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Combating health issues

Every day new reports are published in newspapers worldwide reporting about the effects of antibiotic resistant bacteria and its consequence on human health.

The World Health Organisation (WHO) gives warning of unknown germs, but also makes us aware of known pathogenic bacteria, which have become resistant or dangerous due to changes in their DNA.

Animal production also contributed to the development of antibiotic resistance as antibiotics have been used as growth promoters in animal feed at sub-therapeutic levels for many years. In Europe, where the use of antibiotic-growth promoters (AGPs) is prohibited, research has focused on finding alternatives to AGPs.

Acidifiers were moved into the centre of attention, as they are, amongst others, one of the most adequate alternatives to the use of antibiotics. Acidifiers create, via the reduction of the pH, unfavourable conditions for potentially harmful bacteria. They also have direct antimicrobial effects as, in their non-dissociated form, they can penetrate into the bacterial cell inhibiting vital cellular functions, resulting in cellular death.

However, the effects of organic acids on the inhibition of pathogenic bacteria are somehow limited. Therefore, continuous effort is made in order to find an even more powerful way to combat bacteria. This was believed to be achieved by combining organic acids with essential oils as in literature synergisms when combining organic acids and essential oils are described.

Also, phytochemicals, which are defined as components of pure essential oils, are known to have antimicrobial effects.

This is clearly the case for cinnamaldehyde as it targets the so called FtsZ protein, which is responsible for the division of bacteria. Furthermore, cinnamaldehyde acts selectively, targeting pathogenic bacteria. The most difficult part when it comes to combating pathogenic bacteria is, to combat Gram-negative bacteria, as their additional outer membrane is serving as an additional barrier against antimicrobials.

However, by using permeabilising substances, the outer membrane of Gram-negative bacteria can be weakened and the entry of antimicrobial substances, such as organic acids or/and a phytochemical can be facilitated.

In house research at BIOMIN has shown synergistic effects in vitro when a permeabilising substance was added to a mixture of organic acids and a phytochemical.

Combating pathogens in livestock production is of high importance to avoid economical losses, especially under the present market conditions, in which the pressure on producers is very high and achieving economical benefits difficult.

Therefore, new naturally derived products at reasonable prices have to be developed in order to more effectively combat bacteria and not only reduce adverse effects on livestock but also on humans. The combination of a blend of organic acids, a phytochemical and a permeabilising substance was shown to provide the possibility to meet these targets.

However, it has to be mentioned that if bacteria can be combated more effectively highly depends which substances and at which inclusion level the single substances are combined.

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