

Nucleic reaction enhances vaccine

Adding nucleic acids to poultry feed can boost the effects of vaccination, as *Richard Allison* explains

All the major broiler breeding companies publish guideline performance figures for the different strains of poultry, but to achieve these levels of performance, birds must be in good health.

In most cases, vaccines and good terminal cleaning programmes do not give birds sufficient protection against disease, says Swiss nutritionist Klaus Hoffmann. "It is more and more evident that the bird's own natural immunity is still the most essential element in the control of disease. In fact, no treatment is fully successful if the animal's immune system is not being simultaneously enhanced in order to increase resistance to disease."

Combined with higher feed prices, these increased health concerns in animal production have led to the establishment of a new class of nutrients – the so-called "nutraceuticals". The term implies that the active ingredient or ingredients in the feed additive are shown to have a physiological benefit and/or provide protection against diseases. Mr Hoffmann points to nucleotides as one example where recent trial data has shown to offer benefits.

WHAT ARE NUCLEIC ACIDS?

Nucleotides are the building blocks of DNA and RNA. A gene is a discrete sequence of DNA nucleotides and genes are what make up our chromosomes.

For birds and any other animal to live, grow and develop, it must create new cells all the time to replace dying cells. Millions of cells must be made every minute, just to maintain the body as it is. And nucleotides are required to make these new cells.

"Stress can also increase the need for nucleotides, which are necessary for overcoming the negative effects



Broiler breeders fed nucleic acids in trials showed improved disease resistance.

of hormones released during stress, for building up the immune system," says Mr Hoffmann.

He highlights the fact that researchers recently refuted the assumption that all organisms can supply enough nucleotides to meet their demands. "The recycling of nucleotides from dead cells or their synthesis is sufficient under 'normal' conditions," he says. "However, under increased requirements, such as during a disease challenge or periods of stress, the internal production of these acids is insufficient to meet this demand."

One solution is to top up the bird's reserves by supplementing feed with RNA nucleotides. "Producers should regard feeding nucleotides as a management tool to maintain general health, enhance performance and manage the harmful effects of stress," he says.

One reason for the success of nucleotide supplementation of diets

is the intensified and accelerated response of the bird's immune system. A strong immune response is equally important to address stress factors such as injuries, environmental changes, physical exertion, growth and disease, he says.

The effect of nucleotides on antibody titres (levels of antibody) after Newcastle Disease vaccination was determined in day-old Hubbard chicks (see graph). The control group received a normal diet while a second group (Treatment 1) had an identical diet containing nucleotides for 16 days, starting at day 8. In the third group (Treatment 2), birds started receiving the nucleotides at day 16, simultaneously with the vaccination, and this was continued for a further 16 days.

While feeding nucleotides, the specific antibody titres were increased in both treatment groups compared with the control. In the control group, 65% of the vaccinat-

ed birds were protected from infection with virulent Newcastle Disease virus. In the treatment groups, this increased to 90% and 80%, respectively (see graph).

"This showed that vaccinated birds fed a nucleotide-fortified diet were more rapidly and thoroughly protected from an infection with virulent Newcastle Disease virus," he says.

A trial designed to test the performance of broiler breeders on nucleotides unexpectedly turned into a health challenge experiment after an outbreak of coccidiosis followed by an infectious bronchitis (IB) variant and an acute Marek's infection. "Even under these challenges, the performance in the nucleotide group was remarkably improved compared with the control," says Mr Hoffmann.

Mortality was reduced by 67.6%, egg production was increased by 13.8%, and hatchability rose by 11.6%. "This indicates that the bird's general health was supported by the addition of nucleotides to the feed. Birds effectively coped with the infections better."

Mr Hoffmann concludes that nucleotides not only boost bird performance, but also directly support the immune system's function. "They facilitate immune response by supporting the crucial multiplication of cells involved in defence mechanisms."



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