



GET THE FULL  
**POTENTIAL**



## 3 generations of IBD vaccines

Dr Pushparaj Chaudhari

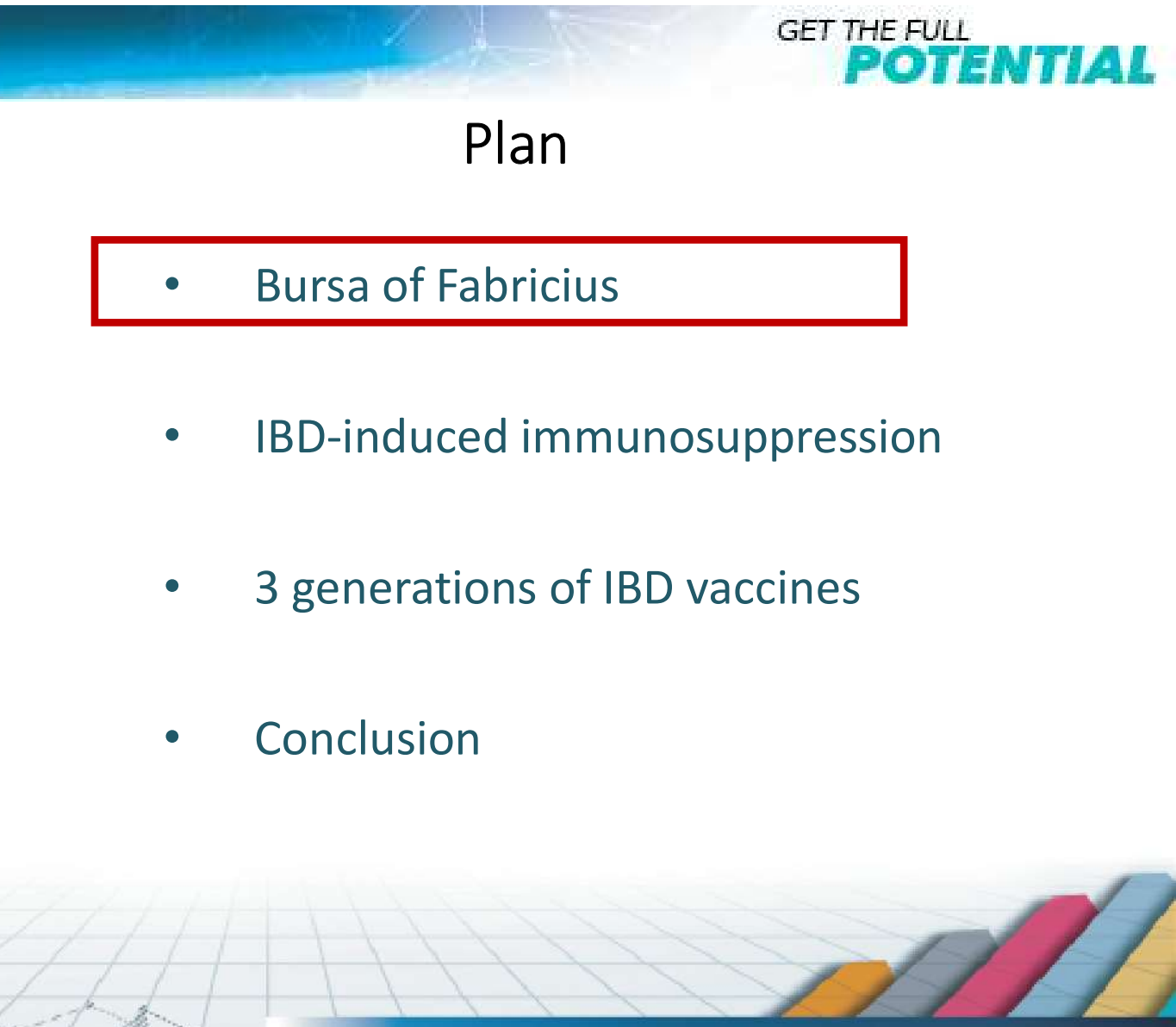
Boehringer Ingelheim India Pvt. Ltd.

**PREVENTION WORKS**  
Shaping the future of poultry health



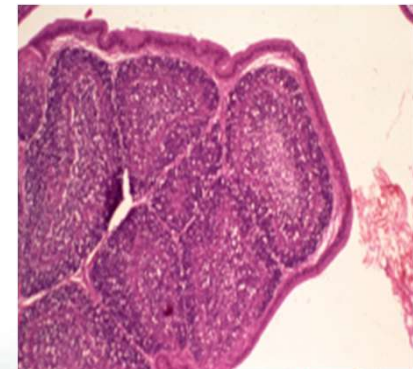
## Plan

- Bursa of Fabricius
- IBD-induced immunosuppression
- 3 generations of IBD vaccines
- Conclusion



## The bursa of Fabricius

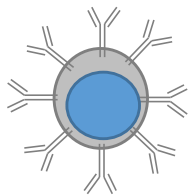
- « The school of B lymphocytes »
  - (Prof Bernd Kaspers)



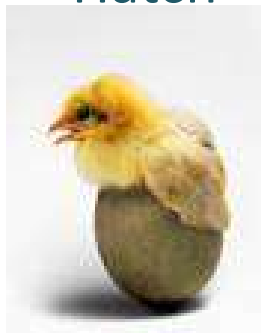
8-14 days



- Colonization of bursa with pre-B-cells



Hatch



Proliferation  
Ig gene conversion



B-cells diversity

Antibody repertoire

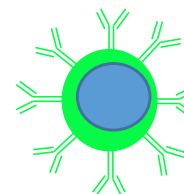
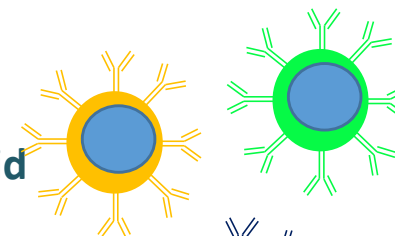
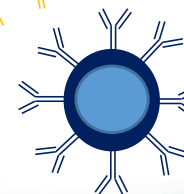
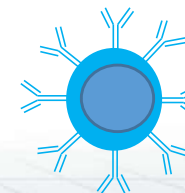
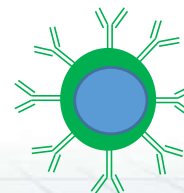
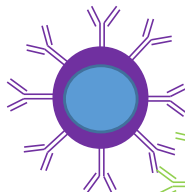
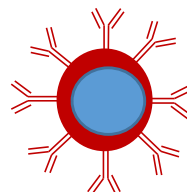


