

Colostrum may have lasting health effects

Bottom Line

with
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HOW do you teach an old dog new tricks? Or how do you get dairies or calf operations to do a better job of managing colostrum feeding?

In either case, maybe it is to offer new information on benefits or incentives. A brief review of the National Animal Health Monitoring System (NAHMS) 2002 study found that:

- Only 56% of dairy heifer calves were immediately removed from their mothers following birth — to better control access and timing of colostrum fed.
- Nearly two-thirds of calves were hand fed colostrum from a bucket or bottle, but still 30% were allowed the first feeding by nursing from the cow.
- Almost one-half of operations provided more than two quarts but fewer than four quarts by hand feeding during the first 24 hours after birth.
- Only 4% of all operations measured immunoglobulin G (IgG) levels, but nearly 30% that had more than 500 cows did.
- An average of 27% of all operations pooled colostrum from more than one cow, with 70% of operations that had more than 500 cows following this practice.

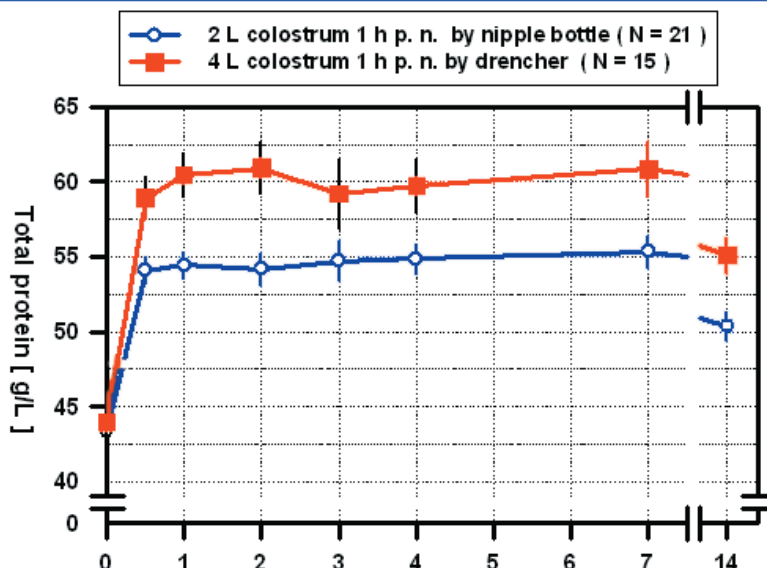
There is a simple equation that pathogen load plus degree of protection from colostrum equals calf health. This ties in with NAHMS data that the greatest problem with calf mortality before weaning is scours, while after weaning, it is respiratory ailments.

Some field data also tie scouring with respiratory problems and overall performance of calves and beyond. One of those field studies from Canada (Waltner-Toews et al., 1986) found that:

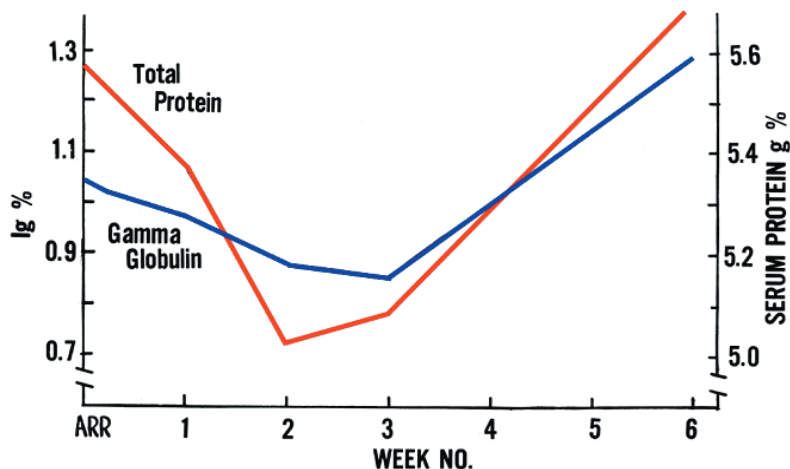
- Calves with pneumonia during the first three months were 2.5 times more likely to die after 90 days of age.
- If there was a calfhood history of scours, calves were 2.5 times more likely to be sold than other calves.
- Heifers treated for scours were 2.9 times more likely to calve after 30 months of age than other heifers.

1. Blood plasma total protein levels in relation to amount fed and time after feeding of colostrum

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2. Calf blood levels of total protein and gamma globulin



C.U. Brownstein & Warner, 1976.

Other field studies from New York (Correa et al., 1988; Curtis et al., 1989; Warnick et al., 1995) found that:

- Calves with respiratory problems were less likely to enter the milking string, took longer, had more dystocia and were culled sooner.
- In New York, of 1,171 Holstein

heifer calves, 9.9% had incidences of scours within 14 days of birth, 5.2% from 15 to 90 days of age and 7.4% for calves with respiratory illness.

