



 Never Stop Improving

PIC Nutrition Summit

PIC Global Nutrition Team

June 9th, 2020

PIC[®]

Nutrition Team Structure



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NAM nutrition specialist

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Philippine nutrition specialist

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Global nutrition specialist

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China nutrition specialist

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Global Consultants Team

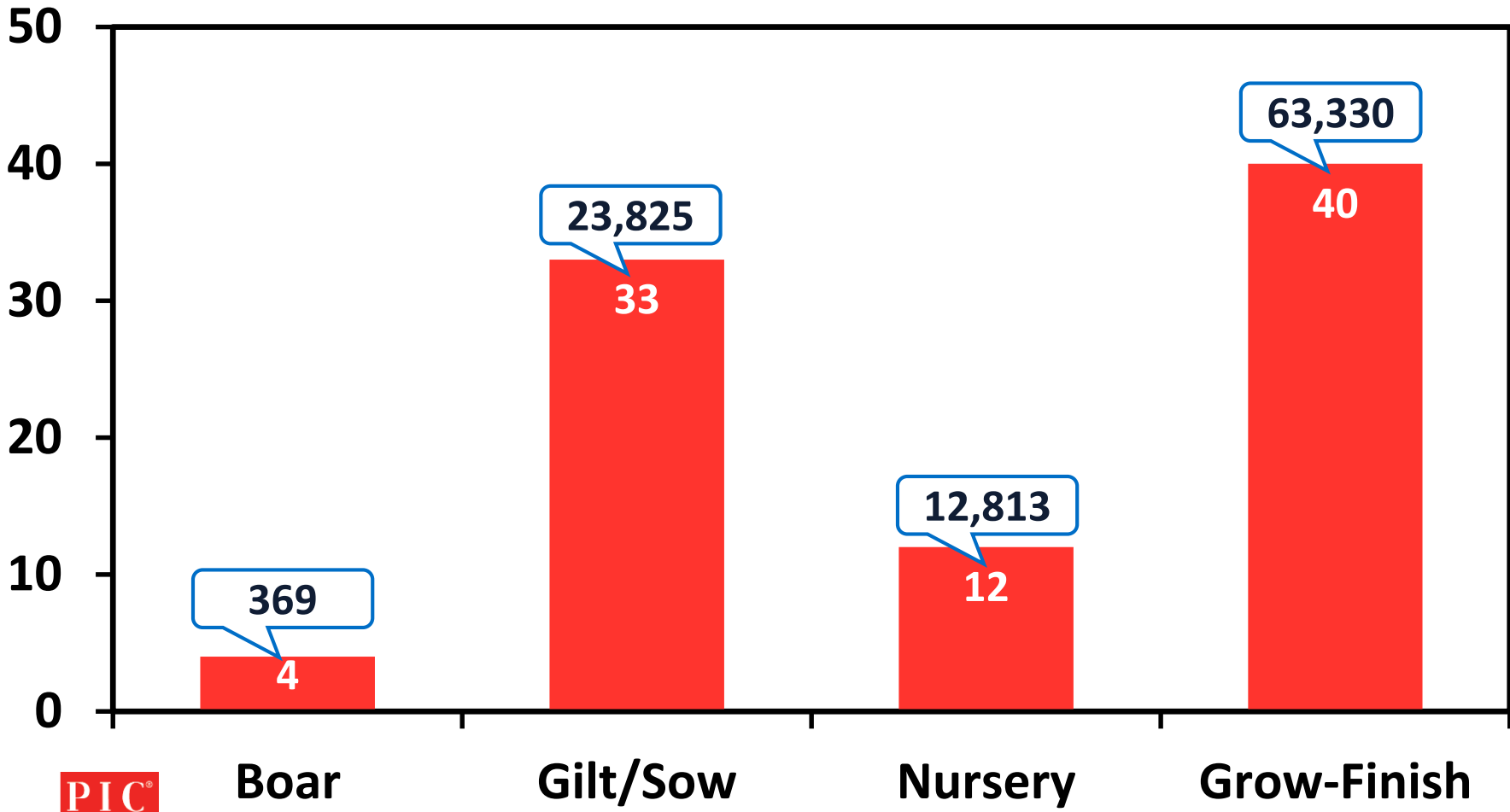


**PIC strives to make our customers the most
successful pig producers in the world!**

Nutrition trials (2016-2020)

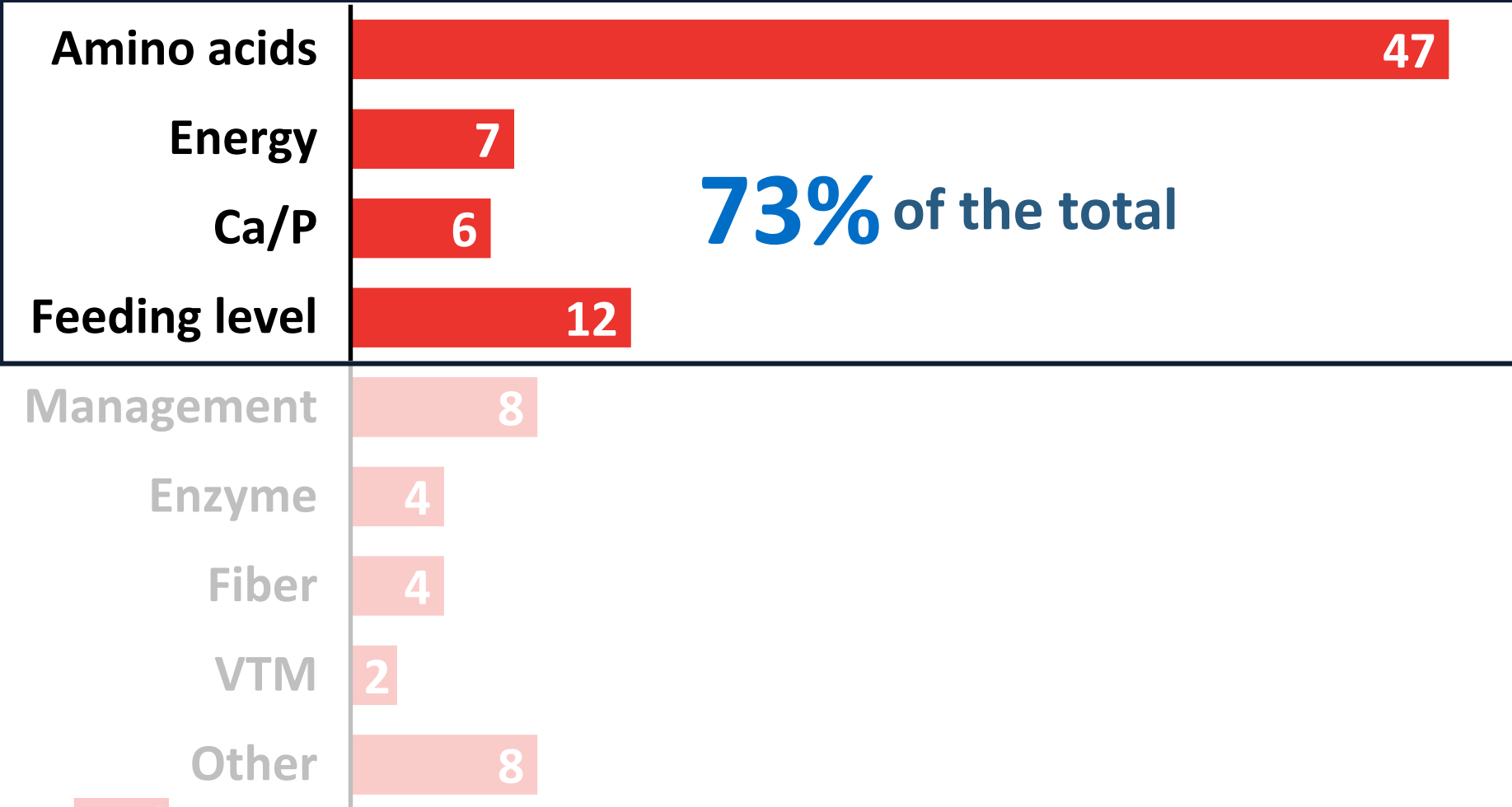


A total of 89 trials involved with 100,337 PIC animals



Nutrition trials (2016-2020)

Research Topics



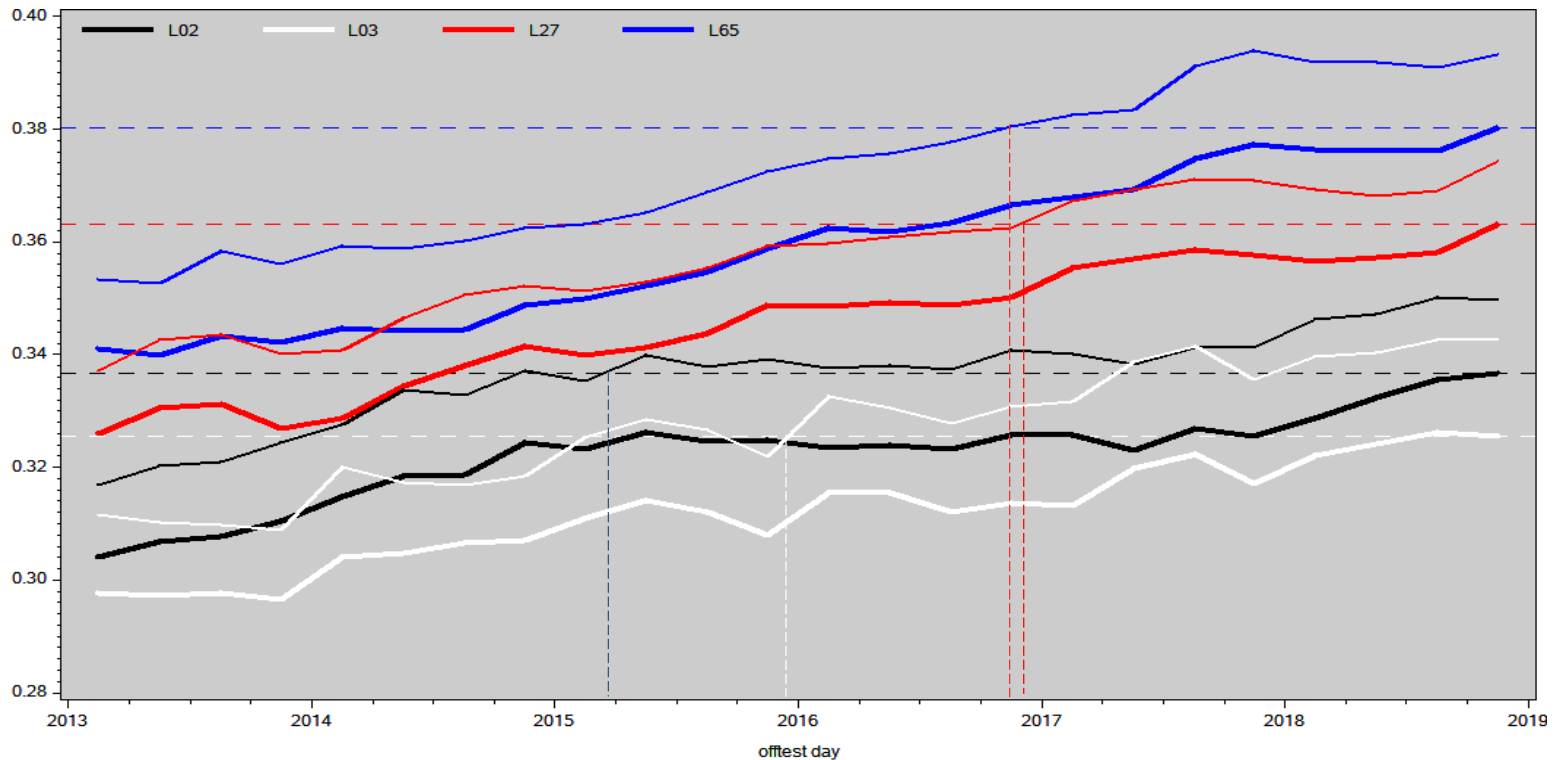
Ongoing trials



High index boar



- Camborough sows bred with semen from top 10% high-index boars
- 1,200 piglets from high-index boars
- Treatments: 85, 95, 105, 115, and 125% of PIC 2016 SID Lys



- Awaiting data-analysis

SID Lys titration for Camborough barrows



- PIC/CISS/PSM
- 2,400 Camborough barrows will be used
- Treatments: 85, 93, 100, 107, and 115% of PIC 2016 SID Lys for barrows

Phase	Room 1	Room 2
N3	Trial N3	Washout
F1	Washout	Trial F1
F2	Trial F2	Washout
F3	Washout	Trial F3
F4	Trial F4	Washout
F5	Washout	Trial F5

- Ongoing

Nutrition plan for PIC 800 pigs



- PIC/Reicksview/SVC
- 1,000 (Camborough x PIC 800) barrows and gilts will be used
- Treatments: 87, 95, 103, and 111% of PIC 2016 SID Lys curve

SID Lys, % of the diet

TRT	Phase						
	N3	F1	F2	F3	F4	F5	F6
A	1.20	1.07	0.95	0.86	0.76	0.69	0.65
B	1.31	1.17	1.03	0.94	0.84	0.76	0.71
C	1.42	1.27	1.12	1.02	0.91	0.82	0.77
D	1.53	1.37	1.21	1.10	0.98	0.89	0.83
PIC 2016 (100%)	1.38	1.24	1.09	0.99	0.88	0.80	0.75

- Ongoing

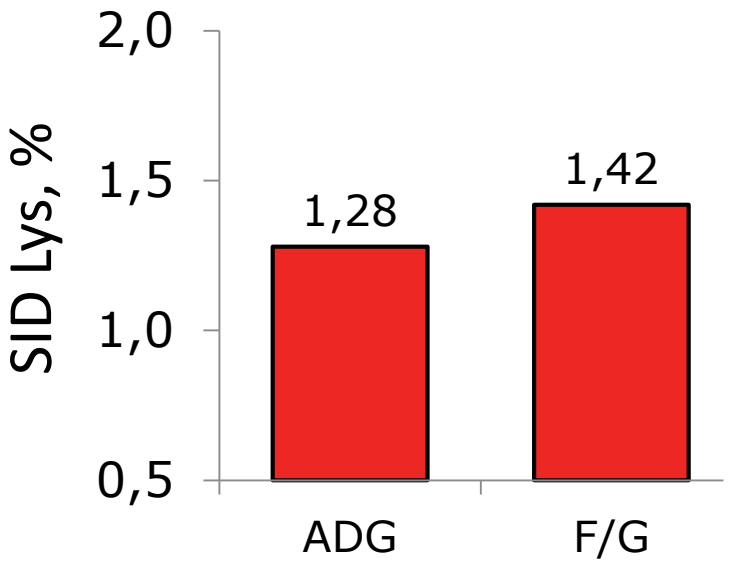
PIC®

- PIC/AGPIC/Agroceres multimix
- **Project 1:** To determine the differences in W2F performance of two breeding levels, two deviations apart, and three sex categories (intact gilts, immunocastrated barrows, and immunocastrated gilts)
- **Project 2:** To determine the SID Lys requirements of intact boars, gilts, and immunocastrated barrows from 12 to 125 kg.
- Treatments: 80, 90, 100, 110, and 120% of PIC 2016 SID Lys requirement for gilts, barrows, and boars
- Planning

PIC Nutrition Tools



Different approaches for diet formulation

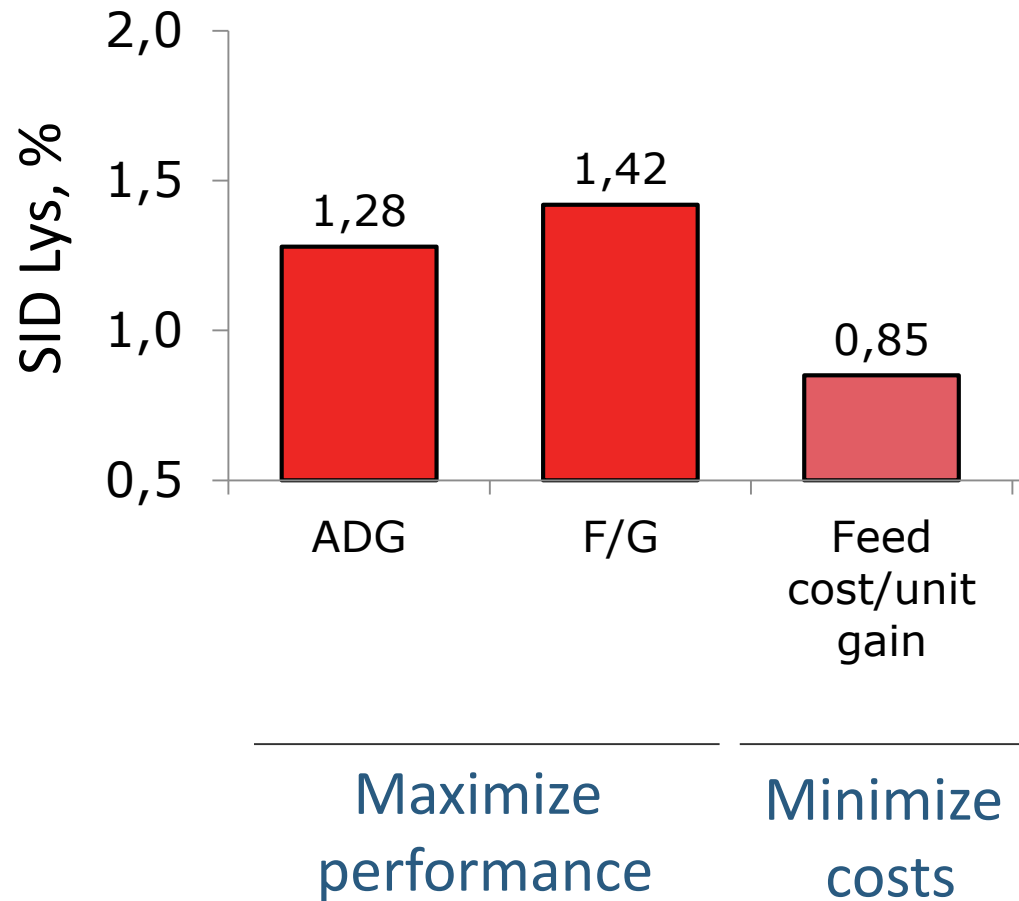


Maximize performance

Exemples of SID Lys levels to optimize different criteria for PIC pigs (20 to 25 kg pigs; PIC internal data).



