

# Factors Associated with Colostral Hydrometer Values

**Fiona Maunsell, BVSc, Dawn Morin, DVM, MS, Diplomate ACVIM,**

**Peter Constable, BVSc, PhD, Diplomate ACVIM, and Gene McCoy, MS**

*Departments of Veterinary Clinical Medicine and Animal Sciences, University of Illinois, Urbana, IL*

A hydrometer (Colostrometer™) is often used on dairy farms to estimate the immunoglobulin concentration ([Ig]) of colostrum and assist in the selection of colostrum for feeding to neonatal calves. We identified a farm on which hydrometer estimates of [Ig] were recorded for 971 first milking colostrum samples over a 3.5 year period. When colostrum was obtained at morning milking, the hydrometer measurement was made at ambient temperature; when colostrum was obtained at evening milking, it was refrigerated and the measurement made the next morning. The estimated [Ig] displayed on the hydrometer was recorded, with no adjustment for colostrum temperature or breed of cow. Failure to make such adjustments is probably commonplace on dairy farms. The aims of this study were 1) to determine if unadjusted hydrometer readings were associated with breed, lactation number, or season of calving, and 2) to determine if the hydrometer readings were correlated with 305 day yields of milk, fat, or protein for the preceding or subsequent lactation, weight of first milking colostrum, or dry period length.

Lactation number had a significant ( $P < 0.0001$ ) main effect on [Ig] estimate. Mean  $\pm$  SD hydrometer readings for cows in lactation number 1, 2, 3, 4, and  $\geq 5$  were  $61 \pm 29$ ,  $62 \pm 30$ ,  $73 \pm 31$ ,  $67 \pm 32$ , and  $78 \pm 35$  mg of Ig/ml, respectively. Both 1st and 2nd lactation cows had lower ( $P < 0.05$ ) readings than those in 3rd or  $\geq 5$ th lactation. The main effect of breed was also significant ( $P < 0.0001$ ), with Holstein cows ( $n = 673$ ) having higher ( $P < 0.05$ ) hydrometer readings ( $68 \pm 30$  mg/ml) than Brown Swiss cows ( $n = 79$ ,  $54 \pm 32$  mg/ml). Hydrometer

readings for Jersey ( $n = 139$ ,  $65 \pm 31$  mg/ml) and Ayrshire ( $n = 69$ ,  $56 \pm 28$  mg/ml) cows were numerically, but not significantly, lower than for Holstein cows. Guernsey cows were not included because of low sample numbers. Although it was previously reported that hydrometer readings, using equations derived from Holstein cattle, underestimate [Ig] in Jersey colostrum, we are unaware of similar investigations in other dairy cattle breeds. Our results suggest that investigation of the relationship between colostrum specific gravity and [Ig] in Brown Swiss and Ayrshire cows is warranted. We also observed a significant ( $P < 0.0001$ ) main effect of season on hydrometer readings: readings were higher ( $P < 0.05$ ) in autumn ( $76 \pm 31$  mg/ml) than in all other seasons. Readings were lowest in summer ( $57 \pm 32$  mg/ml), with winter ( $65 \pm 28$  mg/ml) and spring ( $61 \pm 28$  mg/ml) being intermediate. The reduction in summer was expected as a result of colostrum changes accompanying heat stress and underestimation of actual [Ig] by the hydrometer at high temperatures. We were not able to explain the high readings in autumn, as environmental temperatures in Illinois are similar in the autumn and spring.

Hydrometer readings were weakly but significantly correlated with 305 day milk ( $r = 0.18$ ,  $P = 0.0001$ ), fat ( $r = 0.16$ ,  $P = 0.0003$ ) and protein ( $r = 0.19$ ,  $P = 0.0001$ ) yields in the preceding lactation and with 305 day milk ( $r = 0.11$ ,  $P = 0.0014$ ) and protein ( $r = 0.09$ ,  $P = 0.0060$ ) yields in the subsequent lactation. Neither weight of first milking colostrum, nor dry period length was significantly correlated with hydrometer reading.