Colonization of 2<sup>nd</sup>ary lymphoid organs

5-7 weeks



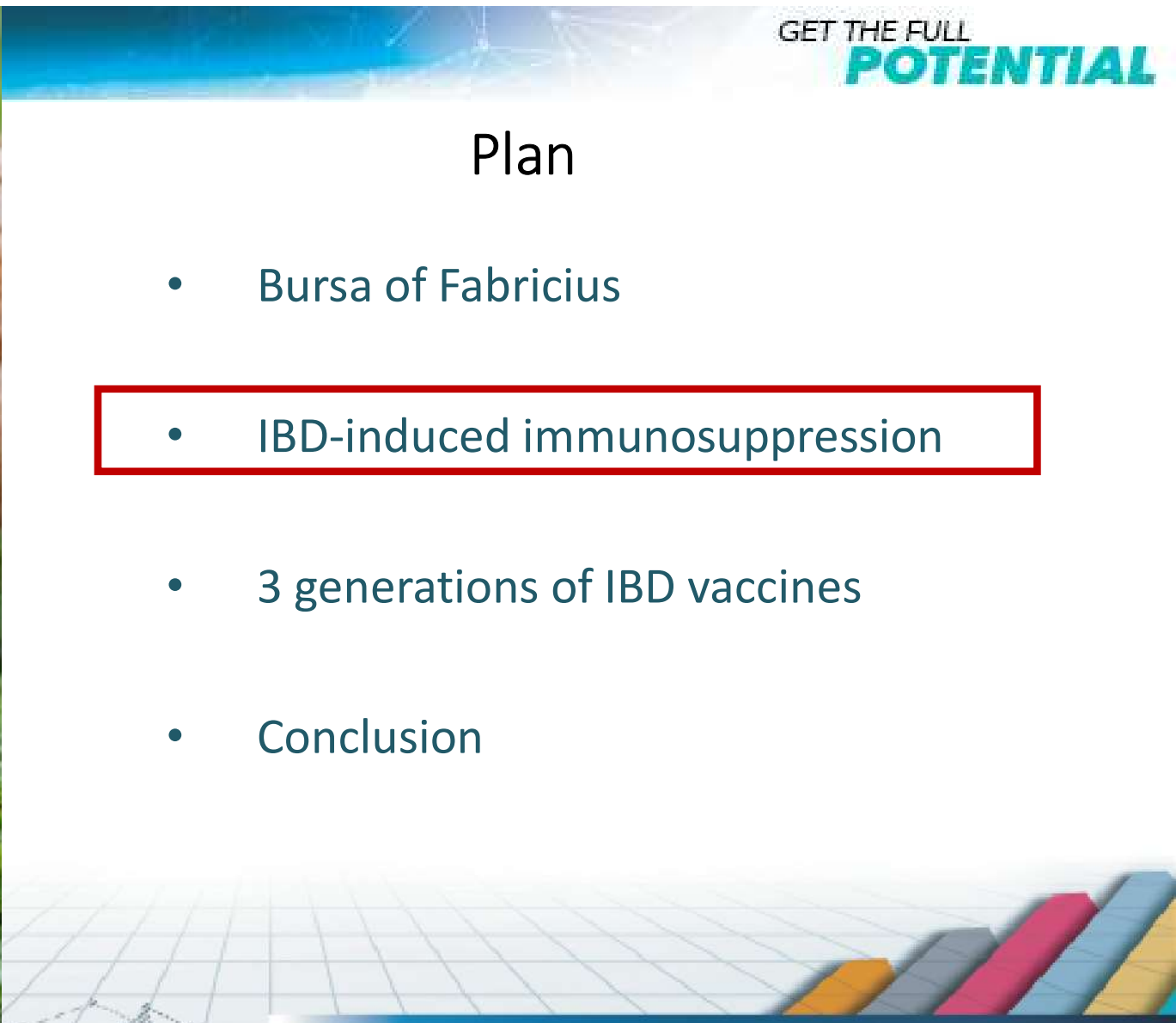
Mature repertoire



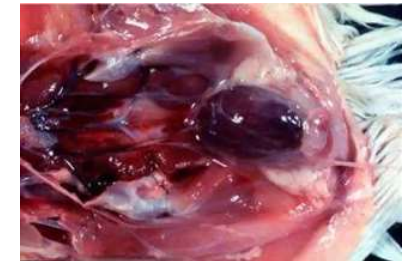
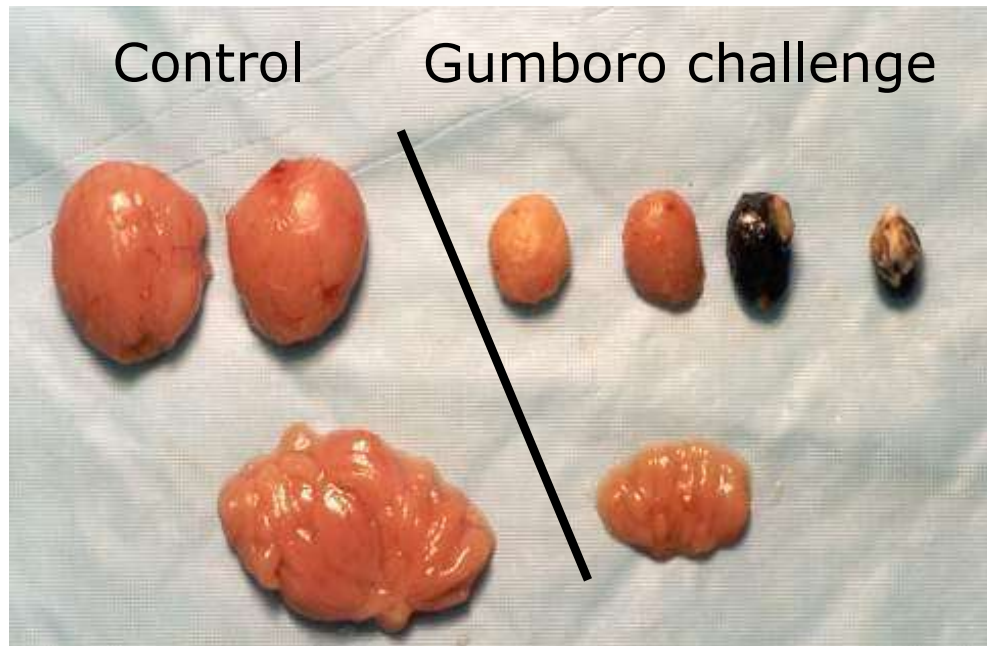


## Plan

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## Infectious Bursal Disease (Gumboro Disease)



[Courtesy: Dr. Jagdev Sharma]

Gumboro disease – bursa of Fabricius lesions

↓ **Humoral**

- ↓ serum Ig M (Hirai *et al.*, 1979)
- ↓ % B-cells (Hirai *et al.*, 1981)
- ↓ Ab titer to Ag (Dohms & Jaeger, 1988 ; Sharma *et al.*, 2000)
- ↓ Ab titer to **vaccine** (Hirai *et al.*, 1974; Giambrone *et al.*, 1976; Rautenschlein *et al.*, 2007)

↓ **Cellular**

- ↓ lymphocytes mitogenic response (Sivanandan & Maheswaran, 1981; Sharma *et al.*, 1983)
- ↓ T-cells IL2 secretion (Sharma *et al.*, 2000)
- Thymus transient lesion (Sharma *et al.*, 1983)

