Vaccination in the hatchery

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For various reasons, including the continuous reduction in the length of the broiler fattening period, the increase in the size of poultry operations and the frequent difficulties in finding properly trained and/or motivated manpower on the farm, vaccination in the hatchery is becoming more and more popular and will strongly develop in the years ahead.

It includes administration of the vaccines either by injection ('in-ovo' or subcutaneous routes) or local application (spray or eye drop). For many years it has been the only way to ensure an early and/or improved resistance to mucosal diseases like infectious bronchitis or Newcastle disease. More recently, new types of vaccines based on immune complex or recombinant technologies have been launched.

Both have proven capable of inducing active immunity in the presence of maternally derived antibodies, which were previously neutralising classical live attenuated vaccines if given at too early an age. This capacity, associated with the precision and the reliability of individual injection, is responsible for much better vaccine coverage of the flocks. Vaccination in the hatchery is actually opening the door to a real control of broiler diseases.

One of the key challenges for the poultry meat industry, both now and in the future, is the control of broiler health. This is not only to avoid disease outbreaks but, more importantly, to protect the full expression of the genetic potential. Protection weighs heavily on the economy of production and limits contamination by zoonotic pathogens, which could significantly decrease the commercial value of the final product.

The backbone of any sound policy aiming at controlling broiler health and reducing the risk of disease is biosecurity and no real and long lasting success can be expected in this area without real and solid implementation of it at both breeder and broiler levels including the hatchery.

Vaccination is a complementary approach to biosecurity and there is no place today where we can actually think of dropping it. However, major changes are occurring in this field aimed at making vaccinations easier to apply, less expensive and more efficacious. This is why vaccination in the hatchery has recently gained such popularity and is developing quite fast among the poultry industry. The objective of this article is to examine the key factors that explain this success.

Main problems

For many years, considering quality, reliability and cost effectiveness, vaccination in the hatchery has been regarded as the optimum situation for vaccine application by poultry producers.

However, until recently, only a few vaccines could honestly be recommended to be given at the hatchery with consistent or acceptable efficacy. These include Marek's disease (MD), infectious bronchitis (IB) and coccidiosis, Newcastle disease (ND) and swollen head syndrome (SHS).

The main reasons why vaccination against other diseases like infectious bursal disease (IBD – Gumboro), laryngotracheitis (ILT) or Newcastle disease was not possible were:

- Lack of adapted or reliable equipment.
- The problem of interference between maternally derived antibodies (MDA) and live attenuated vaccines.
- The residual pathogenicity of some vaccine virus.

New equipment

One of the main requests for vaccination to be given at the hatchery is the possibility to make it automatic and fast, with a low percentage of non or badly vaccinated chicks and a reduction in costs associated with vaccine application.

Many developments have recently been made in this area and today, powerful and user friendly equipment is available to poultry producers for vaccination by eye drop, coarse spray and fine spray, sub cutaneous injection at day old and 'in-ovo' injection at 18-19 days of embryonic life.

Some of this equipment also allows the combination of two or more vaccinations (spray and injection, double injection) at the same time. However, although reliability has improved and sophistication added, they should not be regarded as perfect and an eye should always be kept on them as well as on the operator and the quality of vaccine application regularly checked.

A four person Autovac injection carousel in operation, running up to 12,000 double injections and sprays per hour.

Various devices and procedures have been developed for this purpose.

New vaccines

Many new vaccines have recently been introduced on to the market and more are still to come. Because of them, the range of vaccines applicable at hatch has enlarged and the cost benefit ratio of expensive equipment like 'in-ovo' injectors strongly modified in favour of hatchery vaccination.

Among these new products, the following vaccines are worth mentioning:

- **Live attenuated Newcastle disease vaccines of the 'enterotropic' type.**

These viruses are naturally apathogenic for chickens and can induce local immunity without creating lesions of the trachea as classical 'tracheotropic' live ND vaccines do, leaving chickens more susceptible to secondary viral or bacterial infections.

With this new category of vaccines, no rolling infection is observed, growth is improved and consumption of antibiotics is reduced. This category of apathogenic live attenuated ND vaccines has really contributed to the spreading of ND vaccination at the hatchery.

- **Immune complex IBD (Gumboro).**

Based on a combination of vaccine virus and specific homologous antibodies in very well defined proportions, these vaccines have

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the capacity to delay the release, and hence the replication, of the vaccine virus up to an age where maternally derived antibody level has reached a level that is no longer capable of neutralising it.

Because of their reliability and their strong efficacy, in particular in areas where the very virulent form of the disease is present, this new type of IBD vaccine is becoming more and more frequently used all over the world.

● **Recombinant (IBD, ND, ILT and AI).** These vaccines are made from a gene extracted from a virus against which protection is looked for. This gene, encoding for a protective antigen, is introduced in the genome of another virus used as a carrier (the vector).

Indeed, this vector must be apathogenic for chickens like fowl pox (FP) virus for example and preferably not susceptible to homologous MDA, which is the case of the herpes virus of turkey (HVT) also used to protect chickens against the mild forms of the Marek's disease.

The way these vaccines induce protection is something really new and a lot of research work still need to be done until we actually fully understand it. Their capacity to breakthrough MDA is real when HVT is the vector.

Besides, since HVT persist forever in the vaccinated animal, long lasting protection is observed. This is very interesting when considering protection against ND.

Main advantages

The main advantages associated with vaccination in the hatchery are the following:

● The vaccine is handled by a few people that can be well trained and monitored. Globally speaking, it is much easier to control five workers in a hatchery than 200 farmers spread across a wide area. It is also easier to make sure that the cold chain recommended for storage of the vaccines from the producer to the end user is respected.

● The chickens are kept in boxes, which make it easier to manipulate than when they are spread all over a poultry house.

● Sophisticated and consequently expensive equipment is more affordable for a big structure like a hatchery than a for a poultry farm. Also equipment can be better monitored and better maintained in the hatchery than on the farm.

● Spray vaccination, which is the best method for administration of respiratory vaccines like ND or IB, is much easier to apply and consequently more efficacious when given in the hatchery than when applied on the farm.

● Injection required for vaccines based on new technologies like immune complex or recombinant, can only be applied with reasonable cost and quality at the hatchery.

● The hatchery is the only place where 'in-ovo' vaccination can be applied.

Recent field trials conducted around IBD vaccination have included very close comparison of efficacy between vaccination at the hatchery and vaccination on the farm. Results were just unbelievable.

In some organisations, the percentage of non-protected flocks, despite a heavy vaccination programme, was as high as 20-30%, and sometimes even higher! In hatchery vaccinated flocks, the percentage of protected flocks almost always reached 100%.

Conclusion

For many reasons, including the reduced length of the growing period for broilers, increased costs of work on the farm, as well as the recent availability of adapted equipment and new types of vaccines, vaccination in the hatchery is becoming more and more common in the poultry world.

Globally, it helps producers to reduce costs and improve the efficacy of vaccine prevention. It is also a field of very active research for vaccine producers and there is no doubt that this is where the future of broiler vaccination stands. Vaccination in the hatchery is a real improvement for vaccine prevention and this is a really promising way to better control diseases. ■