THE UNIVERSITY OF MELBOURNE

Faculty of Veterinary and Agricultural Sciences

Vaccination of Poultry

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VETS30032/VETS90127

Why do we want to protect our flocks and against what?

- Protect the host against disease and productivity losses
  - Losses could be mortality, egg recovery, carcass quality
  - Coccidiosis, Infectious Bronchitis, Fowl Cholera, MDV – *all poultry*
- Protect the progeny by MAB
  - Infectious Bursal Disease (IBD), Chicken Anaemia Virus (CAV) – *Broiler Breeders and broilers*
- Food Safety
  - Salmonella – *all poultry*
- Regulatory
  - Newcastle Disease

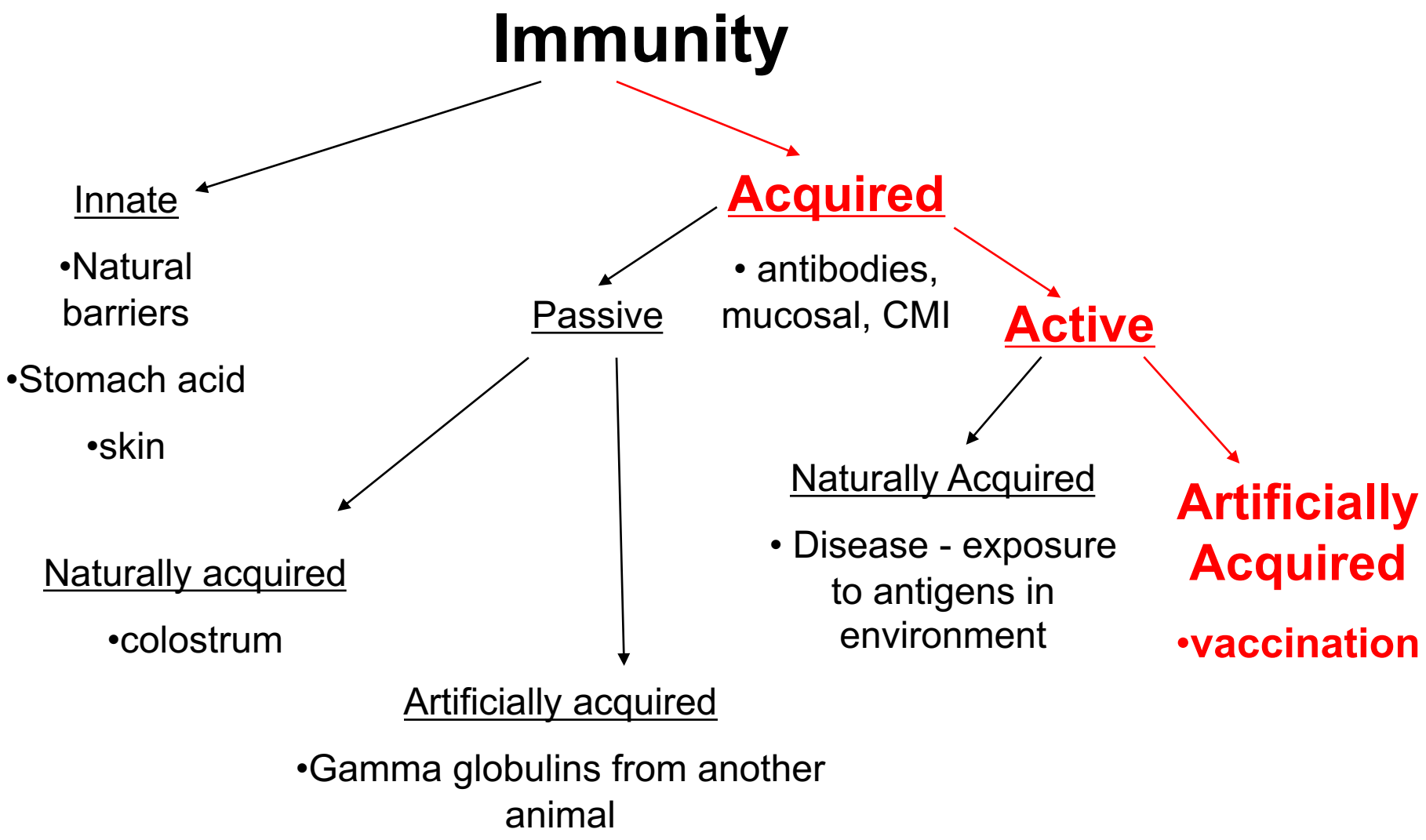
Immunity- ability to protect from challenge by a pathogen

- Innate: Skin, nares hairs, coughing, evacuating bladder, temperature, etc
- Passive: MAB's (colostrum, yolk IgY) and antitoxin – short lived
- Acquired
  - Natural exposure
    - Significance being survival, age of challenge and productive state
  - Developmental
    - E.g. GIT flora and development of inherent resistance. Competitive exclusion (Nurmi). Faecal transplants- nothing new!
    - Fatty acids on skin
  - Active
    - Deliberate exposure to an antigen with the "aim" of inducing a protective immunity

