The First Meal That Shapes a Calf's Future: Why Colostrum Timing Matters

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ABSTRACT

The first hours after birth represent a critical window in the life of a dairy calf. Unlike humans, cattle do not transfer substantial quantities of immunoglobulins across the placenta before birth; newborn calves therefore depend on colostrum to acquire passive immunity. Colostrum is the first mammary secretion after calving and contains immunoglobulins, energy, protein, fat, vitamins, minerals, growth factors and other bioactive compounds. Its benefit depends not only on quality, but also on the quantity consumed, time of feeding and microbial cleanliness. Intestinal absorption of immunoglobulins declines rapidly after birth, making early feeding a practical priority. This article summarises the science of colostrum timing and presents a farm-ready approach suited to Indian dairy systems, where calves may be left to suckle, milk may be shared with household needs, and labour or calving supervision may be limited. The recommended management approach is to provide clean, high-quality colostrum as soon as possible, ideally within 1–2 hours, aim for approximately 10% of birth body weight at the first feeding, provide a further feeding within the first 12 hours, and use a Brix refractometer to assess quality where available. A simple, consistent colostrum protocol can reduce the risk of failure of passive transfer and support calf health, growth, welfare and future productivity.

INTRODUCTION:

The birth of a calf is a high-risk transition from the protected uterine environment to a world containing bacteria, viruses, changing temperatures and multiple sources of stress. The newborn's immune system is functional but not yet fully experienced in responding to pathogens. Colostrum provides an immediate supply of maternal antibodies and other bioactive substances while the calf's own immune system develops. For this reason, colostrum management is widely regarded as one of the most influential early-life practices in dairy calf rearing (Godden, 2008; McGrath *et al.*, 2016).

Colostrum should not be treated as an optional by-product of calving or as a meal that can be postponed until routine farm work is complete. Timing matters because the newborn calf's intestine can absorb intact immunoglobulins only during a limited period after birth. As that capacity declines, the calf may consume colostrum but absorb less of the antibody protection it contains. Reviews of colostrum management therefore emphasise four linked factors: quickness, quality, quantity and cleanliness (Lora *et al.*, 2018; Fischer *et al.*, 2022).

1. What makes colostrum different from ordinary milk?

Colostrum is the first secretion produced by the mammary gland after calving. Compared with mature milk, it generally contains much higher concentrations of immunoglobulins, especially immunoglobulin G (IgG), 4 times more protein, 6 times more vitamins as well as fat and minerals. It also contains growth factors and other bioactive components that contribute to intestinal development and early adaptation. The concentration varies considerably among cows and can be influenced by parity, vaccination and health history, dry-period management, time from calving to collection and the volume collected (Godden, 2008; McGrath *et al.*, 2016).

Antibodies in colostrum help recognise and neutralise pathogens encountered by the calf. This is known as passive transfer of immunity. Adequate passive transfer is associated with reduced risk of illness and mortality, can support better early growth. It does not replace good housing, sanitation, vaccination planning or veterinary care; it gives the calf a stronger starting point from which these measures can work.

2. Why the first 1–2 hours matter

In cattle, the placenta normally prevents meaningful transfer of maternal immunoglobulins to the foetus. After birth, specialised intestinal cells can absorb intact antibodies, but this capacity decreases with time and becomes very limited by approximately 24 hours. The process is often described as intestinal closure. The efficiency of absorption is highest early in life, so prompt feeding increases the chance that a calf receives useful quantities of IgG into the bloodstream (Godden, 2008; Fischer *et al.*, 2022).

A practical target is to feed the first meal within 1–2 hours after birth. Feeding within the first 4 hours remains important, but waiting until a routine milking or the next convenient work period can compromise absorption. A scoping review by Fischer *et al.* (2022) found that the evidence base comparing exact feeding times is variable across studies, but the overall biological rationale and current management guidance support early feeding rather than delay.

Leaving the calf with its dam may allow natural suckling, but it does not confirm how much colostrum the calf has consumed or when it first drank. Weak calves, difficult births, udder conformation, large teats,

maternal illness or poor maternal behaviour can delay or reduce suckling. Where feasible, observe the calf and ensure that a known, adequate volume is consumed rather than relying on appearance alone (Godden, 2008).



Figure 1. Timing, quality and quantity of colostrum management.

3. Four pillars of effective colostrum management

3.1 Quickness: feed early: Aim to deliver the first colostrum meal within 1–2 hours after birth. This requires advance preparation: keep clean feeding equipment ready, identify the person responsible for night-time calvings and record birth time.

3.2 Quality: select colostrum with adequate antibodies: Visual appearance alone is not a reliable measure of antibody concentration. A Brix refractometer provides a practical indirect estimate of colostrum quality. A reading of about 22% Brix or higher is commonly used as a field threshold for high-quality colostrum, although Brix measures total soluble solids and is not a direct IgG assay (McGrath *et al.*, 2016; Fischer *et al.*, 2022). Clean colostrum from a healthy cow should be prioritised. Colostrum that is bloody, abnormal, or collected from a cow with a disease or treatment history that makes it unsuitable should not be fed without veterinary advice.

