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First you add knowledge...

**Virginia State Feed Association/Virginia Tech Nutrition Cow College**

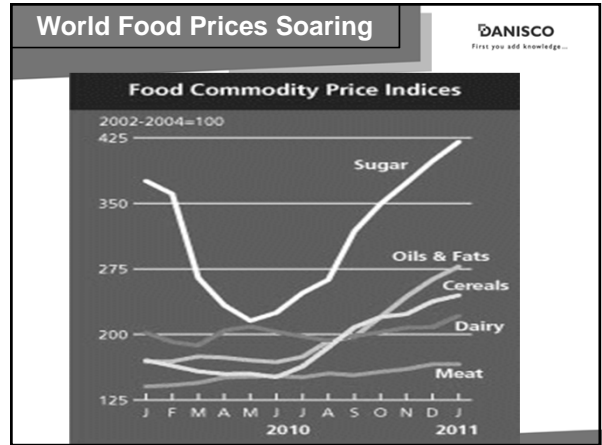
**Daniel Karunakaran**  
Senior Technical Services Manager  
Danisco Animal Nutrition

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# Changing Times And Challenges

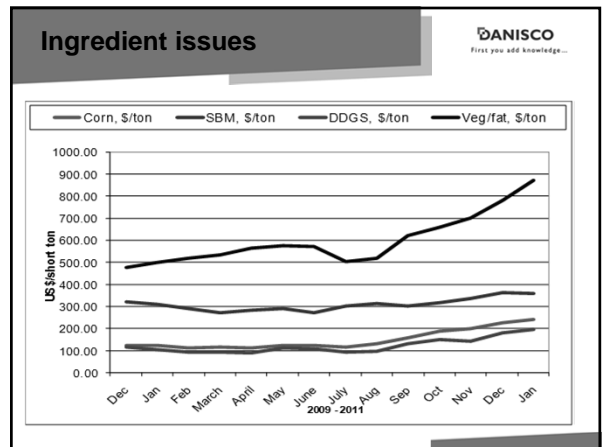
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## FY 2012 Budget Higher Taxes 1.5 trillion tax hike (10 years)



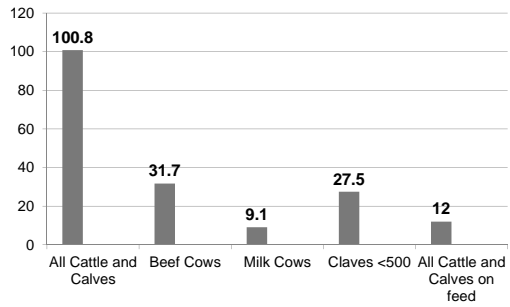
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## Ingredients



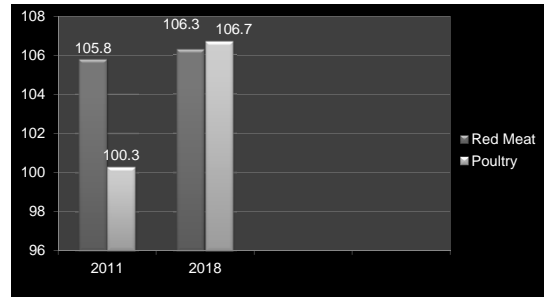
### Cattle Population in the US July 2010

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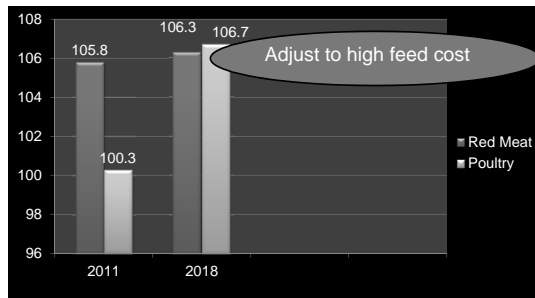
### US Per capita Meat Consumption – Forecast 2018

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### Why is the shift?

