

# Prevention of Newcastle disease through vaccination : an assessment.

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## Summary

*The properties of inactivated, live attenuated and combined vaccines against Newcastle disease are discussed. Their conservation and way of administration are given.*

*A vaccination scheme is suggested for parents, layers and broilers.*

*A survey of the most important reasons for failure of the vaccination is given.*

## Résumé

*Les qualités des vaccins inactivés, atténués et combinés contre la Maladie de Newcastle sont discutées, ainsi que leur conservation et administration.*

*On donne un schéma de vaccination pour les parents, les pondeuses et les lourdes.*

*Une revue des causes de l'échec de la vaccination est donnée.*

## Introduction

Newcastle disease in poultry has always been a worldwide problem. That is why several investigations have been done to see how the disease outbreaks can be eliminated. These experiments have led to improved vaccines.

The purpose of this article is to inform the field staff in developing countries on the use and possibilities of the present vaccines.

## The vaccines

The poultry farmers rely more and more upon vaccines, at least if they are available. Nowadays one can normally find monovalent and multivalent, inactivated and live vaccines against Newcastle disease on the market.

### a) monovalent vaccines

#### — inactivated vaccines

These vaccines always have to be injected. They hardly ever cause an inflammatory reaction. Besides that, there is no spreading of the virus. A sufficient immunity is obtained after 5-10 days and it lasts about 5 months. However, if the adjuvant incorporated in the commercial vaccine is based on aluminiumhydroxid, a second vaccination has to be done after 2 weeks (10).

Inactivated vaccines should always be kept in a refrigerator (2-6°) and never be put in a freezer, because they lose their activity there. (7, 8, 9, 11, 12).

#### — live vaccines

Live vaccines can be distinguished by their pathogenic properties: the lentogenic strains have hardly any pathogenicity, e.g. the Hitchner B<sub>1</sub> and the La Sota strains, but the mesogenic strains have more pathogenic properties, e.g. Beaudette, Komarov, Mukteswar, Haifa...

In contrast to the inactivated vaccines, the live vaccines do cause an excretion and spreading of the vaccine virus.

The live vaccines are usually lyophilised.

After a first immunisation with a lentogenic strain, the attained immunity lasts up to 3 months with the Hitchner strain, and 6 months with the La Sota strain.

Mesogenic vaccines may only be used after a prior vaccination with a less pathogenic live or killed vaccine.

The duration of the obtained immunity depends upon the way of vaccination: intranasal it lasts up to 6 months, injected it is sufficient for more than 1 year.

These live vaccines are best given before the laying period, because they reduce the egg production. They can be injected, put in the drinking water, sprayed and dropped into the eye and nose. Some of the live vaccines are very susceptible to deterioration by sunlight and disinfectants.

Lyophilised vaccines must be preserved in the freezer or in the refrigerator. (1, 2, 3, 4, 5).

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## b) Multivalent vaccines

Multivalent vaccines are also available. They give protection against two or more diseases : Newcastle disease and infectious bronchitis, Newcastle disease + infectious bursitis and infectious bronchitis, Newcastle disease +Salmonellosis and Pox, Newcastle disease +infectious bursitis and infectious tendovaginitis. Only the last vaccine gives a poor immunological response versus Newcastle disease. All the others give sufficient protection against Newcastle disease but the attained immunity against the other diseases might be inferior than that obtained by a monovalent vaccine, e.g. the multivalent vaccine against infectious bronchitis. (13, 16).

## The administration of the vaccines

### a) General precautions.

No matter if a mono- or multivalent vaccine is used, some points must always be born in mind to obtain a good immunological response.

Only good vaccines should be adopted, which means well stored and transported. Lyophilisated vaccines may be kept at 4° or in a deep freezer for 2 years. An oil emulsion vaccine must never be put in a freezer but in a refrigerator, where they keep their activity about 1 year. The identification number of the vaccine and the date of the vaccination should always be noted in a logbook.

### b) Drinking water

If the vaccination is done through the drinking water, the troughs should be cleaned and rinsed carefully, so that there remain no detergents. The water is cut off about 2-3 hours before the vaccine is put into the water. Better not wait any longer, because the thirsting will reduce the effect of the vaccination.

