Avian Influenza H9N2 in the Middle East & North Africa Countries and the vaccine efficacy

H. Bakri*; Entisar Al-Hallaq

Vaxxinova, Amman, Jordan, P.O.Box: 960809 Code 11196
*Corresponding author: Husam.bakri@vaxxinova.com

Avian influenza (AI) is a highly contagious disease caused by type A influenza viruses that are members of the family Orthomyxoviridae in the genus Influenza virus A.
Middle East countries have an estimated poultry population of 3 billion broilers, 137 million commercial layers, 30 million breeders, 2x10^6 layer breeders and 500.000 GP broilers,180.000 GS layers. Since 1999 the region faces different health problems such as drop in egg production, close to peak production: up to 40-50% during 2-3 weeks, thin – shelled, rough and misshapen eggs, moderate mortality and respiratory signs in commercial layer and breeder production; while in broiler it was noticed severe mortality (over 60% after 3 weeks of age), severe respiratory signs, high percentage of condemnation due to secondary bacterial infections.
Different serum and tissues samples were taken from breeders, layers and broilers from different countries and analyzed by serology and virus isolation.
The results showed the presence of AI H9N2 virus in the Middle East area combined with IB or ND.; different investigations were done using reduction in mortality and improvement in production as parameters.
By using H9N2 vaccine, the farmers were able to control the economic impact of the infection.

Keywords: AIV; Middle East; Influenza H9N2 vaccine.

Introduction

The avian influenza virus (AIV) H9N2 subtype was first characterized in 1966 as causing mild respiratory diseases in turkeys (Homme and Easterday, 1970) and, for the first decade after its isolation, was found only in shorebirds and mallards (Kawaoka, et al., 1988). However, after almost 50-years evolution and propagation, the H9N2 viruses have spread across most of the earth, circulating in wild bird and domestic poultry populations worldwide. Although AIV infections commonly result in low mortality in avian populations, in immunosuppressed chickens, recent isolates of H9N2 virus have been associated with high mortality in young chicken and a severe decline in egg production in laying chickens via secondary bacterial infections of the upper respiratory tract and other viruses resulted in significant economic losses of domestic poultry.

AI in the Middle East

Estimated poultry population in the Middle East consists of 3 billion broilers, 137 million commercial layers, 30 million breeders, 2 million layer breeders. Since 1999 the region faces different health problems such as drop in egg production, close to peak production: up to 62% during 2-3 weeks, thin–shelled, rough and misshapen eggs, moderate mortality and respiratory signs in commercial Layer and Breeder production; while in broiler it was noticed severe mortality (over 60% after 3 weeks of age), severe respiratory signs, high percentage of condemnation due to secondary bacterial infections. Thus, it has been believed valuable to find out what is the reason behind above mentioned respiratory problems.

Materials and methods

Several field visits to flocks with these clinical signs were performed in Kingdom Saudi Arabia (KSA), Jordan, Syria, Lebanon, United Arab Emirates (UAE), Kuwait, Tunisia, Algeria , Libya and Yemen. A large number of samples (serum and tissues) have been collected for serological testing and virus isolation. ELISA tests performed for the major respiratory diseases such as IB, ND, AI, TRT, EDS and ILT. Test results showed the presence of AI. So HI, PCR tests and virus isolation from tissues, kidney, trachea, lung and ceacal tonsils was done to detect and type the strain of AI.

Results and discussion

More than 60%, 1790 blood samples showed positive AI antibody response in AGP and Elisa tests. Same sera tested in HI showed positive titers against AI H9 strain, (Figure 1) and ND., while for PCR analysis of 194 samples, 36% showed positive for Avian Influenza as shown in figure 2.

Figure 1: HI results of Broilers, Breeders and Layers

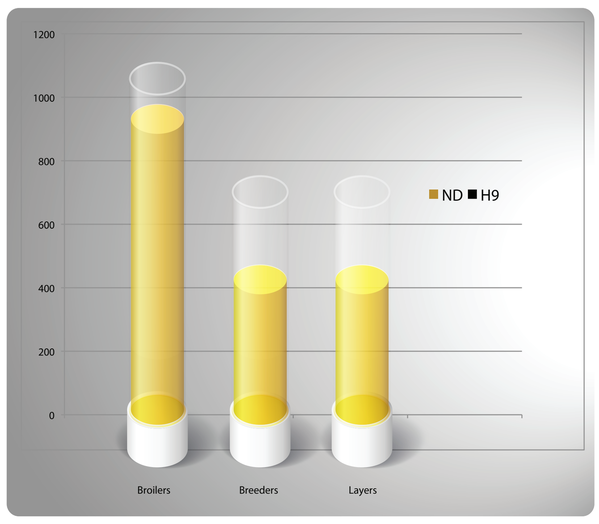
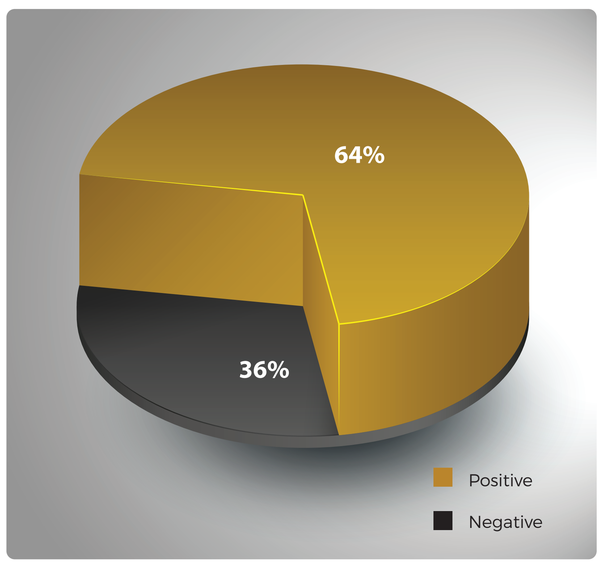


