Optimizing the Nutrition Program

Carthage Conference 2025

Casey Neill

CARTHAGE
INNOVATIVE SWINE SOLUTIONS

Take home messages for Optimizing Nutrition

1. Many Factors affect the nutrition program
   - Genetics, Health, Temperature, Market Prices
2. Sow Nutrition
   - Understanding nutrition requirements and feed intake
3. Grow-Finish
   - Lysine Levels
   - Feed Budgets
   - Additives

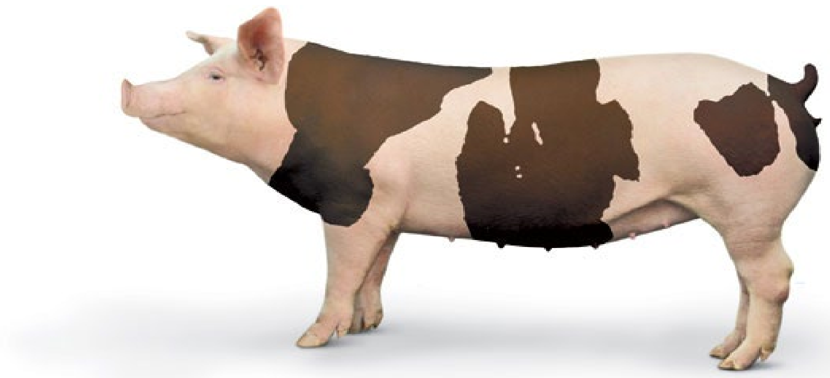
CARTHAGE NUTRITION PRESCRIBED

Quick!

Pick the most productive milker

Milk production

- Holstein dairy cow produces 75 lbs (34 kgs) of milk per day. (Holstein Association)
- 1500 lbs (680 kgs)
- 0.05 lbs of milk per lb of body weight
- Sow can produce 25 lbs (11.3 kgs) of milk per day (porkgateway.com)
- 450 lbs (204 kgs)
- 0.055 lbs of milk per lb of body weigh



Changes in Energy & AA req'ts

Modern Sows need more Energy and AA:

- More for maintenance: sows are larger & leaner
- More for maternal growth: quicker growth to reach mature size
- More for fetal growth: larger litters

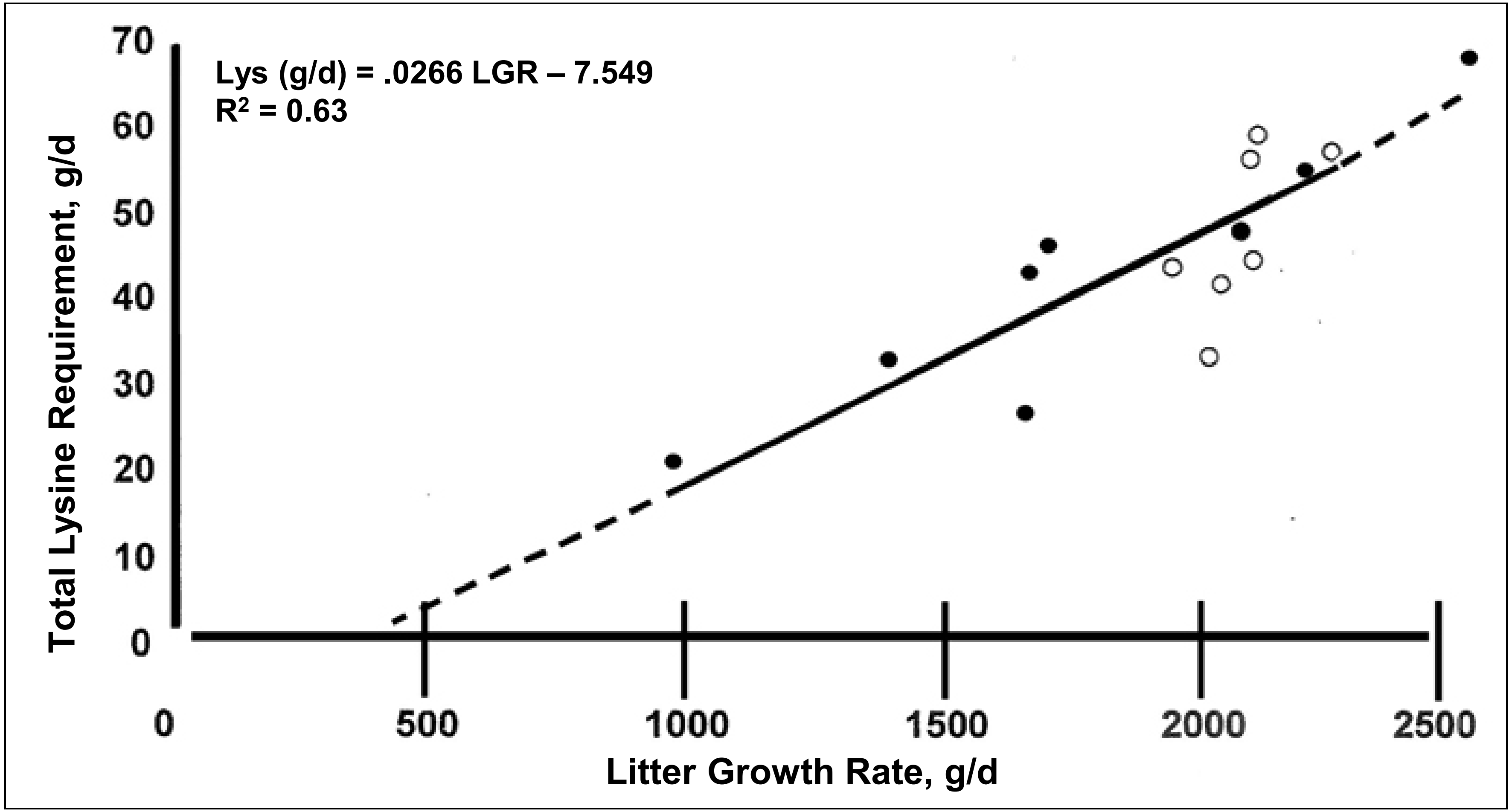
Inadequate Sow Energy & Amino Acid nutrition may:

