

# Graduate Student Competition: ADSA Southern Section Graduate Student Oral Competition

**93 The effect of somatic cell score on milk yield of dairy cattle in the southeastern United States.** Derek T. Nolan\* and Jeffrey M. Bewley, *University of Kentucky, Lexington, KY.*

The objective of this study was to quantify the effect of somatic cell score (SCS) on milk yield of dairy cattle. Collection of Dairy Herd Information cow records included: herd, days in milk (DIM), parity, birth date, calving date for each parity, and SCS. Records were collected from 6 states in the Southeast (Tennessee, Kentucky, Virginia, Georgia, Florida, and Mississippi). To be included in the data set, cows must have been within one standard deviation of the mean age of the parity group and have DIM between 240 and 305 d. Herds containing less than 5 cows that met the criteria were not included in the analysis. As a result, 10,333, 5,917, 3,213, and 3,266 cows were included from 468, 357, 238, and 244 herds in the analysis of parities 1, 2, 3, and 4 respectively. The GLM procedure of SAS version 9.3 (SAS Institute Inc. Cary, NC) was used to analyze the following model:  $Y_{ijklmn} = S_i + H_j + M_k + D_l + A_m + I_n + E_{ijklmn}$ , where  $Y_{ijklmn}$  = lactation milk yield,  $S_i$  = effect of the  $i$ th state,  $H_j$  = effect of the  $j$ th herd,  $M_k$  = effect of  $k$ th calving season,  $D_l$  = effect of the  $l$ th days the cow was in lactation,  $A_m$  = effect of the  $m$ th age at calving,  $I_n$  = effect of  $n$ th SCS, and  $E_{ijklmn}$  = residual error. Analysis of parities 1 to 4 occurred separately. Herd was a random effect in the model; all other variables were considered fixed. For every 1-unit increase in SCS, a milk yield loss of -113.58, -209.89, -214.42, and -252.09 kg/lactation occurred for parities 1, 2, 3, and 4 respectively. Overall, first-parity cows have half of the milk production loss from a unit increase in SCS than older parity cows. The Southeast Quality Milk Initiative project is supported by Agriculture and Food Research Initiative Competitive Grant no. 2013-68004-20424 from the USDA National Institute of Food and Agriculture.

**Key Words:** somatic cell score, milk yield, Southeast Quality Milk Initiative

**94 Effect of early lactation increased milking frequency on milk yield and local regulators of mammary cell activity.** Diana K. Hardin\*<sup>1</sup>, Andrea J. Lengi<sup>1</sup>, Hollie H. Schramm<sup>2</sup>, and Benjamin A. Corl<sup>1</sup>, <sup>1</sup>*Department of Dairy Science, Virginia Tech, Blacksburg, VA,* <sup>2</sup>*Department of Large Animal Clinical Sciences, Virginia-Maryland College of Veterinary Medicine, Blacksburg, VA.*

Increased milking frequency (IMF) during early lactation increases milk yield not only during the IMF period, but also during continuing lactation after a return to twice daily milking (2×). The increase in milk yield is locally regulated within the mammary gland; however the mechanism for the increase in milk yield is unknown. The objective of this study was to demonstrate a difference in milk and component yield, both during the IMF period and throughout remaining lactation, and examine potential local regulation mechanisms that increase production due to early lactation IMF. Eight multiparous dairy cows were assigned to unilateral frequent milking [2× left udder half and 4-times-daily milking (4×) right udder half] for the first 21d of lactation. Both udder halves were milked 2× for the remainder of lactation. Milk weights from each udder half were recorded at 7, 14, 21, 60, 120 and 180 DIM. Mammary biopsies were obtained from each rear quarter at 21 DIM, and tissue was used to measure protein and mRNA expression. During the IMF period, between 0 and 21 DIM, 4× milking increased milk yield  $5.5 \pm 0.5$  kg/d more than 2× ( $P < 0.05$ ). Between 60 and 180 DIM, the 4× half tended to produce  $4.4 \pm 0.9$  kg/d more than the 2× half ( $P < 0.1$ ). Overall, between d 0 and d 180, IMF increased milk yield by  $4.6 \pm 0.5$  kg/d more than 2× ( $P < 0.05$ ). The 4× gland had reduced phosphorylated and activated Akt (phospho:total Akt) compared with the 2× gland ( $P < 0.05$ ). There was no significant difference between the mRNA expression of IGF-1 or IGFBP-5 between 4× and 2× milking. There was no significant difference between total and phosphorylated STAT5, however the 4× gland tended to have increased activation of STAT5 (phospho:total STAT5) compared with the 2× gland ( $P < 0.06$ ). There was no significant difference between the expression of total, phospho, or activated STAT3. We conclude that early lactation IMF significantly increased milk yield throughout lactation, and this increase in milk yield may be regulated by changes in cell activity resulting from activation of STAT5.

**Key Words:** milking frequency, lactation, STAT5