HoloRuminant
Understanding microbiomes of the ruminant holobiont

CALF SCOUR AND THE GUT MICROBIOME

Preventing scour by supporting gut microbiome development in early life

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ABSTRACT PRACTICE

INTRODUCTION

Diarrhoea, also known as scour, is a **serious health problem when raising dairy calves.** Disease incidence rates can reach upwards of 50%, and it is the most common cause of death in calves during the first 30 days of life. Scour is a complicated disease that is difficult to treat because it is most often **caused by viruses and parasites,** not bacteria, which means that antibiotics do not help. In addition to this it is common for more than one scours-causing pathogen to be involved in disease manifestation, for example, calves may test positive for both rotavirus and cryptosporidiosis at the same time. Scour during the preweaning period (birth to weaning) has both short- and long-term effects on the animal. In the short term, their welfare is compromised because of secondary symptoms like dehydration, lack of appetite, and general unthriftiness. In the long-term, scour has been associated with decreased growth rates, problems with fertility and lower milk yields during the animal's professional life.

THE GUT MICROBIOME AND CALF SCOUR

Scour is difficult to treat, and calves face a high risk of illness during the pre-weaning period due to several key factors:

Immune System Immaturity:

- Calves are born with a naïve immune system and rely on antibodies passed from their dam through colostrum for early immune protection (passive transfer of immunity).
- These maternally derived antibodies begin to decline around 2 weeks of age and are largely gone by 1 month.
- The calf's own immune system only begins to function effectively around 3 weeks of age, leaving a vulnerable window of reduced immune defense.

Developing Hindgut Microbiome:

- The hindgut microbiome—a complex community of bacteria, archaea, viruses, fungi, and ciliates—plays a critical role in calf health.
- This microbiome is in the early stages of development and remains unstable until about 1 month of age.

An immature microbiome may increase susceptibility to intestinal diseases such as scour.

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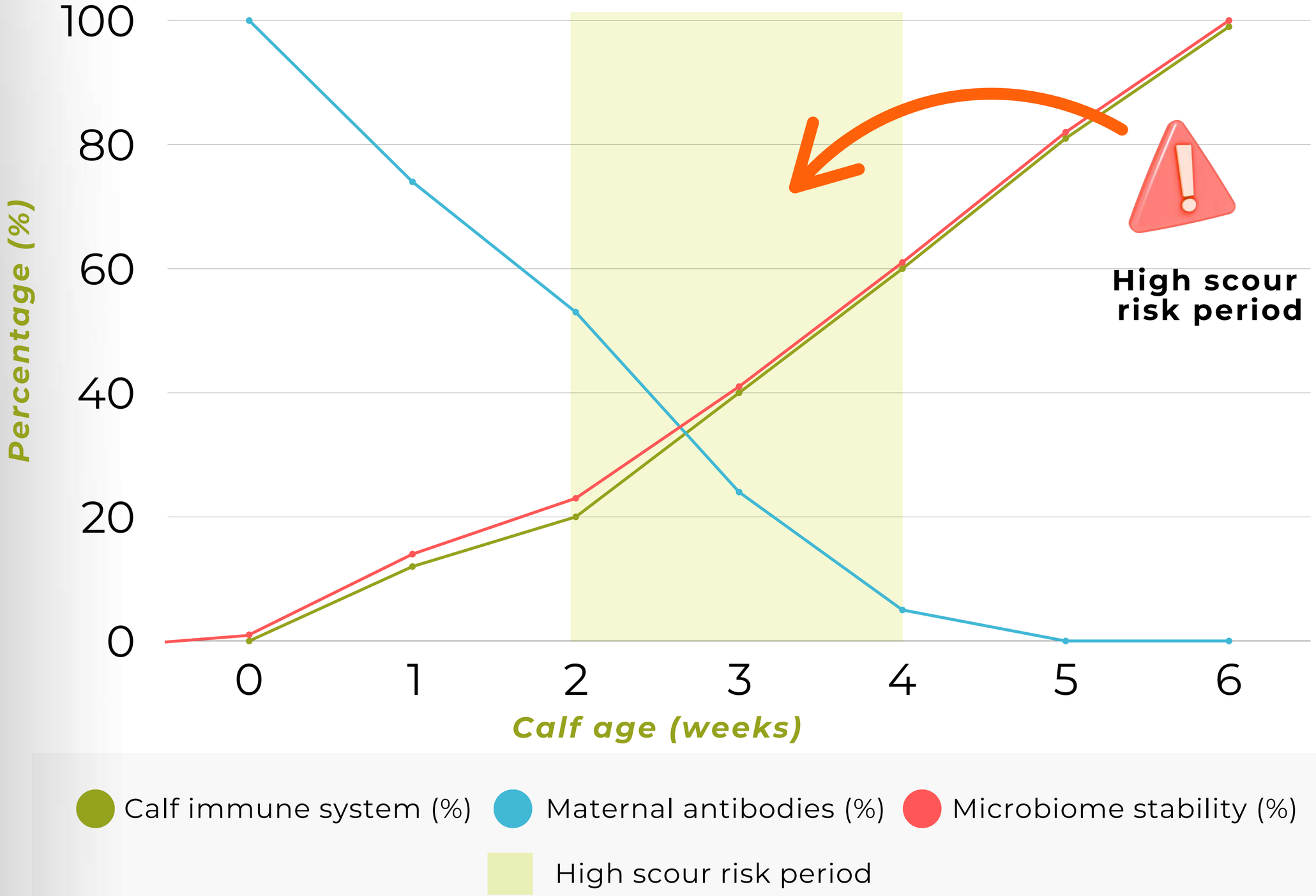
PRACTICE ABSTRACT