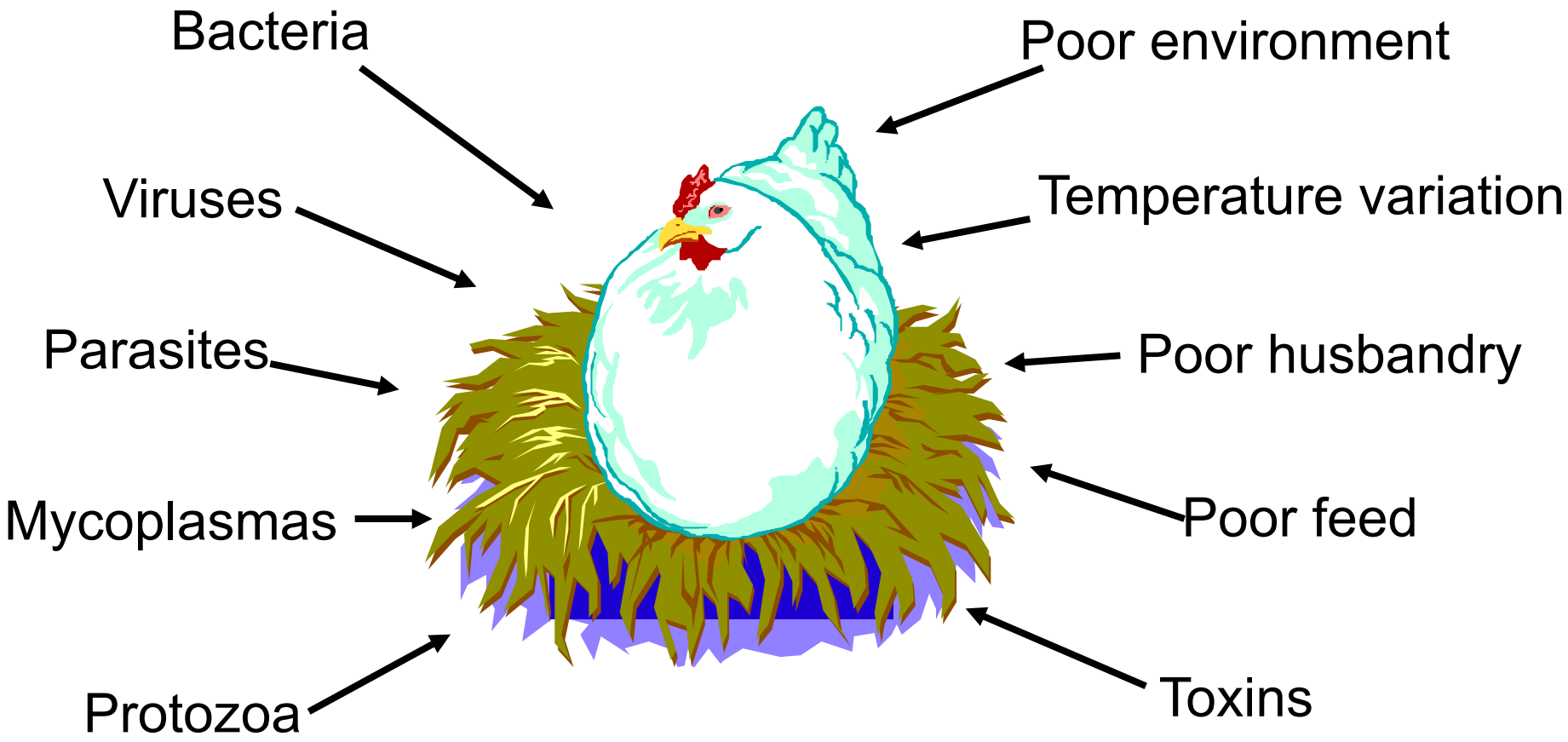
Developing Immunity

Depends also on the hosts interaction with environment and its response

Immunity (cont.)

