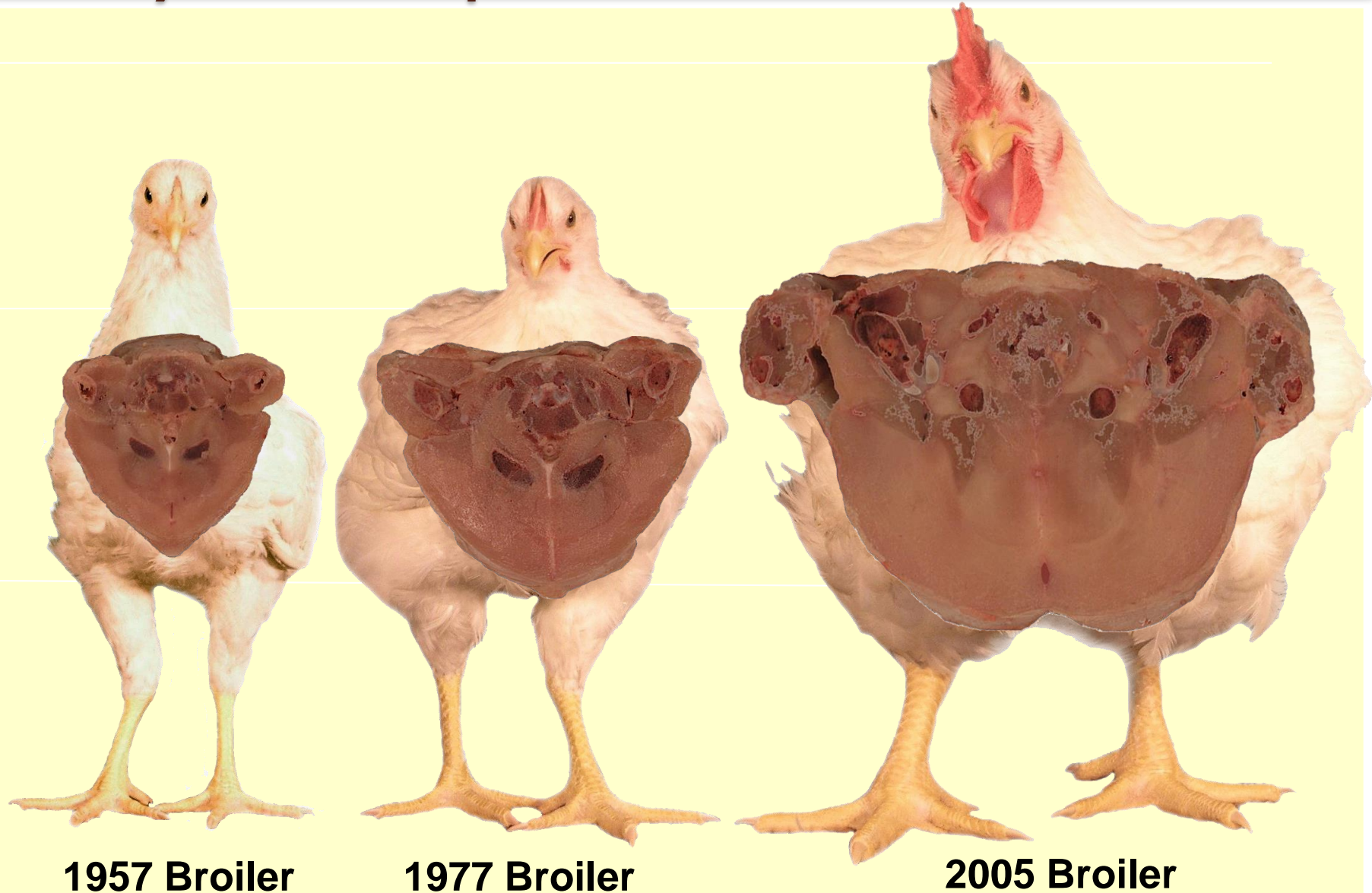


An Optimist's View on How We Will Maintain Broiler Gut Health and Performance in Today's NAE, Food Safety and Regulatory Climate

Chuck Hofacre, DVM, MAM, PhD
The University of Georgia
And
Southern Poultry Research Group



Why I am Optimistic!



1957 Broiler

1977 Broiler

2005 Broiler

Agriculture Has Become Highly Regulated

- Welfare Standards
- Food Safety Regulations
- Antimicrobial Stewardship
- Environmental Regulations

Welfare Standards

- Customer Driven
- Bird Density
- Lighting programs – intensity, duration
- Slow Growth vs. Modern Genetics

Environmental Regulations

- State and Federal Government Driven
- Litter Disposal – seasons, weather, run off
- Nutrient management plans
 - Phosphorous
- Air quality – ammonia emissions??

Food Safety Regulations

- Federal Government
 - Administration – Obama vs. Trump??
 - CDC
 - FSIS
 - FDA (FSMA & S.E. Egg Rule)
- Consumer Advocate Groups
- International Trade Partners
 - Codex Alimentarius (joint WHO/FAO)

Antimicrobial Use Stewardship

- Federal Government
 - FDA
 - CDC
- Customers (not consumers)
- Export Markets



Why do we grow broilers?



Why?

Fun, great lifestyle!



Why?

Make Money



Why?

Feed the World!

