Fight salmonella with an effective and sustainable natural tool

Salmonella – an economically important poultry disease – is also a threat for human health.

In 2020, salmonellosis was the second most reported zoonotic disease in the US.

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The CDC estimates salmonella bacteria causes about 1.35 million infections, 26,500 hospitalisations, and 420 deaths in the United States every year. Salmonella transmission presents a practical example that the One Health approach is very justified: with reservoirs of pathogens in humans, animals, plants, and the environment, it can be easily transmitted from birds to humans.

Without much difficulty, it spreads by ingestion of contaminated meat, eggs, or water. That is why, if we want to reduce salmonella infections in humans, we need to take care of the whole production chain.

Animal feed is an important source of salmonella

Salmonella causes huge losses to the poultry industry by decreasing egg production, reducing growth and increasing condemnation at slaughter houses. It can be transmitted to the birds by a wide variety of routes, but reported case studies indicate that contaminated animal feed is one of the main sources of salmonella.

Literature often shows the connection between an animal feed's quality and further animal and human health implications.

Therefore, to protect animals from infection, it is crucial to control bacteria in the delivered feed. It provides for healthier flocks, and safer meat for consumers.

It is very difficult to control infection in raw feed ingredients. The most common control methods include thermal sterilisation and application of organic acids. For instance, formaldehyde treated feed was very common until 2018, when its use in poultry feed as a preservative and hygiene condition enhancer was banned in the European Union, potentially increasing salmonella risks.

But what if there is another, more environmentally friendly and sustainable way, that does not cause any side effects for the animals?

Bacteriophages – key for prevention of contamination

Bacteriophages are naturally occurring, highly specific 'bacterium eaters'. They are active against particular species and even strains of bacteria by recognising receptors on the bacteria's surface. They are considered a viable alternative to antibiotics and other chemical antimicrobials used in different setups.

Due to their high specificity bacteriophages can be used at all levels of the food production chain, not interfering with good microflora. E. Wojcik et al. in their study published in 2020 presented BAFASAL – an innovative tool to fight salmonella. It is a bacteriophage cocktail designed especially for poultry farming.

The study investigated the safety and effectiveness of the anti-salmonella bacteriophage cocktail BAFASAL, intended to prevent contamination of poultry feed. A series of safety studies like toxicity, genotoxicity and tolerance at 100x concentrated dose demonstrated the safety of the product.

Animal study results confirmed that phage administration has no side effects on animal health, their life parameters, or behaviour. Moreover, other in vivo studies on poultry showed that BAFASAL can decrease the feed conversion ratio, enhance the growth of broilers, and increase egg production in laying hens.

Protection by eliminating feed contamination

Data obtained from extensive testing of BAFASAL revealed that it possesses desirable characteristics in terms of safety and efficacy requirements. The in vitro crop assay, mimicking normal feed storage and feed application conditions showed that BAFASAL reduced the number of salmonella bacteria in experimentally contaminated feed.

The BAFASAL preparation was introduced into the feed by various methods: the liquid form was sprayed on or administered by immersion, while the powder form was mixed directly with the feed. The reduction of the bacterial load was observed for all examined forms of the bacteriophage cocktail. Importantly, no visible changes in terms of appearance, smell and structure of the feed were observed.

Data obtained in experiments reflecting the field conditions of storing and using poultry feed indicated a significant decrease in the number of viable salmonella bacilli following artificial contamination of feed with Salmonella enteritidis.

The efficacy of BAFASAL in decreasing the number of salmonella was noticeable within a short period and in all examined conditions. Moreover, this effect was sustained and even enhanced in the following hours.

It was also noticed that administration of BAFASAL before experimental feed contamination gave even better results in terms of salmonella reduction. These observations indicate that BAFASAL can be used as a feed protective agent in prophylaxis against salmonella feed contamination, affecting food safety.

Impacts on both public health and the economy

A detailed examination of BAFASAL confirmed the general assumption of bacteriophages as harmless to animals and effective in the struggle against bacteria, which pose a public health concern.

The application of the BAFASAL bacteriophage cocktail in poultry feed has the potential to reduce salmonella feed contamination effectively, thus substantially improving the safety of the food production chain.

Clean feed means no bacterial challenge in birds, which in turn ensures safe and healthy food for humans. Additionally, a healthier flock directly translates into greater profits for the farm. ■

References are available from the author on request