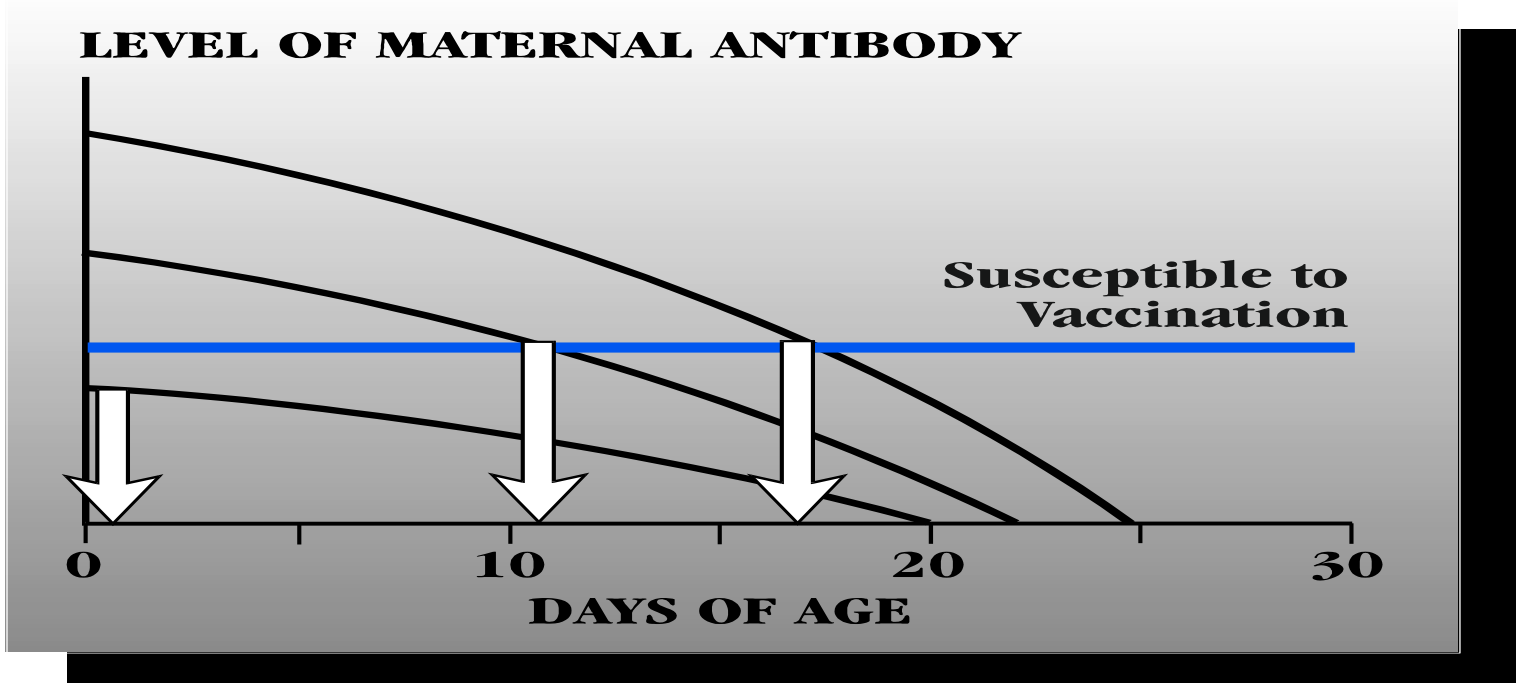


Causes of disease



MAB in a flock

- Reasons for variability:
  - Mixing of chicks from different breeder flocks
  - Differences between hens and amount of antibody transferred
    - Note Live IBD!
- Single vaccination to flock with variable antibody levels - results in partial flock immunisation



Pathogens Fight Back!

- Mechanisms pathogens use to avoid the hosts immune response
  - Mycoplasma and malarial plasmodium keep changing their surface antigens.
  - Recombination. Particularly RNA viruses - Influenza
  - Herpes viruses such as Infectious laryngotracheitis, Marek's Disease and Herpes Simplex viruses become latent as DNA
  - Mucosal residency – salmonella.
  - Encapsulate in biofilm: staphylococcus.
  - HIV replicate within the activated T Cell
  - Nematodes, protozoa – complex structure

What do we know about diseases caused by the above pathogens

No vaccines, vaccines of limited efficacy or strategic application required

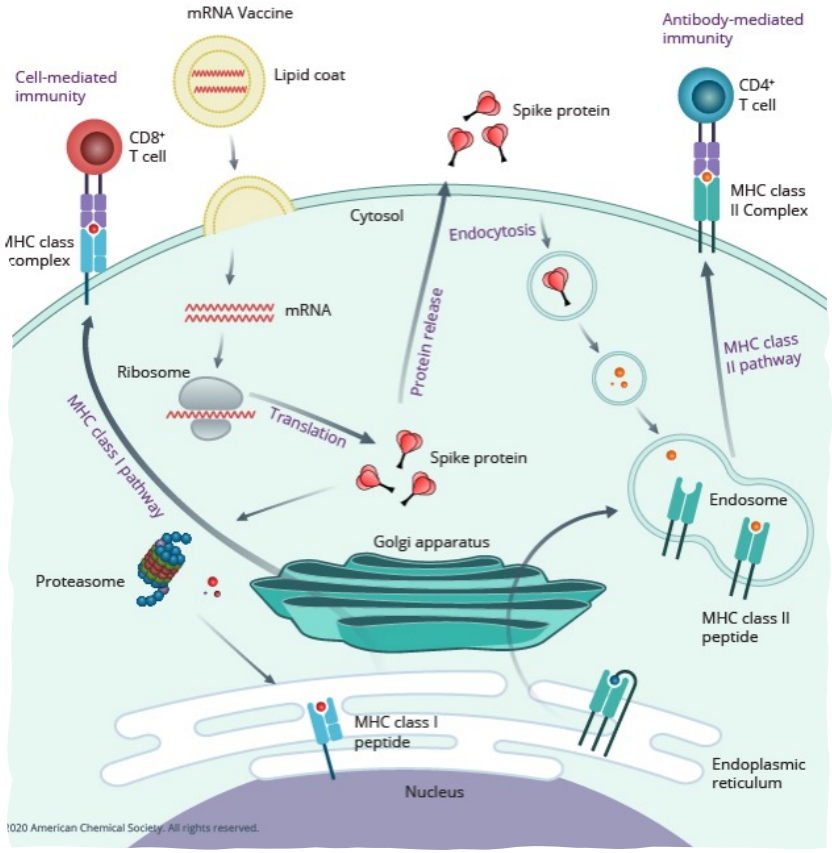
Types of Vaccines

- Live attenuated Vaccines
  - Advantages
    - Invariably heterologous immunity.
    - Low cost to manufacture.
    - Easy to administer – drinking water, spray, eye drop
  - Disadvantages
    - An inability to safely attenuate
    - Difficulties in attenuating while maintaining ability to produce adequate protective immunity
    - Reversion to virulence
    - Change in tissue trophism or susceptible host
    - Inactivation by MAB
    - Low level MAB production
    - Increased legislative hurdles
    - Storage, Handling and Sterile administration

Types of vaccines (cont.)

- Inactivated Vaccines
  - Advantages
    - Safe as organism inactivated.
    - No reversion to virulence potential.
    - Less legislative barriers
    - Easier handling and storage
  - Disadvantage
    - Normally require and adjuvant,
    - Costly to manufacture.
    - Normally need to be injected into the host.
    - Adjuvant host discomfort and OH&S issues
    - Logistical difficulties where repeat administration is required in production animals, especially poultry

Types of Vaccines (cont.)

