

# Vaccines in Our Food

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# The USDA

- ▶ **1884** - The U.S. government established the Bureau of Animal Industry (BAI) to study animal disease in domestic livestock
  - ▶ It was a branch of the Department of Agriculture, established by Abraham Lincoln in **1863**



# The USDA

- ▶ Today, the USDA is a bureaucratic behemoth that oversees food, agriculture, natural resources, rural development, nutrition, and issues related to public policy.
  - ▶ 15 agencies with nearly 100,000 employees and more than 4,500 locations nationwide and abroad.
- ▶ **2024 operating budget:** \$24.46 billion, an increase of 11.5% over the previous year

# The APHIS

- ▶ The Animal and Plant Health Inspection Service (APHIS) is one of the 15 agencies within the US Department of Agriculture (USDA).
  - ▶ Six programs, 8,000 employees in the U.S. and 35 countries
  - ▶ Veterinary Services - one of the six programs
    - ▶ Works to protect and improve the health, quality, and **marketability of our nation's livestock**, animal products, various wildlife, and **veterinary biologics**.





# New BE labeling Rules

Jan 2022: Tricky new GMO labeling rule, National Bioengineered Food Disclosure Standard (NBFDS) went into effect

The new rules require disclosure of information about whether a food is bioengineered (BE) or uses BE food ingredients.

- ▶ The law has so many exemptions, loopholes, and technical limitations that many products made from BE ingredients will not be required to be disclosed.
- ▶ For example, the law does not apply to restaurants, cafeterias, food trucks, airplanes, etc. or small food manufacturers with annual gross revenues of less than \$2.5M

# New BE labeling Rules

- ▶ Animal feed, pet food, personal care products, meat, poultry, and eggs are *exempt from labeling*.
- ▶ Stabilizers, highly refined cooking oils such as canola oil, artificial flavorings, and sugar made from genetically modified beets are *not required to be labeled* if the are BE.
- ▶ Also, ***there is no requirement to notify consumers if the animals have been fed bioengineered crops.***



# More: BE labeling Rules

- ▶ New labels are unlikely to disclose that the salmon was farmed or identify the names of the chemicals used to raise a particular fish.
- ▶ *The USDA doesn't even have a definition for organic salmon.*
- ▶ The use of antibiotics to control diseases in farm-raised fish may seriously impact human health.
  - ▶ Antibiotics may be in higher concentrations in transgenic fish than in farm-raised counterparts.




# Veterinarian Biologics

## First Animal Vaccines

- ▶ **1879** - Chicken Cholera Vaccine - the first animal vaccine developed by Louise Pasteur
- ▶ **1881** - Anthrax vaccine for cattle and sheep





# Veterinarian Biologics

Today, there are more than **400 vaccines** for animals:

- ▶ Exotic animals: monkeys, gorillas, tigers, coyotes, bears, camels, and zebras.
- ▶ For 35 species of fish
- ▶ Vaccines for coyotes, bears, shrimp, frogs, alligators...
- ▶ And even one for bees.

# Animal Vaccines

## Safe and Effective?

- ▶ Standards for approval of animal vaccines are much lower than standards for human vaccines.
- ▶ Human vaccines require many clinical trials for safety, the development of protective antibodies, and the level of effectiveness.
- ▶ ***This is not required for animal vaccines.***
  - ▶ Manufacturers are not required to publish findings, especially if there are adverse events.
  - ▶ **Efficacy:**
    - ▶ In humans, it means protecting ***the individual***
    - ▶ In animals, it means protecting ***the group***
    - ▶ Hence, the concept of **“herd immunity.”**

# Mass Vaccination of Farm Animals



- ▶ Having to vaccinate 20,000 chickens or 10,000 piglets in a short period of time is daunting.
- ▶ Therefore, the most common option is **aerosol spraying** or **through drinking water**.
  - ▶ Originally developed for poultry, aerosol vaccination is much more difficult in swine and cattle.

