

Improving Pig Viability with Dietary Porzyme – Xylanase

R. Dean Boyd, Ph D

Technical Director – The Hanor Company

Adjunct Professor of Animal Nutrition

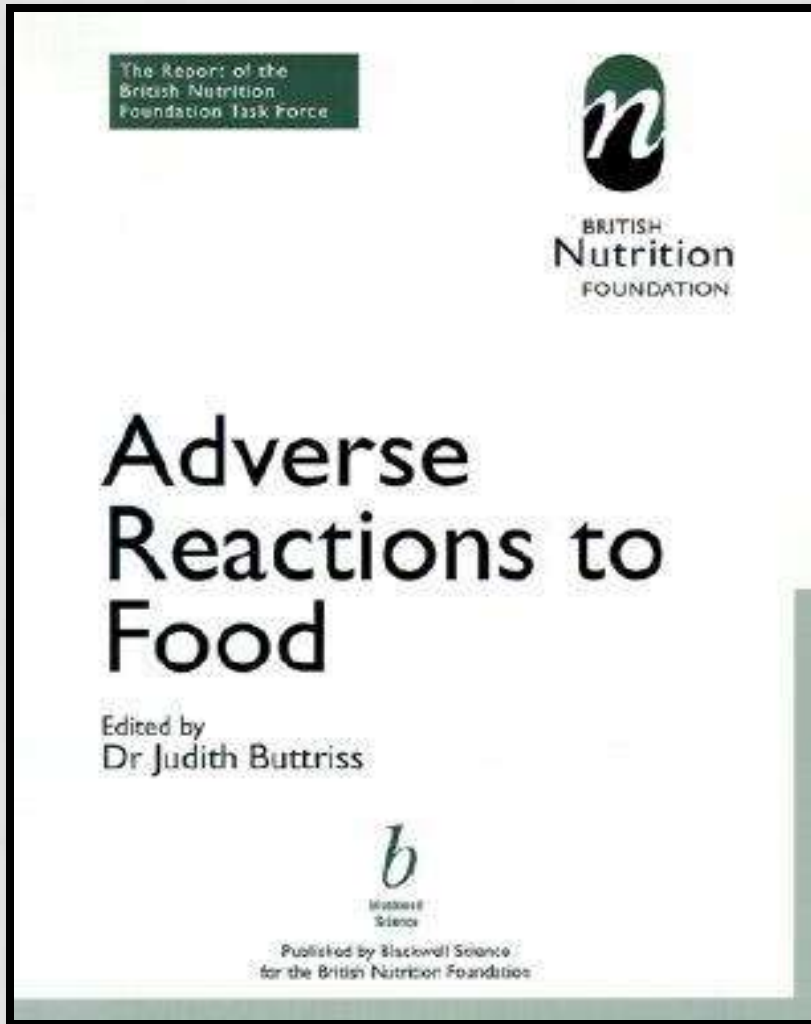
North Carolina State and Iowa State Universities

Presentation Framework:

Most Important Benefit of Dietary Xylanase is Improving Viability in Growing Pigs.

- First Observation that Porzyme Xylanase Improves Pig Viability
- Viability Response is Dose-related
- Viability Response under High and Low Immune Response
- Financial Value is Powerful . . . and Dynamic
- Nutrient Uplift – True or False ?
- Mechanism – Microbiome Balance ?

Diet Ingredients are Known to Promote and Harm Viability, esp. in Young Pigs



Certain Ingredients Used to Manage Disease Stress in Young Pigs–

- Steamed Oats
- High Quality Fish Meal
- Animal Plasma

SBM Ameliorates adverse response to Respiratory Disease in G-F Pigs.

Our Understanding of Ways in which Ingredient Incompatibility is Expanding and Includes –

- Epithelial Cell – Cell disruption
- Microbiome Balance
Substrate Balance to Favor
Beneficial Microbes ?

Pig Viability is One of Most Differentiating Profit Drivers Among Producers

- Agri-Stats Records summary for Live Production, n=68 Firms
- Pig Viability was most Important Differentiating Factor
- Differentiating Factors distinguished Best Profit Systems; Factors ranked the same in Profit and Loss years

Performance Mean and Relative Advantage						
Metric	Unit	AVG	Top 25%	ADV	Rank	Outcome
Post-wean mortality	%	9.5	6.8	1.290	1	No. pigs
Culled at barn close	%	2.8	2.1	1.253	2	No. pigs
Pre-wean mortality	%	14.8	13.4	1.094	3	No. pigs
Market price	\$/100 Lb	52.2	56.1	1.075	4	Price
Total finish cost	\$/100 Lb	49.0	45.9	1.064	5	Cost
Wean pig cost	\$/Pig	27.8	26.4	1.049	6	Cost
Finish feed cost	\$/Ton	206.4	199.5	1.033	7	Cost
Weaned/mated sow	Pigs	23.7	24.4	1.030	8	No. pigs
Caloric FCE, Finish	Kcal ME/Lb	3874	3906	0.992	10 ²	Cost

