Best Practice
on the Farm

Spray Vaccination

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Introduction

1 Spray vaccination is a practical and effective method for the mass administration of live vaccines in poultry. It is well suited for field use with the objective of delivering a full vaccination dose to each bird, ensuring uniform coverage with minimal disruption. The key factors for success that are to be monitored throughout the spray vaccination process are vaccine handling, appropriate droplet size, application technique, and optimal environmental conditions.

In the poultry industry, respiratory vaccines such as Newcastle Disease Virus (NDV) and Infectious Bronchitis Virus (IBV) are the most common vaccines administered via spray. However, vaccines typically delivered through drinking water, such as Infectious Bursal Disease (IBD) and Reovirus, may also be administered by spray.

Best Practice for Spray Vaccination

1 **The primary goal of spray vaccination is to deliver a uniform and effective dose of a live vaccine to each bird, targeting the respiratory and/or digestive systems.** Achieving a good vaccination relies on three critical factors: appropriate droplet size, correct equipment calibration, and optimal environmental conditions during application.

2 **A successful spray vaccination procedure requires:**

- Comprehensive preparation
- Correct application of the vaccine
- Systematic post-vaccination validation

3 **Regular review of protocols and close collaboration with a poultry veterinarian are essential to ensure consistent protection, high flock performance, and uniform vaccine distribution, as part of a comprehensive wider health program.**

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Preparation Before Vaccination

1 **Always consult a qualified poultry veterinarian to design a vaccination program suitable for flock age, production type, vaccines available, and local disease challenge.**

2 **Use sprayers exclusively for vaccine application.** Never repurpose sprayers used for chemicals or disinfectants. Well-maintained, battery-operated sprayers designed specifically for poultry vaccination are preferred over manual ones due to their consistent output, optimal droplet size, and uniform coverage.

- Determine the number of sprayers needed for vaccination based on their spray reach and the width of the poultry house.
- The droplet or particle size of the spray has a major influence on where the vaccine is deposited in the respiratory tract. Fine droplets (<70 µm) can be inhaled deeply into the lungs and air sacs, potentially leading to strong post-vaccination reactions. Coarse droplets (>100 µm) are primarily deposited in the upper respiratory tract (eyes, nares, and feathers) and provide safer, more uniform vaccination. Furthermore, larger droplets better preserve vaccine viability and are more likely to settle on the birds' feathers and be ingested during preening, thereby increasing overall vaccine uptake.

A designated sprayer.

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Spray Vaccination

Follow the sprayer manufacturer's recommendations for vaccine water volume.
If no specific guidance is provided, use the following step-by-step calculation method:

Step 1
Test sprayer output

Add a known volume of water (e.g., 2 L) to the sprayer and record the time required to spray it completely (e.g., 120 s).
Sprayer output = Time (s) ÷ Volume (L)

E.g., 120 s ÷ 2 L = 60 s/L

Step 2
Record spray time during test run

Fill the sprayer with distilled water. Walk the length of the house (or occupied section) at a normal pace, and record the time taken.

E.g., 240 s

Step 3
Measure sprayer reach

During the test run, have a helper measure how far the spray consistently reaches on each side.

E.g., 3 m (9.8 ft) on each side = 6 m (19.7 ft) total spray width

Step 4
Determine how many sprayers or spray routes are needed/necessary

Use the spray reach to calculate how many sprayers or routes are needed to cover the house width.

E.g., a 12 m (39.3 ft) wide house requires:

- Two sprayers walking 3 m (9.8 ft) parallel to each side wall, or
- One sprayer walking two routes, 3 m (9.8 ft) from each wall.