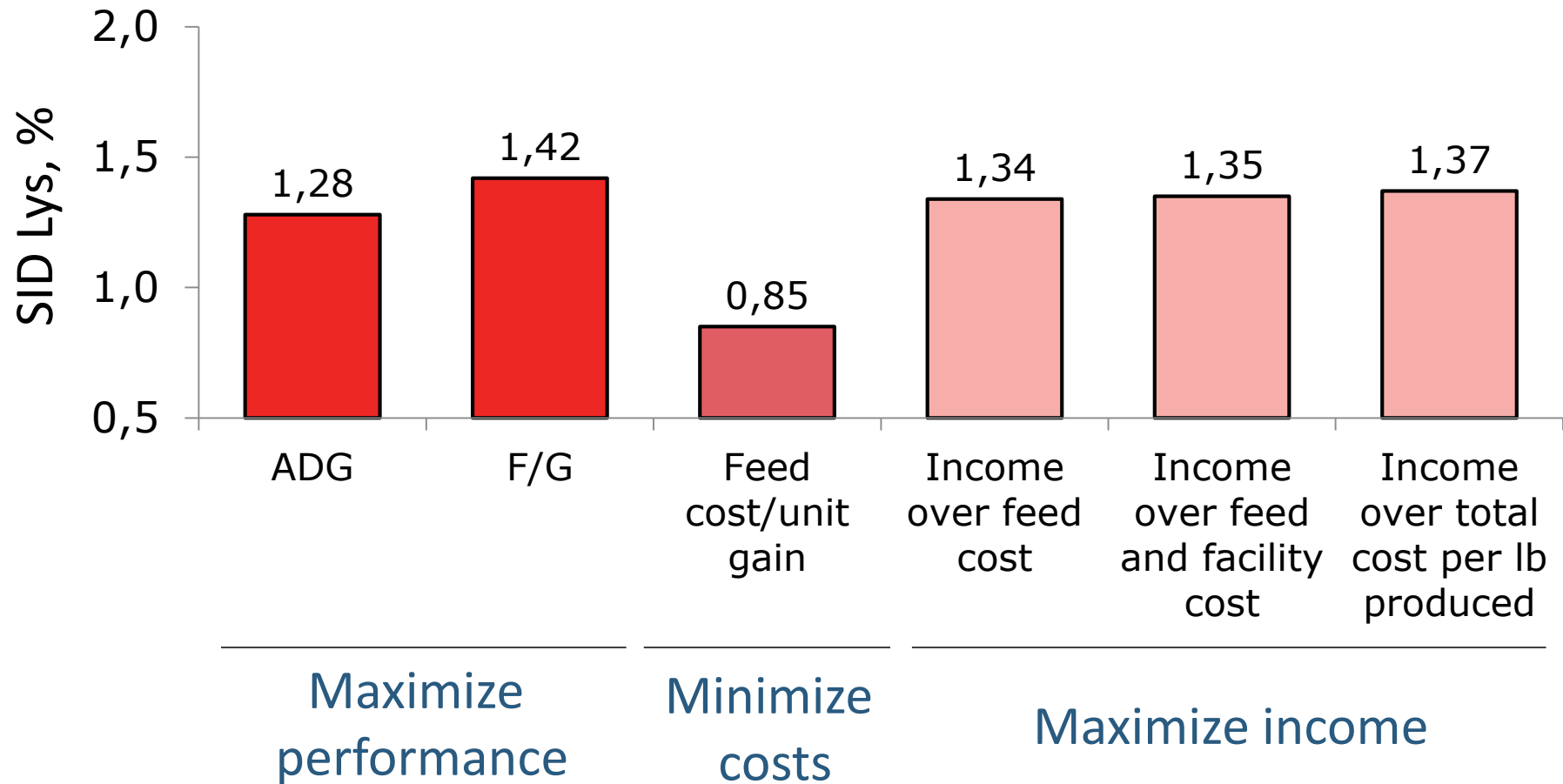
Different approaches for diet formulation



Exemples of SID Lys levels to optimize different criteria for PIC pigs (20 to 25 kg pigs; PIC internal data).



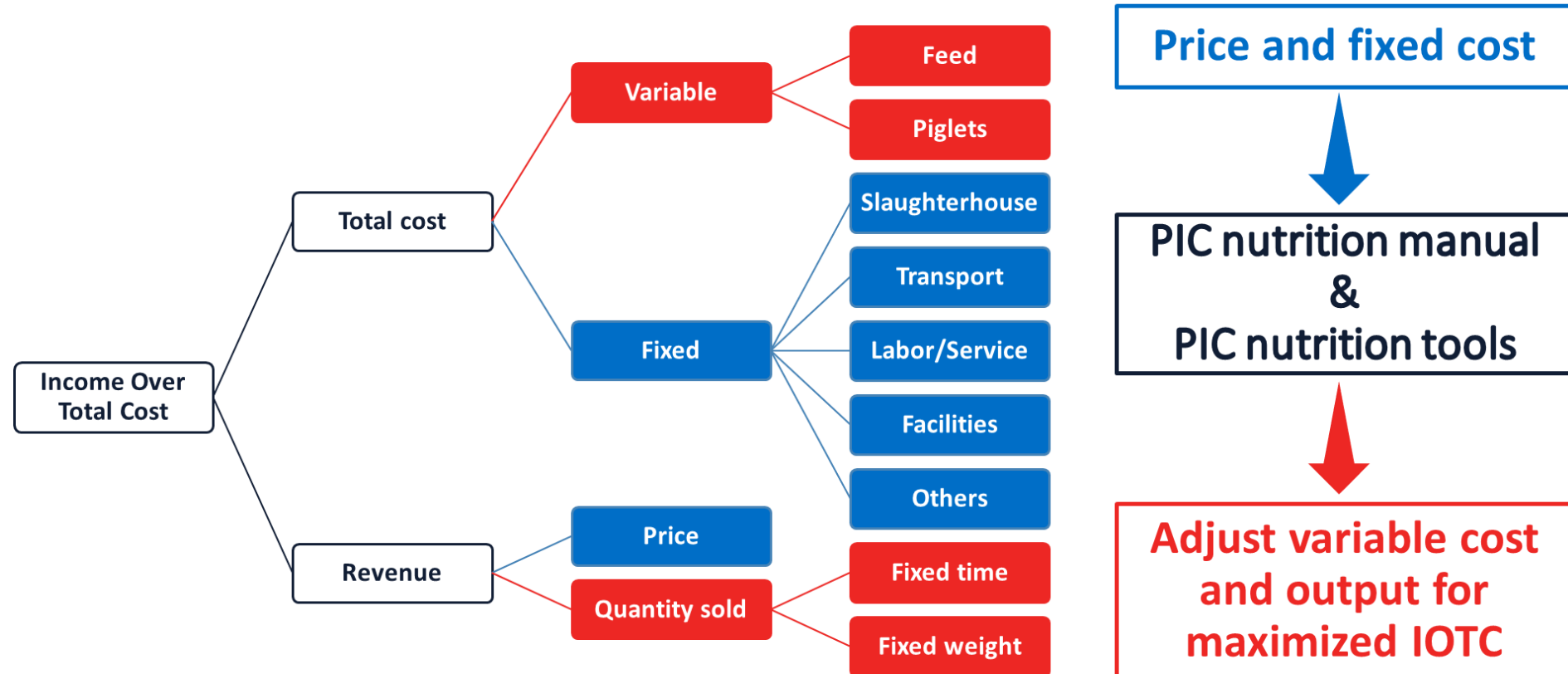
Different approaches for diet formulation



Exemples of SID Lys levels to optimize different criteria for PIC pigs (20 to 25 kg pigs; PIC internal data).



Maximizing Income Over Total Cost



Tough times ahead?

- If the pig has adequate nutrient access
 - Look hard at energy - we have a tool!
 - Look hard at lysine levels - we have a tool!
 - Look hard at P levels - we have a tool!
 - Seasonality formulation - we have a tool!
- Available at <https://gb.pic.com/resources/>

~97%
of total feed cost
covered

Seasonality tool

Seasonal Diet Formulation Tool for PIC® Pigs

Best window to market pigs		Production system	Low constraints
6/1/2018	9/1/2018	Gender	Barrows + Gilts

Phase	Initial	Final	Start	End
1	6.4	7.3	Don't change	Don't change
2	7.3	11.3	Don't change	Don't change
3	11	25	Don't change	Don't change
4	25	34	Tuesday, February 06, 2018	Wednesday, May 09, 2018
5	34	50	Friday, February 16, 2018	Saturday, May 19, 2018
6	50	64	Tuesday, March 06, 2018	Wednesday, June 06, 2018
7	64	84	Monday, March 19, 2018	Tuesday, June 19, 2018
8	84	107	Saturday, April 07, 2018	Sunday, July 08, 2018
9	107	132	Sunday, April 29, 2018	Monday, July 30, 2018

If system is fixed time, consider as the final weight the expected weight for summer months.

Fill colored cells

Seasonal Diet Formulation Tool for PIC® Pigs

JANUARY							FEBRUARY							MARCH							
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	
	01	02	03	04	05	06			06	07	08	09	10	04	05	06	07	08	09	10	
07	08	09	10	11	12	13	11	12	13	14	15	16	17	11	12	13	14	15	16	17	
14	15	16	17	18	19	20	18	19	20	21	22	23	24	18	19	20	21	22	23	24	
21	22	23	24	25	26	27	25	26	27	28				25	26	27	28	29	30	31	
28	29	30	31																		
APRIL							MAY							JUNE							
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	
	02	03	04	05	06	07		01	02	03	04	05	06		01	02	03	04	05	06	
08	09	10	11	12	13	14	06	07	08	09	10	11	12	03	04	05	06	07	08	09	
15	16	17	18	19	20	21	13	14	15	16	17	18	19	10	11	12	13	14	15	16	
22	23	24	25	26	27	28	20	21	22	23	24	25	26	17	18	19	20	21	22	23	
29	30						27	28	29	30	31			24	25	26	27	28	29	30	
JULY							AUGUST							SEPTEMBER							
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	
	02	03	04	05	06	07				01	02	03	04		03	04	05	06	07	08	
08	09	10	11	12	13	14	05	06	07	08	09	10	11	02	03	04	05	06	07	08	
15	16	17	18	19	20	21	12	13	14	15	16	17	18	09	10	11	12	13	14	15	
22	23	24	25	26	27	28	19	20	21	22	23	24	25	16	17	18	19	20	21	22	
29	30	31					26	27	28	29	30	31		23	24	25	26	27	28	29	
OCTOBER							NOVEMBER							DECEMBER							
SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT	
	01	02	03	04	05	06					01	02	03		02	03	04	05	06	07	08
07	08	09	10	11	12	13	04	05	06	07	08	09	10	02	03	04	05	06	07	08	
14	15	16	17	18	19	20	11	12	13	14	15	16	17	09	10	11	12	13	14	15	
21	22	23	24	25	26	27	18	19	20	21	22	23	24	16	17	18	19	20	21	22	
28	29	30	31				25	26	27	28	29	30		23	24	25	26	27	28	29	
														30	31						

Phase	Color	Start	Finish
Phase 1	x	Don't Change	Don't Change
Phase 2	x	Don't Change	Don't Change
Phase 3	x	Don't Change	Don't Change
Phase 4	x	2/6/2018	5/9/2018
Phase 5	x	2/16/2018	5/19/2018
Phase 6	x	3/6/2018	6/6/2018
Phase 7	x	3/19/2018	6/19/2018
Phase 8	x	4/7/2018	7/8/2018
Phase 9	x	4/23/2018	7/30/2018

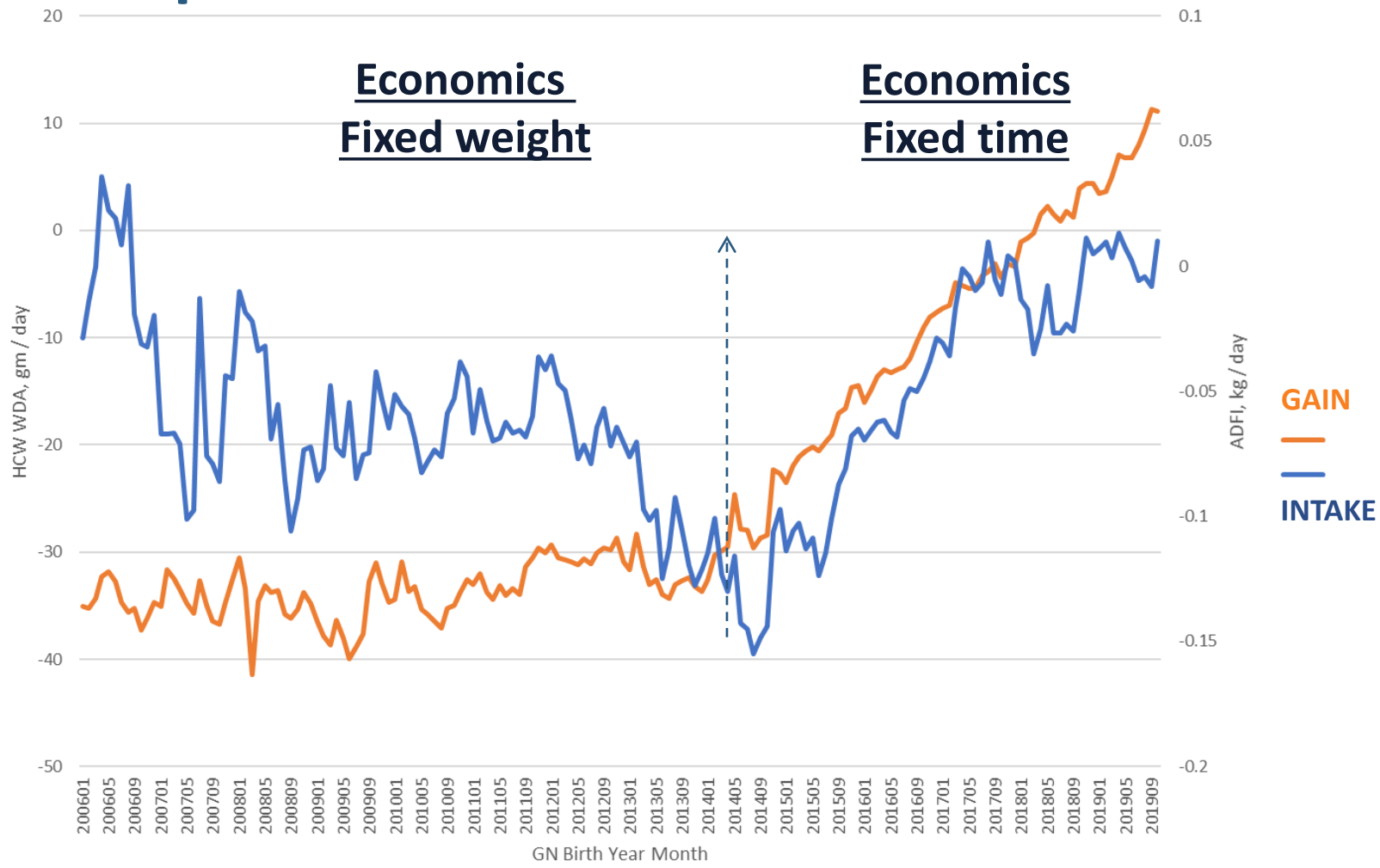


A photograph of a piglet in a nursery. The piglet is white with a pink snout and ears, standing on a slatted floor. Other piglets are visible in the background, some lying down on a green mat. The lighting is bright, and the overall scene is clean and well-maintained.

Genetic Development and Nutrient Requirement Changes

Genetic development and nutrient requirements changes

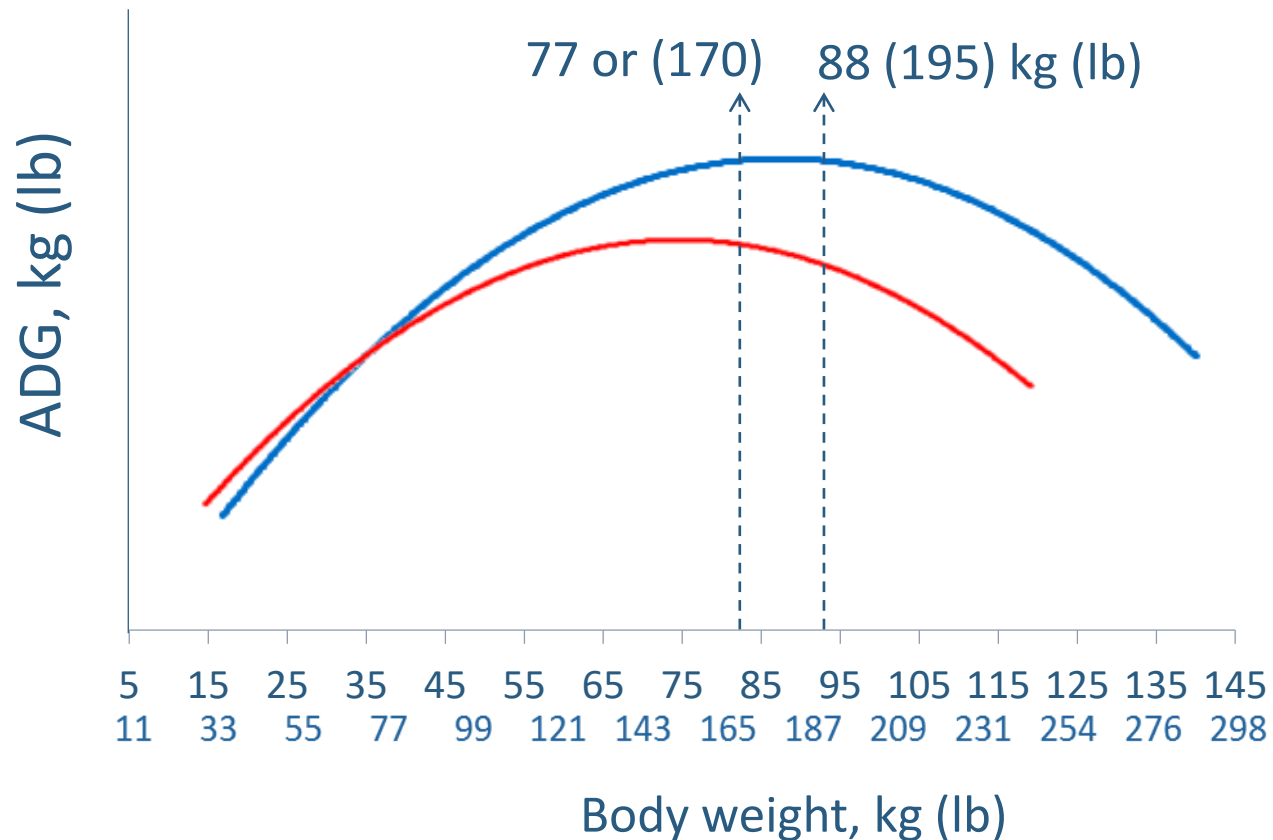
Improvement in FCR since 2006



Genetic development and nutrient requirements changes

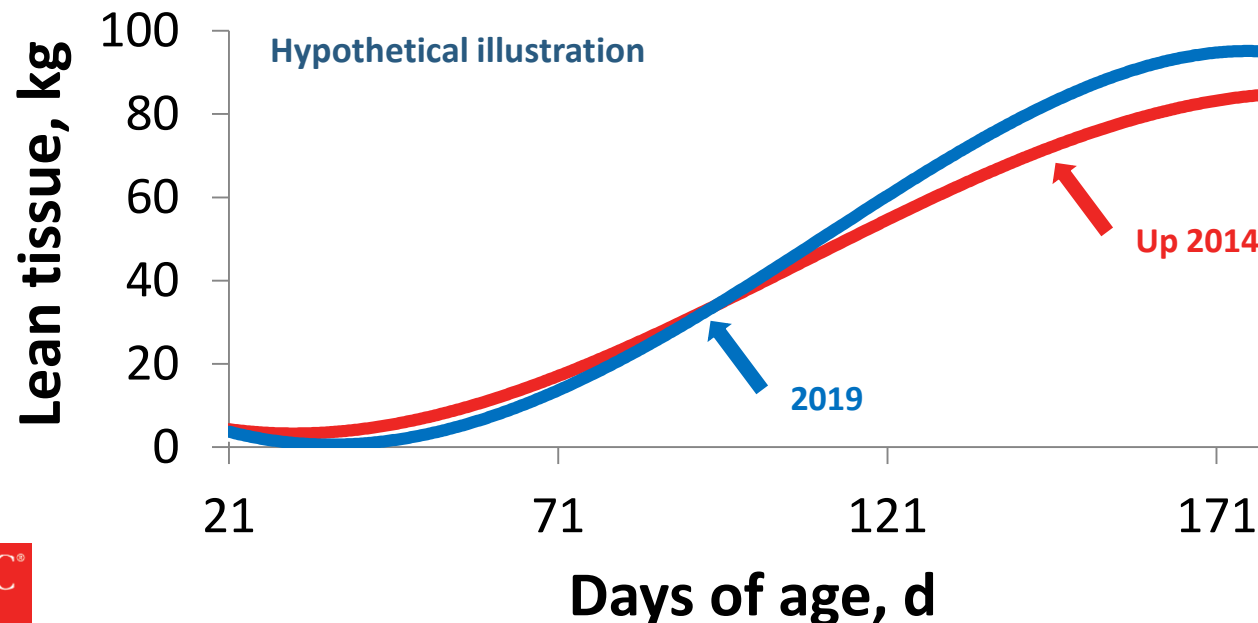
Body Weight at Maximum Protein Deposition

Estimated based in the growth curves of 337 in **2007** and **2016**



Growth rate: Late performance

1. Selection to a leaner pig at a heavier BW
2. Poorer performance in the early stages of life



A photograph of a piglet standing on a slatted floor in a nursery. The piglet is white with a pink snout and ears. It is looking down and to the right. In the background, other piglets are visible, some lying down on a green mat. The lighting is bright, and the floor is made of light-colored slats.

