# Protect the supply chain from contamination with acid-based eubiotics

There are multiple routes for pathogens to enter the hatchery, including though contaminated feed, water and litter, as well as via people, equipment, and vehicles. Therefore, ensuring an integrated approach to biosecurity is crucial for optimal egg and hatchery hygiene.

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Another route of contamination may be via the parent stock. Whilst the most common infections in breeder hens can usually be mitigated through the implementation of strict biosecurity programmes and good hygiene practices, salmonella, particularly S. enteritidis (SE), remains a serious problem in poultry production for all breeding stock, which may have negative impacts further along the supply chain.

## Issues with salmonella infection

SE has the unique ability to colonise the reproductive tract of the breeder hen. This bacterial transfer to the hens' reproductive tract can in turn lead to contamination of the yolk and albumen within the oviduct, resulting in the presence of SE within the developing egg.

In addition to in ovo contamination, horizontal transmission of salmonella to the chick remains the greatest risk factor within the environment. Ensuring that the seeding microbiome is both balanced and contains beneficial bacteria is of vital importance for the naïve newly hatched chick, as this can have an impact on lifetime performance of the progeny.

A pathogenic control system which favours the development of beneficial bacteria can help to manage potentially harmful bacteria, such as salmonella, within breeders and consequently help lower faecal shedding into the environment. This in turn helps to reduce the risk of transfer to the yolk or eggshell, and possible transfer to the developing egg and newly hatched chick.

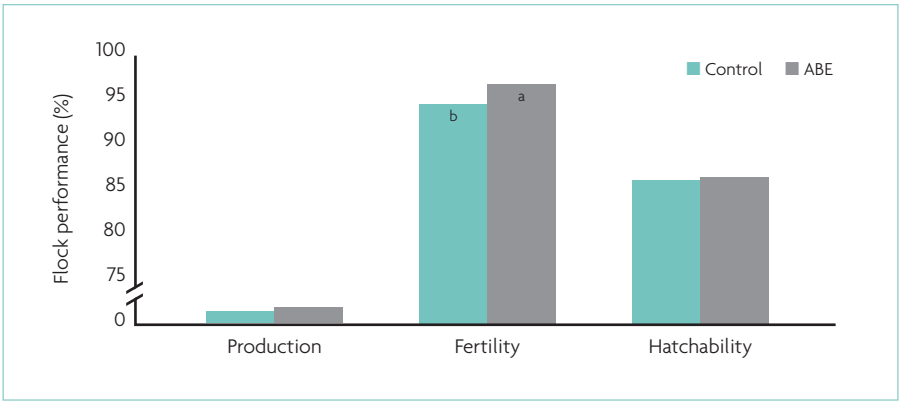


**Fig. 1. Performance of 45-week old broiler breeders fed either a control or an ABE supplemented diet. Differing letters denote significant differences at p<0.05 (University of São Paulo, 2014).**

## The principles of salmonella control

Salmonella control principles can be divided into three broad categories:

- Efforts to prevent bacteria from entering the hatchery via one of the many multiple routes, as outlined above.
- Reduce bacterial multiplication and contamination within the facility.
- Implementation of procedures for bacterial control in feed and feed materials.

## Salmonella control with acid-based eubiotic feed additives

Acid-based eubiotics (ABEs) can offer extensive benefits for breeder flock health and performance, helping to support the three principal categories of salmonella control. ABEs formulated from a synergistic blend of organic acids are some of the most effective.

Formic acid is the only organic acid to have been classified as a bacterial decontaminating agent for feed in the EU, and includes, but is not limited to, salmonella. When blended with propionic acid, it demonstrates a synergistic action, whereby the benefits seen on breeder hen gut health when using formic acid alone are further enhanced.

In addition to being an effective antibacterial, formic acid has also been shown to be effective in deactivating certain types of viruses, such as enveloped viruses, including avian Influenza, making it a highly effective feed mitigant.

The use of a formic acid and propionic acid blend in feed has proven to be a practical and efficacious intervention for pathogen control. In vitro trials have shown these blends to be effective at reducing counts of salmonella, E. coli and campylobacter in feed.

