Preventive Veterinary Medicine 149 (2018) 75–81

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

Serological evidence for eight globally important poultry viruses in Trinidad & Tobago

Arianne Brown Jordan[a], Jamie Sookhoo[a], Lemar Blake[a], Paul Crooks[d], Zul Mohammed[c], Judy Molawatti-Bisnath[c], Christine V.F. Carrington[b], Christopher A.L. Oura[a,*]

[a] Department of Basic Veterinary Sciences, School of Veterinary Medicine, The University of the West Indies (St. Augustine), Eric Williams Medical Sciences Complex, Mount Hope, Trinidad and Tobago
[b] Department of Preclinical Sciences, Faculty of Medical Sciences, The University of the West Indies, St. Augustine, Trinidad and Tobago
[c] Poultry Surveillance Unit, Animal Production and Health Services Division, Ministry of Agriculture, Land and Fisheries, National Animal Disease Centre, Caroni North Bank Road, Centeno, Trinidad and Tobago
[d] Division of Food Production and Fisheries, Tobago House of Assembly, Trinidad and Tobago

ARTICLE INFO

Keywords:
Avian influenza
Infectious bronchitis
Infectious laryngotracheitis
Avian pneumovirus
Infectious bursal disease
Avian adenovirus

ABSTRACT

Viruses affecting poultry cause significant levels of disease leading to severe economic losses among poultry farmers worldwide. The Americas region continues to be vulnerable to the spread of poultry viruses across the continents and Caribbean island chains. In Trinidad and Tobago (T&T) there is limited information on the viruses circulating in poultry. Many flock are vulnerable to infection and there are occasional outbreaks of disease resulting in high levels of morbidity and mortality. This study aims to identify important viruses of poultry circulating in T&T through a broad-based surveillance approach. Serum samples from 29 layer farms in Trinidad and 14 layer farms in Tobago were collected from the eldest laying hens. Samples were tested from unvaccinated birds for antibodies by enzyme-linked immunosorbent assay (ELISA) against Avian influenza virus (AIV), Infectious bronchitis virus (IBV), Newcastle disease virus (NDV), Infectious laryngotracheitis virus (ILTV), Avian pneumovirus (APV), Infectious bursal disease virus (IBDV), Fowl adenovirus Gp1 (FADV) and Egg drop syndrome virus (EDSV). In Trinidad, the estimated true seroprevalence levels of antibodies were 0% (CI 95%: 0–0%) for AIV, 100% (CI 95%: 97–100%) for IBV, 79.8% (CI 95%: 70.6–86.9%) for NDV, 1% (CI 95%: 0–2.6%) for ILTV, 67.55% (CI 95%: 62.3–72.4%) for APV, 94.93% (CI 95%: 88.0–98.6%) for IBDV, 100% (CI 95%: 99.7–100%) for FADV and 67.8% (CI 95%: 62.4–72.8%) for EDSV. In Tobago, seroprevalence levels were 0% (CI 95%: 0–0%) for AIV, 100% (CI 95%: 95.6–100%) for IBV, 80.5% (CI 95%: 70.1–88.5%) for NDV, 29.9% (CI 95%: 20.8–40.6%) for ILTV, 100% (CI 95%: 97.7–100%) for APV, 97.1% (CI95%: 89.9–100%) for IBDV, 100% (CI 95%: 97.5–100%) for FADV and 100% (CI 95%: 99–100%) for EDSV. The results reveal strong evidence for the circulation of IBV, NDV, APV, IBDV, FADV and EDSV in layer poultry on both islands, as well as ILTV in Tobago.

1. Introduction

Viral diseases continue to threaten poultry industries worldwide, causing significant economic losses due to a combinations of reduced weight gain, morbidity and mortality. The twin island state of Trinidad & Tobago (T&T) is no exception as it has a thriving but vulnerable poultry industry. T&T is self-sufficient in broiler meat production and poultry meat consumption was estimated to be 53.8 kg/capita in 2011; the 7th highest in the world (Evans, 2014, 2015). The layer industry, though smaller, is also self-sufficient and yields approximately 65 million eggs yearly (FAOSTAT, 2013). T&T is located to the southern end of the chain of Caribbean islands and is only 7 km from Venezuela on the South American continent. Trinidad's land mass is about 4768 km^2 and is divided into 8 counties, whereas Tobago is approximately 300 km^2, 5.8% of the total country area. On both islands farmers occasionally experience high rates of morbidity and mortality in their poultry flocks and on many occasions a definitive diagnosis is not achieved. Very little research has been conducted into the viral causes of disease affecting poultry in T&T despite these outbreak incidents and there is currently limited baseline data available on the presence of avian viruses in poultry within the country.

In this study, we used a serological approach to investigate viral

* Corresponding author.
E-mail addresses: brown.arianne@gmail.com (A. Brown Jordan), vekey2@gmail.com (J. Sookhoo), Lemar.Blake@sta.uwi.edu (L. Blake), pauldcrooks@gmail.com (P. Crooks), judybisnath136@gmail.com (J. Molawatti-Bisnath), christine.carrington@sta.uwi.edu (C.V.F. Carrington), chris.oura@sta.uwi.edu (C.A.L. Oura).

https://doi.org/10.1016/j.prevetmed.2017.11.006
Received 5 September 2017; Received in revised form 3 November 2017; Accepted 6 November 2017