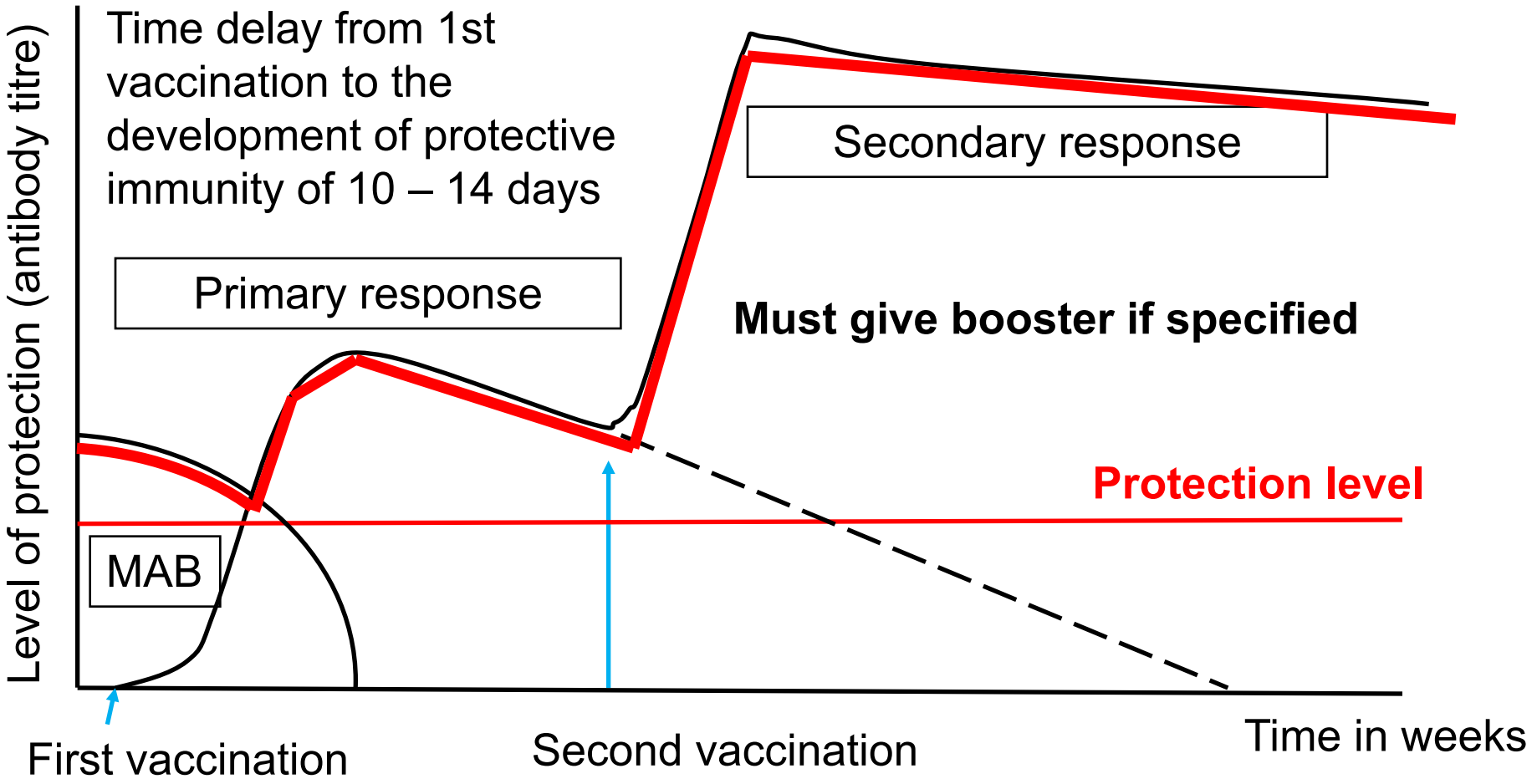


- New Technology associated with Vaccines
  - Vector Vaccines
    - ILT, COVID
  - mRNA
    - COVID
  - Mutation
  - Cell culture advancements.
    - Influenza from embryonated eggs to cell culture
  - Improved adjuvants
  - Delivery systems
    - Intradermal (circovirus in pigs), latex, *in ovo* (MDV)