Antimicrobial Stewardship Regulations

March 2009 – FDA Guidance #120

- Control unnecessary use of antimicrobials
- Veterinary Feed Directive

June 2010 – FDA Guidance #209

- Judicious use of medically important antimicrobials in food animals
- Remove label for promoting growth or improving feed efficiency

December 2010 – FDA Guidance #213

- New Labels – no production/performance indication
- Use veterinary oversight for both in feed and water
- Began January, 2017

What does this mean?

Oxytetracycline

CHEMICAL NAME: Oxytetracycline from Oxytetracycline Quaternary Salt or Oxytetracycline Dihydrate Base, equivalent to Oxytetracycline Hydrochloride

Chickens

1. **FDA Status:** No feed mill license required.
Regulation §558.450

WARNING STATEMENT REQUIRED: At 500 g/ton use level, 24-hour withdrawal period. No withdrawal necessary at lower use levels. In low calcium feeds withdraw 3 days before slaughter. Do not administer to chickens producing eggs for human consumption.

SPECIAL CONSIDERATIONS: Oxytetracycline in low calcium feeds (0.18-0.55% dietary calcium) should not be fed for more than 5 days and should not be fed to laying hens.

ANIMAL	DRUG	USE LEVEL	INDICATIONS FOR USE
Chickens	Oxytetracycline	10-50 g/ton Use continuously	Increase rate of weight gain and improved feed efficiency.
	Oxytetracycline	100-200 g/ton Feed continuously for 7-14 days	Control of infectious synovitis caused by <i>Mycoplasma synoviae</i> ; control of fowl cholera caused by <i>Pasteurella multocida</i> susceptible to Oxytetracycline.
	Oxytetracycline	400 g/ton Feed continuously for 7-14 days	Control of chronic respiratory disease (CRD) and air sac infection caused by <i>Mycoplasma gallisepticum</i> and <i>Escherichia coli</i> susceptible to Oxytetracycline.
	Oxytetracycline	500 g/ton Feed continuously for 5 days	Reduction of mortality due to air sacculitis (air sac infection) caused by <i>Escherichia coli</i> susceptible to Oxytetracycline.

World's Changing

- Antimicrobial Stewardship

- No longer use ceftiofur (Naxcel) – No extra label
- Reduced/eliminate gentamicin use (Medically Important)
- Market driven less AGP Use
 - NAE
 - ABF
- VFD/Prescriptions

Raising Chickens without Antibiotics

- Consumers want it!
- QSRs want it!
- Retailers want it!

They are willing to pay more

Dos and Don'ts of ABF in a Broiler Company

- When you start – Piece of cake
- 100% of production **sold** ABF = Bad
- Chick quality is critical!

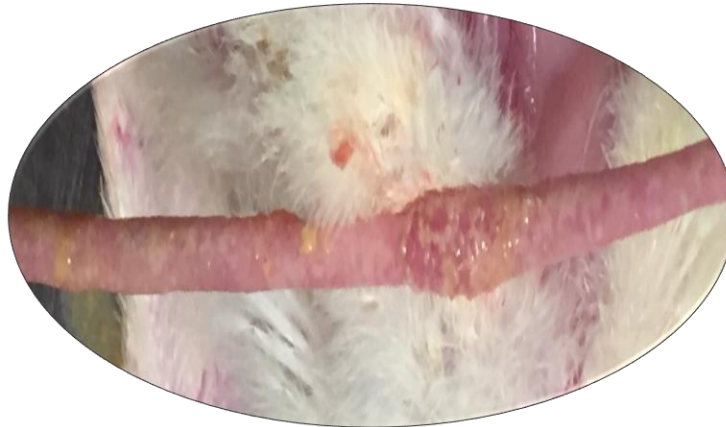
What I Have Experienced

- NE more severe in winter
- Can be as much as 30 - 50% of houses placed
- Often farms with poorer husbandry



More Experience

- When on Coccidia vaccine
 - 16.3 days of age (372 cases)



- Earliest 11 days and oldest 28 days
- Clean/new litter a risk factor (37% of cases)

J. Smith

More Experience



- Vaccines in U. S.
Coccivac™, Advent™,
Inovocox™, Hatch Pak™
*No difference in NE incidence

- Combine vaccine and chemical coccidiostat
- 14 day minimum downtime
- Greater square footage

More Experience



Subclinical N. E. can lose 4 points (1.66 to 1.70/3.25kg)

- Feed passage up to 15% is normal, starts in second feed
- All veg diet – a problem

Feeding Program

- Feed changes at wrong time – Disaster
 - 18 days o.k.
- Higher protein early = higher N. E.
- Want highly digestible protein early
- Welfare programs may clash with ABF
 - i.e. 6 hours continuous darkness??
- Phytase and rickets??

More Experience

1. Egg Pack is critical
2. Chick Quality is critical
3. If 1 & 2 perfect without Gentamicin 0.5%
higher first week
4. If 1 & 2 less than perfect → Happy at 3.5%
average first week