Step 5
Calculate water volume per pass

Water volume per pass = Test-run time (s) ÷ Sprayer output (s/L)

E.g., 240 s ÷ 60 s/L = 4 L

Step 6
Calculate total water volume for the full house

Total water volume for full house = Water volume per pass × Number of sprayers or routes × Number of passes

E.g., 4 L × 2 routes × 2 passes = 16 L

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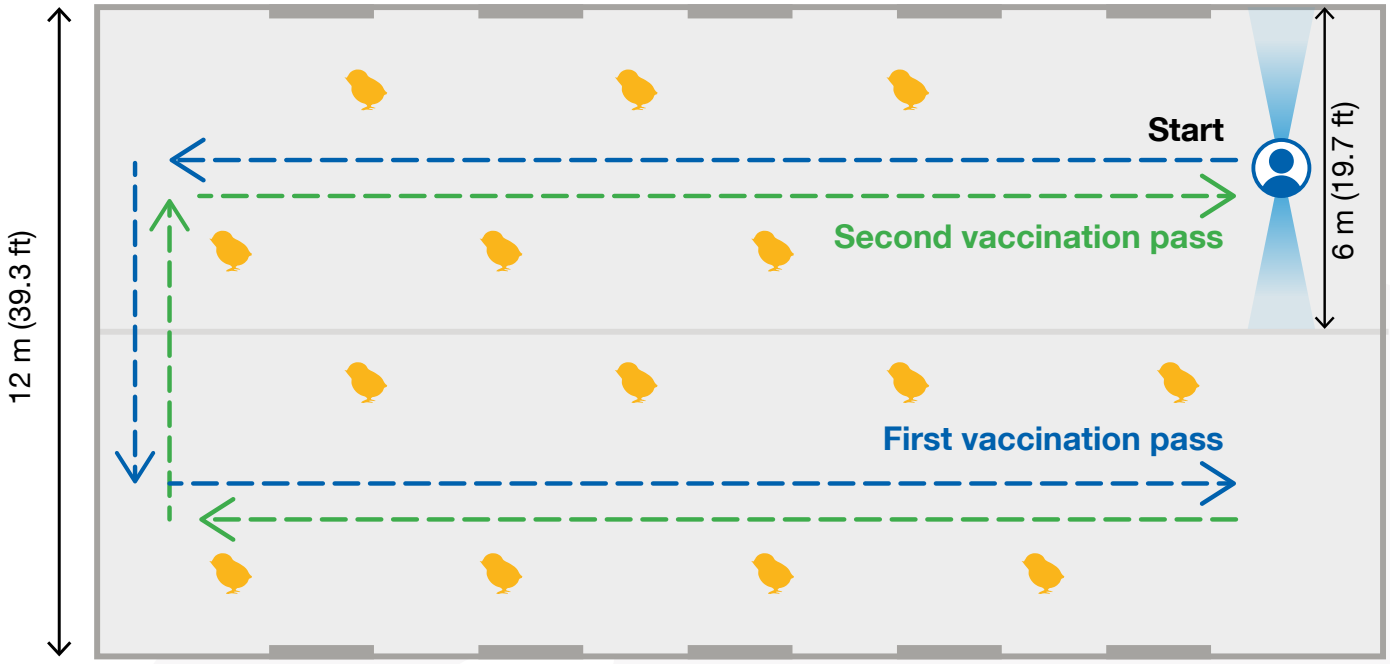
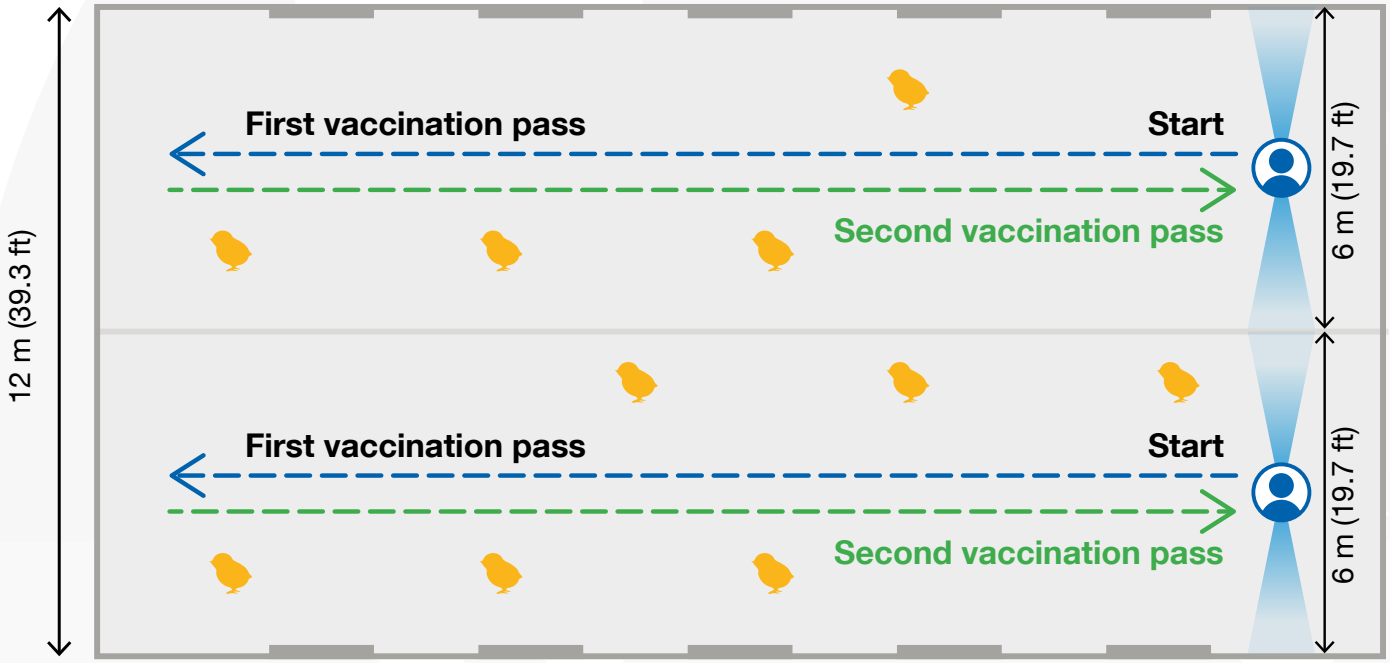
Spray vaccination route and pass for one person and two people (top and bottom, respectively).
Note: Two complete passes of vaccine are recommended to ensure full coverage.