Principles of vaccination

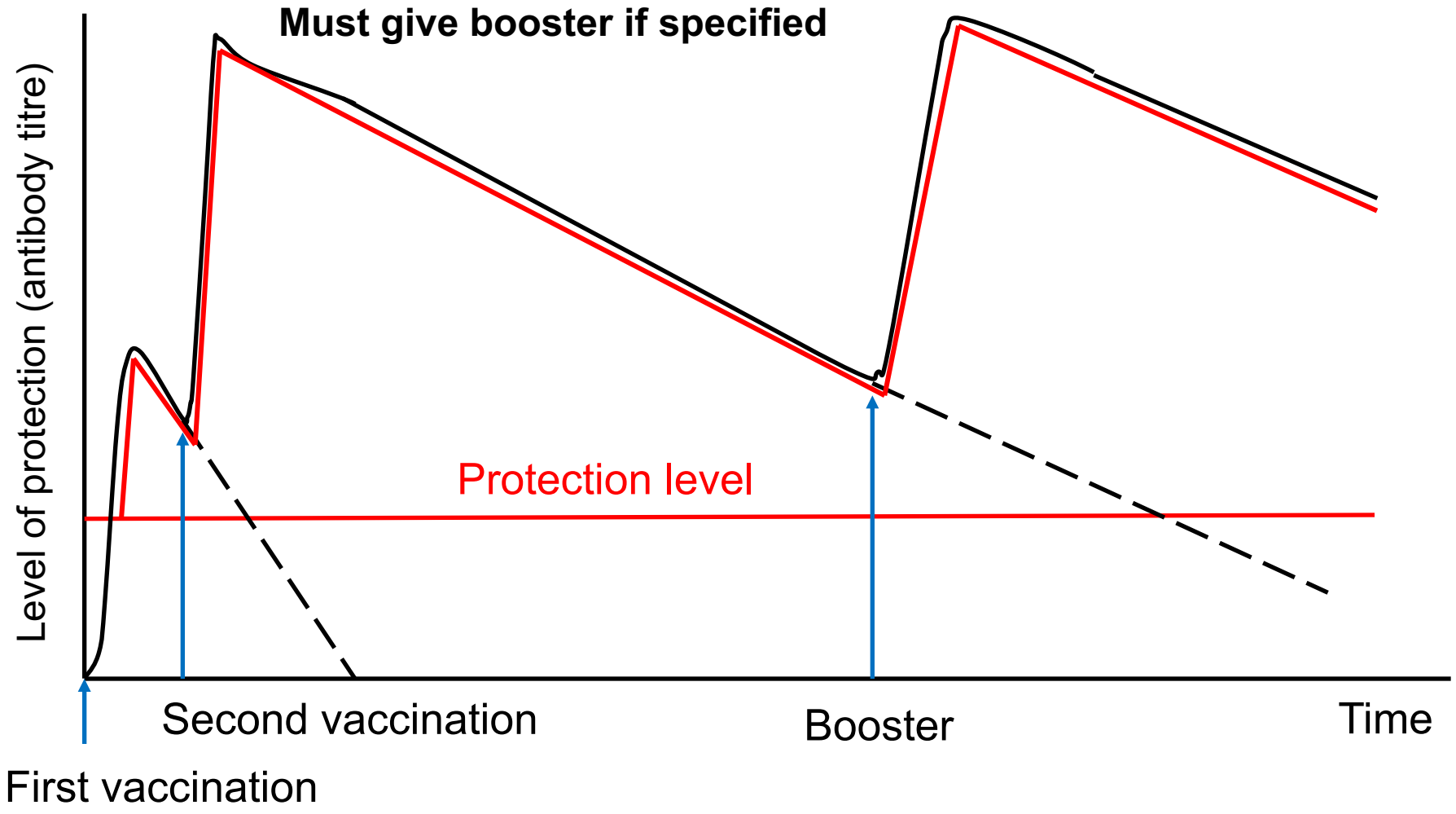
- Vaccinate healthy animals - vaccinate BEFORE exposure to disease. An example where this is not the case!
- Do not vaccinate during period of stress
- Give an effective dose of vaccine and administered effectively
- Give by the prescribed route
- MUST give booster if specified. May require further boosters
- Consider as an aid to disease control
- Vaccines may protect against disease but may only reduce the quantitative level of colonisation and shedding of the wild type

Principles of vaccination (cont.)

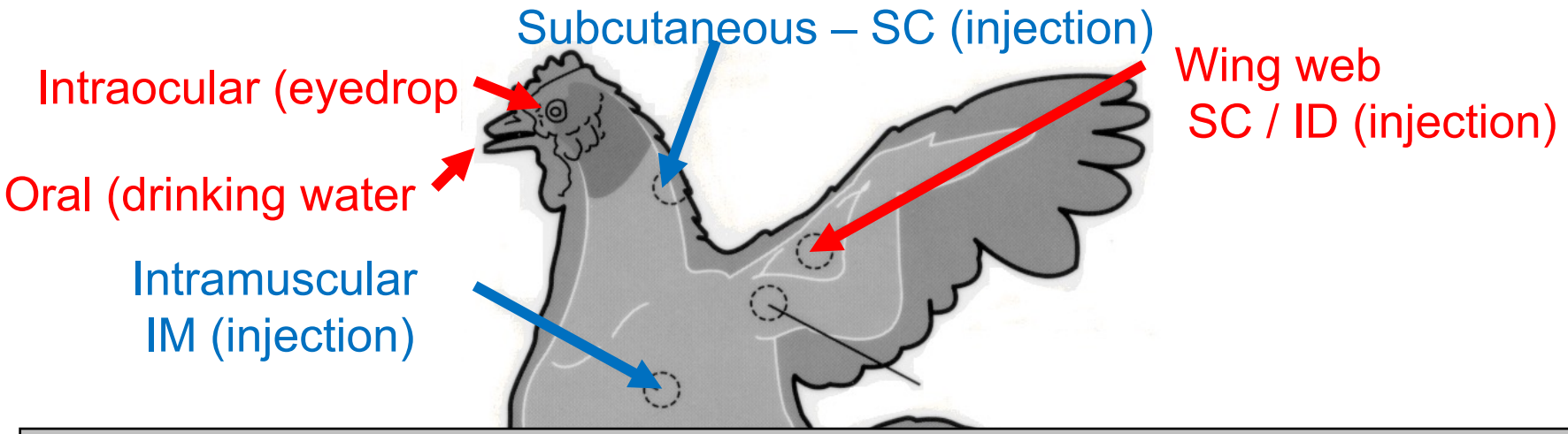


MAB's and vaccination protection in naive animal

Principles of vaccination (cont.)



Principles of vaccination (cont.)



- **Give in prescribed route (vaccination technique)**
- Vaccine administration methods for:

➢ **Live vaccines:** Intraocular (eyedrop), oral (drinking water) and wing web

➢ **Killed vaccines**: Intramuscular (brest muscle) and subcutaneous (neck)

Water administration (cont.)

