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Anita Sarathi
University of Arkansas, Fayetteville

Tom Yazwinski
University of Arkansas, Fayetteville

Chris Tucker
University of Arkansas, Fayetteville

Jennifer Robins
University of Arkansas, Fayetteville

A survey into the prevalence of parasitic helminths in broiler breeders

Anita Sarathi[*]*, T.A. Yazwinski*[†]*, C. Tucker*[§]*, and J. Robins*[‡]

ABSTRACT

A survey was conducted to determine the prevalence of helminth infections in spent broiler breeders. Intestinal tracts from 10 birds from each of five farms were obtained and examined for parasite identification and quantification. *Heterakis gallinarum* infections were the most common, followed in order of decreasing incidence by *Capillaria obsignata*, *Ascaridia galli*, and *Raillietina cesticillus*. Peak worm burdens for individual birds were 121 (*A. galli*), 535 (*H. gallinarum*), 215 (*C. obsignata*) and 125 (*R. cesticillus*). Significant farm-to-farm variation in worm burdens was observed.

[*] **Anita Sarathi is a junior pre-medical student in the Department of Animal Science.**

[†] **Tom Yazwinski is a professor in the Department of Animal Science and an adjunct professor in the Department of Poultry Science.**

[§] **Chris Tucker is a research associate in the Department of Animal Science.**

[‡] **Jennifer Robins is a graduate student in the Department of Animal Science.**

MEET THE STUDENT-AUTHOR

Anita Sarathi

I am from Bartlesville, Oklahoma, and a graduate of Bartlesville High School. At present, I am a junior at the University of Arkansas majoring in animal science and minoring in Spanish. At the U of A, I have received the Chancellor's Scholarship, the Arena Seat Award from the Animal Science Department, the Fort Smith Kennel Club Scholarship, and the Wind Symphony Scholarship (trombone). After obtaining my Bachelor of Science degree from the U of A, I plan to attend medical school.

I undertook this research project as a special problem funded by the Hartz Mountain Corporation. It was extremely interesting and I learned a great deal about the "world of worms" within the poultry industry. I thank everyone at Tyson's, Simmons, the University of Arkansas, and Hartz Mountain who aided me in attaining this research experience.

INTRODUCTION

The nematodes *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria obsignata*, and the cestode *Raillietina cesticillus* are four of the most common helminths found to infect chickens (Whiteman and Bickford, 1979). The roundworm *A. galli* is the largest nematode in chickens. Ascarids can cause economic losses due to lost feed efficiency and lowered egg production (Ikeme, 1971). The cecal worm, *H. gallinarum*, is thought to be relatively harmless in the chicken. However, studies have shown that *Heterakis* does cause both cecal and hepatic lesions in the chicken (Riddell and Gajadhar, 1988) as well as aids in the onset of "blackhead" disease in turkeys (Madsen, 1962). *Capillaria obsignata* may cause the most damage to the chicken's performance of all the nematodes (Taylor et al., 1993). Chickens infected with *C. obsignata* become depressed, emaciated, develop diarrhea, and in the case of breeder hens, may develop a secondary Vitamin A deficiency which results in lowered hatchability of eggs. The tapeworm, *R. cesticillus*, competes with the chicken for nutrients from ingested feed, and therefore can cause lowered feed efficiency and weight loss (Reid et al., 1964). Very little is currently known regarding the incidence and magnitudes of infections caused by the above helminths, especially in broiler breeders, and hence this current project was undertaken.

MATERIALS AND METHODS

Sample Collection

Ten intestinal tracts from birds originating from each of five broiler breeder farms were obtained from a local processing plant. All tracts were obtained during the months of April and May 2003.

Parasite Isolation and Quantification

Procedures followed for parasite isolation, identification, and quantification are those that are currently recommended by the World Association for the Advancement of Veterinary Parasitology (Yazwinski et al., 2003). Briefly, each tract was incised lengthwise (from gizzard to cloaca, including the ceca) and all contents collected. Each tract was then soaked overnight in water under refrigeration, and the resultant soak fluid likewise collected. All collected materials were sieved appropriately, and the residues stereo-microscopically viewed for the parasite counts.

Statistical Analysis.

All data (helminth counts) were analyzed by analysis of variance procedures using SAS (SAS Inst, Inc. Cary, NC) after transformation to the log (X+I) to reduce variance. Means were separated by the t-test ($P<0.05$).

In determining significance of variation in parasite incidences between farms, positive or negative infection status of the intestinal tracts by each helminth was analyzed (compared) using the Fisher's Exact Test from PROC FREQ of SAS.

RESULTS AND DISCUSSION

Photographs of specimens of the four helminth species found in this study are provided in (Fig. 1). The incidences of the four parasite species, on a per farm basis, are given in Fig. 2. Incidences of infection among farms, varied significantly for *C. obsignata* ($P < 0.03$), *A. galli* ($P < 0.03$), and *R. cesticillus* ($P < 0.02$). Incidences of *H. gallinarum* infection were not different among farms, with a high incidence (80 – 100%) on each of the surveyed farms.

Geometric means (by farm) for the helminths are given in Table 1. Infection magnitudes were consistent with incidences. *H. gallinarum* was found to be the most abundant helminth followed in magnitude by *C. obsignata*, *A. galli*, and lastly, *R. cesticillus*. The three nematode parasites appeared to develop similar patterns of incidence and magnitude whereas *R. cesticillus*, the only cestode parasite found, had the greatest infection levels on a farm which ranked fourth out of the five farms for nematode presence.

From the survey results, it is apparent that parasitic helminth infections are common and of considerable magnitude in commercial broiler breeders at the end of their production period.

