Ammonia concentration and relative humidity in poultry houses affect the immune response of broilers

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ABSTRACT. To investigate the effect of ammonia (NH₃) and humidity on the immune response of broilers, broilers were exposed to 30 or 70 mg/kg atmospheric NH₃ for 21 days. Additionally, birds were exposed to 35, 60, and 85% relative humidity (RH). The relative weights of lymphoid organs, serum total protein, serum globulin, serum albumin, serum lysozyme, proliferation index of peripheral blood lymphocytes, and splenic cytokine gene expression were determined. Exposure to 70 mg/kg NH₃ decreased the relative weight of the spleen during the experimental period, serum lysozyme concentration in the first and second weeks, and serum globulin concentration in the third week. The proliferation of peripheral blood lymphocytes was reduced. High levels of NH₃ caused increase in IL-1β gene expression in the experimental period and IL-4 gene expression in the first week. Birds exposed to
85% RH had lower thymus and bursa of Fabricius weights in the third week and serum lysozyme concentration in the first week; *IL-1β* and *IL-4* expressions were higher in the second and third weeks and first and second weeks, respectively, than in birds exposed to 60% RH. *IL-4* expression was lower during the first week, and *IL-1β* expression was higher during the second week with 35% RH than with 60% RH. In conclusion, high NH₃ level in the poultry house suppressed the immune response of broiler chickens. Neither high nor low RH benefited the immune response of broilers. Furthermore, there was an interactive effect between NH₃ and RH on the immune response of broilers.

**Key words:** Broiler; Ammonia concentration; Relative humidity; Immune response