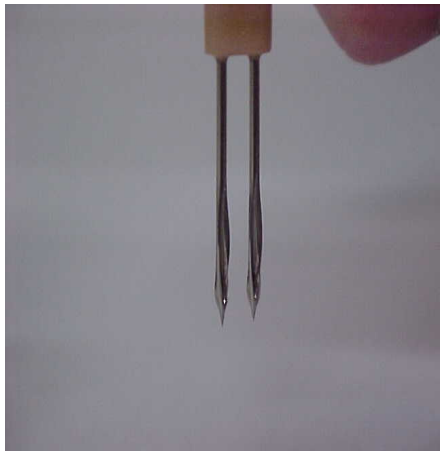
- Water as a diluent must be free of chlorine or chemicals
  - Use an inactivator like skim milk powder or a commercial product.
- Ensure the vaccine is dissolved from its vial and the vial rinsed using the inactivated water
- Estimate water consumption over "2-4 hours" period!!.
- Check drinker heights and water pressure in the water line
- Water withdrawal??- careful considerations here.
  - just the period necessary to flush the vaccine through the drinker line
- Administration using either dossers (not preferred) or medicating tanks
- A blue marker dye can be used.

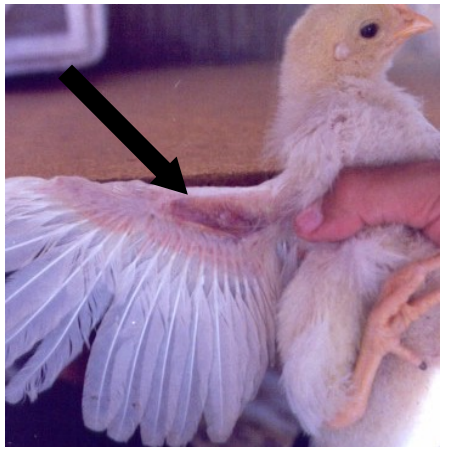
Vaccine - Eye Drop

- Eye drop administration of LIVE poultry vaccines stimulates mucosal surface immunity
- Reconstitute vaccine by adding sterile diluent, prescribed by the manufacturer, to the freeze-dried LIVE vaccine
- Add blue dye indicator
- Shake the vial gently until vaccine is completely dissolved
- Pour the reconstituted vaccine into the bottle with eyedropper.
- Allow vaccine to reach room temperature
- Hold each bird with head tilted to the one side
- Slowly squeeze the bottle with eye dropper and place ONE drop (approximately 0.03mL per drop) of vaccine in one eye of each bird to flood eye
- Allow the fluid to spread over the eye before releasing the bird
- After the application hold the birds until blinks and ensure that the droplet does not drop off from the eye surface

Vaccination - Wing Web

- Administration with wing stabber
- Vaccinate all birds in a flock on same day
- Reconstitute vaccine by adding one vial of diluents, prescribed by the manufacturer, to the one vial of freeze-dried vaccine
- Mix by rotating the vial gently until vaccine is completely dissolved
- One person hold the birds and spread the wing with underside facing upwards
- Second person dips the stabber into the reconstituted vaccine, so that both needles are wet
- Stab with stabber needles through the web in the clean area of the wing
- Without delay remove needles from the wing after the stab
- Avoid feathers, blood vessels, bones and muscles
- Flocks to be checked one week after vaccination for swelling and scabs at the vaccination site