Wean to Finish Pigs

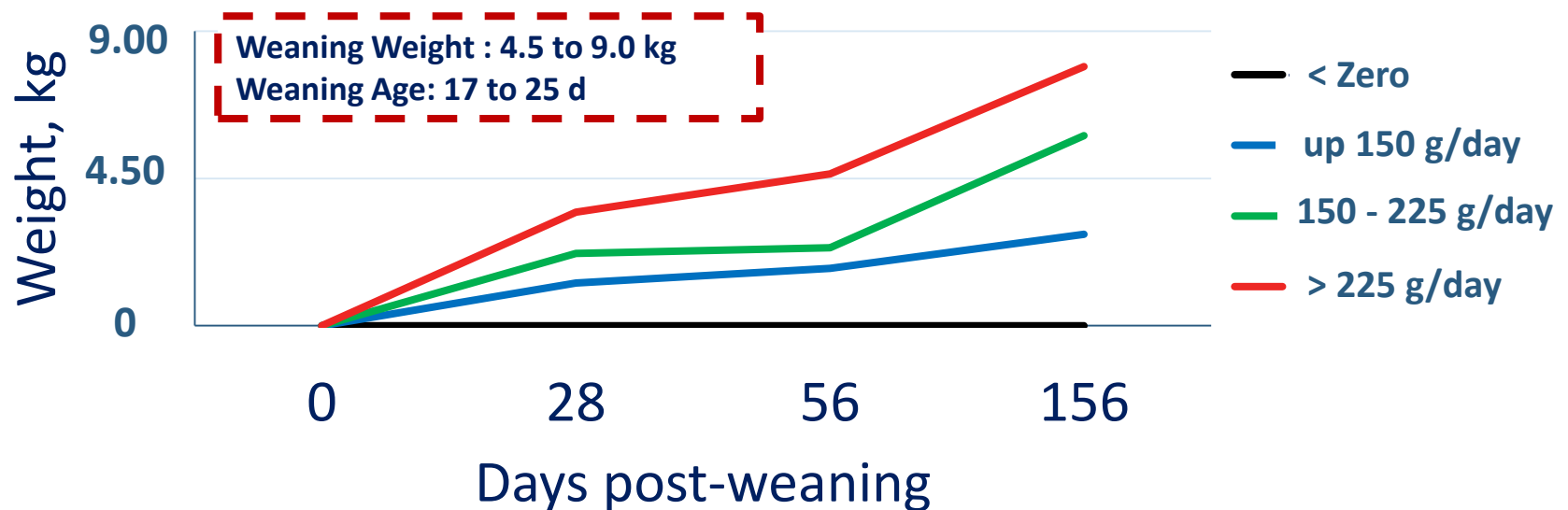
Wean to finish pigs

Nursery diet complexity

Post-weaning period

General rule: pigs that grow faster in the nursery also grow faster in the finisher.

Weight advantage based on the growth rate during the first week post weaning

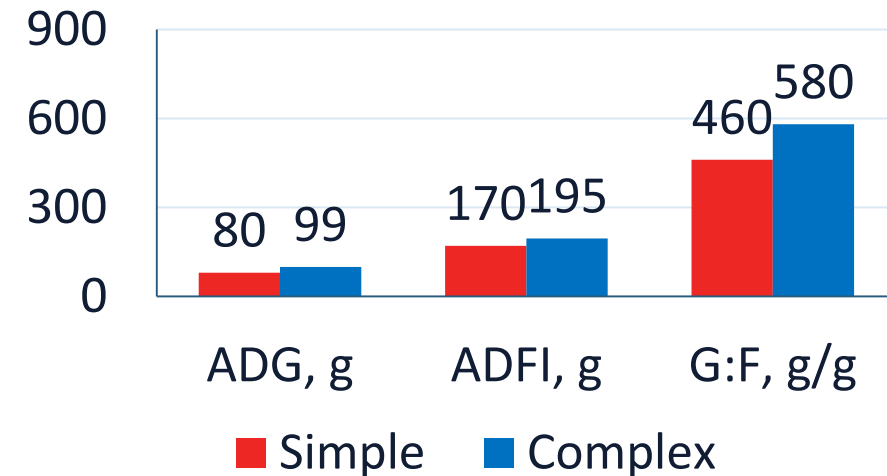


Nursery diet complexity

Influence of Diet Complexity on Subsequent Performance

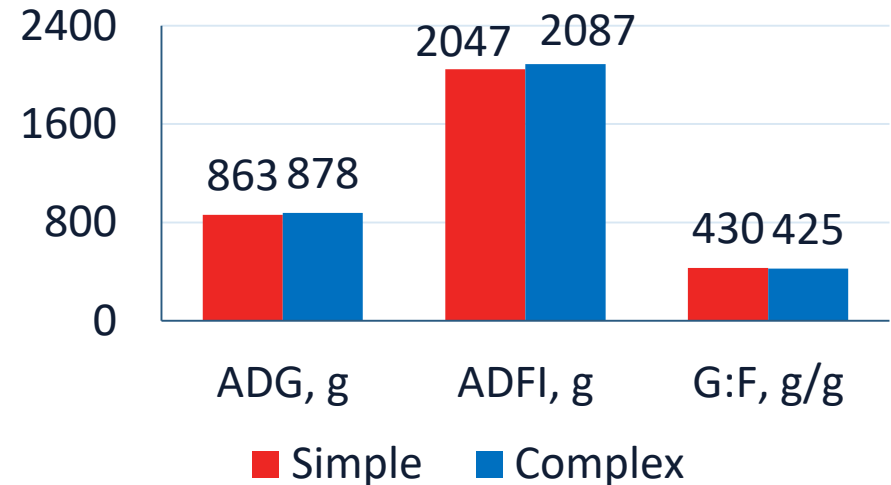
(Weanling BW 7.0 ± 0.07 kg)

d 0 to 7



P-values ADG and G:F= 0.01
SEM = 10.4, and 4.0, respectively
P-value ADFI = 0.64
SEM= 65.7

d 0 to 119



P-value > 0.10
SEM = 28.4, 69.3, and 10.0, respectively

Nursery diet complexity

Diet Complexity on Performance and Economics of nursery pigs

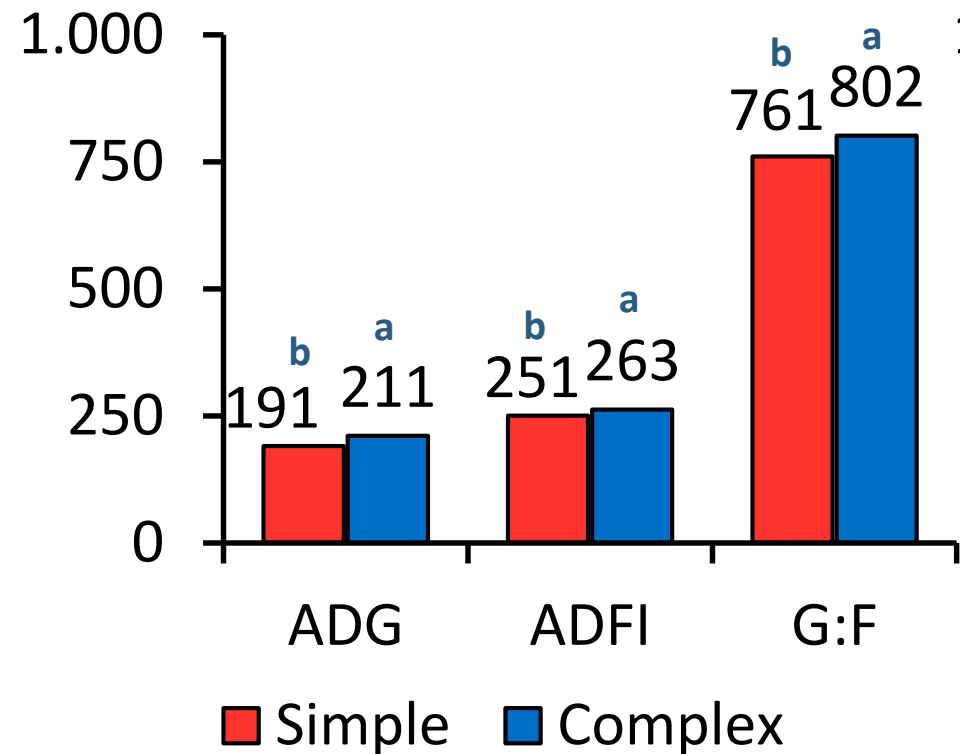
- 1,296 weanling pigs (PIC 337 × Camborough, initially BW 5.8±0.10 kg)
- Phase 1 for 10 d and phase 2 for 10 d
- A common diet after d 20 post-weaning

	Phase 1 (d 0 to 10)		Phase 2 (d 0 to 10)	
	Simple	Complex	Simple	Complex
Soybean Meal, %	20.0	12.0	26.0	20.0
Lactose, %	12.0	20.0	6.2	12.3
Specialty proteins, %	8.7	12.8	5.0	7.5
SID Lys, %	1.46	1.46	1.42	1.42
Phytase, FTU/kg	2,000	500	2,000	500

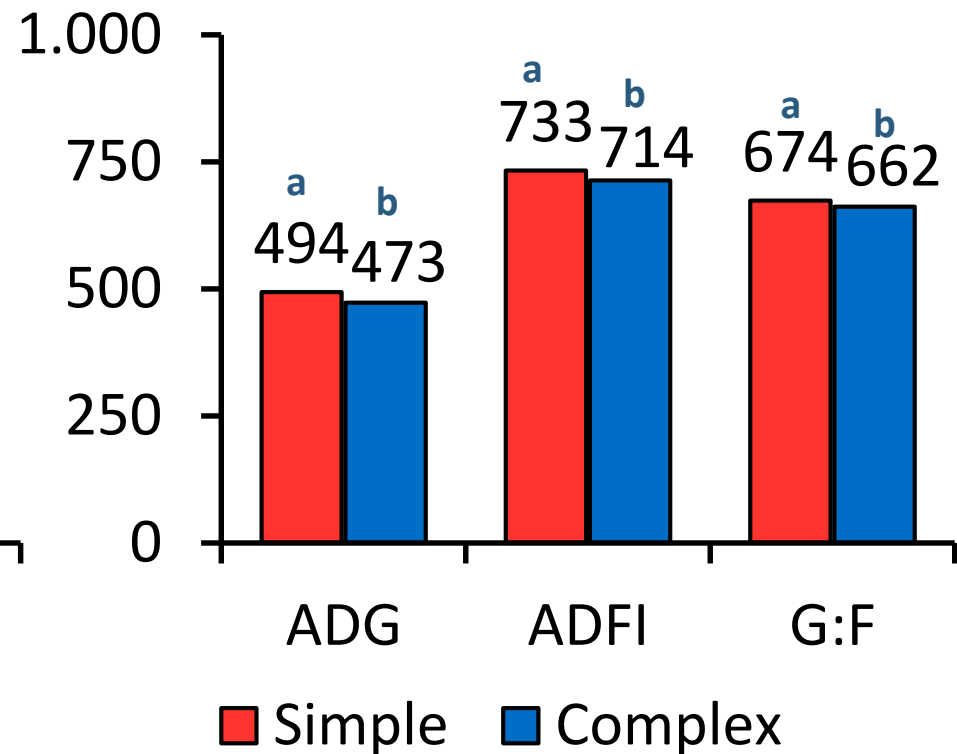
Wean to finish pigs

Nursery diet complexity

Treatment diets, d 0 to 20



Common diet, d 20 to 42



Means with different superscripts within variable differ

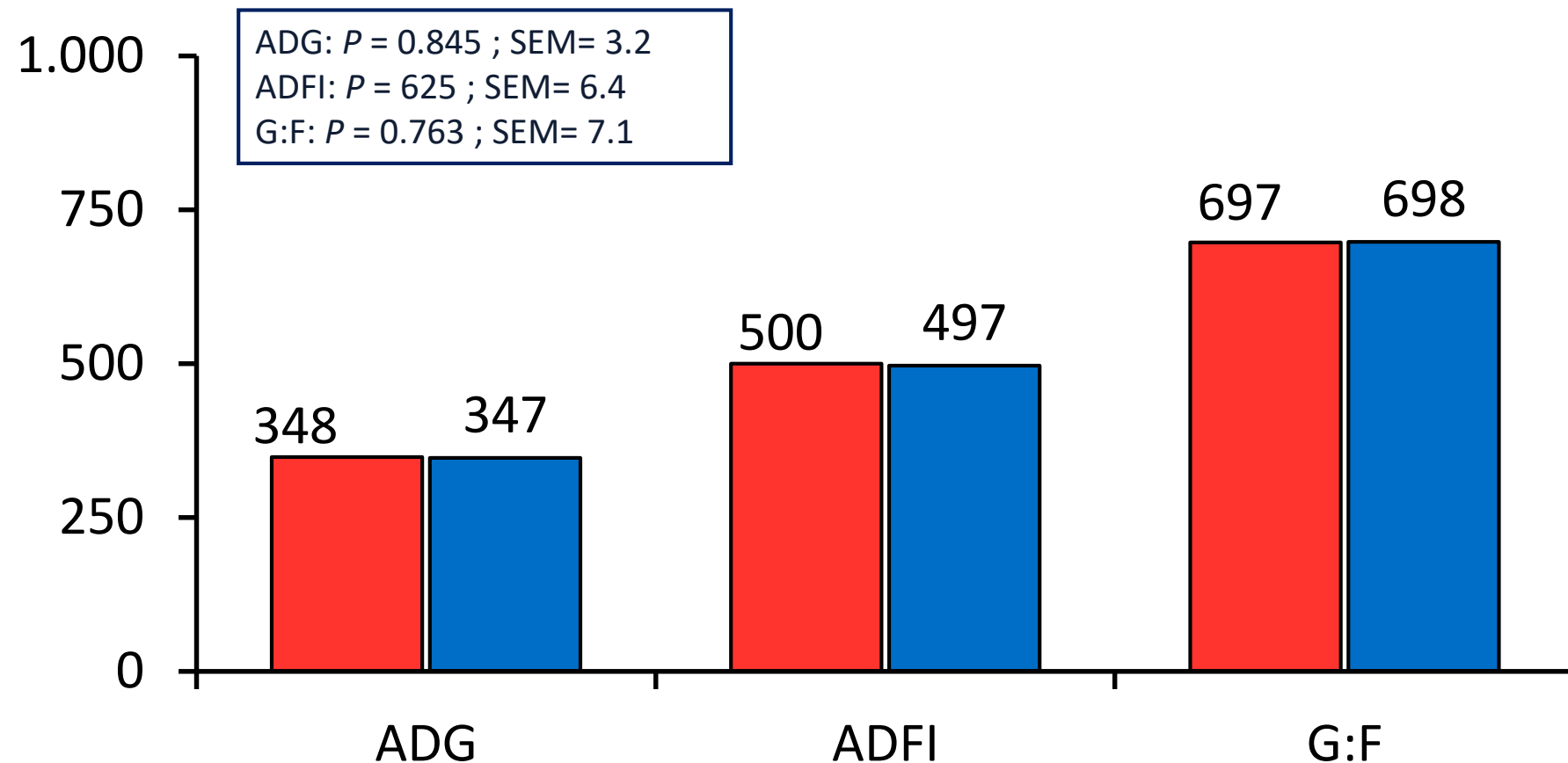
ADG: $P < 0.001$; SEM= 3.4
ADFI: $P = 0.045$; SEM= 4.4
G:F: $P = 0.062$; SEM= 23.0

