

Guidelines for effective vaccination of broilers

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A broiler health strategy starts with the broiler breeder, includes broiler management and is fine tuned by the judicious use of vaccines. A successful vaccination schedule is dynamic, maintaining a balance between disease risk and the type and frequency of vaccines administered.

Failing this, the very vaccines we administer to keep broilers healthy may become part of the problem instead of the solution!

The broiler breeder

Nature has developed a system which provides the young chick with a lifeline while the immune system matures.

Based on the assumption that the chick will, in all likelihood, face the same disease challenge as the parent a package of protection mirroring that of the parent is transferred via the egg yolk, so called maternal derived antibody (MDA).

Modern farming practices have disturbed this balance. The hen is kept in one environment, eggs hatched in a separate hatchery and the broiler raised in yet another environment away from the breeder hen.

However, using vaccination we emulate nature manipulating the breeders' immune profile to best suit the needs of the broiler.

The broiler

The modern broiler reaches target weight within six to seven weeks, leaving little time to develop a mature immune system and even less opportunity to implement extensive vaccination schedules.

Live attenuated vaccines are favoured for broilers; they induce a rapid immune response and are best suited to methods of mass administration.

The use of live vaccines is, however, not without risk. Interference between live vaccines administered in short succession of each other, vaccinating broilers with an existing underlying disease or basic mismanagement resulting in chilling or heat stress post vaccination could all precipitate severe vaccine reactions, with a negative impact on broiler performance.



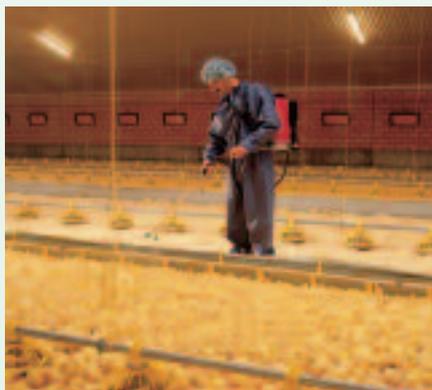
In line spray administration of vaccine to day old chicks in the hatchery. It is important that spray equipment is correctly calibrated to administer a consistent droplet size. Too fine a spray may result in excessive post vaccination reactions.

Broiler vaccinations should be kept to an absolute minimum and, where feasible, the number of administrations in the field should be limited, especially vaccinations during the latter half of the broiler cycle.

Special caution is required when administering respiratory type vaccines. Do not vaccinate broilers with underlying respiratory signs; the vaccine may exacerbate the problem.

Administering different respiratory vaccines in short succession of each other

Spray vaccination in the broiler house using a knapsack sprayer.



may result in vaccine interference, excessive reactions and reduced vaccine efficacy. The rule of thumb is a 10-14 day interval between separate administrations.

Using the correct vaccine administration technique is critical. Poor administration techniques result in a rolling vaccine reaction when vaccinated broilers start to infect poorly vaccinated pen mates.

Spray vaccination is the preferred and most effective administration technique for respiratory type vaccines; however the quality of spray requires specific attention. Too fine a spray delivers the vaccine deep down into the respiratory tract with subsequent severe vaccine reactions in broilers, especially if not suitably primed.

Start with a healthy broiler chick

As previously stated, broiler health starts with the breeder. Broiler chicks should have high uniform levels of MDA and be free of infectious pathogens transmitted via the egg (vertical transmission); such