Or



3 **Use cool distilled water less than 20°C (68°F) to prevent thermal degradation of the vaccine's potency**. If distilled water is not an option, guarantee the chosen source is free from pathogens, excessive minerals, and disinfectant residues to preserve vaccine potency.

- Always include a vaccine stabilizer containing dye in the spray solution, even when using distilled water. The stabilizer maintains vaccine viability and helps verify uniform coverage visually.
  Note: The stabilizer must be added to the water before it is used to mix the vaccine.

4 **Store vaccines in a dedicated refrigerator at 2–8 °C (35–46 °F).** Include a minimum and maximum thermometer to monitor temperatures and detect deviations.

- Calculate the required vaccine doses to the nearest 1,000 birds, ensuring at least one full dose per bird.
- Transport vaccines in a 12-volt cooler, hard-sided plastic cooler, or as a last resort, a Styrofoam cooler, maintaining 2–8 °C (35.6–46.4 °F) with ice packs. Ensure vaccines do not come into direct contact with ice packs.

Transport vaccines in a cooler with ice packs *(Pictures courtesy of ANA Services and Training & Development Teams).*

5 **When preparing the vaccine, maintain a clean, biosecure environment, and wear the correct personal protective equipment (PPE) for spray vaccination.**

A. Work on a clean, dry surface that has been disinfected with 70% alcohol. Allow the surface to air dry completely before proceeding.

B. Prepare the vaccine for only one poultry house at a time to avoid confusion and maintain vaccine efficacy.

C. Follow the Aviagen recommended biosecurity guidelines and wear appropriate personal protective equipment (PPE), including disposable gloves, a mask or respirator, and safety glasses.

