



# Success stories with DDGS in broilers and fattening pigs

Anne-Marie Debicki-Garnier

EMEA Technical Director

Danisco Animal Nutrition – Dupont Industrial Biosciences

WE'RE SOLVING THE WORLD'S GREATEST CHALLENGES

# TOGETHER

WELCOME TO  
THE GLOBAL  
COLLABORATORY™

Solving the challenges presented by a population now at seven billion will take collaboration on a global scale.

## FOOD



Providing enough healthy food for people everywhere

## ENERGY



Decreasing our dependence on fossil fuels.

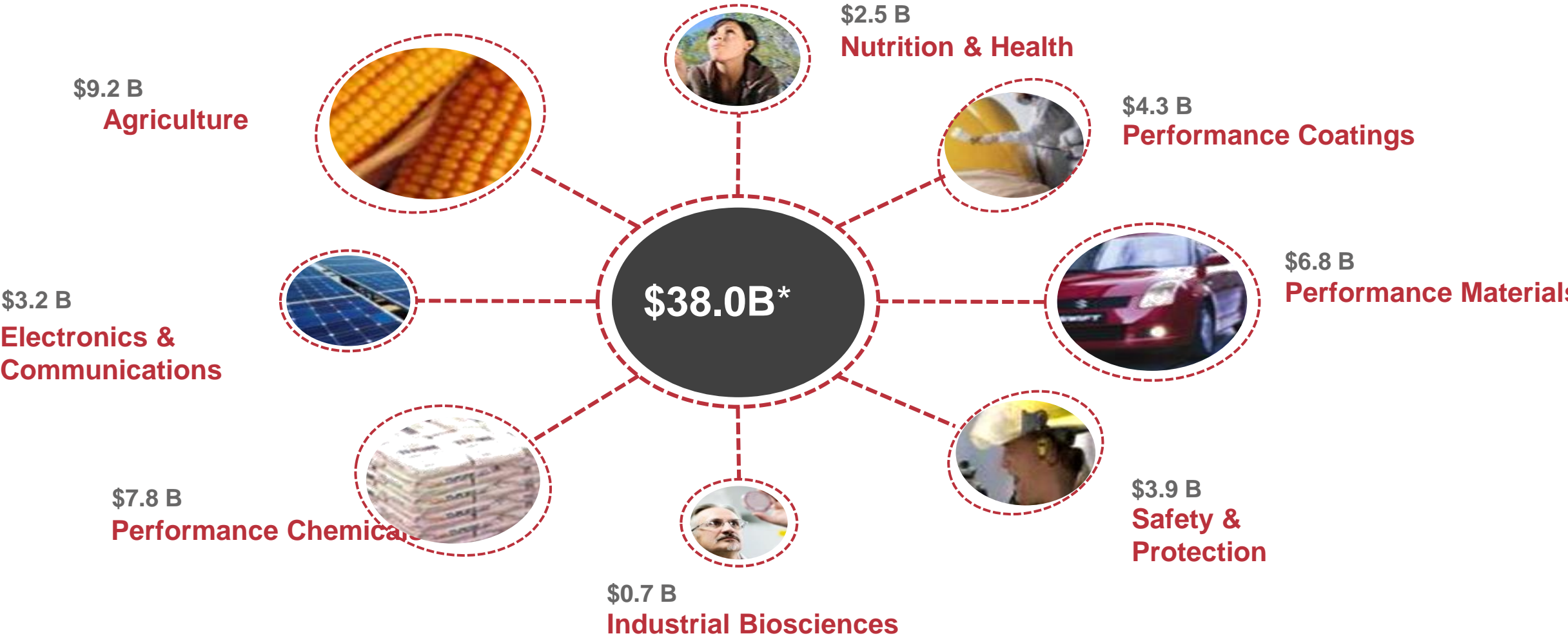
## PROTECTION



Safeguarding life and the environment.