ADG: $P = 0.001$; SEM= 4.0
ADFI: $P = 0.011$; SEM= 8.4
G:F: $P = 0.019$; SEM= 6.0

Wean to finish pigs

Nursery diet complexity

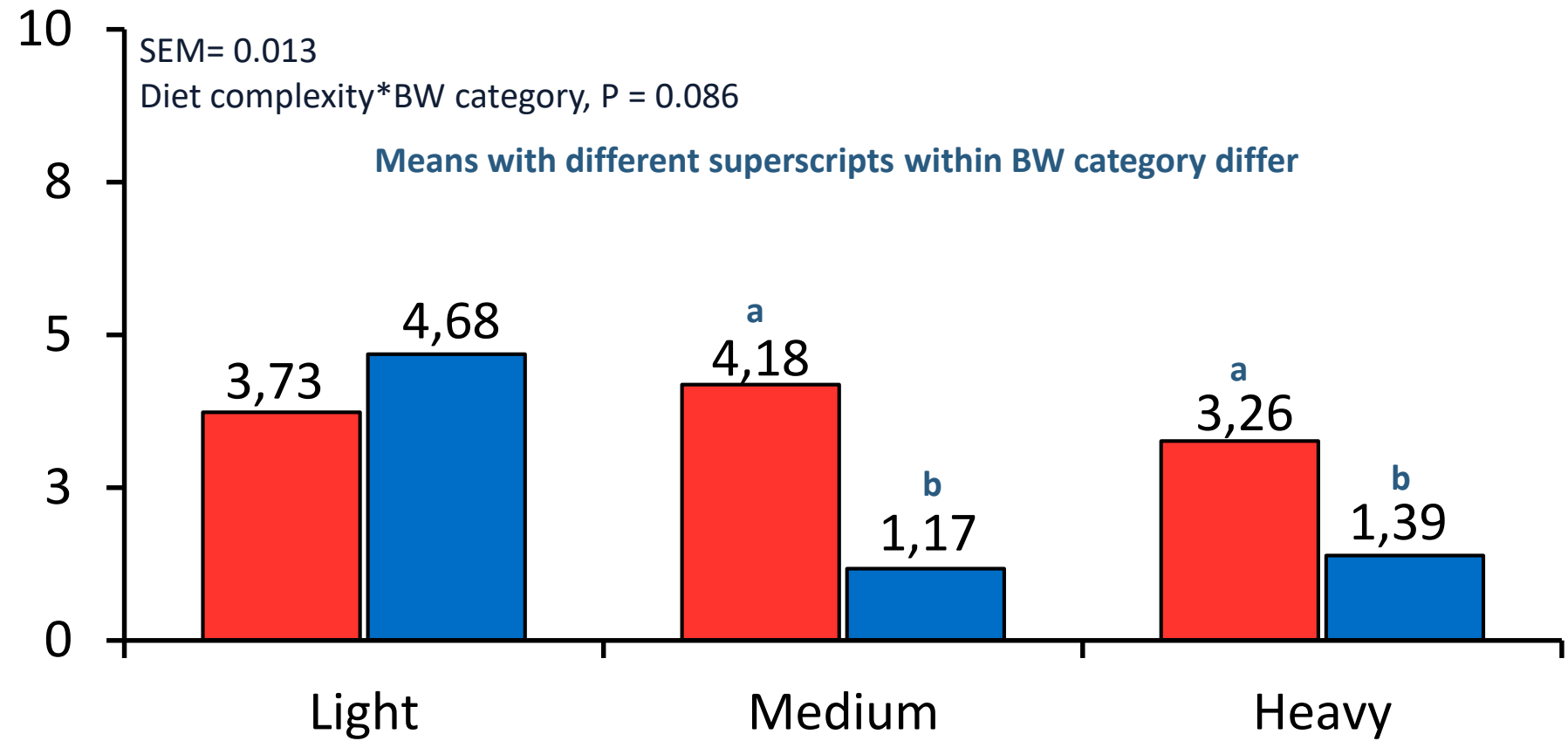
Overall, d 0 to 42



Nursery diet complexity

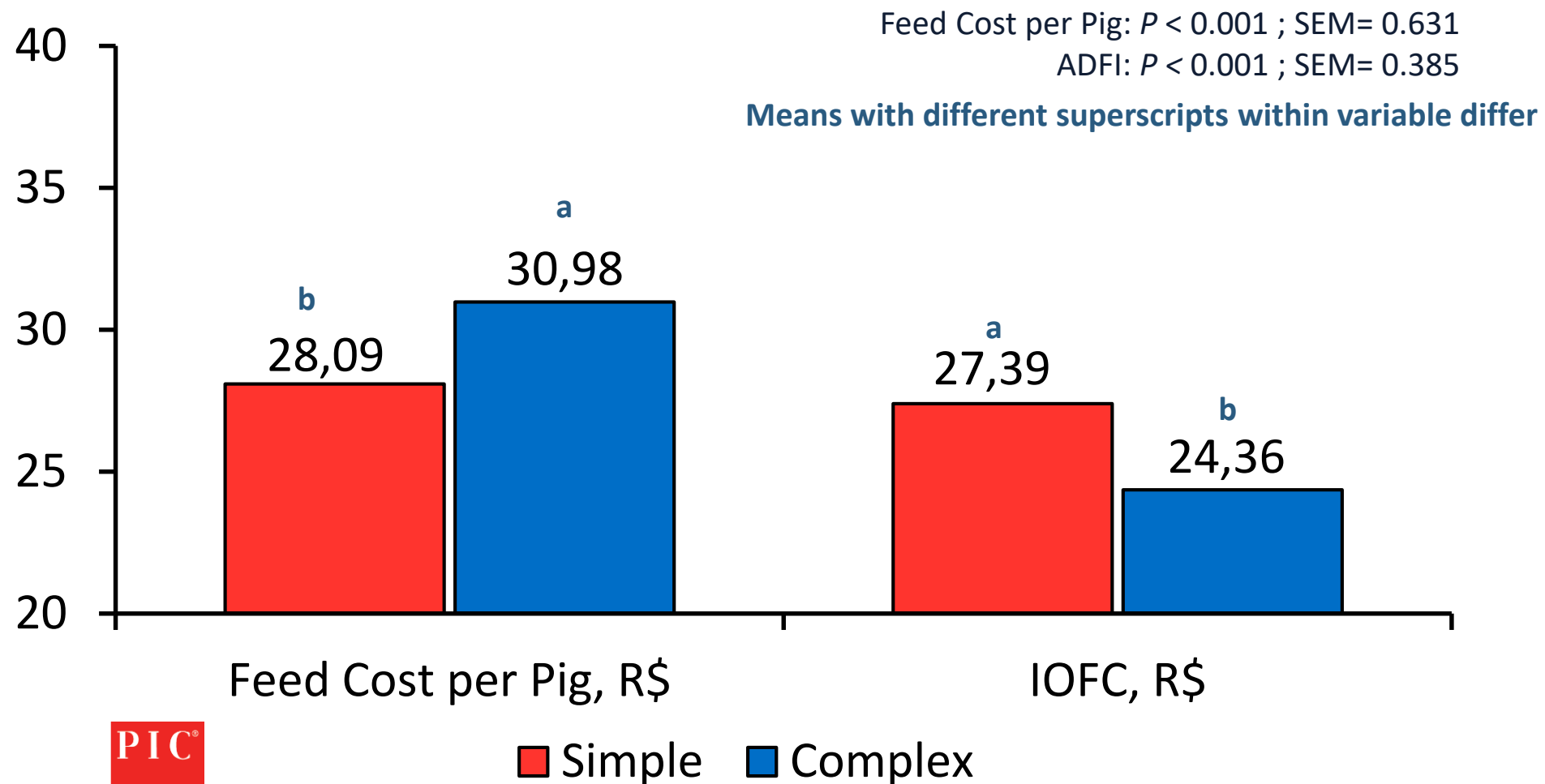
Mortality + removal rate, %

We couldn't analyze mortality alone because only 5 pig died



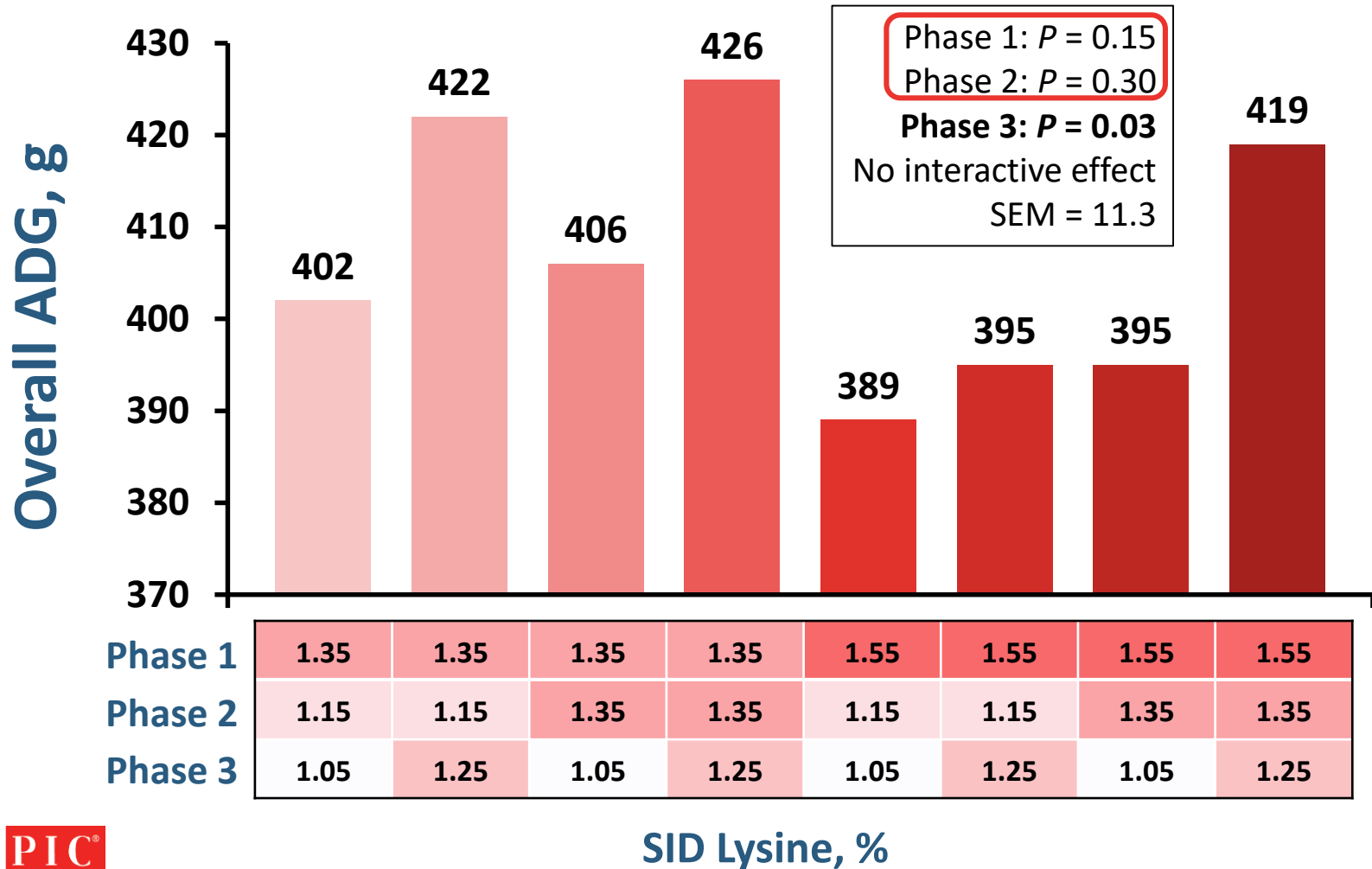
Nursery diet complexity

Overall, d 0 to 42



Amino Acids

Effects of SID Lys on growth performance of weanling pigs

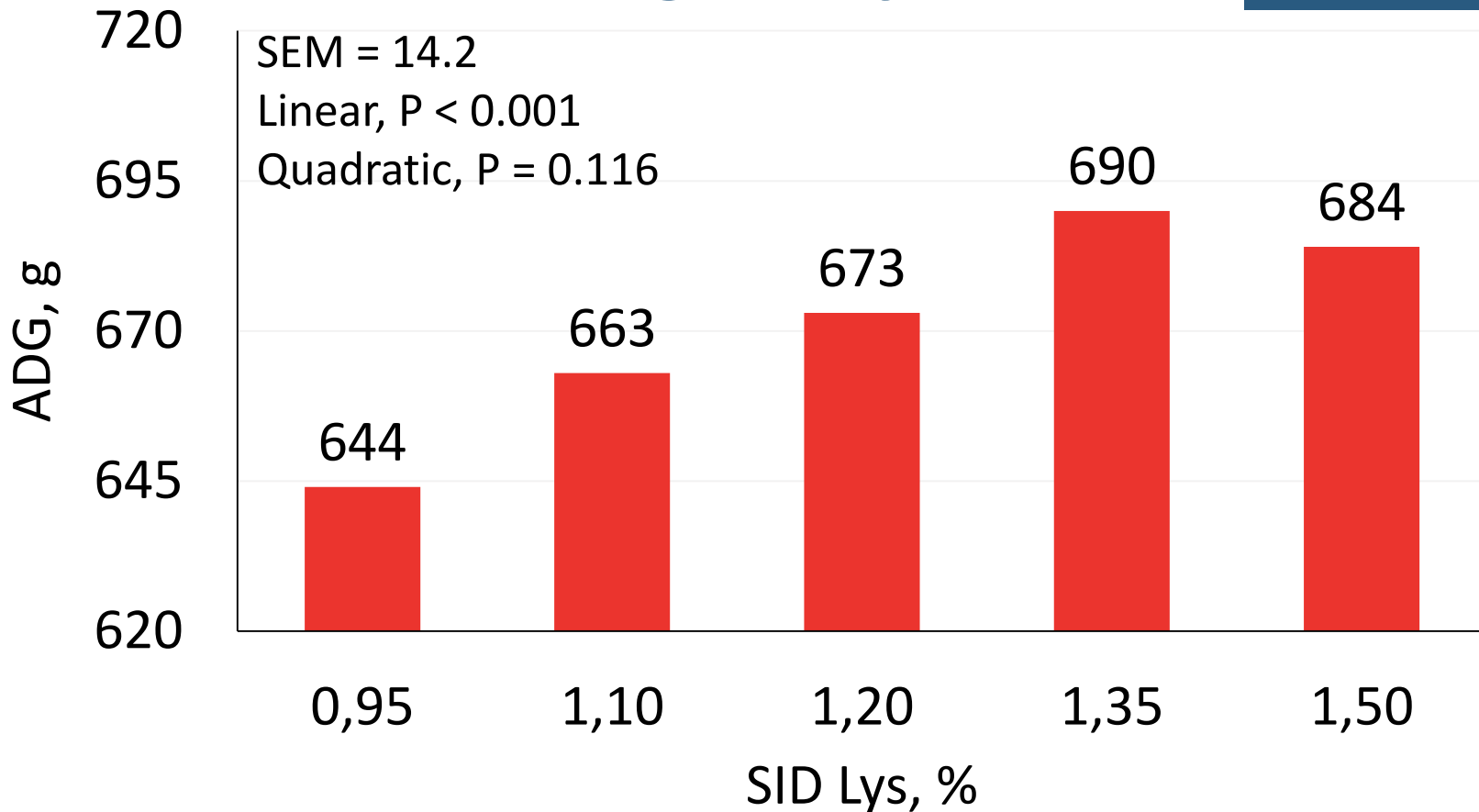


Amino Acids

SID Lys requirement of 12 to 26 kg pigs (42 to 63 d age)*

Average Daily Gain

*High index boars



PIC®

BLL = 1.31% SID Lys

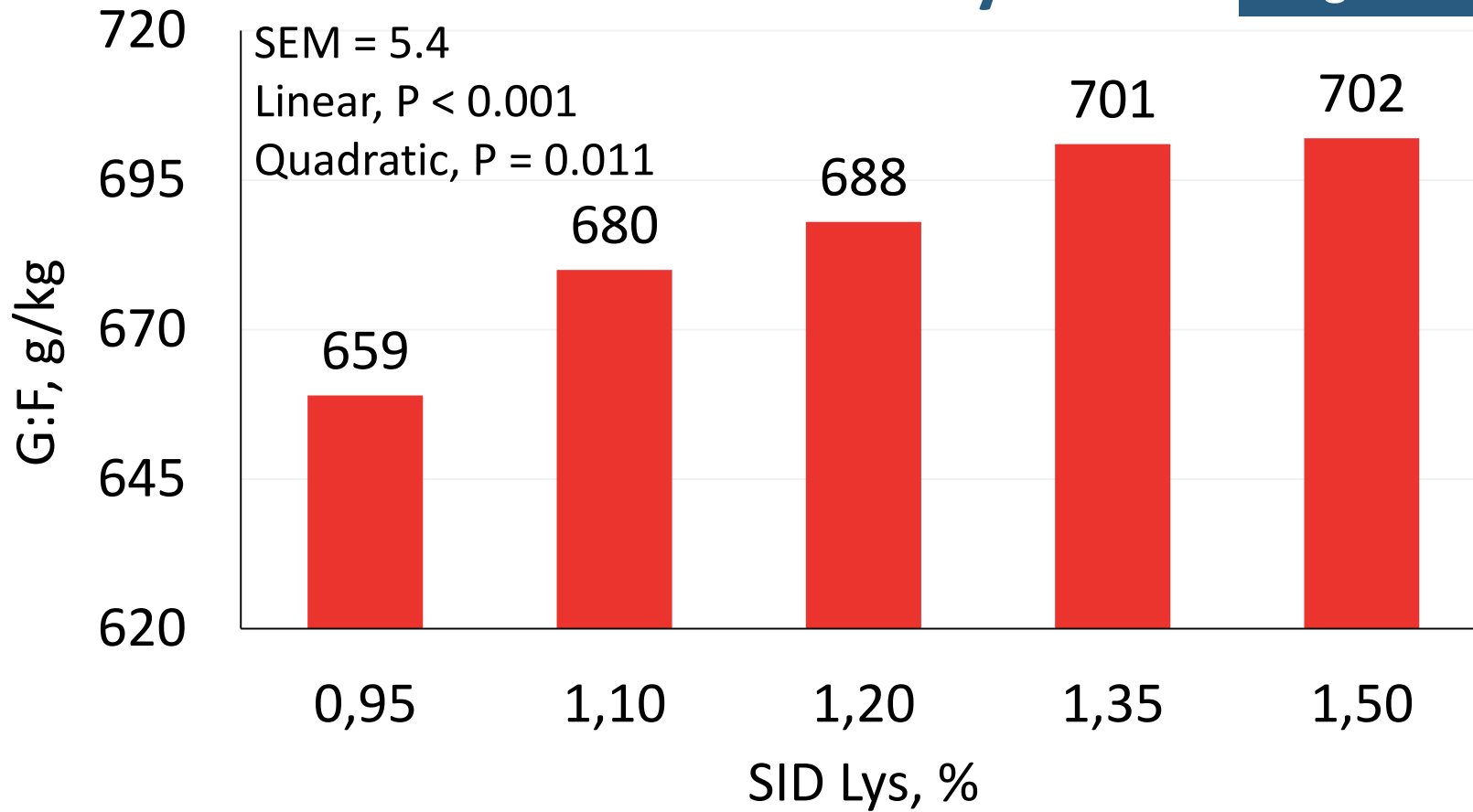
QP = 1.43% SID Lys with 99.6% of maximum ADG at 1.31%

