

Toxibond®

Mycotoxin Absorbent  
Metabolic Modifier

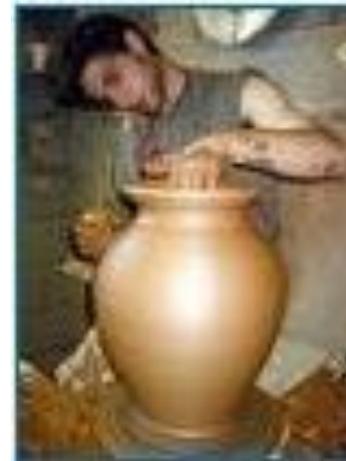
# What is Toxibond?

- **TOXIBOND®** is Hydrated and Heat Activated Sodium and Calcium Aluminum Silicate (HSCAS), innocuous for humans and animals, and due to its chemical and physical properties (such as pH, Cationic Exchange Capacity, Expansibility, Particle Size, Pore Size, Water Absorption and Activation Temperature), can be used as broad-spectrum mycotoxin adsorbent.

# Toxibond

## Calcium and Sodium Aluminum silicates:

- ✓ Hydrated
- ✓ Activated
- ✓ Expanded
- ✓ Pillared



# Toxibond Composition

FRACTION	AMOUNT
SiO <sub>2</sub>	63.90%
AL <sub>2</sub> O <sub>3</sub>	16.20%
CaO	1.95%
Fe <sub>2</sub> O <sub>3</sub>	3.32%
MgO	2.90%
Na <sub>2</sub> O	3.90%
K <sub>2</sub> O	0.80%

# Toxibond Composition

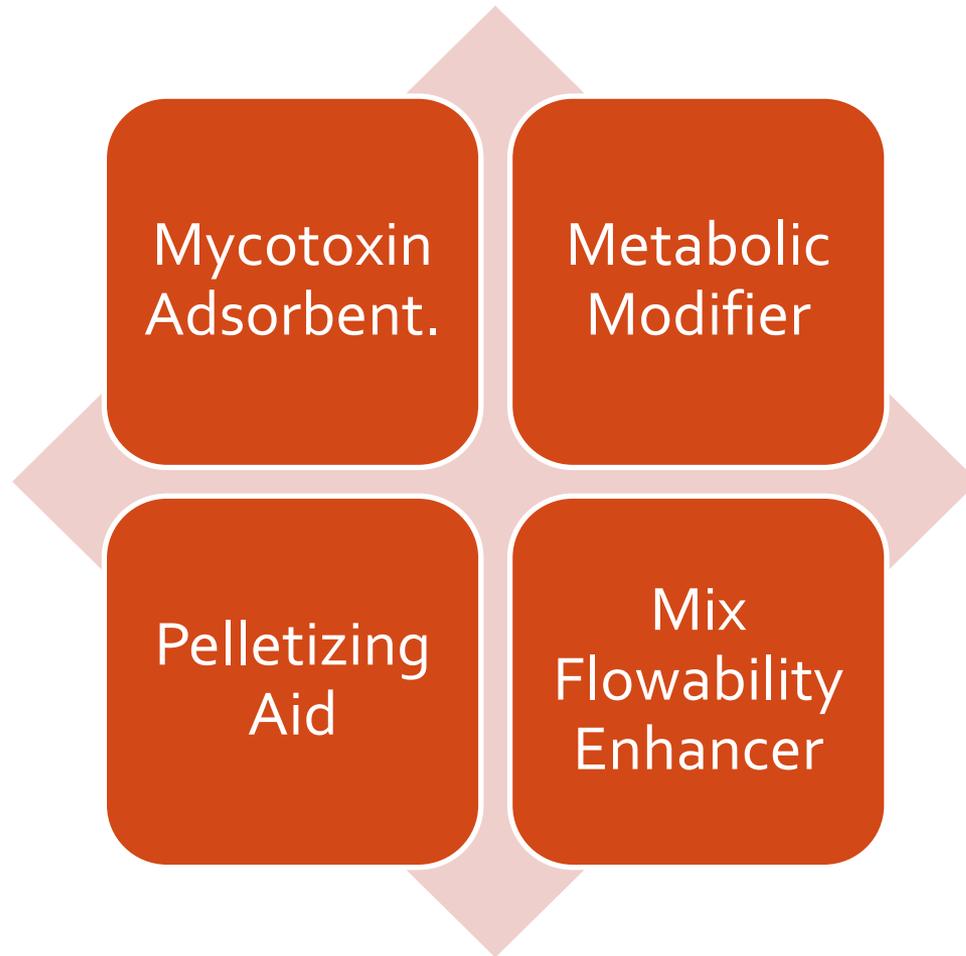
Clay Minerals Polarity		
<u>Clay Minerals</u>	<u>C.E.C.</u>	<u>Polarity</u>
Illites/ Chlorites	20-60 mEq	Bi -polar(+/-)
Montmorillonites/Bentonites	60-100 mEq	Polar (+)
Caolinites	0-20 mEq	Polar (+)

