SCHOOL OF SUSTAINABLE FOOD SYSTEMS
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RESIDENTIAL WORKSHOP & TRAINING PROGRAMME

THE INDIAN POULTRY SECTOR

Perspectives on Role of Vaccination in Reducing Diseases in Poultry

Science, Challenges and Possibilities

Context of Indian Poultry Sector

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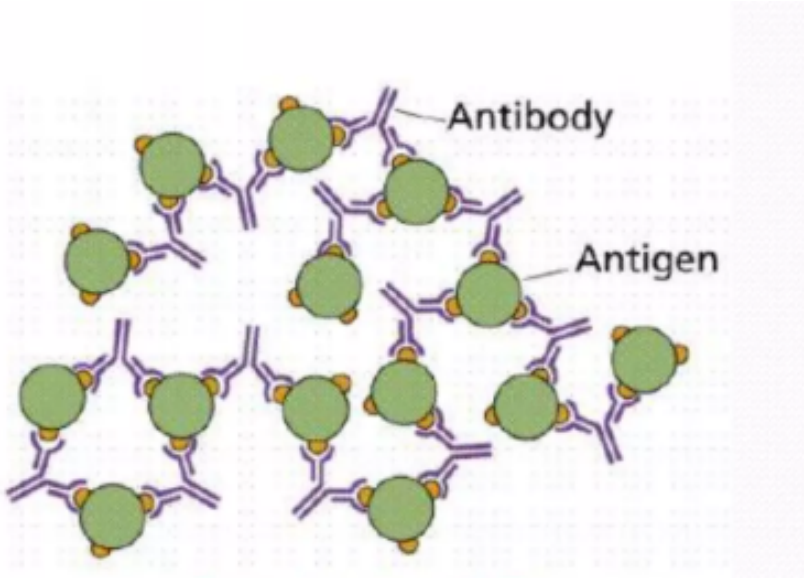
Introduction

- Poultry sector in India is a major contributor to food security and rural livelihoods.
- Vaccination is a fundamental tool to prevent major infectious diseases.
- Protects flock health, reduces economic losses, and ensures sustainability of poultry farming.

What is Vaccination?

- Inoculation with a **biological substance (antigen)** to stimulate resistance or **immunity** to a disease.
- Antigen is usually a **small dose of attenuated (weakened) organism**.
- Triggers the body's defense system to produce:
  - **Antibodies**
  - **Immune cells** to attack the invading organism.



How Do Vaccines Work?

- Vaccines stimulate the immune system against disease-causing agents.
- Can be administered in various ways (ocular, nasal, water, injection, etc.).
- Create “memory” response with antibodies and immune cells.
- Repeated exposure (via boosters) enhances protection.
- Multiple vaccinations maximize immunity in flocks.

Why Do We Vaccinate?

- Essential for poultry management and flock success.
- Protects millions of birds from contagious and deadly diseases.
- Improves flock health and production efficiency.
- Cost-effective compared to outbreak losses.
- Not a substitute for biosecurity and sanitation.
- Reduces clinical disease and optimizes flock performance.
- Some vaccines (e.g., Salmonella) also benefit human health.
- **For breeders:**
  - Protect pullets and hens from diseases.
  - Protect progeny from vertical disease transmission.
  - Provide passive immunity to progeny.

