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157 – Causes of disease IV

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Bacteria as a cause of disease

For disease to occur in a bird it must receive the infective dose of a particular bacterium. This is the number of bacteria required to establish the disease in that animal. This figure varies and is basically a reflection of the capability of the immunity and defence mechanisms to counter the initial invasion of the bird's body. For example, the infective dose is often depressed in immunocompromised flocks.

Bacteria can enter the body by one or more of several routes. These include ingestion, inhalation, via the reproductive tract, for example at coitus or artificial insemination, from the mother to the offspring, or via skin penetration, for example due to biting insects.

Different disease-causing bacteria affect different parts of the body and this can correlate with the route of entry. For example, Pasteurella Spp, that cause pneumonia, are often inhaled, whereas Salmonella Spp. are ingested

Let me share with you a human example to explain this concept in relation to non-immune defence mechanisms. Some years ago there was an outbreak of salmonellosis food poisoning caused by Salmonella napoli in soft, continental chocolate. The levels of S. napoli in the chocolate were such that anyone eating it would surely die of chocolate poisoning before they ever succumbed to S. napoli food poisoning!

However, on further investigation, it was found that the S. napoli were being encapsulated in very small fat globules and these protected the S. napoli from acids in the upper digestive tract. When these globules reached the small intestine they were attacked by lipases and the salmonella organisms were then released. That is, 100% of the salmonella were avoiding the effects of the stomach acid which normally killed off a large percentage of the organisms – an effect which had not been taken into account when determining the original infective dose!

Optimum bacterial growth temperature

All bacteria have an optimum growth temperature, which is the temperature at which they grow and multiply the fastest. Most disease-causing (pathogenic) bacteria have evolved so that this temperature is very close to the animal's body temperature, thereby optimising their efficiency at causing disease.