NC STATE UNIVERSITY

Hatchery Vaccination

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Economic Impact of Respiratory Disease

ASSUME: Broiler Complex Processing 1 Million Birds/Wk (7lb avg. wt)

LIVE PRODUCTION COST

1% Increased mortality = **$30K / wk** *or* **$1.56M / yr**

For every **1%** higher FCR = **$16K / wk** *or* **$832K / yr**

(Calculations based on analysis of industry trends)

Carcass (Airsac) Condemns due to respiratory disease

10% Line speed reduction

$80K / day *or* **$400K / year** *or* **$21M / year**

0.25

$3.7K / day *or* **$19K / year** *or* **$1M / year**

TOTAL $25M / yr

lost sales calculations excluded

Disease Prevention

In addition to implementing best animal care practices, there are two main areas of focus for helping prevent disease:

1. BIOSECURITY

- Practices that aim to prevent the introduction and/or spread of disease by helping eliminate or reduce the exposure to pathogens.
- Includes physical structures, operational procedures, and policies

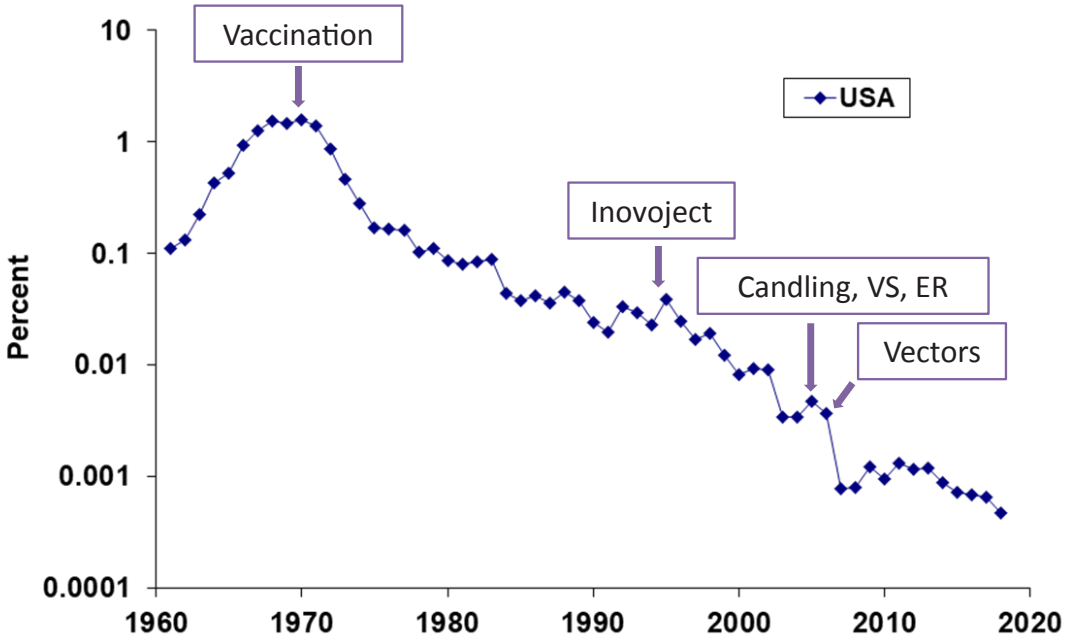
2. VACCINATION

- Use of a vaccine to produce immunity against disease

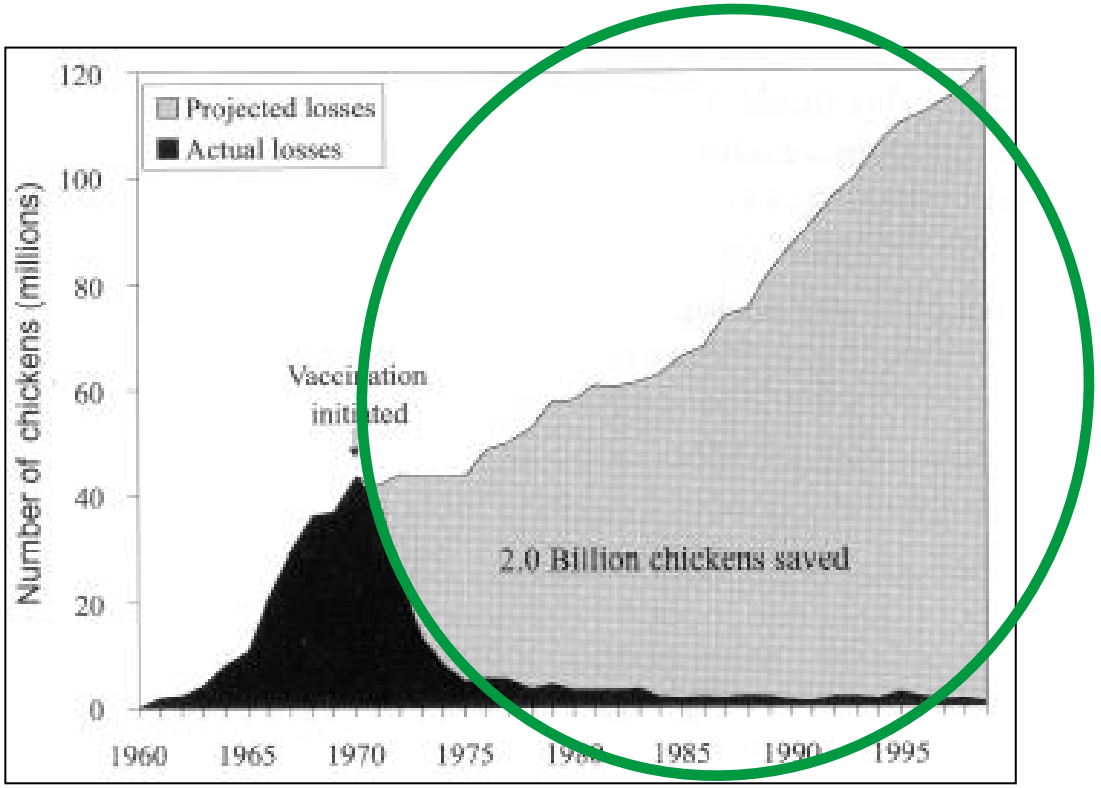
What is a Vaccine?

- A biological preparation that induces or improves immunity to a particular disease.
- Typically, it contains an agent that resembles a disease-causing microorganism.
- It is often made from an attenuated form of the organism. The agent stimulates the immune system to recognize, neutralize, and remember it.
- Once a memory immune response is established, it becomes easier to recognize and neutralize the agent in later encounters.

USA Marek's Disease Condemnations

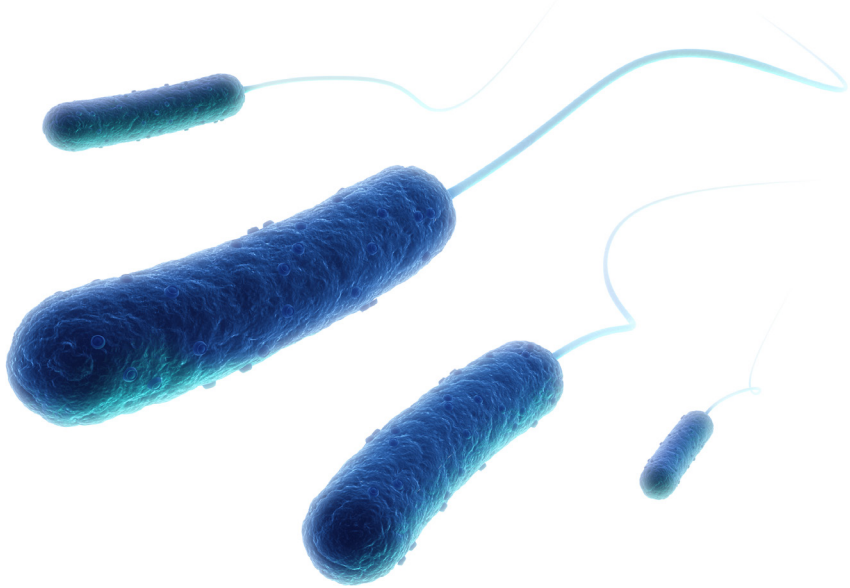


Dunn JR, Gimeno, IM; *Avian Diseases*, 57: 483-490, 2013



Witter RL; Marek's Disease, Ed. K Hirai. Springer-Verlag, Berlin Heidelberg, 2001