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### Corn Supply

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### Corn Supply

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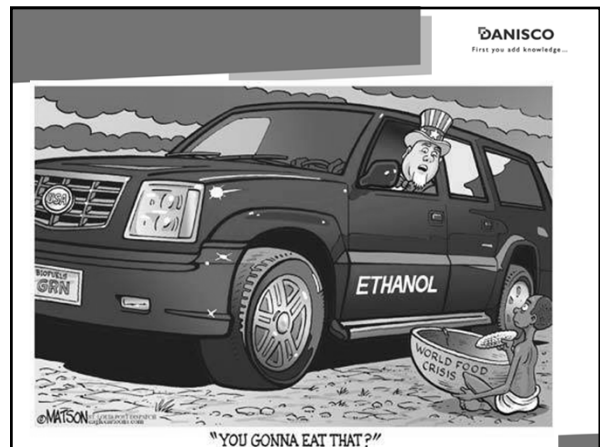
#### Tight Supply Globally

675 Million bushels by Aug 2011

China imported 1.57 tones – largest in 15 years

2<sup>nd</sup> largest exporter – Argentina 17% less

Other factors





**DDGS -**

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We Have to learn how to use DDGS

**DDGS Supply**

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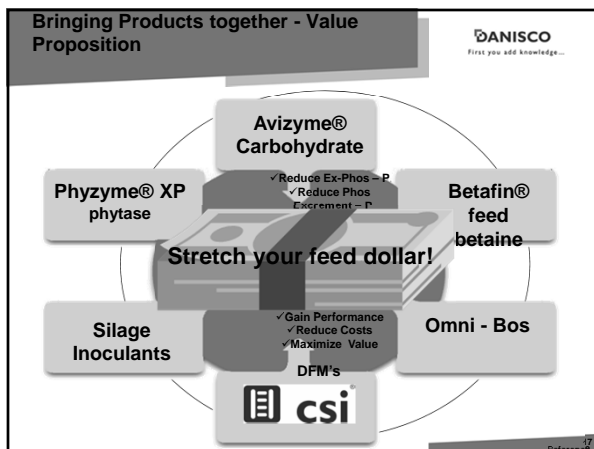
Second largest feed ingredient now

DDGS -Highly variable nutrient profile

China largest importer 2.9 million tones – 11 months in 2010. Almost nothing 3 years ago

Replacing 1.5 million tons of corn

Enzyme addition helps restore animal performance



## Ruminant Group Contacts

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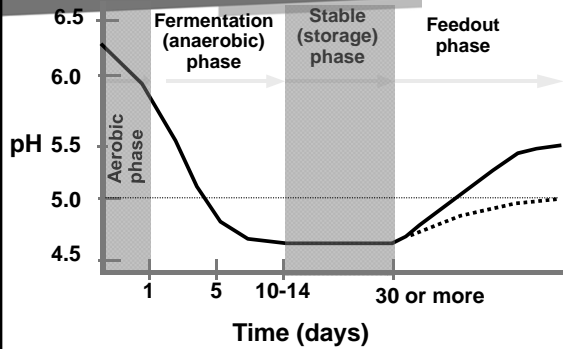
## Forage Treatment Products

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- Inoculants
  - Conventional
  - *Lactobacillus buchneri* products
- Enzymes
- Propionic Acid
- Others

## Silage Phases

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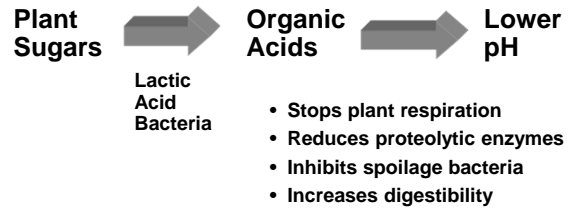


## Silage Phases - Fermentation

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### Fermentation Phase

Anaerobic conditions - optimum growth for lactic acid bacteria



Allow O<sub>2</sub> to enter

- ✓ Largest loss of DM, nutritional value
- ✓ Yeast, molds

Spoilage Levels  
10<sup>8</sup> CFU/g (100 million) yeast  
10<sup>6</sup> CFU/g (1 million) molds



## Silage Phases

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### Role of Inoculants:

Proper silage management + Inoculants



Shorter aerobic phase  
Increases rate of fermentation  
Inhibits spoilage organisms

## Effects on Silage

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### Homofermentative Inoculants

- High Lactic Acid Production
- Low pH levels
- Improved DM Recovery
- Slightly improved animal performance



## What to Look for in an Inoculant

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- Min. 100,000 cfu/g of crop
- Must have viable lactic acid bacteria
- Produce lactic acid
- Grow over a wide of pH, moisture,
- Ferment a wide range of plant sugars



## ROI- Dry Matter Savings

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- DM Savings 5%
- Total corn silage ensiled 1500 tons
- Tons saved using inoculant 75 tons
- Cost of Inoculant (.75/ton) \$1,125.00 total
- Average intake per cow 55 lbs
- 75 tons of extra silage 150,000 lbs of forage saved
- $150,000 / 5500 = 27.27$  days of extra silage

....this gives us almost an extra month of high quality forages - this would come in handy at the end of season as most farmers are running short!!