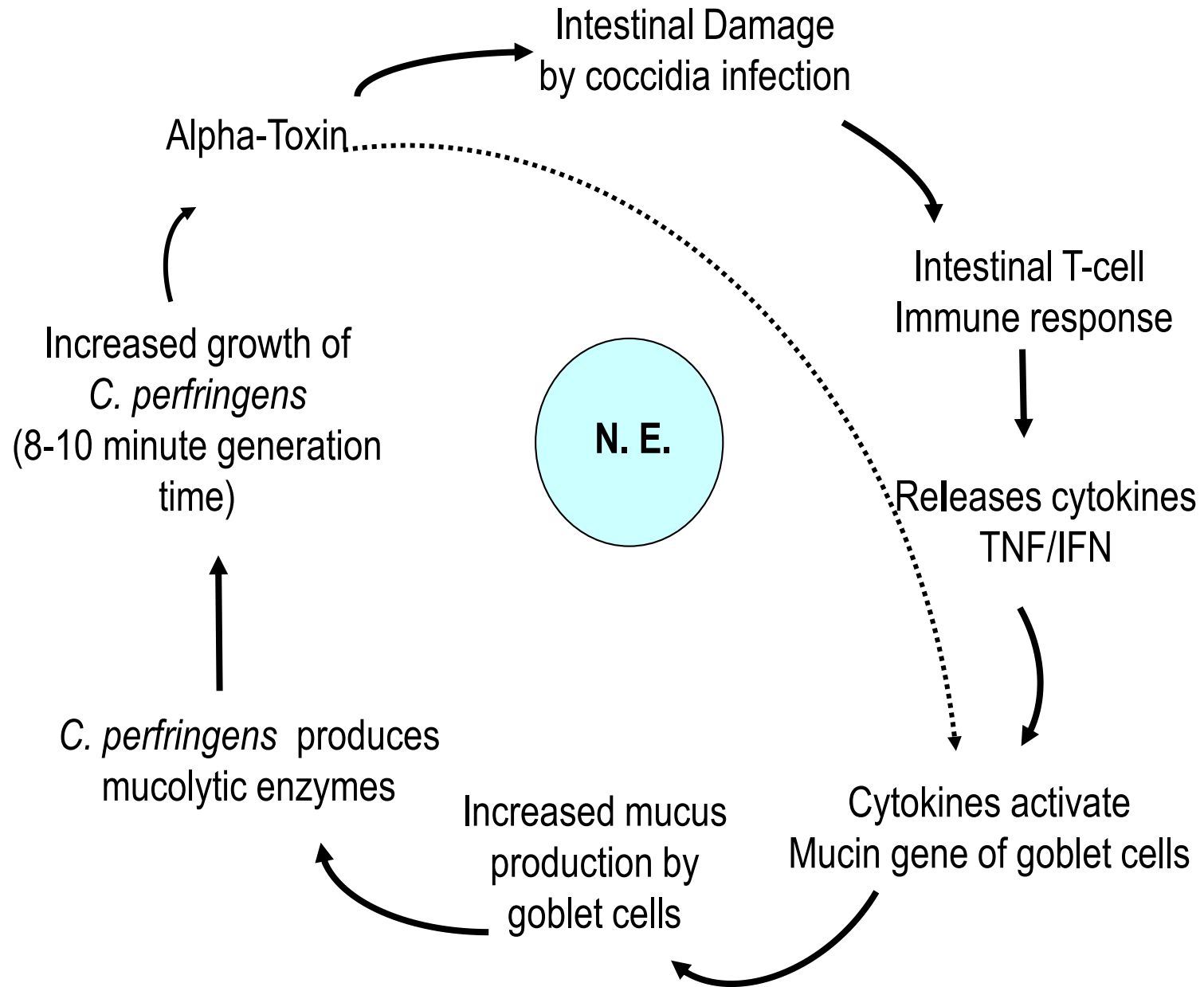
More Experience

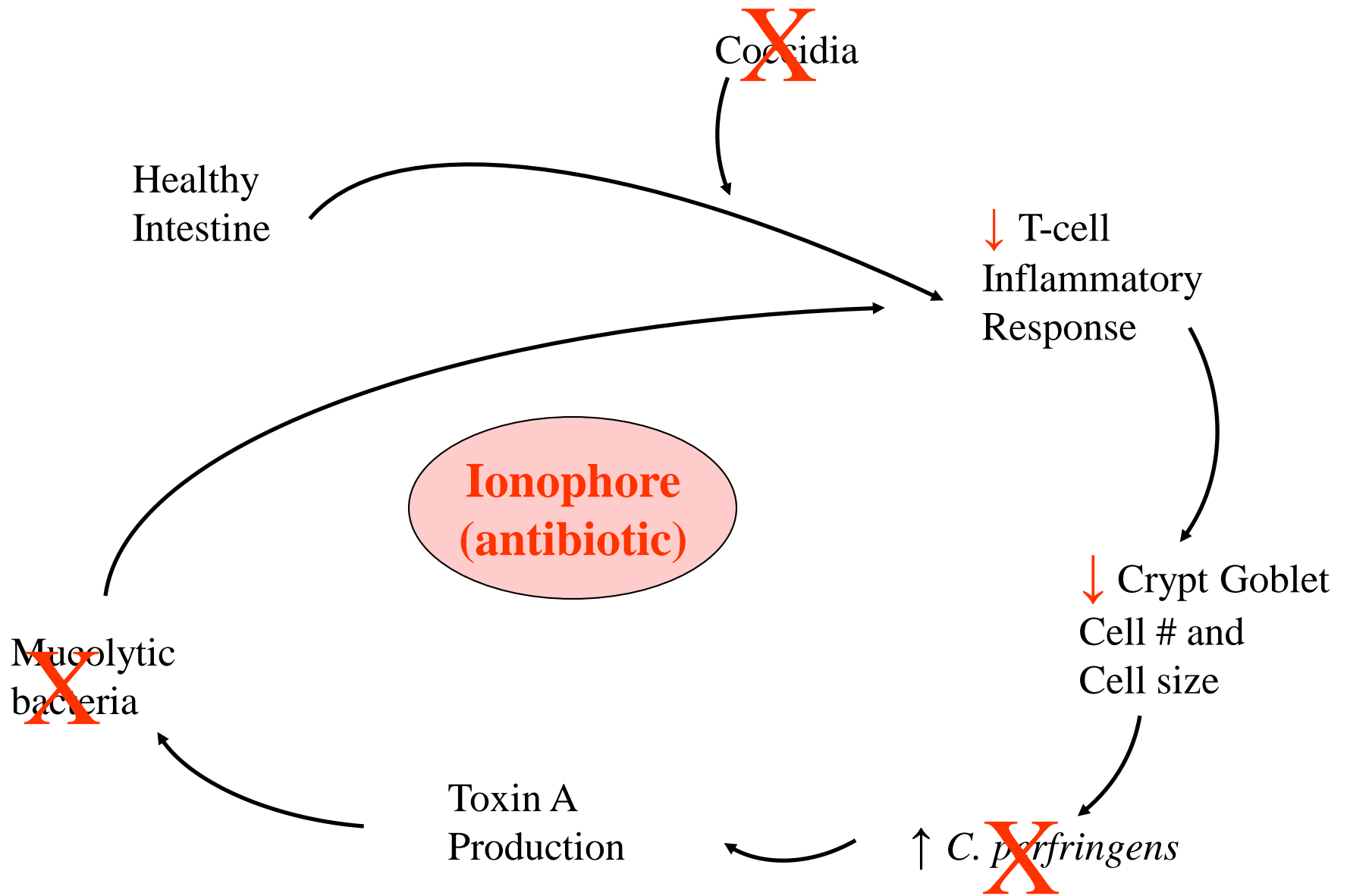
(Number of Cases January 2016 – March 2016)