Viability is a Powerful KPI in Pig Production – Probing for Profit Opportunity: 2015

How much change in Key Performance variables is required to –
Improve Net Income by \$1.50 per 282 lb base pig given 2015
Projections. NO. Pigs is a Powerful driver (Fr. McCulley Financial Model)

- | | | |
|---------------|---|--------------|
| ● 0.71 | Carcass Price, \$/Cwt (<u>most</u> powerful single factor) | → Revenue |
| ● 1.00 | Pigs/Mated Sow/Year Weaned | → Production |
| ● <u>0.78</u> | W-F Mortality and Off-Grade Pigs, % | → Production |
| ● 11.8 | Live Weight Increase over 282 Projection, lbs | → Production |
| ● 0.049 | W-F FCR Improvement, <u>2015</u> Feed Cost (\$225/ton) | → Cost |
| ● 0.034 | W-F FCR Improvement, <u>2013</u> Feed Cost (\$325/ton) | → Cost |
| ● 4.08 | W-F Feed Cost, \$/ton | → Cost |

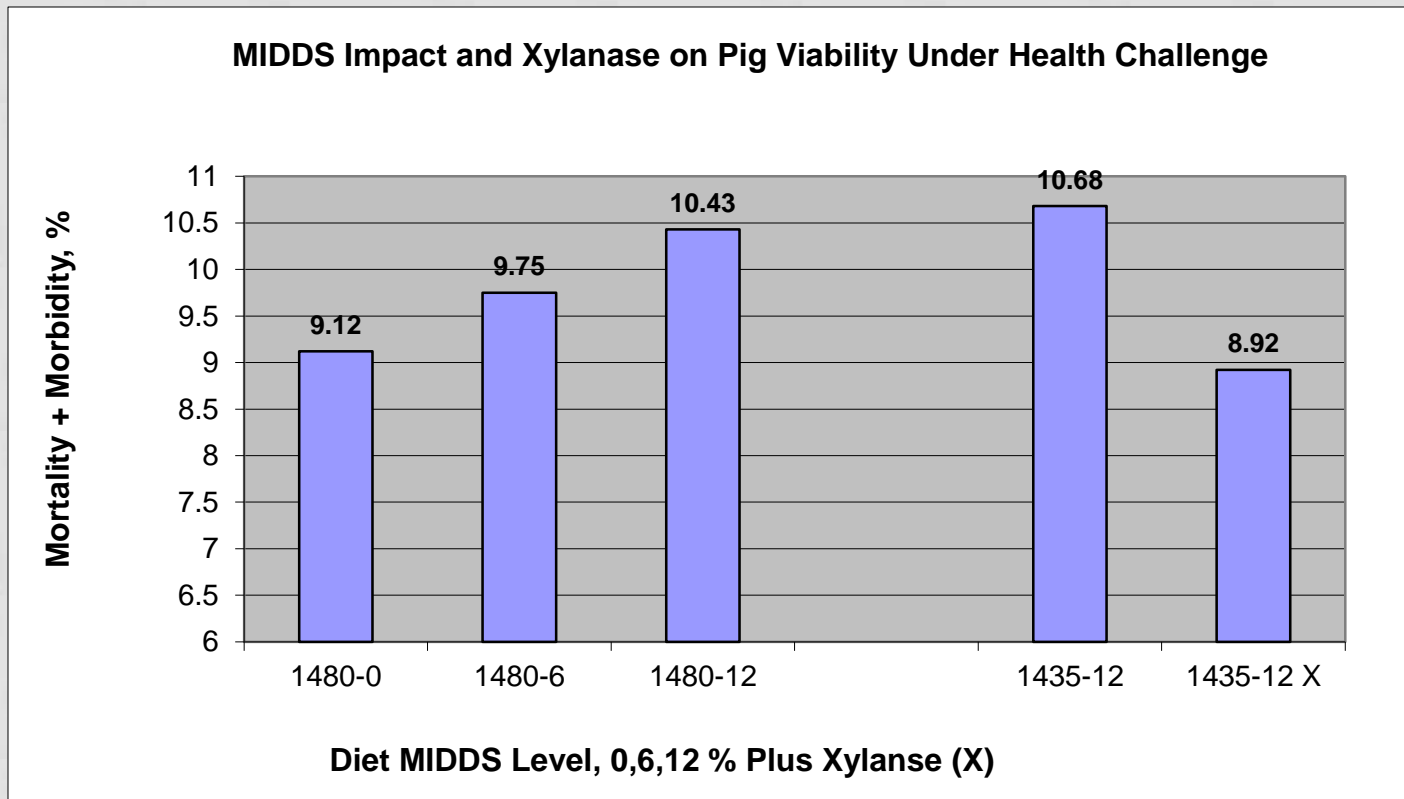
First DEMO that Pig Viability Could be Improved – Porzyme Xylanase (Collaboration w. Janet Remus)

