Immunologic Function of Historic vs. Commercial Turkey Breeds

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Abstract

The turkey is one of a few domesticated animals native to the Americas. Many breeds of turkeys (i.e., Black Slate, Black Spanish, Narragansett, Royal Palm, Bourbon Red, and Black Spanish Narragansett) have been selected for production qualities (i.e., body size and growth rate). Although, commercial turkeys have strong production parameters, they are more susceptible to disease. This is a significant concern to breeders as they try to maintain their adaptability and several characteristics in production. The immune system is necessary for survival. The immune system provides a defense against potential pathogens. The two branches of the immune system are cell-mediated immunity and antibody-mediated immunity. There are five types of white blood cells: neutrophils, monocytes, eosinophils, basophils, and lymphocytes. Lymphocytes are responsible for the production of antibodies and T cells produce cell-mediated immunity. The benefits of understanding the turkey immune status will lead to identifying breeds with the potential for a compromised immune system and evaluating therapeutic treatments for immune-mediated diseases. The immune status of turkeys can be improved by importing turkeys to prevent disease. The immune status examined in turkeys can lead to improvement of vaccines used to prevent diseases in commercial turkeys. The immune status of the turkeys examined in this study had no reaction to any of the concentrations of antigens tested. Among the breeds, the appearance of cell recovery differed. The Blue Slates, Bourbon Reds, Black Spanish, and Blue Slates, had the best T cell mitogen response out of all the breeds. The Royal Palms had a high cell recovery and percentage of CD4 expression. However, this breed did not exhibit good lymphocyte proliferation in response to Con A. The fact that "viable" birds like the Royal Palms did not respond well to the Con A stimuli suggests that these birds are more susceptible to disease. A method for assessing immune endpoints, we can assess recovery, percentage of CD4 or CD8 expression and lymphocyte proliferation. The Royal Palms had a high cell recovery and percentage of lymphocytes expressing CD4 antigens. However, this breed did not exhibit good lymphocyte proliferation in response to Con A. The fact that "viable" birds like the Royal Palms did not respond well to the Con A stimuli suggests that these birds are more susceptible to disease.

Results

The immune status examined in turkeys can lead to improvement of vaccines used to prevent diseases in commercial turkeys.

Materials & Methods

Blood collection/lymphocyte isolation

- Preanesthetized birds (20-40 lb) were sedated with a 2 cc mixture d-tubocurarine and atropine sulfate (2 mg/ml) to minimize stress.
- Blood was collected into heparinized vacutainer tubes.
- Lymphocytes were identified and enumerated with a hemacytometer and adjusted to 5 x 10⁶/mL.

Methods

- Lymphocytes were isolated from heparinized blood by density gradient sedimentation using Ficoll-Hypaque.
- Stained 100-ul aliquots of cells with FTC-CD8 monoclonal antibodies and measured antibody fluorescence by flow cytometry.
- A lymphocyte proliferation assay was done to measure the fluorescent changes. The lymphocytes were then analyzed with monoclonal antibodies by flow cytometry. In this preliminary study, differences among the breed scores were observed.

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References