How to reduce feed cost and improve calf growth

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Healthy young stock is essential for successful and profitable dairy production and methods to improve calf growth and health are continually being researched. However, some traditional methods of improving animal health and growth have come under public scrutiny, including antibiotics widely used in milk replacer.

Antibiotics can eliminate beneficial intestinal flora and do not stimulate or support the inherent immune system. To address these concerns about antibiotic use, alternative methods for improving calf health and growth must be developed.

This article shows how Olmix have succeeded in developing this type of natural product and how it works on the calf's digestive system.

The calf's digestive system

As we know, cows are ruminant. They have different stomachs. At birth the calf is monogastric and it then becomes polygastric. That is why the digestive system evolves from birth to adult. Some factors have a big impact on rumen development. There are five 'ingredients' that are required for ruminal development:

- **Establishment of bacteria in the rumen.** At birth the rumen is sterile. By one day of age a large concentration of bacteria can be found – mostly aerobic. Thereafter, the numbers and types of bacteria change as dry feed intake occurs and the substrate available for fermentation changes.
- **Liquid of the rumen.** To ferment substrate (grain and hay), rumen bacteria must live in a water environment. If water is offered to calves from an early age, this is not usually a problem; unfortunately producers do not provide free water to their calves until calves reach four or more weeks of age.

Feeding water can increase body weight gain, starter intake, and reduce scour scores. This does not happen with the milk, because the closure of the groove does not occur while drinking milk.

- **Outflow of material from the rumen (muscular action).** Proper ruminal development requires that material entering the rumen must be able to leave it.

With increasing intake of dry feed, rumen contractions begin. When calves are fed milk, hay, and grain from shortly after birth, normal rumen contractions can be measured as early as three weeks of age.

- **Absorptive ability of the tissue.** The absorption of end products of fermentation is an important criterion of ruminal development. The end products of fermentation, particularly the volatile fatty acids (VFA: acetate, propionate, and butyrate) are absorbed into the rumen epithelium. However. there is little or no absorption or metabolism of VFA in neonatal calves.

Therefore, the rumen must develop this ability prior to weaning. The results of many studies indicate that the primary stimulus for development of the epithelium are VFA.

Milk, hay and grain added to the rumen are all fermented by the resident bacteria, therefore they contribute VFA for epithelial development.

This is further support for the hypothesis that ruminal development is primarily driven by the availability of dry feed, but particularly starter, in the rumen.

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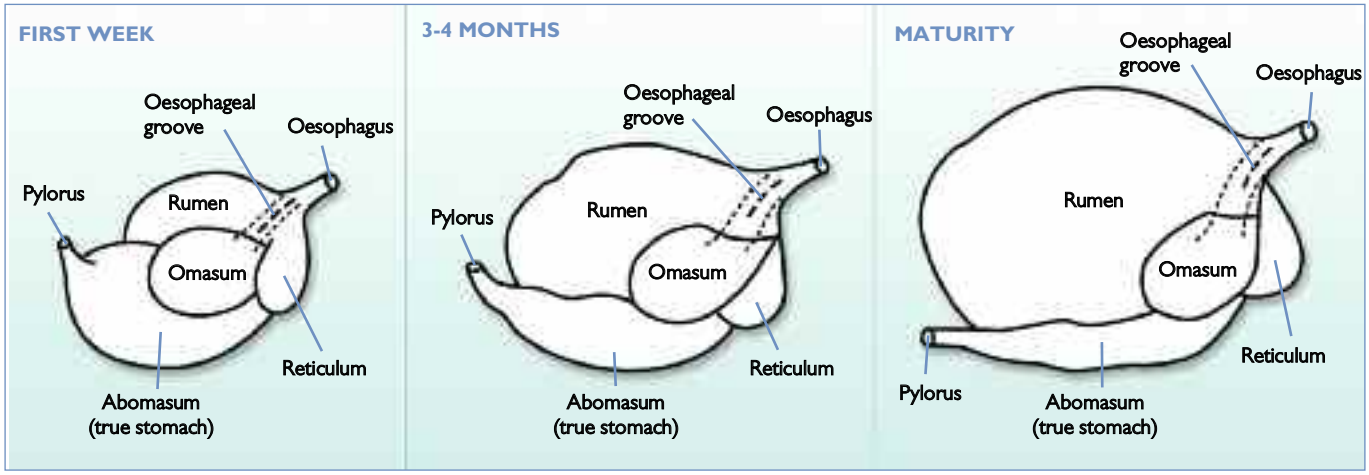
Fig. 1. Development of bovine stomach compartments from birth to maturity (P. Guilloteau, R. Zabicliski, J. W. Blum).