3.3 Quantity: deliver enough IgG: A widely used practical target for the first meal is approximately 10% of the calf's birth body weight. For a 35 kg calf, this is about 3.5 litres; for a 40 kg calf, about 4 litres. The appropriate volume depends on the calf, colostrum quality and the feeding protocol, so the aim is to deliver a sufficient mass of IgG rather than to follow a volume without considering quality. Current reviews commonly describe a first feeding of around 10% of body weight and a second feeding within the first 12 hours (Fischer *et al.*, 2022; Lora *et al.*, 2018).

3.4 Cleanliness: do not feed antibodies with a heavy bacterial load: Bacteria in colostrum can cause disease directly and may interfere with the absorption of immunoglobulins. Wash hands, use clean collection containers, and clean and sanitise bottles, nipples and tube-feeding equipment after use according to an appropriate protocol. Collect colostrum into a clean container and feed it promptly. Avoid overheating during thawing because excessive heat can damage immunoglobulins (Godden, 2008; McGrath *et al.*, 2016).

3. A practical protocol for Indian dairy farms

At calving: Record the birth time, check that the calf is breathing normally, dry and warm the calf as needed, and ensure that the dam and calf are stable. Seek veterinary assistance for a difficult birth or a weak calf.

Collect and assess: Collect colostrum hygienically as soon as possible. If available,

measure quality using a clean Brix refractometer; aim for about 22% Brix or higher.

Feed promptly: Offer the first meal within 1–2 hours, aiming for about 10% of birth body weight. Use a clean nipple bottle if the calf can suck and swallow safely.

Ensure intake: If the calf cannot or will not consume an adequate amount, contact a trained animal-health professional promptly. Oesophageal-tube feeding should be performed only by a trained person using correct equipment and technique.

Feed again and record: Provide a further feeding within the first 6–12 hours as recommended by the farm protocol. Record time, approximate volume, quality reading and method of feeding.

Follow up: Maintain dry bedding, clean housing, navel care, appropriate milk feeding and access to clean water. Where practical, a herd veterinarian can assess passive transfer in a sample of calves using serum IgG or validated indirect tests.

4. Common mistakes and how to prevent them

A common mistake is assuming that a calf has suckled because it is standing near the dam. Another is feeding a small amount of poor-quality colostrum simply to meet a time target. Timing, quantity and quality must be considered together. Feeding contaminated colostrum, storing it at room temperature for too long, or using equipment that is not properly cleaned can undermine the benefit. Finally, force-feeding or tube-feeding without training may injure the calf or place fluid in the airway.

CONCLUSIONS

Colostrum is the calf's first and most time-sensitive nutritional and immunological resource. Because antibody absorption declines rapidly after birth, the first feeding should ideally occur within 1–2 hours. A practical programme combines high-quality colostrum, a sufficient first volume, a further early feeding and strict hygiene. Colostrum management cannot eliminate all calf disease, but it gives the newborn a stronger start and should be treated as a core component of dairy herd health, welfare and long-term productivity.

REFERENCES

Fischer, A. J., Song, Y., He, Z., Haines, D. M., Guan, L. L., & Steele, M. A. (2022). Colostrum management practices that improve the transfer of passive immunity in neonatal dairy calves: A scoping review. PLOS ONE, 17(8), e0270122. https:// doi.org/10.1371/journal.pone.0270122

Food and Agriculture Organization of the United Nations (FAO). (n.d.). Small-scale dairy farming manual: Calf rearing and colostrum management. https://www.fao.org/4/t1265e /t1280e06.htm

Frontiers in Veterinary Science. (2023). Welfare implications on management strategies for rearing dairy calves: A systematic review. Part 1—Feeding management. Frontiers in Veterinary Science, 10, 1148823. https:// doi.org/10.3389 /fvets.2023.1148823

Godden, S. (2008). Colostrum management for dairy calves. Veterinary Clinics of North America: Food Animal Practice, 24(1), 19–39. https://doi.org/10.1016/j.cvfa.2007.10.005

Lora, I., Gottardo, F., Contiero, B., Dall Ava, B., Bonfante, E., Stefani, A., & Barberio, A. (2018). Associations between passive immunity and health status of dairy calves under 30 days of age. Preventive Veterinary Medicine, 152, 12–15.

McGrath, B. A., Fox, P. F., McSweeney, P. L. H., & Kelly, A. L. (2016). Composition and properties of bovine colostrum: A review. Dairy Science & Technology, 96, 133–158. https://doi.org/10.1007 /s13594-015-0258-x

Ontario Ministry of Agriculture, Food and Rural Affairs. (2023). Colostrum for the dairy calf. https:// www.ontario.ca/page/colostrum-dairy-calf.