We can improve daily gains

by A.F. Kertz

FROM the last foreseeable joint annual meeting of the Animal and Dairy Science Societies held in Salt Lake City in July, four abstracts related to calf and heifer raising were selected to briefly review.

Colostrum still vital

This study was conducted as part of the calf component of the National Animal Health Monitoring System's Dairy 2014 study, which included 104 dairy operations in 13 states. This longitudinal study focused on dairy heifer calves from birth to weaning and was conducted over an 18-month period.

Data analysis included 1,972 Holstein calves. Mean colostrum IgG was 74.4 grams per liter (g/L), with 77.4 percent of samples having colostrum IgG levels above 50 g/L. The mean serum IgG was 21.6 g/L, and 73.3 percent of calves had serum IgG levels above 15 g/L.

A statistical analysis determined which factors were most important for determining colostrum IgG levels. The model for colostrum IgG included the source of the colostrum and the temperature and humidity index (THI) for the month before calving. Colostrum IgG was highest for third or higher lactation dams (84.2 g/L) and lowest for commercial colostrum replacers (39.5 g/L). For every 10-unit increase in THI, the colostrum IgG went up 1.4 g/L.

Factors most important for predicting serum IgG levels were also evaluated. The final model for serum IgG included source of the colostrum, timing to the first feeding, total amount of colostrum fed in 24 hours, the age of the calf at blood sampling, colostrum IgG, and THI for birth month.

Serum IgG was highest for calves from first-lactation dams (23.4 g/L) and lowest for commercial colostrum replacer (14.5 g/L). For every hour following birth that colostrum was administered, serum IgG declined 0.37 g/L. For every 1 L of colostrum administered in the first hour after birth, the serum IgG increased 0.56 g/L. For every 10 g/L improvement in colostrum IgG, serum IgG rose 1.1 g/L. For every additional 10 units in birth month THI, the serum IgG expanded 0.32 g/L. These results indicate that prompt feeding of high-quality colostrum in appropriate amounts following birth and THI are crucial to the passive transfer status of dairy calves.

Take-home message: The more we study this issue, the more beneficial we find colostrum to be. On the flip side, I still see many dairy calf issues related to limitations in managing the entire process of harvesting, processing, and feeding colostrum.

Contact: Jason Lombard, USDA APHIS VS, Colorado; Phone: 970-494-7245; Email: jason.e.lombard@aphis.usda.gov

Room to improve daily gains

Like the study described above, this study was conducted as part of the calf component of the National Animal Health Monitoring System's Dairy 2014 study. This analysis included data from 1,331 Holstein calves. The mean ADG (average daily gain) was 1.65 pounds per day, and calves were fed liquid diets an average of 64 days.

A statistical model was used to determine which environmental factors, diet, and management practices significantly impacted ADG. The final model included disease occurrence, pounds protein fed in the liquid diet per day, the average temperature and humidity index (THI) for the preweaning period, dam lactation number, bedding type, and singleton versus twin birth.

After controlling for other independent variables in the model, calves with no disease events gained on average 0.11 pound per day more than calves with one or more disease events. Every 1 pound of protein fed per day equated to 0.1 pound per day of gain. Each 10-unit reduction in THI equated to 0.044 pound per day of gain.

Calves from third or higher lactation dams had the highest gains (1.5 pounds per day), followed by second-lactation dams, and then first-lactation dams. Calves bedded with a combination of bedding materials gained the most (1.59 pounds per day), followed by those bedded with shavings, then straw or hay, and lastly no bedding or sand (1.15 pounds per day). Single calves gained 0.18 pound per day more than twins.

These results highlight the importance of feeding an appropriate quantity and quality of a liquid diet, keeping calves healthy, and mitigating the effects of temperature and humidity on ADG.

Take-home message: Doubling calf birth weight by the end of 2 months of age has been targeted as the goal for calf raising. Since heifer calves in this study averaged about 94 pounds at birth, doubling that weight requires about 1.6 pounds daily gain.

In this study, calves averaged 1.65 pounds per day. That is good, but there are many variables that affect ADG, many dairies do not weigh calves at birth or at 2 months of age, and there is too much range in ADG. There is still room for improvement.