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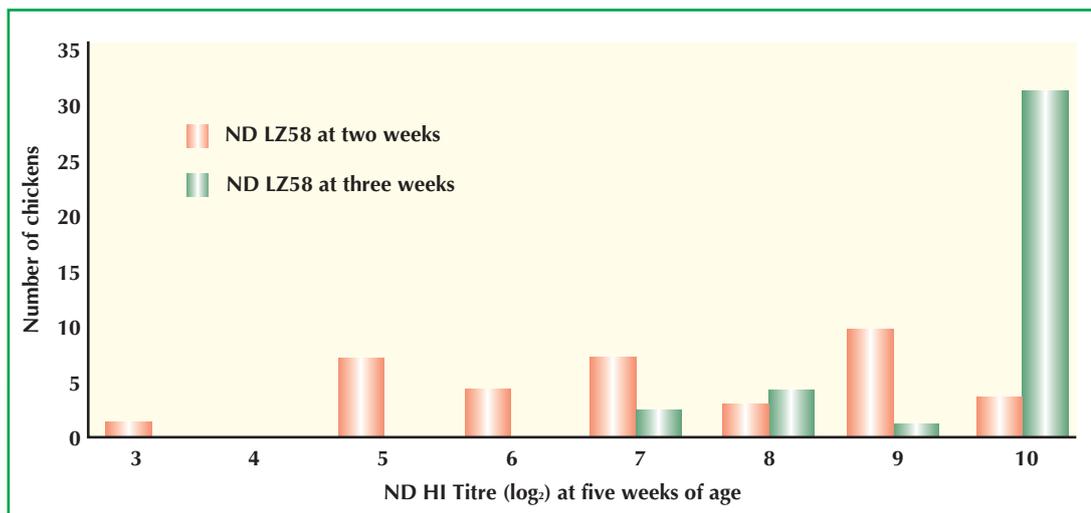


Fig. 1. Two groups of broilers vaccinated at day old with a combination infectious bronchitis/Newcastle disease vaccine (Nobilis Ma5+Clone30). First group revaccinated two weeks later and second group three weeks later with a Newcastle disease vaccine (Nobilis ND LZ58). ND serology titres determined at five weeks of age. Group revaccinated at three weeks of age presented with a higher and more uniform titre.

as avian encephalomyelitis, reovirus, chicken anaemia virus (CAV), mycoplasma and salmonella.

Vaccination of the breeder hen with suitable live and/or inactivated vaccines stops or at least reduces the incidence of vertical transmission.

Control policies for mycoplasma and salmonella vary from country to country. It is, however, generally accepted that broiler breeder flocks should be Mycoplasma gallisepticum (MG) free.

In certain countries MG is monitored by national surveillance schemes and breeder flocks testing positive for MG are usually culled.

Although MG vaccines are widely used in the layer sector, they are generally not approved for use in breeders.

Nonetheless, in certain regions breeder flocks are vaccinated with positive reports of a reduction in the incidence of MG transmission to the broiler.

Breeder flocks must be free of fowl typhoid and bacillary white diarrhoea caused by Salmonella gallinarum and S. pullorum respectively.

In addition, most developed countries require strict monitoring for Paratyphoid salmonellas, in particular S. enteritidis and S. typhimurium, which are of concern to human health. Vaccination of breeders is widely accepted as one of the salmonella control measures to keep flocks salmonella free.

Inactivated salmonella vaccines are favoured in breeders as they induce a solid, long lasting immunity with protective levels of MDA transferred to the broiler chicks.

The broiler's respiratory system

The Achilles' heel of the broiler is the

respiratory system. Airsacs extend into the abdominal cavity and skeletal structures creating a large surface area exposed to bacterial infection.

In addition, the absence of a diaphragm significantly reduces the efficacy of sneezing or coughing as a method to expel foreign material from the respiratory tract.

Instead the chicken relies on the sweeping action of cilia lining the mucosa of the trachea for the continuous removal of foreign particles, including bacteria, before they reach the deeper respiratory structures.

Agents that damage the cilia open the door for secondary bacterial infections; airsac infection, increased broiler mortality, poor growth performance and carcass condemnation at the processing plant.

The broiler respiratory complex presents a challenge to even the most experienced poultryman. A large part of the solution is in the correct identification of the primary agent. Is it management related (suboptimal ventilation), veterinary (incorrect vaccination schedules/procedures) or infectious (viral/bacterial)?

