Survey of Ectoparasite Populations Found On Poultry on Dominica

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Abstract

In an effort to improve Dominica's poultry efforts we conducted a survey on the ectoparasites of chickens. We visited two sites during our stay: one being a more mature and well organized operation, and the other being a relatively new and smaller operation. In using aspirators, tweezers, and a Berlese funnel we found one species of lice and potentially up to three species of mites. The lice was identified as *Menopon gallinae*, but the mites remained unidentified beyond the suborder Prostigmata.

Keywords: chickens, lice, mites, *Menopon gallinae*, Berlese funnel, Prostigmata

Introduction

With Dominica being a geographically small island and an approximate population of 90,000 people there is a large demand for protein. Collecting ectoparasites on the Island of Dominica is ideal right after the rainy season (Tate, 2007). Chicken (Gallus gallus domesticus) is one of the vital protein sources for the island and its inhabitants; many inhabitants of the island often raise them in small operations locally. Unfortunately, there is also a large group of arthropods that are harmful to the health of the poultry population. Most of the arthropods that are harmful consist of ticks and mites. In order to counteract or take steps to prevent damage to the poultry industry the island first needs to gain data on what poultry pests even inhabit the island of Dominica. Most of the arthropods that are harmful consist of ticks and mites.

Objectives

The purpose of this research project is to collect data on what ectoparasites are present on the island of Dominica that could potentially harm the poultry population. The residents of Dominica need to know this data in order to find remedies and ways to prevent any economic hardships. This project also is to collect data in order for future projects with poultry.

Experimental Design and Methods

We began collecting on Tuesday 5/27/2014 at 10:00 a.m. to 12:00 a. m. and first visited Dr. Woolley's contact Mr. German who is a commercial poultry operator. We examined the chickens under the wings, the feet and around the neck. For the first site,

Mr. German allowed us to examine his two coops, which consisted of broiler chickens for meat and the other coop consisting of egg laying chickens. Mr. German explained that the broiler chickens were approximately 7-8 weeks old, while the egg layers were over a year old. He also told us that he had been raising chickens for 4 years. The coops were approximately 20' by 50' with hanging plastic 10-gallon chicken feeders and plastic 10-gallon water trays. Both coops were made using a wood frame wrapped in chicken wire and the chicken-laying coop had laying boxes approximately 2' by 2'. We first examined the broiler coop and selected 4 chickens out of the approximate 50 broiler: the first 2 selected had difficulty moving, had more feathers missing, sore red spots on their body, and defects such as crippled leg deformities; the 3rd chicken was examined as a median looking chicken between the first two and a healthy one, which was examined last. The second coop examined was for the egg laying chickens, which were much more compacted with little room for the large number of chickens~150-200 approximately. Once again the same selecting process was used but these chickens were in much worse shape with more skin exposure on the backs, wings, and sternum. In the second coop wood shaving from the laying boxes were collected in a 1 gallon SC-Johnson Ziploc bag.

a b

Figure 1: Mr. German's Egg Laying Chicken Coop- a) Justin holding one of the specimens, b) Mr. German (left), Justin (middle with chicken), Chris (middle with bag of shavings, Amanda (right).

The specimens were collected by a few different techniques. The first technique was using an aspirator and also by manually retrieving specimens with tweezers. Another method used was by dipping a paintbrush in 95% ethanol alcohol and applied to bare red spots in soft paintbrush like motions, in attempts to collect possible mites causing these

red areas. Flea combs were also used, which in some cases helped bring specimens to the surface but did not initially help in Mr. German's coops. The final technique was collecting the nesting material from the coop where they roost and letting the material filter through a Berlese funnel.

Figure 2: Mr. German's Broiler Chicken Coop- Justin holding one of our specimens.

The second destination was visited on Wednesday 5/28/2014 at approximately 10:00 a.m. to 11:30 a.m. in downtown Roseau, which was owned by Mr. Honore. Mr. Honore's niece brought us to the coop where they had been chickens broiler chickens ages 5-8 weeks. This was their first generation of chickens, the niece told us she had gone to school to study chicken raising methods. The coop was built in the same manner but was approximately 20' by 15' but had hanging 5 gallon chicken feeders and water distributers. This coop also had chicks unlike Mr. German's chickens. There were approximately 30-40 adults and 50-60 chicks. The new chicks bought were from a

different distributor so they could have brought in different mites or other ectoparasites. Four chickens were selected in the same way as Mr. German's chickens. The only method used during this collecting event was aspiration and soft-forcep removal, based on the results from the collecting events gave positive data in Mr. German's chicken survey. The chicks were not examined based on the fact that we had achieved efficient data and ectoparasites may not have entirely established yet.

a **b**

Figure 3: Mr. Honore's Chickens- a) Chick raising box separate from adults, b) adults in the center of chicken coop.

To identify lice specimens we cleared the specimens in a solution of KOH and then conducted them through a series alcohol baths. Starting from KOH the specimens were transferred into the first bath of distilled water and then to the subsequent alchohol bath of 25% ethanol. Each alcohol bath lasted for fifteen minutes and increased by approximately 25% purity each time until the final alcohol bath was 95% ethanol. The specimens were then placed onto a glass slide with two drops of Euparal. The lice were

then arranged within the Euparal mountain, and a slide cover was gently placed over the mountain. After the slide mount was prepared it was left over night until sufficiently stable to handle under the microscope. The mites underwent a different process of slide preparation: starting with placing the specimens in Nesbitt's solution overnight. The following morning the specimens were transferred to Hoyer's solution and arranged dorso-ventrally on slides for microscope identification.

Results

Mr. German's two coops only produced mite ectoparasites on the chickens and in the shavings but Mr. Honore's coop produced both mites and lice. The lice found on the chickens, of which approximately fifteen collected, were determined to be *Menopon gallinae* due to the lack of spine-like processes on the underside of the head and the single rows of hairs on the abdominal segments. While some mites were found through aspiration, the vast majority of mite collection from the chicken litter we collected in their bedding. We collected approximately half a pound of the litter and after ten hours under the Berlese funnel we found .65 cubic milliliters of mites. We were unable to identify these Prostigmata mites, but believe that there are potentially as many as three species living in the chicken coops.

Discussion

There are many different types of mites that infest chickens or live amongst chickens. Some can cause major diseases, while some can be beneficial. The 15 lice collected have been known to cause major problems with chicken farms. In large numbers (infestations) they can decrease egg production in chickens and in extreme cases kill chickens (Kunkel, D., 2013). Amongst the mites caught some could be predators of

other organisms, while some could just be feeding on skin cells or leaf litter. The possible skin exposure from Mr. Germans second coop of egg laying chickens could be from mite infestation, cleanliness of coop, or stress from them being so compact. The broiler chickens had less skin exposed possibly due to the younger age or the less confined living conditions. This study can show what local chickens are living around and what is living on them. With this information local people can better understand what to do if any problems occur in their chicken coops. They can also find out what kind of acaricides or insecticides to use.

This study can achieve better data by testing a larger number of chicken farms/coops. Further studies need to be made to identify mites in this area. Another study can be made by examining were the chickens are being purchased from and if there are any lice or might infestations at any of the facilities.

References

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