Use of B. licheniformis to mitigate the impact of necrotic enteritis on-farm

Both clinical and sub-clinical gastro-intestinal diseases in broilers can lead to poor welfare, reduced profitability and major losses on farm. Necrotic enteritis (NE) is a prominent example, with the opportunistic pathogen Clostridium perfringens being a causative agent in the onset and development of the disease.

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On an economic level, the global cost of NE outbreaks has been estimated to be between 2-6 billion US$ annually. With the use of antibiotics under scrutiny, both in sub-therapeutic concentrations as well as in treatment dosages, various alternative feed additives have been developed to help mitigate NE in poultry flocks.

Probiotics as a first security

An interesting example is probiotics, viable micro-organisms which, when administered in adequate amounts, confer health benefits to the host. Their mode of action is often multifactorial, with benefits coming from outcompeting pathogens for nutrients or physical space, producing beneficial compounds, increasing the digestion and/or absorption of nutrients, improving the gut barrier function, reducing gut inflammation and/or interacting with the immune system – or a combination of the above. An example of a well-known probiotic to mitigate NE is Bacillus licheniformis, with the probiotic showing to be antagonistic against C. perfringens both in vivo as in vitro.

More recent research has highlighted this further, confirming the probiotic's capability to reduce the negative effects caused by NE on the gut microbiota of chickens. To evaluate the above a commercially available B. licheniformis, B-Act (Huvepharma), was put to the test. The probiotic product is based on a single strain of B. licheniformis (DSM 28710), already known to support technical performance in poultry and inhibit C. perfringens.

B. licheniformis versus induced NE

To confirm its efficacy in terms of mitigating induced NE, a 42-day trial was recently conducted in broilers. Both health and production performance parameters were recorded in the trial, which has been published in the Journal of Applied Animal Nutrition.

The trial set-up included an induced NE challenge, with all animals receiving the same amount of C. perfringens on day 19, 20 and 21 (1.0ml/bird, 1.0 x 10^{8-9} CFU C. perfringens/ml). The C. perfringens strain used was known to have caused NE on-farm in the past. Over the course of the study, three groups were evaluated: a negative control (basal diet), a B-Act group (1.6 x 10^{12} CFU B. licheniformis DSM 28710/tonne of feed, supplemented from start until finish) and an antibiotic group.

Animals in this latter group were treated with oxytetracycline hydrochloride (OXT; according to label recommendations), for three consecutive days after the NE challenge. Even under the induced NE challenge, weight gains of the B-Act and OXT groups were similar to each other and significantly higher compared to the control at the end of the study ($P<0.05$).

Weight gain of the B-Act group was already significantly higher compared to the control on day 21 ($P<0.05$, Fig. 1), indicating a potential benefit of the probiotic even before clinical establishment of NE.

Feed conversion ratio (FCR) values followed a similar pattern throughout the study, with a significantly lower overall FCR for the B-Act and OXT groups compared to the control ($P<0.05$, Fig. 1; day 0-42). From a health perspective, NE lesion scores, NE mortality and general mortality were also evaluated. For all three parameters, both B-Act and OXT groups had significantly lower values than the control ($P<0.05$, Fig. 2).

Conclusion

This trial demonstrates that feeding probiotic B-Act significantly improved both health as well as growth performance parameters of broilers under a NE challenge.

The results achieved with prophylactically administered B-Act were comparable to those realised with the therapeutic OXT treatment. As such, continuous administration of B-Act has the potential to be a useful and practical tool to mitigate NE in commercial broilers. ■

References are available from the author on request

Fig. 1. Technical performance for the three groups, from day 0-42.

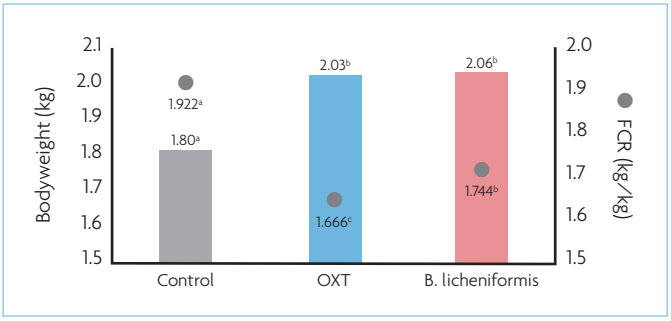
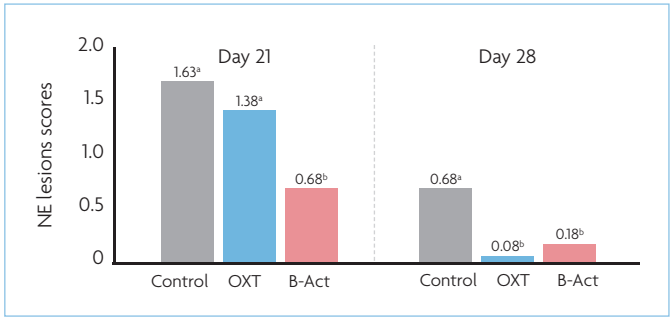


Fig. 2. NE lesion scores for the three groups, at day 21 and day 28.



Different superscripts indicate significant differences ($P<0.05$).