# Vaccines in Livestock

According to Dr. Lew Strickland, Associate Professor and Extension Livestock Veterinarian Dept. of Animal Science, writing for the University of Tennessee Institute of Agriculture (June 2023)

“It would be false to say that mRNA vaccines for cattle do not exist. In fact, trial studies have been conducted on cattle at some research facilities. *However, none of the mRNA trial vaccines [for cattle] have been USDA-approved.* That means the mRNA technology vaccines cannot be used in beef cattle in the United States. Cattle farmers and ranchers do vaccinate cattle, but presently, none of these vaccines include mRNA technology.”

▶ Over 100 vaccines for cattle have been approved for viral, bacterial, and parasitic infections.

▶ **More than 30 of these are commonly used**



# Vaccines in Chickens

Poultry breeding - largest meat production in the world

- In 2020:
  - 100.974 million tons of meat *(that's 201.9 Billion pounds of chicken meat)*
  - 86.670 million tons of eggs *(that's 173.34 billion pounds of eggs)*
- **Approximately 50 to 60 vaccines** are approved for use in chickens.



# Vaccines in Pigs



- ▶ **SEQUIVITY** -
  - ▶ mRNA vaccine called “RNA particle technology” -
  - ▶ approved April 2023
- ▶ Vaccine against influenza A virus in swine, porcine circovirus (PCV), rotavirus, “and beyond.”
- ▶ Approximately **30 to 40 vaccines** are approved for use in pigs, especially piglets.

# Vaccines in Fish

- ▶ According to incomplete statistics, as of 2020, more than **140 aquatic vaccines** have been approved worldwide for **35 different species** of fish.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9684733>

- ▶ Vaccines for use in fish include
  - ▶ killed vaccines
  - ▶ attenuated vaccines
  - ▶ DNA vaccines
  - ▶ recombinant technology vaccines
  - ▶ and synthetic peptide vaccines.

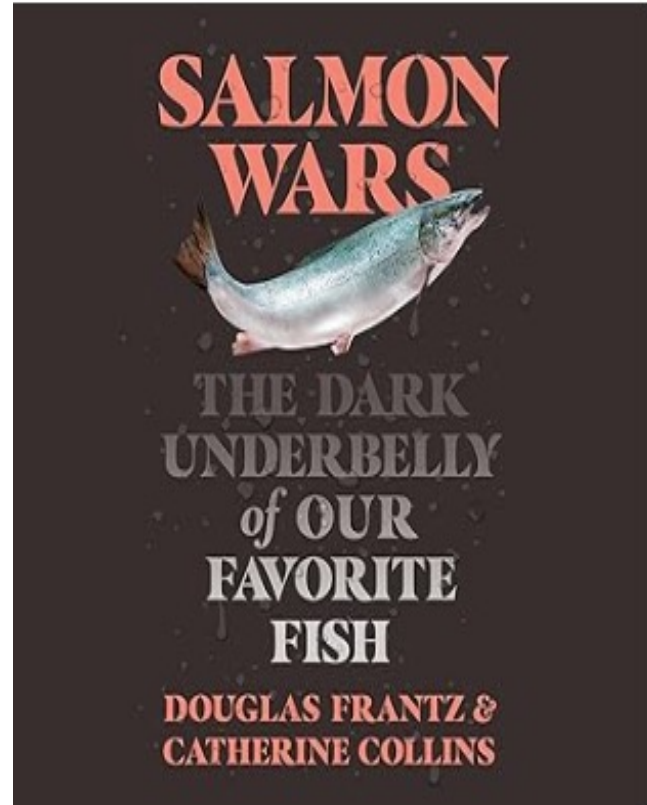
# Aquafarming

- ▶ The breeding, raising, growing, and harvesting of aquatic organisms grown in fresh or saltwater
  - ▶ Everything from seaweed and kelp to sea urchins and fish are farm-raised.
  - ▶ Currently, more than 50 percent of the world's seafood comes from the 4,000-year-old process of aquafarming.
  - ▶ Worldwide, the most prevalent fish species produced in fish farms are carp, catfish, tilapia, and salmon.
  - ▶ There are at least 14 additional fish species raised via aquaculture.
- ▶ **Economics:** in 2023, the global salmon market topped USD \$31.8B and is expected to grow to USD \$45.7B by 2028.
- ▶ ***The farmed salmon industry is one of the fastest-growing industries in the world.***