Types of Poultry Vaccines

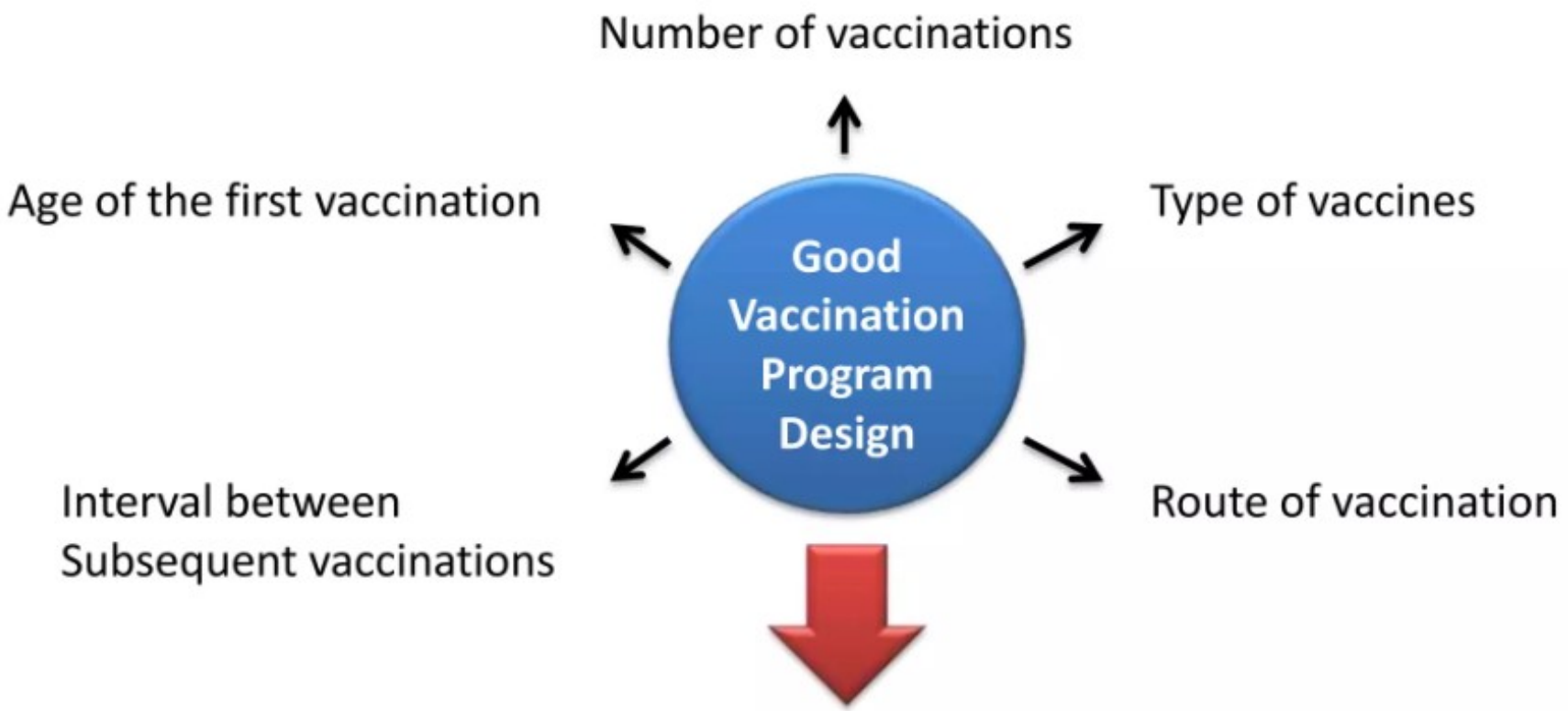
Three main forms:

- **Live (Modified/Attenuated):** Naturally or genetically modified mild strains.
- **Inactivated (Killed):** Whole viruses/bacteria inactivated and formulated as injectable.
- **Recombinant:** Use live virus/bacteria as vectors carrying protective antigen genes.