- Chick Quality 14%
- N. E./Cocci 27%
- Respiratory 13%
- GD 12%
- IBH 7%
- **BCO** 5%
- Unknown 10%

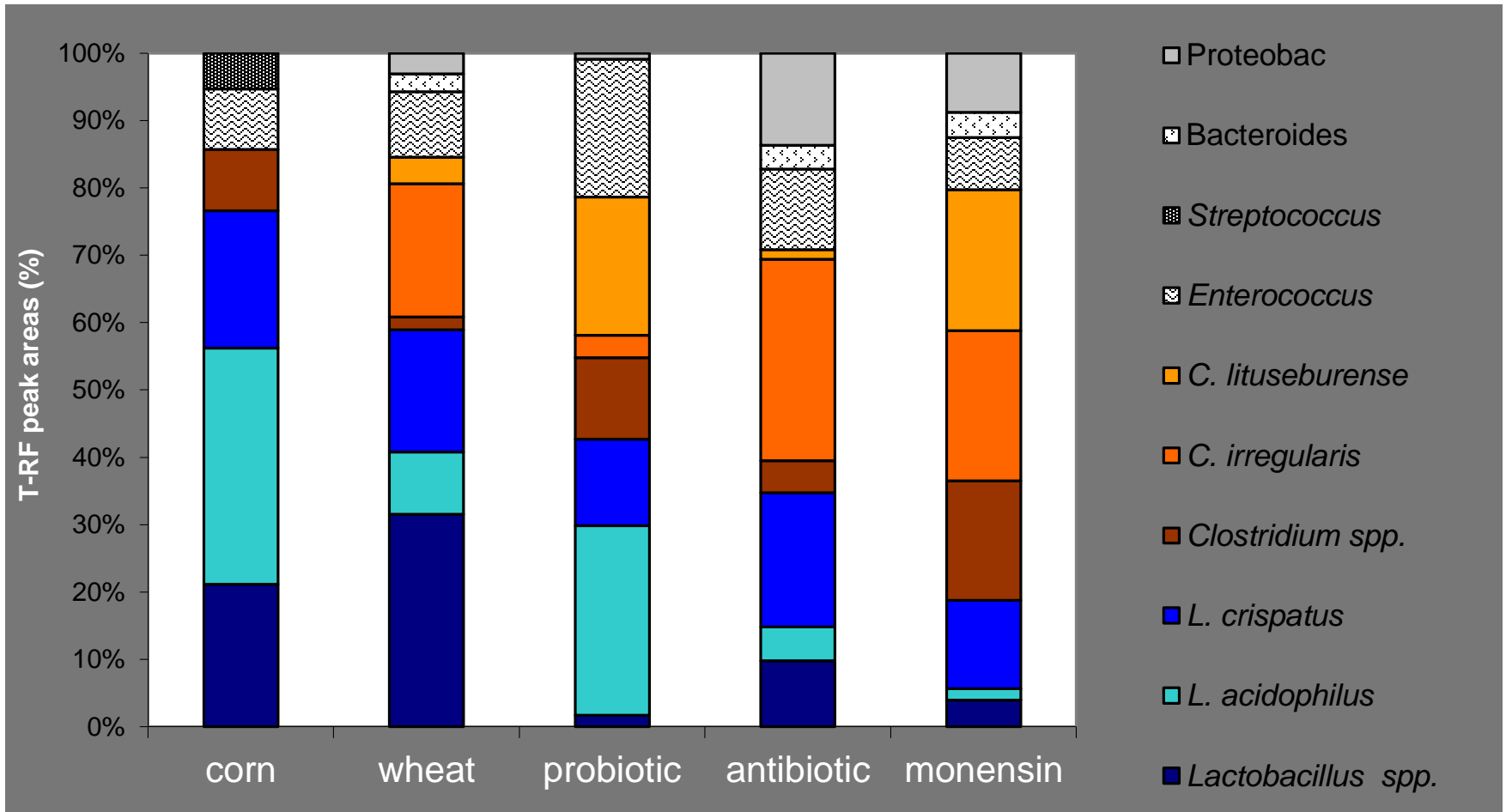
Clostridium perfringens

- Soil organism
- Anaerobe forms highly resistant spores
- Normal flora
- Alpha, beta and Net B toxins
- Toxins or digestive enzyme??



