

Improving rumen fermentation for better production

A good functioning of the rumen is essential. It provides 60-85% of the amino acids reaching the intestine. For energy, the volatile fatty acids (VFA) resulting from fermentation represent more than 70% of the total energy supply for the animal.

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Beyond the nutritional aspects, a good balance of the physico-chemical conditions and the rumen flora is essential for the health of the animal.

The management of methane or nitrogen waste in the environment by ruminants is also directly linked to rumen function.

It is therefore understood that ensuring a good rumen function is essential to maintain sustainable breeding, both productivity and profitability, with respect for the environment and animal welfare.

A well-balanced diet and a good farm management system are critical, but additives can give extra help to reach maximum performance. Plant-based products are helpful for this purpose, another advantage is that they are popular with consumers

Vivactiv is a range of natural feed solutions based on phytogenic and mineral raw materials that has been the subject of numerous publications on the mode of

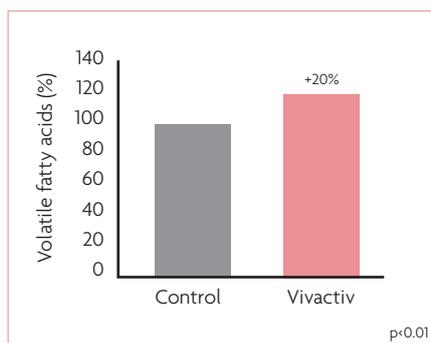


Fig. 1. Comparison of cows fed with soya bean meal and soya bean meal including Vivactiv (South Dakota University).

action as well as the zootechnical results in partnership with INRAE research institute in France, IGM institute in Spain and South Dakota University in the USA.

In order to meet the different rations and objectives encountered, the Vivactiv range consists of three products:

- Rumiviv for high protein rations, in particular rumen-degradable protein (RDP).
- Amiviv for rations rich in fermentable carbohydrates.
- Turboviv for balanced rations.

Vivactiv, incorporated into the feed, improves rumen fermentation by:

- A better adaptation of the microbiota.
- An improvement in VFA production.
- Rumen environment.
- A good degradation of starch and protein.

Fig. 3. Starch degradability in the rumen with different sources and Amiviv. Barley with Vivactiv has a rate of starch degradability intermediate between native barley and corn. It brings energy to the rumen flora by limiting the risk of acidosis or to increase the flow of intestinal starch.

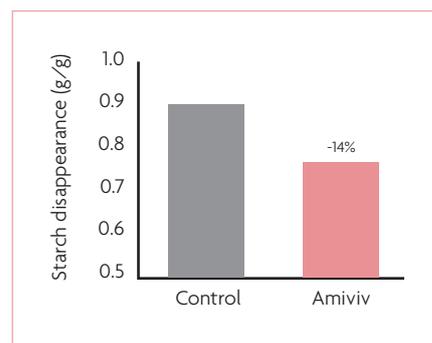
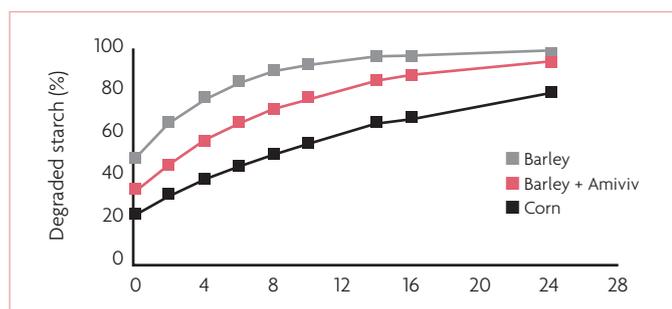


Fig. 2. Starch degradability per hour (CSIC, Spain, 2015).

Improving the nature and quantity of volatile fatty acids

Vivactiv has a direct impact on the production of VFA by managing the flora population. At South Dakota University a trial compared cows fed with soya bean meal and soya bean meal including Vivactiv. The Vivactiv fed cows had significantly more VFA in the rumen (see Fig. 1).

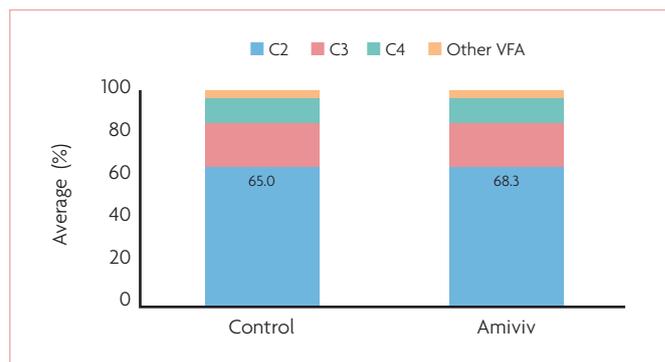
Impact on rumen microbiota

High starch diets are challenging for the maintenance of rumen pH and cellulolytic bacteria activity. These diets are quite common with high yielding cows.

Vivactiv (Amiviv product) slows down

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Fig. 4. Relative proportion of volatile fatty acids (VFA) with Amiviv. Artificial rumen (CCPA-INRAE-2003).



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starch disappearance, maintains pH, and cellulose activity. In a 2015 trial at CSIC in Spain in artificial rumen with sheep fed with different regimen, it was demonstrated that with Vivactiv the starch disappearance per hour was reduced by 14% (Fig. 2).

With this result we can make a model of degradability (Orskov model) and show that the rate of barley with Vivactiv was intermediate between the control barley and corn (Fig. 3).

This new rate of starch degradability allows a higher pH to be maintained and promotes the development of cellulolytic bacteria. Therefore, in this specific diet, acetic proportion is higher (Fig. 4) which is in favour of a higher milk fat content.

Managing protein efficiency through the rumen with plant extracts

We can modify the RUP/RDP ratio to improve the flow of protein entering the intestine. The phytogetic component of Vivactiv reduces the degradation of protein to the ammonia stage and stimulates the production of microbial protein (Fig. 5).

This improvement of microbial flow allows global milk production to be improved or the protein content of the total diet to be reduced with the same production. In both

strategies the consequence is a better margin per litre of milk produced.

Better rumen efficiency means less environmental impact. Ruminants produce methane during feed fermentation in the rumen, contributing about 3% to global warming. Around 95% of methane emissions comes from rumen fermentation.

By improving rumen efficiency, Vivactiv has been proven, both in vitro and in vivo, to contribute positively to reducing methane emissions.

At the INRA institute it was demonstrated that this result is mainly due to the reduction of methane-producing bacteria and protozoa in the rumen.

Another trial has shown a 40% reduction in Methanococcales abundance with the use of natural solutions.

The reduction in CH₄ production in vitro was confirmed in vivo, with a 6% decrease in CH₄ emission (g/d) and 10% decrease in emission intensity (g CH₄/kg milk).

Products are used in many parts of the world

Depending on the type of diet and the objective of the farmer or feed compounder, CCPA technical staff can help to choose the right product and how to integrate it into the rationing system to get the maximum benefit. ■

References are available from the author on request

Fig. 5. Microbial and bypass protein flow modifications with Vivactiv. Artificial rumen trial (INRA/CCPA Group).