Vaccines Provided in the Broiler Hatchery



VIRUS

- Marek's Disease Virus (MD, MDV)
- Newcastle Disease Virus (ND, NDV)
- Infectious Bursal Disease Virus (IBD, IBDV)
- Infectious Bronchitis Virus (IB, IBV)
- Infectious Laryngotracheitis (ILT)

PROTOZOA

- Coccidiosis

BACTERIA

- *Salmonella* (ST, SE)
- *E. coli*

- Pro-/pre-biotics or nutrients (sometimes added)

Advancements in Vaccine Technology

VECTOR VACCINES (HVT, FP)

A nonpathogenic virus carrying a foreign gene inserted into a region of the genome not required for viral replication.

When the virus infects the host, the foreign protein is expressed.

The host immune system responds to the virus vector as well as the foreign protein.

Presentations/ Formfactors of Vaccine*

LYOPHILIZED
(Freeze-Dried)

FROZEN

WATER-IN-OIL EMULSION

**Product information, registration, and availability may vary per country, and may change without notice. Contact your local Zoetis representative for details.*

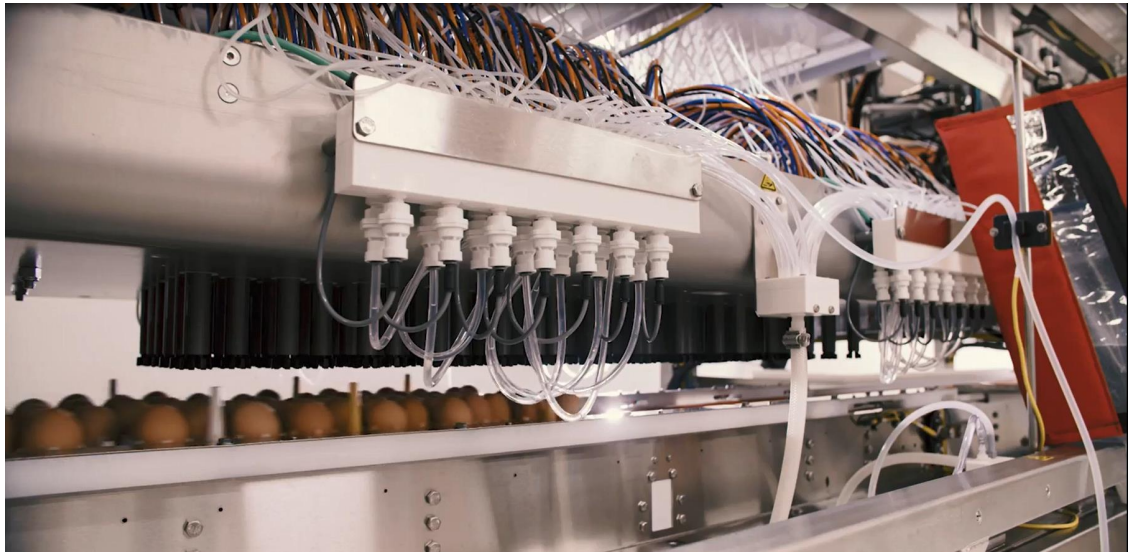
Methods of Hatchery Vaccination

