International Poultry Production's
Poultryhealth BYTES
YOUR OWN REFERENCE SOURCE ON POULTRY HEALTH

040 – The disease equation

Introduction

Typically disease, which can be defined as 'a state of ill being that has a cause and adverse consequences', occurs when bodily activities are impaired due to the action of infections (infectious disease) or non-infections, such as deficiencies and toxicities (non-infectious disease). The severity of the disease is a manifestation of the severity of the impairment to bodily functions.

Diseases are often complex and arise from an interaction between the bird (host), the agent (cause) and the environment the bird/flock is in.

The agent

Agent factors such as their numbers, type, virulence and route of entry affect the outcome of the disease. Some highly virulent organisms and highly pathogenic avian influenza is a good example of a disease causing agent that is able to quickly overcome the resistance of the healthiest of birds. Other strains of avian influenza behave very differently and some are even apathogenic in certain species of poultry. But, this can change if the right environmental conditions, for example concurrent infections, come into play.

It should be remembered that sick, moribund or dead birds are, in reality, a high concentration of infectious agent and their presence in the poultry house represents an increased challenge of that agent to other birds in the house.

Good terminal hygiene programmes are an effective way of reducing the challenge from infectious agents on the next flock in the house.

The host

Host factors that influence the outcome of the disease include the effectiveness of the host's defence mechanism and previous exposure to disease or vaccination (immunity). In addition, the host's age, nutritional status, genetics and whether concurrent or immunosuppressive diseases are present are all factors.

The environment

Environmental factors can influence the agent, and a good example of this is litter condition, and their influence on coccidiosis challenge or they can influence the host. A good example of this is elevated ammonia concentrations in the air breathed in by the bird which can adversely affect ciliary action in the windpipe and depress macrophage activity – two factors that then favour an invading respiratory microbe.

In essence, good management is all about providing the flock with a good environment and thereby removing or reducing to a point of insignificance the impact of adverse environment on disease manifestation. Good food, water, ventilation, environmental temperature, air quality and stocking rate all play their part in this context.

Modern poultry production

Modern poultry production methods impact on disease manifestation in several ways. Battery cages have a very good impact in that they separate birds from their faeces, thereby eliminating or greatly minimising the recycling of enteric pathogens. Keeping birds in cages keeps them in small groups where there is less competition for feed and water (providing the nipple is working!). On the other hand, free range production exposes birds to the adversities (stresses) of the weather and predators.

Modern production means large numbers of birds in a small confined space and this provides ideal conditions for a rapid multiplication of an infectious disease agent and a 'disease explosion'.

If we put birds under such conditions management has a responsibility of managing the environment the flock finds itself in so as to minimise the likelihood of disease occurrence.