**Toxibond** is a synergetic compound mixture of three different clay minerals: Illites, Bentonites and Caolinites. Due to this combination Toxibond has a capability to adsorb a wide range of mycotoxins.

# Toxibond: Physical and Chemical Characteristics

Property	Value
pH	7.5-9.5
C.E.C.	<b>38.52</b> mEq
Color	Light Brown (Beige)
Toxicity	Nil (Innocuous)
Water Absorption	Low
Granulometry	250 – 325 mesh
Thermal Activation	<b>at 120 °C</b>
Electric Charge	<b>Bipolar (+ / -)</b>
Pore Size	2.8 A°
Category	Broad-Spectrum

# Toxibond



# How does it Work?

- As a mycotoxin adsorbent

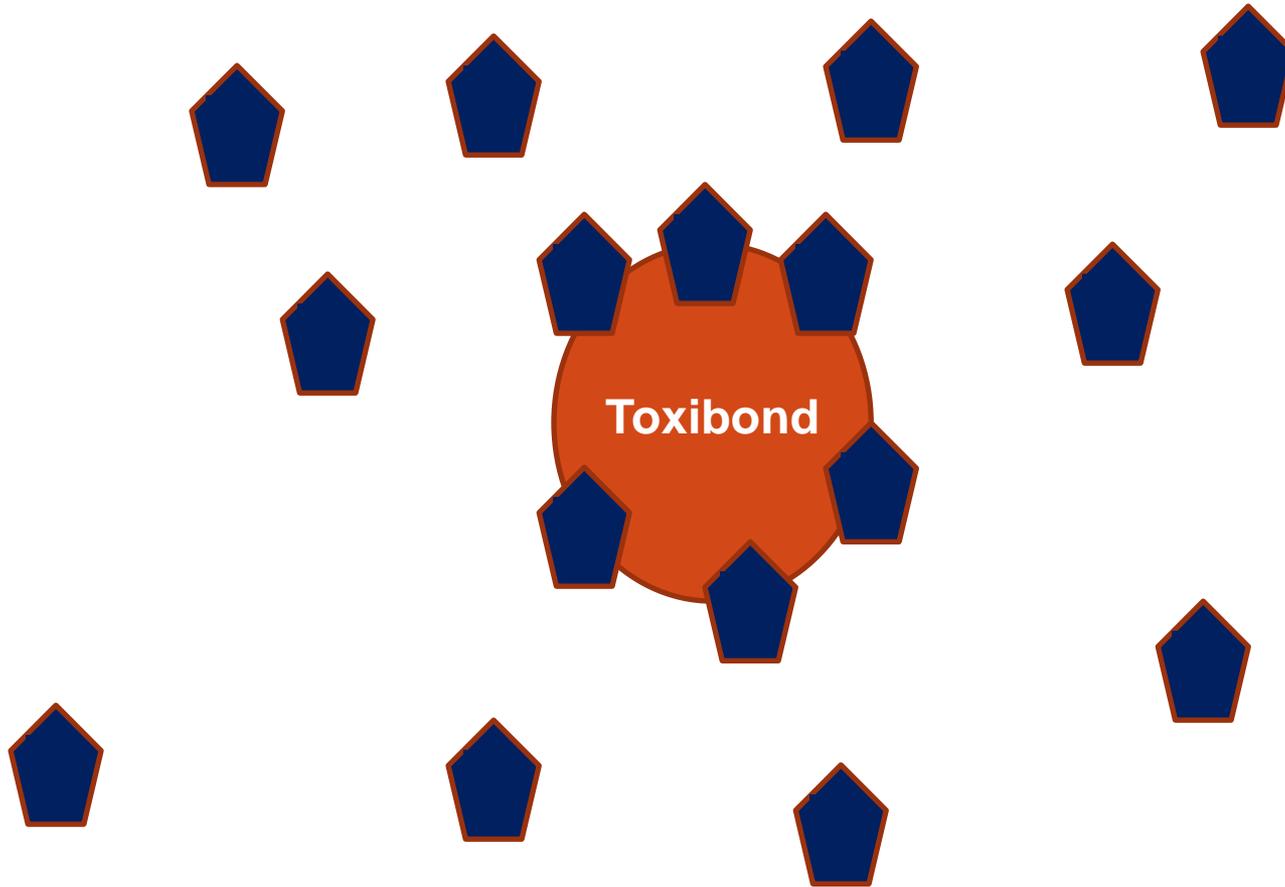
- **TOXIBOND®** has low Cationic Exchange Capacity (C.E.C.) and bipolar electric charges, which makes it an excellent alternative to adsorb (by electric binding) a broad range of mycotoxins among them: Aflatoxin B<sub>1</sub>, Zearalenone, Ochratoxin, Vomitoxin, Fumonisin, T<sub>2</sub> and Citrinin.
- Using Van der Waals forces **TOXIBOND®** binds to active toxin's chemical groups, turning them into larger size compounds and avoiding their absorption into the small intestine