Figure 2: PCR results of Broilers, Breeders and Layers



From tissues frequently AI H9N2 virus was isolated, (Table 1), and ND

Table 1: Number of virus isolation samples

Disease	Virus isolation in:	In Broilers	In Breeders	In Layers
AI (H9 N2)	MENA area	4	2	1
ND	MENA area	2 field strains	1 field strain	-

Discussion and Conclusion

Field trials have been conducted in UAE at a farm, where AI H9 was isolated the first time. In this commercial layer farm one house (45,000 birds, Lohmann) was vaccinated. A second house (45,000 birds, Lohmann) was not vaccinated as control. Birds were vaccinated twice with 0.5 ml of the vaccine H9N2 at 12 weeks and 16 weeks of age. Production and mortality were monitored (see figure 3). The control flock which showed a severe drop in egg production just before the peak of lay: 62% at 21 weeks of age. No drop in egg production and mortality were observed in the vaccinated flock. Field trials were performed in the most endemic area and showed good protection against clinical signs. Figure 4 showed Production and mortality curves of a breeder flock, infected with AI H9N2, while figure 5 showed the egg quality of during AI problems in a commercial layer farm. Figure 6 (A, B, C and D) showed the postmortem signs in broiler during AI problem.

Figure 3: Results of a field trial with commercial layers in UAE: Production curve of a non-vaccinated flock (Non Vac) and a flock vaccinated with Influenza H9N2 at 12 and 16 weeks of age (Vac).

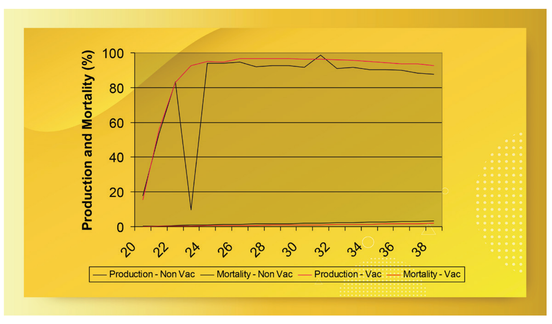
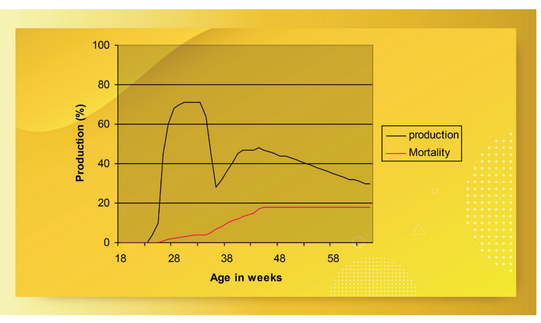


Figure 4: Production and Mortality curves of a breeder flock, infected with AI H9N2



All the results from isolation, Elisa and HI tests show that H9N2 is present in the Middle East countries. Most of the governments allowed the use of vaccines containing the antigen H9N2 in order to control the economical impact of the disease.

Figure 5: Egg quality during AI problems in a commercial layer farm.

In conclusion: AI H9 virus has a high prevalence in the Middle East region. The vaccine H9N2 helps the farmers to control the economical impact of the infection.

Acknowledgements

- The author would like to extend his thanks to Animal Health Service Deventer - The Netherlands.
- Institute of Animal Health, Compton – UK.

References

- **HOMME, J.** and **EASTERDAY, C.** (1970) Avian influenza virus infections I Characteristics of influenza A-turkey-Wisconsin-1966 virus. Avian Disease, Vol.14, pp. 66-74.
- **KAWAOKA, Y., CHAMBERS, M., SLADEN, L.,** and **WEBSTER, G.** (1988) Is the gene pool of influenza viruses in shorebirds and gulls different from that in wild ducks? Virology, Vol. 163, pp. 247-250.

Figure 6-A: Redness of mucosa, vascular injection, congestion and oedem

Figure 6-B: Mucopurulent plaques in the lumen

Figure 6-C: Obstruction by plaques

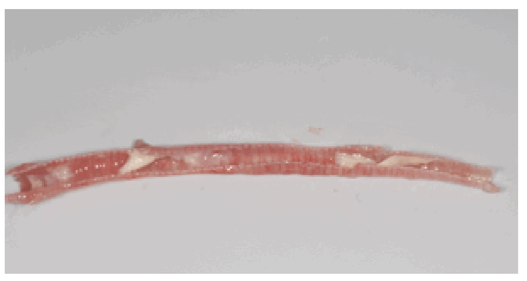


Figure 6-D: Bifurcation