# Aquafarming



According to the book, *“Salmon Wars: The Dark Underbelly of our Favorite Fish”* (2022), by investigative journalists Douglas Frantz and Catherine Collins:

“The fish spend 2-3 years in open-net farms that contain **up to a million salmon jammed into 10 or 12 cages**. The crowded cages are petri dishes for tiny parasites called **sea lice**.”

“Approximately **15 to 20 percent** of farmed salmon die each year before they are harvested; **that is tens of millions of fish**.”

“By comparison, the mortality rate for factory-farmed chickens is 5% and 3.3% for feedlot cattle.

Fish farms are the **massive ocean feedlots** of our day.”

# Vaccinating Fish


- ▶ **Oral** - incorporates the vaccine into the fish food.
- ▶ **Intraperitoneal injection** - Injection guns used for vaccinating allows each operator to inject *1,000-2,000 fish per hour*.
  - ▶ In Norway, more than *200 million salmon and trout* are vaccinated intraperitoneally every year.



# Vaccinating Fish




- ▶ **Immersion method**
  - **dip method** - fish are dipped for about 30 seconds in a high concentration of vaccine solution
  - **bath method** - where fish are exposed for a few hours to a lower vaccine concentration; requires booster doses.
- ▶ **Intramuscular injection** - preferred method by fish farmers. The disadvantage of this method is that the stress leads to increased fish mortality.



# More on GMO fish

Fish are being engineered for traits that allegedly make them better suited for aquaculture, such as faster growth, disease resistance, larger muscles, and temperature tolerance.

- ▶ Around the world, at least 35 species of fish have been **genetically modified**.
- ▶ Genes used to modify experimental fish come from other fish, fruit, nuts, sea coral, mice, bacteria, ***and even humans***.



## Ingredients in Animal Vaccines

- ▶ Ingredients are very difficult to find because, unlike human vaccines, **ingredients are NOT REQUIRED** to be listed by APHIS or the USDA
- ▶ Most have adjuvants: **aluminum or MR59**
- ▶ One example: Inactivated Salmon Pancreas Disease Virus (SPDV).

Ingredients include:

- ▶ Formaldehyde
- ▶ Paraffin
- ▶ Mineral oil
- ▶ Polysorbate 80, and
- ▶ Sorbitan oleate, an emulsifier that helps oil and water mix together.

# Let's Do Some Math

- ▶ Cattle - 100 approved (30 commonly used)
- ▶ Chicken - 55 approved (25 commonly used)
- ▶ Swine - 40 approved (25 commonly used)
- ▶ Fish 140 approved (50 commonly used)

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Total approved: 335

**Total commonly used: 130**

**And our concern and focus is on *ONE* mRNA vaccine in pigs, and the “potential” for a few more?**

# What to do?

- ▶ Know your local farmer and how he raises your meat
- ▶ Eat wild caught, local fish
  - ▶ Use this website to find local fish retailers.  
<https://finder.localcatch.org>
- ▶ When eating Atlantic salmon or other farmed fish, look for a label from a third-party certifier.
  - ▶ The biggest and best is the Aquaculture Stewardship Council (<https://asc-aqua.org>) - look for their teal green and white label.
- ▶ The ASC label allows consumers to know that fish and seafood products are traceable and have been independently certified as farmed with care.

## Where to find more..

**Website:**

[DrTenpenny.com](http://DrTenpenny.com)

**Education:**

[Learning4You.org](http://Learning4You.org)

**Tenpenny Integrative Medical Center:**

[TenpennyIMC.com](http://TenpennyIMC.com)

**ECP Centers:**

[TenpennyECP.com](http://TenpennyECP.com) and [ECPstudio.com](http://ECPstudio.com)