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Impact of Fresh or Used Litter on the Posthatch Immune System of Commercial Broilers

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Important Findings

This study was carried out to investigate the effects of exposure of growing broiler chickens of commercial origin to used poultry litter on intestinal and systemic immune responses. The litter types evaluated were fresh wood shavings or used litter obtained from commercial poultry farms with or without a history of gangrenous dermatitis (GD). Although it is likely that the presence of *Eimeria* oocysts and endemic viruses varies qualitatively and quantitatively between flocks and, by extension, varies between different used litter types, we believe that these data provide evidence that exposure of growing chicks to used poultry litter stimulates humoral and cell-mediated immune responses, presumably due to contact with contaminating enteric pathogens.

Significance of Findings

To the best of the researchers' knowledge, this is the first report to demonstrate that the quality of litter used during chicken growth influences the expression and development of avian immune cells. Although it is likely that the presence of *Eimeria* oocysts and endemic viruses varies qualitatively and quantitatively between flocks and, by extension, also varies between different used litter types, the researchers believe that these data, when considered in the context of previous reports emphasizing the importance of the gut microbiota for normal development of immunity, have important implications for poultry farm management. Future studies to characterize the intestinal commensal bacterial population at the species level that are responsible for this effect are needed.

Additional Information

In modern poultry production systems, multiple grow-out broiler flocks are commonly reared on a single batch of litter. However, reuse of litter qualitatively and quantitatively alters the avian gut microbiota through the ingestion of litter-borne enteric pathogens, thereby affecting the overall health and growth performance of broiler chickens. According to a study by Torok *et al.*, significant litter effects on growth performance and the composition of the intestinal microbiota occurred when birds were raised on used *vs.* fresh litter. Cressman *et al.* demonstrated that *Lactobacillus* spp. were dominant in the gut-associated microbiota of fresh litter-raised chicks, whereas unidentified Clostridiales predominated in chickens raised on used litter at 7 days of age. Among the latter group, members of the genus *Clostridium* are the etiologic agents of several important poultry diseases, including necrotic enteritis and GD. Moreover, this effect is not limited to avians, and a direct relationship between an antibiotic-altered microbiota and increased susceptibility to pathogen infection also has been proposed in mammals.

There is increasing evidence indicating that the extent and character of the intestinal microbiota have enormous impacts on the development of the avian immune system. Therefore, the researchers predicted that exposure of growing chickens to used litter would stimulate the development of posthatch immunity against enteric pathogens present in the litter, a hypothesis that has never been systematically tested under experimental settings that simulate field conditions.

Impacto de la Cama Nueva o Usada Sobre el Sistema Inmune Post-nacimiento del Pollo de Engorda Comercial

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Hallazgos Importantes

Este estudio fue realizado para investigar los efectos de la exposición de pollo de engorda en crecimiento de origen comercial a cama para aves ya utilizada sobre la respuesta inmune intestinal y sistémica. Los tipos de cama evaluados eran recortes de madera frescos o cama utilizada obtenida de granjas comerciales de aves con o sin historia de dermatitis gangrenosa (GD, por sus siglas en inglés). Aunque es posible que la presencia de oocistos de *Eimeria* y de virus endémicos varíe cualitativamente y cuantitativamente entre parvadas y, por extensión, varíe entre diferentes tipos de camas utilizadas, creemos que estos datos proporcionan evidencia de que la exposición de pollos en crecimientos a cama para aves ya usada estimula respuestas inmunes mediadas por células y humorales, presumiblemente debido al contacto con patógenos entéricos contaminantes.

Relevancia de los Hallazgos

En lo que concierne a los investigadores, este es el primer reporte para demostrar que la calidad de cama utilizada durante el crecimiento del pollo influencia la expresión y el desarrollo de células inmunes aviares. Aunque es probable que la presencia de oocistos de *Eimeria* y de virus endémicos varíe de forma cualitativa y cuantitativa entre parvadas y, por extensión, también varíe entre diferentes tipos de cama utilizados, los investigadores creen que estos datos, cuando se consideran en contexto de reportes previos que enfatizan la importancia de la microbiota intestinal para el desarrollo normal de inmunidad, tienen importantes implicaciones para el manejo en la granja avícola. Se necesitan futuros estudios para caracterizar la población de bacterias intestinales comensales a nivel de especie que son responsables de este efecto.

Información Adicional

En los modernos sistemas de producción avícolas, las parvadas de pollo de engorda en crianza múltiple se crían sobre un único lote de