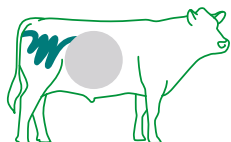




TECHNICAL BULLETIN

LOWER GUT HEALTH: CHALLENGES AND SUPPORT



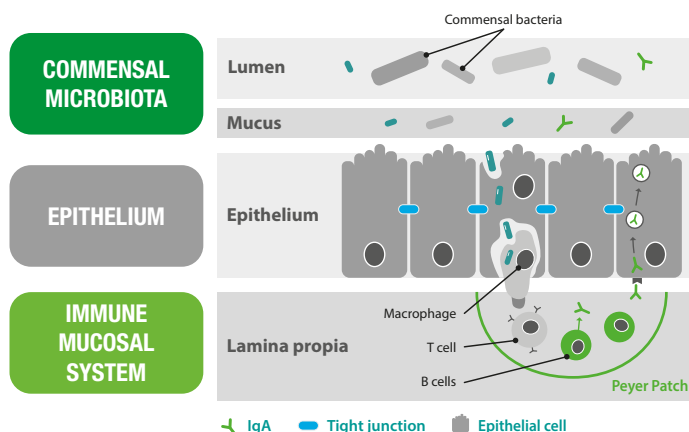
The **intestine** and the **rumen** are two totally distinct parts of the gut in terms of morphology, functions and microbiological composition, and therefore in terms of preventive management.

LOWER GUT MICROBIOTA, A KEY PARTNER IN HELPING TO MAINTAIN SYSTEMIC GUT HEALTH

The colonization of gastrointestinal microbiota is a complex process, and the stable establishment of beneficial microbiota is important at different levels, particularly for the maturation of the mucosal immune system.

(Chase *et al.*, 2019, Zened *et al.*, 2021).

Lower gut morphology and immunity pattern



Role of intestinal microbiota



Protection against enteric infection



Fermentation in the cecum and colon (10 to 30% of starch)



Development of the intestinal mucosal epithelium

Any imbalance in the microbiota (dysbiosis) is likely to affect the proper functioning of the intestinal system, nutrient absorption, and even have repercussions for the animal body, given its central role in the homeostasis of the entire "system".

Main stress factors in ruminant lifecycle



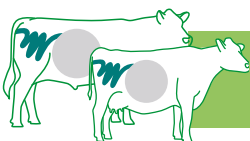
Adaptation to a new environment with high pathogen load

Passive (colostrum) to active immunity

Thermoregulation

Digestive transition

Vet treatments



Handling and transport

Ruminal Acidosis

Heat stress

Calving

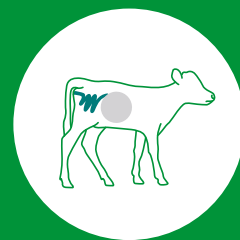
Fattening (beef)

HOW TO TAKE CONTROL?

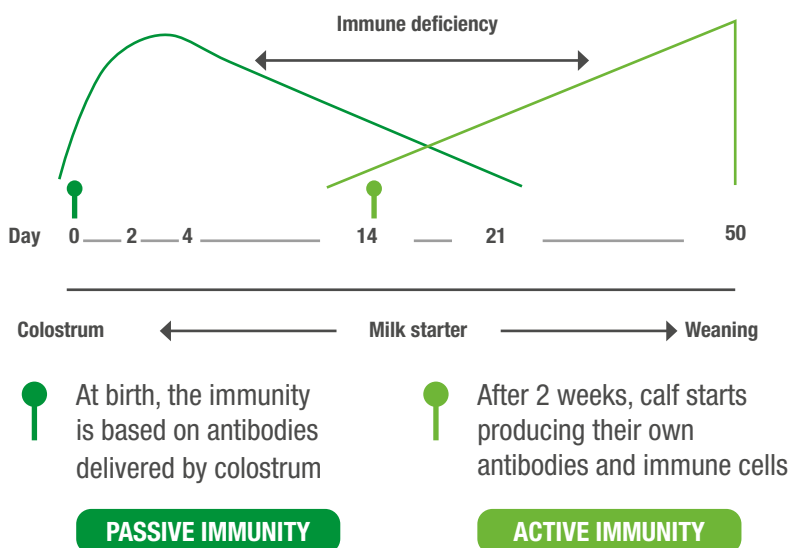
SELECTED PROBIOTICS SUPPORTING LOWER GUT HEALTH CAN HELP RUMINANTS TO BE RESILIENT TO STRESS FACTORS AND REACH THEIR HIGHEST PERFORMANCE



CALVES LOWER GUT HEALTH: MAIN CHALLENGES



IMMATURE IMMUNE SYSTEM, WHICH CONSEQUENCES?



