The foundations of optimal herd health begin at birth

How successful your milking herd is in the future begins with the health of calves being born today. By providing proper nutrition and management, you can get the calf's gut microbiome and immune system off to a good start and help production, performance, and your bottom line.

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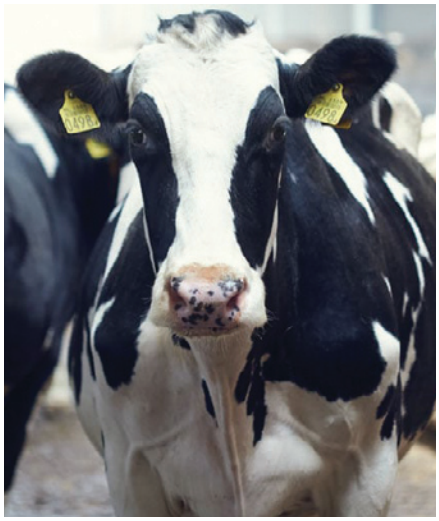
The foundation of herd health starts with calves

First things first. Ask yourself this question. Are we providing a plane of nutrition for heifers to survive or to thrive? Calves are born with 100% of their genetic potential, and as managers, we can deliver an environment and nutrition to capitalise on that potential – or lose it.

No, we will never have a perfect environment and calves will never be able to express 100% of their genetic potential. But we do want them to express as much of it as possible.

Too often, we still find programmes where calves are being fed on a plane of nutrition and where we feed as little as we can get away with.



It is expensive to feed milk to these babies, whether that be whole milk or milk replacer, but what is the cost of not providing quality nutrition? Is this enough for them to get by? Perhaps. However optimal nutrition for them to thrive and be productive is the long-term goal.

Quality nourishment and proactive management are vital from day one. Establishing a healthy gut microbiome from birth can have a lasting impact on a calf's life. Most of their immune system is found in the gut.

That is why gut health is linked to immune health. It is also why providing high-quality colostrum is critical as it helps develop a calf's microbiome and is an essential part of keeping them healthy.

Every discussion on calves starts with colostrum because study after study continues to build on the importance of calves receiving an adequate quantity and quality of it.

At birth, a calf's microbiome is immature. Colostrum helps develop it, protecting the gut lining and helping shape the immune system a good starting point for evaluating the effectiveness of the colostrum programme is measuring serum total proteins in the blood of calves.

Improved passive transfer results in healthier calves.

However, according to the 2007 National Animal Health Monitoring System survey, approximately 19% of dairy heifer calves in the US had a failure of passive transfer.

To provide successful passive transfer of immunity, feed high-quality colostrum, feed colostrum promptly after birth (within 1-2 hours), and minimise bacterial contamination of colostrum by proper udder preparation, collecting colostrum in a clean container, and other sanitation best practices.

Colostrum management is the single most important management factor in determining calf health and survival.

The key is to establish and feed gut microbes for optimal growth

Why is establishing a healthy microbiome critical? The rumen and intestine microbiomes contribute to most of a dairy animal's functions. They play a key role in the digestion of nutrients, education of the immune system, functionality of gut epithelium, and setting up a proper gut environment.

Members of the gut microbiome also produce a range of metabolites that impact the function of distant organs such as the

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lungs, liver, udder, and reproductive system.

Therefore, establishing proper rumen and intestine microbiomes early in life and supporting their populations throughout different stages of life is pivotal for the long-term health and production efficiency of dairy calves and cows.

What affects the establishment of the gut microbiome?

Colonisation of the rumen and intestines starts during and after birth. Microbes from the vaginal tract and cow environment are among the first colonisers followed by those introduced by colostrum, milk, liquid, and solid feed.

Among these, colostrum and milk microbiota perhaps play a more important role in intestinal microbiome development than that of the rumen. This is speculated because, in sucking calves, the majority of milk bypasses from the rumen to the abomasum through the oesophageal groove to avoid wasteful fermentation in the rumen.

As a result, the more extensive establishment of the rumen microbiome begins with an introduction of solid feed. During the first several weeks of a calf's life, microbiomes of the rumen and hindgut change quickly from one composition to the next. The first group of colonisers changes the gut environment in a way that promotes the growth of a certain group of secondary colonisers, and so on.

Their adequate abundance maximises calf growth and immune efficiency and promotes the robustness and resilience of the microbiome against stressors and infectious agents.

How can we impact microbiome development?

Calf nutrition and management strategies can play a critical role in setting up the proper rumen and intestine microbiomes for life. These strategies start with the timely feeding of colostrum. Research at the University of Alberta showed that delayed first colostrum feeding by 12 hours tends to decrease Bifidobacterium spp. and Lactobacillus spp. compared to calves fed colostrum immediately after birth.

Adequate abundance of influential species is essential for proper interaction of calf and its microbiome and education of the immune system in the long run. Other strategies during the pre-weaning stage, such as feeding liquid calf diets fortified with probiotics and postbiotics, can improve proper colonisation of calf microbiome, help prevent microbial imbalance, and reduce the incidence of infectious diseases.

Weaning age and stepwise vs. abrupt weaning strategies can also influence the speed and the extent of the rumen and intestine microbial transition. The transition from liquid to solid feed results in a shift in the site of digestion from the intestines to the rumen. Low rumen pH at weaning accompanied by an imbalance of rumen and intestine microbiomes can compromise epithelial barrier function and result in a leaky gut.

As a result, a weaning strategy that, for instance, includes postbiotic supplementation can provide influential members of the microbial community a competitive edge over opportunistic (for example faster growers) and pathogenic micro-organisms. This prevents excessive growth of those species and helps maintain the diversity and balance of the rumen and intestines microbial communities.

The outcome is a controlled fermentation and improved rumen and hindgut environment.

Together, these strategies can minimise weaning-associated feed intake depression, improve calf growth, and reduce the susceptibility of calves to infectious diseases within and outside of the gut.

Better calf health leads to better performing cows

Sufficient nutrition and management early in life not only improves the performance, health, and well-being of young calves, but it can also allow them to express their genetic potential for milk production and longevity.

We need to recognise these effects and capitalise on them through our management and feeding practices.

Through genetic selection in our breeding programmes, we might achieve 150-300lbs of milk production improvement per lactation. Striving for continued genetic improvement is important, but it is key to remember that, as managers, we can have a significantly greater impact on lifetime performance.

It is well established that calves fed to double their birthweight by 56 days of age will have improved milk production in both their first lactation and cumulatively across their lifetime performance.

Across many studies, the first lactation improvement averaged 1,500lbs of milk, and after three lactations, 6,000lbs improved production.

Research at Cornell demonstrated that calves with just one antibiotic treatment while on milk produced over 1,000lbs less milk in their first lactation. The bottom line is better nutrition equals healthier and more resilient animals.

Lifetime performance is influenced by early life development. Dairy producers can manipulate the early life of a calf through nutrition.

Ensuring a productive cow in the future will depend on feeding and managing the calf of today. ■