Use and impact of vaccination as a control and preventive tool against HPAI

**Current status and knowledge**

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Vaccination: a tool for the control of avian influenza

An OIE/FAO/IZSVe Scientific conference
AVIAN INFLUENZA VACCINATION

---> OIE information document
---> Verona Recommendations*

Background

This document was prepared with the support of FAO and the valuable input of the OIE ad hoc group on AI vaccination guidelines, which first met in March 2006. Members of the ad hoc group are: Dr Annemarie Bouma (The Netherlands), Dr Hualan Chen (China), Dr Baltus Erasmus (South Africa), Dr Peter Jones (International Federation on Animal Health), Dr Stefano Marangon (Italy) and Dr Joseph Domenech (FAO).

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The reports of the first and follow-up meetings of the ad hoc group were submitted, in accordance with OIE procedures, for endorsement by the Scientific Commission for Animal Diseases and the OIE International Committee.

The document was first distributed to OIE delegates during the 74th General Session in May 2006 and has now been updated with the recommendations following the international scientific conference in Verona, Italy from 20 to 22 March 2007.

This document was developed, in conjunction with the guidelines published by FAO in September 2004, to provide urgently needed information to OIE Member Countries. This input from FAO in the preparation of the guidelines, is highly appreciated.
Verona recommendations

• Technically sound, but some countries found it difficult to apply them successfully
• Relatively weak on vaccination in countries where infection is enzootic and unlikely to be eliminated in the medium term
• Have served as guidelines for FAO, and have been modified over the years based on field experience.
Since then...

- **HPAI H5N1 enzootic in 7 countries**
  - Vaccination in 4/7 enzootic countries (China, Indonesia, Egypt, Viet Nam) - *implemented only after the virus already well established in poultry*
  - Vaccination not employed as a control tool in 3/7 enzootic countries (South Asia) - *Vaccination under trial study in Bangladesh*

- **No country has eliminated HPAI H5N1 with vaccination**
  - other than Hong Kong SAR in 2002/3
  - but elimination was not the objective in the enzootic countries

- **Great experience in vaccination in enzootic context also in Mexico (H5N2, H7N3) and in Pakistan (H7N3)**

- **Vaccination as targeted method to eliminate the virus**
  - Cote d’Ivoire, France, Netherlands, Israel, Russia, etc
Since then... (continued)

- More data available on: influenza epidemiology, vaccine efficacy, optimized surveillance strategies, social and economic impacts
- Other strategies/guidelines on vaccination produced
- New vaccines (for hatchery/duck vaccination)
- Virus diversity increased (esp. H5N1 HPAI)
- H7N3 HPAI and H7N9 LPAI have emerged and surprised us all; i.e. broadening our view of diversity of zoonotic AI viruses and need for emergency control platforms including vaccines
APPROACHES TO CONTROLLING, PREVENTING AND ELIMINATING H5N1 HIGHLY PATHOGENIC AVIAN INFLUENZA IN ENDEMIC COUNTRIES
Assessment of national strategies for control of high-pathogenicity avian influenza and low-pathogenicity notifiable avian influenza in poultry, with emphasis on vaccines and vaccination

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Summary
Twenty-nine distinct epizootics of high-pathogenicity avian influenza (HPAI) have occurred since 1959. The H5N1 HPAI panzootic affecting Asia, Africa and Eastern Europe has been the largest among these, affecting poultry and/or wild birds in 63 countries. A stamping-out programme achieved eradication in 24 of these epizootics (and is close to achieving eradication in the current H5N2 epizootic in South African ostriches), but vaccination was added to the control programmes in four epizootics when stamping out alone was not effective. During the 2002 to 2010 period, more than 113 billion doses of avian influenza (AI) vaccine were used in at-risk national poultry populations of over 131 billion birds. At two to three doses per bird for the 15 vaccinating countries, the average national vaccination coverage rate was 41.9% and the global AI vaccine coverage rate was 10.9% for all poultry. The highest national coverage rate was nearly 100% for poultry in Hong Kong and the lowest national coverage was less than 0.01% for poultry in Israel and the Netherlands. Inactivated AI vaccines accounted for 95.5% and live recombinant virus vaccines for 4.5% of the vaccines used. Most of these vaccines were used in the H5N1 HPAI panzootic, with more than 99% employed in the People’s Republic of China, Egypt, Indonesia and Vietnam. Implementation of vaccination in these four countries occurred after H5N1 HPAI became enzootic in domestic poultry and vaccination did not result in the enzootic infections. Vaccine
Vaccination impact

