Commercial chicken vaccination: part 3 – injectable administration

Author : William Garton

Categories : General, Vets

Date : June 13, 2016

The two most common vaccine administration routes used for commercial chicken flocks – sprayed aerosol and drinking water – have been covered in part one (*VT*46.16) and part two (*VT*46.21) of this article.

Figure 1. SC injection: it is often possible to visual SC vaccines. The vaccine has been administered SC at the back of the neck in a turkey poult.

This final part will discuss use of injectable vaccination, looking at common pitfalls and the main anatomical locations for injection.

All inactivated (killed) vaccines, whether licensed or autogenous, are given via an injectable route – IM or SC. The convenience and efficiency of hatchery operations, plus the naïve immune status of day-old chicks, makes this an ideal place to administer injectable vaccination alongside the aerosol counterparts.

The majority of modern day hatcheries use automated vaccination equipment for delivery of SC Marek's disease vaccine. This, however, hasn't totally replaced the need for IM or SC vaccine at later stages in the bird's productive life.

Equipment

Automated machinery needs to be calibrated before use to ensure each bird receives the required dose (0.1ml to 0.5ml), with fresh, sterile needles inserted at the right position.

Equipment, such as handheld vaccination guns, should be tested before use and completely sanitised. Some vaccinators are self-sanitising through biocidal sleeves or sponges.

Needles should be replaced every 500 birds or with each new vaccine vial. Day-old chicks tend to be injected SC in the neck region, where a dyed or emulsion-based vaccine can be visualised (**Figure 1**). The alternative location would be into the musculature of the leg, although this has close association with nerves and tendons, and can be difficult to achieve, even in adult birds.

Injectable vaccines should be stored between 4°C and 8°C (or according to manufacturers' guidelines) and removed from the refrigerator 24 hours prior to use, allowing them to reach room temperature. The injection of a cold, oily substance at 4°C into the muscle of a 41°C bird can be extremely painful and stressful – a welfare consideration often overlooked.

Various automatically reloaded syringes are available – these should be used with an 18-gauge or 19-gauge quarter-inch or half-inch needle to allow easy passage of the injected substrate and are easier if pre-warmed as recommended. It is important to ensure all the dosage has been injected into the bird before withdrawing to maintain even and uniform vaccination.

It is necessary to regularly check the vial and replace needles. Poor accuracy can not only blunt needles, but also be traumatic or fatal if vaccine is injected directly into the bird's liver.

Administration

Methods of vaccine administration include:

- in-ovo (in the egg embryo)
- day of hatch (SC)
- inactivated vaccines (IM/SC)
- wing web

Sites

Various sites can be used for vaccine injection.

Breast

Figure 2. When administering IM vaccine into the pectoral muscle, locate the most forward point of the keel bone and the shoulder joint, then inject into the third point of an equilateral triangle in the deepest part of the muscle. This route is often
used in small animal practice for off licence antibiotic therapy.

Locate the most forward point of the keel bone and the shoulder joint, then inject the vaccine into the third point of an equilateral triangle into the deepest part of the pectoral muscle (**Figure 2**). Avoid the thinning, peripheral region of the muscle where it is possible to inject through into the liver.

Thigh

Ensure the limb is immobilised and take care to avoid major vessels, tendons and nerves. Contact with, or penetration into, the bone can cause an osteomyelitis.

Wing web

Remove feathers from the wing web and inject using a two-pronged needle into the centre of the web, avoiding major vasculature.

Wing muscle

Inject into the underside of the wing and direct the needle towards the body.

Tail head

Direct the needle into the underside of the pygostyle, towards the side of the tail bone and in a

cranial direction.

Neck

Raise a flap of skin at the base of the neck, avoiding major structures (such as vertebrae and the spinal column). Inject parallel into the skin fold.

Inguinal skin fold

Inject the vaccine into a pocket of skin created by lifting the skin connecting the abdomen and the thigh.

Leg muscle

Inject into the external side of the gastrocnemius muscle, around midway between the stifle and the tarsus. Direct the needle upwards towards the head, avoiding nerves and joints.

In-ovo vaccination

Vaccination of a 17-day to 19-day-old embryo while still within the egg is a relatively new development made possible due to highly sophisticated automated equipment that requires complex management for repeatable and hygienic performance.

The method ensures each embryo receives an equal dose, allowing an enhanced level of immune protection from the first day of life, but carries the risk of parental introduction of pathogen material.

Common pitfalls

With injectable vaccination, hygiene is essential as inoculation of a bird with a contaminated needle will lead to disease.

All equipment should be properly maintained and sterilised before each vaccinating session and regular needle changes will reduce the incidence of contamination. Disposable equipment will help maintain high hygiene standards.

Rushed or inappropriate vaccine delivery will reduce vaccine uptake and efficacy. Common errors include withdrawing the needle too soon, depressing the syringe plunger on withdrawal or using a needle with an insufficient diameter and length. Vaccine delivery into an inappropriate muscle or at an inappropriate temperature will predispose to an adverse vaccine reaction and tissue trauma.

Series conclusion

It is possible to quantify vaccine success by measuring the antibody titre in blood samples post-vaccination.

A high titre of antibody with low individual variation denotes the ideal result. Production of antibodies against a vaccine can take two weeks to three weeks. There is value in obtaining antibody titres pre-vaccination to establish a baseline titre –again at two weeks post-vaccination and then at four weeks.

The staged collection of blood samples allows for interpretation of immune response over a time period, throughout which antibody titre should continue to raise, assuming successful vaccination.

Vaccinations are an effective tool in disease control and prevention, but are not a replacement for poor management and inadequate biosecurity. Several factors need to be considered when employing a vaccination strategy for the purposes of practicality, repeatability and vaccination success.

Injectable vaccination can be labour-intensive when used in adult birds, but simple and effective with the proper equipment in day-old chicks. Stringent hygiene and correct technique are paramount when opting for injectable vaccination.

Acknowledgement

The author would like to thank MSD Animal Health and Alastair Johnston of The Minster Veterinary Practice poultry department for use of images.

- **Commercial chicken vaccination: part 1 – spray and aerosol usage**
- Commercial chicken vaccination: part 2 – drinking water administration

Further Reading

- Cobb-Vantress (2013). Vaccination procedure guide, www.cobbvantress.com/docs/default-source/management-guides/cobbvaccination-procedure-guide---english.pdf
- Cserep T (2002). Datafile: drinking water vaccination, Intervet Poultry Division, www.gumboro.com/downloads/english/watervaccination.pdf
- Defra (2014). National statistics: latest poultry and poultry meat statistics, www.gov.uk/government/statistics/poultry-and-poultry-meat-statistics
- Ferndandez A (2008). Drinking water vaccination – a few simple rules, *Ross Tech Notes*, September.
- Pattison M, McMullin P, Bradbury JM and Alexander D (2008). *Poultry Diseases* (6th edn), Saunders Elsevier, Philadelphia.
- Responsible Use of Medicines in Agriculture Alliance (2006). Responsible use of vaccines and vaccination in poultry production, www.ruma.org.uk/poultry/responsible-use-

vaccinesvaccination-poultry-production-2/
- Wyatt Poultry Health Services (2015). Vaccination strategies and application of vaccines, poultry health course.