Hanor Research Memo 2008-06

SEM 1.47

DIET TRTS, NS

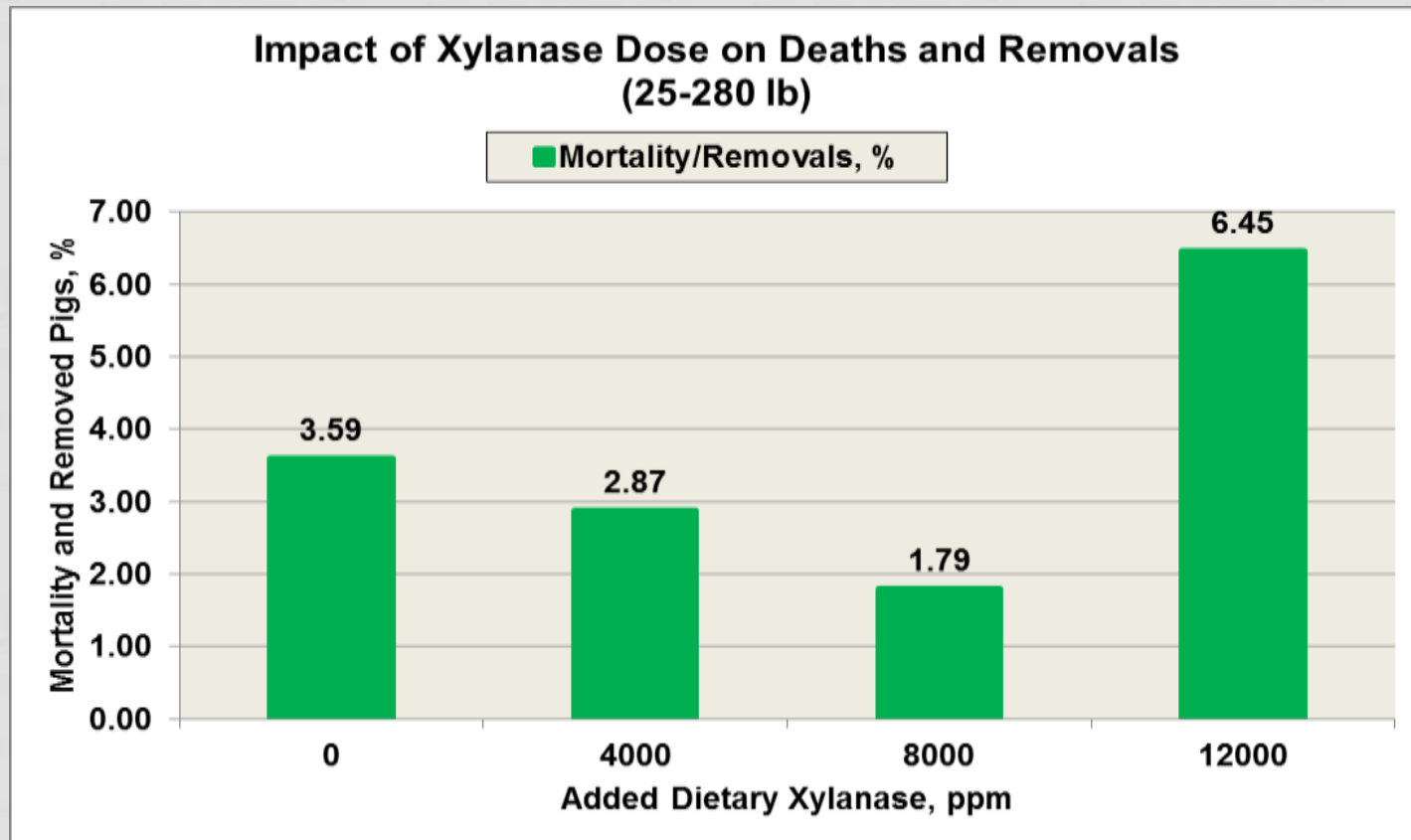
MIDDS Effect Linear, NS



First DEMO of Xylanase Dose-related Pig Viability

- N = 1116 Feeder - Finish Pigs, high health from 25-280 lbs
- Diets contained Corn Germ, DDGS, HF-Rice Bran (NDF, 16.3%)

SEM 1.08, Quadratic P=0.034



Experimental Method – Remus Protocol 2014-01

Define Porzyme Dose Response more Clearly

Animals

- 2124 Pigs placed in Commercial Research Barn, 2 Rooms
 - PIC Genetics
 - Gender balanced but Penned separately
 - 36 Pens per Room and 34 Pigs placed/Pen
 - EU = Pen
 - Initial weight, 25 lbs
 - Final weight, 305 lbs
 - 16 Pens per Xylanase dose for approx. 530 Pigs each
 - Pens allocated within weight block and gender to Diet TRT
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Experimental Method – Remus 2014-01