• Important role of vaccination in endemic countries: to help contain infection and disease until virus elimination is feasible

• Observed reduction in number of human cases, poultry outbreaks and environmental load, probably all positively impacted by vaccination programme
Key statements on vaccination programs (1)

• Transition from mass vaccination to targeted vaccination
  – in Viet Nam, Egypt, Indonesia
  – China moving to targeted vaccination

• Mass vaccination campaigns for smallholder poultry
  – difficult to apply effectively over a large area
  – but potential for smaller scale activities
Key statements on vaccination programs (2)

• **Vaccination and sectors of production**
  – Vaccination programmes that interfere with production cycles (e.g., broiler and meat duck production) have a smaller chance of being implemented
  – Close to impossible to get sustained high level population immunity in some poultry populations, esp. at village and small commercial level
  – Ducks farmers have less incentive for vaccination

• **The notion of exit strategy:**
  – Confusing for some authorities
  – Should be seen as a gradual process for each country where infection is endemic, rather than as an all-or-nothing option (FMD example)
Vaccination challenges

- Limitations of vaccination in presence of immune suppressive factors, regardless of the vaccine used and its application
- Vaccination complicates serosurveillance and case definition
- Reported vaccine failures due to variant viruses; yet failure to vaccinate often more important than vaccine failure
- Gaps in public-private partnerships
  - esp. on regulation of vaccination in commercial sector, sharing of outbreak information and strains, and information on vaccine failure
Means of optimizing use of vaccination (1)

- Epidemiologically sound surveillance for vaccination programmes is crucial for strategists and policy-makers to target vaccine resources in most effective way.
- Mass vaccination covering all production sectors unlikely to be applied now in countries considering vaccination (lessons learned from other countries).
- Primary future need may be as an emergency means to reduce escalating human cases.
  - What if H5N1 became as infectious for humans as H7N9?
Means of optimizing use of vaccination (2)

• Operational research
  – helps governments develop robust plans to move away from mass vaccination to targeted and risk-based strategies
  – but don’t underestimate the difficulties in doing this work

• Additional means of risk reduction should be applied
  – farm and market management & biosecurity

• Hatchery vaccination might provide an option for some poultry populations

• Strengths, weaknesses and likely effects of all control measures (both + and -) should be assessed by endemic countries
A few key questions

- Impact or success of vaccination?
- Vaccine failures: fault of the vaccine or the way it was used?
- Vaccination program for virus elimination or for virus reduction?
- Which populations to target? What population immunity should be reached locally?
- Shift for mass to targeted vaccination: why and what difference did the change make?
- How to get the 4 sectors engaged in the control program?
Meeting objectives

• Review on challenges and success linked to developing and implementing effective HPAI surveillance and vaccine monitoring, and their impact on control programs

• Propose ways of better implementing vaccination and assessing its impact

→ develop new guidelines
Meeting approach

• Share country experiences
  Crucial to illustrate:
  – what we know and don’t know about vaccination campaigns
  – what has gone right and what could have been/be improved

• Multidisciplinary core expertise to facilitate discussions
Meeting agenda

• Session 1: Lessons learned on the success and failure of HPAI vaccination as a control and preventive tool
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• Session 2: Social, political, economical and public health aspects of HPAI vaccination
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• Session 1: Lessons learned on the success and failure of HPAI vaccination as a control and preventive tool
• Session 2: Social, political, economical and public health aspects of HPAI vaccination
• Session 3: Implementation of vaccination
• Session 4: Conclusions and recommendations
Enjoy the meeting!