↓ **Mucosal**

- ↓ antibody titer in Harderian gland (Dohms & Jaeger, 1988)
- ↓ plasmocytes in Harderian gland (Dohms *et al.*, 1988)
- ↓ serum IgA (Giambrone *et al.*, 1977)

B-cells  
T-cells  
Macrophages

Ingrao *et al.*, 2013

**IBDV infection  
at ≥3 weeks of age**

**Transient  
immunosuppression**

↓ **Resistance to pathogens**

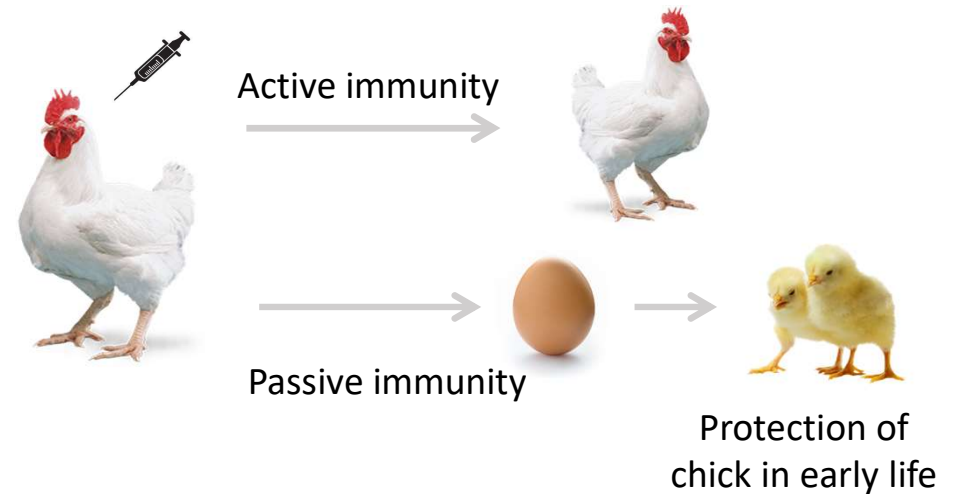
- ↓ **IBV** resistance (Winterfield *et al.*, 1978; Toro *et al.*, 2006)
- ↓ **E. coli** resistance (Wyeth, 1975; Rosenberger *et al.*, 1985)

## IBD prevention through vaccination

### Aim of IBD vaccination:

- Protection from mortality
- Protect bursa (No bursal damage)

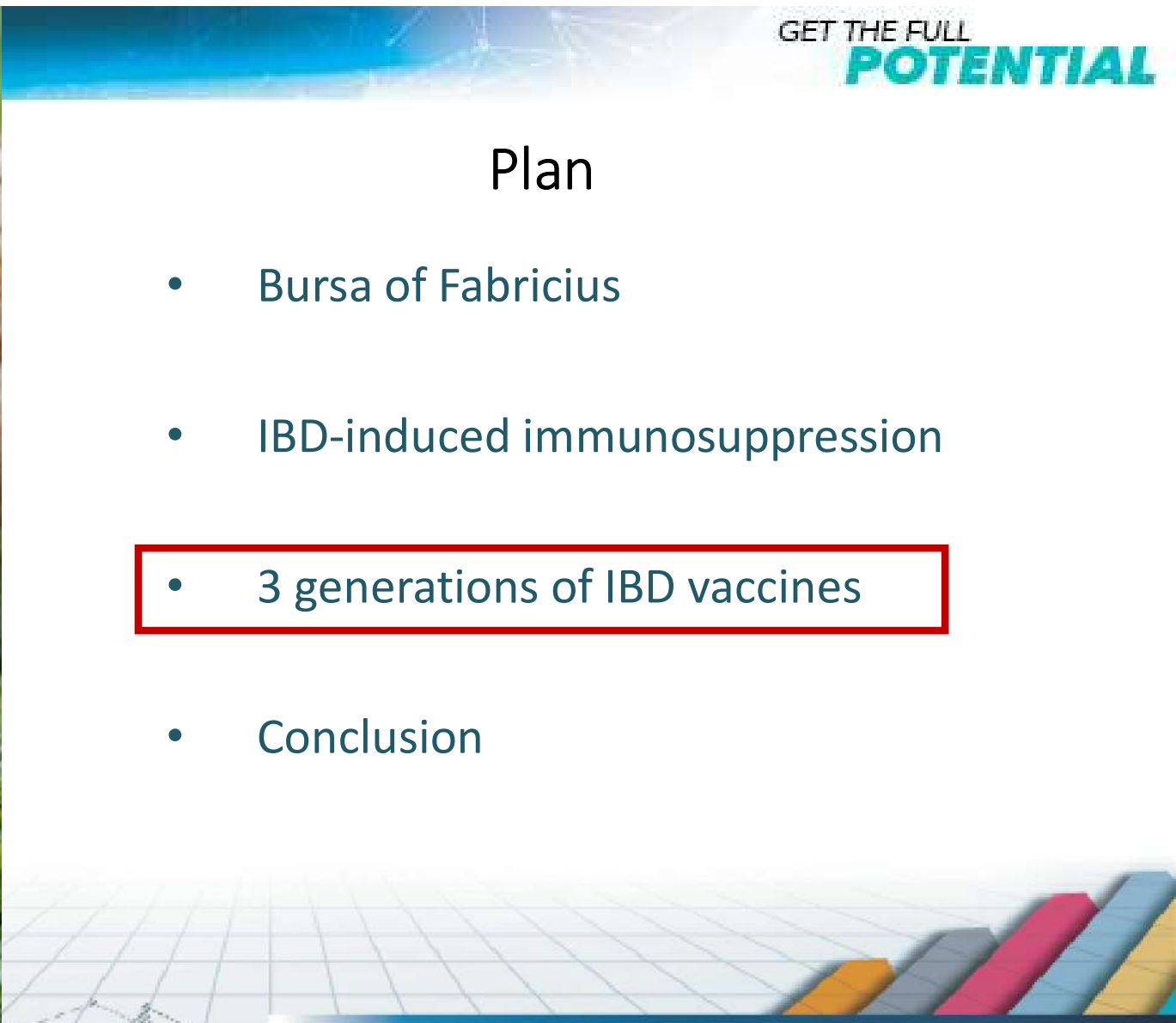
### Aims achieved by:





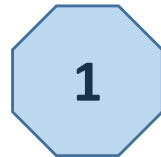
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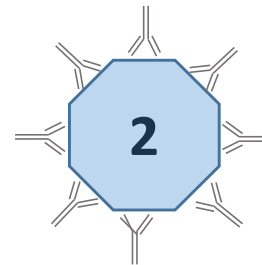
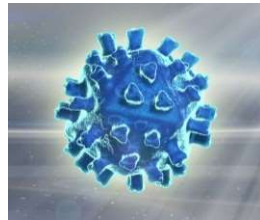