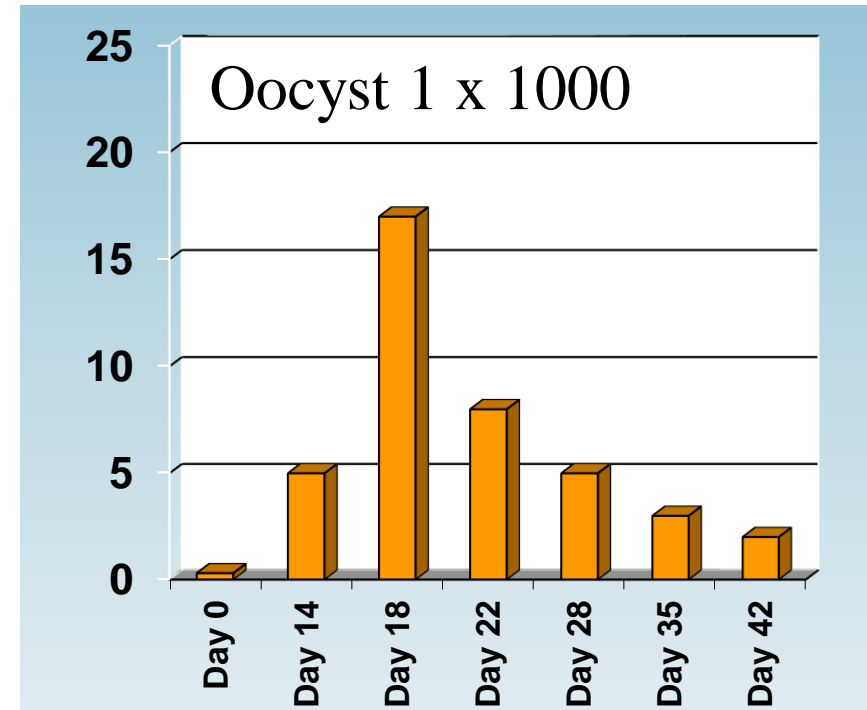


Bacteria composition of the Ileum



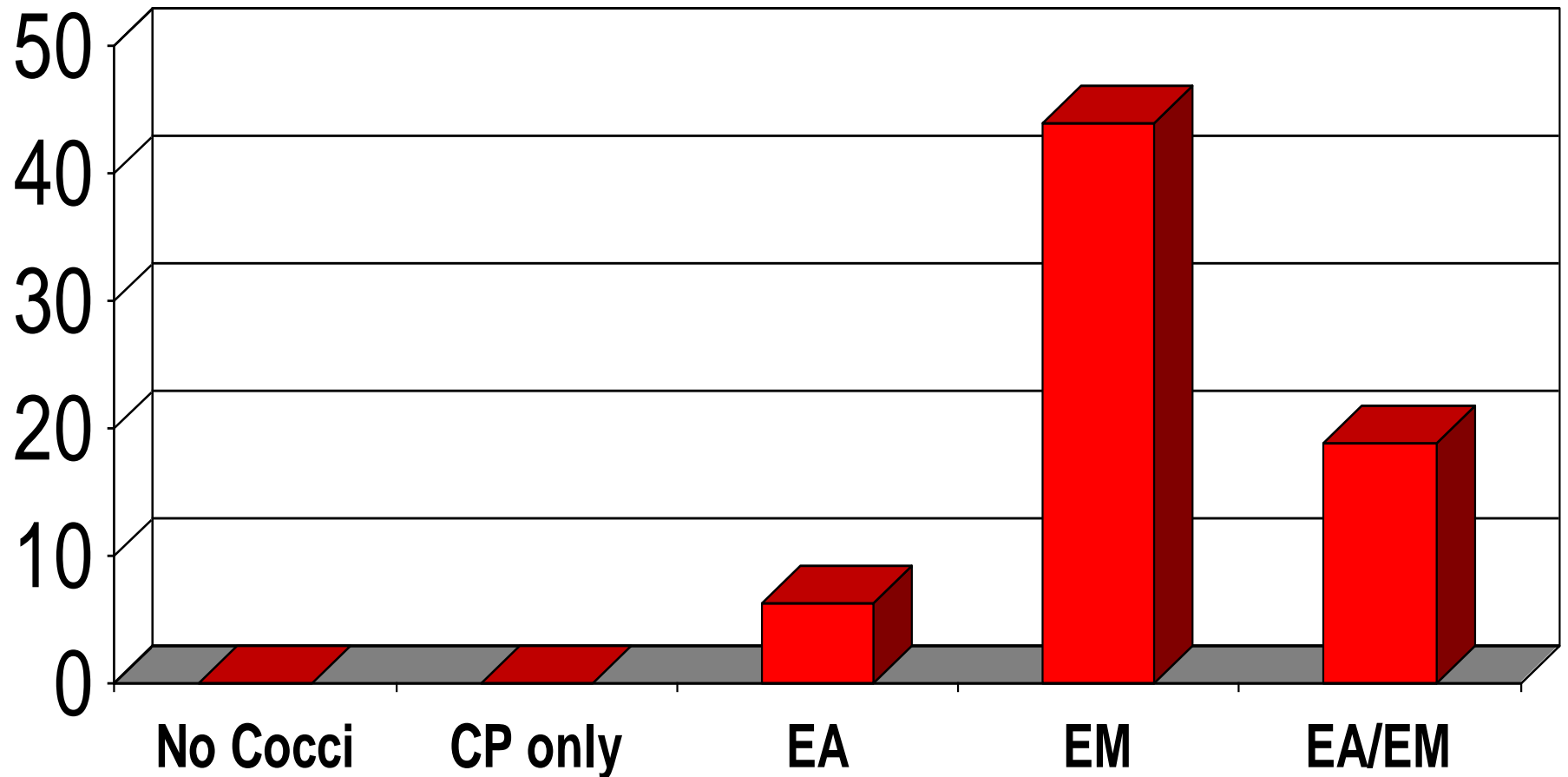
Oocyst Shedding Pattern following Coccivac-B Vaccination

