Vaccination against avian influenza (AI) is currently applied worldwide with inactivated vaccines. Since November 2012, a novel recombinant H5N1-AM5 (Hepatitis virus of turkeys as vector) vaccine has been commercialized and applied to day-old chicks (DOC) in some industrial hatcheries in Egypt (Kilany, 2014; Kilany, 2012). The objectives of this study were to assess the cost-effectiveness of AI DOC vaccination in hatcheries and the feasibility of implementing AI DOC vaccination in the different production sectors in Egypt.

A model of the Egyptian poultry production network was combined with a model on flock immunity to simulate the distribution profile of AI immunity according to different vaccination scenarios (including DOC vaccination or not). The model estimated the levels of vaccine coverage for each node of the network and vaccination scenario and positive sero-conversion levels and the duration of sero-protection.

The model predicted that targeting DOC AI vaccination in industrial and large size hatcheries would increase immunity levels in the overall poultry population in Egypt and especially in small commercial poultry farms (from <30% to >60%). This strategy was shown to be more efficient than the current strategy using inactivated vaccines. Improving HPAI control in the commercial poultry sector in Egypt would have a positive impact effect to improve disease control.

This innovative way to analyze the outcome of AI immunity predictive model supports the design of a more efficient HPAI disease control plan in Egypt. This model may be replicated in other AIV endemic countries that wish to better manage infections or emerging disease threats.

**STUDY OBJECTIVES**

We combined network analysis of poultry production systems with an immunity model to study the distribution profile of avian influenza immunity in flocks through the commercial poultry production network in Egypt.

The specific objectives were:

1. To model the movement of DOC within the poultry value chain of Egypt
2. To estimate vaccine coverage and sero-conversion levels according to different vaccination scenarios including DOC vaccination.

**RESULTS**

The model demonstrated a statistically significant increase of vaccination coverage (>60%); 0.65) within the total population if hatchery vaccination was implemented in integrated and large farms (Fig. 2A). Only by vaccinating integrated DOC (Sc. 2), vaccine coverage in large and medium-sized farms would reach 80%.

The model predicted that targeting DOC AI vaccination in industrial and large-size hatcheries (Sc. 4) would increase immunity levels in the overall poultry population in Egypt and especially in small commercial poultry farms (from <30% to >60%) (Fig. 2B) (Bouma, 2009).

Spatial analysis of AI immunity distribution demonstrated that under Sc. 4, the immune level density (both in terms of coverage and sero-protection) would increase above the threshold levels in the most at risk Governmental (Fig. 3).

DOC vaccination would be cost-effective either as prime-boost strategy with one boost of inactivated vaccine or as single dose vaccination both for long cycle and broiler birds whatever the current inactivated vaccination protocol (in Table 2).

**REFERENCES**


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