# With Danisco Acquisition, DuPont Continues to Evolve

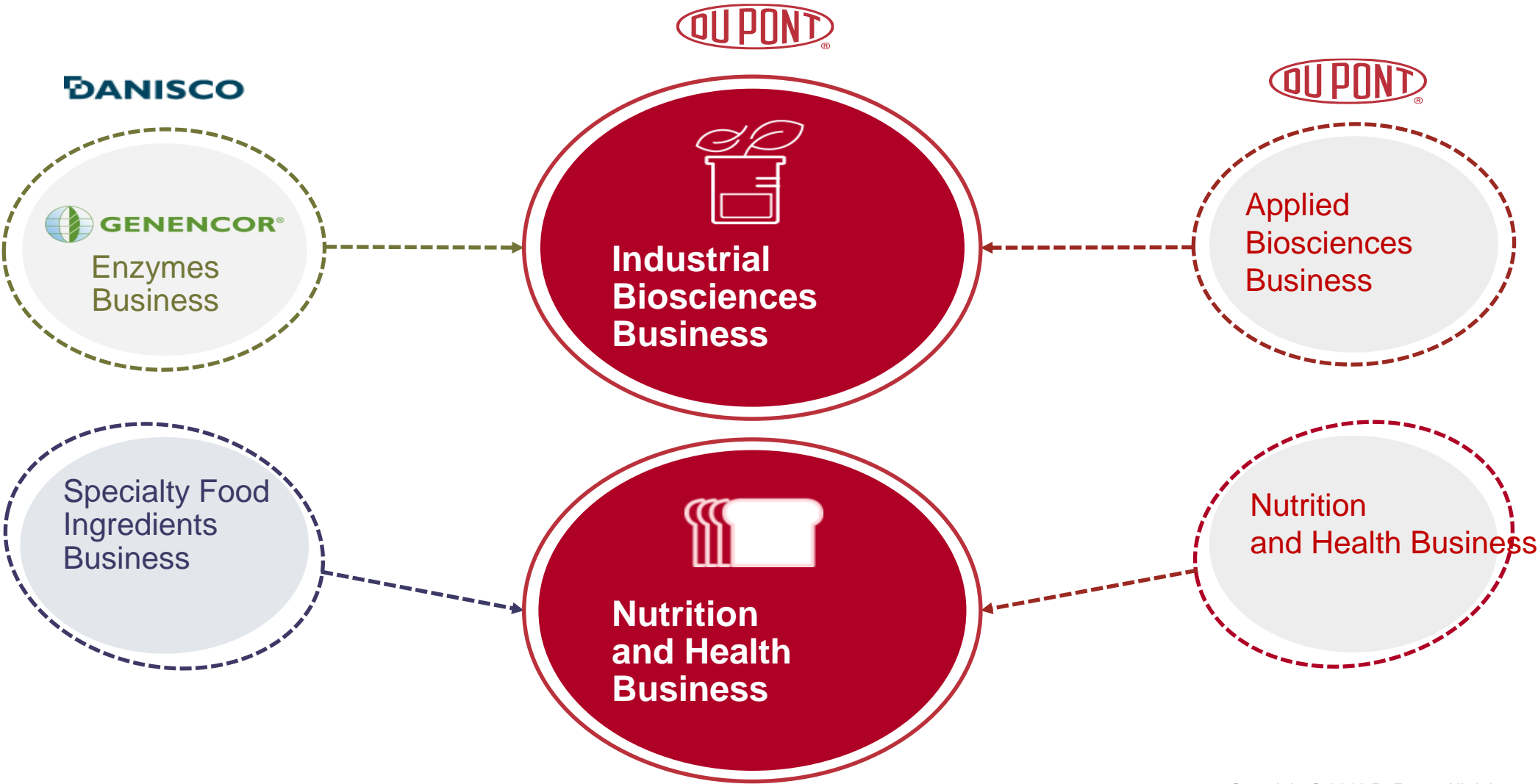
DuPont 2011 Segment Sales



\* Total company sales exclude transfers.

