Indigenous Ducks are Better Reservoirs of *P. Multocida* than Indigenous Chickens

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Abstract

Two experiments were performed to study cross infections from chickens to ducks and vice versa. For each experiment the source birds (chickens or ducks) were infected with *Pasteurella multocida* strain 10322. The infected birds were then mixed with sentinel indigenous ducks or chickens, respectively, six hours after inoculation. To monitor cross transmission, oropharyngeal and cloacal swabs were taken from the sentinel birds daily, for culture on blood agar and other media, for two weeks. The cultured bacterial isolates were characterized for *P. multocida* through biochemical and other tests. For chickens to duck transmission study a few ducks (40%) picked the bacteria on the first day, number of infected birds increasing with time and the birds had high infection rate (60%) by day 14 post-infection. In the duck to chicken transmission study, most chickens (80%) were infected by the first day and maintained infection up to the twentieth day (60%) but appeared to clear the infection thereafter. These results showed that it was possible to transmit *P. multocida* from indigenous chickens to ducks and vice versa. The duck may be a better carrier of *P. multocida* under scavenging system than chickens. This contact cross transmission may be playing a role in the maintenance of the bacterium at the village level.

Introduction

In Kenya, poultry population is about 29 million, of which over 70% are indigenous birds. The majority of these birds are chickens followed by ducks, turkeys and geese (Mbugua, 1990a; b; Njue, 2002). Many small-scale farmers in peri-urban and rural areas keep mixed flocks of indigenous chickens and ducks (Mbutthia et al., 2003; Nyaga et al., 2002). Others keep them separately but they interact during scavenging. Many poultry pathogens infect and cause disease in both chickens and ducks (Saini et al., 2003). At farm level the chickens and ducks may, therefore, share and spread infections between them. *Pasteurella multocida* causes fowl cholera, a disease of major economic importance in poultry production. *Pasteurella multocida* carrier status in indigenous chickens has been reported in flocks in Kenya (Mbutthia et al., 2002). There is little documentation on cross transmission and retention of *P. multocida* organisms between indigenous chickens and ducks. The objectives of this study were to demonstrate contact transmission and the bird’s ability to maintain the *P. multocida* infection carriage.

Materials and Methods

Experimental birds: A total of 22 wing-tagged birds comprising equal numbers of twelve week-old indigenous chickens and eight week-old ducks were used in two experiments. The susceptible ages and experimental birds had been determined in another study (unpublished data). In the first experiment for chickens to ducks, six 12-week-old chickens that were infected and 5 sentinel eight-week-old ducks were used. The second experiment for ducks to chickens, 6 eight-week-old ducks that were infected and 5 sentinel twelve-week-old chickens were used. Before experimentation all the birds were isolated, screened through bacteria culture of swabs taken from their oropharynx and cloaca, and shown to be negative for *P. multocida*.

Sampling procedure: Each of the 22 birds in the two experiments was swabbed on the oropharyngeal and cloaca separately using sterile cotton-tipped applicator swabs. A total of 44 swabs were collected. The swabs were placed in 2 ml of sterile physiological saline and transported in a cool box to the laboratory for screening for *Pasteurella* species.

Bacteria used to infect birds: *Pasteurella multocida* strain NCTC 10322 was maintained on Dorset egg agar was used. It was spread onto blood agar (BA, Oxoid Ltd., CM55, Basingstoke, Hampshire, England) with 5% citrated calf blood and incubated aerobically at 37 °C, for 24 hours to check for purity prior to preparation of the inoculum (Petersen et al., 2001). Each of the respective 6 birds was inoculated intratracheally with 0.5 ml brain heart infusion culture containing 1.6 x 10⁶ colony forming units of *P. multocida* organisms.

Isolation and characterization of bacterial isolates

Each swab was thoroughly vortexed, streaked on blood agar and incubated aerobically at 37°C, for 24 hours for initial culture. Bacterial colonies from these were sub-cultured on blood agar and MacConkey agar. The bacteria were identified according to the criteria given in the Bergey’s manual (1994). The characterization of the *P. multocida* subspecies followed procedures described elsewhere (Dorsey, 1963; Bisgaard and Mutters, 1986; Mbutthia et al., 2002). The biochemical reactions of the isolates were compared with the known *P. multocida* NCTC 10322 to confirm their re-isolation.