# Effectiveness of Toxibond as Mycotoxin Adsorbent

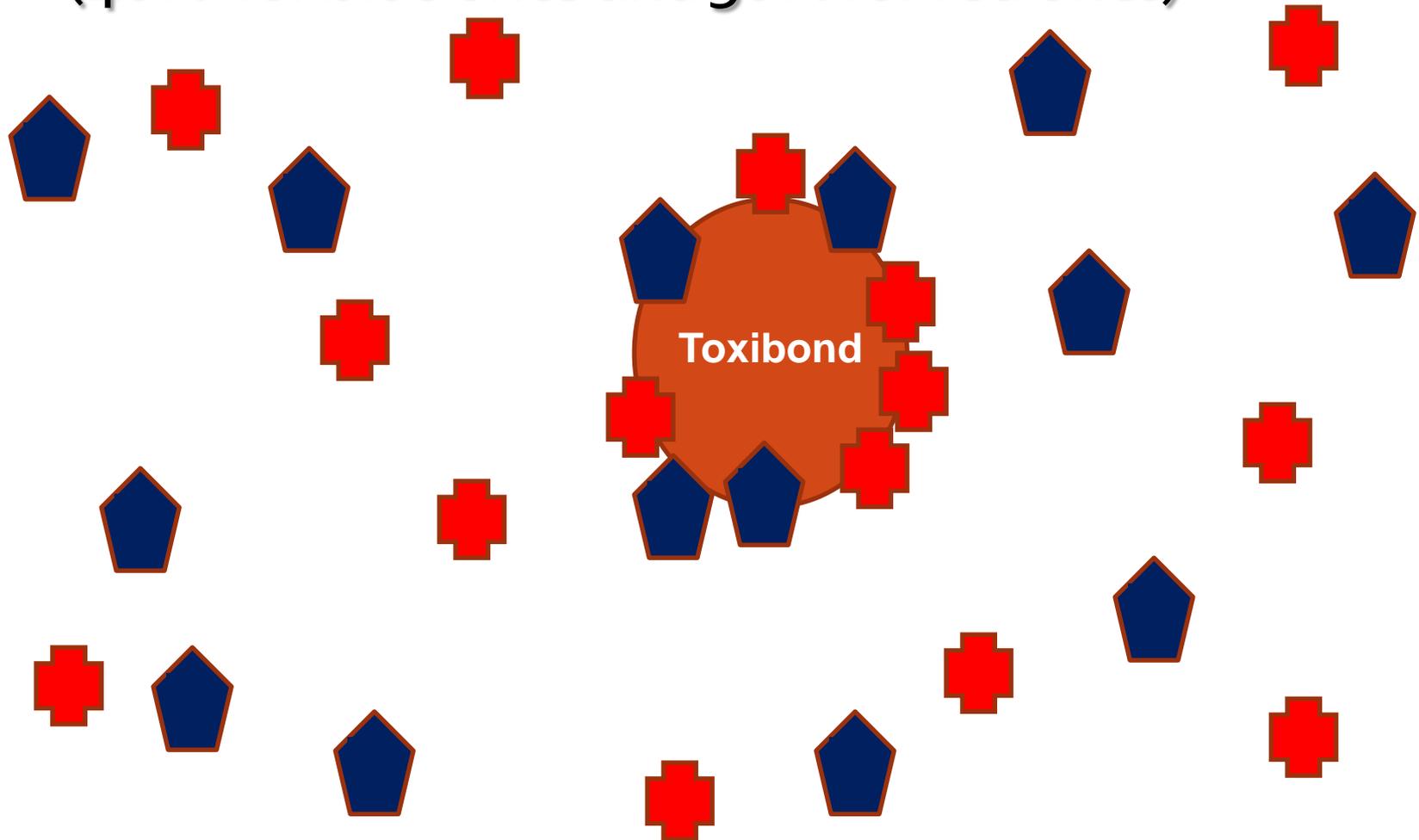
Average results of different *in-vitro* tests, using a pH of 6, and a dosage of 2,500 grams of **TOXIBOND** per metric ton of feed,

