

# *Arkansas* **Animal Science** **Department Report • 2008**



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**Editors**

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## INTRODUCTION

Welcome to the 11<sup>th</sup> edition of *Arkansas Animal Science*. Once again, we owe a great debt to Drs. Zelpha Johnson and Wayne Kellogg who devoted valuable time to making this a quality publication. We believe Arkansas Animal Science is an essential publication for our program. While peer-reviewed journals are the ultimate goal for quality research, the time-lines for publication and the frequent necessity to combine several trials limit the utility of journals for early dissemination of results. Stakeholders, researchers, extension faculty, and industry professionals need results as quickly as the data are statistically analyzed and prepared in a professional publication such as *Arkansas Animal Science*. The capacity to present this year's publication for the first time in only electronic format on the departmental, Division of Agriculture, and University of Arkansas Web sites further increases its impact.

The research described in this report was conducted at the four main experiment stations used by the Department of Animal Science, including the Arkansas Research and Extension Center at Fayetteville, the Southwest Research and Extension Center at Hope, the Southeast Research and Extension Center at Monticello, and the Livestock and Forestry Branch Station at Batesville. Other valuable research and extension work was conducted at numerous private farms across the state. In the modern world of animal science, the traditional lines between research and extension programs are increasingly disappearing. This should be apparent as one looks at the authorship of the articles in this publication.

Readers are invited to view all programs of the Department of Animal Science at the departmental Web site at [animalscience.uark.edu](http://animalscience.uark.edu) and the Livestock and Forestry Branch Station Web site at [www.Batesvillestation.org](http://www.Batesvillestation.org).

This was a challenging year for the department as we have been faced with the same escalating costs experienced by our stakeholders. Many of our research and extension programs reflect these challenges. Members of our faculty have quickly developed new projects and programs to give stakeholders answers and at the same time adapt our operations as efficiently as possible. In this respect, the challenges have made our programs more relevant. The Animal Science Extension Section developed a new emphasis program titled 300 Days of Grazing designed to make the most effective use of fuel, equipment, and fertilizer inputs, and to optimize cattle management and marketing. This program will be set up and demonstrated on livestock operations across Arkansas and on our research station at Batesville.

Finally, we want to thank the many supporters of our teaching, research, and extension programs. Whether providing grants for research and extension and funds for scholarships or supporting educational and extension programs and donating facilities or horses and livestock, these friends are essential to maintaining a quality animal science program. We thank each and every one of you on behalf of our faculty, staff, students, and stakeholders. We hope you find the research, extension, and educational programs reported herein to be timely, useful, and making a contribution to the field of animal science.

Sincerely,



Keith Lusby  
Department Head



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## 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 0.1%, respectively. Using the example of  $P < 0.05$ , there is less than a 5% chance that 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 letters in common are. Another way to report means is as mean  $\pm$  standard error (e.g.  $9.1 \pm 1.2$ ). The standard error of the mean (designated SE or SEM) is a measure of the amount of variation 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  $+1$ .



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## COMMON ABBREVIATIONS

Abbreviation	Term
<b>Physical Units</b>	
cal	Calorie
cc	cubic centimeter
cm	centimeter
°C	Degrees Celsius
°F	Degrees Fahrenheit
ft	Foot or feet
g	Grams(s)
gal	Gallon(s)
in	Inch(es)
IU	International unit(s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
lb	Pound(s)
L	Liter(s)
M	Meter(s)
mg	Milligram(s)
Meq	Milliequivalent(s)
Mcg	Microgram(s)
mm	Millimeter(s)
ng	Nanogram(s)
oz	ounce
ppb	Parts per billion
ppm	Parts per million
<b>Units of Time</b>	
d	Day(s)
h	Hour(s)
min	Minute(s)
mo	Month(s)
s	Second(s)
wk	Week(s)
yr	Year(s)
<b>Others</b>	
ADF	Acid detergent fiber
ADFI	Average daily feed intake
ADG	Average daily gain
avg	Average
BCS	Body condition score
BW	Body weight
CP	Crude protein
CV	Coefficient of variation
cwt	100 pounds
DM	Dry matter
DNA	Deoxyribonucleic acid
EDTA	Ethylene diamine tetraacetic acid
EPD	Expected progeny difference
F/G	Feed:gain ratio
FSH	Follicle stimulating hormone
LH	Lutenizing hormone
N	Nitrogen
NDF	Neutral detergent fiber
NS	Not significant
r	Correlation coefficient
$r^2$	Simple coefficient of determination
$R^2$	Multiple coefficient of determination
SD	Standard deviation
SE	Standard error
SEM	Standard error of the mean
TDN	Total digestible nutrients
wt	Weight

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