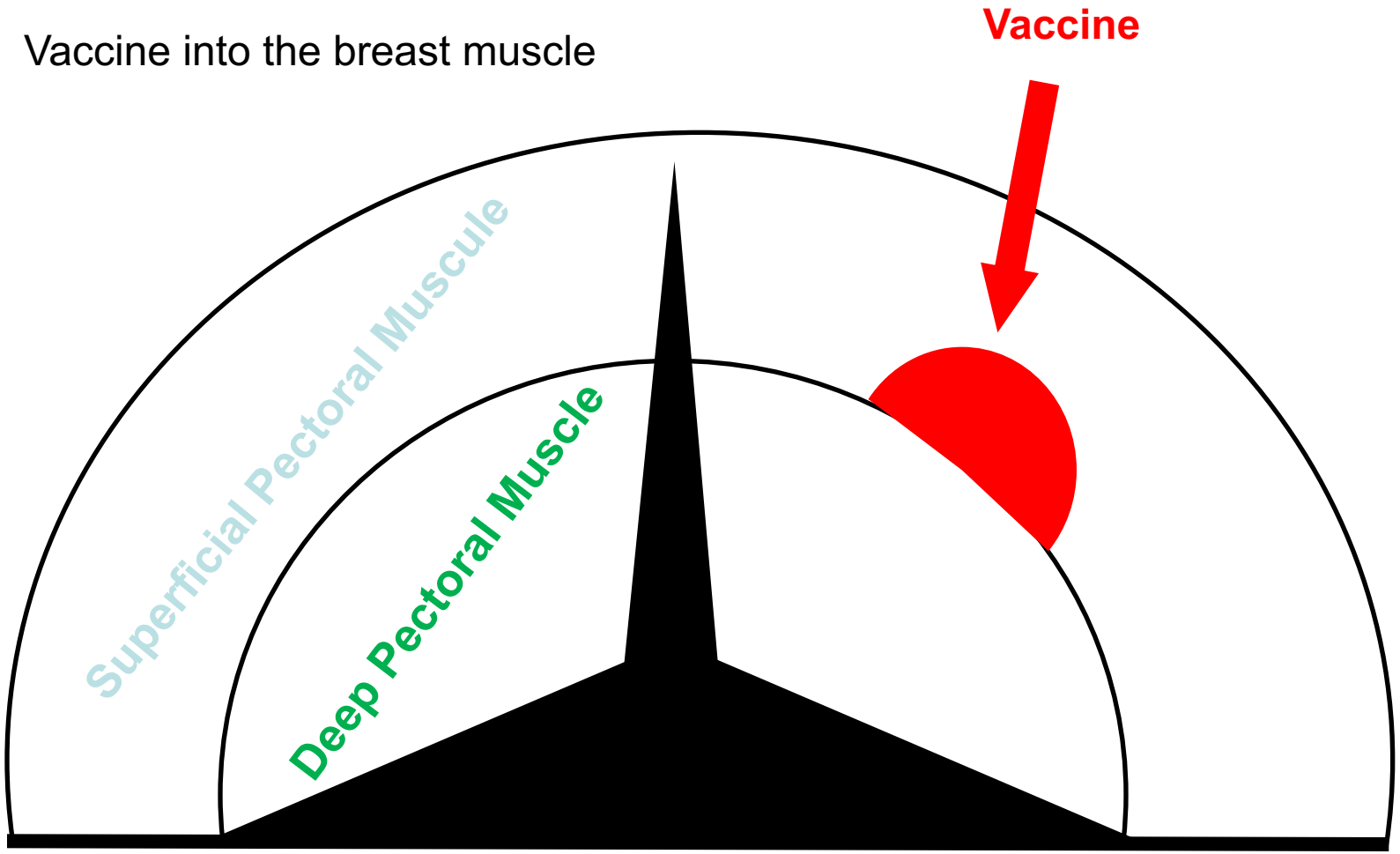


Vaccination – I/M Breast Muscle

- Allow inactivated vaccine to stand at RT for a period and gentle rotate the vaccine bottle to mix before use
- **<u>Staff safety - accidental self injection is very serious health risk</u>**
- Check automatic vaccinator setting is on correct dose rate
- All equipment has to be clean and sterile
- Vaccine into the breast muscle
- The first person hold the bird with the breast muscle upward
- Second person inject into the breast muscle.

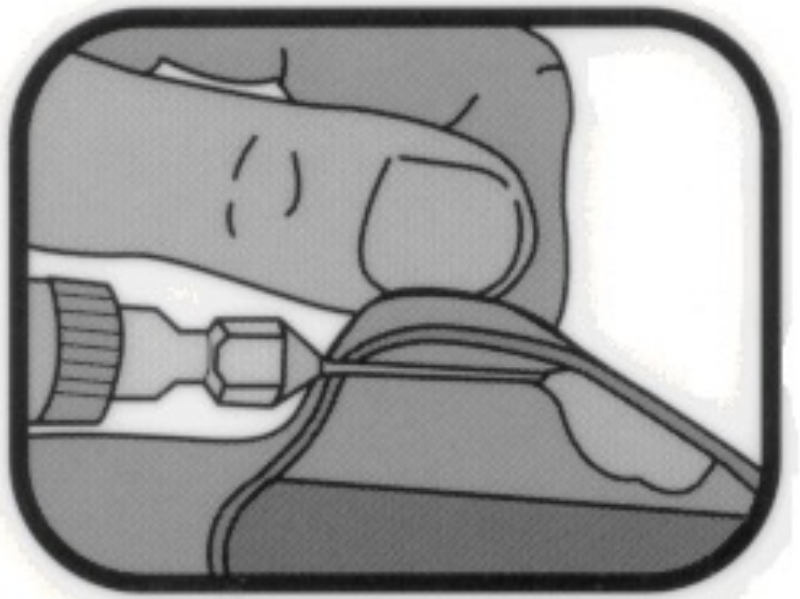
Vaccination – I/M Breast Muscle (cont.)

Vaccine into the breast muscle



Vaccination – S/C Neck

- Vaccination between the skin and underlying tissue in the back of the neck
- Gently push your thumb and finger together to form a “tent” of skin on the back of the chick’s neck just behind the head.
- Line up the syringe or vaccinator with the line of the spine of the chicks and insert needle into the tent of skin created with your thumb and finger.



Regulatory Aspects of Poultry Vaccines

- Fully Registered Vaccines
  - Extensive R & D, laboratory and field studies to demonstrate the vaccinee is safe and efficacious. Overseen by the APVMA
  - New candidate vaccines extensive dossiers and can take around 6 to 10 years to get registered. Significant $
  - Imported vaccines with require dossiers, tested for freedom from extraneous agents and may require field testing.
  - Every batch of vaccine has to meet a minimum release titre and be shown to be free from extraneous agents.
- Autogenous Vaccines (predominantly inactivated bacterial adjuvanted vaccines)
  - Can only be produced if no registered alternative.
  - Vaccine manufactured under an APVMA permit at an approved manufacturing laboratory.
  - Can only be manufactured from the organism from the site on which the vaccine will be used.
  - Manufacture proves safety but not efficacy and only used by the responsible veterinarian.

Off Label Vaccine Use

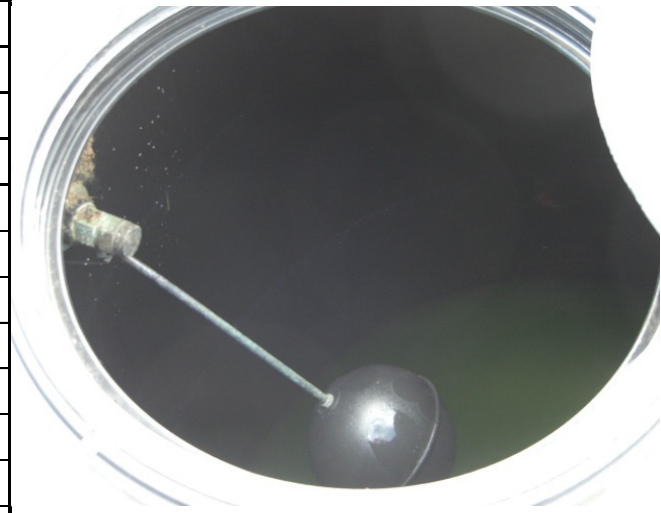
- Used in the Designated Species but by a different route
  - Often particularly where mass vaccination is required company will administer a vaccine by not the registered route.
  - This is allowed but the veterinarian / producer takes the risk regarding efficacy.
  - Some manufacturers may decide to after field studies get this alternate route registered. E.g. NDV V4 live by coarse aerosol spray at the hatchery.
- Used in a Different Species to what the vaccine is registered
  - This arises when a disease situation occurs in one food producing species but there is no registered vaccine in that species but is registered in another species.
  - Essential that there is no contraindication on the label.
  - Veterinarian takes responsibility.
  - E.g. Erysipelas in Free Range poultry. Currently use the erysipelas vaccine registered for use in sheep and pigs