Diets

- Diets Formulated to be Nutrient Adequate
- 6 Feed Phases: Nurse 4, Finish 1-5
- 2 Diets Manufactured per phase (0, 9000 U/kg)
- 2 Diets Summit blended to form 0, 3000, 6000, 9000 U/kg
- Pigs Placed in Medical Pens on respective Diets

Pigs Harvested at Triumph Food at Avg 305 lbs WT

Key Measures –

- WB ADG, FCR
 - Carcass Yield, ADG, FCR
 - Mortality, Medical Pens, Off-grade Markets
-

Ingredient Composition: Selected Diets

Ingredient, % as fed	Nursery 4	Finish 1	Finish 3	Finish 5
Corn, 8.5% CP 650 u	953	958	1165	1283
Soybean meal 47.5%	548	464	266	155
Corn DDGS	300	300	300	300
Wheat MIDDS	100	200	200	200
Fat CWG	20	20	20	20
Limestone	24.7	25	24.1	23.7
Monocalcium Phos 21%	11.4	3	0	0
Salt	8	8	8	8
VTM Premix	2	2	2	2
Porzyme Premix	+1	+1	+1	+1
Amino Acids + Other (FTU)	31.9	19.0	14.9	8.3
Total	2000.0	2000.0	2000.0	2000.0

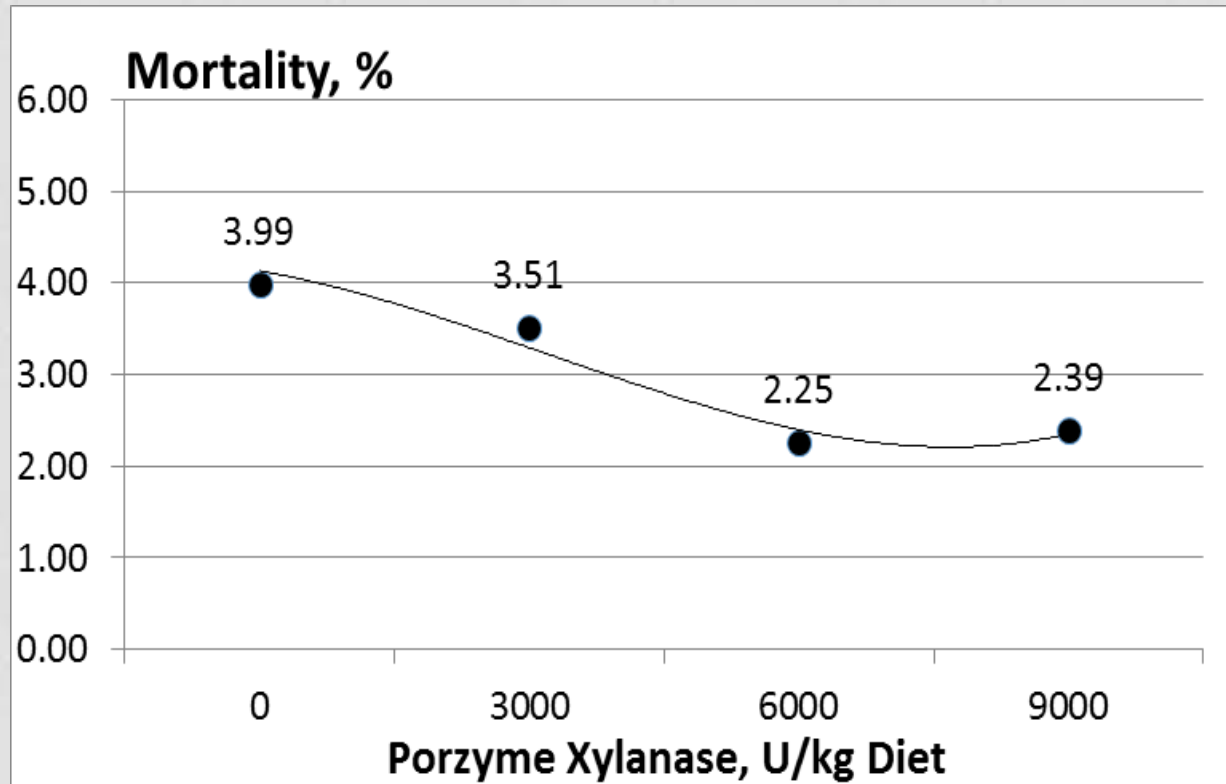
Growth Response to Increasing Porzyme Xylanase Dose in Pigs under LO Immune Stress (25 to 300 lbs)