Amino Acids

SID Lys requirement of 12 to 26 kg pigs (42 to 63 d age)*

Feed Efficiency

*High index boars

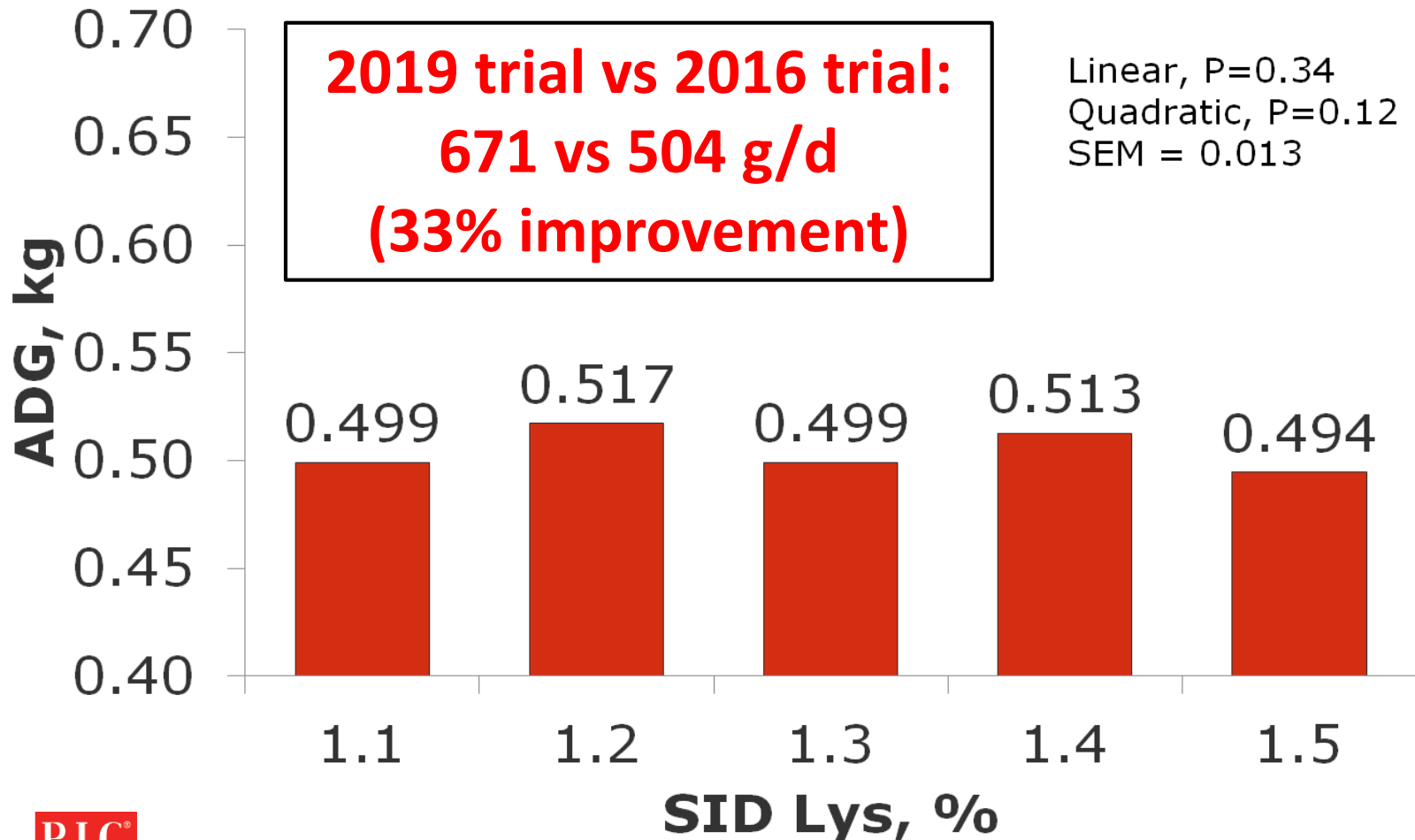


PIC®

BLL = 1.30% SID Lys and BLQ = 1.36% SID Lys
QP = 1.48% SID Lys with 99.4% of maximum ADG at 1.31%

Amino Acids

SID Lys for 11-23 kg PIC pigs (2016)



Nursery diet complexity and Amino Acids

Influence of Diet Complexity on Subsequent Performance

- Early life growth multipliers
 - Birth weight – Consistently improvement in PIC since 2014
 - Weaning age - Main et al., 2004
 - Weaning weight - Wolter and Ellis, 2001; Schinckel et al., 2007; Collins et al., 2017
- Non multipliers
 - **Diet Complexity** - Whang et al, 2000; Wolter et al., 2003; Skinner et al., 2014
 - Added fat – Tokach et al., 1996
 - **Amino acids** – Fabian et al., 2002; Nemecek et al., 2012
 - Antibiotics - Skinner et al., 2014
 - Supplemental milk – Wolter and Ellis, 2001

Effects of SID Lys levels on performance of 29 to 129 kg pigs*

*High index boars

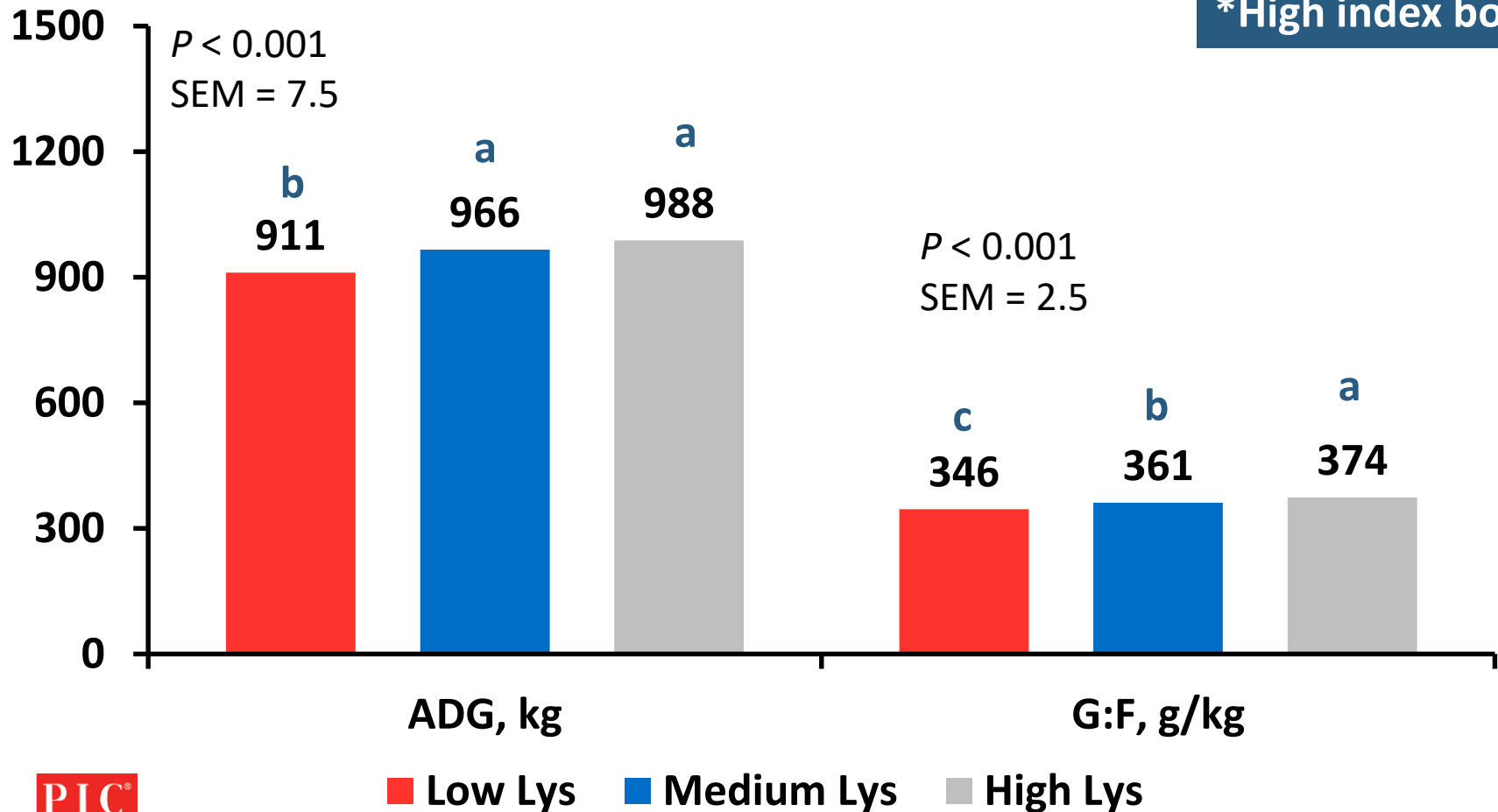
- A total of 1,013 PIC (337 X Camborough) barrows and gilts were used in a 112-d trial
- Dietary energy level kept the same across treatments
- A total of 6 dietary phases
- Dietary treatments
 - **Low Lys:** overall SID Lys levels as **87%** of PIC2016 requirement
 - **Medium Lys:** overall SID Lys levels as **97%** of PIC2016 requirement
 - **High Lys:** overall SID Lys levels as **106%** of PIC2016 requirement

Wean to finish pigs

Energy and amino acids

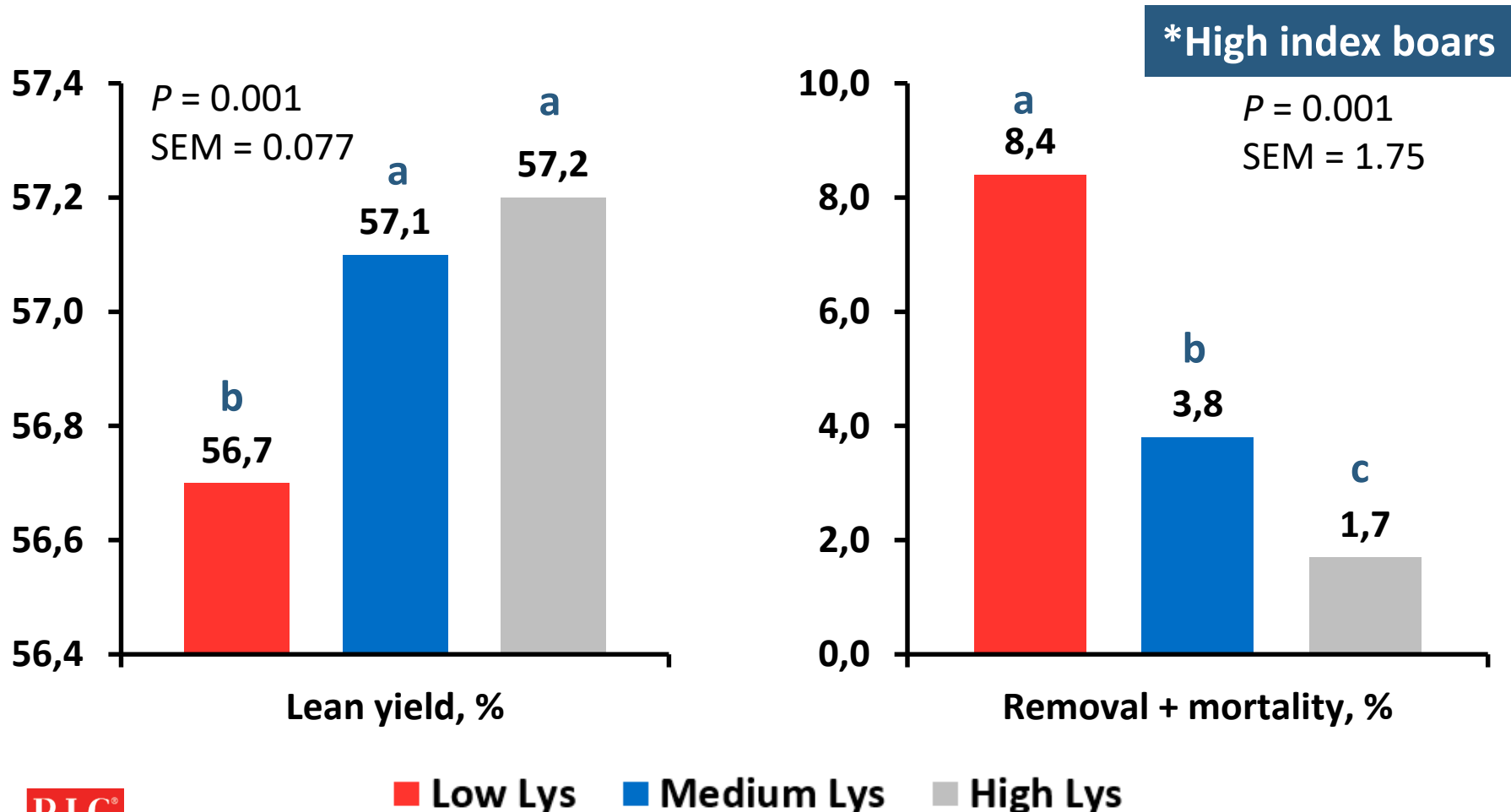
Effects of SID Lys levels on performance of 29 to 129 kg pigs*

*High index boars



Energy and amino acids

Effects of SID Lys levels on performance of 29 to 129 kg pigs*



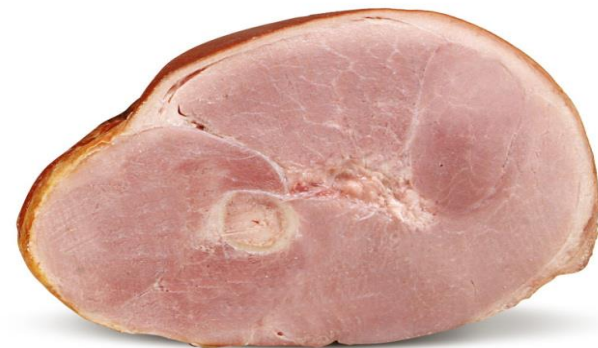
Lysine tool

Amino Acid Requirements

- ✓ Lysine is the first limiting AA
 - ✓ The amount of lysine to make 1 kg of body weight gain is virtually the same over the years

Improved growth rate

Improved feed efficiency



Overtime there is a need to concentrate the diets to unlock genetic potential

Lysine tool

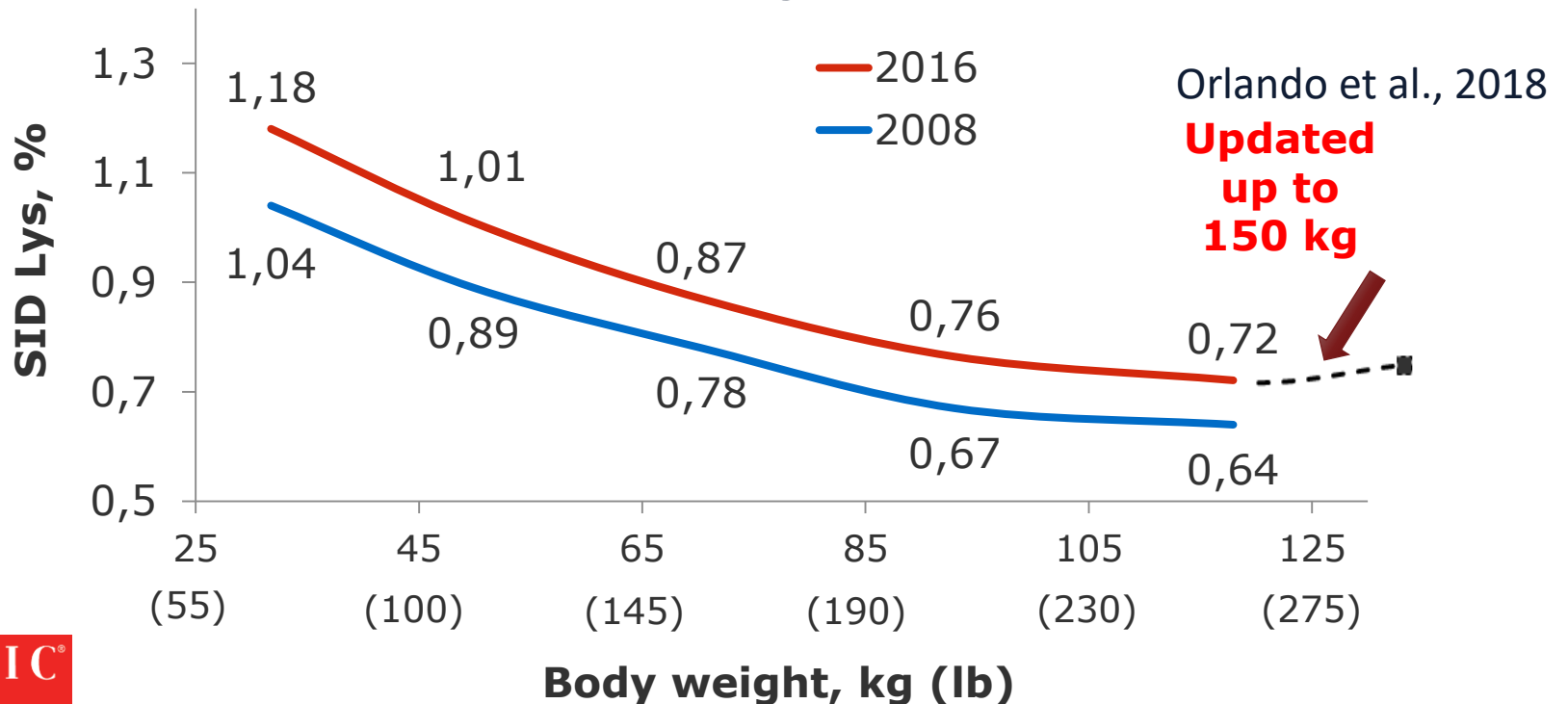
Amino Acid Requirements

Meta-analysis

28 commercial experiments, with a total of 46,092 pigs.

Average of barrows and gilts, average of ADG and F/G.