## 3 generations of live IBD vaccines

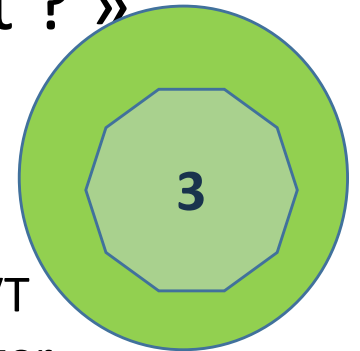
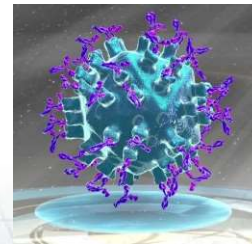
« How do they protect ? »



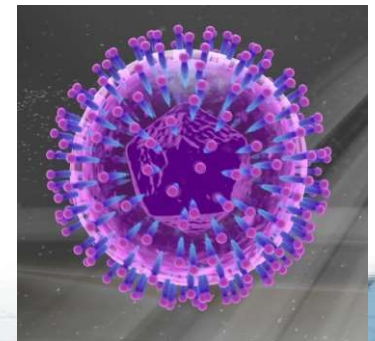
IBDV MLV



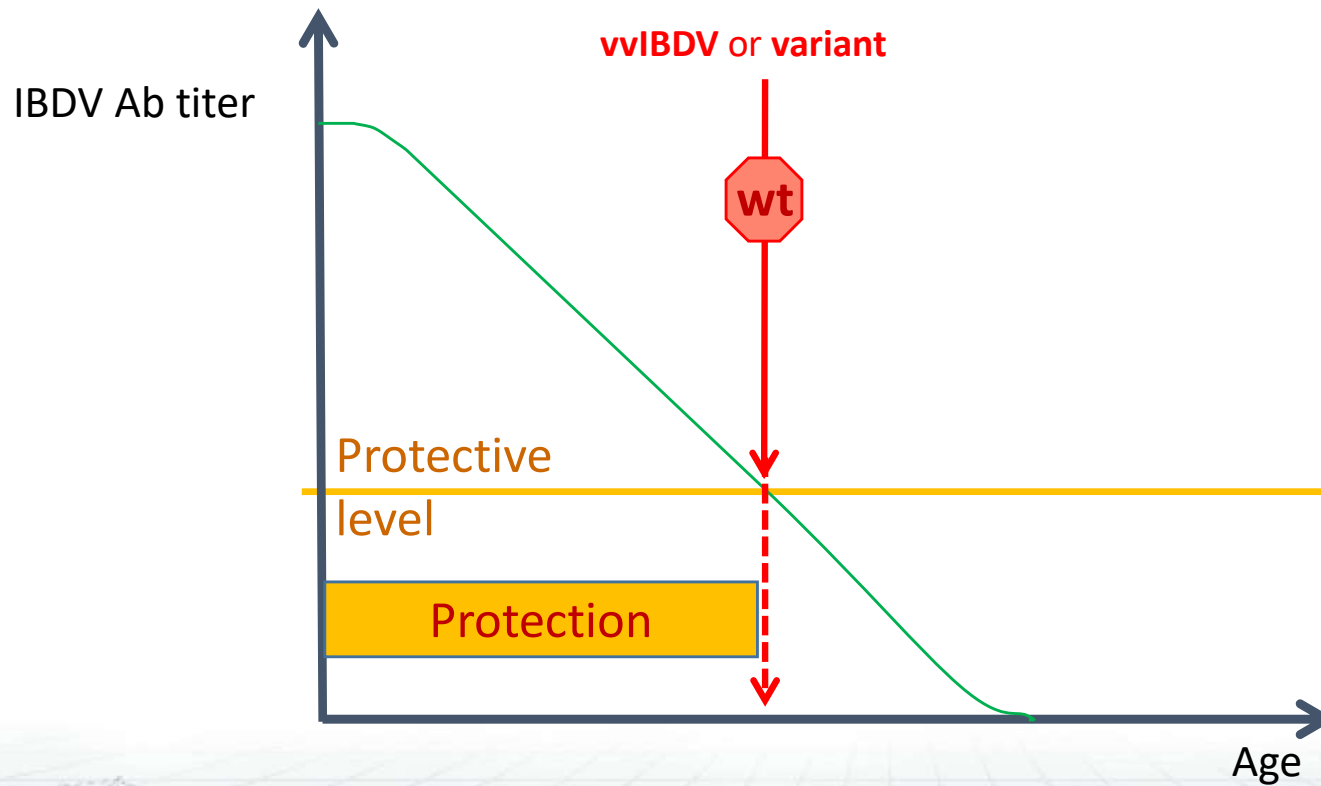
Imm. Cplx.



HVT  
vector

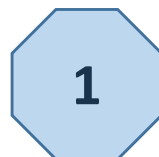


## Maternally-Derived Ab (MDA) protection





# 1<sup>st</sup> generation Modified live vaccine



IBDV MLV





1

IBDV MLV

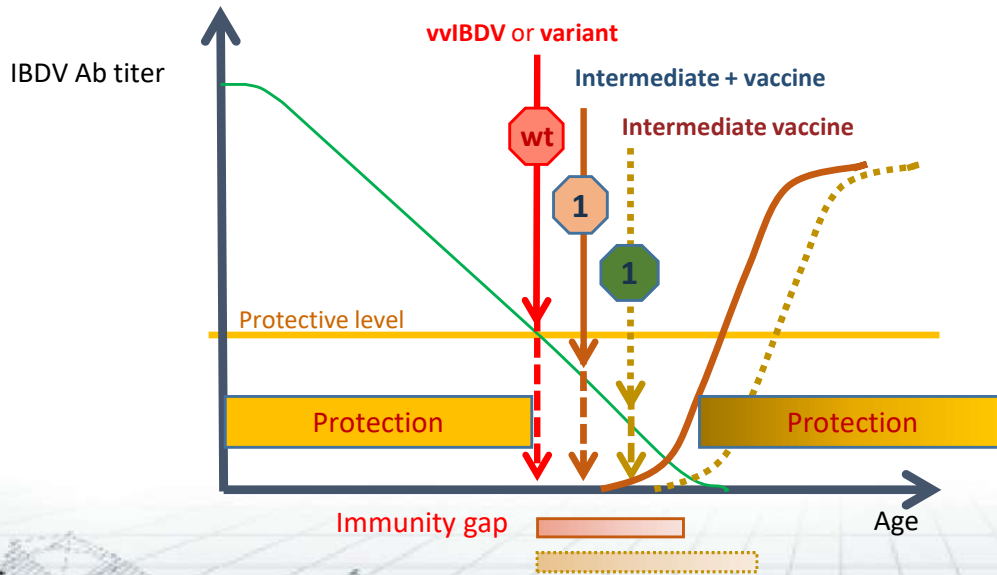
Broilers



Layers



Breeders

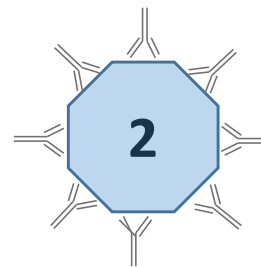


Factor affecting vaccination

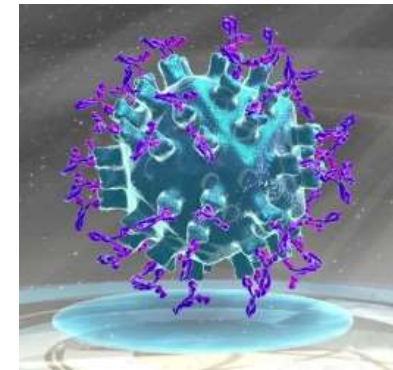
- Time of vaccination
- Quality of vaccination

## 2<sup>nd</sup> generation Immune complex (ICx)

- « How does it protect ? »

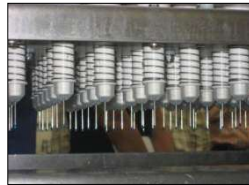


Imm. Cplx.