Contact: Jason Lombard, USDA APHIS VS, Fort Collins, Colo.; Phone: 970-494-7245; Email: jason.e.lombard@aphis.usda.gov

Brix refractometer estimated solids content

The Brix refractometer is used on dairy farms and calf ranches for several reasons, including evaluation of colostrum quality (estimation of IgG concentration), estimation of serum IgG concentration in neonatal calves, and nonsalable milk evaluation of total solids for calf nutrition. Another potential use is to estimate the total solids concentrations of milk replacer mixes as an aid in monitoring feeding consistency.

The study evaluated the use of two Brix refractometers to estimate total solids in milk replacer solutions. Five different milk replacer powders were mixed to achieve total solids concentrations from approximately 5.5 to 18 percent, for a total of 90 different solutions. Both digital and optical Brix refractometers were used to compare with total solids.

The two types of refractometers' readings correlated well with one another. The Brix readings were highly correlated with the total solids percentage. A value of approximately 1.08 to 1.47 would need to be added to the Brix reading to estimate the total solids in the milk replacer mixes. Osmolality was correlated to the Brix reading, but the relationship was different depending on the type of milk replacer.

Overall, the Brix refractometer can be successfully used to estimate total solids concentration in milk replacer mixes to help monitor milk replacer feeding consistency.

Take-home message: Solids concentrations can vary greatly on calf operations, particularly when waste milk (which can vary in solids) volume is augmented by milk replacers. The digestive system of calves does not fare well with variable solids, especially above 15 percent. A Brix refractometer can be a useful tool to monitor and manage liquid solids levels for calves.

Contact: Dale A. Moore, Washington State University; Phone 509-335-7494; Email: damoore@vetmed.wsu.edu

Jury's out on nonmilk proteins

Calves were fed pasteurized waste milk (PWM) or a combination of 67 percent PWM with 33 percent milk replacer (MR) formulated with similar crude protein to PWM using varying milk and nonmilk protein sources. A total of 108 (2 to 5 days old) Holstein heifer calves weighing 85 pounds were fed either 1) PWM at 0.75 pound dry matter (DM); 2) PWM (67 percent) fed with 33 percent all-milk protein MR; 3) PWM (67 percent) fed with 33 percent MR containing 50 percent all milk and 50 percent of a blend of soy protein concentrate/wheat protein; 4) PWM (67 percent) with 33 percent MR containing 50 percent all milk and 50 percent of a blend of hydrolyzed vegetable proteins and autolyzed yeast.

All calves were fed twice daily from Day 1 to 42 and once daily from Day 43 to weaning at Day 49. Calf starter and water were fed free-choice Day 1 to 56. Total milk DMI was similar for all calf groups, averaging 66 pounds.

Preweaning average daily gain (ADG) tended to be greater for calves on Treatment 1 (1.76 pounds) and Treatment 2 (1.61 pounds) versus those fed Treatments 3 (1.52 pounds) and 4 (1.54 pounds). There were no postweaning ADG differences. Pre- and postweaning starter DMI were similar across treatments, averaging 48 and 34 pounds, respectively.

Hip height gain Day 1 to 56 averaged 5 inches. Preweaning and overall Day 1 to 56 gain per feed was highest for Treatment 1 calves. There were no differences in number of scouring days and treatment costs among the groups. From Day 57 to Day 84, there were no differences in ADG across treatment options when all calves were on a common diet in group pens.

In this study, calves fed whole milk tended to have better preweaning performance parameters versus those fed two-thirds whole milk and one-third MR containing varying protein sources.

Take-home message: The jury is still out on feeding nonmilk protein sources in milk replacers. Since there is such a wide range of nonmilk protein sources (soy flour, soy protein concentrate, soy isolate, wheat protein concentrate, wheat isolate, plasma proteins, and so forth), and variation within each of these categories, performance will depend on specific nonmilk protein source, level fed, and age of calves.

Contact: Hugh Chester-Jones, University of Minnesota; Phone: 507-837-5618; Email: chest001@umn.edu

The author is the principal in Andhil LLC, a St. Louis-based consulting firm.