Mycotoxin	Level Of Adsorption
Aflatoxin B1	92-96%
Ochratoxin	68-70%
T2 toxin	82-85%
Citrinin	85-90%
Vomitoxin	75-80%
Zearalenone	48-51%
Fumonisin	60-65%

# Adsorption of one mycotoxin (60%): Laboratory conditions



# Adsorption of two mycotoxins: Field Conditions (40% for blue ones and 50% for red ones)



# Toxibond Effectiveness as Mycotoxins Absorbent

Dose: 2.5 Kg/TM Reading: HPLC	T2	Zea	DON	Afla	Fum	Ochra
	ppb	ppb	ppb	ppb	ppb	ppb
Feed with Toxibond*	10.20	9.87	0.98	12.54	2.10	7.16
Variation Coefficient	20.59%	11.96%	3.06%	13.16%	23.81%	14.53%
Contents in Feces	5.80	4.32	0.45	11.34	1.12	4.81
Variation Coefficient	16.90%	11.96%	11.11%	20.28%	7.14%	12.47%
Apparent Adsorption	56.86%	43.77%	45.92%	90.43%	53.33%	67.18%
*Each value is the average of 4 laboratory tests						

# Toxibond

- This presentation contains information resulting from the use of Toxibond® as a Metabolic Modifier in phase I