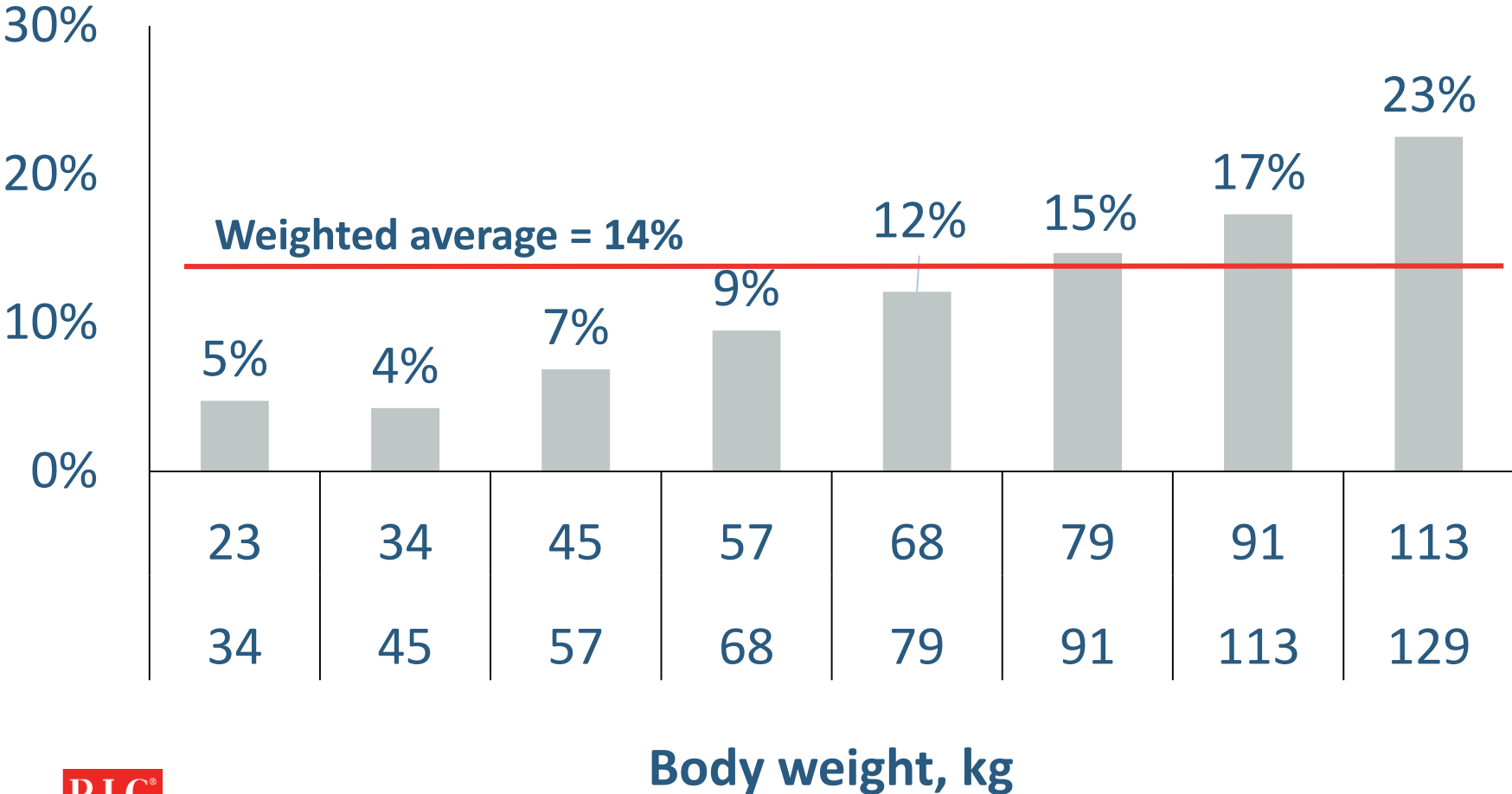
2,440 kcal NE/kg (1,107 Kcal NE/lb)



SID Lysine recommendations for PIC boars



% of SID Lys for boars is greater than barrows



Lysine – example biological tool



Energy level, NRC NE kcal/lb	1150	1167	1180	1185	1195	1182
Weight In, lb	50	75	103	141	180	212
Weight Out, lb	75	103	141	180	212	300

SID Lys:Cal NE

Barrows	4.83	4.37	3.88	3.42	3.11	2.83
Gilts	5.08	4.55	4.00	3.52	3.22	3.03
Boars	5.08	4.62	4.23	3.87	3.63	3.48

SID Lys % (NE equation)

Barrows	1.22	1.12	1.01	0.89	0.82	0.74
Gilts	1.29	1.17	1.04	0.92	0.85	0.79
Boars	1.29	1.19	1.10	1.01	0.96	0.91
Barrows and Gilts	1.26	1.15	1.02	0.91	0.83	0.76
Boars and Gilts	1.29	1.18	1.07	0.97	0.90	0.85

Wean to finish pigs

Amino Acids

Lysine – example economic tool

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Economic model for optimum lysine for PIC pigs

Input (please fill beige cells)

Gender	Barrows and gilts
Live pig price, \$/cwt	\$62.96
Feeder pig cost, \$/pig	\$44.37
Facility cost, \$/pig/day	\$0.12
Other costs, \$/pig	\$14.00

			Biological requirement		Current diets	
BW, lb		Energy, kcal NE/lb	SID Lys, %	\$/ton	SID Lys, %	\$/ton
50	75	1,150	1.26	\$219	1.18	\$213
75	103	1,167	1.15	\$211	1.07	\$204
103	141	1,180	1.02	\$201	0.96	\$197
141	180	1,185	0.91	\$194	0.86	\$189
180	212	1,195	0.83	\$187	0.78	\$184
212	300	1,182	0.76	\$182	0.72	\$178

Output

% of maximum ADG	100.0%	97.9%
% of maximum feed efficiency	98.7%	96.9%
Net profit difference, \$/pig		
Fixed time (space short)	+ 1.51	- 1.51
Fixed weight (space long)	+ 0.02	- 0.02

Amino Acids

Lysine requirements between PIC lines

- Are there biological differences? Probably yes.
- Are they meaningful? It has been hard to document an economically meaningful difference.

Estimated¹ weighed SID Lys requirement as % of 337:

Dataset	n	337	327	280	380	408	410	280	8.0
1	> 7k	100	99	97	99	98	99	97	---
2	>100k	100	100	97	98	99	---	97	97

¹Estimated using actual ADFI and F/G relative differences for each line and assuming 19 g of SID Lys per kg of gain using 2016 PIC Lys requirement as baseline. Market weight: 290 lb.

Energy and fiber

Effects of dietary NE and NDF levels on growth performance of 30 to 135 kg pigs

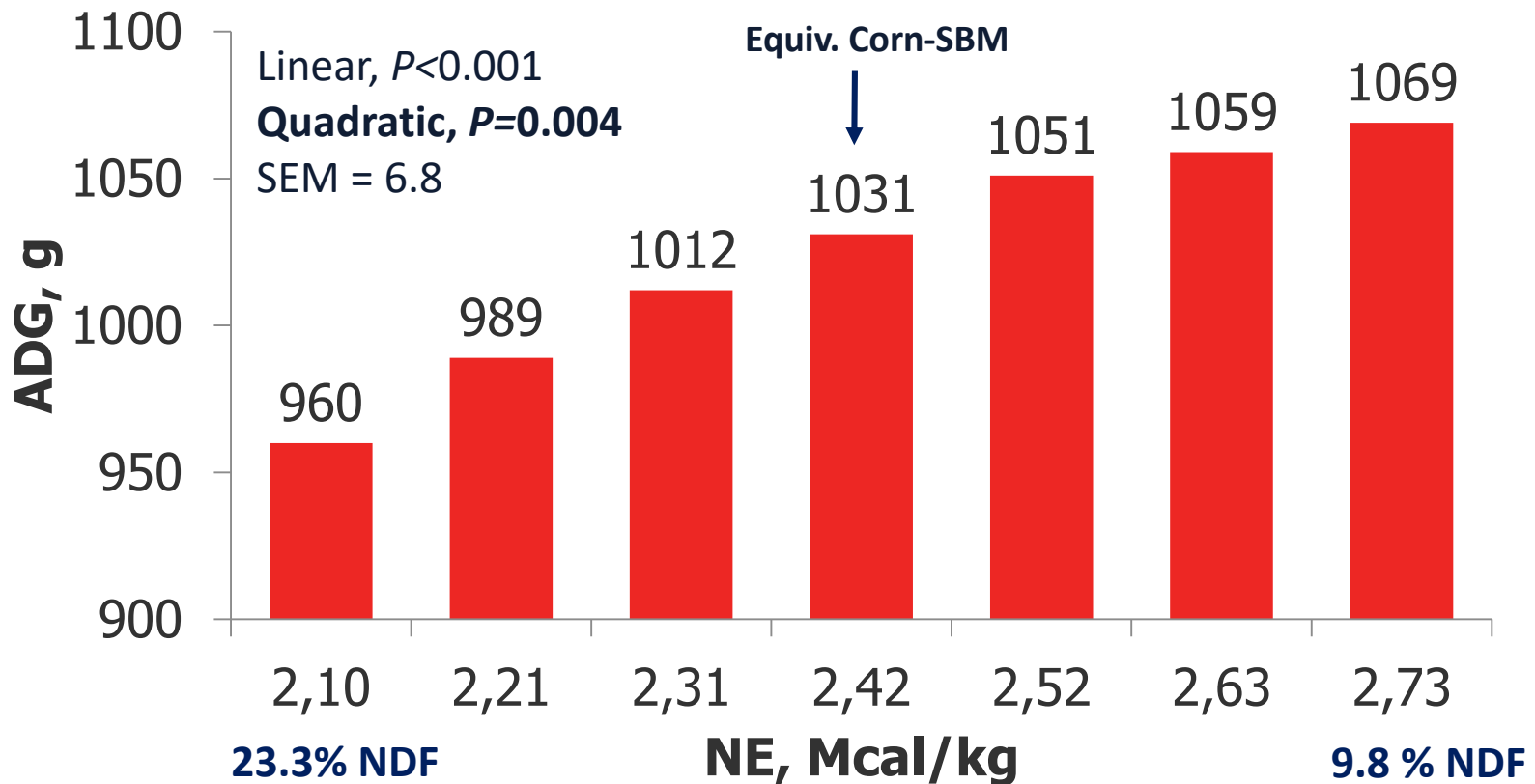
- A total of 2,058 PIC (380 X Camborough) barrows and gilts were used in a 97-d trial.
- SID Lysine:NE ratio kept the same across treatments

Net energy, Mcal/kg	2.11	2.21	2.32	2.42	2.52	2.63	2.73
NDF, %	23.3	20.3	17.2	14.3	12.8	11.3	9.8

Energy and fiber

Effects of NE and NDF on growth performance of 30 to 135 kg pigs

Overall ADG – 30 to 130 kg (d 0-97)

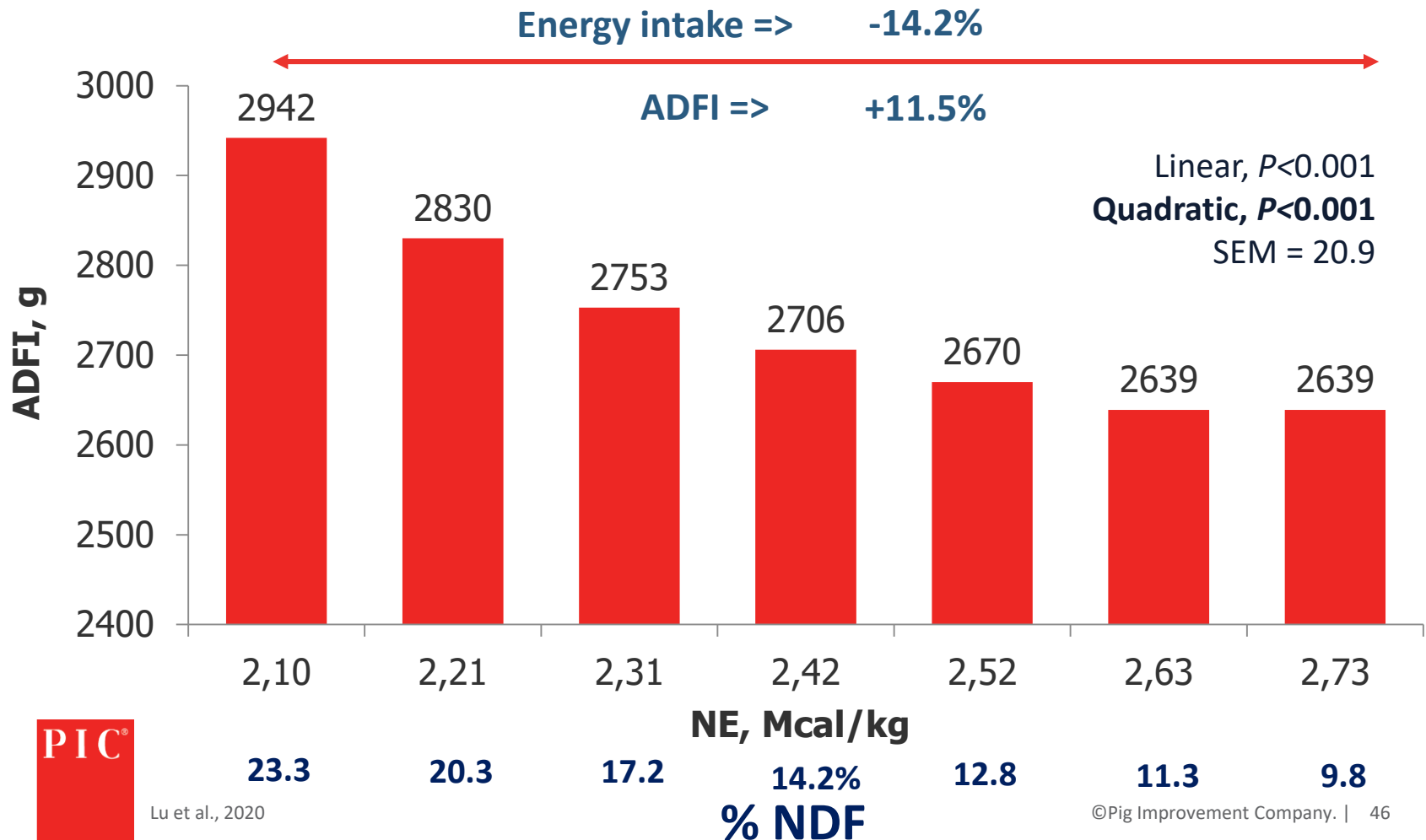


Wean to finish pigs

Energy and fiber

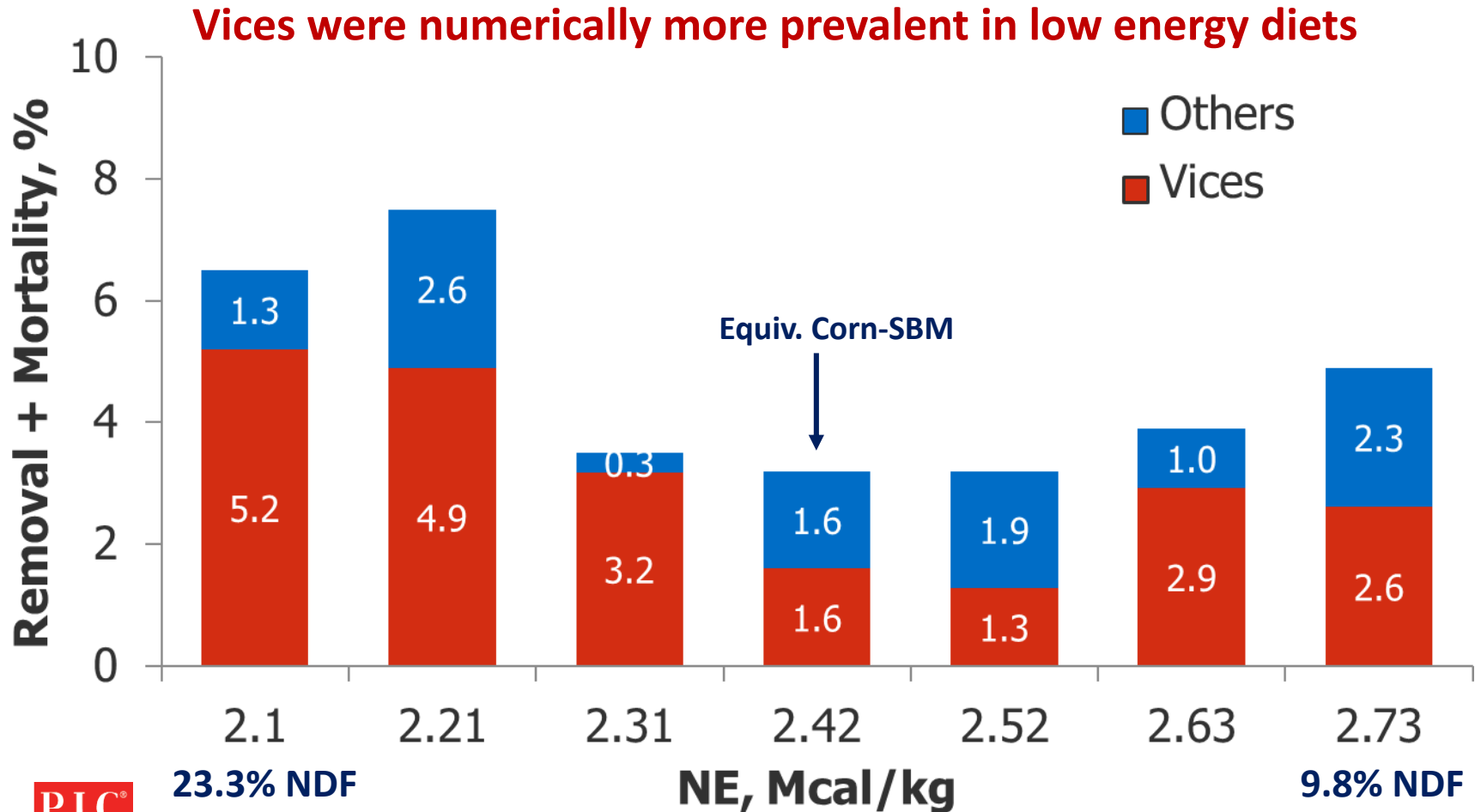
Effects of NE and NDF on growth performance of 30 to 135 kg pigs

Overall ADFI– 30 to 130 kg (d 0-97)

