Importance of colostrum to dairy calf emphasized

THE 20th annual conference of the Dairy Calf & Heifer Assn. was held April 11-13 in Madison, Wis. Attendees came from 27 states and 10 countries and represented 1 million calves/heifers from dairy operations and commercial growers.

The program had a mix of presentations on feeding, management, housing, health, reproduction, economics, employee management, animal welfare and public engagement.

I found the producer panels especially enlightening because growers shared about their operation and how they manage issues. I was able to attend panels on the nutrition of the post-weaned calf, building client relationships and calf group housing and feeding programs. I will highlight some key areas in some other presentations.

Colostrum

Mike Van Amburgh of Cornell University indicated that while there is a lot of focus on offering quality colostrum that provides immunoglobulin G (IgG) protection to the newborn calf, there are many other components in colostrum that provide major benefits as well.

For instance, more than 200 bioactive compounds have also been identified in colostrum (Blum and Baumrucker, 2002) that foster intestinal development, facilitate nutrient absorption and help exclude pathogenic bacterial action and absorption.

Remember when it was recommended and standard practice to feed colostrum (first milking) and then transition milk for the first three days of a calf's life? That practice largely went away as dairies got bigger, had a separate fresh cow hospital grouping or combined transition milk in the tank with regular milkings. It turns out that was a good practice, as seen by the composition of colostrum and subsequent milkings during the first three days post-calving (Figure).

The presence of various hormones (Table 1) refutes the claim that there is such a thing as "hormone-free" milk.

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Bottom Line

with
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These data do illustrate how the components in transition milk are still higher than in regular milk. In total, most of these many components are anabolic in contributing to growth of the calf. The major nutrients of protein and fat/energy also provide higher levels of nutrition for the calf receiving colostrum.

To address the question of whether there is at least an additive effect for the amount of colostrum fed and the amount of milk replacer fed, a study (Soberon and Van Amburgh, 2010) was done with 125 calves fed either two or four liters of colostrum after birth; then, each of these two groupings were split into equal numbers and fed either four or 12 liters of milk replacer daily. Calves were weaned at 52 days and measured at 80 and 101 days of age.

Clearly, feeding more colostrum almost doubled IgG blood levels (Table 2), even though two liters of colostrum resulted in more than the minimum goal of 10 mg per liter of IgG. For those calves initially fed only two liters of colostrum with 12 liters of milk replacer, there was more average daily gain (ADG) at 80 days, but not over the following 21 days. There also was an additional inch more hip height over the 101 days of this treatment.

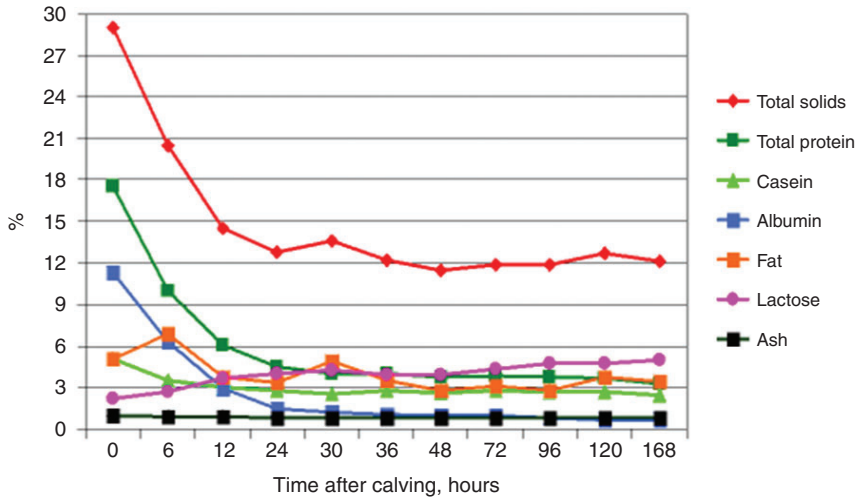
However, the additive effect of feeding more milk replacer to calves initially fed four liters of colostrum was even greater. The 0.2 lb. greater ADG at 80 days of age continued on for the following three weeks, and the hip height increase was greater than for any of the other three milk replacer treatments.

Clearly, there is more than just nutrition at work here. It is likely due to all of those bioactive components of colostrum and an epigenetic effect in which the high level of nutrition and bioactive components activate more genes, which can have a lasting lifetime beneficial effect.

This was best illustrated in a study by Faber et al. (2005) in which calves were fed either two or four quarts of colostrum and, thereafter, were fed and managed the same in one herd.

The veterinary costs were double for the calves receiving two quarts compared to the calves receiving four quarts, while daily gain at breeding was about 0.50 lb. greater for those getting four quarts. Most striking was that the calves on the four-quart treatment produced 11% more milk in their first lactation and 17% more milk in their second lactation.

Change in composition of colostrum and transition millk post-calving



Source: Fundamentals of Dairy Chemistry, 2nd Ed.

Other talks

Mike Overton of Elanco Animal Health presented data for developing higher-quality dairy heifers based on an analysis of a model he has been developing and actual data from three herds. Pneumonia and scours have lasting detrimental effects, while investment in a more intensive calf-raising program does pay off before and during subsequent lactations.

Sandy Stokes Goff of Stagecoach Consulting Services addressed various dimensions of animal welfare, including distinguishing between animal rights and animal welfare. Employee training is a critical component of animal care, which should include establishing standard operating procedures, training employees and getting a commercial third-party audit of all animal welfare programs.

The Bottom Line

Calf and heifer growers gather annually to share information and experiences in all phases of growing dairy herd replacements.

Colostrum is critical not only for transferring IgG to calves but also because it contains myriad bioactive components. These components and nutrients provide a high level of nutrition and anabolic growth factors that can affect not only a calf's growth but also its future growth and subsequent milk production.

It is good practice to feed transition milk following the initial colostrum feeding as it continues to provide intermediate levels of nutrients and bioactive components compared to those found in colostrum and regular milk.

1. Composition of colostrum and mature milk

Components	Colostrum	Mature milk
Gross energy, MJ/L	6	2.8
IgG, g/L	81	<2
Lactoferrin, g/L	1.84	Undetectable
Insulin, µg/L	65	1
Glucagon, µg/L	0.16	0.001
Prolactin, µg/dL	280	15
Growth hormone, µg/dL	1.4	<1
Insulin-like growth factor-1, µg/dL	310	<1
Leptin, µg/dL	30	4.4
Transforming growth factor-alpha, µg/dL	210	<1
Cortisol, ng/dL	1,500-4,400	710
17-beta-estradiol, ng/dL	1,200-2,000	10-20

Sources: Blum and Hammon (2000); Bonnet et al. (2002); Blum and Baumrucker (2008).

2. Effects of feeding more colostrum after birth and also more milk replacer until and after weaning

		-----ADG (lb.)-----		
Treatment	IgG, mg/L	At 80 days	For next 3 weeks	Hip height increase at 80 days (in.)
2 L colostrum/4 L milk replacer	14.2[a]	1.17[a]	2.03[a]	4.7[a]
2 L colostrum/12 L milk replacer	14.7[a]	1.45[a]	1.94[a]	5.7[b]
4 L colostrum/4 L milk replacer	24.8[b]	1.52[ab]	2.14[ab]	5.0[a]
4 L colostrum/12 L milk replacer	27.5[c]	1.72[b]	2.36[b]	6.6[c]

[a,b,c]Means within a column differ at $P < 0.05$.

References

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