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● **Substrate available in the rumen.** The primary factor determining ruminal development is dry feed intake (bacteria, liquid, rumen motility, and absorptive ability are established prior to rumen development).

To promote early rumen development and allow early weaning, the key factor is early consumption of a diet to promote growth of the ruminal epithelium and ruminal motility. Because grains provide fermentable carbohydrates that are fermented to propionate and butyrate, they are a good choice to ensure early rumen development.

Early and aggressive intake of calf starter is the key to good ruminal development. Offer starter from three days of age and keep it fresh, clean and available.

Stomach compartments

In a calf at birth, the abomasum is the largest compartment of the stomach, making up more than 50% of the total stomach area. The reticulorumen and omasum account for 35 and 14% of the total stomach area in the newborn calf. As ruminants develop, the reticulorumen and omasum grow rapidly and account for increasing proportions of the total stomach area.

The young ruminant (weaned or not weaned) therefore often has difficulties adapting to new feeding conditions. Until recently antibiotics could be used as growth factors and help the gastrointestinal tract to bridge difficulties during transition periods.

The practice is forbidden in the EU since 2006. Therefore it was urgent to find substances which are able to improve the maturity and digestibility of the gastrointestinal at each development stage.

A number of products have been invented but, until now, there were no satisfying products available.

Olmix, a French company, has found the solution. By using a complex process and different substrate,

the company has developed a new efficient product (Mfeed), which improves the digestibility of the feed when it is added to the calf diet.

Effects of Mfeed

Mfeed is composed of modified montmorillonite combined with copper resulting in an increase of the enzymatic activity in the intestine.

● Montmorillonite: Reduces transit rate in the intestine. Protects the intestinal mucosa.
● Clinoptilolite: Improves enzymatic activity in the intestine.
● Diatomaceous earth: Adsorbs toxins and bacteria. Limits the development of pathogenic microflora.
● Essential oils: Limits pathogenic microflora. Stimulates enzymatic secretion. Promotes beneficial bacteria

Having noticed the natural ability of certain clays to develop high chemical reactivity in the fields of catalysis, the Olmix research team devised a process whereby the structure of the clays was transformed in order to increase the accessibility to the catalytic active sites of the internal structure, and develop more contact surfaces. They noticed too that the ulvans (polysaccharide) contained in some particular seaweeds (sea lettuce) have the ability (under specific conditions) to modify the structure of montmorillonite.

This unique process is patented worldwide. Later, copper is added in a special process resulting in the Mfeed product.

Way of action

Thanks to the combination of modified montmorillonite associated with copper, diatomaceous earth, yeast extracts, seaweed extracts and essential oils, Mfeed is particularly efficient in improving the digestion process as well as the balance of the gut microflora.

By including the combination of modified montmorillonite combined with copper in Mfeed, the product has huge catalysis properties which increase the yield of the digestion process of the feed in the gut. The gut is a natural bioreactor for the catabolism of the feedstuffs, breaking down large molecules into smaller molecules which can cross the intestinal mucosa.

The chemically active surfaces of the opened layers of the clay provide cofactors that act as a catalysis for the chemical process of digestion, thus increasing the yield of the process and improving the feed conversion rate.

Field results

Trials have already been done in different farms and countries, for example one was undertaken between March and July 2010 in Hokkaido, Japan where Mfeed was tested on Japanese Black beef calves.

The animals were fed up to 90 days after the birth by top dressing daily their diet with 10g of Mfeed. On average, the daily gain was 1.24kg (nearly 20% higher than the control group).

Because of better digestion, the higher feed intake during the growing period resulted in heavier calves when they came out of the nursery.

The product is also used on several dairy farms in Spain, in female dairy calves, and the effects include a decrease in digestive disorders, mainly due to the effect of the copper, an increase of nutrients assimilation, reduction of enteropathologies and better digestive stability.

So what can be expected is a reduced veterinary cost (less use of antibiotics, so less risk of resistance), and a better growth with a low investment

Conclusion

By using Mfeed during calf rearing digestion of the pre-ruminant is boosted.

A good prestarter or starter feed can be expensive but with Mfeed calves can use more nutrients from the feed, which means more protein and energy from the diet reaches the nutrient level that can be absorbed to be used for growth.

Therefore, the growing period is reduced and feed costs are reduced too. ■