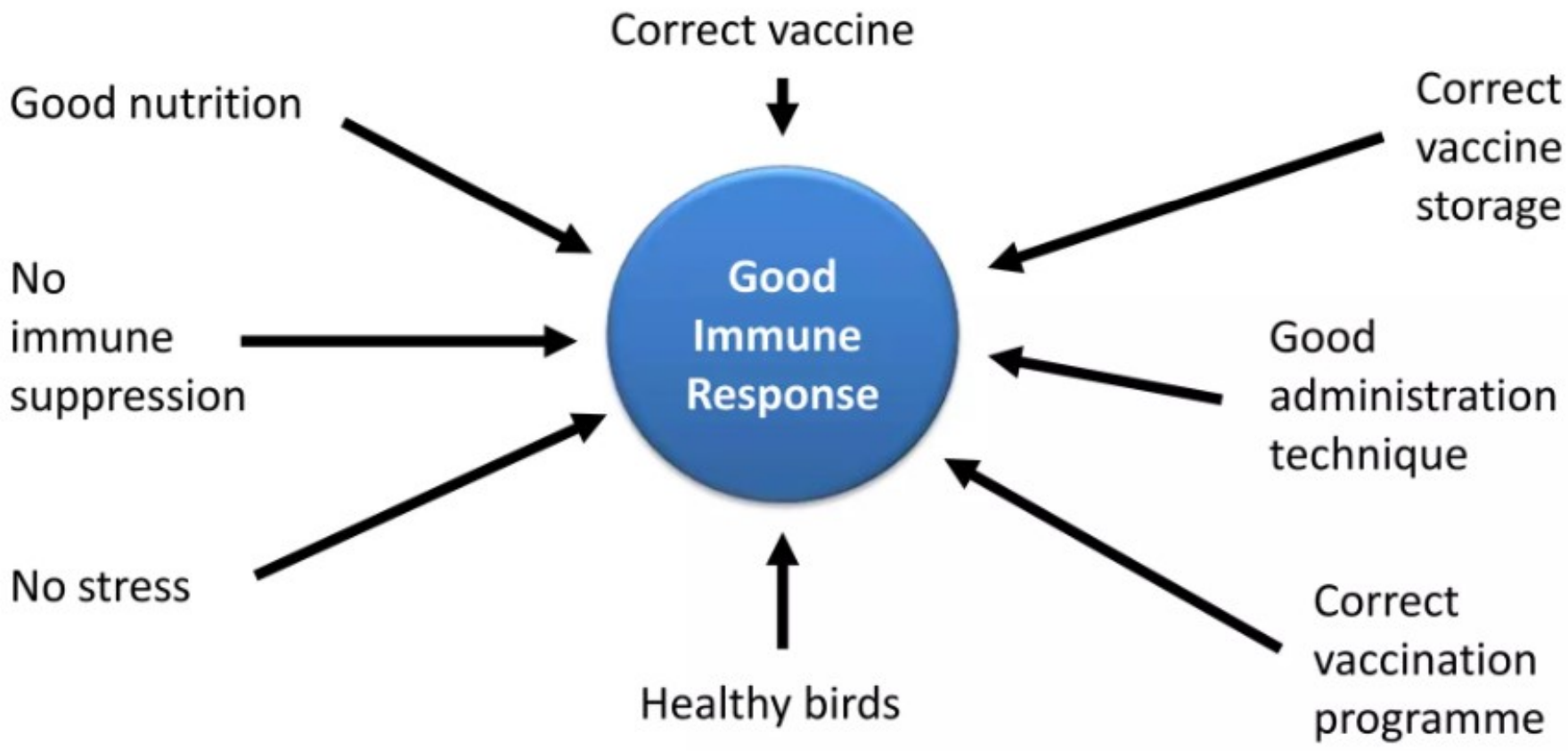
Types of Poultry Vaccines (by Contents)

- **Viral vaccines**
  - MDV, ND, IBV, IBDV, Reovirus, ILTV, etc.
- **Bacterial vaccines**
  - MG, MS, Cholera, Coryza, *E. coli*, *Salmonella enteritidis*, *S. typhimurium*, etc.
- **Protozoal vaccine**
  - Coccidiosis

Basics of Poultry vaccination



Basics of Poultry vaccination



Layers: Vaccination Schedule

Age	Vaccine	Dose	Route
5–7 days	F/Lasota	-	I/R or I/O
14–16 days	I.B.D.	-	I/O or D/W
24–26 days	I.B.D. (booster)	-	D/W
30 days	Lasota (booster)	-	D/W
7th week	Fowl Pox	0.2 ml	I/M
9th week	Deworming	-	-
10th week	R2B	0.5 ml	I/M
15th week	Debeaking	-	D/W
17th week	Lasota	-	-

I/N – Intra Nasal
I/O – Intra Ocular
D/W – Drinking Water
I/M – Intra Muscular

Broilers: Vaccination Schedule

Age	Vaccine	Dose	Route
3–5 days	Lasota	-	I/O or I/N
7–9 days	I.B.D.	-	I/O or D/W
16–18 days	I.B.D. (booster)	-	D/W
24–26 days	Lasota (booster)	-	D/W

I/N – Intra Nasal
I/O – Intra Ocular
D/W – Drinking Water
I/M – Intra Muscular

Vaccine Handling and Storage

For all vaccines:

- Transport in well-insulated box with cool packs.
- If vaccine arrives hot → contact manufacturer/distributor.
- Store at **35–45°F (2–8°C)**.
- Avoid freezing, overheating, and intense light.