Properly dressed personnel cleaning the working surface.

5

D. Add a small volume of distilled water mixed with the recommended concentration of vaccine stabilizer and dye in a clean container. Pour the remaining water/stabilizer solution into the sprayer tank.

E. Reconstitute the vaccine by using a disposable syringe to transfer the stabilizer-dye solution into the vaccine vials. Gently swirl or shake until the vaccine pellet is completely dissolved. *Note: Ensure the surface of the vial stopper is clean before injecting through it, to avoid contaminating the vaccine.*

F. Remove the vial stopper and pour the dissolved vaccine into the sprayer tank. Rinse each vial twice with the stabilized water and add the rinses to the tank to ensure full recovery of the vaccine.

G. Close the sprayer lid tightly. Gently tilt or invert the tank several times to ensure the solution is evenly mixed.

Transfer the stabilizer-dye solution into the vaccine vials.

Dissolving the vaccine pellet in vial.

Pour the remaining water/stabilizer solution into the sprayer tank.

Tilt tank gently to mix.

Vaccine Application

1 **Prepare environmentally-controlled and open-sided houses for spray vaccination by monitoring lighting and ventilation.**

- For environmentally-controlled houses, before spraying, dim the lights to reduce the migration of birds in the vaccination area. Turn off the ventilation or heating system and keep them off for at least 10 minutes after spraying is completed. This allows the vaccine to settle properly.
- For open-sided houses close all side curtains and turn off the fans during spraying. Keep the curtains closed for 10 minutes after spraying to minimize air movement and ensure even vaccine distribution.

2 **Apply vaccines during the cooler period of the day, preferably in the early morning, using an approved technique**. This is especially important during summer or in hot climates.

- Hold the sprayer lance parallel to the ground, approximately 1 meter (3.3 ft) above the floor, directed towards one side of the house.
- Walk at a steady and consistent pace, spraying in a side-to-side sweeping motion to cover the target area evenly. Continuously monitor bird movement during the process to prevent uneven distribution and uphold animal welfare.
- Perform two complete passes through the house to ensure uniform vaccine distribution across the entire flock.

Hold the sprayer lance 1 m (3.3 ft) above ground, spraying parallel to the floor
(Pictures courtesy of ANA Services and Training & Development Teams).

Post-Vaccination Actions and Validation

1 **After a minimum of 10 minutes post-spraying, ventilation, heating systems, curtains, and any other environmental controls should be restored to regular operation.**

2 **Document all critical information, including:**

- Vaccine type and name
- Manufacturer
- Lot number and expiration date
- Volume of water used
- Date of vaccination
- Any additional relevant observations or notes

3 **Properly clean the sprayer using an initial rinse, disinfection, and a final rinse.**

- Rinse the sprayer tank with distilled water, then spray the entire contents to flush the system.
- Refill the tank with alcohol, spray it through the system, and empty completely.
- Repeat the rinse using distilled water to remove any alcohol residue.
- Wipe the exterior of the sprayer thoroughly using disinfectant wipes to remove any vaccine residues or contaminants.
- Allow the sprayer to air dry completely before closing it. Charge the battery, repair or replace any damaged parts, and store the equipment in a clean, dry, and secure area until the next use.

Disinfect the tank with alcohol.

4 **Assess the effectiveness of the vaccination using serological or molecular diagnostic methods to confirm an appropriate immune response.**

5 **Assess the effectiveness of the spray vaccination to confirm an appropriate immune response.**

- **Serological monitoring** (e.g. *enzyme-linked immunosorbent assay* [ELISA]) may be used to evaluate the immune response to key antigens such as NDV, IBV, IBD, and *reovirus*, typically around 3 weeks or more after vaccination.
- **Molecular monitoring**, where applicable (e.g. *reverse transcription polymerase chain reaction* [RT-PCR] or *quantitative* RT-PCR [qRT-PCR] for IBV vaccines), may be used to confirm vaccine take following spray vaccination, typically around 5–7 days post-vaccination.