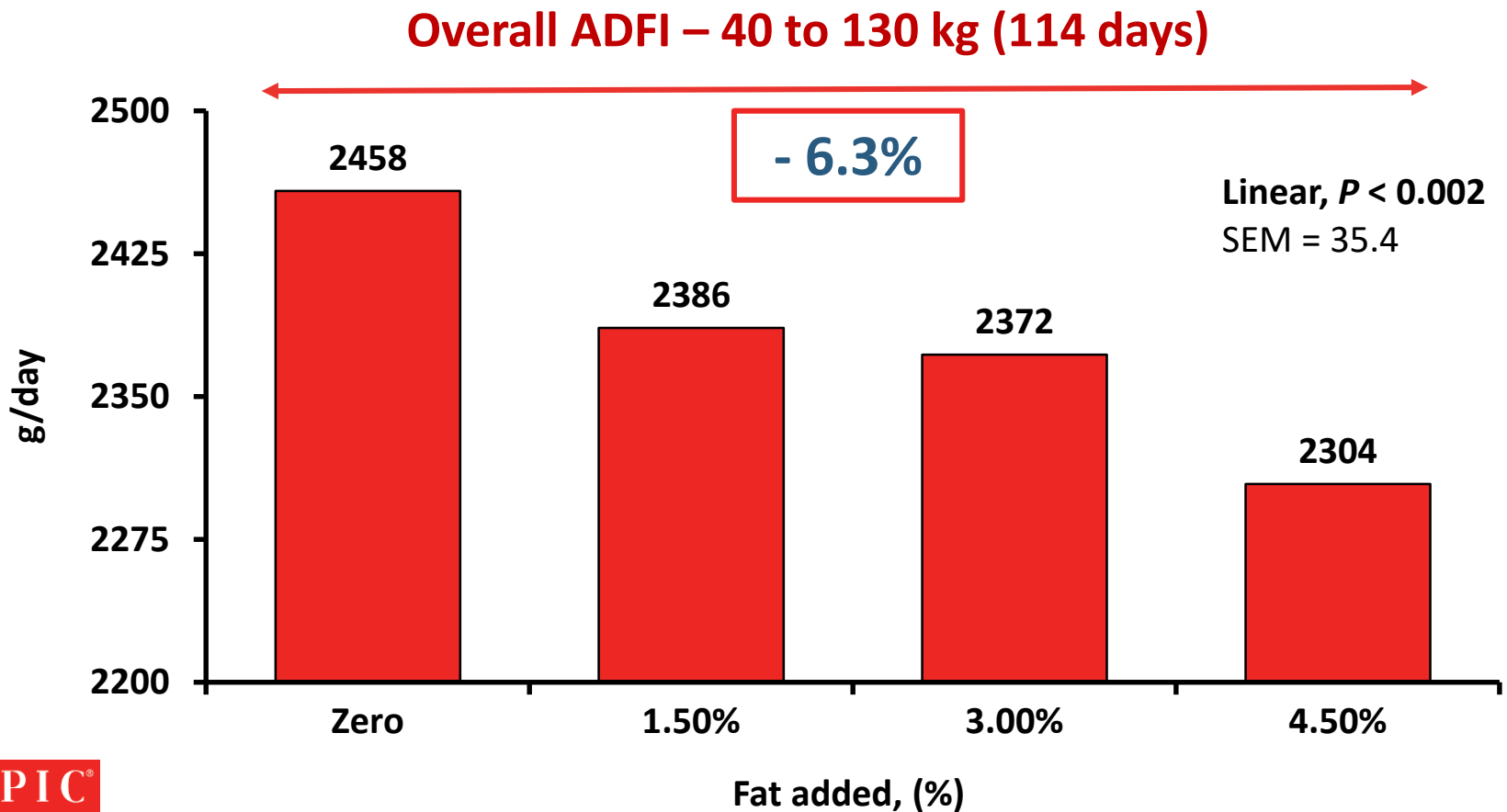


Energy and fiber

Effects of NE and NDF on growth performance of 30 to 135 kg pigs



Effects of added fat on ADFI of grow-finish pigs under commercial conditions



Energy tool

PIC/KSU Optimum Energy Tool

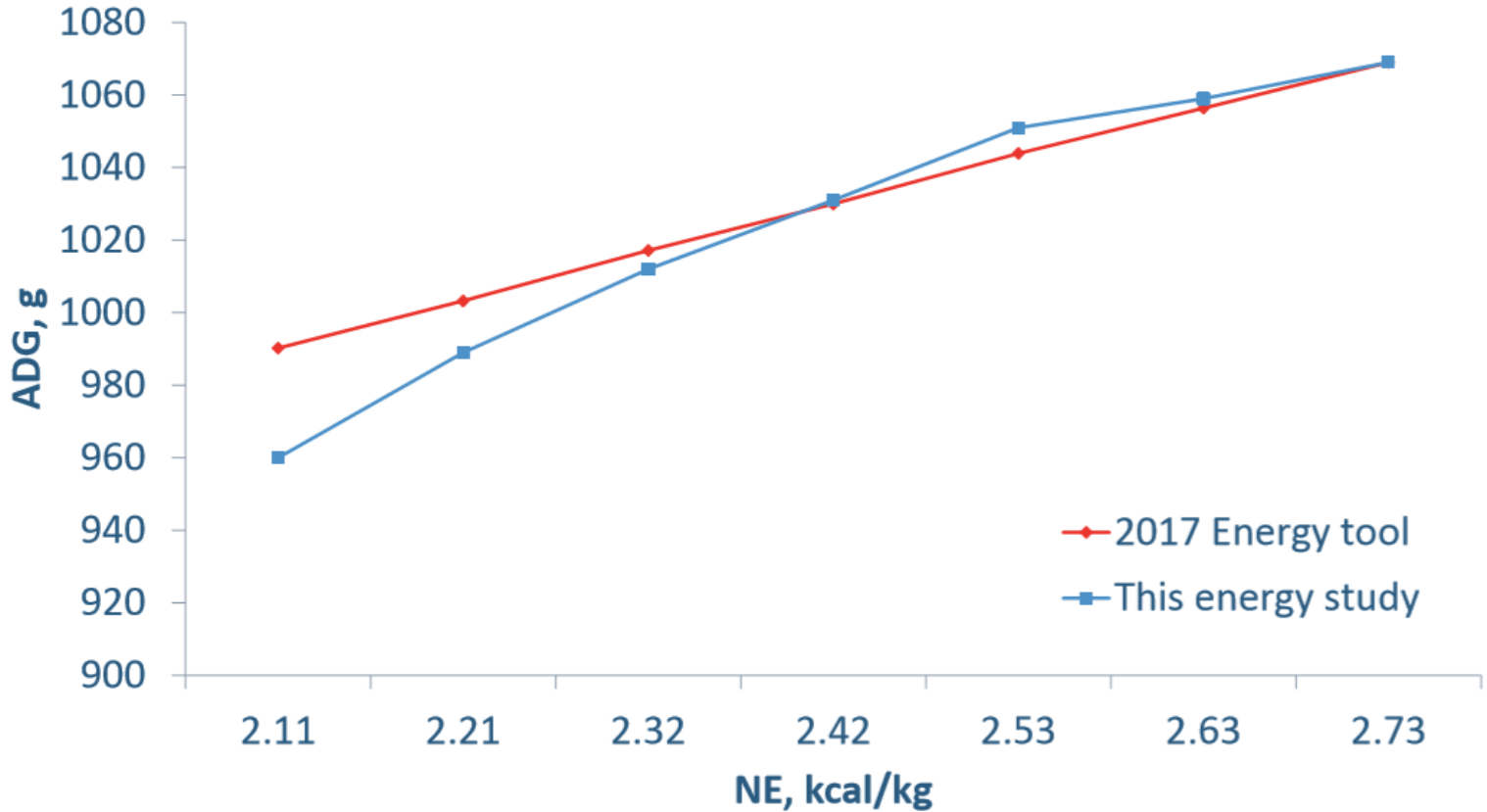
Meta-analysis by Nitikanchana et al. (2015) to predict performance (based on 41 studies)

Meta-analysis by Soto et al. (2016) to predict the NDF impact on carcass yield (based on 8 studies)

Energy tool

ADG Prediction

Above 2.3 Mcal NE/kg (3.06 kcal ME/kg), residual error was 1 gram (-6 g overall)



Energy tool

USA

Live price, \$/lb	0.38
Carcass price, \$/lb	0.50



Dietary Phase	Net energy, Kcal/lb		Change, %
	Current	Recommended ¹	
Ph 1	1,104	1,083	(1.9)
Ph 2	1,122	1,097	(2.3)
Ph 3	1,130	1,110	(1.8)
Ph 4	1,145	1,119	(2.3)
Ph 5	1,150	1,126	(2.1)
Ph 6	1,140	1,140	0.0



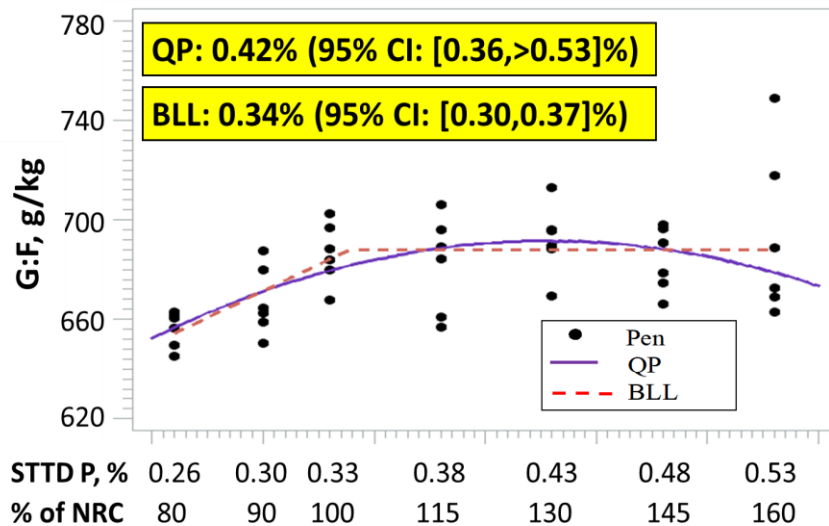
Metrics	Current	Recommended
Total feed cost, \$/pig	53.01	48.37
Total feed cost & facility cost, \$/pig	64.89	60.25
Gross Income, \$/pig	108.30	107.89
IOTC Carcass, \$/pig	-16.29	-12.34
Diff., \$/pig		3.95



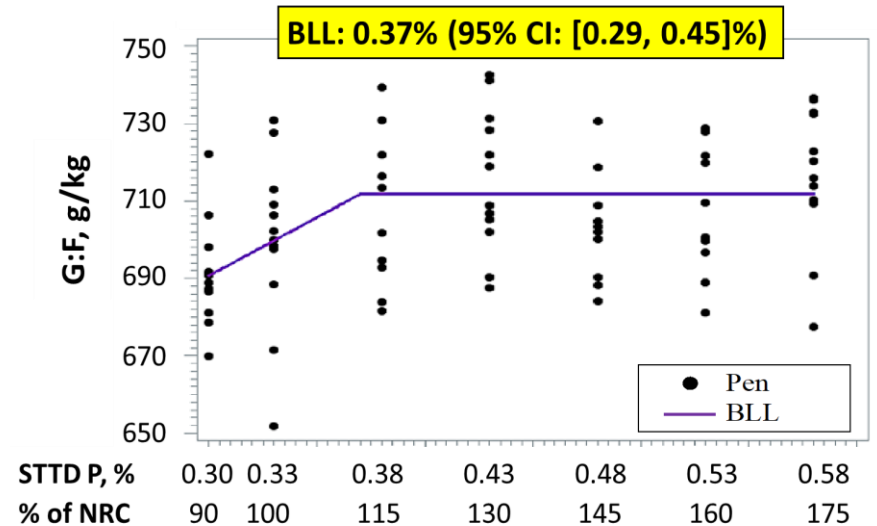
Calcium and phosphorus

Effects of STTD P levels on growth performance of 11- to 23- kg pigs

Exp. 1: Feed Efficiency, 11- to -23-kg pigs, w/o phytase

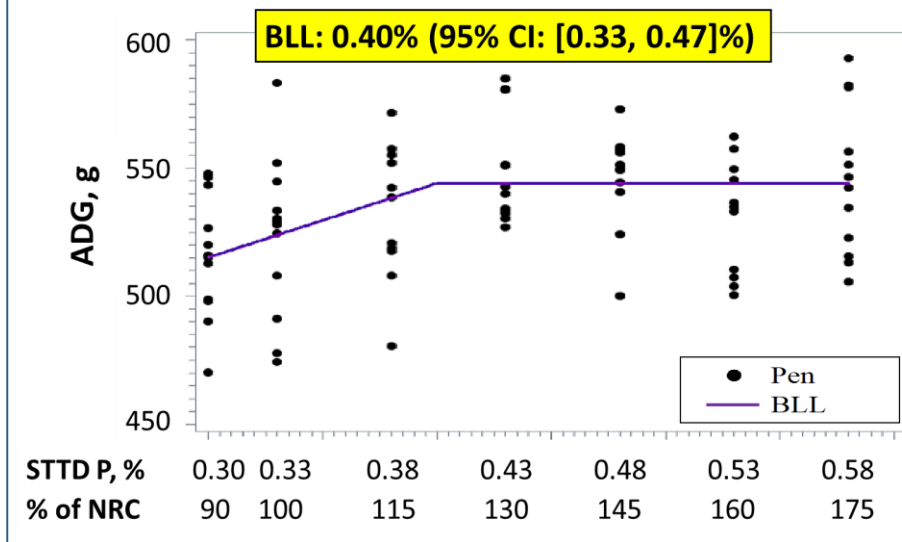


Exp. 2: Feed Efficiency, 11- to -23-kg pigs, w/ phytase

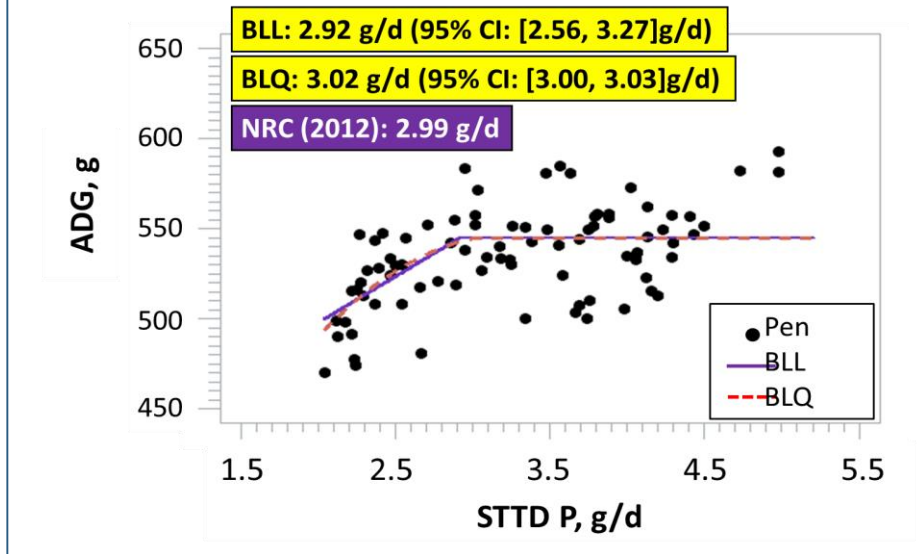


Effects of STTD P levels on growth performance of 11- to 23- kg pigs

Exp. 2: Average Daily Gain, 11- to -23-kg pigs, w/ phytase



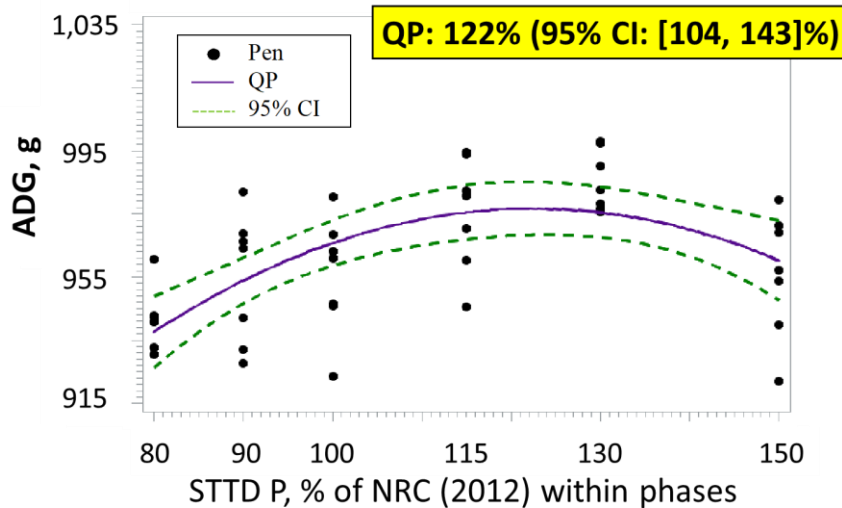
Exp. 2: Average Daily Gain, 11- to -23-kg pigs, w/ phytase



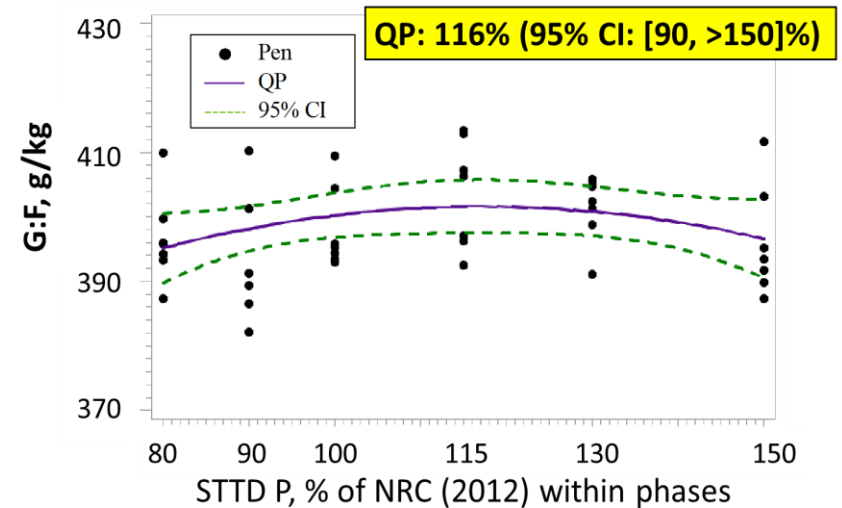
Calcium and phosphorus

Effects of STTD P levels on growth performance of 24- to 130- kg pigs

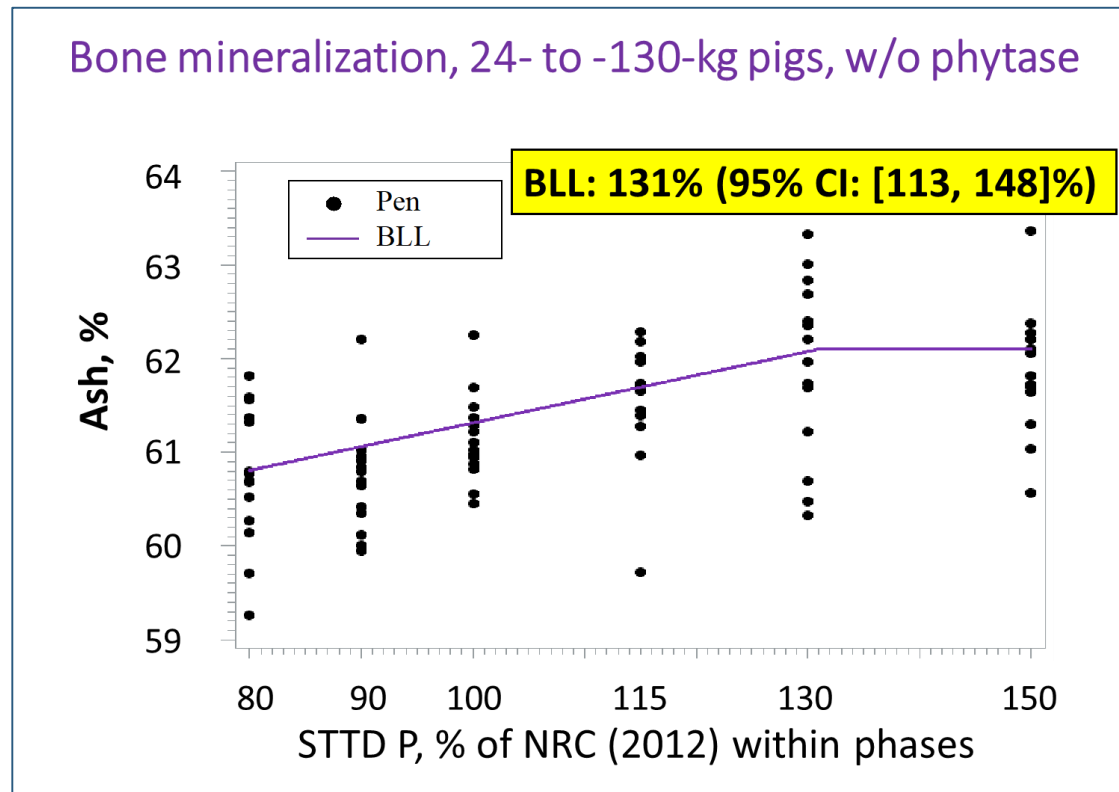
Average daily gain, 24- to -130-kg pigs, w/o phytase