- Chickens vaccinated on day of hatch
- Oocyst shedding peaks
- As immunity develops, the number decrease
- Damage to mucosa from 7 to 22 days with major damage ~ 18 to 21 days



(Mathis, 2001)

% Necrotic Enteritis Mortality



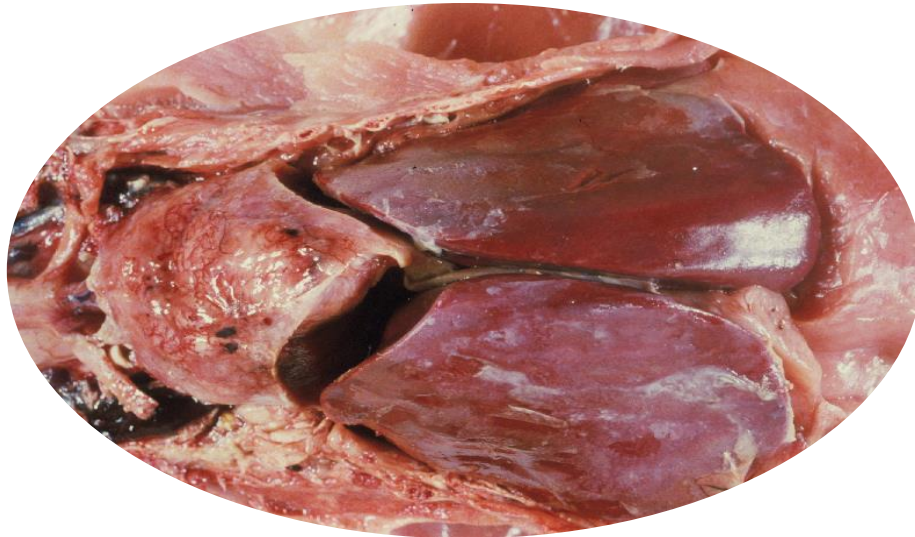
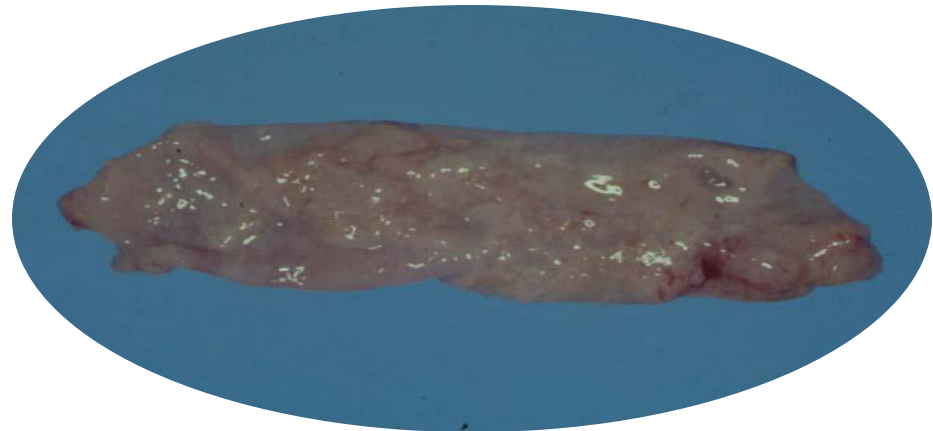
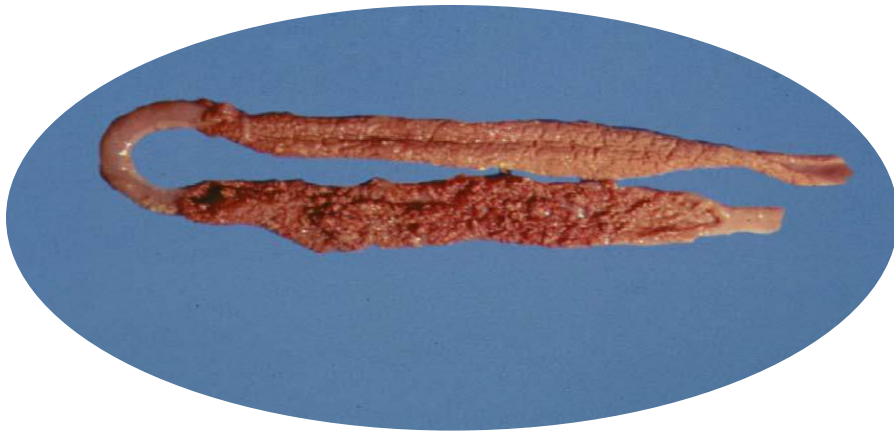
Prevent Necrotic Enteritis