DID YOU KNOW?

The hindgut microbiome is a community of tiny organisms—like bacteria, viruses, fungi, and more—that live inside the calf's intestines. Most of these microbes help keep the animal healthy, but some harmful ones are also there in very small amounts. When the microbiome is balanced and stable, these harmful microbes don't cause disease.

CALF IMMUNITY, MATERNAL ANTIBODIES & MICROBIOME STABILITY



During the preweaning period, however, as previously stated, the hindgut microbiome is considered unstable, leaving it at risk for disruption called dysbiosis. During dysbiosis, the number of beneficial microbes decreases and pathogens take over as the dominant community member. In a recent study by Teagasc, done in dairy heifer calves who all had adequate passive transfer of immunity, 53% of the calves still got scour.

During this study, the hindgut microbiome was examined before, during and after scour, to understand what is happening to this community that results in sickness. Researchers were able to establish that dysbiosis of the hindgut occurred before the calf scoured. This means that the microbial community experienced a disruption that disturbed its development which then led to scour. In addition to this, researchers were able to conclude that when the calf is properly supported during a scour incident, the microbial community can recover and return to similar composition observed in the healthy calves that did not get sick.

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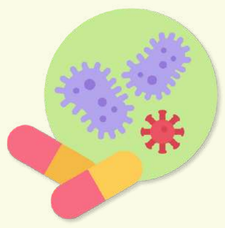
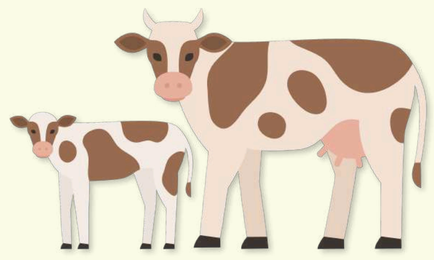
CONCLUSIONS AND PRACTICAL RECOMMENDATIONS

Calves are particularly vulnerable to disease during the preweaning period for many reasons, that when looked at together, create a perfect storm of conditions that are ideal for pathogens to come in and cause disease. The microbial community in the hindgut is intricately connected to the immune development of the calf, and so if we support good hindgut microbiome development from birth to weaning, we are also supporting good immune development and may even be able to prevent scour in calves.