## ROI- Animal Performance

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- › Assume 3-5% improvement when effective
  - Additional 3lbs milk/cow/day
  - 50% effectiveness; 1.5 lbs milk/cow/day
  - Milk price = \$10.00/cwt
  - Additional income = \$0.15/cow/day
  - Cost of inoculation (60lb silage/cow/day) = \$0.03/cow/day
- › ROI : 4 to 1

## Questions?

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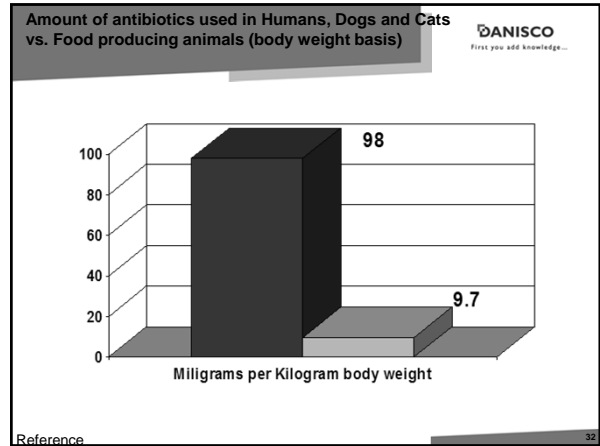


Antibiotics  
In  
Food Animals

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## Amount of antibiotics used in Humans, Dogs and Cats vs. Food producing animals (body weight basis)

Reference 31



## Probiotic solutions

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## A supplement to help maintain gastrointestinal health in the neonatal dairy calf

# Omni-Bos<sup>CB</sup>

## Cost of Scours

→ **Calf Scours:**

- 7.8% of calves die prior to weaning<sup>1</sup>
- 56.7 of calf deaths are associated with scours<sup>2</sup>
- Veterinary costs for preweaned calves - \$17.26 per calf<sup>1</sup>
- Calves treated for scours are 2.9 times more likely to increase age to first calving<sup>4</sup>

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## Causes of Calf Scours

→ **Identification of Calf Scour Organisms (160 respondents)\***

- *E. coli*..... 74.4%
- *Salmonella*..... 28.8%
- *Cryptosporidium*.....28.1%
- Rotovirus.....26.9%
- Corona Virus.....21.9%

→ 41.9% of respondents treated calves at birth to prevent scours\*

\*Hoard's Dairyman 2009 Continuing Market Survey

## The Neonatal Calf

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- Calves are born with a naïve immune system
- Passive immunity from colostrum provides some protection
  - Many calves fail to acquire passive immunity



**This exposes calves to increased pathogen susceptibility.**

Kampen *et al.*, 2006; McDonough *et al.*, 1994; Wilson *et al.*, 1996

## Solution—*Bacillus* spp.

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### *Bacillus* Produce

#### -Antimicrobial Peptides (bacteriocins)

- gramicidin
- subtilin
- bacitracin
- polymyxin

These compounds provide a competitive niche environmentally by prohibiting growth of other organisms competing for nutrients—In the gut it is called **COMPETITIVE INHIBITION**.

### *Bacillus* Benefits

- Competitive Inhibition-Toxigenic *Clostridium*, and *E. coli*
- Improves performance- through stimulation immune function modulating GI microbial community

### *Bacillus* Features

- Spore former (Active under a wide range of conditions)
- Several species have GRAS status

## Omni-Bos<sup>CB</sup> Development

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- Identified and characterized calf pathogens
  - ✓ Over 1,000 rectal swabs and GIT samples from clinically ill calves
  - ✓ Geographical areas: CA, WI, IA, OH and PA
  - ✓ Different neonatal calf production types
- Selected strains of *Bacillus* with ability to inhibit growth of calf associated pathogens
  - ✓ *In vitro* growth inhibition studies\*:



## *Bacillus* Bacteriocin Screening Results

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Selected strains of *Bacillus* with ability to inhibit growth of calf associated pathogens

Pathogen type	Isolates	Genotypes	Inhibition*
<i>Salmonella</i>	181	64	99%
<i>Escherichia coli</i>	126	17	100%
<i>Clostridium perfringens</i> Type A	917	155	89%

\* Represents percentage of isolates that were inhibited at 50% or greater

## Summary

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- A Specialized Formulation of Highly **Stable** *Bacillus* to Minimize Pathogenic Challenges
- Significant reduction in pathogenic CP
- Promotes Healthy, Efficient Calf Growth
- Milk Replacer or Therapeutic Treatments
- Improved Immune Status
- Reduced Medication Cost
- Improved Performance

