

Today's Management Practices Program Tomorrow's Milk Production



By Donna M. Amaral-Phillips

Feeding and management practices, as well as health of dairy cattle, not only impact today's performance, but also milk production and reproductive performance months from now and that of their offspring. As our biological knowledge base continues to advance, we are learning how cells are "programmed" and how this programming impacts a dairy cow's ability to absorb nutrients from the digestive tract or alter a cell's function at a later time. This programming starts before birth and continues throughout the life of a dairy heifer and into her adult life. This article explores how management practices within the first two months of life, "program" her production once she enters the lactating dairy herd.

Colostrum Important for More than Immunity

After birth, colostrum is important in not only for the immunity of the calf, but also the growth of tissues and the colonization of beneficial, and not harmful, bacteria in the gastrointestinal tract. Calves are born without antibodies against diseases and must receive antibodies through the timely intake of colostrum. Besides antibodies, colostrum contains various growth factors which are important in the growth of cells within the gastrointestinal tract. Growth of these cells is important for absorption of nutrients throughout life, especially after she calves. This programming starts at birth, not just after calving!!! Colostrum also coats the intestine, helping minimize the colonization of detrimental bacteria, i.e. *E. coli*. In addition, research has shown the enhanced colonization of beneficial bacteria when colostrum is fed within the first hour or few of life.

Implementation On-Farm: Feed 4 quarts of high-quality colostrum as soon as possible after birth, but within 4 to 6 hours of life, which was harvested in clean, sanitized equipment and from a properly prepped cow shortly after calving. Within 6 to 8 hours of the calf's life, another 2 quarts of colostrum should be fed.

Reward: Large breed calves fed 4 quarts of colostrum at birth produce 2500+ lbs more milk in their first lactation.

Higher Plane of Nutrition from 2 Weeks of Age

In calves, greater growth rates occur when higher planes of nutrition are fed. Under conventional feeding programs where 2 quarts of milk or reconstituted milk replacer are fed twice daily, growth rates were generally around 1 lb or less per day. On this feeding program, calves are expected to consume calf starter to make up the deficit in energy not provided by their milk. With accelerated feeding programs, more milk, 8 quarts or more, is fed from approximately 2 weeks of age until stepped-down just before

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weaning at 8 weeks of age. In addition to this increased milk intake, water and calf starter starting at day 3 of life should be offered. Calves gain more weight than those on conventional feeding programs. These improved growth rates have been associated with improved milk production after calving. Currently, the recommendation is to double a dairy heifer's birth weight within the first 60 days of life. For Holsteins (birth weight 90 lbs), this equates to a growth rate of approximately 1.5 lbs daily over this 60-day period.

Implementation on farm: Use of "accelerated" milk feeding programs where calves are fed more milk compared to a conventional feeding program, improves weight gain. If reconstituted milk replacer is fed, the replacer powder contains 27-28% crude protein, to better match protein needs associated with the higher growth rates. Calves generally are fed 2.5-3 quarts of milk twice daily for the first week or two of life. Then until weaning, calves are fed 8 quarts or more of milk daily either 2 to 3 times daily or through an automatic feeder. In *ad lib* feeding programs, calves can consume as much milk as they prefer, usually up to 12 quarts or 3 gallons of milk daily and are fed using an automatic calf feeding system where calves consume multiple small meals over the day. Within 1 to 2 weeks before weaning, the amount of milk fed is stepped down with the expectation that calf starter intake will increase to replace the amount of energy lost by the decreasing intake of milk.

Reward: Calves which gain more than 1.1 lbs daily, gave more milk as first-calf heifers. In another compilation of research trials, scientists estimated that for each pound of gain within the first 2 months of life, calves gave 1540 lbs more milk within the first lactation or 6000 lbs more milk over the first 3 lactations. Also during this time period, calves are very efficient at gaining lean tissue or muscle versus fat. Although hard to document, calves fed more energy may be better able to fight off disease challenges.

Consistent Feeding Times and Milk Composition

Calves, like dairy cows, like consistency in their feeding regimes, be it feeding times or feed composition.

Implementation on farm: By weighing the amount of milk replacer or having a consistent source of milk (i.e. not mixing colostrum, transition milk or whole milk), the milk solution offered to the calves will contain a more consistent amount of solids and needed nutrients for growth. Many portable scales can be purchased to weigh the amount of powder and water used when mixing milk replacer which are both accurate and economical. If automatic calf feeders are used, the amount of milk powder needs to be calibrated as part of the normal maintenance routine.

Reward: Calf gain will be more consistent with less digestive upsets.

Minimize Disease and Potential Use of Antibiotics

A Cornell University study investigated whether a relationship existed between calves treated or not treated with antibiotics and their subsequent milk production as first-calf heifers. Calves not treated with antibiotics gave 1085 lbs more milk as first-calf heifers than those treated. Researchers did not find an association between calves with and without scours and subsequent decrease in milk production. They concluded that the decrease in milk production was most likely associated with the illness itself and the diversion of energy away from growth.

Implementation on Farm: Prevention, prevention, and prevention is key. Prevention starts with adequate and appropriate ventilation, timely feeding of colostrum, and feeding an appropriate amount of milk, calf starter and water. Early detection of disease is critical, especially within the first 2 weeks of life.

Reward: Minimizing disease incidence results in better growth and increased production later in life as well as a more “care-free” calf.

Heat Abatement for Dry Cows Impacts Their Offspring

Heat stress affects not only the cow herself, but also the fetus she is carrying. Effects on the fetus last her lifetime. Calves born to heat stressed dams are 10 to 15 lbs lighter at birth, are lighter the first 12 months of age, have a lower calf survival rate, and give less milk once they calve. These calves have a lower antibody absorption rate and, as a result, an immune system less able to combat disease early in life. Unfortunately, feeding colostrum from a non-heat stressed dam, i.e. frozen colostrum or colostrum replacer, cannot overcome the reduced antibody absorption rates seen in these calves.

Implementation on farm: If possible, house dry cows in a facility that provides fans and sprinklers to reduce heat stress. If housed outside in the summer, rotate shade trees to prevent mastitis. Shade can help and should be provided, but does not alleviate the total effects of heat stress.

Rewards: Improved milk production of the dam and fetus and improved survival of newborn calves.