To support hindgut microbiome development **before** scour occurs:





Immediately After Birth

Feed high-quality colostrum:
- As much as possible, as soon as possible after calving

First Hours to Day 1

Continue feeding colostrum beyond the first meal:
- Supports passive immunity development

Day 2 to Day 4+ Feed transition milk

Use nonsaleable milk from the 2nd to 8th milking:
- *Avoid* waste milk or milk with antibiotic residues

Throughout Early Life

Use antibiotics only when necessary:
- Always follow your vet's advice.
- Overuse can destroy beneficial gut bacteria

Milk Feeding Period

Feed high-quality whole milk or milk replacer:
- If using replacer, ensure all ingredients are dairy-based

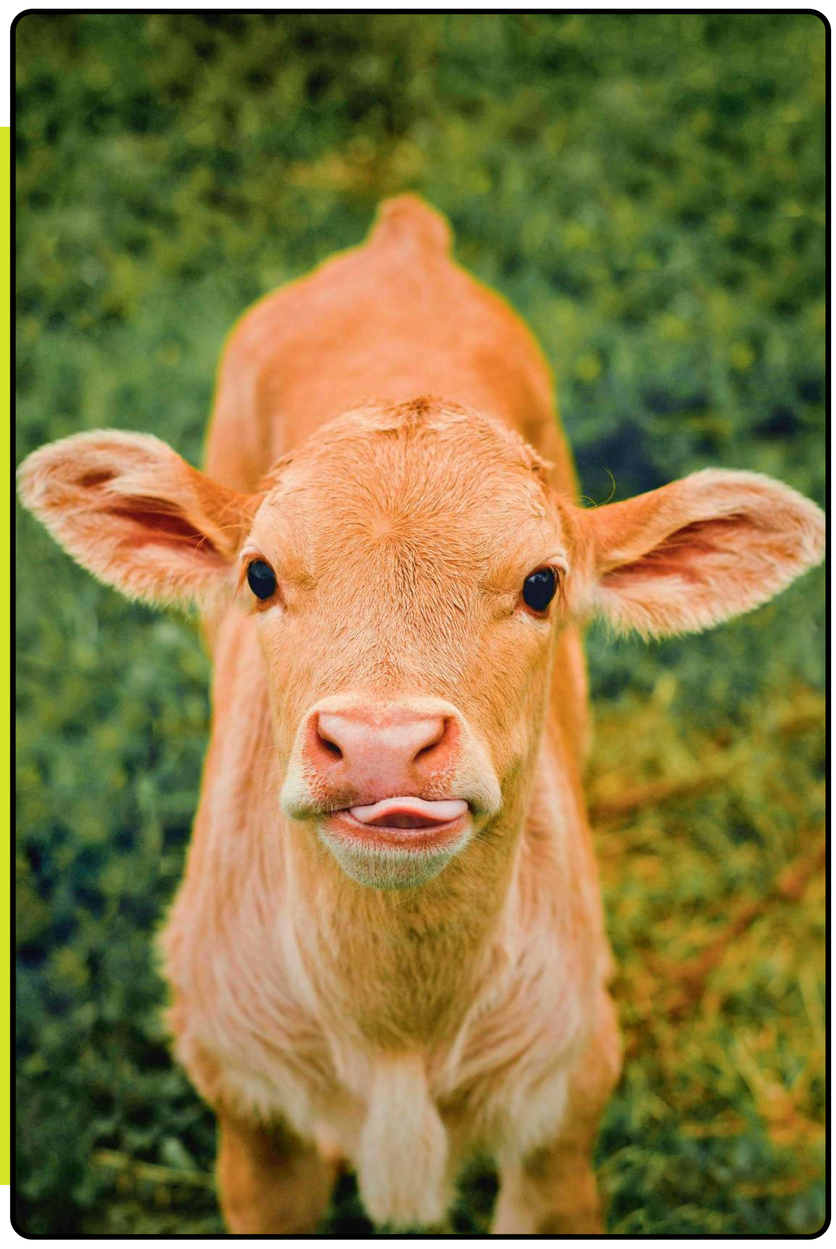
Daily Growth Monitoring

Never underfeed your calves:
- Ensure adequate milk volume to meet their growth needs

As always, work closely with your veterinarian to develop an appropriate herd health plan.

If the calf does get scour, make sure the calf is supported properly by keeping the calf environment clean, warm and dry.

Do not skip milk meals and give the calf extra support by feeding electrolytes or oral rehydration solutions in between milk meals.



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