 **Omni-Bos<sup>CB</sup>**


## Direct Fed Microbial for Poultry Feed additive



### Why choose Enviva Pro ?

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- Supports natural gut health
- Proven to improve economic return from poultry diets
- High in feed stability
- No withdrawal period for reduced complexity in feed mills



### Enviva® Pro product form

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- Multi-strain direct fed microbial for poultry diets, based on 3 strains of *Bacillus subtilis*.
- spray dried granular product
- carrier is limestone



### Key messages

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Gut morphology is important for efficient nutrient utilization in broilers

A combination of three *Bacillus subtilis* strains was found to:

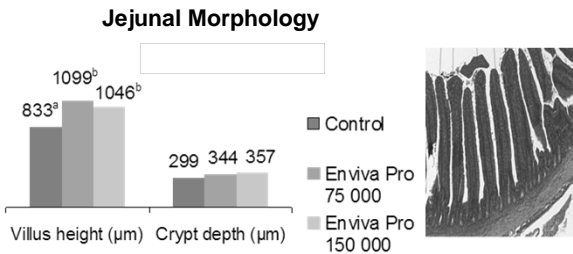
- Modulate gut morphology in a positive way
- Increase economic returns through improved feed conversion
- Have no effect on inflammatory responses, as determined by relevant blood parameters

Amerah and Gracia (2011)

### Effects on gut morphology

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#### Jejunal Morphology



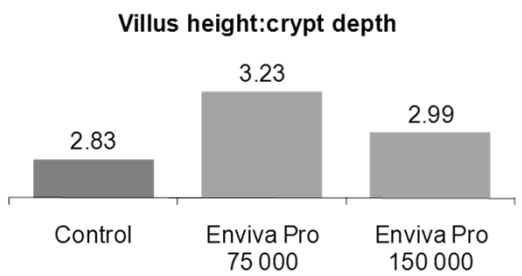
Parameter	Control	Enviva Pro 75 000	Enviva Pro 150 000
Villus height (µm)	833 <sup>a</sup>	1099 <sup>b</sup>	1046 <sup>b</sup>
Crypt depth (µm)	299	344	357

Amerah and Gracia (2011)

### Effects on gut morphology

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#### Villus height: crypt depth



Group	Villus height: crypt depth
Control	2.83
Enviva Pro 75 000	3.23
Enviva Pro 150 000	2.99

Amerah and Gracia (2011)

### Improved economic return from poultry diets

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Return on investment up to 10.3:1

	Trial 1		Trial 2	
	Control	Enviva Pro <sup>1</sup>	Control	Enviva Pro <sup>2</sup>
FCRc	1.77 <sup>a</sup>	1.72 <sup>b</sup>	1.78 <sup>a</sup>	1.72 <sup>b</sup>
kcal/kg weight gain	5420	5266	5467	5282
Increase in caloric efficiency		2.8%		3.4%
Improvement in cost/kg body weight gain		2.6%		2.81

<sup>a,b</sup> P<0.05. <sup>1</sup>75 000 cfu/g of feed. <sup>2</sup>150 000 cfu/g of feed FCRc: corrected 3 points per 100g live weight difference

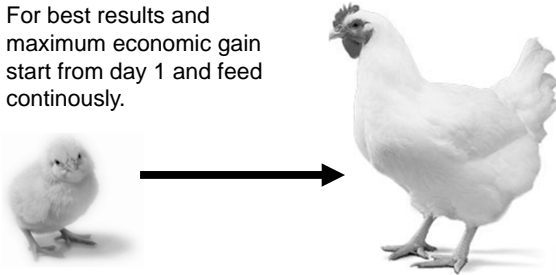
Amerah and Gracia (2011)



**Application**

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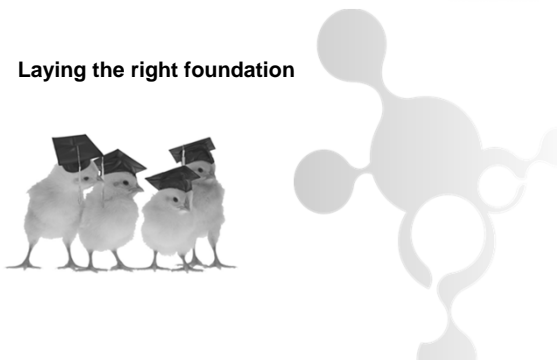
For best results and maximum economic gain start from day 1 and feed continuously.



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**Laying the right foundation**



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