

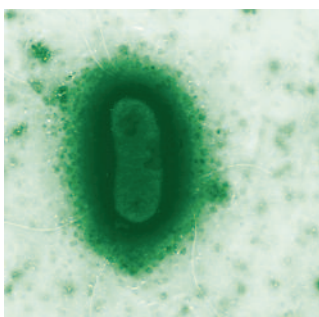
Natural alternatives for antibiotics and zinc oxide

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Organic acids such as propionic acid and formic acid are widely used in pig feed with the objective to improve growth performance and intestinal health.

After the ban on antimicrobial growth promoters (AGPs) in the EU in 2006, the use of organic acids has significantly increased as an alternative for AGPs. Organic acids exert their antibacterial properties in particular in the stomach.

At the low pH values in the stomach most organic acid molecules are in the undissociated form, which enables them to pass through the bacterial wall.



Microscopic photograph of an E. coli bacterium with flagella (white hairs on the picture). E. coli uses the flagella to move around.

Having entered the bacterium they disturb the energy metabolism and damage the DNA, which causes the bacteria to stop growing and multiply themselves.

In contrast to the stomach, however, the small intestine has a high pH level which causes most acid molecules to be in their dissociated form. In this state the acid molecules

can not penetrate the bacterial wall. However, in case of a combined addition of organic acids and essential oils to the feed, the essential oils will damage the bacterial cell wall so that the acids can enter the bacterium, despite their dissociated form.

In addition to that essential oils inhibit the development of flagella by the bacteria (see photograph).

Natural antibacterials

Essential oils are plant components that possess antibacterial properties. A plant produces these 'natural antibacterials' to defend itself against bacterial infections. In the past research has been conducted on the synergistic effects between essential oils and organic acids. From laboratory experiments it appeared that organic acids and essential oils mutually enhance each other's effect to a great extent.

The combination of organic acids and essential oils has been tested in an E. coli infection trial by Perstorp.

This trial revealed that by using the combination of organic acids and essential oils there is less growth of E. coli and a faster reduction of the infection as compared to organic acids alone.

Recently, two field trials were conducted to test the effect of the combination of organic acids and essential oils, a product called ProPhorce BD.

Trial number one

This experiment was conducted on a closed farm of 500 sows in Spain. Two groups of piglets (in total 484) were compared. The control group was fed feed with zinc oxide (3000ppm) in the two feeds given from weaning until 40 days of age.

Table 1. Comparison of ProPhorce BD and zinc oxide in weaned piglets.

	Dead (%)	DWG (g)	FCR
ProPhorce BD	1.26	307	1.98
Zinc oxide	1.63	286	2.26

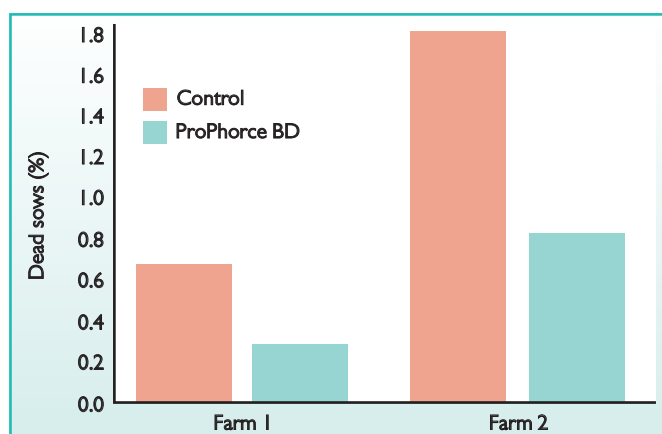


Fig. 2. Percentage of dead sows caused by clostridium on two farms where ProPhorce BD in the lactation feed was compared to a control feed with no addition.

The test group was continuously supplied with ProPhorce BD in the drinking water from the day of weaning (1 litre/1,000 litres). The feed of this group did not contain zinc oxide.

Furthermore, there were no differences in the feed composition of both groups.

The trial revealed that the use of ProPhorce BD in drinking water prevents post weaning diarrhoea and improves daily gain and feed conversion ratio (Table 1).

It also shows that the product can be a substitute for zinc oxide. The improved daily gain and feed conversion ratio are probably caused by a higher digestibility of the feed caused by ProPhorce BD.

This was recently demonstrated in a digestibility trial.

Trial number two

This experiment was conducted on two sow farms in Spain (600 and 1200 sows) which used to have a history of high mortality in lactating sows caused by clostridium.

ProPhorce BD was included in the lactation feed (2kg/ton) from seven days before parturition during the whole 25 day lactation period.

This group was compared with sows that did not receive the product in the feed. The result is pre-

sented in Fig. 2. It appeared that ProPhorce BD substantially reduced the incidence of dead sows caused by clostridium on both farms.

Alternatives for antibiotics

These experiments in the laboratory, on experimental farms and in practice show that specific combinations of organic acids and essential oils have very strong antibacterial properties.

This goes for both Gram negative bacteria (E. coli) as for Gram positive bacteria (clostridium).

The combination can replace antibiotics and zinc oxide. The need for alternatives for antibiotics gets increasingly urgent because of the development of multi resistant bacteria (MRSA) that threaten human health.

Alternatives for zinc oxide become more and more important because the use of high levels of zinc oxide is forbidden in most EU countries.

Also in other areas its use is under debate because of the accumulation of zinc in the soil. Organic acids and essential oils provide a good alternative antibacterial concept. ■

References are available from the author on request karin.frijters@perstorp.com