IBD ICX



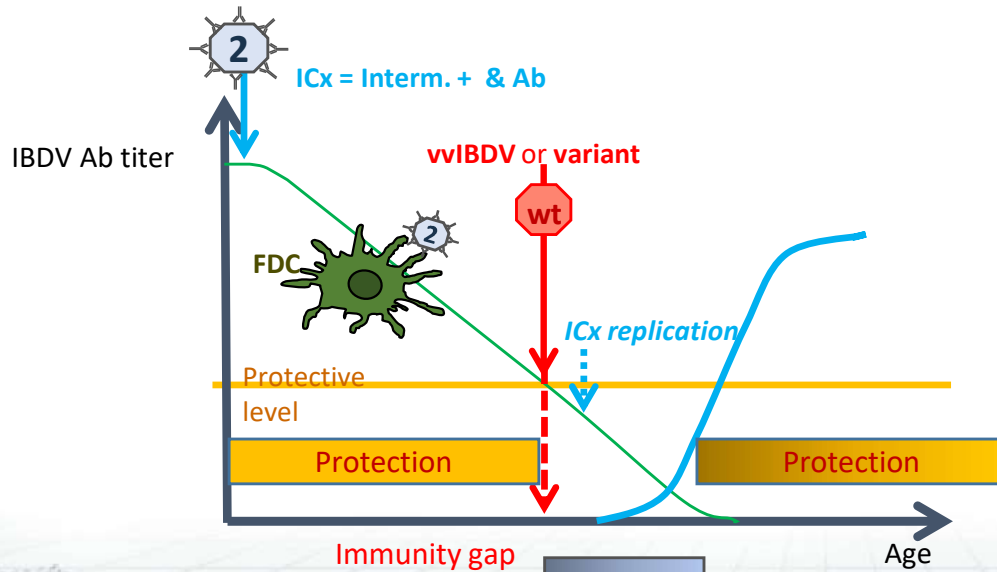
**Broilers**



**Layers**



**Breeders**

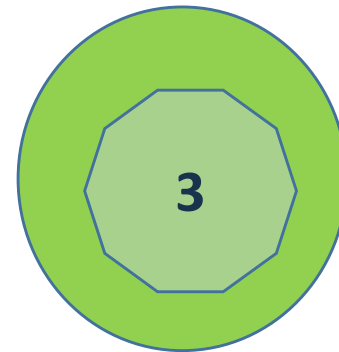


- Benefits**
- Hatchery vaccination
  - One single dose
  - No need for vaccination day prediction

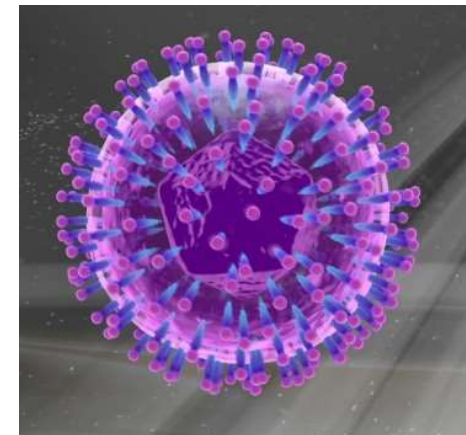
GET THE FULL  
**POTENTIAL**

## 3<sup>rd</sup> generation HVT vector vaccine

« How does it protect ? »

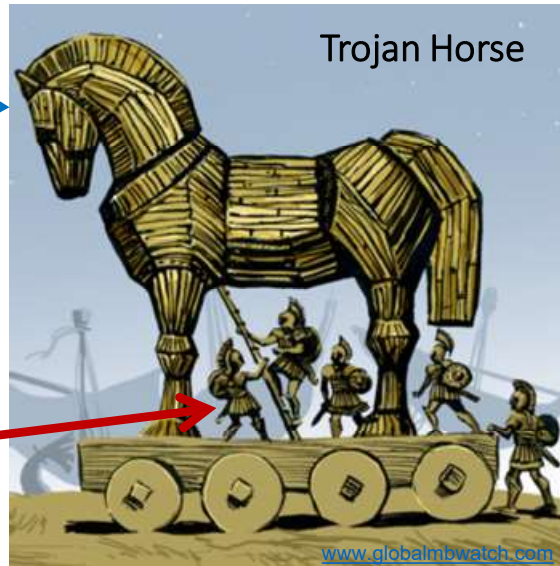
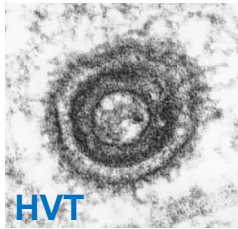


HVT  
vector

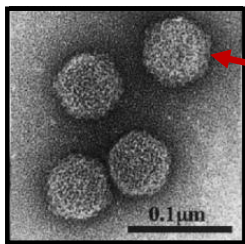




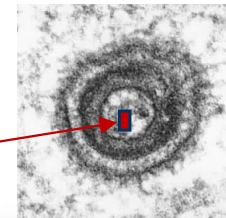
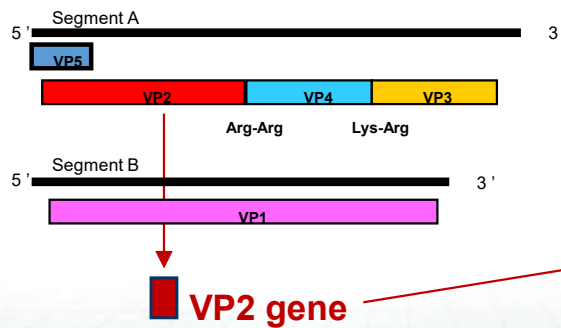
1. Horse: **HVT vector**