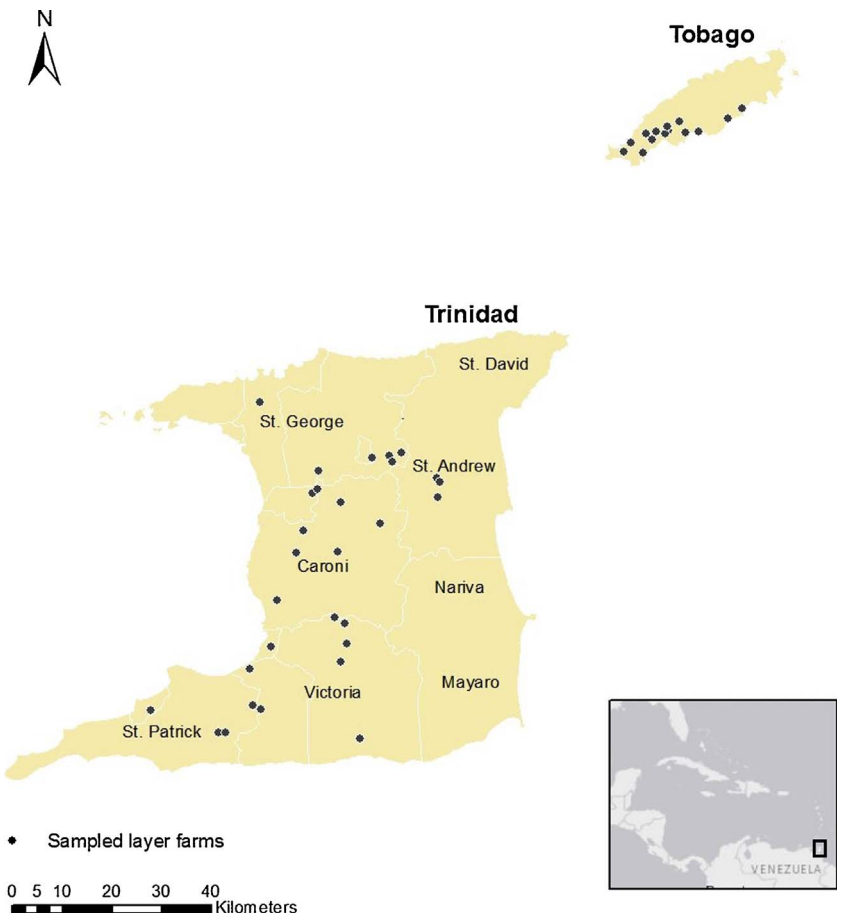

Fig. 1. Map of Trinidad & Tobago showing locations of farm sample sites in the various counties throughout Trinidad and farm sample sites on the island of Tobago.

pathogens of poultry in T&T. The targeted viruses were selected based on their worldwide significance and potential importance to the local T&T poultry industry. They included Avian influenza virus (AIV), Infectious bronchitis virus (IBV), Newcastle disease virus (NDV), Infectious laryngotracheitis virus (ILTV) and Avian pneumovirus (APV), which all cause respiratory disease, and Infectious bursal disease virus (IBDV), Fowl adenovirus Gp1 (FADV) and Egg drop syndrome virus (EDSV), all associated with immunosuppression.

In T&T poultry, vaccination is at the discretion of the farmer and some farmers choose to vaccinate their flock, while other do not; very little poultry vaccination is done on the island of Tobago. Little research has been done to determine the best and most effective vaccines to use to gain protection against local circulating virus strains. Currently, the layer farmers who vaccinate use the following vaccines: IBV/NDV (COMBOVAC-30, Merck), IBDV (UNIVAX-BD, Merck) and Fowl pox virus (FP-VAC, Merck). Thus, in designing the serology survey, consideration was given to vaccine use so that vaccinated birds were excluded from the testing.

Although there have been studies reporting seroprevalence levels, vaccine inefficiency and molecular characterization of poultry viruses from various Caribbean and South American countries, this is the first comprehensive serological survey to take place in T&T. The objectives were to determine if selected globally important viruses were circulating on layer farms in T&T and to measure the seroprevalence levels of these viruses on farms within the twin island country.

2. Materials and methods

2.1. Sampling population

A cross-sectional survey was designed for the detection of eight viruses within poultry flocks in T&T. The study was conducted through the sampling of layer birds for reasons of risk of exposure and ease of access to farms. The layer population in T&T is estimated to be approximately 500,000. Two sampling study phases were undertaken: June 2014 – October 2015 for Trinidad (Phase 1) and July – September 2015 for Tobago (Phase 2).

For the first phase of the study, 42 active layer farms were identified with the assistance of the Poultry Surveillance Unit (PSU) across the eight counties of Trinidad (Caroni, Mayaro, Nariva, Saint Andrew, Saint David, Saint George, Saint Patrick and Victoria). Farms ranged in sizes and were categorized as small ($<=1000$ birds), medium (1001 and 10,000 birds) and large ($>10{,}000$ birds). In the second phase of the study, layer farms in Tobago were sampled based on an active population of 18 farms identified through the assistance of the Division of Food Production and Fisheries, Tobago House of Assembly. Tobago has predominantly small layer farm establishments with bird counts well below 1000.

It was not possible to determine the extent of vaccination before visiting the farms, so the sampling strategy was designed taking all farms into consideration, whether farms were vaccinated or not, however only samples from unvaccinated birds were used in the testing phase.

2.2. Farm sample size determination

The target sample size of farms for phase one of the study in Trinidad was determined to be 29 using Epitools calculator 'sample size to demonstrate freedom of disease in a finite population for a specific test sensitivity'(Sergeant, 2017). Since the prevalence in the population was unknown, the probability of detection was set as 95%, and the target prevalence at 5%. Calculations of sample size were based on