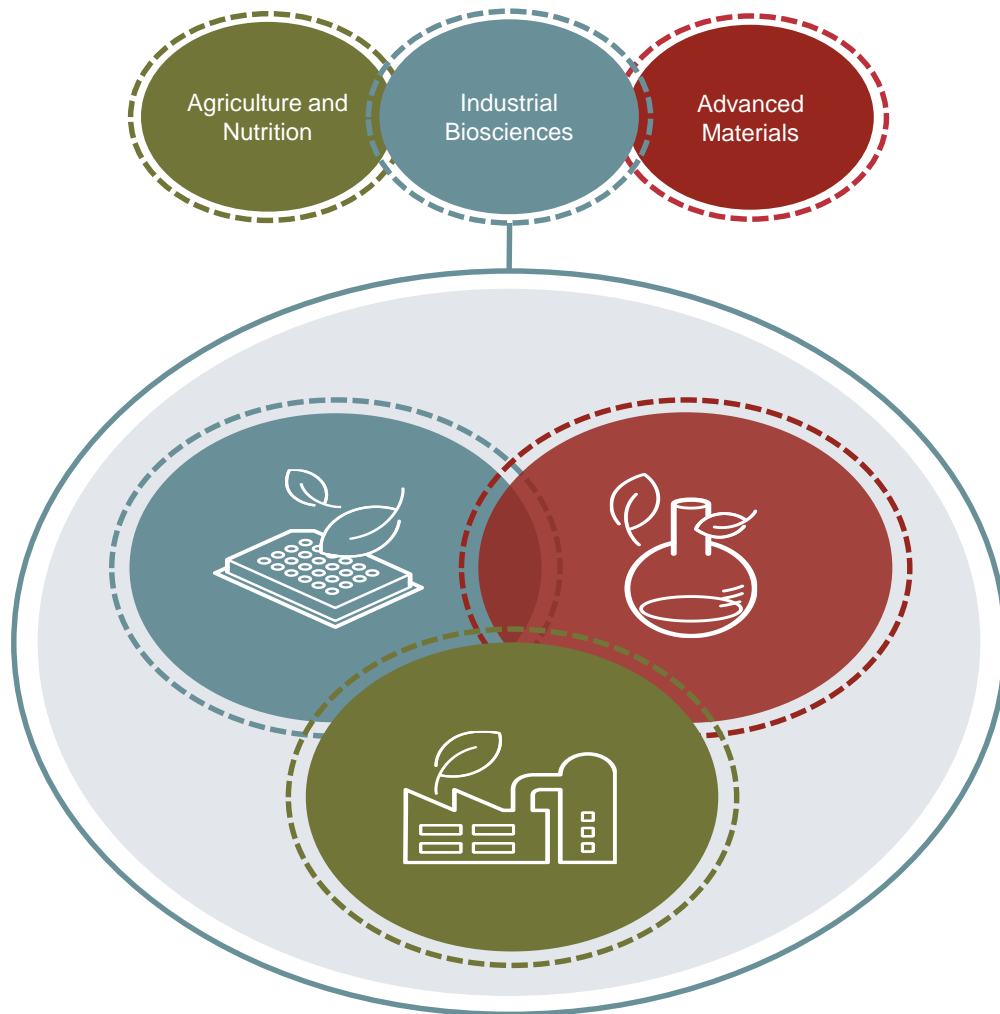


# Two New Businesses Formed



# Industrial Biosciences Business Units

Three biobased segments, serving a diverse set of customers

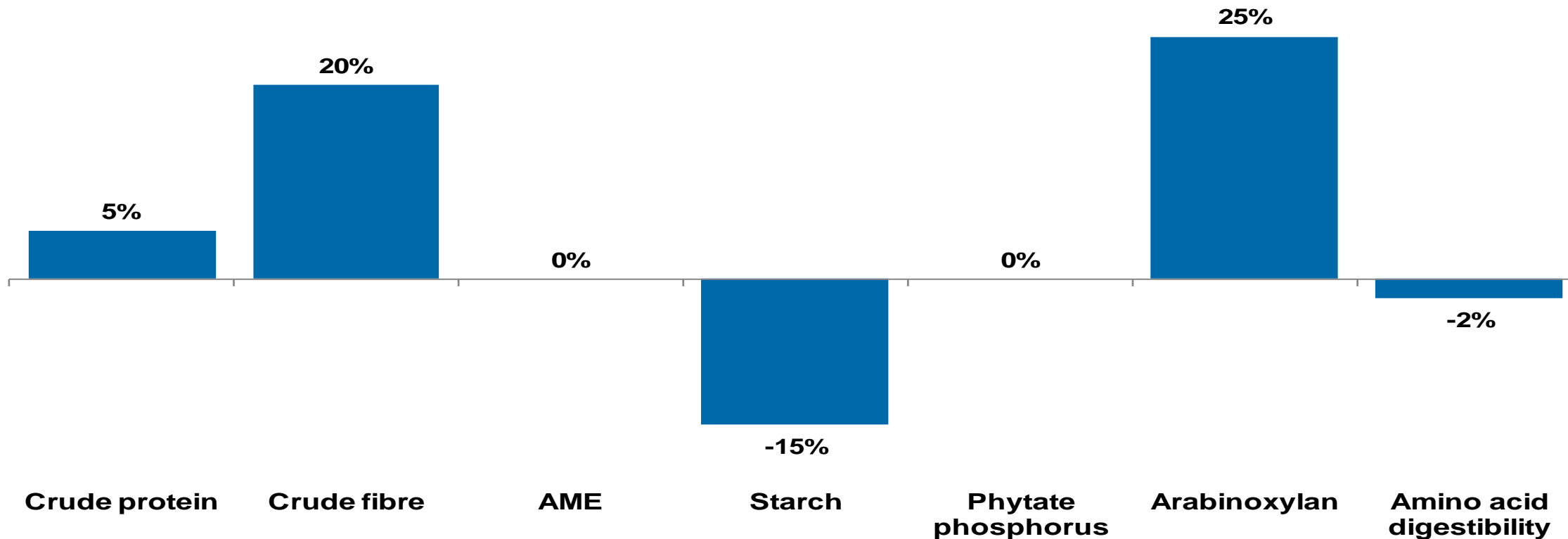


 <b>Bioactives</b>	Enzymes Proteins Peptides	Food and Beverages, Feed, Cleaning, Paper, Personal Care
	PRODUCTS	END USE MARKETS

 <b>Biomaterials</b>	Biochemicals Biomaterials	Carpet, Textiles
	PRODUCTS	END USE MARKETS

 <b>Biorefineries</b>	Ethanol, Biobutanol, Bioprocessing aids	Fuels, Carbohydrate Processing
	PRODUCTS	END USE MARKETS

## Relative changes in diets when moving from pure corn/soy to corn/soy/10% corn DDGS



For the bird this means higher endogenous losses and therefore higher maintenance energy costs  
For the nutritionist these changes currently bring savings of ~\$6/tonne of feed (~\$5.50/short ton)

## Why using enzyme technology ?

- Complex diets containing multiple substrates require a multi-enzyme solution
- Interactions between protein, fibre and starch reduce the nutritional value of the diet
- Introduction of alternative low cost raw materials to diets increases levels of anti-nutrients and enzyme substrates e.g:
  - Arabinoxylans in dietary fibre
  - Trypsin inhibitors
  - Lectins

### Xylanase

- Targets soluble and insoluble arabinoxylans in dietary fibre - releasing captured nutrients
- Particularly suitable for corn-based complex diets