2. Soldier: **protective IBDV VP2 gene**



**IBDV**



**HVT-IBD (VP2)**

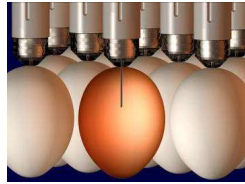


# 3<sup>rd</sup> generation – HVT vector vaccine

GET THE FULL  
**POTENTIAL**



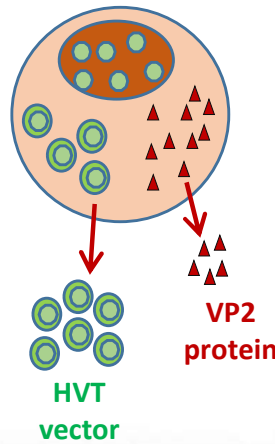
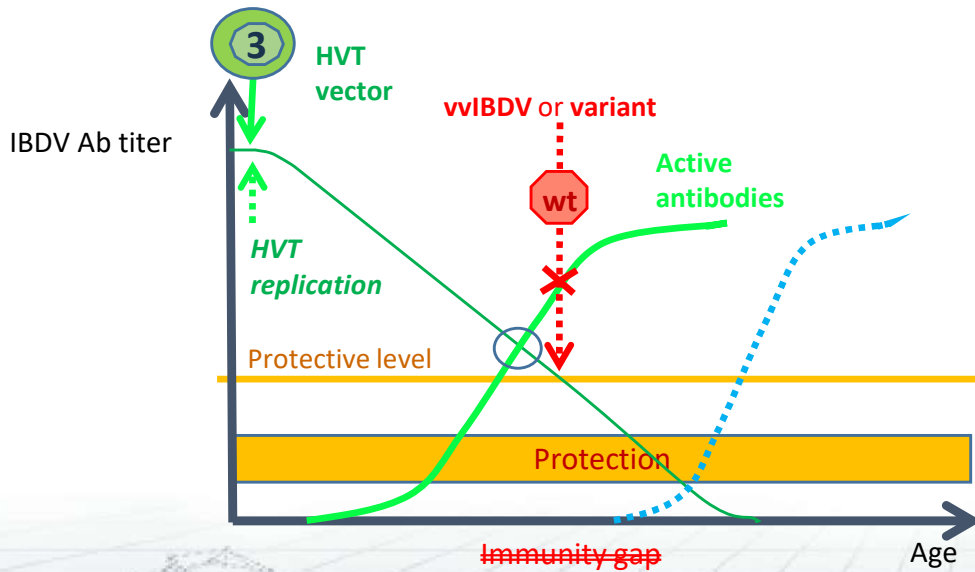
HVT Vector



**Broilers**

**Layers**

**Breeders**

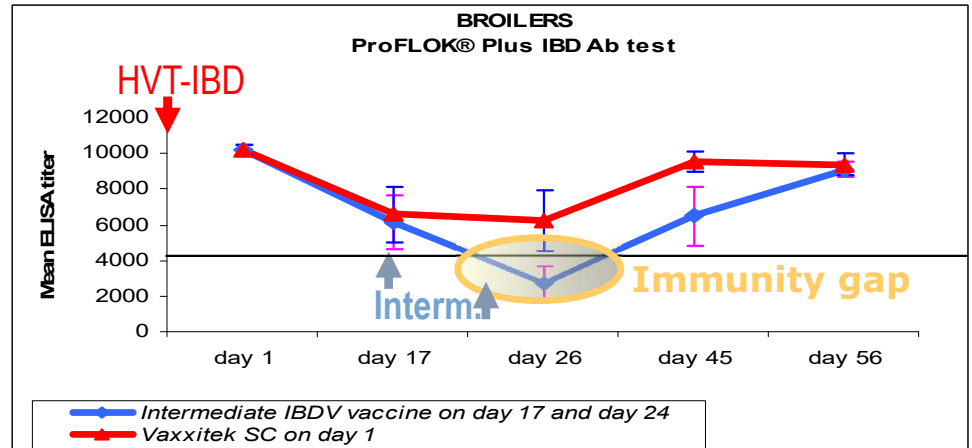
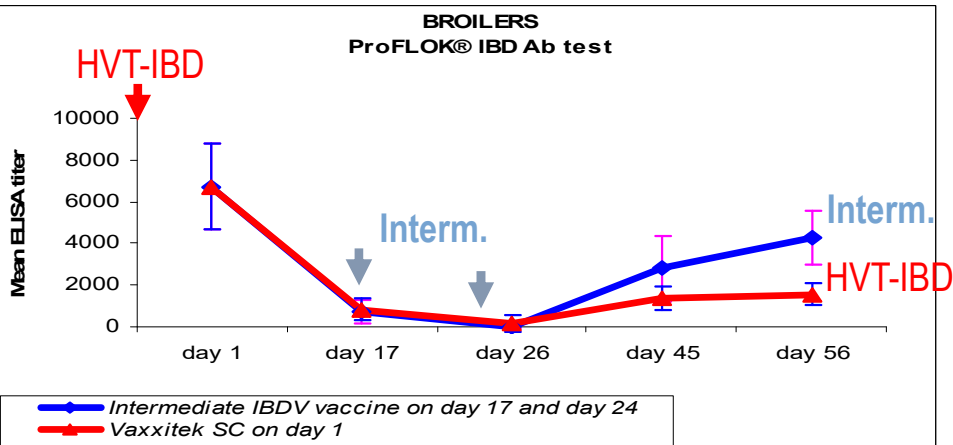


Poultry industry's  
**1<sup>st</sup>**  
Innovative HVT vector  
vaccine



## Classical ELISA

## Proflok **IBD+** ELISA\*



Antibodies against IBDV **VP3**

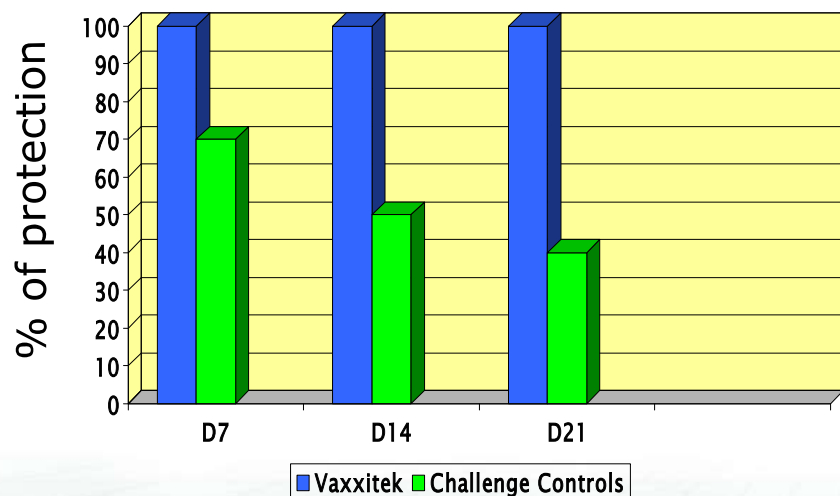
Antibodies against IBDV **VP2**

HVT-IBD induced antibodies  
detectable by specific **IBD+** ELISA  
No immunity gap with HVT-IBD