Feed efficiency, 24- to -130-kg pigs, w/o phytase



Effects of STTD P levels on growth performance of 24- to 130- kg pigs



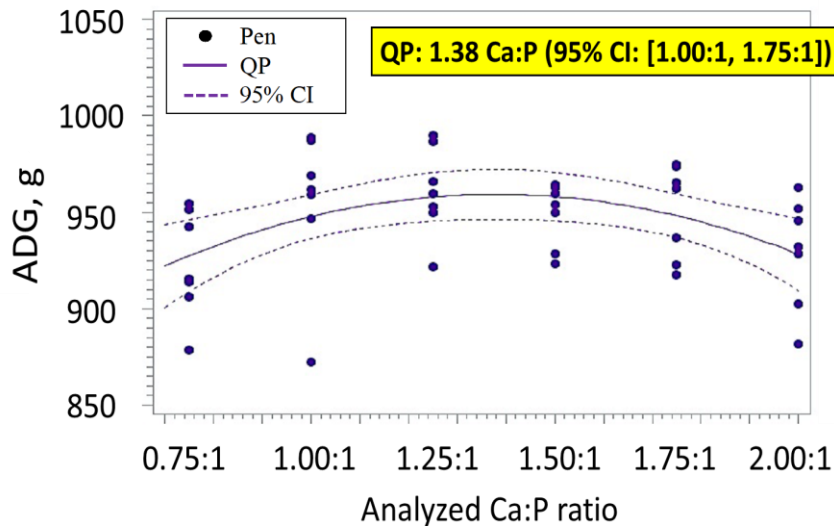
Wean to finish pigs

Calcium and phosphorus

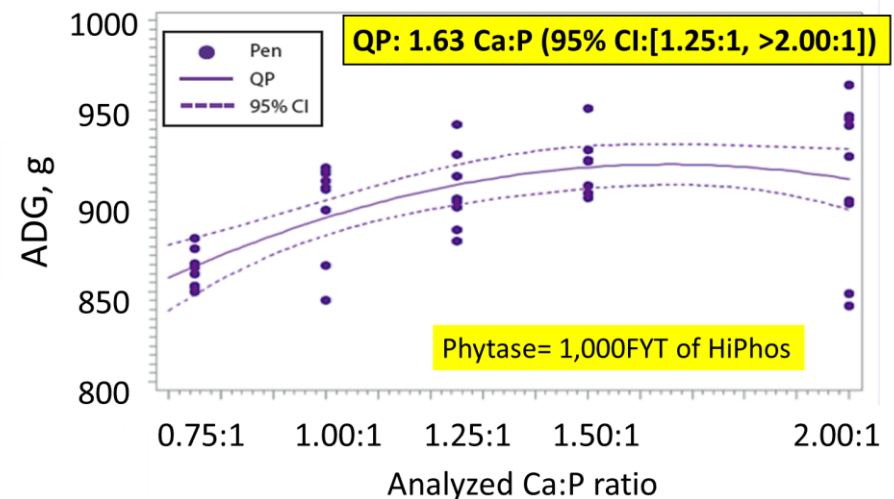


Calcium to phosphorus ratio requirement of 26- to 127-kg pigs

Exp. 1 Average Daily Gain, 26- to -127-kg pigs, w/o phytase



Exp. 2 Average Daily Gain, 26- to -127-kg pigs, w/ phytase

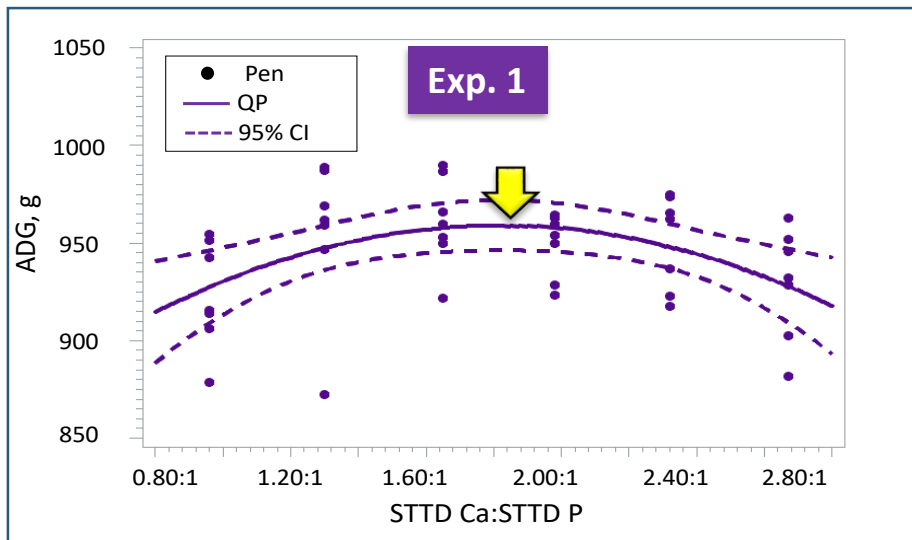


Calcium and phosphorus

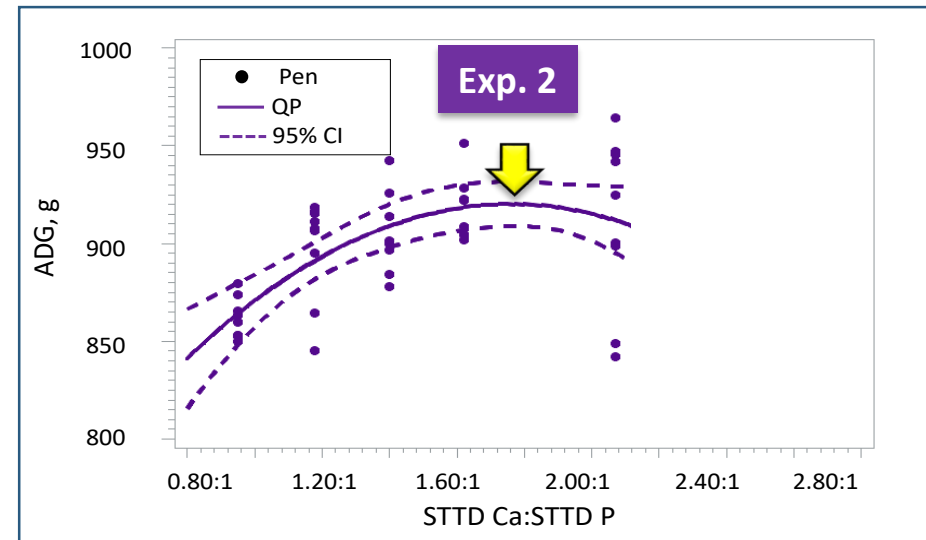
Calcium to phosphorus ratio requirement of 26- to 127-kg pigs

**QP: 1.75:1 STTD Ca:STTD P
(95%CI:1.40:1,>2.07:1)**

**QP: 1.82:1 STTD Ca:STTD P
(95% CI: 1.30:1,2.31:1)**



Bone: 99.5%



Bone: 100%

Updated STTD Phosphorus requirements, %

Item	Body weight, kg				
	23-41	41-59	59-82	82-104	104-129
Terminal Gilts					
PIC2016	0.33	0.30	0.28	0.26	0.24
PIC2020	0.40	0.37	0.33	0.29	0.25
Barrows					
PIC2016	0.33	0.30	0.27	0.25	0.24
PIC2020	0.37	0.34	0.31	0.28	0.24
Replacement Gilts					
PIC2016	0.35	0.35	0.35	0.35	0.35
PIC2020	0.42	0.38	0.34	0.30	0.26



STTD: Standardized Total Tract Digestible

Updated Available Phosphorus requirements, %

Item	Body weight, kg				
	23-41	41-59	59-82	82-104	104-129
Terminal Gilts					
PIC2016	0.30	0.28	0.26	0.25	0.24
PIC2020	0.34	0.31	0.28	0.24	0.22
Barrows					
PIC2016	0.30	0.28	0.26	0.25	0.24
PIC2020	0.32	0.29	0.26	0.23	0.21
Replacement Gilts					
PIC2016	0.35	0.35	0.35	0.35	0.35
PIC2020	0.35	0.32	0.29	0.25	0.23

Phosphorus - example economic STTD P tool



Economic model for optimum phosphorus levels

PIC

Input (please fill yellow cells)

Economic evaluation criteria	Carcass
Carcass price, \$/kg	\$1.43
Current carcass yield, %	73.4
Facility cost, \$/pig/day	\$0.12
Number of phases	6

	Current diets				Maximal growth		
	BW, kg		Energy, kcal NE/kg	STTD P, %	\$/ton	STTD P, %	\$/ton
Phase 1	25.0	34.0	2,425	0.33	\$173.65	0.40	\$174.03
Phase 2	34.0	50.0	2,449	0.30	\$166.98	0.37	\$167.22
Phase 3	50.0	64.0	2,482	0.27	\$160.96	0.34	\$161.15
Phase 4	64.0	84.0	2,509	0.26	\$155.51	0.31	\$155.65
Phase 5	84.0	107.0	2,549	0.23	\$153.23	0.28	\$153.32
Phase 6	107.0	129.0	2,564	0.21	\$152.78	0.25	\$152.92

PIC

Vier et al., 2017

Calcium and phosphorus

Phosphorus - example economic STTD P tool

Low carcass value
\$1.08/kg

Moderate carcass value
\$1.43/kg

High carcass value
\$1.81/kg

Economics Output

Net profit difference between maximal growth and current diets, \$/pig

Fixed Weight (space long)

IOFFC **-\$0.07**

Fixed Time (space short)

IOFC **\$0.18**

Economics Output

Net profit difference between maximal growth and current diets, \$/pig

Fixed Weight (space long)

IOFFC **-\$0.07**

Fixed Time (space short)

IOFC **\$0.36**

Economics Output

Net profit difference between maximal growth and current diets, \$/pig

Fixed Weight (space long)

IOFFC **-\$0.07**

Fixed Time (space short)

IOFC **\$0.57**

Worth **\$0.18/pig**
on a fixed time
situation

Worth **\$0.36/pig**
on a fixed time
situation

Worth **\$0.57/pig**
on a fixed time
situation

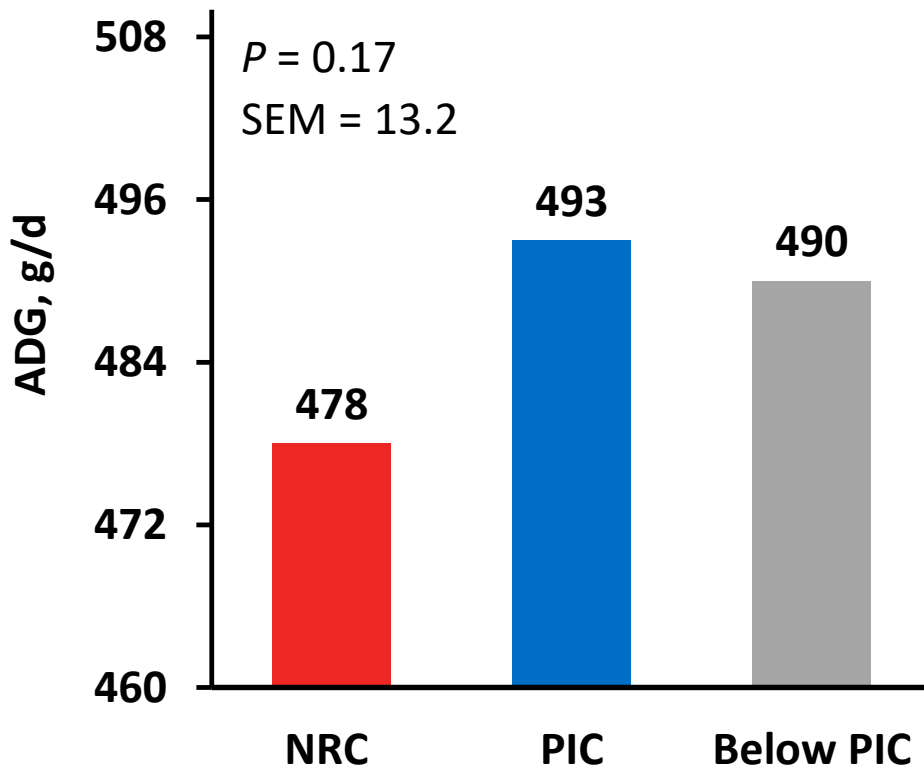
Effects of different added vitamin levels on growth performance of 5 to 130 kg pigs

- A total of 900 PIC (PIC337 X Camborough) barrows and gilts

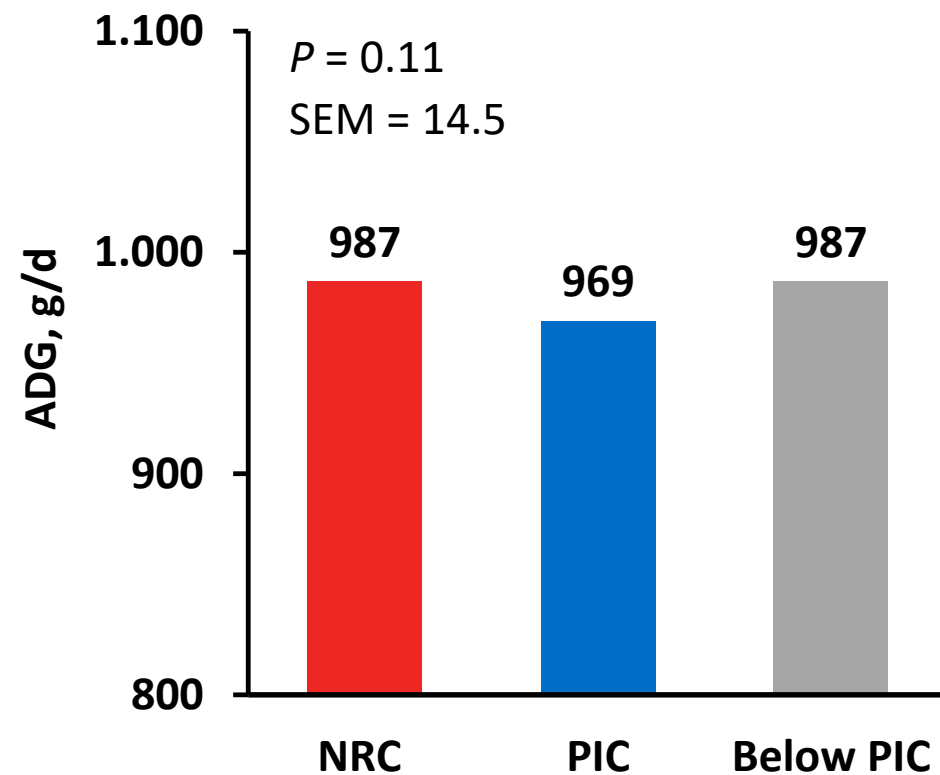
Treatment	NRC		PIC 2016			Below PIC 2016		
	11-55	55 - 287	11-55	55 - 176	176 - 287	11-55	55 - 176	176 - 287
Bodyweight range, lb								
Vitamin A, IU	2200	1300	11025	6615	5510	4200	2800	2800
Vitamin D ₃ , IU	220	150	1765	1215	1015	1600	800	640
Vitamin E, IU	16	11	85	33	28	16	11	11
Vitamin K, mg	0.5	0.5	5.5	3.3	2.8	3.0	1.5	1.2
Thiamin, mg	1.0	1.0	3.5					
Riboflavin, mg	3.5	2.0	13.0	5.7	4.9	8.0	4.0	3.0
Pyridoxine, mg	7.0	1.0	7.0					
Vitamin B ₁₂ , µg	17.5	5	0.055	0.026	0.022	0.039	0.019	0.015
Niacin, mg	30	30	70	40	31	50	25	20
d-Pantothenic acid, mg	10	7	40	20	17	28	14	11
Folic acid, mg	0.3	0.3	1.05					
Biotin, mg	0.05	0.05	0.275					

Effects of different added vitamin levels on growth performance of 5 to 130 kg pigs

5- to- 26 kg




26- to- 130 kg



Updated vitamin recommendations

Treatment	NRC		PIC 2016			Below PIC 2016		
	11-55	55 - 287	11-55	55 - 176	176 - 287	11-55	55 - 176	176 - 287
Bodyweight range, lb								
Vitamin A, IU	2200	1300	11025	6615	5510	4200	2800	2800
Vitamin D ₃ , IU	220	150	1765	1215	1015	1600	800	640
Vitamin E, IU	16	11	85	33	28	16	11	11
Vitamin K, mg	0.5	0.5	5.5	3.3	2.8	3.0	1.5	1.2
Thiamin, mg	1.0	1.0	3.5					
Riboflavin, mg	3.5	2.0	13.0	5.7	4.9	8.0	4.0	3.0
Pyridoxine, mg	7.0	1.0	7.0					
Vitamin B ₁₂ , µg	17.5	5	0.055	0.026	0.022	0.039	0.019	0.015
Niacin, mg	30	30	70	40	31	50	25	20
d-Pantothenic acid, mg	10	7	40	20	17	28	14	11
Folic acid, mg	0.3	0.3	1.05					
Biotin, mg	0.05	0.05	0.275					

A woman with dark hair tied back, wearing a white lab coat with a red PIC logo on the chest, is kneeling on a wooden slatted floor in a pigpen. She is surrounded by numerous small, pink piglets. The background shows metal railings and a concrete wall. The overall scene is brightly lit, suggesting an indoor farm environment.

Thank you!
PIC Global Nutrition Team

PIC[®]