

## Advanced feeding strategies for enhanced and circular sustainable livestock and aquaculture production

### How do they work?



## RUMINANTS

FEFAC asked in autumn 2022 to its members what they can do to support the European livestock and aquaculture in the transition towards more sustainable production practice. This consultation showed that **animal nutrition has the potential to address many challenges** that may be common to all species or species specific and are applicable to all or some production systems (intensive, extensive, organic, etc.).

The purpose of this factsheet is to provide general information on **how animal nutrition solutions specific to ruminants work** to address key priority challenges, broken down in three categories: **environment, animal health and animal welfare**. It complements the fact sheet on feeding techniques applicable to all species.

In addition, a number of **specific techniques, strategies and formulations**, supported by strong scientific evidence have been selected by FEFAC members and **showcased on the [FEFAC website](#)**, with detailed information on the conditions of use, the trade-offs, the economic aspects, the regulatory limitations when exist, as well as bibliographic references (mostly meta-analysis) for those who want to learn more.

## ENVIRONMENTAL CHALLENGES

The key environmental challenge specific to the farming of ruminant animals is the release into the atmosphere of **methane gas**. Methane comes from the digestive systems of cows, sheep, and other ruminant animals. When these animals digest their food, they produce methane as a by-product, which is then released into the atmosphere through belching and flatulence. Methane emissions from cattle and other livestock animals are a problem because methane is a potent greenhouse gas that contributes to global warming and climate change. Methane has a much higher global warming potential than carbon dioxide, meaning that it has a greater ability to trap heat in the atmosphere. As the global population grows, so does the demand for meat and dairy, which in principle means that the number of livestock is also increasing, and so are the associated methane emissions. Although biogenic methane is part of a cycle and may not be compared with methane from the exploitation of fossil energy, the EU and national policymakers are keen to see methane emissions from ruminants to be brought down as a short-term action to tackle climate change.

**The key environmental challenge identified by FEFAC members** where animal feeding strategies can play a specific role for ruminants is a **reduction of enteric methane emissions**.

### How can animal feeding strategies help reduce methane emissions from ruminants?

There are several animal feed solutions that can help to reduce methane emissions from cattle. **Forage management** would be the first step for a cattle farmer to take into account. An approach that includes complementary feed is adapting the formulated feed that reduces the amount of methane produced during digestion. For example, **adding fats, oils, or certain types of carbohydrates** to the feed can help to slow down the process of digestion and reduce the amount of methane produced. Another approach is to modify the feed diet to include more easily digested feed, such as grains and soy, and **reduce the amount of fibrous feed**, such as hay and grass, which can be more difficult for the animals to digest and lead to more methane emissions.

A lot of research and development has been invested in creating a **methanogenesis inhibitor** that can be added as a supplement to the complementary feed, inhibiting the growth of methane-producing bacteria in the animals' digestive system. Bovaer® (active substance 3-NOP) is the first EFSA-approved feed additive that reduces enteric methane emissions from dairy and reproductive cows and is safe for the animal and the consumer.

## ANIMAL HEALTH CHALLENGES

Infectious diseases caused by bacteria are the number one challenge for ruminant health and the need to **minimize antimicrobial treatments** is a key objective, including for young calves being destined for veal production. **Viral diseases** are also a significant threat (Foot-and-Mouth Disease for example). Besides these microbiological threats, cattle are potentially exposed to stressing situation at specific physiological stages, for example, calving: **milk fever** are metabolic disorders that occur at calving when calcium requirements are suddenly increased for colostrum and milk production. They result in a reduction of blood calcium levels leading to muscle weakness. Cattle are also exposed to the **risk of ketosis** (an elevated concentration of ketone bodies in all body fluids, which translates into anorexia, decreased milk production, noticeable loss of body condition, etc.), or the risk of **tetany or acidosis**. Animal feeding strategies may help support some of these ruminant health issues, e.g. to help animals cope with microbial challenges and non-pathogenic diseases.

**The key animal health challenges identified by FEFAC members** where animal feeding strategies can play a specific role for ruminants are: i) the risk of **milk fever**, ii) the risk of **tetany** and iii) the risk of **acidosis**.

## **How can animal feeding strategies support ruminant health?**

Besides the range of feeding techniques and strategies to reduce the need for antimicrobial treatment that are effective for all species (see factsheet for all species), several feed formulations, mostly based on **supplementation with trace elements, vitamins and macrominerals** have been recognized by the legislator as effective to meet **specific nutritional purposes**<sup>1</sup> associated with certain physiological situations affecting animals' health. The risk of milk fever and hypocalcaemia may be reduced if the **level of calcium in the blood** is maintained. This may be achieved in different manners, e.g. feed with low cations/anions ratios or with the addition of zeolite to mention a few. The risk of tetany may be reduced thanks to feed containing high levels of magnesium and low level of potassium. The risk of acidosis may be minimized thanks to feed with low concentrations of fermentable carbohydrates and high buffering capacity.

## **ANIMAL WELFARE CHALLENGES**

In ruminants, an overall **metabolic stress** response affecting animal welfare is observed for example during the development of a functional rumen (modification of the digestive system and weaning). The period of **weaning** is indeed characterised by a rapid, but transitory, decrease in the feed intake which is partly responsible for structural and functional alterations of the intestines. Weaning has also a major impact on the dynamics of the development of the intestinal microbiota. Moreover, the animal at the weaning stage produces free radicals, which, if present at too high a level, can create oxidative stress. The regulation of the redox system plays a major role in maintaining cell and tissue integrity. Its imbalance may be an aggravating factor of post-weaning troubles.

External factors, such as **heat stress**, may affect predominantly outdoor (grazing) animals. Clinical observations related to these stress responses are the prevalence of lameness, hock, knee and skin lesions, and swellings.

**The key animal welfare challenges identified by FEFAC members** where animal feeding strategies can play a specific role for ruminants are: i) **weaning** and ii) **heat stress**.

## **How can animal feeding strategies support ruminant welfare?**

To support calves during the **weaning** period, it is important to provide the animal with **supplements of calcium and phosphorous** for the constitution of bone tissues and of **trace elements & vitamins** to prevent the risk of anaemia and contribute to the protein synthesis and especially immunoglobulins, that have a preventive action on the growth crises. **Regarding heat stress**, the addition in the diet of **fat** which releases heat at a slower rate during their metabolism compared to carbohydrates and proteins may help regulate body temperature.

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<sup>1</sup> [Regulation \(EU\) No 2020/354](#) establishing a list of intended uses of feed intended for particular nutritional purposes