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# Promoters and Modifiers

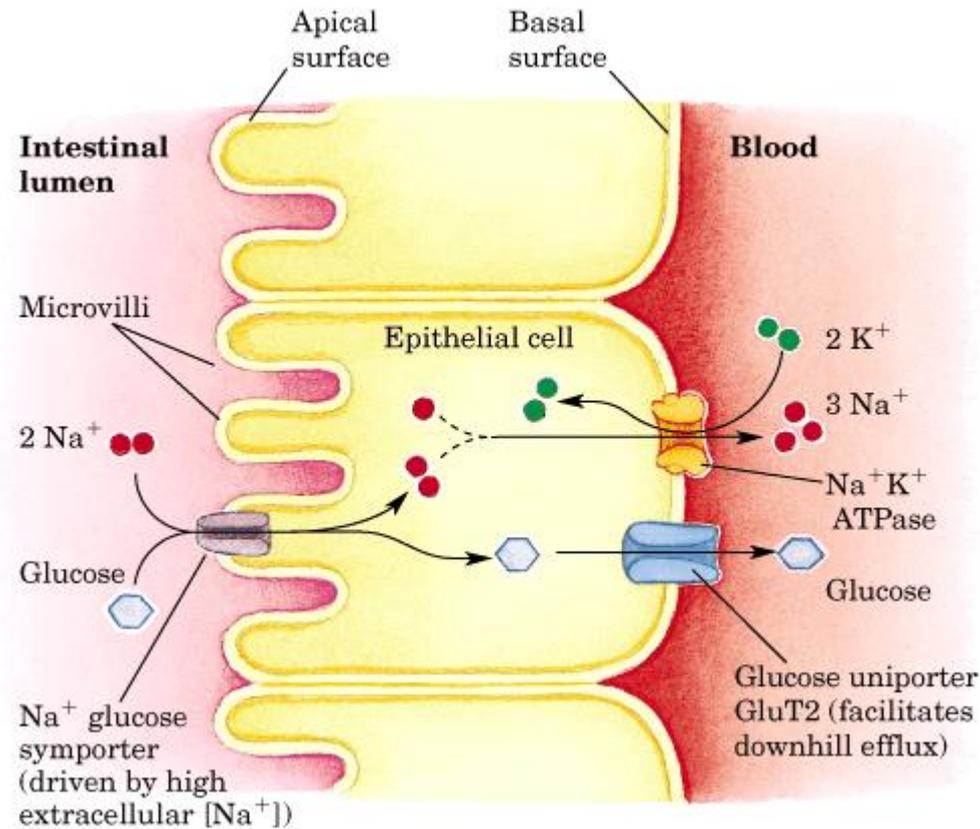
- Growth Promoter: Ingredient (nutritional or additive) stimulates the availability of nutrients in favor of increased body weight (Zinc Bacitracine, Olaquinox, and so on)
- Promoter of Production: Ingredient (nutritional or additive) stimulates availability of nutrients in favor of improved production indicators (Zinc Bacitracine, Olaquinox, and so on)
- Metabolic modifier: Collier (2001) classified the compound altering metabolism to improve efficiency in a productive process. (Enzymes, Raptopamine, Anabolic implants, Toxibond). This includes improved rate of growth, production, body composition or utilization of nutrients. The challenge to producers is on how to assess or calculate the effects of metabolic modifiers over the animal nutritional requirements.

# Toxibond as Phase I Metabolic Modifier

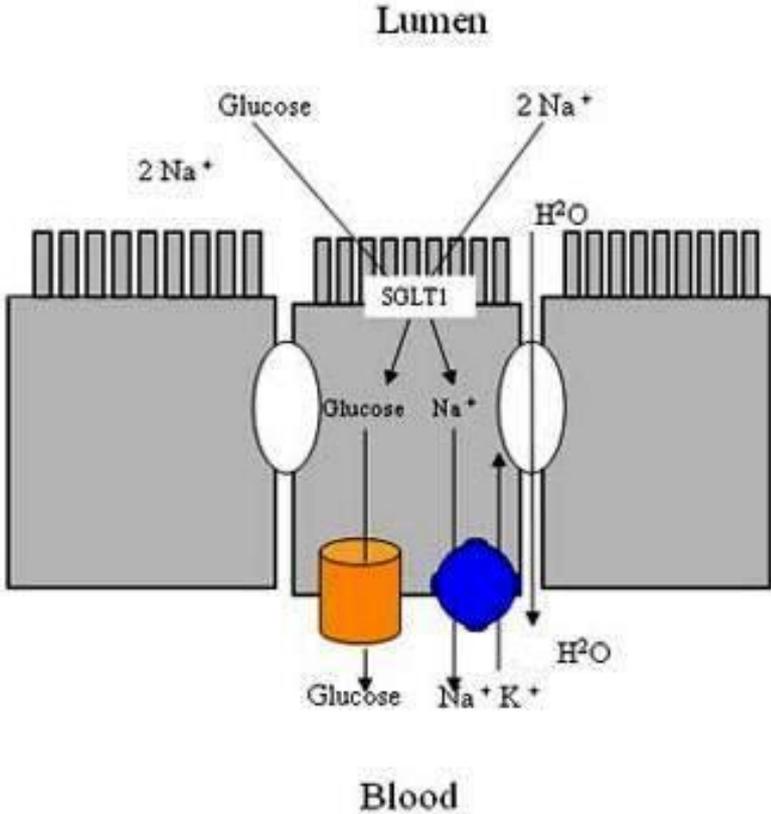
**Research and field testing have demonstrated that Toxibond acts as metabolic modifier on phase I through three mechanisms:**

1. Increases gastrointestinal retention time which favors endo and exo-enzymatic action. This is due to TOXIBOND® low percentage of hydration (6%) which does not cover the villi and, therefore, does not impair the absorption of nutrients.
2. Increased trans-cellular absorption of glucose through increased trans-mural potential differential (PDT) at the enterocyte of the micro-villi; as a result more energy retention is produced and in turn a reduction in feed consumption which does not affect productive parameters.
3. Indirect increase in Para-cellular absorption of water favoring a reduction in fecal humidity and stench.