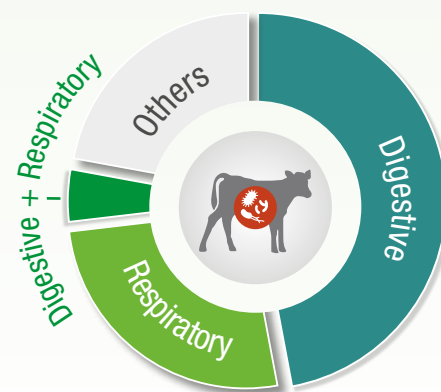
(Figure adapted from Hulbert *et al.* 2016)

This period of transition is very challenging : the immature immune system needs to be trained and therefore, gives a very high susceptibility for the newborn calf which has to adapt to a new environment with high pathogen load.

Neonatal life is a challenging period:
34% morbidity, 5% mortality
in 1 month-old dairy calves.

USDA, 2014

MORBIDITY (% of sick calves)



(Urie *et al.*, 2018)

Unbalanced gut flora, consequences



Enteropathogens cause diarrhea in preweaned calves
Rotavirus, Coronavirus
Cryptosporidium parvum
ETEC, Salmonella



Consequences later in livestock life
Morbidity, malabsorption,
poor production performance



Economical losses at short-term and negative impacts at long-term
(Osorio *et al.*, 2020)

HOW TO TAKE CONTROL?

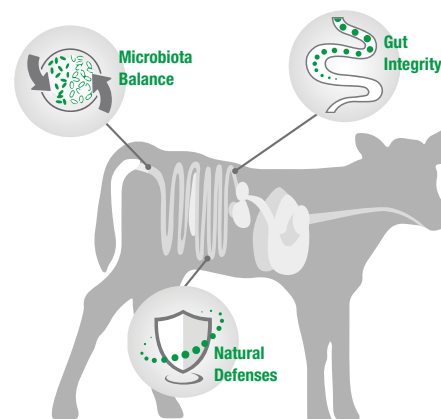
SELECTED PROBIOTICS, KEY PARTNERS OF LOWER GUT HEALTH?

The lower gut plays a major role in calf health, particularly because of the importance of the microbiota. The density and diversity of its microbiota is essential to ensure several functions.



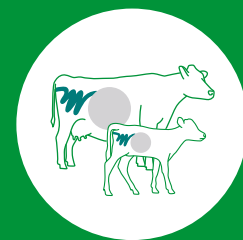
**HELPS TO MAINTAIN HEALTHY CALVES
AND SUPPORT IMPROVED PERFORMANCE**

Probiotics effects





CALVING TRANSITION COWS AND COW CALVES: LOWER GUT CHALLENGES



CONSEQUENCES OF IMMUNE ACTIVATION

In transition dairy cows, excessive immune activation likely stems from a compromised epithelial barrier at the uterus, mammary gland, intestine (metritis, mastitis, leaky gut).

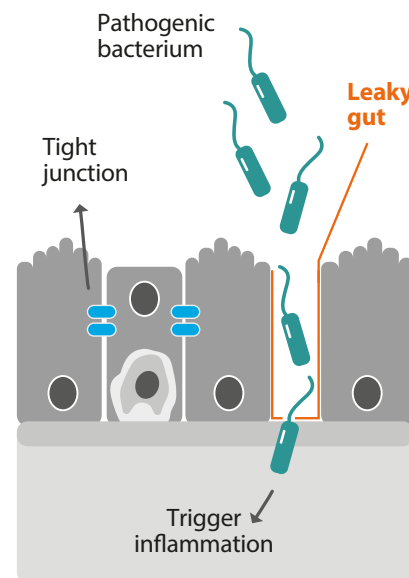
To answer this increasing energy demand of the immune system, the animal shifts its metabolic priorities which can negatively affect growth, reproduction and productivity.

(Vancamelbeke *et al.*, 2017)

LEAKY GUT, PATHOGENESIS



(Nida Amin *et al.*, 2021)



(Nida Amin *et al.*, 2021)

NEED TO SUPPORT LOWER GUT HEALTH

The principal function of the small intestine is to break down food, absorb nutrients needed for the body, and get rid of the unnecessary components. It also plays a role in the immune system, acting as a barrier to a multitude of microorganisms that inhabit the gut and to make sure no harmful bacteria enter the body. The commensal microbiota is the first barrier, though in case of intestinal dysbiosis, inflammation cascade will start locally in the epithelium, impairing the barrier function and also reducing the capacity to absorb essential nutrients. As a result, energy extracted from the diet is reduced and inflammation could extend beyond digestive tract.