Research Memo 2014-01

Criterion	Xylanase Dose, U/kg Diet				Statistics		
	0	3000	6000	9000	SEM	Linear	Quad
No. Pigs	520	528	545	531	-	-	-
No. Pens	16	16	16	16	-	-	-
Start WT, lbs	25.8	25.9	25.7	25.6	0.4	0.636	0.847
Final WT, lbs	305.5	301.2	303.7	305.5	1.2	0.686	0.014
DOF, d	148.8	150.8	151.4	149.9	0.8	0.261	0.027
WB ADG, lbs/d	1.87	1.82	1.82	1.86	0.01	0.616	0.001
WB FCR	2.61	2.62	2.60	2.58	0.02	0.160	0.443
Farm Carcass Yield, %	<u>73.90</u>	<u>74.01</u>	<u>74.13</u>	<u>74.26</u>	0.002	0.160	0.951
Carc ADG, lbs/d	1.39	1.36	1.37	1.39	0.01	0.825	0.001
Carc FCR	<u>3.51</u>	<u>3.49</u>	<u>3.44</u>	<u>3.45</u>	0.02	0.015	0.567

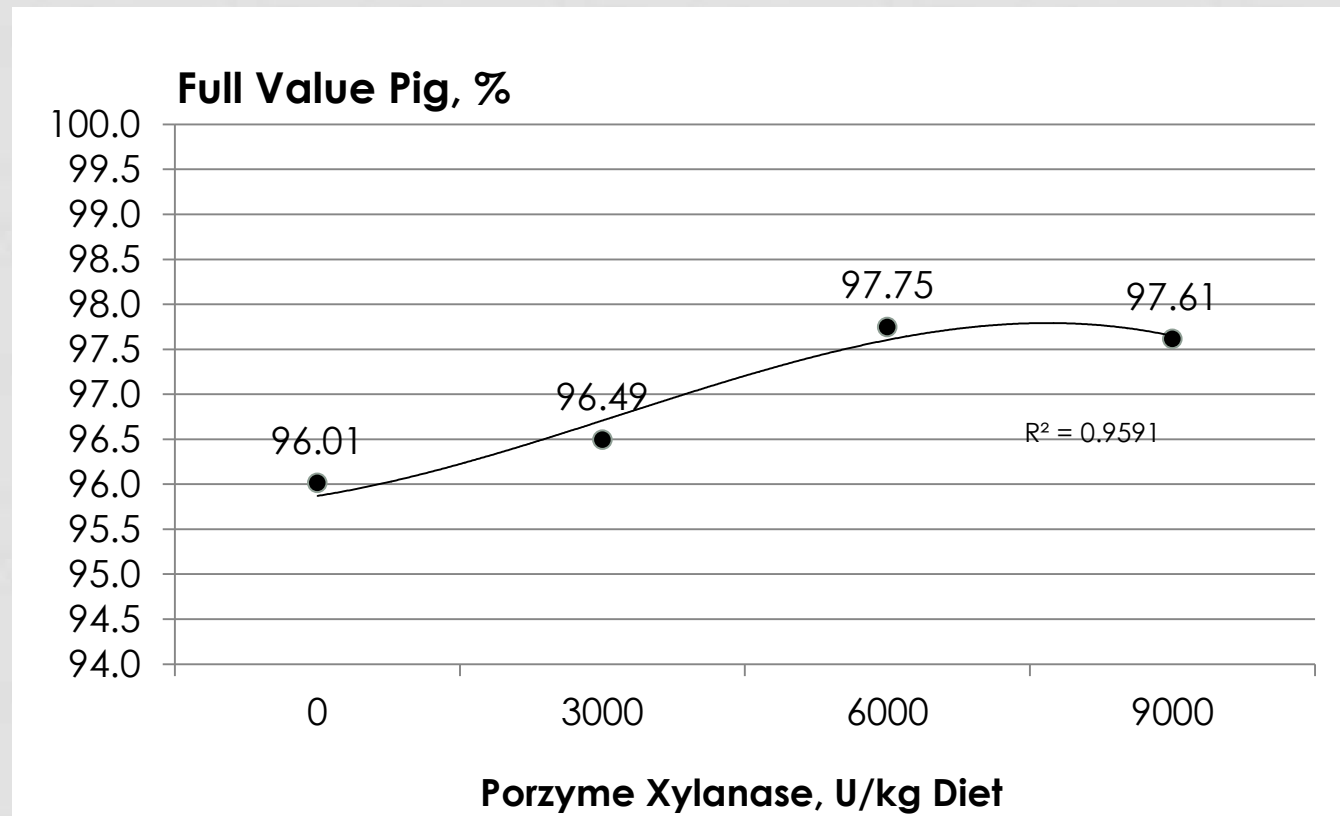
Improved Viability with Porzyme Xylanase is Dose-Related – LO Immune Stress (25 to 300 lbs)

Research Memo 2014-12



Improved Viability with Porzyme Xylanase is Dose-Related – LO Immune Stress (25 to 300 lbs)

Research Memo 2014-12



Are There Other Examples of Xylanase ?