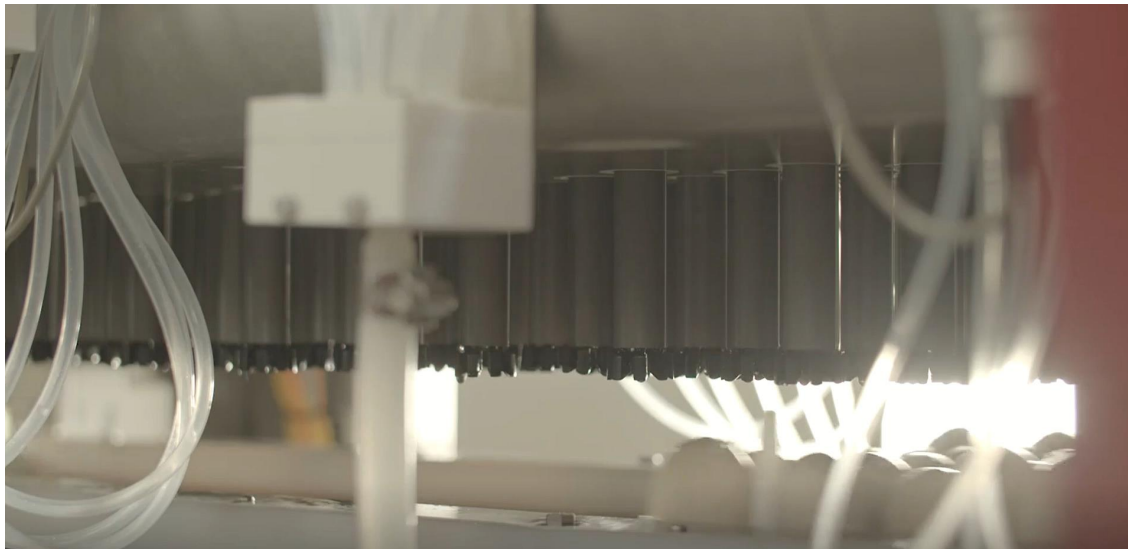
- ***In ovo***

Vaccine delivered via a needle in the egg to amnion or embryo at 17.5-19 days of incubation.

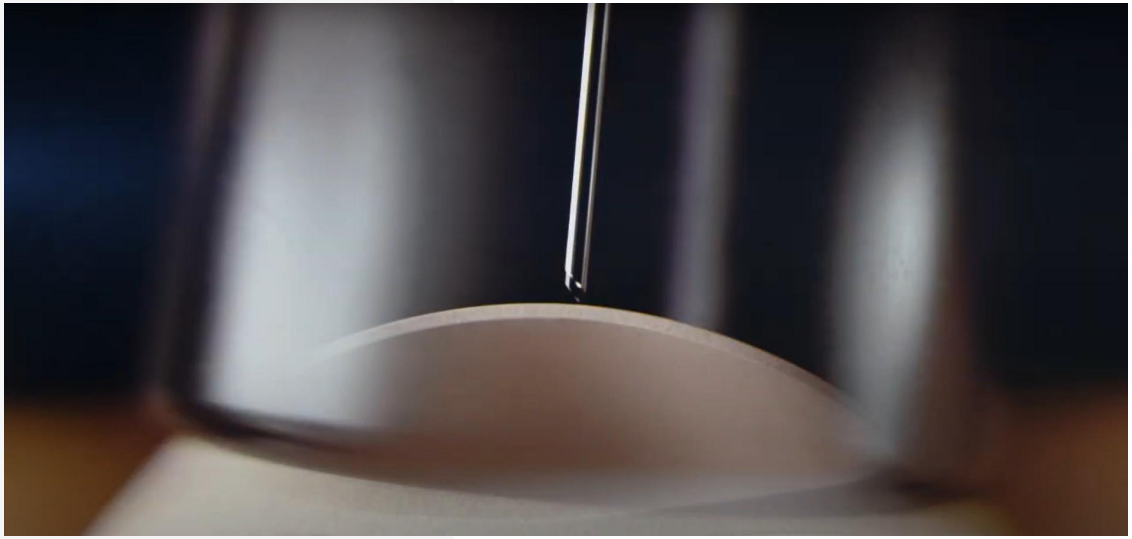
- Precision dose applied at the individual level
- Early immune response, protection prior to exposure
- Pairs with transfer process and equipment that provides data
- Cannot vaccinate for IBV

Examples of *in ovo* Vaccination:






Inovoject NXT
Inject Module
Tooling Clamp Bladders
Pin Stops
Retract
Extend
Head
Punch
Sanitizer Dispense
Double Sanitation
QC Cycle
Egg Support



Methods of Hatchery Vaccination

- ***Subcutaneous***

Vaccine delivered via a needle below the skin (subcutaneous, SQ) of chicks/poults during processing at the hatchery.

- Precision dose applied at the individual level
- Requires individual handling of chicks/ poults
- Higher labor requirement

Examples of subcutaneous Vaccination:

- ***Spray***

Vaccine is delivered via a liquid spray or gel over boxes of chicks/poults during processing at the hatchery.