1. Control intestinal epithelium damage
 - ingredient quality
 - Coccidia
2. Prevent toxigenic strains of *C. perfringens* from multiplying
 - Ingredient types
 - Use of enzymes
3. Maintain Healthy Intestinal Microbial Flora

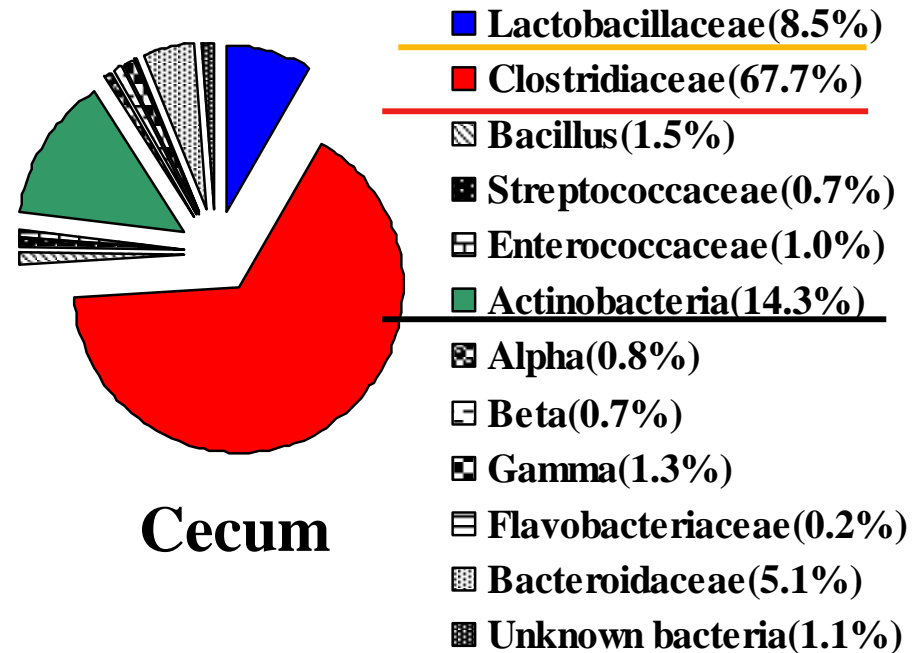
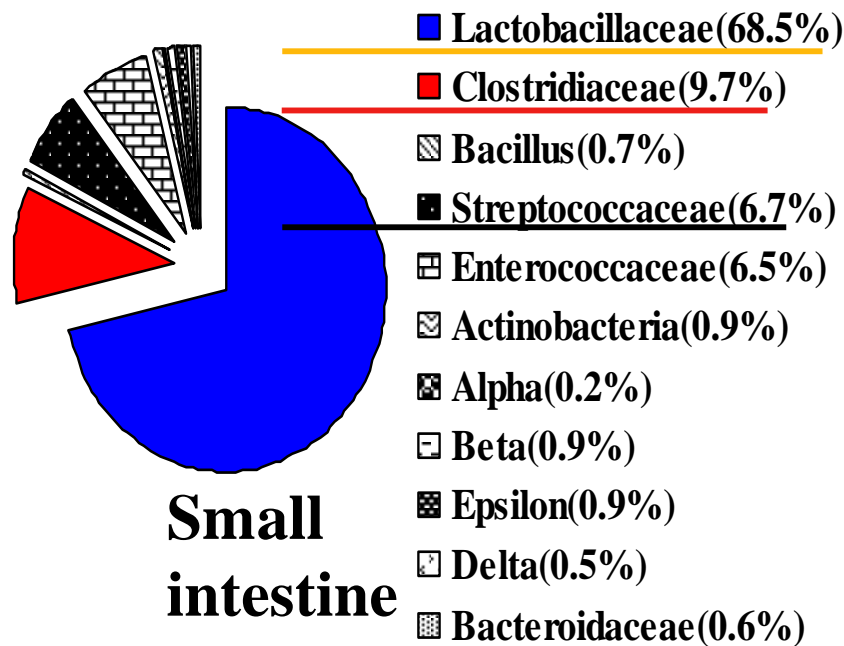
N.E. Interventions Tested That Work:

- Enzymes i.e. Phytase, Amylase, etc.
- Prebiotics (MOS)
- Probiotics (Defined/undefined)
- Organic acids
- Inorganic acids
- Phytochemicals (essential oils, Saponins, etc.)
- Immune stimulants/modulators
- **Combination of above**

Intersection of Antibiotic Stewardship – Food Safety – Animal Welfare



Intersection of Antimicrobial Stewardship Food Safety – Animal Welfare



**Microbial Composition of the Broiler Intestine
(16S clone libraries)**

Interventions Tested Work Only for N.E.?