For Live Vaccines:

- Transport with ice packs to maintain constant temperature.
- Reconstitute with diluent just before application.

For Inactivated Vaccines:

- Remove **24 hrs before use** to reach room temperature.
- Warm water bath allowed (≤100°F, max 5 hrs).
- Do not expose bottles to direct sunlight during transport.
- Gently agitate bottles thoroughly before use.

Vaccine Emulsion Check (Before Use)

Normal (OK to Use):

- Uniformly milky white.
- Significant settling → two layers.
- Slight settling → two layers.

Broken Emulsion (DO NOT USE):

- Three layers → bottom layer black/dark brown.
- Three layers → plus thin black/dark brown layer.

Pre-Vaccination Care

- Do not vaccinate sick birds.
- Avoid nasal vaccination in birds with respiratory problems.
- Store vaccine in **deep freeze**.
- Vaccinate all birds in a house at the same time.
- Supplement antibiotics in water/feed **3–4 days before vaccination**.
- Never mix two vaccines to save time/labour.
- Use **only distilled water** for reconstitution.
- Vaccinate in the **evening** → birds can rest overnight.

Post-Vaccination Care

- Use **anti-stress medicines** for 3 days to reduce vaccination stress.
- Anti-stress medicines include:
  - Vitamins A & E
  - Probiotics
  - Antibiotics
  - Liver tonics
  - Glucose
- Administer through **drinking water**.
- In case of vaccine failure:
  - Give **immunostimulants**
  - Vitamins A & E
  - Selenium preparations
  - Probiotics

Causes of Vaccination Failure (Bird)

- Maternal antibodies
- Stress
- Birds may already be incubating disease
- Birds may be immunosuppressed
- Strong field challenge
- Waning of vaccine immunity

Maternal Antibodies

- High levels interfere with live vaccine virus multiplication.
- Reduce immunity development.
- Example: Chicks from hens with high IBD antibodies → maternal antibodies persist for weeks, inactivating vaccine virus.

Stress

- Stress suppresses immune response to vaccines.
- Sources of stress: overcrowding, poor nutrition, heat/cold stress, transportation, handling.
- Leads to weaker immunity despite vaccination.

Birds Already Incubating Disease

- If birds are already infected at the time of vaccination, vaccine response is poor.
- Vaccination cannot cure ongoing infections.
- Instead, disease progresses and masks vaccine effects.

Immunosuppression

- Birds with weakened immunity cannot mount a strong vaccine response.
- Causes:
  - Viral infections (e.g., Marek's, IBD).
  - Mycotoxins in feed.
  - Nutritional deficiencies.
- Results in poor antibody production post-vaccination.

Strong Field Challenge

- High pathogen load in the environment can overwhelm vaccine-induced immunity.
- Vaccines reduce disease severity but may not prevent infection under heavy challenge.
- Emphasizes importance of biosecurity alongside vaccination.

Waning of Vaccine Immunity

- Immunity declines over time if booster doses are not given.
- Birds become susceptible again.
- Timely boosters are essential for sustained protection.

Automated Vaccination Systems

- **In-ovo vaccination:** Ensures early immunity.
- **Automated injection systems:** Accurate dosing, 3,500 chicks/hr.
- **Spray systems:** Effective for respiratory vaccines.
- **Water-line systems:** Simple, suitable for large flocks.

Benefits: Precision, reduced stress, improved efficacy, cost savings.

Combined Vaccines in Poultry

Definition

- Formulations containing antigens of **two or more poultry pathogens** in a single dose (e.g., **ND + IB**, **ND + IBD**, **IBD + Marek's**, etc.).
- Available as **live attenuated** (spray/drinking water) or **inactivated oil-emulsion** vaccines.