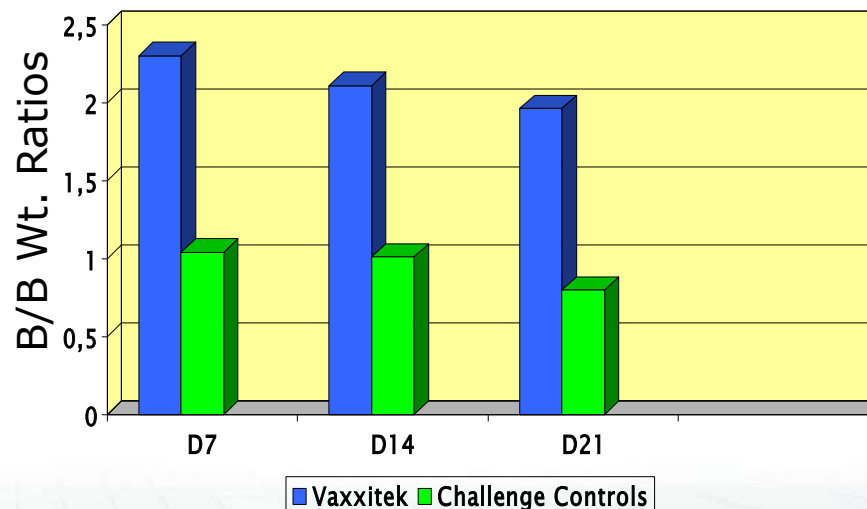
## Fast onset of immunity

- **SPF bird**: 100% protection in **2 weeks**
- **Broilers**: protection as soon as **1 week**

Classical IBD challenge



Variant IBD challenge





## Lifelong protection against MD & IBD pathotypes



### Protection against all IBD pathotypes\*

Classical

Very virulent

Variant



### Protection against different MD pathotypes<sup>†</sup>

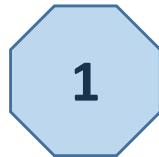
Virulent

Very virulent

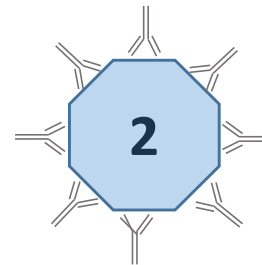
\* Layers & Breeders: Vaxxitek to be administer with Marek's serotype 2 SB1 vaccine or Prevexxion

## 3 generations of live IBD vaccines

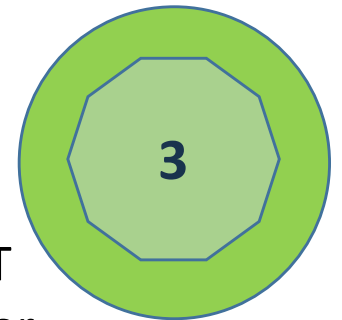
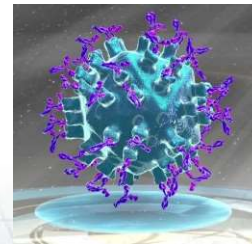
« What are the consequences ? »



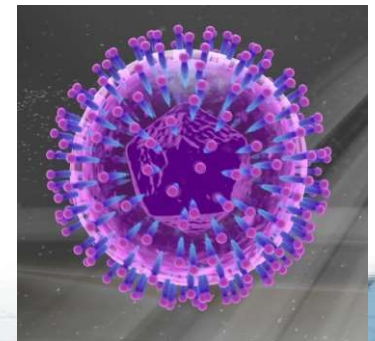
IBDV MLV



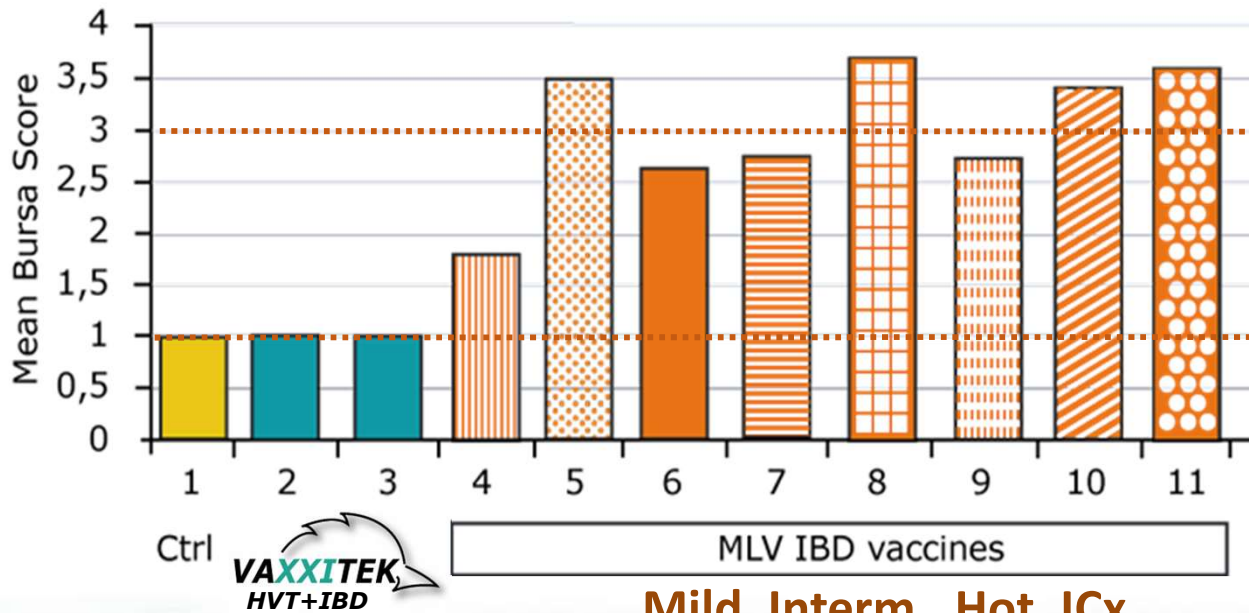
Imm. Cplx.



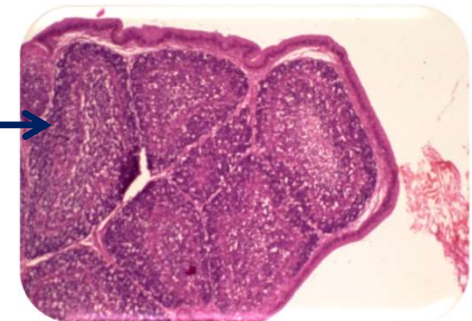
HVT  
vector



- Broilers with no anti-IBD MDA
- Histopathology scoring: 1 to 4
- Lesion score at **day 21** :