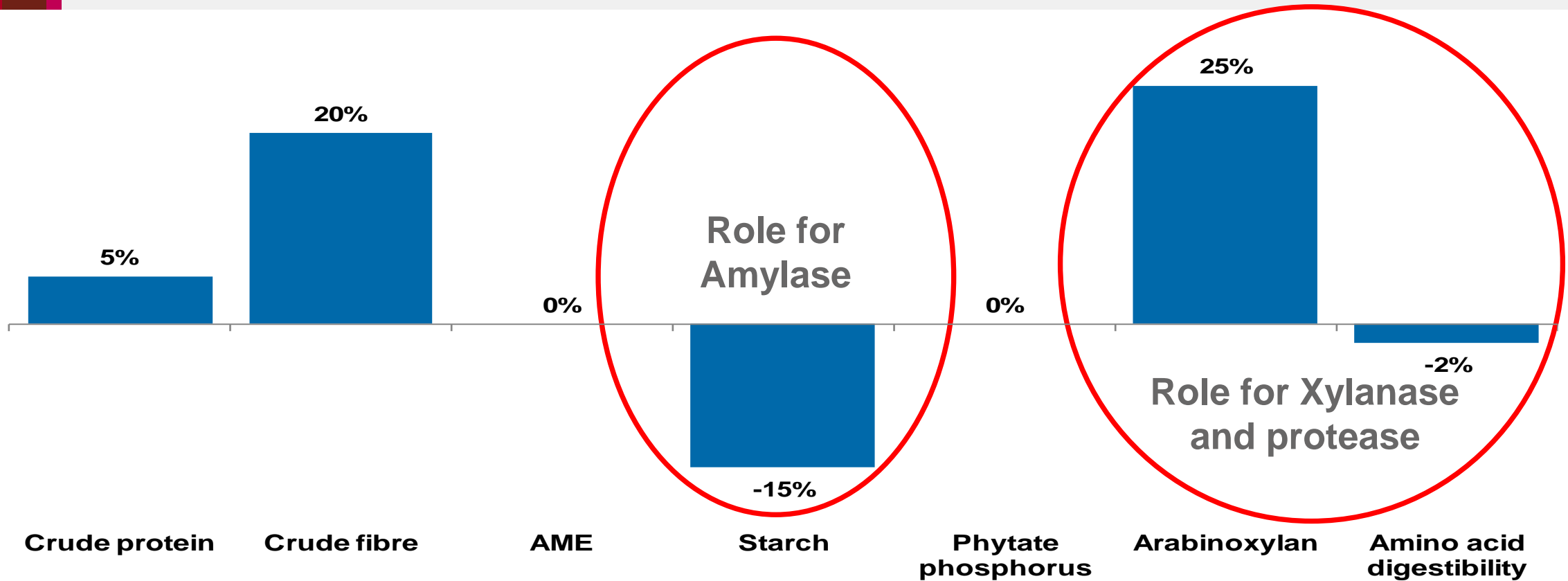
### Amylase

- High bio-efficacy to maximize starch digestibility, providing energy to fuel growth

### Protease

- Targets storage proteins improving amino acid digestibility and starch accessibility
- Reduces anti-nutrients e.g. trypsin inhibitors and lectins to limit endogenous losses

## Relative changes in diets when moving from pure corn/soy to corn/soy10% corn DDGS



For the bird this means higher endogenous losses and therefore higher maintenance energy costs

For the nutritionist these changes currently bring savings of ~\$6/tonne of feed (~\$5.50/short ton)

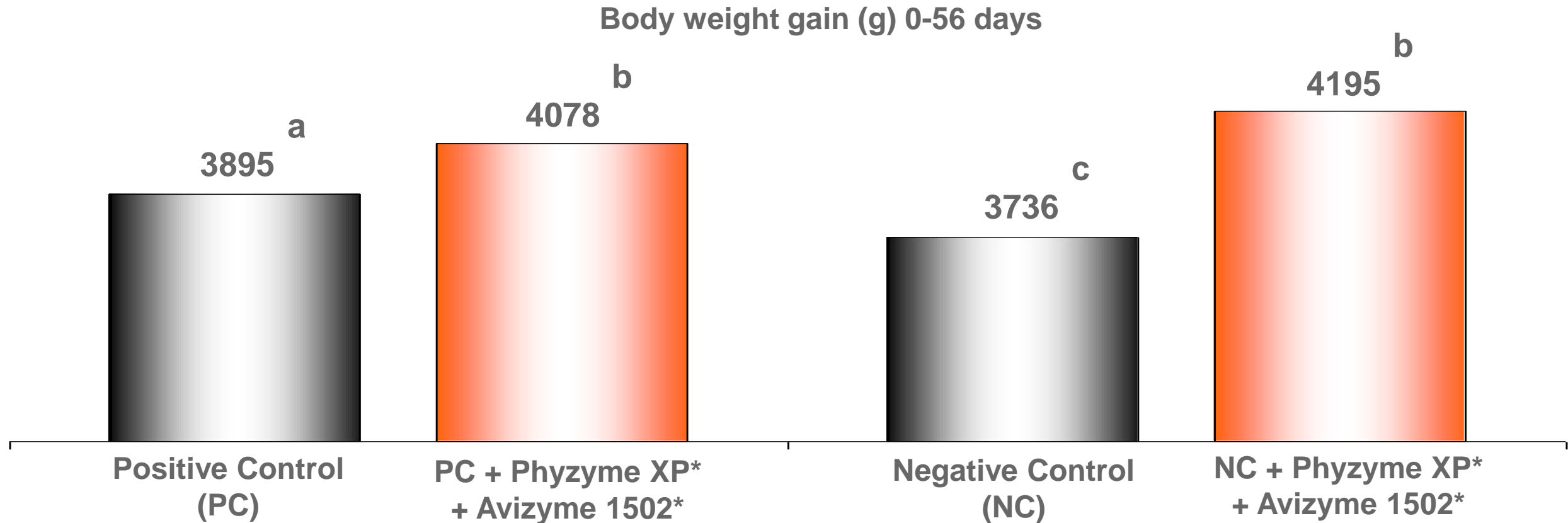


# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve broiler performance in diets containing 10% DDGS

## DESIGN

- 400 day-old male Ross 708 broilers allocated to 16 floor pens with 25 birds/pen
- Four dietary treatments fed in 3-phase diets to 56 days of age. Diets were pelleted & crumbed (starter) or pelleted (grower & finisher)
  1. Positive Control (PC)
  2. Negative Control (NC) reduced by 80 kcal/kg ME, 0.10% AvP and 0.12% calcium
  3. PC + Phyzyme XP (500 FTU/kg feed) + Avizyme 1502 (500g/tonne)
  4. NC + Phyzyme XP (500 FTU/kg feed) + Avizyme 1502 (500g/tonne)
- Broiler body weight, feed intake, and FCR determined at 21, 42, and 56 days of age
- Dressing %, abdominal fat %, breast meat % and femur breaking strength (kg) were determined at 56 days of age

# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve broiler performance in diets containing 10% DDGS