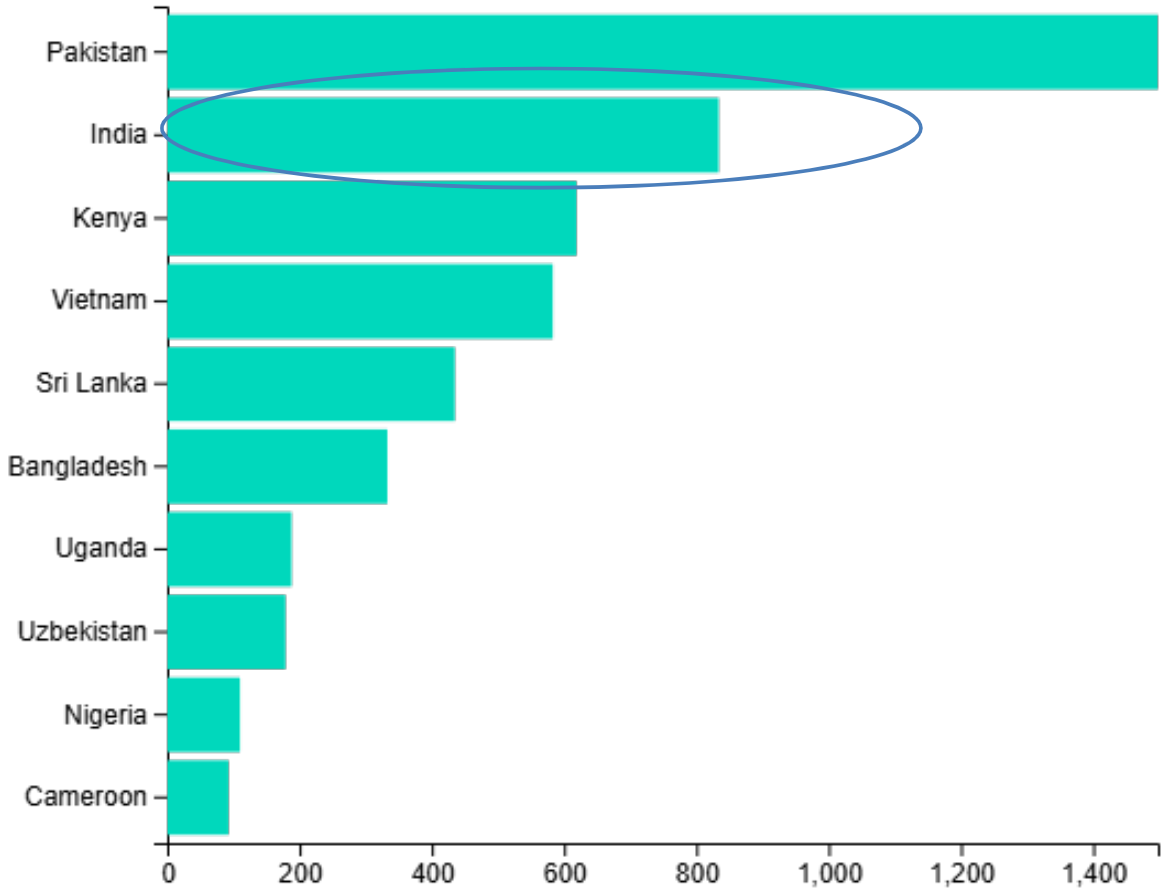
Benefits

- **Reduced handling stress**: fewer injections/dosings for birds.
- **Broader protection**: multiple disease agents covered in one schedule.
- **Cost efficiency**: lower labour, logistics, and equipment usage.
- **Synchronized immunity**: coordinated protection against co-circulating diseases.
- **Less flock disturbance**: particularly important in commercial layer and breeder operations.
- **Limitations to Note** (optional if you want a balanced slide)
- Possible **immune interference** between antigens if not well-matched.

Challenges in Indian Context

- Vaccine failures due to improper storage or administration.
- Maternal antibody interference in chicks.
- Pathogen variability, especially in ND and AI strains.
- Economic constraints among smallholder farmers.
- Limited access to cold chain and quality vaccines in rural areas.