In Fact, there were but the UK Researchers only summarized the ADG and FCR Data. 4 Other Studies exist.

4-Trial Bottom-line:

4453 Total Pigs under Commercial Conditions (side x side trials)

AVG Initial Lbs 31 kg (68 lbs)

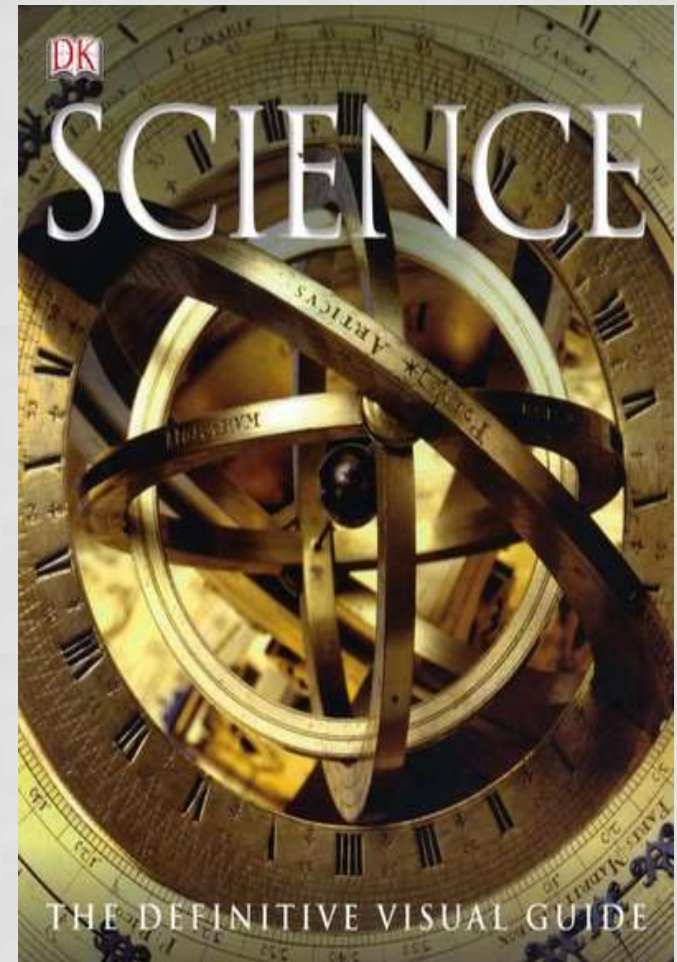
AVG Final Lbs 115 kg (253 lbs)