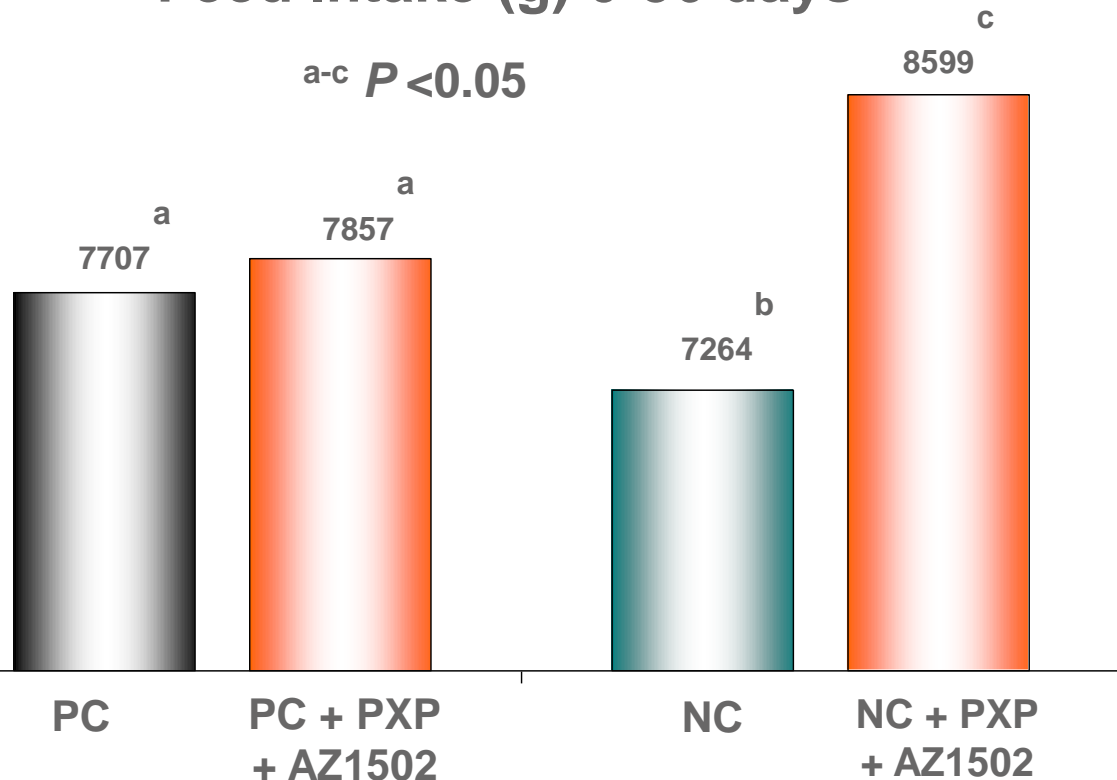
a-c  $P < 0.05$

\*Avizyme 1502 500 g/t, Phyzyme XP 500 FTU/kg feed

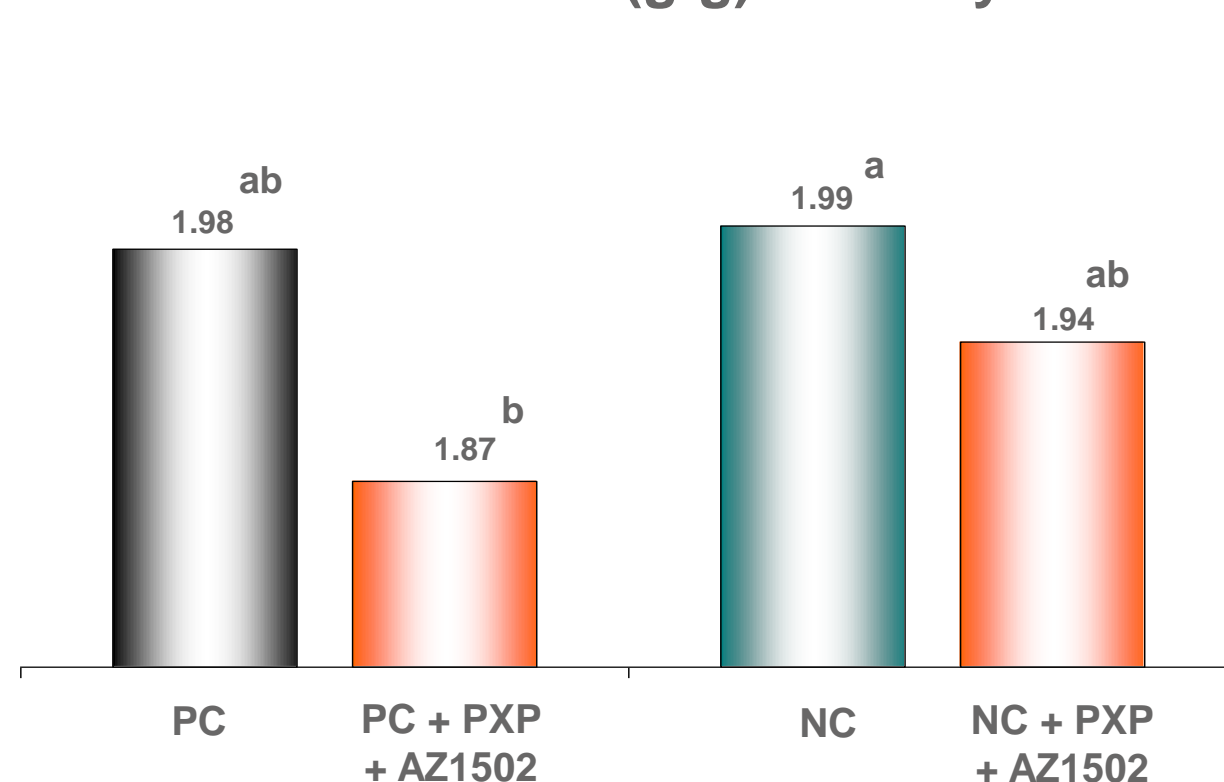
Reference: PhyzymeXP.B.USA.08.63; 1502.USA.08.07  
Auburn University, USA

# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve broiler performance in diets containing 10% DDGS

## Feed Intake (g) 0-56 days



## FCR corrected\* (g:g) 0-56 days



PC = Positive Control, NC = Negative Control

\* FCR corrected for bodyweight gain (100 g = 3 pts FCR)

Reference: PhyzymeXP.B.USA.08.63; 1502.USA.08.07  
Auburn University, USA

## Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve broiler performance in diets containing 10% DDGS

