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Feeding & Management Important to Optimize Rumen Development

Proper development of the rumen is an important task that can be controlled to benefit both the calf and producer. The process of rumen development does not occur "magically", and with the right management, the cost of raising a calf can be decreased, according to J.D. Quigley III, an associate professor in the department of animal science at the University of Tennessee.

Depending on the cost of feed and labor, raising a calf can cost anywhere from $1,000 to $1,500. Poor management, disease and high feed costs add to this expense. Important considerations in regard to feed costs during the time of rumen development (birth to approximately three months), are the source of the liquid feed and the age of weaning.

Milk Replacer Economics

Farm Gate Milk Price/cwt.	$32	$34	$36	$38	$40	$42
$11.00	12	10	8	6	4	2
$11.50	14	12	10	8	6	4
$12.00	16	14	12	10	8	6
$12.50	18	16	14	12	10	8
$13.00	20	18	16	14	12	10
$13.50	22	20	18	16	14	12
$14.00	24	22	20	18	16	14
$14.50	26	24	22	20	18	16
$15.00	28	26	24	22	20	18
$15.50	30	28	26	24	22	20
$16.00	32	30	28	26	24	22
$16.50	34	32	30	28	26	24
$17.00	36	34	32	30	28	26
$17.50	38	36	34	32	30	28

Table 1. Chart indicates $$ saved per bag when milk is sold, rather than fed to calves.

Calves fed whole milk for more than 10 weeks can have feed costs of $100 or more per calf, but calves fed transitional milk, milk replacer and colostrum for 4-5 weeks may incur costs of $25 or less. Table 1 shows the money saved by dairymen when salable milk is sold, rather than fed to calves.

Calves with a well developed rumen at weaning are less susceptible to disease and gain more body weight with lower management and labor costs.

Rumen Development Factors

Quigley notes five things that are needed to cause rumen development:

√ Establishing bacteria in the rumen
√ Having liquid in the rumen
√ Material flowing from the rumen
√ Absorptive ability of the tissue
√ Substrate (hay and grain)

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Even though the rumen is sterile at birth, by day one of age, there are numerous bacteria, mostly aerobic, or oxygen-using, in the rumen. The number and types of bacteria change as dry feed intake and the type of substrate change.

It has been shown that there is no difference in the total number of bacteria between calves fed only milk to eight weeks of age of those fed both milk and grain. There was, however, a large decrease in the number of aerobic bacteria in week two in calves that were offered grain from birth. The same decrease happened at week nine when calves fed only milk were first offered grain in week eight.

In order to ferment substrate, bacteria within the rumen must live in an environment that contains water.

Without enough water, bacteria cannot grow and rumen fermentation is decreased.

This is not a problem if water is offered to calves at an early age but many producers do not provide free choice water to calves until they reach four or more weeks of age. Milk or milk replacer cannot be considered water because it bypasses the rumen and reticulum until the calf is about 12 weeks old. Feeding water can increase body weight gain, starter intake and reduce scours.

Material begins flowing from the rumen (muscular activity) as early as three weeks in calves that are fed milk, hay and grain shortly after birth. For calves fed only milk, rumen contractions may not be measurable for longer periods.

The ability of the rumen to absorb the end products of fermentation is another important development factor. The rumen must have developed papillae of the epithelium layer in order to absorb nutrients. Volatile fatty acids, found in milk, hay and grain, are believed to contribute to this papillae development. Development of the epithelium is mainly controlled by chemical, not physical means, concluding that rumen development is aided by the availability of dry feed, particularly starter.

The availability of substrate is a key factor in developing the rumen. In order to promote early rumen development and allow early weaning, the best option is to make grains available.

Hay should be a part of the diet after weaning. Calves should be weaned at 4-5 weeks of age and offer hay from 6 to 7 weeks of age. For calves that are not weaned until 8-10 weeks, it may be a good idea to feed hay limited to 1 lb. per day from about six weeks of age. Hay should not be fed too soon because calves tend not to eat significant amounts of it until grain is offered and calves have a high energy requirement that hay does not provide. The energy requirement can only be met when calves are fed high-quality milk replacer, transitional milk and/or excess colostrum and calf starter.

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Strategies

Dry feed intake, especially starter intake, is needed to maximize rumen development. Producers should follow these recommendations:

- Feed milk or milk replacer at 10% of the birth bodyweight. Only increase the amount of milk as the calf gets older to adjust to environmental conditions such as winter. Use milk replacer, transitional milk or excess colostrum to keep costs down.
- Offer fresh calf starter ad libitum daily. Keep feed buckets clean.
- Make water available to calves from four days of age, keeping the buckets clean.
- Offer hay 1-2 weeks after weaning unless weaning occurs after eight weeks of age, then offer limited hay from six weeks.
- Use careful management to wean calves by 4-5 weeks of age.

There are many quality commercially available calf starters on the market that are palatable and provide the necessary nutrients for rumen development. It is important, yet inexpensive, for calf starters to provide vitamin B supplements and a coccidiostat to provide protection against coccidial infection.

Palatability of calf starter is generally highest with textured feeds, followed by complete pellets. Calves do not like mashed feeds as well, and palatability and intake are usually lower than the other types of feeds. Fines in pelleted calf starters will also decrease intake.

Source:
Feedstuffs, Feeding, management important to optimize rumen development. July, 1996.