Before mixing the vaccine into the water, add 250 g of milk or 25 g of milkpowder per 10 liters of water : the milk will inactivate all disinfectants still present. It also acts as a buffer. The amount of water to be given is calculated by the following formula :

$$\frac{\text{number of chickens} \times \text{age expressed indays}}{1.000}$$

with a maximum of 40 liters of water per 1.000 chickens.

### c) spray vaccination

A spray vaccination is done with distilled or spring water. Normally one uses 300 ml of water for 1,000 vaccine doses.

The ventilation must be stopped during the spraying, till 15 minutes after the vaccination ?

A spray vaccination is easy to do, as it requires no handling of the animals, but, if the spraying is not done correctly, e.g. if each animal does not receive a sufficient dose, the obtained immunity cannot be predicted. It is better then, to adopt another mode of vaccination. (6, 14, 15).

### d) drops

If the vaccination is done through eye drops, distilled water should be mixed with milk or milkpowder. Then 1,000 vaccine doses should be added to 5 ml of water ;

The vaccine solution used for nose drop vaccination has to be prepared in the same way. There is a need to check the cleanness of the nostrils : often they are covered with dust, so that the vaccine does not enter the nasal cavity.

The beak and one nostril should be closed, so that the fowl is forced to inhale the drop through the other nostril.

### e) injection

The vaccine can be injected into the pectoral muscles, or subcutaneously in the neck fold.

In case of inflammatory reactions following these injections the ambient temperature must be raised by 2° C if possible, and food supplemented with vitamins and minerals should be given.

### f) vaccination scheme

A possible vaccination scheme against Newcastle disease is the following :

parents and layers :

2 weeks : killed or Hitchner vaccine

8 weeks : Hitchner or La Sota vaccine, if the infection pressure is normal and if no severe Newcastle disease outbreaks are nearby.

17 weeks : same as at 8 weeks

broilers :

1 day : Hitchner

or 4-5 days : Hitchner

or 12-16 days : La Sota

broilers should get at least half of the dose given to parents and layers.

In areas where there is a high virulent Newcastle disease virus strain, it is advisable to vaccinate the chickens weekly or biweekly, till they are 2 months old.

The mesogenic strains should only be used when really indicated. This means that if a Hitchner or a La Sota vaccine gives sufficient immunity, there is no need to use a more virulent virus strain, because it might cause an outbreak of Newcastle disease.

If a mesogenic strain has to be used the Mukteswar strain is advised in Asia, while in Africa and in the Middle East, the Haifa or Komarov vaccine is recommended, because they have less residual virulence (2, 3, 5).

Note: Methods and doses described above are those usually accepted. However, the instructions of use provided by the vaccines suppliers should always be strictly followed.

### Failure of vaccination

Unfortunately, a vaccination is not always 100 % protective against the disease. Vaccination breakdowns might still occur, due to several factors: the vaccine, the diluent, the animal, the user, the virus strain, the hygiene,...

The used vaccine can become inactive because of inadequate storage or transport. It might be given in the wrong way, or even in insufficient doses, with no result at all. At the time of the vaccination, the animal may still have maternal antibodies (till 28 days after hatching). An immunodepressive disease (infectious bursitis, Marek's disease, ...), even without showing clinical symptoms may also mean that the vaccination will not succeed. The same will happen

if the animal is receiving the vaccine together with immunosuppressors, e.g. antibiotics, corticosteroids,...

The surroundings are also important. If animals of different ages are kept in the same place, the risks of vaccination breakdowns are increased: it is possible to vaccinate the elder chicken with a vaccine strain that still has enough residual virulence to infect the younger chicken.

Importation of chickens without putting them into quarantine also contains some risks: a new virus strain might be imported together with the fowl.

The poor hygienic status of tropical nurseries is a non negligible factor: not only does it increase the infection pressure of Newcastle disease, it also augments the number of other infections, which reduce the food intake and consequently facilitate a vaccination breakdown and a disease outbreak. And last but not least, there is often no legal regulation for poultry disease prevention in tropical areas. Even if there is one, there is hardly any control of its application. This can explain why Newcastle disease outbreaks are so frequent in tropical developing countries.

Improvement of poultry keeping is difficult to envisage without effective vaccination campaigns.

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