Control = 7.2% vs Competitor Xylanase = 4.8%

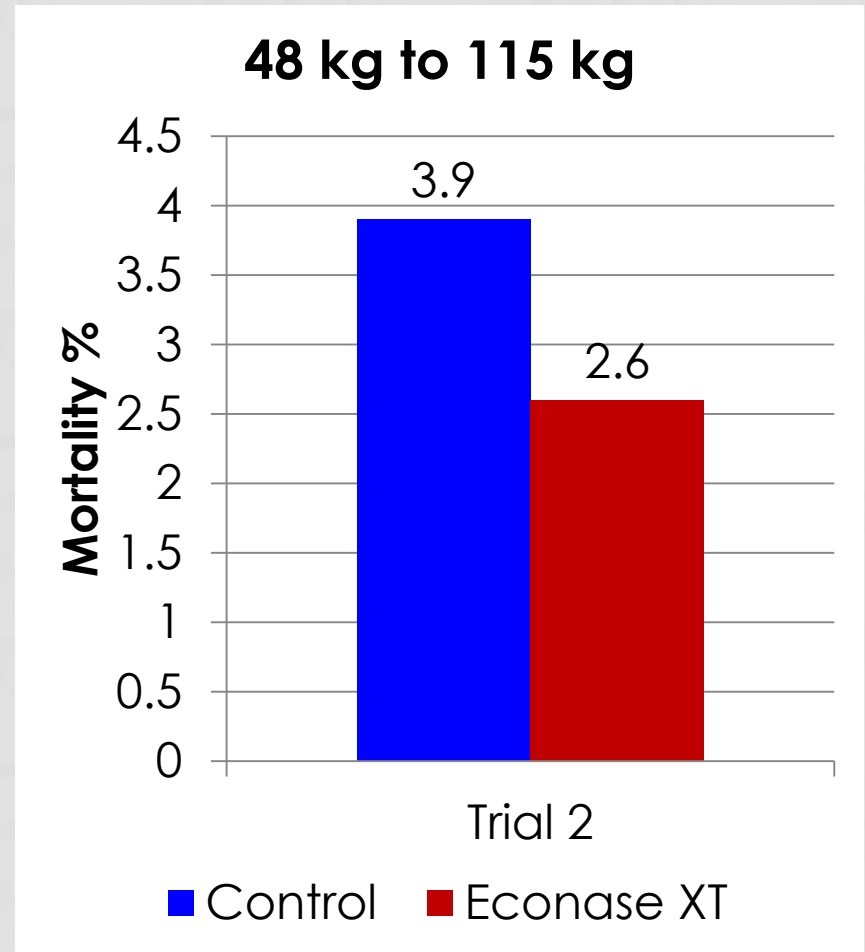
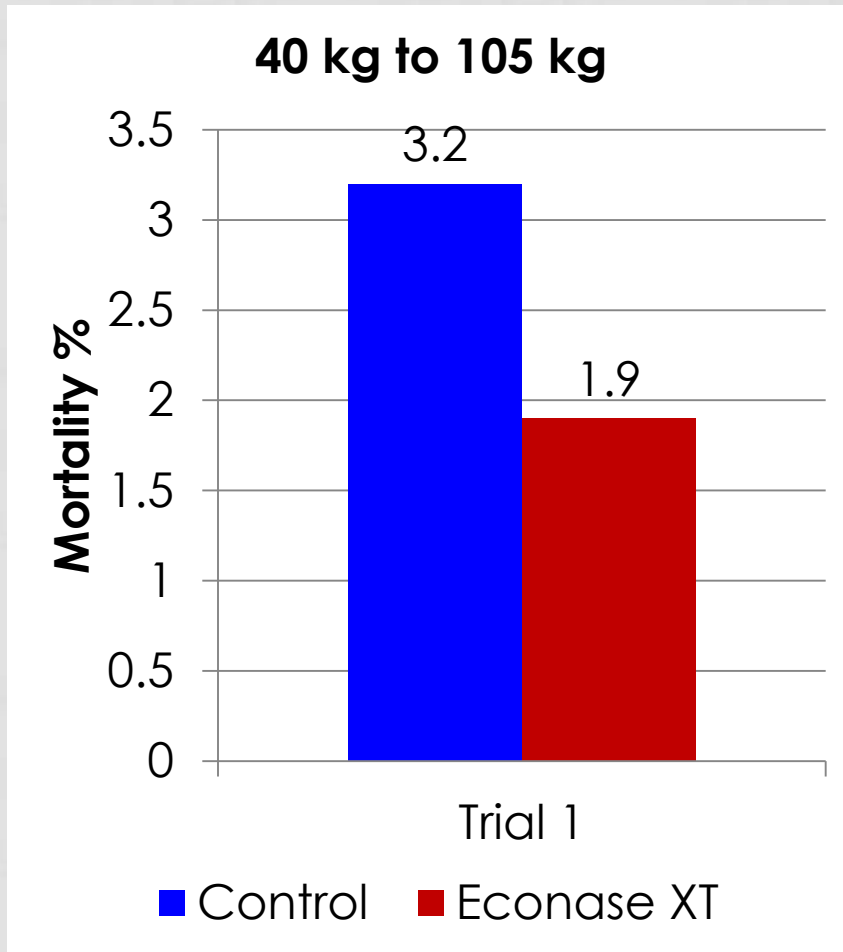
Let the Data Lead You . . .

Discovery is a matter of *'Seeing what everybody has seen and thinking what nobody has thought'*

Albert Szent-Gyorgi, 1937 Nobel Prize in Physiology.

