TRENDS IN AGRICULTURE SCIENCE
Popular Article
Vol.3 Issue 08 August 2024, Page: 2135-2138

Nutritional Strategies for Optimal Calf Growth: From Colostrum to Weaning

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DOI: 10.5281/TrendsinAgri.13623672

INTRODUCTION

High milk production and excellent fertility is a dream of livestock owner. Proper management of young calf plays pivotal role in success of dairy farm. Optimum nutrition and better management favours early puberty and sexual maturity in livestock. Calf should attain 60 per cent of mature body weight at puberty. Body weight play important role as compared to the age in attainment of puberty in dairy animals. Poor feeding leads to higher age of first calving causes the loss of productivity in dairy development programme. Therefore, livestock owner needs to understand the importance of proper feeding and management for better development of dairy farm.

IMPORTANCE OF COLOSTRUM IN CALF REARING

What is Colostrum?

Colostrum is the first milk produced by a cow immediately following the birth of her calf. Unlike regular milk, colostrum is thick, yellowish, and packed with essential nutrients and antibodies that are critical for the newborn calf's health. It contains a high concentration of gamma globulins, which are antibodies that protect the calf from various diseases by providing passive immunity. These antibodies are developed in the cow in response to pathogens and environmental antigens she has been exposed to during her lifetime.

Nutritional Benefits of Colostrum

- Colostrum is incredibly nutrient-dense, containing seven times the protein and twice the total solids compared to regular milk.
- This rich composition provides a powerful nutritional boost, helping to jumpstart the calf's development and enhance its early intake of proteins and solids.
- Additionally, colostrum is abundant in minerals and vitamins, particularly vitamin A, which is essential for maintaining the integrity of the calf's immune system and fighting infections.

Published: 30 August 2024
ISSN: 2583-7850

- The laxative properties of colostrum also facilitate the expulsion of meconium, the calf's first feces, helping to clear the digestive tract and reduce the risk of early digestive problems.

Timing and Absorption of Antibodies

The absorption of antibodies from colostrum is most effective within the first few hours of a calf's life, with the highest rates occurring within the first 1-2 hours. Feeding colostrum within 15-30 minutes of birth, followed by a second dose after 10-12 hours, ensures maximum antibody absorption. After this period, the calf's intestinal wall undergoes a process called "gut closure," where it becomes impermeable to large molecules like immunoglobulins.

Recommended Colostrum Feeding Schedule

- 15-30 minutes after birth: Feed 5-8% of the calf's body weight in colostrum.
- 10-12 hours after birth: Feed another 5-8% of body weight.
- 2nd and 3rd day: Feed 10% of body weight.

Excess colostrum can be stored by refrigeration or freezing for future use. This practice ensures that any surplus colostrum is not wasted and can be used for other calves, including orphans or those whose mothers are unable to produce sufficient colostrum.

WHOLE MILK FEEDING GUIDELINES

Individualized Care

Each calf should be treated as an individual, with its feeding program tailored according to its specific weight and growth needs. Calves should be weighed weekly, and their diet adjusted based on growth responses to prevent underfeeding or overfeeding, both of which can lead to health issues. It is crucial to avoid group feeding, as it can lead to inconsistent nutrient intake among calves, increasing the risk of some calves receiving too much or too little milk.Milk should be boiled and cooled to body temperature (around 39°C) before feeding to reduce the risk of bacterial contamination and ensure it is safe for the calves. During the first week, calves should be fed 3-4 times daily. This can be reduced to twice daily after the first week, continuing until the calves are about 90 days old.

Training for Pail Feeding

Training calves to drink milk from pails rather than directly from the cow or a bottle nipple simplifies feeding management, particularly in larger operations. The training process should be gradual and gentle, especially for buffalo calves, which may be more resistant and slower to learn. Introducing milk to the calf using the caretaker's fingers can help the calf associate the pail with feeding. Consistent, patient training will ensure the calf learns to drink from the pail without fear or resistance.

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NURSE COW METHOD AND WEANING

Using Nurse Cows

In dairy operations, particularly those involving crossbred cows that produce more milk than a single calf requires, a nurse cow method can be employed. This method involves assigning 3-4 calves to one nurse cow. Careful management is essential to ensure that the nurse cow accepts all the calves, which can be encouraged by smearing all the calves with the cow's birth mucous shortly after calving, allowing her to lick and clean them. This helps to imprint the scent of her own calf on the other calves, reducing the likelihood of rejection.

Early Weaning and Milk Replacer Feeding

Early weaning involves separating calves from their mothers soon after birth and training them to drink from pails or nipples. This method allows for more controlled feeding and easier management. The calves should be weighed regularly, and the amount of milk or milk replacer they receive should be adjusted based on their weight to ensure adequate nutrition. Transitioning to a milk replacer, supplemented with calf starters and good quality hay, supports early weaning by providing a balanced diet that promotes healthy growth and rumen development.

ECONOMICAL CALF REARING

Substituting Whole Milk

For cost-effective calf rearing, whole milk can be partially replaced with skim milk and a calf starter. While skim milk is lower in energy, it can be supplemented with grains, fats, and sweeteners like jaggery to provide the necessary calories and nutrients. A feeding schedule that introduces skim milk from the fifth day and includes energy supplements like jaggery from the second week can achieve growth rates similar to those achieved with whole milk feeding, but at a lower cost.

Calf Starter

Calf starters are specialized feeds introduced early in life to promote rumen development and provide essential nutrients. A good calf starter should be highly palatable, high in energy (75% Total Digestible Nutrients), and contain 14-16% digestible crude protein. Free-choice feeding of calf starter can begin in the second week of life, gradually increasing until the calf consumes about 1-1.5 kg per day. At this point, milk feeding can be gradually reduced and eventually discontinued.

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Calf feeding schedule (birth to 26th of week of age):

Period	Colostrum/ Whole Milk (kg/day)	Calf starter (kg/day)	Good quality hay* (kg/day)	Green fodder* (kg/day)
0-2 days	1.5-2.0 (colostrum)	--	--	--
3-4 days	1.5-2.0 (milk)	--	--	--
4-14 days	1.0-1.5 (milk)	0.10	0.10	--
3rd week	0.5-1.0 (milk)	0.20	0.15	0.75
4th week	Milk (0.5 kg) or milk replacer (0.25 kg) can be fed, if available with progressive dairy farmers & having good economic conditions	0.25	0.20	1.25
5th week		0.40	0.30	2.0
6th week		0.50	0.40	2.5
7th week		0.60	0.60	3.0
8th week		0.70	0.80	3.5
9th week		0.80	0.90	4.0
10th -11th wk		1.00	0.90	5.0
12th week		1.20	1.00	5.0
13th -16th wk		1.50	1.20	6.0
17th -20th wk	--	1.75	1.50	7.5
21st -26th wk	--	2.00	2.0	8.0
Note: *Requirement of hay and green fodder may vary from breed to breed & body weight of calf. Colostrum feeding is very essential during early life of calf.				

Source: NDDB

CONCLUSION

Proper management during the early stages of a calf's life is crucial for ensuring its health, growth, and development. Colostrum feeding is essential for providing passive immunity and nutritional support. By adhering to recommended feeding schedules, maintaining hygiene, and implementing economical feeding practices, farmers can optimize calf rearing outcomes, ensuring robust growth and minimizing health issues. Using nurse cows and transitioning to milk replacers and calf starters also offers flexibility and cost savings in calf management, supporting sustainable and productive dairy farming.

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ISSN: 2583-7850