### Processing parameters at slaughter (56 days of age)

Performance / period	Positive Control (PC)	PC + Phyzyme XP + Avizyme	Negative Control (NC)	NC + Phyzyme XP + Avizyme
Carcass weight (g)	2915 <sup>a</sup>	2991 <sup>ab</sup>	2709 <sup>c</sup>	3090 <sup>b</sup>
Dressing (%)	72.6	72.2	72.3	72.7
Abdominal fat (%)	1.69 <sup>a</sup>	2.08 <sup>b</sup>	1.55 <sup>a</sup>	1.68 <sup>a</sup>
Breast meat (%)	26.0	26.7	26.1	25.7
Femur break strength (kg)	33.8 <sup>a</sup>	36.8 <sup>b</sup>	30.6 <sup>c</sup>	38.7 <sup>b</sup>

a-c  $P < 0.05$

Reference: PhyzymeXP.B.USA.08.63; 1502.USA.08.07  
Auburn University, USA

# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve digestibility in corn-based diets with DDGS

## DESIGN: 21-day digestibility study

- 432 male Cobb 500 broilers in 72 battery cages with 6 birds/cage from 7-21 days of age
- 12 mash diets
- 4 Levels of corn DDGS:
  1. 0%
  2. 6%
  3. 12%
  4. 18%
- 3 treatments for each level of DDGS:
  1. Positive Control (PC), no enzyme addition
  2. Negative Control<sup>1</sup> (NC) + Phyzyme XP (500 FTU/kg feed)
  3. NC<sup>1</sup> + Phyzyme XP (500 FTU/kg feed) + Avizyme 1502 (500g/tonne)

<sup>1</sup> NC diets had 0.12% less available P, 0.11% less digestible P and 0.11% less calcium versus the PC diet, according to Phycheck recommendations for 500 FTU/kg feed



## Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve digestibility in corn-based diets with DDGS

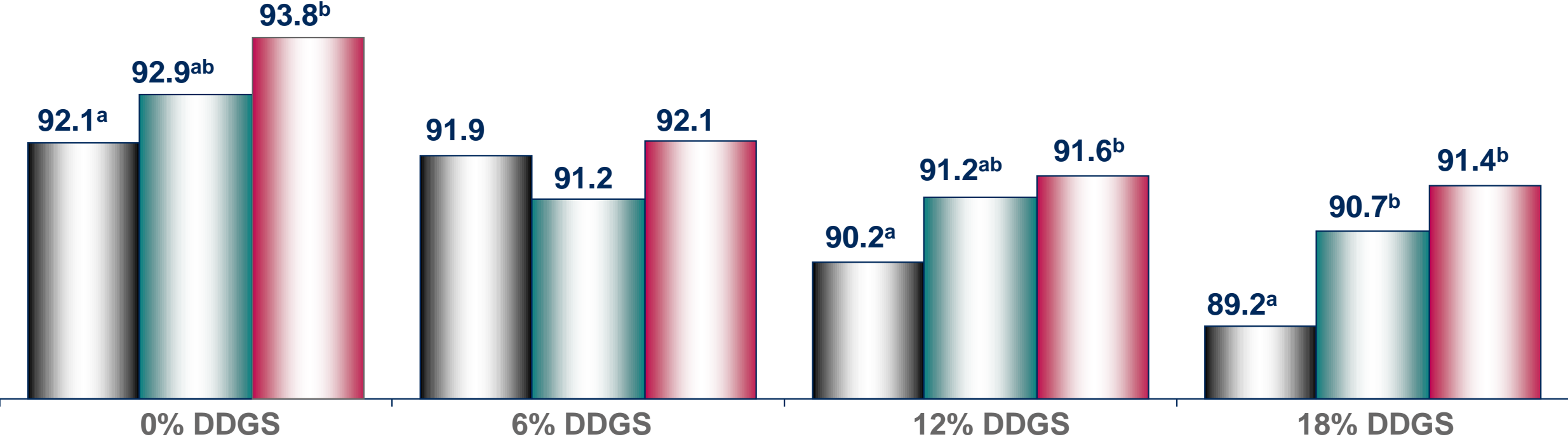
Ingredient (kg/tonne)	Corn DDGS levels in diets			
	0%	6%	12%	18%
Corn	529	498	466	434
Soybean meal (48%)	390	360	331	301
Corn DDGS <sup>1</sup>	-	60	120	180
Corn oil	33	33	33	33
Limestone <sup>2</sup>	13.1 (14.2)	14.1 (15.1)	15.1 (16.1)	16 (17.1)
Dicalcium Phosphate <sup>2</sup>	19 (12.2)	17.5 (10.7)	16.0 (9.2)	14.5 (7.7)
Synthetic AA's	2.6	3.3	3.9	4.5
Salt/vits/mins	9.5	9.3	9.2	9.0
Filler & inert marker <sup>2</sup>	0 (9.5)	0.8 (10.6)	1.8 (11.6)	4 (13.7)
Phyzyme XP	-/+ 500 FTU	-/+ 500 FTU	-/+ 500 FTU	-/+ 500 FTU
Avizyme 1502	-/+ 500g	-/+ 500g	-/+ 500g	-/+ 500g

<sup>1</sup> 'Dakota Gold', Sioux Falls, USA

<sup>2</sup> Ingredient levels in Positive & Negative control diets were identical except for dicalcium phosphate, limestone and filler, **for which levels in negative control diets are given in parentheses**

# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve digestibility in corn-based diets with DDGS

Ileal lysine digestibility (%)



