Probiotics in pig production: searching for the gold standard

In recent years, the swine sector has gone through many changes, including an increased use of alternative feed additives to support optimal production. This has been driven by a better understanding of the gut microbiota and its importance, as managing this microbiota effectively can optimise animal performance. Probiotics are part of these feed additives: beneficial living micro-organisms which balance and enhance the gut microbiota.

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Important questions to ask

When looking at the current probiotic market, there are plenty of products to choose from, but it is always important to keep three questions in mind: what should the probiotic do, where should the probiotic exert its effect and can it be used in standard feed processing?

Miya-Gold is an example of a probiotic containing viable spores of Clostridium butyricum: it is this spore-forming capacity which makes it more adept at dealing with feed processing, whilst it also protects the probiotic throughout the digestive process until it reaches its location of action.

As the name suggests, Miya-Gold's probiotic strain (C. butyricum) produces butyric acid. The multiple positive direct and indirect effects of this short chain fatty

acid are well documented: it can increase nutrient digestibility, modify the intestinal microbiota, improve epithelial integrity and stimulate immunity.

Butyric acid can also directly or indirectly act on tissue development and repair, with indirect actions being linked to the hormone-neuro-immune system. Finally there is reason to believe that it plays a role in down-regulating bacterial virulence, making Miya-Gold a very interesting feed additive to enhance performance and optimise production.

Because of C. butyricum's anaerobic respiration, it will primarily produce butyric acid in the hindgut, where oxygen levels are demonstrably lower. This location is usually not easily reached by traditional coated butyrates incorporated directly into the feed, as the butyric acid is utilised well before it reaches the hindgut.

There are two interesting aspects to this location: first of all, it is the primary site for salmonella proliferation. Secondly, specific butyric acid receptors are present on the hindgut's colonocytes. These are capable of efficiently utilising butyric acid and oxygen to produce ATP (Adenosine Triphosphate, energy), actively decreasing oxygen concentrations further, whilst providing energy for the animal at the same time.

The benefit of supplementing the animal's energy reserves might be clear, but the advantage of decreasing oxygen levels might not be. It is exactly this additional aspect which sets Miya-Gold apart from other probiotics: the reduction in oxygen limits the proliferation of salmonella, as the bacteria require oxygen to thrive effectively. Under normal circumstances the pathogeny of this bacteria includes migration into the gut tissue, where it triggers an immune response. This can be accompanied by diarrhoea and although this affects animal performance, it is mainly the level of antibodies produced which is of interest. It is this seroconversion which will determine the salmonella category at slaughterhouse level, and thus the price payable for the produced meat.

Danish experiences

Supressing salmonella proliferation improves food safety actively, as was observed in Denmark: Danish pig producers noted a rise in salmonella incidences, causing multiple farms to see more economic fines at the slaughterhouse. Initial adjustments to their biosecurity management did not change the situation significantly. To cope with the challenge producers decided to alter their management further, adding Miya-Gold to the feed. Supplementing the animals with the probiotic led to a real change, with results confirming the probiotic's mode of action, as slaughterhouse salmonella titers improved significantly and medicine use plummeted.

Particularly in piglets the benefits were undeniable, with strong diarrhoea reduction, more robust animals and a major decline in antimicrobials used for gut health. Further trials confirmed the Danish results, validating Miya-Gold as a worthy investment in regards to controlling salmonella, balancing the gut microflora and optimising pig production. ■