Given these findings, additional studies are currently being formulated with the Arkansas poultry industry so that several key questions might be answered:

1) At what point in the life of a broiler breeder are helminth infections acquired?
2) What infection levels (magnitude and incidence) are developed in the life of the broiler breeder?
3) Are the infection rates and magnitudes as seen in this survey similar to those that the birds have maintained during their yearlong life span?
4) What is the economic/productivity significance of commonly occurring helminthiasis in broiler breeders (feed efficiency, reproduction, secondary health considerations, etc.)?
5) What can be done to curb the levels of helminthiasis (husbandry, treatments, etc.)?

The helminths found in the current study have been shown to be true pathogens yet very little is known concerning their epidemiology and consequence (AAVP, 1986). Therefore, continued research in this area is indicated.

ACKNOWLEDGMENTS

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Table 1. Geometric means by farm for the helminths (and stages thereof if appropriate) in processed birds.

Helminth	Farm				
	1	2	3	4	5
A. galli					
2nd larval	0.4^{c}	4.1^{a}	1.2^{abc}	3.7^{ab}	0.7^{bc}
3rd larval	0.2^{b}	8.8^{a}	3.8^{a}	3.7^{a}	0.2^{b}
4th larval	0.0	1.2	0.5	1.3	0.6
Adult	0.4	0.2	0.3	0.3	0.2
TOTAL	1.2^{b}	16.1^{a}	7.4^{a}	9.1^{a}	1.5^{b}
H. gallinarum					
larval	6.7^{b}	41.2^{a}	6.2^{b}	21.3^{ab}	5.0^{b}
Adult	37.8^{ab}	77.1^{a}	38.1^{ab}	80.3^{a}	12.7^{b}
TOTAL	55.6^{ab}	125.3^{a}	51.9^{ab}	105.9^{a}	16.9^{b}
C. obsignata	1.2^{c}	40.5^{a}	8.5^{b}	16.6^{ab}	8.4^{b}
R. cesticillus	4.5^{a}	0.3^{b}	0.0^{b}	0.0^{b}	0.0^{b}

^{a,b,c} Means on the same line with different superscripts are different ($P < 0.05$).

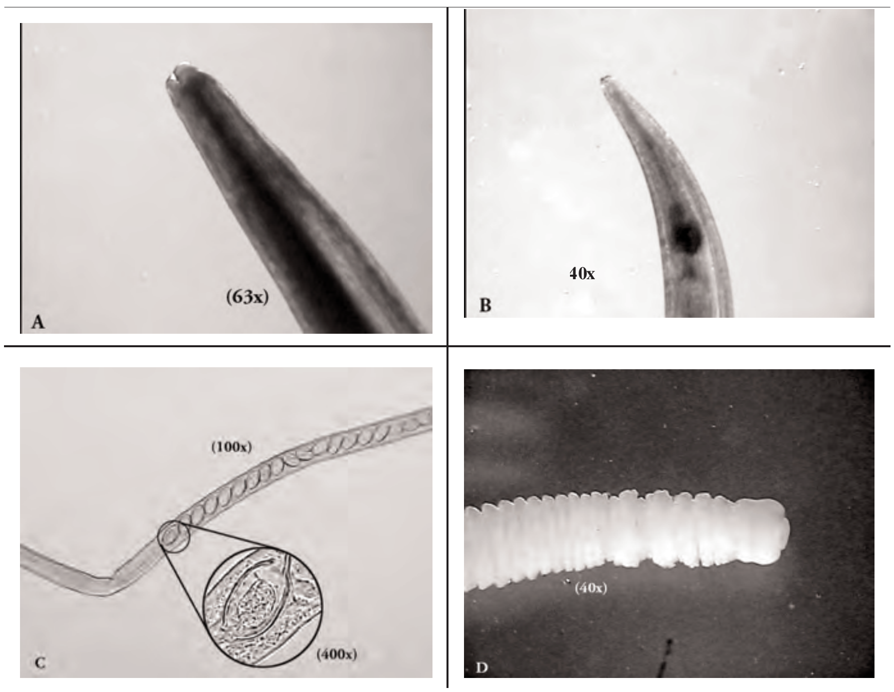

Fig. 1. Specimens of the poultry helminths found in this study; A. *Ascaridia galli*, B. *Heterakis gallinarum*, C. *Capillaria obsignata*, and D. *Raillietina cesticillus*.

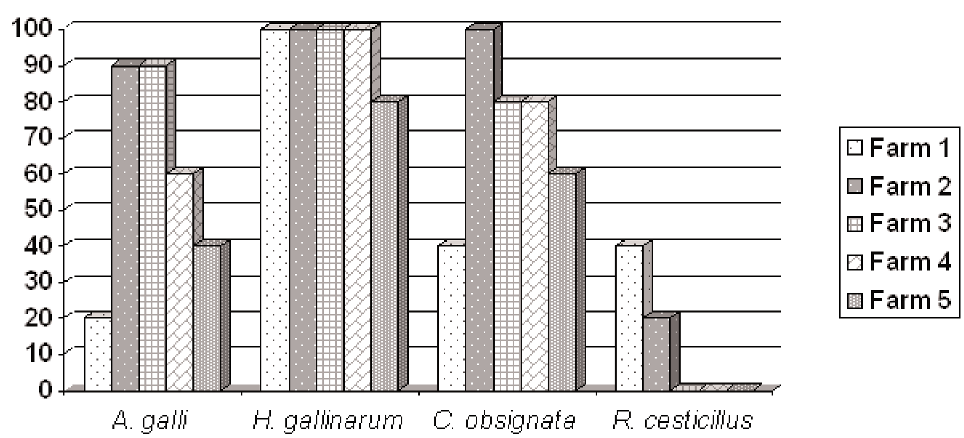

Fig. 2. Incidences of helminth infections by farm, May and June 2003