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Research Update

ADSA 2015: Key calf studies reviewed

The 2015 Joint Annual Meeting of the American Dairy Science Association and the American Society of Animal Science took place July 12-16 in Orlando, FL, presenting the research of many of the world's leading dairy researchers. More than a dozen Diamond V scientists and Dairy Advisors attended a large number of the hundreds of research presentations.

Diamond V and university scientists presented 13 oral and poster presentations involving studies with Diamond V products, including Original XPC™ and SmartCare®.

However, the Diamond V team also reviewed many other interesting and useful studies, with abstracts and reviewer notes subsequently organized by **Kevin Leahy, PhD**, Diamond V Dairy Technical Specialist.

For a complete collection of the ADSA 2015 research presentations reviewed by the Diamond V team, please contact a Diamond V representative. Below, *DairyAdvisor* presents two of the ADSA research reports, with additional reports scheduled for upcoming issues.

Stress, immunity, and management of calves
Abstract No. 250 in Symposium Presentation

L.E. Hulbert and S.J. Moisa (Department of Animal Science and Industry, Kansas State University, Manhattan, KS)

Objective: To provide an overview of stress and immunity in calves.

One in 10 calves die before weaning. A goal in calf rearing is to double the weight of the calf by weaning and to improve overall health of the calf. Proper nutrition is key to meeting this goal.

Within 24 hours, calves are given colostrum to provide immunoglobulins. Calves are then transferred to hutches and trained to buckets or bottles to receive milk. Starter feed is provided soon after and is increased by 42 days of age. The diet is then switched to a grower diet around 63 days of age. Within these first 63 days of life, there are many stressors that these calves face. The initial stressor is birth, and then transport to the hutches. Receiving maternal antibodies within the first day of life is key to improving and maintaining health of the calf and can reduce mortality by 60% with successful passive transfer.

Calves are often housed in individual hutches to prevent transfer of diseases. However, calves that are housed in groups as small as two have been shown to deal with this stress better than individually housed calves. Around 14 days of age, calves are dehorned, if necessary. This is often done without pain mitigation. Studies with pain mitigation have shown reduced leukocyte function (decrease in inflammation). (Reviewer's note: leukocyte "activation" may be a more accurate term than "function.")

Weaning begins around 42 days of age and finishes around 56 days of age. A slower weaning process compared to abrupt weaning often decreases stress of the calf. At 63 days of age, calves are removed from hutches and comingled with other calves. Individually housed calves that are comingled have a higher stress incidence than those that are group housed at an earlier age.

Immunity from birth up to 21 days of age is highly dependent on maternal antibodies received from the cow. During this period, calves experience more enteric diseases. Around 14 to 21 days of age, immunity switches from being dependent on maternal antibodies to being dependent on antibodies within the calf. During this period, respiratory disease increases.

Reviewer noted: The author stated, "Optimizing the calf's health and well-being at these early-stages may improve its long-term health and behavioral strategies."

Effects of late-gestation heat stress on immunity and performance of calves
Abstract No. 251 in Symposium Presentation

G. Dahl, A. Monteiro, and S. Tao (University of Florida, Gainesville, FL and University of Georgia, Tifton, GA)

Objective: To provide an overview of heat stress during late gestation on performance of calves.

Heat stress has many effects on production of dairy cows. Heat stress in cows can also affect calf performance. Calves from cows that have experienced heat stress have been

shown to have lower birth weights and weaning weights. This may be the result of lower immune status. Calves from cows that have experienced heat stress have been shown to have lower total IgG (immunoglobulin) from 0 to 28 days of life, which is the result of limited absorption of immunoglobulin after birth.

A study was conducted where calves received colostrum from non-heat stressed cows, heat stressed cows, or a combination of colostrum from heat stressed and non-heat stressed cows. Calves from heat stressed cows had decreased birth weights, weaning weights, and hip heights. Absorption of Ig was also decreased. However, there were no differences in performance based on colostrum source. Effects from this study led the researchers to believe that it was more of an effect of heat stress on calf development than colostrum quality.

In another study, calves from cows that were heat stressed were also smaller at birth and at puberty. These calves also had changes in metabolism with more glucose being found in the peripheral tissues. It is believed that the smaller birth weight is the result of the calves being born earlier than calves that are from non-heat stressed cows. Smaller birth weights could be the reason for calves being smaller at puberty as well. However, the changes in metabolism could be a reason that calves from heat stressed cows do not grow as efficiently as the energy is being shifted from growth to some other use or just being stored.

Heat stress in cows can also have an effect on reproduction efficiency in their calves. Calves from heat stressed cows are more likely to leave the herd before puberty and less likely to make it to the first lactation. The number of services to pregnancy is greater and milk production is lower in calves from heat stressed cows.

First reviewer noted: Author conclusions were, “These observations indicate that a relatively brief period of heat stress in late gestation dramatically alters the health, growth, and ultimate performance of dairy calves. Thus, it is critical to effectively manage heat stress of dry cows to avoid negative effects on the calf.”

Second reviewer noted: Heat stress in late gestation has been under estimated with regards to its impact on future animal performance. In utero heat stress for 6 weeks reduced body weight and height to weaning. Conversely, cooling animals in late gestation yielded calves with increased birth weight and increased weight at weaning. It appears in utero heat stress reduces immunoglobulin absorption but not apparently colostrum quality. This leads to lower survival rates through puberty

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