Reduced salmonella shedding and gut colonisation with E. coli have also been demonstrated in vivo when birds were supplemented with a formic acid and propionic blend.

Reduced levels of pathogenic micro-organisms in the intestine mean a lower incidence of shedding, contamination and spread within the hatchery environment.

A trial undertaken at Mercolab in Brazil demonstrated that supplementation of diets with an ABE formulated from a formic and propionic acid blend (pHorce, Anpario plc) at 1kg/tonne of feed reduced salmonella positive birds challenged with SE by approximately 20% after just 18 days.

## Acid-based eubiotics support breeder and progeny performance

As well as supporting biosecurity programmes and pathogen control, the use of an effective ABE in breeder diets can help

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to support performance, egg quality and chick quality.

A study was conducted in conjunction with the University of São Paulo in Brazil, to determine the effect of supplementing broiler breeder diets with an ABE on egg quality, fertility and hatchability of fertile eggs.

Heavy Cobb 500 broiler breeders were randomly allocated to one of two treatments at 25 weeks of age; control diet (control); and control diet with ABE (Salkil; synergistic blend of formic and propionic acids on a unique mineral carrier system) at 2kg/t of feed.

The diets were fed from 25-45 weeks of age. At 45 weeks birds were inseminated and eggs were collected and incubated to evaluate egg quality, fertility and hatchability.

A further study was then run to investigate any benefits on the progeny in which 120 chicks from each treatment group were reared as commercial broilers from day old until 42 days of age and fed the same corn-soy ration with no ABE included. Feed intake, weight gain and feed conversion ratio (FCR) were measured.

The inclusion of the ABE in breeder hen diets significantly increased fertility which led to a higher number of chicks per hen (Fig. 1).

When considering the performance of the broilers, the progeny had optimised performance with a higher weight gain (Fig. 2) and an improved average FCR by six points (Fig. 3) compared to chicks from breeders fed the control diet.

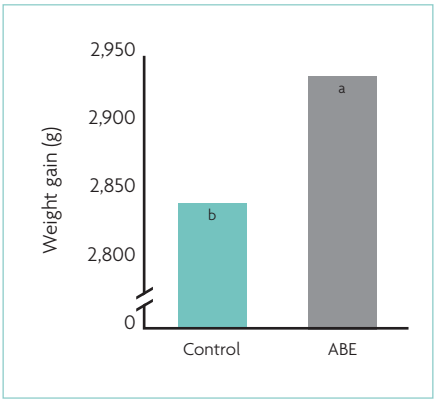


**Fig. 2. Average weight gain of progeny from parent stock fed either a control or an ABE supplemented diet. Differing letters denote significant differences at p<0.05 (University of São Paulo, 2014).**

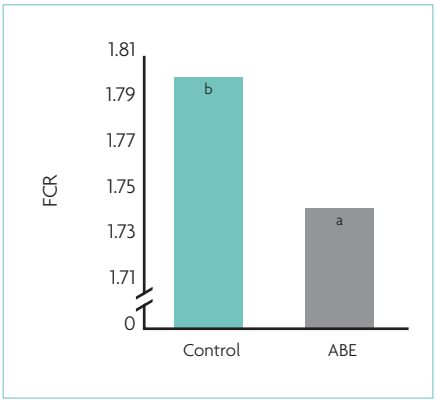


**Fig. 3. Average FCR of progeny from parent stock fed either a control or an ABE supplemented diet. Differing letters denote significant differences at p<0.05 (University of São Paulo, 2014).**

Ensuring effective biosecurity programmes is fundamental in securing optimal hatchery performance. ABEs offer many benefits to producers and are effective in supporting biosecurity measures by helping to maintain a healthy gut, reducing shedding of potentially pathogenic bacteria into the environment, and preventing contamination of the egg, as well as being an effective feed bacterial decontaminating agent.

ABEs have also demonstrated benefits on parent stock and progeny performance, having improved the number of chicks hatched and therefore increased profitability of the crop. ■

References are available from the author on request