Higher milk production through fresh, cold and tasty feed

Within livestock farming ration quality is evident to achieve good production results, making poor silage quality a serious threat to animals and profits. While dairy farmers are critical about the quality of the compound feed and the roughage, the mixed ration often does not receive the attention it deserves.

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Besides the silage quality, the quality of the mixed ration is mainly influenced by the particle length and the dry matter percentage. But factors like loading sequence, speed on the mortars, quality of the knives in the mixing wagon and the mixing time are also evident. All these factors are individually important but combined they are of great importance as well, because they affect homogeneity of the mixture and the potential scalding sensitivity.

Scalding sensitivity

Scalding is the process whereby unwanted micro-organisms develop under the influence of oxygen. As a result, the silage pH rises and therefore growth of unwanted micro-organisms is no longer inhibited, causing spoilage. The heat produced by these micro-organisms in this decay process can be found as 'scalding' in the pit (an increase in the silage temperature).

In general, we speak of scalding when the difference in temperature between the lower and the upper layer of the pit is greater than eight degrees or if hotspots can be designated. Controlling the scalding sensitivity is essential to get the most out of the silage. Scalding affects the palatability and the feed value of the ration, often resulting in a decreased feed intake. In addition, the produced mycotoxins may cause health risks such as digestive problems, fertility problems and a diminished immune system. Besides the effects on the technical results it also has a financial impact due to unnecessary feed losses due to dry matter loss (Table 1).

Temperature rise (°C) above the ambient temperature	5	10	15
Daily dry matter loss (%)	1.2	2.3	3.5
Dry matter loss after seven days (%)	8.4	16.1	24.5

Table 1. Effect of scalding on dry matter loss of grass silage.

Prevention by management

Many factors (pH, temperature, dry matter percentage, oxygen, composition of crop) play a major role in the process of scalding. The most important three are the pH of the silage after conservation, the temperature of the silage before and after conservation and the density (penetration of oxygen) of the silage.

pH after conservation

The pH indicates the degree to which silage is acidified. During the preservation process, acids are formed that stabilise the silage and inhibit bacteria in their development. A pit is well preserved at a pH of 5.2 or less.

The silage pH is related to the dry matter content. A high dry matter percentage often means a high pH. Therefore, the pH of the pit can be influenced by lowering the dry matter percentage of the silage (to approximately 30-45%) around harvesting and by creating good conditions for preservation so that sufficient acetic and lactic acid can be formed.

Temperature

Temperature is an important determinant for scalding. If the silage temperature after preservation is too high this will promote the activity of micro-organisms after opening the silage pit. Also, an ambient temperature equal to or higher than 20° Celsius is an important catalyst for scalding because the bacterial development will increase rapidly. We can state that the lower the temperature, the less the losses due to scalding.

Density of the silage

When the silage comes into contact with air (oxygen), the unwanted micro-organisms become active again at the expense of the feed value and the palatability of the silage.

The exact depth of oxygen penetration is highly dependent on the density of the silage and the method of feeding. A low density means that the oxygen will penetrate the silage easily resulting in exposure of the feed to the environment for a relatively long time.

Depending on the exact oxygen penetration, a decline in nutritional value can be predicted. An additional risk is that yeasts and moulds develop quickly under the influence of oxygen. The sooner they can start their development, the sooner these fungi will be able to produce mycotoxins.

Prevention by acidification

When management measures during the ensilaging process seem ineffective an alternative is to use a mixture of organic acids in the total mixed ration to prevent scalding.

The organic acids (for example formic acid and propionic acid) will cause a pH drop in the mixed ration (Fig. 1), thus creating an unfavourable environment for bacteria, fungi and yeasts. As a result, the growth of these unfavourable micro-organisms is inhibited, the reproduction of bacteria is stopped and further preservation losses remain limited leading to less decay in feeding value.

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Fig. 1. Schematic representation of indirect and direct effect of the acids in Nutripreserve in the cow.

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Effect on the digestion

An important aspect of silage acidification is the effect on the digestion. The intake of formic and propionic acid in the rumen does not have a negative effect on rumen health, provided these acids are added to the ration in appropriate quantities. Furthermore, these are two (derivatives of) acids that ruminants also produce naturally during the carbohydrate metabolism in the rumen (Fig. 2).

Rumen conversion

In the rumen, formic acid is converted to methane gas. This provides an additional advantage because during the formation of methane hydrogen ions are removed, having a positive effect on the acidity of the rumen.

Propionic acid is converted to propionate in the rumen after which it will be absorbed in the bloodstream. When propionate reaches the liver, it will be used in the synthesis of glucose after which it will play a role in energy metabolism.

An important side note is that the use of propionic acid can also work as an inhibitor because propionic acid plays an important role in the regulation of feed intake in ruminants. If the concentration of this volatile fatty acid becomes too high (measured by receptors on the rumen wall), feed intake will decline, which will be at the expense of milk production.

Nutripreserve Basic

To support preservation and for maintaining feed quality, Kanters developed their Nutripreserve products. These liquid acidifiers are suitable to preserve all kinds of animal feed. Whether it concerns roughage, raw materials, liquid feeds or by-products, the Nutripreserve products guarantee the feed quality for a longer period.

Nutripreserve Basic is a liquid blend based on organic acids (formic and propionic acid) and molasses that is developed to reduce overheating in ruminant rations. Due to the combination of buffered and non-buffered acids the mixture is very effective in mixed rations containing high amounts of silage (corn, alfalfa and grass). Because the blend contains a high amount of buffered acids, Nutripreserve Basic is very suitable for use in the mixing wagon because it is less corrosive than non-buffered blends. Besides retaining the nutritional value and the palatability of the mixed ration with organic acids, the addition of molasses also improves the palatability to stimulate feed intake.

Nutripreserve Basic is the perfect addition to mixed rations in order to maintain a fresh, tasty and nourishing ration.

As a result, the feed intake of the animals will go up and they will have more resistance against bacteria and diseases.

In conclusion, proper use of Nutripreserve Basic results in fewer feed losses, better technical results and healthier animals. ■

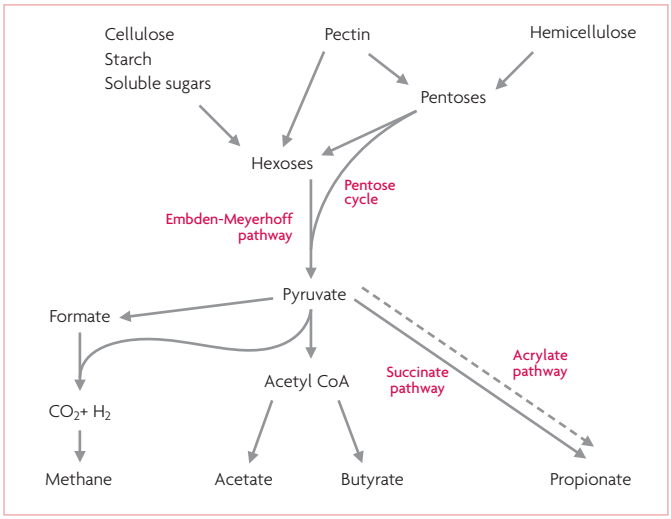

Fig. 2. Schematic representation of carbohydrate metabolism in the rumen (Veen et al., 2003).