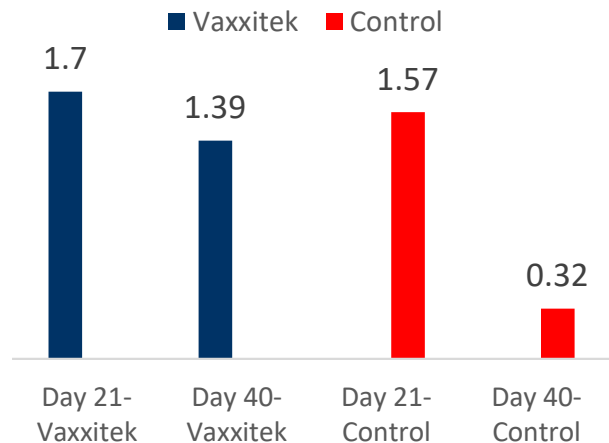
Score 3



Score 1 normal

## Supports Strong Immune Foundation

Bursa : Body Weight Ratio\*

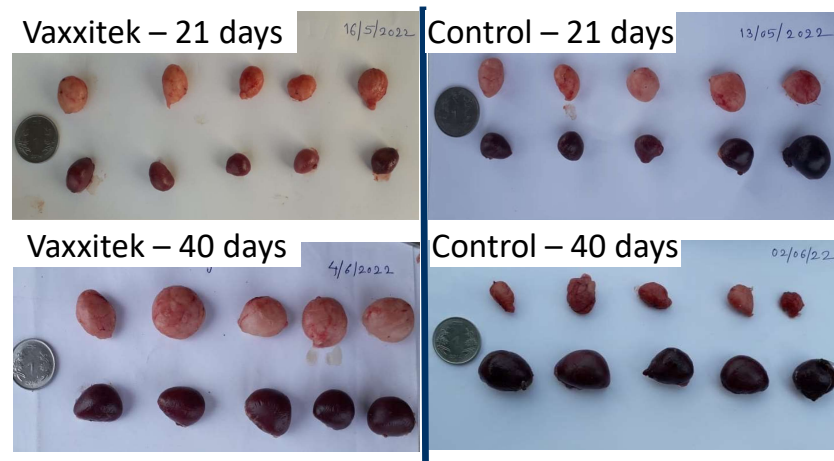


Higher B:BWt ratio



Good immune status

Bursa & Spleen morphometry\*



Bursa size > Spleen size indicates better immune status



## Vaxxitek HVT+IBD: The Vaccine That Pays It Forward

Field trial verses other IBD vaccines: Production performance Summary\*

Trial economic result  
(Age – 42 day)



Telangana

Trial economic result  
(Age – 34 day)



Punjab

Trial economic result  
(Age – 42 day)



West Bengal

Trial economic result  
(Age – 39 day)



Maharashtra

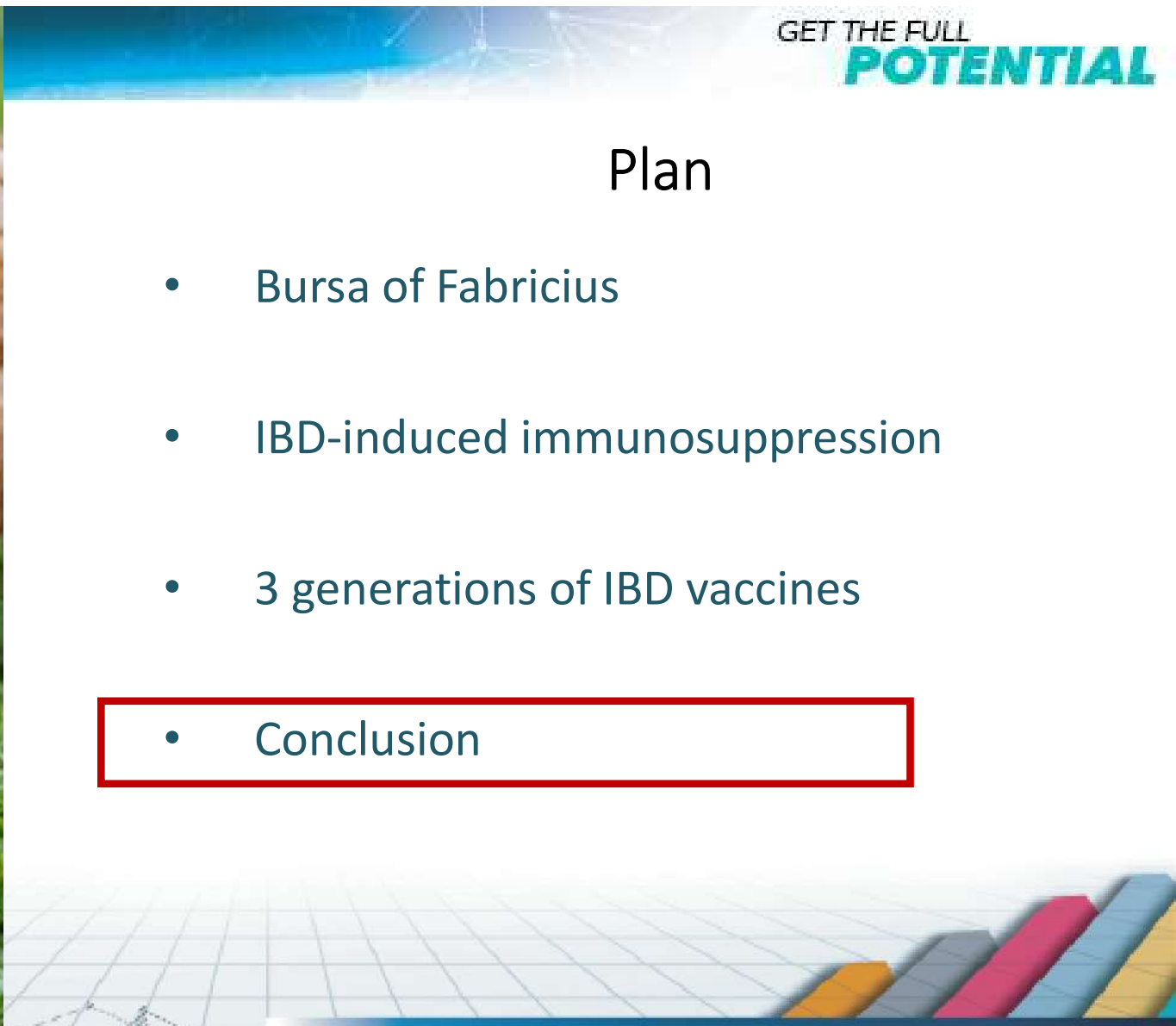
Assumption:

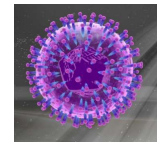
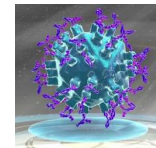
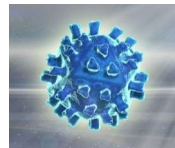
Chick cost – Rs. 25; Feed cost – Rs. 38/kg; Lifting rate – Rs. 85/kg










Vaccine cost: Vaxxitek+ND KVgr – Rs. 1.24/chick & other IBD vaccine group with or without vector ND & IBH KV – Rs. 1.1 -1.28/chick

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	Class. IBD 1970s	Imm. Complex 1995	HVT Vector 2006
Hatchery administration			
Safety			
Efficacy: no immunity gap			

Significant improvement brought by **HVT vector** vaccine





Thank you for your attention

