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Foreword, Dairy Research 2016

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Abstract
Kansas State University is pleased to present the 2016 Dairy Research Report of Progress.

Keywords
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Foreword

Kansas State University is pleased to present the 2016 Dairy Research Report of Progress. The Kansas dairy industry continues to grow, ranking tenth nationally with an increase of 2,000 cows between 2014 and 2015. During the past 5 years (2010 to 2015), total milk production in Kansas has increased by 27%; the number of cows by 20%; and pounds of milk per cow by 1,256. At the end of 2015, Kansas ranked 17th nationally in milk yield per cow at 22,064 lb, 16th in the number of dairy cows (143,000), and 16th in total milk production (3.18 billion lb). Kansas now has 300 dairy operations and averages 477 cows per herd (*Hoard's Dairyman*, March 25, 2016, pp 204-205).

Selected production traits of our Kansas State University Dairy Teaching and Research Center (DTRC) herd are shown below. The excellent functioning of our herd is largely a tribute to the dedication of our staff: Michael Scheffel (manager), Daniel Umsheid, Robert Feist, Alan Hubbard, Kris Frey, Eulises Jiron Corrales, Morgan Taylor, Isabella Carmona, Lauren Barlow, and Cory Sunderman. Special thanks are given to Cheryl Armendariz, Wenjing Fausnett, and a host of graduate and undergraduate students for their technical assistance in our laboratories and at the DTRC. We also acknowledge the support and cooperation of the Heart of America Dairy Herd Improvement Association (DHIA) for its assistance in handling research milk samples.

Kansas State University Dairy Teaching and Research Center Herd[1]	
Cows, total no.	323
Rolling herd milk, lb	31,164
Rolling herd fat, lb	1,139
Rolling herd protein, lb	914
Somatic cell count × 1,000	183
Calving interval, mo.	12.6

[1] November 8, 2016 test day (milking 2 to 3 times daily; no bST).

The sustained increases in productivity and efficiency on dairy farms in Kansas and across the U.S. are largely driven by improved technology and management decisions by dairy producers. It is our hope that the type of research presented in this report contributes to those improvements.

Thorough, quality research is not only time-intensive and meticulous, but also expensive. Nevertheless, studies have demonstrated that each dollar spent for research yields a 30 to 50% return in practical application. Those interested in supporting dairy research are encouraged to consider participation in the Livestock and Meat Industry Council (LMIC), a philanthropic organization dedicated to furthering academic and research pursuits by the Department of Animal Sciences and Industry. Additional details about the LMIC are found at the end of this report.

B. J. Bradford, Editor
2016 Dairy Research Report of Progress

Biological Variability and Chances of Error

Variability among individual animals in an experiment leads to problems in interpreting the results. Although cows on treatment X may have produced more milk than those on treatment Y, variability within treatments may indicate that the differences in production between X and Y were not the direct result of treatment alone. Statistical analysis allows us to calculate the probability that such differences occur because of the treatment applied rather than from chance.

In some of the articles herein, you will see the notation "$P < 0.05$." That means the probability of treatment differences resulting from chance is less than 5%. If two averages are reported to be "significantly different," the probability is less than 5% that the difference is from chance, or the probability exceeds 95% that the difference resulted from the treatment applied.

Some papers report correlations or measures of the relationship among traits. The relationship may be positive (both traits tend to get larger or smaller together) or negative (as one trait gets larger, the other gets smaller). A perfect correlation is one (+1 or -1). If there is no relationship, the correlation is zero.

In other papers, you may see an average given as 2.5 ± 0.1. The 2.5 is the average; 0.1 is the "standard error." The standard error is calculated to be 68% certain that the real average (with an unlimited number of animals) would fall within one standard error from the average, in this case between 2.4 and 2.6.

Using many animals per treatment, replicating treatments several times, and using uniform animals increase the probability of finding real differences when they exist. Statistical analysis allows more valid interpretation of the results, regardless of the number of animals in the experiment. In all the research reported herein, statistical analyses are included to increase the confidence you can place in the results.