The ban of efficacious drugs against blackhead disease, a parasitic disease with serious consequences on bird’s health, has led to its re-emergence in turkeys and chickens. New prophylactic and therapeutic interventions are therefore urgently needed. A vaccine developed at the Christian Doppler Laboratory for Innovative Poultry Vaccines (IPOV) can successfully protect the animals against the disease. Several technical questions still need to be answered before the vaccine is ready for use in the field. Especially the interaction between the protozoan parasite Histomonas meleagridis and intestinal bacteria is of fundamental importance for the success of a vaccination or infection.

Due to the ban of efficacious drugs for prophylaxis and therapeutic purposes, histomonosis – also known as blackhead disease – is again on the rise in turkeys and chickens. The disease, caused by the protozoan parasite Histomonas meleagridis, affects turkeys, chickens and certain game birds. The progression of the disease is often particularly severe among turkeys, generally with an extremely high morbidity and a mortality rate among infected birds of up to 100 percent. In Austria alone, around 30,000 turkeys died or had to be killed in recent years. Due to a lack in biosecurity the disease is of special importance in birds with outdoor access.

Unique interplay of parasites and bacteria

A special feature of the parasite is its intricate interaction with bacteria, both in vitro and in vivo. This important influencing factor has been summarized in two recent studies by Michael Hess, head of the University Clinic for Poultry and Fish Medicine at Vetmeduni Vienna, and his staff. Based on their analyses, the parasite-bacteria interaction could represent a symbiosis with fatal consequences for the host – a unique alliance in medicine. According to Michael Hess, however, the underlying functional mechanisms must still be resolved in future studies.

Important new starting point to fight the disease

“Future research should focus on resolving the unknowns of the interaction between bacteria and H. meleagridis, especially to elaborate whether a targeted manipulation of the gut microbiome could minimize clinical consequences. Similarly, such knowledge could also be used to optimize the newly developed vaccination strategy. More detailed investigations should also help to explain the huge variations in mortality and the manifestation of the parasite on certain farms,” says Michael Hess.

Another important influencing factor: the nematode Heterakis gallinarum

Special attention should also be paid to the parasite Heterakis gallinarum, a nematode that lives in the cecum of galliform birds, especially in domestic chickens and turkeys. The infection it causes is only mildly pathogenic but, as a common carrier of H. meleagridis, it is the most important vector for the transmission of the protozoan parasite. The importance of H. gallinarum cannot be overestimated, as H. meleagridis survives up to three years in the nematode’s
eggs.

Little research to date on parasites and disease

The complicated nature of the pathogen, its epidemiology and the various influences on the pathogenesis of the disease need substantial efforts in order to develop a sophisticated protection strategy. Yet despite the significant impact on animal health, economic and otherwise, current research on the parasite H. meleagridis and blackhead disease is very limited, which might be due to several factors, such as difficulties in handling the parasite in vitro, which is also reflected by the great variation within experimental trials. The interaction between H. meleagridis and the microbiota has also been hardly studied, and the true nature of the interaction between the protozoan parasite and certain bacteria is not yet resolved.

The article “Spotlight on Histomonosis (blackhead disease): a re-emerging disease in turkeys and chickens” by Dieter Liebhart and Michael Hess was published in Avian Pathology. The article “Interplay between Histomonas meleagridis and Bacteria: Mutualistic or Predator–Prey?” by Ivana Bilic and Michael Hess was published in Trends in Parasitology.  

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