Note while PROBIOTICS are administered to alter GIT flora they are currently not considered vaccines.

University of Melbourne

DEEP LITTER REARED PULLET - FREE RANGE PRODUCTION -VACCINATION / SEROLOGY/ TREATMENTS

				Rearing Shed -		For Production Shed-		
Hatch date								
AGE	SCHEDULED (Week Ending)	COMPLETED (Actual Date)	VACCINATION or TREATMENT	SEROLOGY / SWABS	BIRD NUMBER	METHOD	VACCINE BATCH NUMBERS	SIGNED
DAY OLD			MDV (Rispens / HVT)		100%	Subcutaneous Injection		
			IBV (Vic S) / STM1		100%	Coarse Aerosol Spray		
			Salmonella Testing	Chick papers / Day 3 brooding papers Salmonella culture		Minimum 10 papers - SOP		
3 weeks			IBV (Vic S / A strain*)		50%/50%	Drinking Water 1/2 Dose of each		
2 - 4 weeks			^^NDV (Live V4 Strain)		100%	Drinking Water		
3 - 4 weeks			ILT A20 / STM1		100%	Drinking Water		
7 weeks			IBV (Vic S / A strain*)		50%/50%	Drinking Water 1/2 Dose of each		
8 Weeks			AEV**		50%	Drinking Water, 1/2 Dose per bird		
11 weeks			MG: ts-11 / MS: MS-H		100%	Eyedrop		
			ILT SA-2		100%	Eyedrop		
			EDS + NDV (killed)		100%	I.M. Injection		
			STM1		100%	Mixed in with EDS+NDV by IM		
			Fowl Pox		100%	Wing Stab		
			AEV**		10%	Eye Drop		
			Beak Trim		100%	If required		
12 weeks			IBV (Vic S / A strain*)		50%/50%	Drinking Water, 1/2 Dose of each		
14 weeks			SEROLOGY	NDV, EDS, AEV, IBV, MG, MS", ILT		10 birds per shed, separate needle and syringe	N/A	
14 weks			De-worm		100%	Levamisole 36mg/kg		
14 - 15 weeks			Salmonella Testing	Drag swabs		As per SE accreditation program SOP	N/A	
In lay (Free range birds)			IBV (Intervet IBV, Vaxsafe IB or Zoetis IBV I)		100%	Drinking Water every 6 weeks	N/A	
			ILT - A20		100%	Drinking Water at 45 weeks of age		
			De-worm		100%	Levamisole 36mg/kg		
			Salmonella Testing	Salmonella drag swabs (3 monthly)		As per SE accreditation program SOP		



UNIVERSITY OF MELBOURNE BROILER PARENT BREEDER FLOCK HISTORY: VACCINATION / SEROLOGY

REARING FARM:			**SHED:**		**FOR PRODUCTION FARM:**					
HATCH DATE:			**BREED:**							
AGE		SCHEDULED (Week Ending)	COMPLETED (Actual Date)	VACCINATION or TREATMENT	SEROLOGY / SWABS	NUMBER	METHOD	BATCH NUMBER/S	DOSES USED	SIGNED
	Day old			MDV / IBV / Paracox (hatchery)	Salmonella (Chick Paper)		Chick Papers	N/A	N/A	
7	Days			ILT (A20)		100%	Drinking Water			
10	Days			Eimeria 4M		100%	Eye Drop			
3	Weeks			NDV (Live V4 Strain)		100%	Drinking Water			
4	Weeks				Salmonella		Drag swabs	N/A	N/A	
				MS (MS-H)		100%	Eye Drop			
				MG (ts-11)		100%	Eye Drop			
				Grade		100%		N/A	N/A	
5	Weeks			FD IBV Vic S / IBV A3		50:50%	Drinking Water			
7	Weeks			IBDV Live		50%	Drinking Water			
8	Weeks			AE		10%	Orally			
				FAV		10%	Orally			
9	Weeks			ILT (SA2)		50%	Drinking Water			
12	Weeks				CAV	10 Birds/Shed	Wing Bleed			
				AE		10%	Orally			
				FAV		10%	Orally			
13	Weeks			IBDV Live		50%	Drinking Water			
15	Weeks				AE, CAV,FAV	10 Birds/Shed	Wing bleed			
				FD IBV Vic S / IBV A3		50:50%	Drinking Water			
					Salmonella		Drag swabs	N/A	N/A	
17	Weeks			IBDV Killed (Dams Only)		100%	I.M. Injection			
				NDV/EDS Killed Combo		100%	I.M. Injection			
				Fowl Pox, CAV^		100%	Wing Stab			
				**(AE, CAV, FAV)			**(if serology indicates)			
19	Weeks				CAV*,FAV*, AE*, MG, MS NDV, IBV	10 Birds/Shed	Wing bleed	N/A	N/A	