

## MICRO LIFE AND ANIMALS

### Bacteria are life

It is difficult for us humans to imagine the world of microorganisms. They are so small that you cannot see them with the naked eye and even if one single little bacterium is weak and lives only for a short time, the bacteria are unbeatable together. They can cooperate and produce food from sunlight and gas! Hence, they have made the planet earth a good place to live and there is hardly any place where they do not exist: under the ocean, in snow, deep down in the underground, in boiling springs, in stones and most important of all in every living being, humans and our animals.

With time we have learned to make use of the fabulous qualities these curious beings have. The bacteriology was "born" in 1857 through the publishing of Louis Pasteur's observations on lactic acid fermentation. Lactic acid fermentation is in fact a natural form of preservation that is used today to produce fermented products and lactic acid fermentation has obtained recognition in both the production of food and in the health sector.

We know that lactic acid fermentation creates a long shelf life and at the same time lactic acid fermented products are good for the gut and intestines, resulting in a contribution to better living qualities. Lactic acid bacteria not only preserve the food products, they also supply bacteria cultures that are beneficial for the gut and intestines. Lactic acid bacteria prevent rotting, not only in the products where they are contained, but also in the intestines.

Lactic acid bacteria are latent on vegetables and the crops we grow for our animals, and their ability to convert sugar to lactic acid is utilised in the process of ensiling. Ensiling is an old, healthy and natural method of preservation in line with food preservation. The purpose of ensiling is to preserve a good quality feed using a minimum of energy and keeping a high level of feed value. A quick fermentation of the sugar to lactic acid under anaerobe (oxygen free) conditions is essential for a successful ensiling. A good production of lactic acid quickly lowers the pH in the silage. Anaerobe conditions and a low pH create an unfavourable environment for other types of bacteria and fungi and hence stabilises the silage. If not enough lactic acid is created, to lower the pH-value quickly, the result can be a poor fermentation where butyric acid is formed. Butyric acid means a bad silage quality and a big loss of nutrition in the fodder.

The use of acid is frequently found also in normal feed for porkers and pigs. A low pH is absolutely necessary to prevent the growth of salmonella and coli in the liquid feed but the pH can also become so low the animals refuse to eat. Thus, it is not indifferent what kind of methods are used to regulate the pH and it is important to distinguish between the different kinds of acids. The animal's general tolerance to lactic acid and acetic acid is quite large whilst they are very sensitive to too large amounts of formic acid and benzoic acid. These latter acids are bacteria killing and a too large content will lead to a strong effect on the bacteria flora in the animal's intestines. Not only the harmful bacteria but also the beneficial bacteria number will be reduced resulting in a bad feed convention and digestive disorder.

Lactic acid and acetic acid are preferred to regulate the amount of potential pathogen bacteria as these organic acids are produced by the naturally occurring micro flora in the animal's intestinal tract and thus are tolerated by the existing "good" population, including the lactic acid bacteria.

### **Lactic acid bacteria are beneficial in the animal's intestinal tract as they:**

- protect against harmful bacteria and fungi
- produce organic acids like lactic acid
- regulate the pH value
- improve the absorption of essential vitamins and minerals
- release the phytate bound elements to make them more absorbable
- stimulates the peristalsis (prevents the accumulation of waste products)
- forms K and B vitamin

The Danish committee for pigs has carried out a trial (statement no. 543) where they tested the effect of adding lactic acid to the feed (0/2,8 pct. lactic acid) in a piglet population. The total result of the test showed that an addition of 2,8 pct. lactic acid reduced the excretion of Salmonella, a result consistent with the fact that fewer coliform bacteria were found when acid was used in the feed. A low content of coliform bacteria is perceived as positive as there is thought to be a connection between coliform bacteria and Salmonella. Bad growing conditions for coliform bacteria indicates bad growing conditions for Salmonella. The addition of 2,8 pct. lactic acid gave a statistically safe improved production value compared to feed with no added acid. This test underlines the importance of lactic acid in the battle against pathogens like Salmonella.

### **The organic system in the intestinal tract**

Good living conditions for humans and animals are supported by a versatile and balanced micro flora. The permanent stimulation through the intestinal flora is important for the morphological development of the intestinal mucosa and is a basic need for a total development of the body's own immune system. 80% of the defence cells mature in the immune tissue of the intestines. These defence cells are "trained" through confrontation with so called anti-gene active microbial cell wall structures and through the release of low-molecular peptides from the intestinal bacteria. Afterwards, the non-resident defence cells migrate through the body where they protect the mucus membrane of the respiratory passage and the reproduction organs against infection.

The digestive tract is one of the body's most exposed "surfaces", it is a varied and complex eco-system housing hundreds of different bacteria, most of which are resident in the large intestine (the rumen of the cow, the appendix of the horse). Some of these are necessary for an optimal health whilst others produce harmful toxins and carcinogen substances. For human's and animal's health it is crucial that the health improving bacteria are dominate in the intestines.

As mentioned, the micro flora is of crucial importance for how good the intestinal mucus functions. The mucous needs to provide the absorption of the different nutrients and the excretion of waste products. In addition it needs to function as a barrier to substances and bacteria. Many physical and psychological sufferings can be caused by a not optimally functioning transport of both waste products and nutrients. Thus, good health is dependent on a good intestinal flora.

2400 years ago Hippocrates said, "let your food be medicine and your medicine your food". In Denmark, we eat pork, a good 40 kg per inhabitant per year. In 2007, 97,3 tons antibiotics were used for treating pigs. The enormous use of antibiotics for livestock does not only result in medicine remains in the meat causing a risk of developing resistance towards the pathogen bacteria. It also causes a sterile intestinal flora for the animals, the life giving bacteria die. Through a continuous nursing of the intestinal flora, and hence a strengthening of the natural resistibility, the use of antibiotics can be reduced.