Positive Control

Negative control + Phyzyme XP

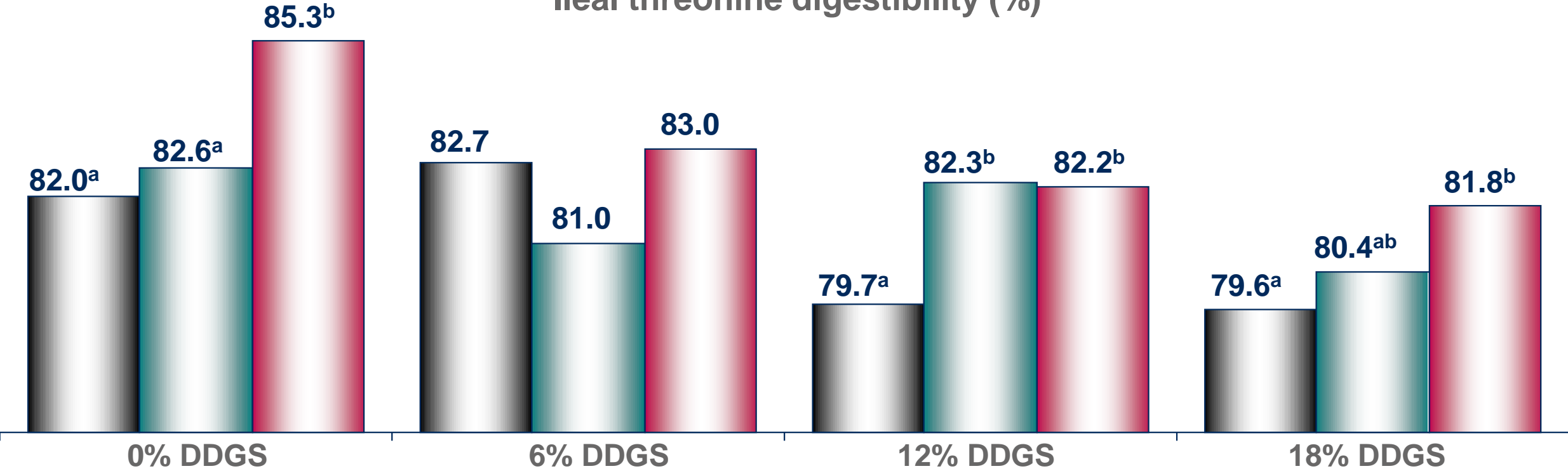
Negative control + Phyzyme XP + Avizyme 1502

a-b P<0.05

Reference: PhyzymeXP.B.USA.09.70; 1502.USA.09.10  
University of Missouri, USA

# Avizyme<sup>®</sup> 1502 and Phyzyme<sup>®</sup> XP improve digestibility in corn-based diets with DDGS

Ileal threonine digestibility (%)



Positive Control

Negative control + Phyzyme XP

Negative control + Phyzyme XP + Avizyme 1502

a-b P<0.05

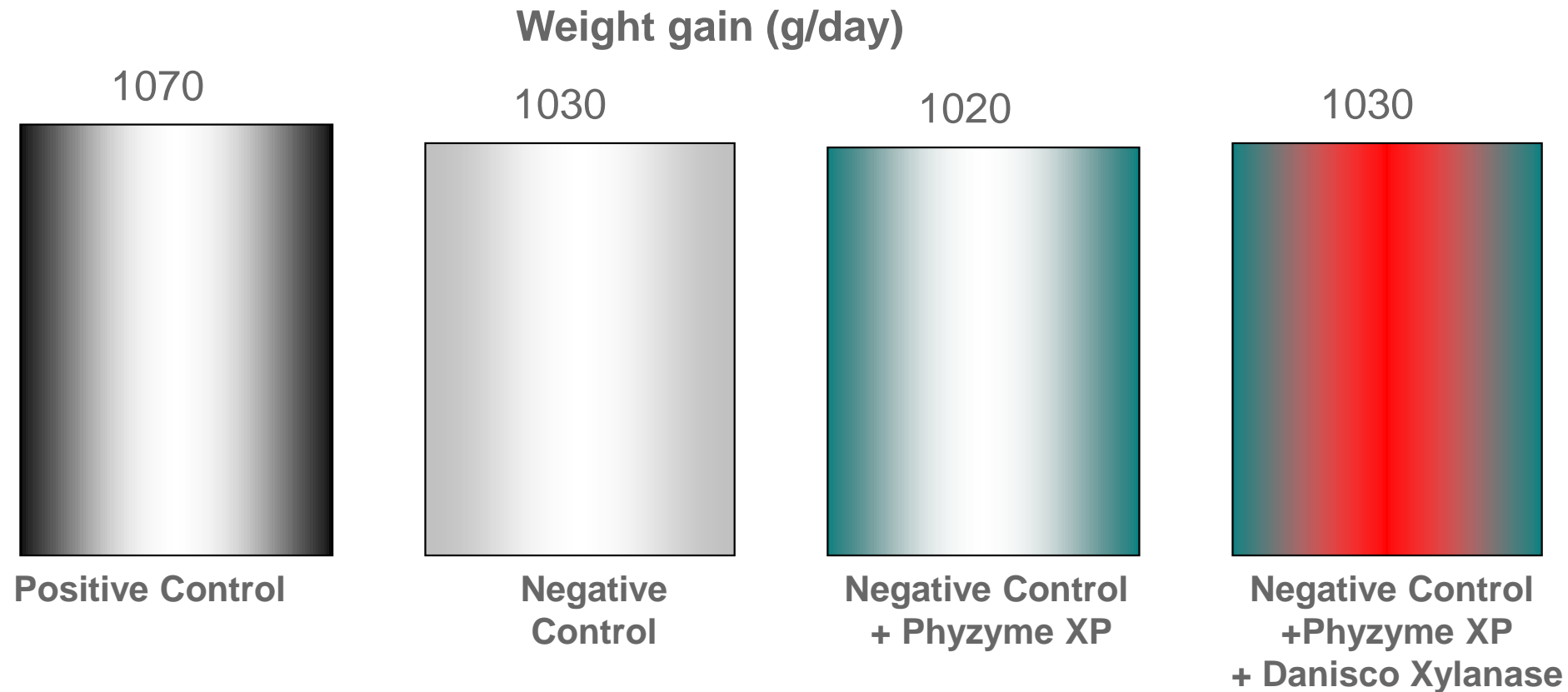
Reference: PhyzymeXP.B.USA.09.70; 1502.USA.09.10  
University of Missouri, USA

