



Drinking Water Vaccination

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Introduction

Mass vaccination of a flock via drinking water is a simple and quick method of vaccine administration. It is less stressful for the birds as it does not require individual catching, handling and vaccine administration. However, mass vaccination methods require careful management if they are to be as effective as individual vaccination methods.

This article gives a few simple rules that should be followed to ensure that mass vaccination via drinking water is as efficient and effective as possible.

The Objective

The objective of mass/drinking water vaccination is to give **every** bird in the flock the correct dose of the vaccine. Effective vaccination will provide the best possible protection for the flock from field challenges and/or provide passive protection via maternally derived antibody to the progeny.

The Vaccination Procedure

Your veterinarian will provide a vaccination schedule and the vaccines.

Calculation of water intake

The aim of drinking water vaccination is for the water containing vaccine to be consumed by the flock over a period of 1½ - 2 hours. If the time is less than 1½ hours then not all the birds will receive a dose of the vaccine. If it is longer than 2 hours the vaccine may die before it is administered to the birds. In order to achieve this aim, the amount of water that is normally consumed within a 1½ - 2 hour period by the flock must be estimated. This can be accurately done the day before vaccination by measuring the amount of water consumed by each house, over a 2-hour period, commencing 45 minutes after feeding. On the day of vaccination the water is withheld for 60 minutes prior to vaccination, so that the flock will consume more water than normal. To account for this, an extra 5% must be added to the calculated water consumption.

Table 1: Amount of water required for vaccination*

Age	Water Consumption per Day**
2 to 3 weeks	25 liters/1,000 birds 6 gallons/1,000 birds
4 to 6 weeks	30 liters/1,000 birds 7 gallons/1,000 birds
7 to 10 weeks	50 liters/1,000 birds 11 gallons/1,000 birds
11 to 15 weeks	60 liters/1,000 birds 13 gallons/1,000 birds

*House temperature of 18 – 20°C (65 – 68°F).

** The quantity of water dosed with vaccine will usually be about 50 – 60% of the normal daily water consumption.

Protection of live vaccines

The vaccine will not be effective or will be killed if there is chlorine or a high hard metal content in the water. The water that is to be used for vaccination can be treated with low fat milk solution (2 grams of skimmed milk powder per liter of water) or with a commercially available vaccine protection product supplied by the vaccine company to neutralize the chlorine and protect against hard metal content. Neutralization of the chlorine must take place at least 20 minutes before the vaccine is added.

Excessive bio-film in the drinker lines will reduce the effectiveness of the vaccine. Bio-film and scale should be removed from the drinker lines using suitable products and drinkers (cups, bell drinkers etc.) cleaned as part of a routine procedure at clean-out. More information on water line sanitation programs can be found in the **AviaTech – Water Line Sanitation**, August 2007.

Storage and transportation of vaccine:

- Vaccine should be stored in a dedicated fridge at a temperature of 2-8°C (35-46°F). A min/max thermometer should be used to check the temperature regularly.
- Amount of doses required should be calculated to nearest 1,000.
- Transport from the place of storage to the place of administration should occur in a cool bag/Styrofoam box, ensuring that the temperature is maintained between 4-8°C (39-46°F).

Equipment needed for vaccination process:

- Plastic container (*approx.* 80 liters (18 gallons) in size).
- Watering cans, a water proportioner system or a dedicated (ideally) vaccination tank (*approx.* 5-10 liters (1-2 gallons) in size).
- Measuring jug.
- Clean bucket or vessel to mix and draw vaccine.
- Skimmed milk.
- Stirrer (plastic).
- Stick (plastic): a paddle for example.

Vaccine preparation and administration – some key points:

1. Vaccine preparation must be on a clean surface (disposable kitchen role or clean newspaper on a clean table top is suitable).
2. **Disposable gloves must be worn for the entire procedure.**
3. Chlorine neutralization solutions must be made up as low volume stock solution (5-10 liters (1-2 gallons)) and then mixed through the larger volume of water for vaccination. Leave for **20 minutes** to neutralize any chlorine which may be in the water.
4. Remove the metal caps from the vaccine bottles.
5. Put approximately 1 to 2 liters (0.22 – 0.44 gallons) of the chlorine neutralized water in a small container. Submerge the vaccine bottle into the solution and remove the rubber bung.
6. Ensure that the pellet has dissolved.
7. Gently but thoroughly stir the solution to mix and then add to the rest of the water (calculated from the previous day's intake during a 1½ - 2 hour period after feeding, plus 5%) for vaccination.
8. Thoroughly mix the solution with the rest of the water in the water tank and stir it with a plastic stick or place the solution under the proportioner, submerging the suction tube.
9. Allow all drinkers to fill with vaccine containing water before lowering them to bird level. In the case of nipples take a bucket to the far end of the nipple line and drain off the existing untreated water. As a rough guide, 1 liter (0.22 gallons) of water should be removed from each 3 meter (10 ft) length of nipple line. Repeat this for each line in the building until colored vaccine water appears. Once drained, nipples should be lowered to the normal height for the birds.
10. Walk the flock at least twice during the vaccination process to encourage uniform consumption and make sure that vaccine is flowing to all the drinkers.

