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Oxytetracycline Express: A Journey Through the Gut Microbiota of Laying Hens

Resume:

Avian colibacillosis is one of the leading causes of mortality among laying hens in Canada. This disease, caused by certain strains of avian pathogenic Escherichia coli (APEC), results in significant economic losses for the egg industry. To combat it, producers have relied on the same antibiotic for several decades: oxytetracycline.

In addition to targeting the bacteria responsible for the disease, antibiotics can also affect the bacteria naturally present in the gut. This community of microorganisms, known as the gut microbiota, plays an important role in digestion, immunity, and protection against infections. However, the effects of oxytetracycline on the gut microbiota of laying hens are still poorly understood.

The objective of this project is therefore to better understand how different dosages of oxytetracycline influence the balance of the gut microbiota. More specifically, we aim to determine the extent to which these treatments disrupt gut bacteria and influence their return to equilibrium. To answer this question, healthy laying hens were given either the standard oxytetracycline treatment or a shorter course of treatment at a higher dose. The effects of these different dosages on the gut microbiota were assessed by counting total E. coli, lactobacilli, and total mesophilic flora. These bacterial populations were monitored for up to 21 days after the first administration of the antibiotic.

The results show that the different dosages had no effect on total E. coli populations. However, temporary changes were observed in the lactobacilli of the ileum after the 3-day treatment, while no changes were observed in the cecum. Differences in the total mesophilic flora of the ileum were still visible 21 days after the start of treatment. Overall, the results suggest that a higher dose of oxytetracycline disrupts the gut microbiota more significantly and prolongs its return to equilibrium.

This research represents a first step toward a more precise and sustainable use of antibiotics in laying hens. Future studies will evaluate these effects in animals with colibacillosis and will use Nanopore sequencing to obtain a more comprehensive picture of gut bacterial communities and their antimicrobial resistance.