- Estimated dose applied at a mass level
- High throughput
- Relatively simple and low cost

Mixing and Handling

SUITABLE STORAGE

- Keep refrigerator temperature consistent
- Maintain dewars with adequate liquid nitrogen

PROPER THAWING

- Thaw bath water temperature of 80°F
- Ensure not to “over-thaw” – use time and visual observation

CORRECT HANDLING

- Aseptic technique/sterility and clean work space
- Avoid cross contamination of day of age (DOA) and in ovo vaccination

DESIRED DELIVERY

- Follow-best practices
- Use vaccine prior to expiration

Dosage Calculation

SPRAY

Two 10,000 dose bottles of vaccine and one gallon of water, delivering 14.0 ml per 100 chicks

- 14.0 ml per 100 chicks = 0.14 ml volume per chick
- One gallon = 3.785 liters or 3785 ml
- 3785/0.14 = 27,036 doses delivered
- 2 X 10,000 = 20,000 doses vaccine
- 20,000/27,036 = 0.74 doses vaccine per chick

IN OVO

Four 4,000 ampule of vaccine and one 800 ml bag of diluent, delivering 50 µl per egg

- 4 ampules x 4,000 doses = 16,000 total doses vaccine
- 800 ml diluent / 50 µl per egg = 16,000 doses delivered
- 1.0 ml per 20 eggs
- 16,000 doses vaccine / 16,000 doses delivered = 1 full dose vaccine

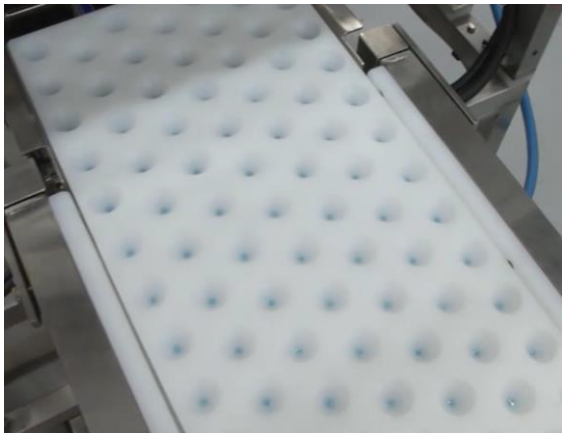
Monitoring considerations

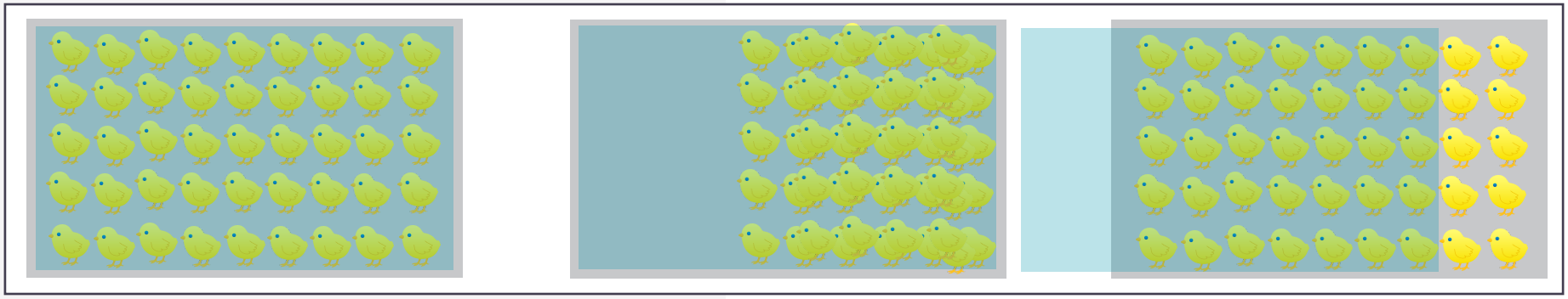
SPRAY

- Spray pattern should be even and have complete coverage
- Tip: Add dye to vaccine and run empty box with paper through

IN OVO

- Proper set-up/shut-down procedures should be followed
- Follow and utilize a process checklist and verify dispense with a QC Plate





Thank you!

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