Top 10 Poultry Vaccine Importing Countries

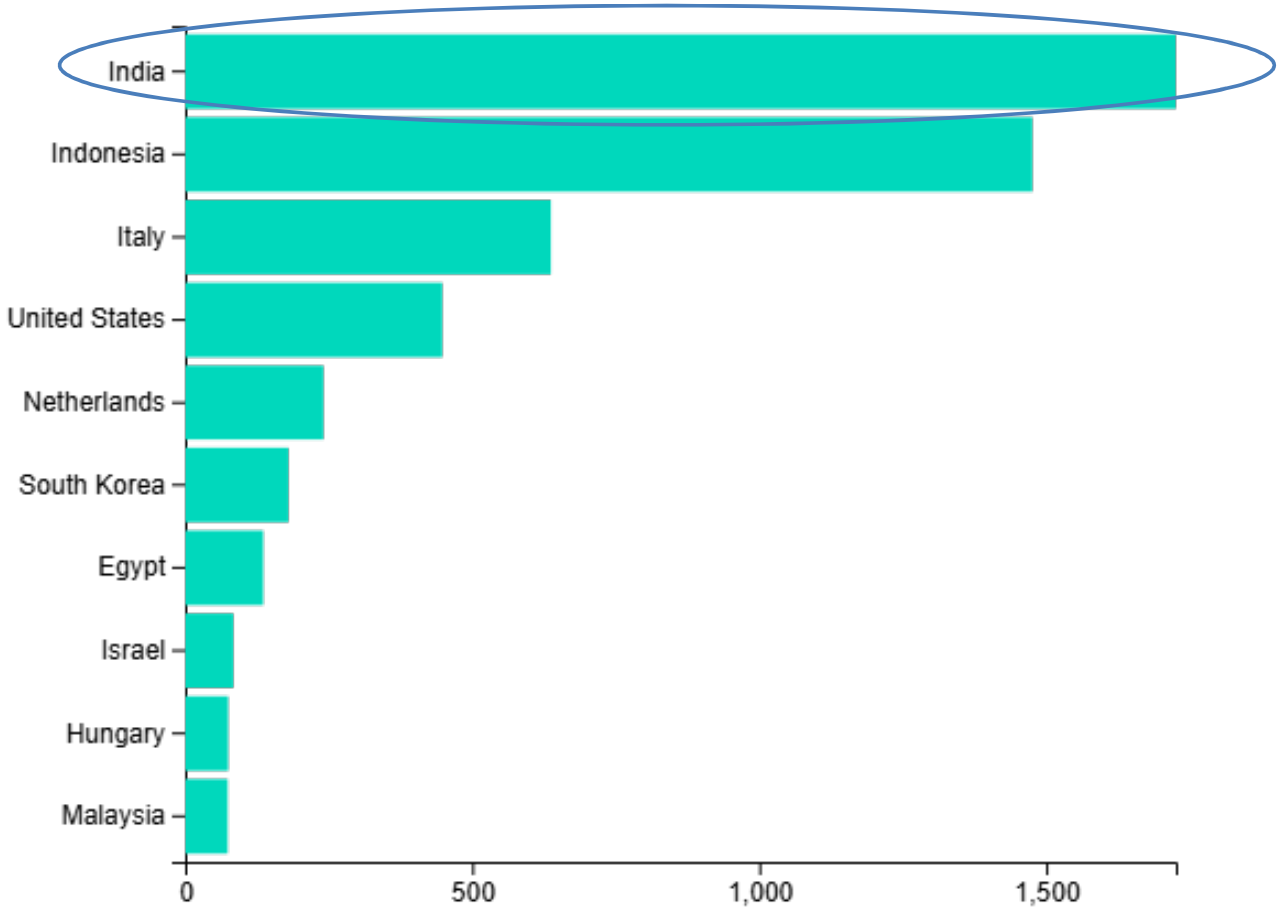


Source: Volza.com

No. of Shipments

Main suppliers: Italy, Indonesia and USA

Top 10 Poultry Vaccine Exporting Countries

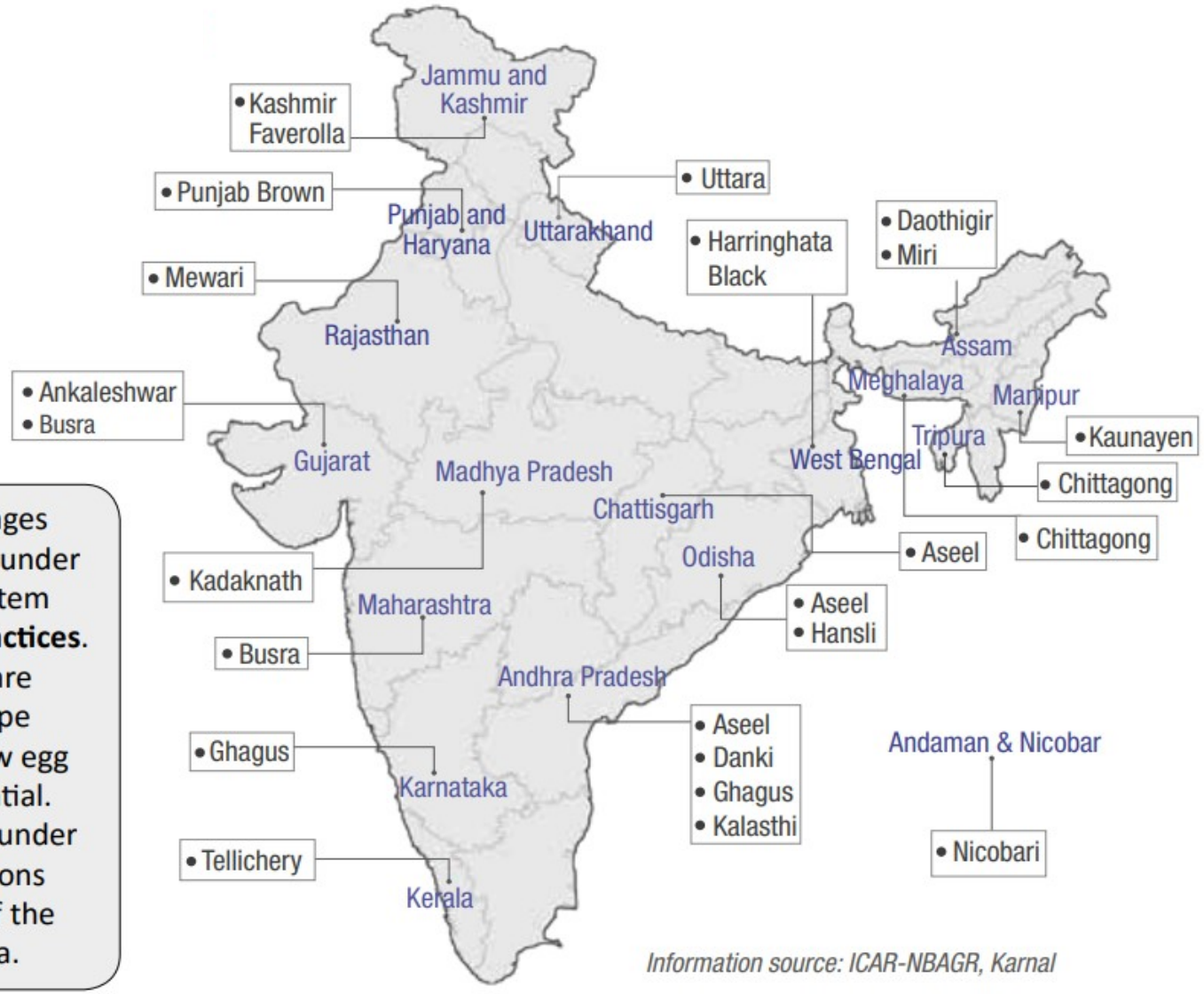


Source: Volza.com

Main Importers: Afghanistan, Uganda, Kazakhstan, Kenya and Sri Lanka

Indigenous/native breeds evolved in different parts of India

In this system, flock size ranges from five to 50 birds raised under a traditional scavenging system **devoid of management practices**. Backyard chickens in India are generally the native/*desi* type (19 poultry breeds) with low egg and meat production potential. Desi chicken breeds grown under free range backyard conditions contribute about 10-12% of the total egg production in India.



Information source: ICAR-NBAGR, Karnal

Conclusion

- Vaccination is indispensable for Indian poultry sector.
- Science and technology are improving vaccine efficacy.
- Challenges exist in field implementation, economics, and policy.
- Integrated strategies with biosecurity and farmer awareness are essential for sustainability.