HOW TO TAKE CONTROL?

SELECTED PROBIOTICS, A SOLUTION TO SUPPORT GUT INTEGRITY?

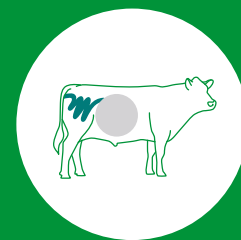
Probiotics proactively can help to support lower gut integrity through reinforcing tight junctions, encouraging mucus production, promoting positive microbiota and enhancing immune response.



SUPPORT SAFE CALVING EVENT (WITH LESS PHYSIOLOGICAL STRESS), AND PERFORMANCES OF MILK LONGEVITY.



BEEF: LOWER GUT CHALLENGES

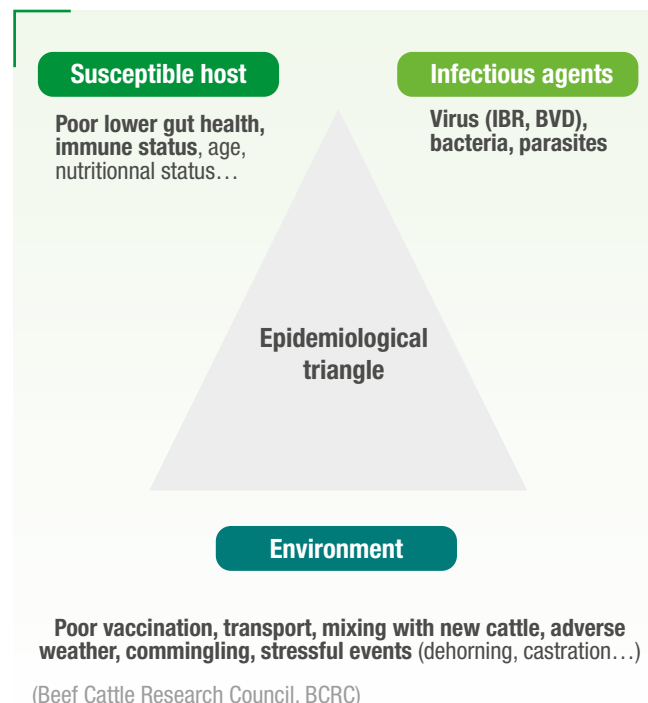


IMPAIRED LOWER GUT HEALTH, WHAT ARE THE CONSEQUENCES?

In combination to others factors, it may increase the probability to develop others symptoms such as Bovine Respiratory Disease, Bovine Viral Diarrhea, clostridial disease, laminitis, liver disease, immune competence and ability to cope with environmental stressors such as heat.

The gut commensal microbiota contributes to influence and maintain body homeostasis by regulating the immune response of both the gut system and distal organs (lungs for example). Microbial dysbiosis promotes susceptibility to inflammation.

The consequences of this inflammation are numerous: decreased feed intake, lower milk and meat production, and increased risk of metabolic disorder and pathogens susceptibility.



What are the mechanisms to explain the role of the intestinal microbiota in overall homeostasis?



The regulation of extraintestinal white cells (out of lower gut)



The development of immune tolerance

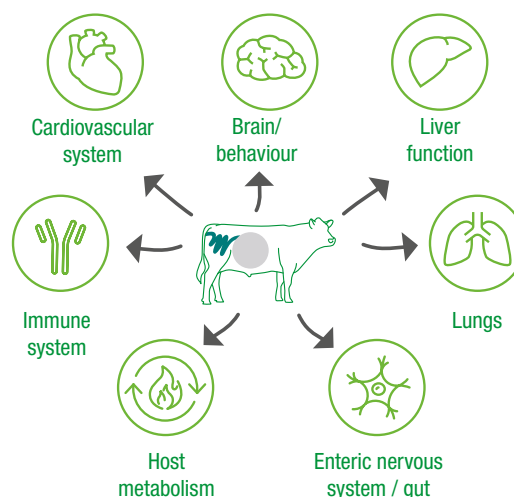


The production of short-chain fatty acids (SCFAs)



The regulation of systemic inflammation

(Ogunrinola et al., 2020)



(Adapted from O'Callaghan, et al., 2016)

HOW TO TAKE CONTROL?

SELECTED PROBIOTICS, TOOLS TO KEEP ANIMAL HEALTHY, EVEN UNDER CHALLENGING CONDITIONS?

Selected probiotics reduce the risk of impaired intestinal health by optimising microbial balance in the gastrointestinal tract.



BENEFIT OF THE GUT MICROBIOTA ON HOST PHYSIOLOGY AND WELL-BEING



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