- Heifers without respiratory illness as calves were twice as likely to calve and did so six months earlier than those without respiratory illness

as calves.

Another field study from Florida (Donovan et al., 1998) found that:

- Season of birth, occurrence of diarrhea, septicemia and respiratory disease plus the farm and birth weight of the calf accounted for 20% of the variation in bodyweight and 31% of the variation in pelvic height at six months of age.

- Septicemia and pneumonia slowed growth by 13-15 days.

- Passive transfer of IgG influenced weight and height through its effect on health.

A recent report showed a more direct effect on subsequent performance due to prior colostrum provision (Faber et al., 2005). At birth, 68 female calves in a Wisconsin Brown Swiss herd were randomly chosen and received either two or four liters of colostrum at birth. There were a variety of sires involved, and a few had sired calves in each treatment.

Colostrum was measured by colostrometer to be in the green zone (Grade 1, > 50 mg Ig/mL). If colostrum did not meet that grade, previously frozen colostrum of that grade was thawed and used. Each calf was force fed within the first hour of birth, with 37 calves receiving two liters and 31 calves receiving four liters of colostrum. Calves were bottle fed, and a fluid feeder was used if a calf refused the full feeding.

Pooled colostrum from second and third milkings was used for four subsequent feedings for all calves in both treatment groups. In addition, each calf received one cup of pooled colostrum that was added to two liters of waste milk fed twice daily through 14 days of age. After that, waste milk was fed until weaning after seven to eight weeks of age.

While health disorders were not significantly different, total veterinary costs were double for the two-liter calves compared to the four-liter calves. While age at conception was not different, daily gain was about 0.50 lb. more ($P < 0.001$) for the four-liter colostrum animals (Table).

Other differences are noted in the Table for heifers that completed both of the first two lactations.

Lactation length differed in first

Amount of colostrum initially fed and performance parameters

	-----Initial colostrum, liters-----	
	2	4
Age at conception, months	14.0	13.5
Daily gain, lb.	1.76 ^a	2.27 ^b
First lactation, lb. (305-day ME)	19,712 ^x ± 751	21,815 ^y ± 738
Second lactation, lb. (305-day ME)	21,232 ^x ± 751	24,869 ^y ± 738
First lactation, lb. (actual days)	17,281 ± 557 (324)	16,572 ± 555 (298)
Second lactation, lb. actual days	17,984 ^x ± 548 (292)	20,954 ^y ± 553 (300)
Heifers that completed two lactations	28	27

^{a,b}P < 0.001.

^{x,y}P < 0.05.

lactation (324 versus 298 days), which was reflected in more milk ($P < 0.05$) on a mature equivalent (ME) basis for the four-liter colostrum treatment.

What is most striking is that the milk production advantage for the four-liter colostrum treatment was much greater ($P < 0.05$) in the second lactation. This increased performance may not be due solely to enhanced antibody levels from feeding two levels of colostrum.

Colostrum/transition milk has been shown to have more than 200 bioactive compounds (Blum and Baumrucker, 2002). Some of these compounds aid in bacterial exclusion, intestinal development and nutrient absorption (Kertz, 2002). In the above study, colostrum and transition milk was fed beyond the first day.

Another dimension of colostrum feeding is how long the effect of antibody absorption in the blood lasts. This can be a key issue when calf operations get calves from dairies that may range in age from 1 to 14 days.

A recent German study (Kaske et al., 2005) fed 21 Holstein Friesian calves one hour postpartum with a nipple bottle versus 15 calves drenched with four liters of colostrum. In all cases, colostrum was from the dam of the calf. Thereafter, all calves were fed milk replacer exclusively.

Data in Figure 1 show that initial day total protein levels following colostrum administration stayed level until day 7, after which levels decreased about 10% during the second week of life. These differences mirrored the amount of colostrum initially administered.

In previous work (Warner and Brownstein, 1976), blood serum protein and immunoglobulin levels were shown to decrease until about two to three weeks of age before increasing (Figure 2).

The significance of Figure 2 is that it shows, along with Figure 1, that blood antibody levels in a calf for the first two to three weeks of life are dependent on colostrum administered until the calf can begin to produce its

own antibodies. Also, it is precisely during these first two weeks that most scours and death losses occur.

So, if a dairy is pointing fingers at a calf operation to which it has consigned its calves for problems during this time period, the calf operation may well point back and question what the dairy's calving environment and colostrum administration program are. This finger-pointing also occurs within dairies with crews responsible for calving or raising the calves.

Rather than finger-pointing, everybody needs to get on the same page and reduce calf mortality and morbidity. Then, everyone — including the calves — benefits.

The Bottom Line

Increasing evidence is that colostrum administration and calving environment are key elements not only in early calf health but in subsequent performance as growing heifers and then as lactating cows.

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