic correlation is a measure of whether or not the same genes are affecting two traits and may vary from –1 to +1.

COMMON ABBREVIATIONS

Abbreviation	Term
ADFI	Average daily feed intake
ADG	Average daily gain
avg	Average
BW	Body weight
cc	Cubic centimeter
cm	Centimeter
CP	Crude protein
CV	Coefficient of variation
cwt	100 pounds
d	Day(s)
DM	Dry matter
DNA	Deoxyribonucleic acid
°C	Degrees Celsius
°F	Degrees Fahrenheit
EPD	Expected progeny difference
F/G	Feed:gain ratio
FSH	Follicle stimulating hormone
ft	Foot or feet
g	Grams(s)
gal	Gallon(s)
h	Hour(s)
in	Inch(es)
IU	International units
kcal	Kilocalories(s)
kg	Kilograms(s)
lb	Pound(s)
L	Liter(s)
LH	Lutenizing hormone
m	Meter(s)
mg	Milligram(s)
Meq	Milliequivalent(s)
Mcg	Microgram(s)
min	Minute(s)
mm	Millimeter(s)
mo	Month(s)
N	Nitrogen
NS	Not Significant
ng	Nanogram(s)
ppb	Parts per billion
ppm	Parts per million
r	Correlation coefficient
r^2	Simple coefficient of determination
R^2	Multiple coefficient of determination
s	Second(s)
SD	Standard deviation
SE	Standard error
SEM	Standard error of the mean
TDN	Total digestible nutrients
wk	Week(s)
wt	Weight
yr	Year(s)

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