The build up of ammonia gases in a broiler house, chilling chicks or exposing broilers to extremely dusty, dry conditions are all management factors with a potential negative impact on cilia activity, contributing to secondary infections.

Add MG to the equation and the respiratory complex is amplified. MG positive chicks are also far more sensitive to vaccine reactions, especially live respiratory vaccines administered by spray.

Live respiratory vaccines must be treated with due respect. Although significantly milder than the disease causing field viruses, used inappropriately live

vaccines do more damage to the cilia than intended fuelling secondary infections.

The most common respiratory type broiler vaccines are against Newcastle disease virus (NDV), infectious bronchitis virus (IBV) and avian pneumovirus (APV).

To avoid vaccine interference and potential reactions respiratory vaccines should not be administered within a few days of each other, or administered as ad hoc combinations.

Only registered combinations formulated by vaccine manufacturers should be used if needed, as these combinations are extensively tested for compatibility.

The key is to identify the primary disease agent and use only the vaccine(s) appropriate to the specific situation.

More is not better! Multiple administrations of live NDV vaccines do not translate into better protection.

If the gap between two administrations is too short the second vaccination is neutralised by the local immunity induced by the first (see Fig. 1).

A suitable live NDV priming vaccination followed by a booster vaccination 14-18 days later induces solid protection for a full broiler cycle.

The addition of an inactivated NDV vaccine at day old is beneficial in NDV endemic regions to boost the level of immunity post 21 days.

The broiler's immune system

Early infection with viruses such as CAV, reo, infectious bursal disease (IBDV) and Marek's disease (MDV) compromise the broiler's developing immune system.

CAV and reovirus are transmitted to the broiler from the breeder hen, hence the breeder should be vaccinated to prevent vertical transmission of these pathogens.

Practically all broilers in the USA are vaccinated against MDV.

Administration is mostly done in the hatchery using the in-ovo technique at the time of transfer from setter to hatcher.

Outside of the USA the incidence of MDV vaccination in broilers varies from country to country and even within a country from one broiler integration to another.

Protecting broilers against IBDV



Left, checking medicated water reaches the end of the nipple line. Right, adding a blue dye to medicated water can assist in evaluating whether all chickens have consumed vaccine.

requires a multifaceted approach. An early infection, within the first one to two weeks, severely damages the developing immune system, with subsequent increased susceptibility to secondary infections and poor performance.

Infections with very virulent IBDV strains result in extensive losses due to mortality, while infections with the North American variant IBDV strains cause severe immune suppression.

IBDV control focuses on three points; eliminating the virus from the environment, passive protection during the first weeks (MDA) and vaccination with suitable live IBDV vaccines at the right moment.

Due to the hardy nature of the virus attempts to eliminate IBDV from a chicken house requires a thorough cleaning and disinfection procedure between broiler cycles.

A high uniform level of MDA provides early protection to the broiler chick, stressing the importance of breeder vaccination.

For the control of variant IBDV the inactivated vaccines used in breeders must contain variant IBDV strains matching the field challenge.

Failing this, the field virus will break through the MDA, infecting broilers at an early age with subsequent severe immune suppression.

Live IBDV vaccines induce an active immunity which replaces the declining MDA protection. However, correct vaccination timing is critical. MDA neutralises IBDV without making a distinction between field strains and vaccine strains.

Vaccination is only successful at the point when MDA levels have declined

sufficiently not to neutralise the vaccine strain.

In summary, broiler health is a prerequisite to achieve good economic performance. Vaccines are only one component of a broiler health strategy. At hatch the broiler should be free of vertically transmitted diseases.

The broiler breeder should be effectively vaccinated to transfer a suitable MDA profile to the chick.

Vaccination of the broiler should be limited to the essential vaccines administered according to a well planned vaccination schedule that takes into account the possible interference between vaccines and the current disease risk. ■