## Phyzyme® XP and Danisco Xylanase in combination improve performance and digestibility in pigs fed corn DDGS

### DESIGN

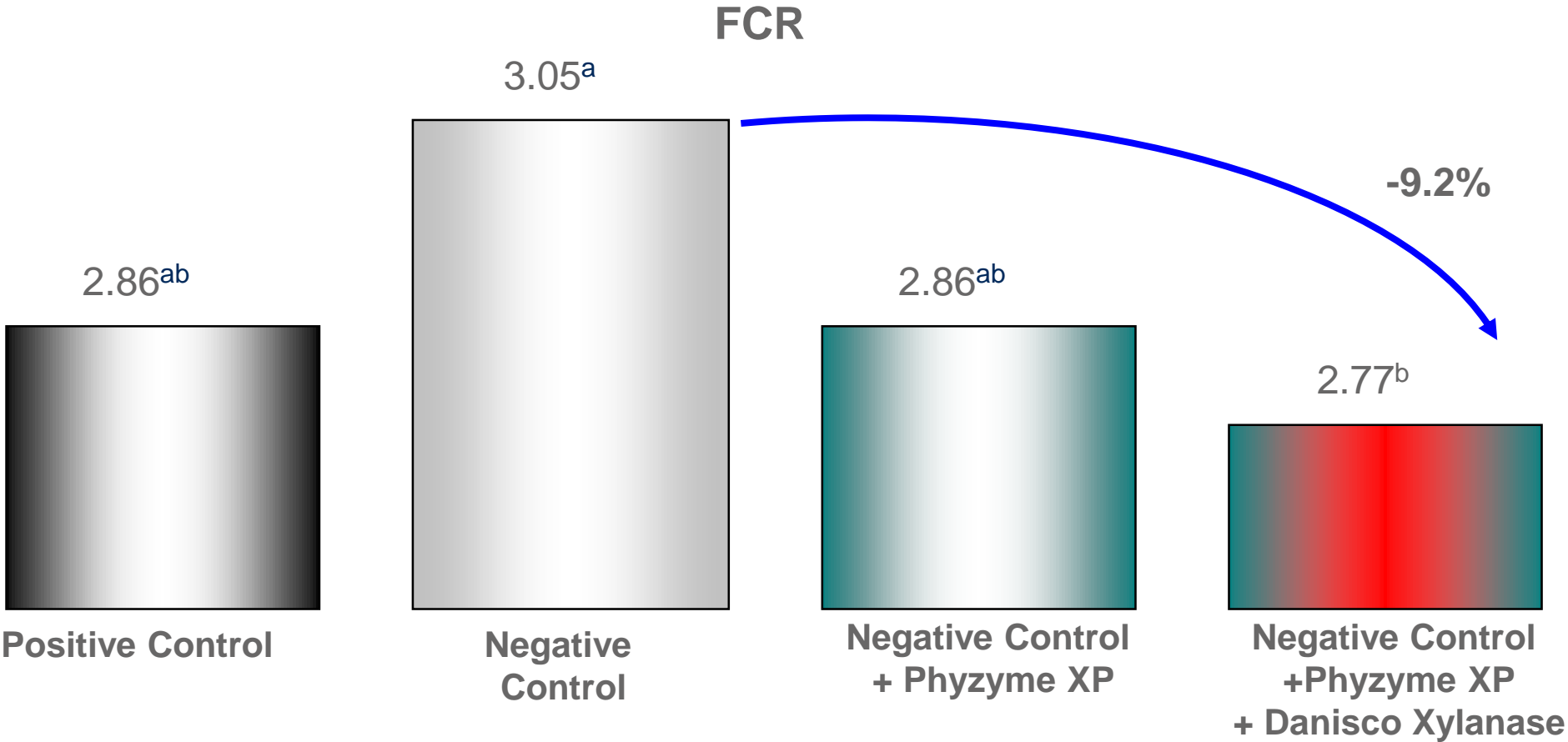
- 96 finishing pigs (61-123kg bodyweight)
- 4 treatments (6 pen replicates/treatment, 2 barrows & 2 gilts/pen)
  1. Positive Control: corn-soya based diet + 20% corn DDGS
  2. Negative Control: Reduced energy (-95 kcal DE/kg) and no inorganic phosphorus supplementation (0.01-0.04% less Available P)
  3. Negative Control + Phyzyme XP (500 FTU/kg feed)
  4. Negative Control + Phyzyme XP (500 FTU/kg feed) + Danisco Xylanase (500g/tonne feed)
- Mash diets
- Weight gain, feed intake, FCR (~60 day trial period, 3 phases)
- Faecal digestibility measurements (chromic oxide marker) for Crude Protein, Energy, Calcium and Phosphorus - in phase 3 of the finishing period

## Phyzyme<sup>®</sup> XP and Danisco Xylanase in combination improve performance and digestibility in pigs fed corn DDGS





# Phyzyme<sup>®</sup> XP and Danisco Xylanase in combination improve performance and digestibility in pigs fed corn DDGS



abP<0.05

Reference: Phyzyme XP.S.USA.09.20  
9300.USA.09.37, University of Kentucky, USA

## Take home messages

- Need for flexibility in using alternative raw materials
- Use of co-products translates into more fibrous diets, more variability
- Danisco Animal Nutrition enzyme technology helps to reduce feed cost without compromising animal performance