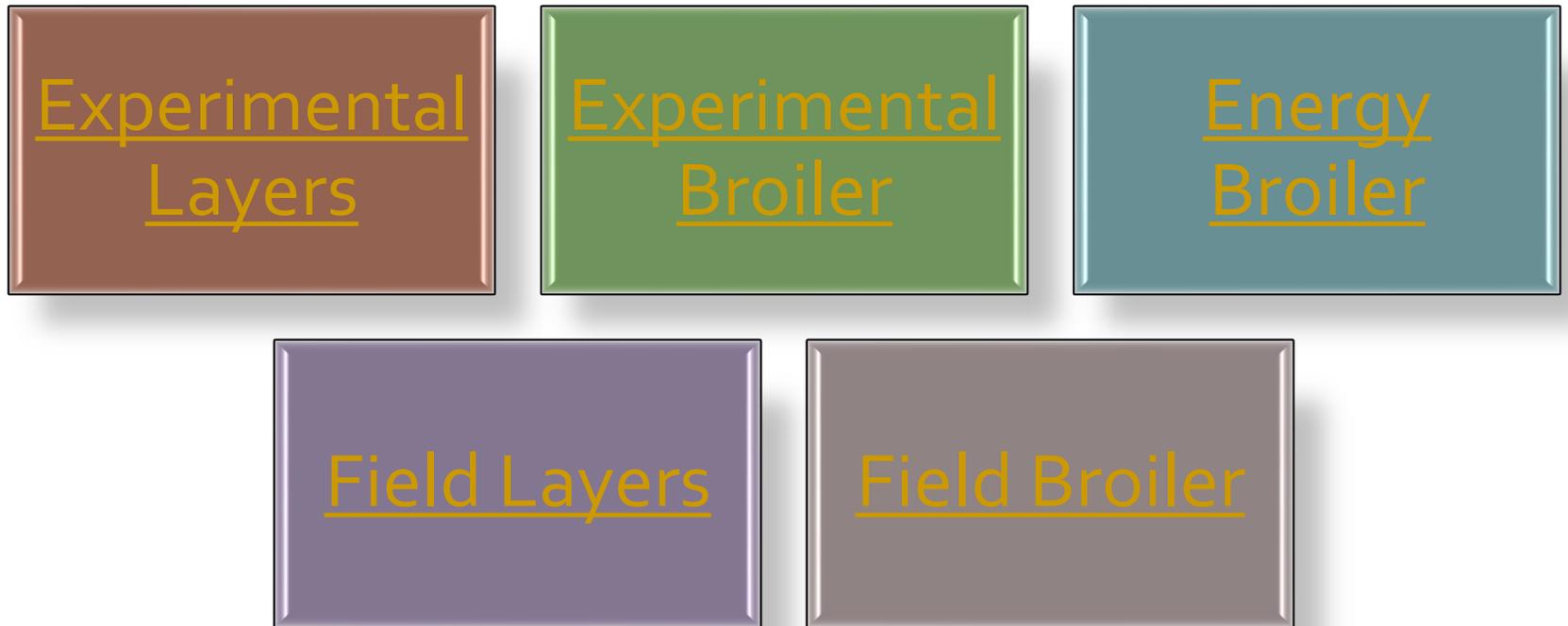
# Toxibond: Mode of Action



# Toxibond: Mode of Action



# Assessment of Productive Parameters



# Toxibond in Ruminants

- Using a Toxibond dose of 30-70 g/animal/day in Dairy Cattle has demonstrated to be effective in controlling Polar mycotoxins such as Aflatoxins (Absorption Level over 95%).
- Also in different experiments an increase in productive parameters has been observed (+600 Kg Milk per 305 day Lactation) in animales consuming Toxibond against negative controls.