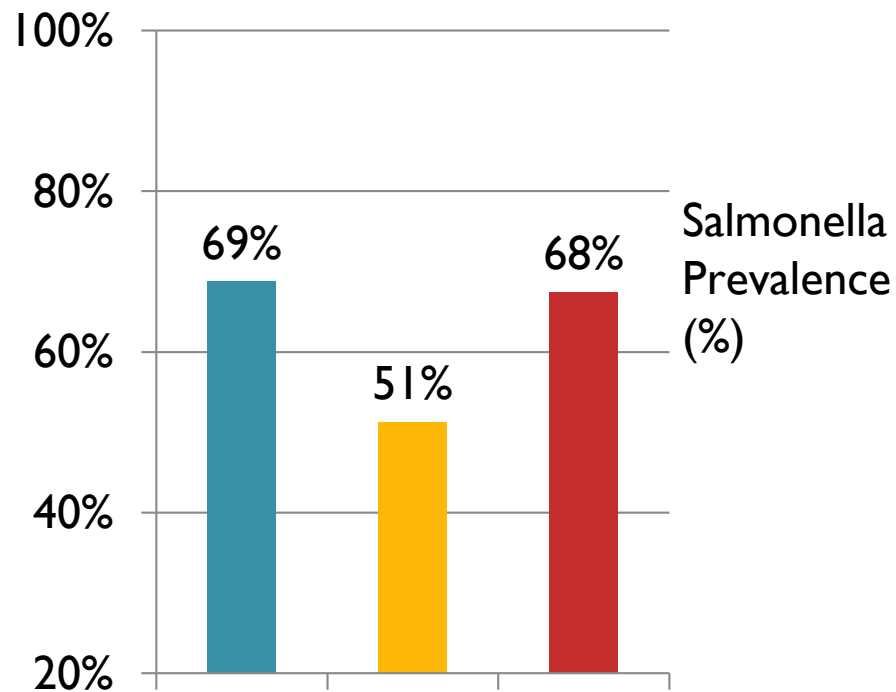
- Enzymes i.e. Phytase, etc.
- Prebiotics (MOS)
- Probiotics (Defined/undefined)
- Organic acids
- Inorganic acids
- Phytoceuticals (essential oils, Saponins, etc.)
- Immune stimulants/modulators
- **Combination of above**
 - Also, Salmonella and Campylobacter (?)

Eimeria and Food Safety

- Eimeria cycling affects the gut flora or local immune response? Collier, 2008.
- “... choice of coccidiosis control.... important for control of Salmonella....” (Volkova, et al. 2011: 66 Broiler flocks)
- E. tenella results in increased colonization and fecal shed of Salmonella
- Tellez, P. S. 1994 found increased resistance to S. E. following subclinical Eimeria tenella
- Baba, 1987 – E. tenella ↑ S. T. spleens/livers:
↑ Salmonella in MSP/MDM/Ground Poultry??

Intersection of Antibiotic Use – Food Safety – Animal Welfare: Coccidia

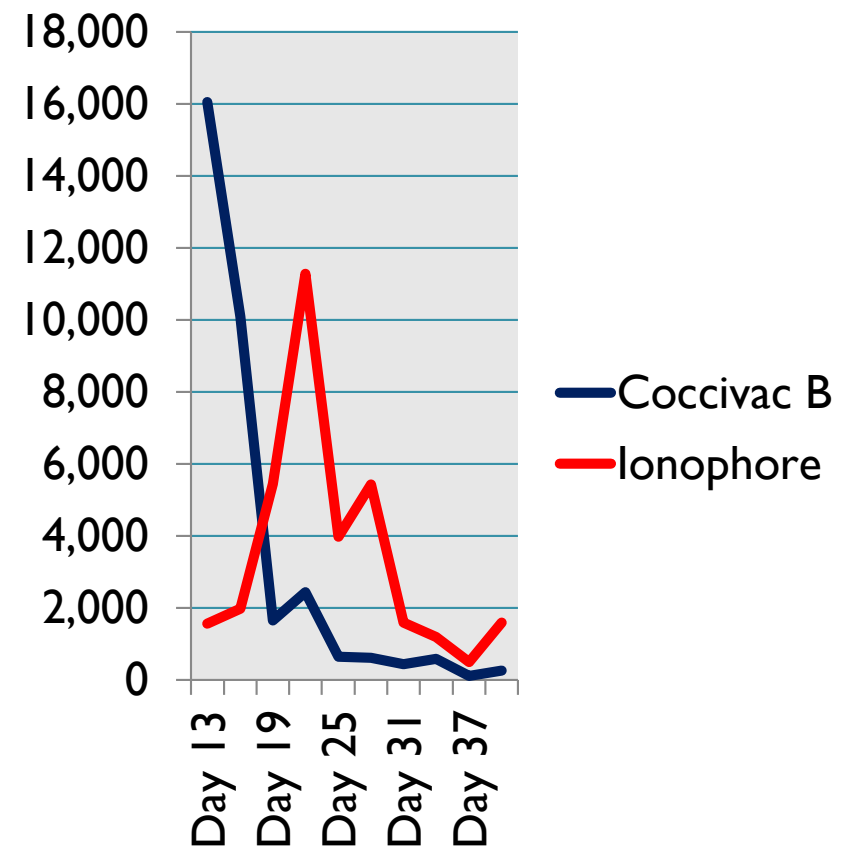
Salmonella Prevalence
Ceca* (42 day)



*10 ceca/pen x 8 replicates
**Not significantly different

Why Does Cocci Affect
Salmonella?

Occyst Counts (E.
acervulina/E. tenella)



This Optimist Believes in the Integrated Poultry Industry

Breeder Pullets



Breeder Layer



Broiler Eggs



Broiler Hatchery



Broiler Farm



Processing Plant



Consumer



Optimists Goal for Poultry Industry

- Fun and a Great Lifestyle
- Make Money
- Feed the World

6 Week Old Broiler: 1957 vs. 2012



How We Will Maintain Broiler Gut Health and Performance in Today's NAE, Food Safety and Regulatory Climate

Team

“A Group on one side.”

Webster's New Collegiate
Dictionary

NAE, ABF: Partner with Growers!





Thank you

John Smith and Greg Mathis