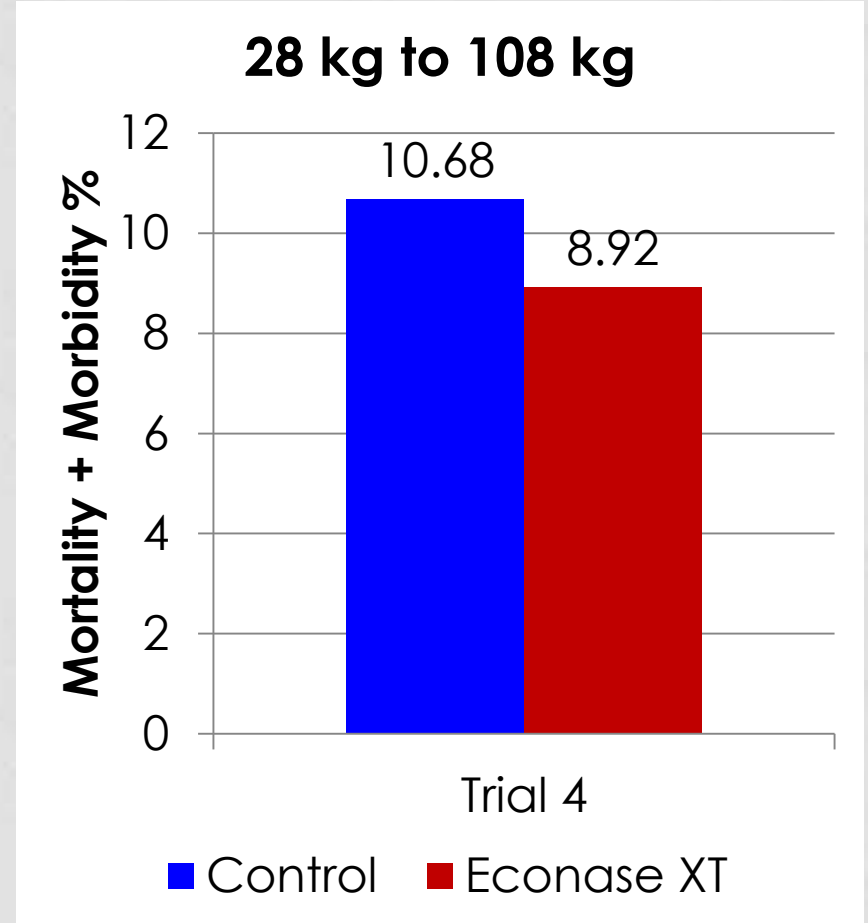
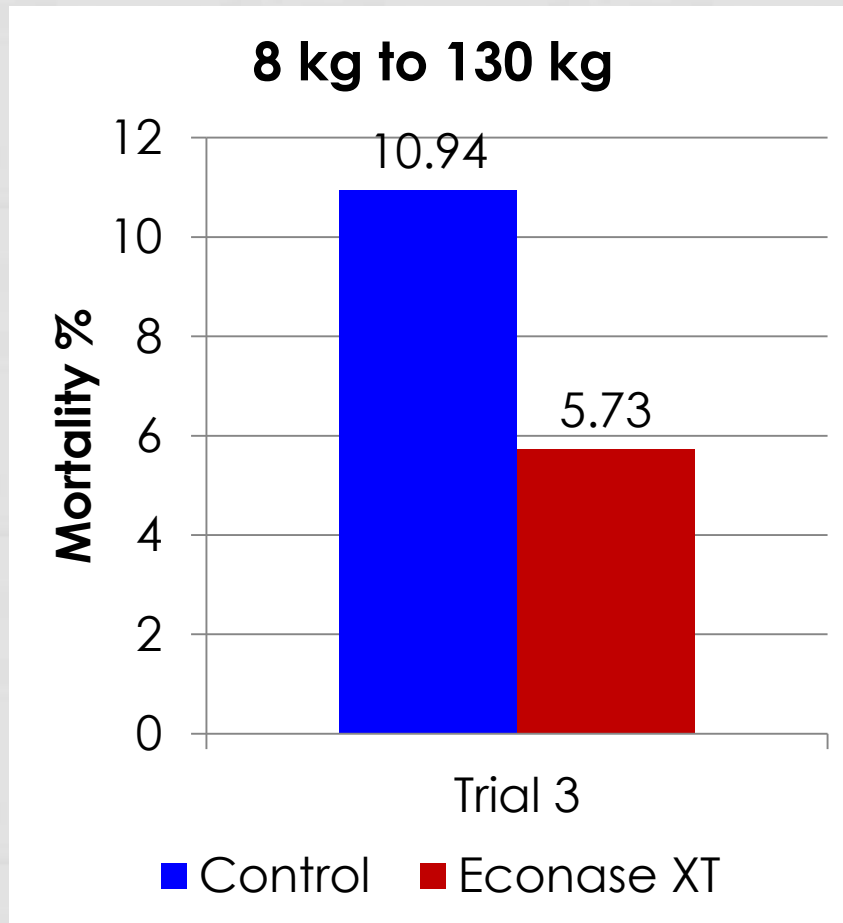


Competitor Xylanase: Response under High Health Conditions



Trial 1, 2: Total of 1552 pigs and 1547 pigs respectively. Farm Trial under typical commercial conditions, wheat based diets, UK

Competitor Xylanase: Response under LO Health Conditions



Trial 1: Total of 384 pigs under Research Conditions (C-S base; USA)

Trial 2: Total of 970 pigs under Commercial Conditions (Wheat base; UK)

Conclusions

- Financially Most Important Improvement from Dietary Porzyme Xylanase
- Nutrient Uplift Observed but not as Consistent.
- Financial Value: ROF per Pig

Feed, \$/ton	<u>0</u>	<u>3000</u>	<u>6000</u>	<u>9000</u>
235	-	1.26	3.25	-0.41
335	-	1.42	3.63	-0.51
NO FCR				
335	-	0.58	1.5	-0.08

THANK YOU

HANOR