11. Observe the drinking behavior and ensure to your own satisfaction that all the birds are drinking and are receiving a dose of vaccine.
12. Monitor the consumption rate of the vaccine to ensure your calculations are correct and that the vaccination solution will be consumed over a 2-hour period. **Note: the vaccination solution will be consumed quite quickly at the start of the process.**
13. Only when the vaccine water in the drinkers is finished should the mains water be turned back on. The vaccine must not be diluted by the addition of mains water.
14. All equipment must be clean, but the vaccine must **not come in contact with disinfectant.**

Cleaning and storage of vaccine equipment

- Wash vaccine equipment with clean water. **No** detergents/disinfectants to be used.
- Store all equipment in a sealed plastic bag and store in clean area of farm.
- Water system should be sanitized.

Vaccination timetable

Before the day of vaccination a Vaccination Timetable should be drawn up. **Where multiple sheds are to be vaccinated on the same day a timetable for each shed must be prepared and vaccination only performed when it is practical to keep to the correct timings to ensure the correct vaccination of each shed.**

Table 2: Example of a vaccine timetable for one house

TIME	ACTIVITY
8am to 8:45am	Feed and water.
8:45am	Turn water off and let birds drink remaining water in drinkers (20 minutes approximately).
9:05am	Raise drinkers or lines out of the reach of the birds.
9:05 to 10:05am	Water withdrawal time. Make up vaccine to dose the volume of water that will be drunk in about 1½ - 2 hours.
10:10am	Drain residual water from each line/bell (1 liter/3 meters (0.22 gallons/10 ft) of line) until milky/white colored water appears and then lower lines/bells to the birds.
10:10am to 12:10pm	Vaccination period. Walk flock twice during vaccination, check flow of vaccine along all water lines and to all drinkers.
12:10pm	Turn on water mains after vaccination. Clean water proportioner.

Evaluation of Drinking Water Vaccination

It is important to assess the efficiency of vaccination once it has been completed. This can be done by using a commercially available dye product that stains the tongue. It is advisable to use dye tablets at least once per flock to assess the vaccination technique. There are several products available. The blue intensity on the tongue of the birds after vaccination varies between products and decreases with time after exposure (**Figure 1**).

Figure 1: Blue dye on the tongue of the bird to assess vaccination technique.



The manufacturer's instructions should be followed carefully when assessing the efficiency of vaccination using this technique. One hundred birds from at least three different locations in the house should be examined for tongue color to see if the blue color of the tongue corresponds approximately to a dose of vaccine. If the vaccination technique has been successful at least 90% of the birds examined will have well-stained tongues in accordance with the manufacturer's guidelines.

If there is any doubt about how well the flock has been vaccinated, inform the line manager or veterinary surgeon responsible for the flock.

Serological Interpretation

It is important to remember that just because the birds seem to have been vaccinated properly it does not mean they are protected from the disease for which they have been vaccinated. Protection can be assessed by looking for the presence of antibodies against that disease. This can be done using the simple biochemical technique ELISA (Enzyme-Linked Immuno Sorbant Assay) which detects the presence of an antibody in a sample. Vaccination has been successful if the level of antibodies (or titer) in the sample is high and if the variation in titer responses between individuals is low. In general, it takes about 3 weeks after vaccination (or challenge) for the birds to develop antibodies. Antibody titers should be

determined by taking blood samples from a representative sample of the population (20 birds). These birds should be chosen at random. The amount of antibodies produced by an individual will depend on a number of factors including:

- Method of administration. For example, drinking water vaccination provokes a stronger production of antibodies than spray vaccination.
- Dose.
- Vaccine program. What type and how hot is the vaccine? For example, in general terms the hotter the vaccine the more immunogenic (more production of antibodies) it will be.
- Age.
- Type of bird.
- Nutrition.
- Immunosuppression.

When evaluating vaccine response 2 parameters to consider are:

1. Titers which refer to the level of antibodies that the individuals have produced and therefore give an indication of how their immune system has responded.
2. Coefficient of variation (CV) which refers to how "similar" to one another individuals are within the population in terms of antibody titer. In general for any disease the CV should be less than 50%.

In addition it is also important to establish a baseline antibody response for your individual farm. This will provide the expected titer or antibody response and CV for all the diseases that the birds are vaccinated against. These baselines are generally produced by taking the average titer for the last 12 months across the entire farming base with the same vaccination programs. If the baseline titer is different to the expected titer indicated by the vaccine manufacture then an investigation should occur and corrective action taken where necessary. More information on evaluating vaccination responses can be obtained from your local veterinarian.

Conclusions

Mass vaccination via drinking water is a simple and quick method of vaccinating a flock and can provide good, uniform immunization against disease. Due to the lower level of bird handling it can have measurable benefits to bird performance over individual vaccination; such as better weight gains, uniformity, egg production and hatchability. However, such benefits will only be realized through effective management of the vaccine procedure and appropriate monitoring of the birds response to vaccination.

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