Dietary rye supplementation affects immune competence related parameters in broilers

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Background and objectives
- Objectives: To investigate whether rye might be a helpful model-ingredient to investigate the effects of nutrition on immune competence related parameters of broilers.

Material and methods
- 960 day-old male Ross 308 chicks, randomly allocated to 24 pens
- 3 dietary treatments with 8 replicates/treatment (40 birds/pen)
- Birds were fed a control starter (d1-d13) and finisher diet (d29-d35)
- Three experimental diets: rye-corn and isonitrogenous grower diets (0%, 5%, and 10% rye) (d15-28)
- Immune competence related parameters: microbiota composition in jejenum, genes expression in jejunal mucosa (microarray), and jejunal morphology.

Results
- No effect of treatment on microbial diversity in jejenum (Fig. 1)
- Exchange between Lactobacillus species occurred (Table 1).
- 5% or 10% rye in the diet (d15-28) decreased performance and litter quality (Table 2), but increased villus height, crypt depth, and surface of goblet cells in the jejenum (Table 4).

• Genome-wide gene expression differed per treatment over time (d21 and 28; Fig. 2).
• At d21 and d28, numerous genes of the jejunal mucosa were down-regulated in the rye fed birds (Table 3).
• Only a few genes were upregulated (Table 3).

Table 3. Descriptive statistics of regulated probes/genes in jejunal tissue between dietary treatments at 21 and 28 days of the study.

Table 4. Gut morphology parameters per treatment of the jejenum at 14, 21 and 28 days of age.

Table 2. Growth performance per treatment; rye supplemented diets were only provided from d15-28; Litter quality score ranged from 0 (wet and 100% caked) to 10 (dry and friable litter)

Table 1. Microbiota composition in the jejunal digesta (% of total) per treatment at 21 days of age.

Conclusions
- Effect of rye in grower diet on broiler performance was limited.
- Dietary rye supplementation affected jejunal gut morphology, microbiota composition of jejunal digesta, and gene expression profiles of jejunal tissue.
- Rye supplementation to grower diets is a helpful model to affect immune competence related parameters of broilers.

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