- Impair body reserves for lactation
- Impair re-breeding
- Reduce longevity & increase death loss
  - > increased replacement costs
- Increase litter variation
  - Reduced income

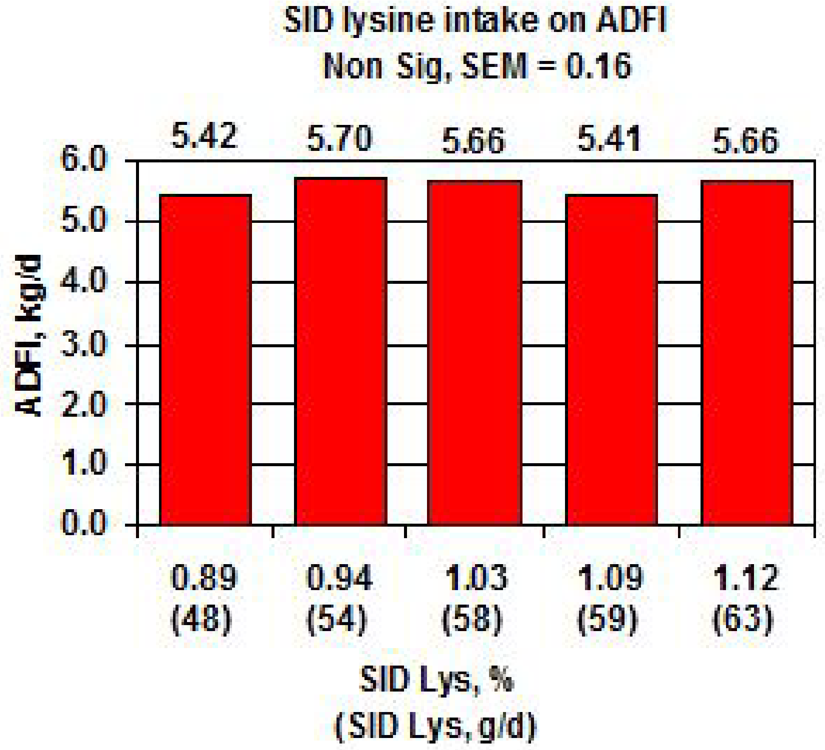
Ron Ball

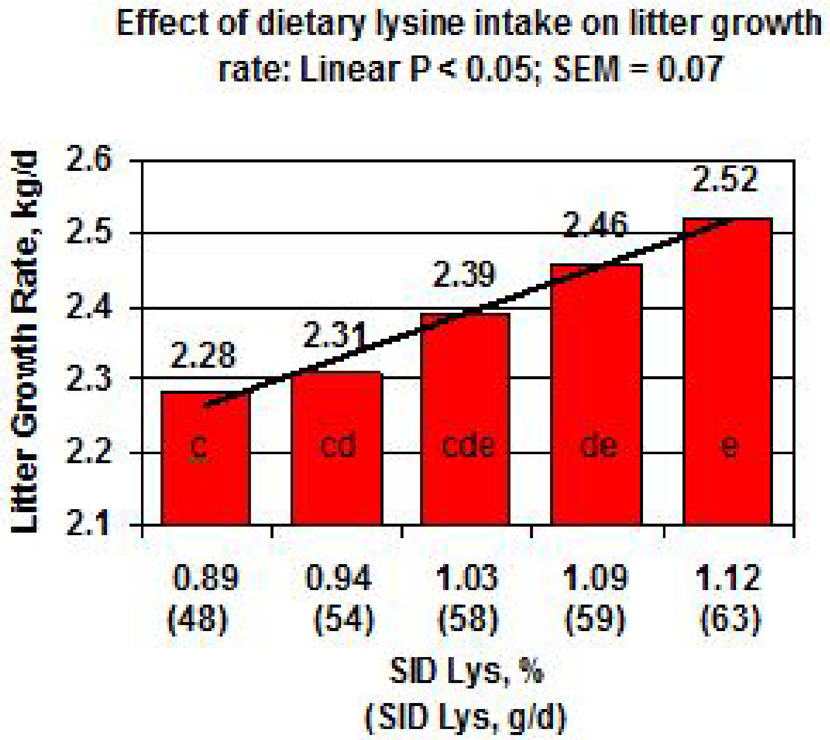
Lysine Requirement of Lactating Sows in Relation to Litter Growth

Boyd et al., 2000 (updated Pettigrew 1993)



SID Lysine Requirement in P1 Gilts





- Linear improvements in Litter Growth Rate and Piglet ADG were observed with no significant changes to reproductive performance
- 1.12% SID Lysine (63 g/d) showed the greatest performance, which is much higher than NRC 1998 recommendation of 0.87% SID Lysine

Lactation Intake Level

Clear intake difference among parities

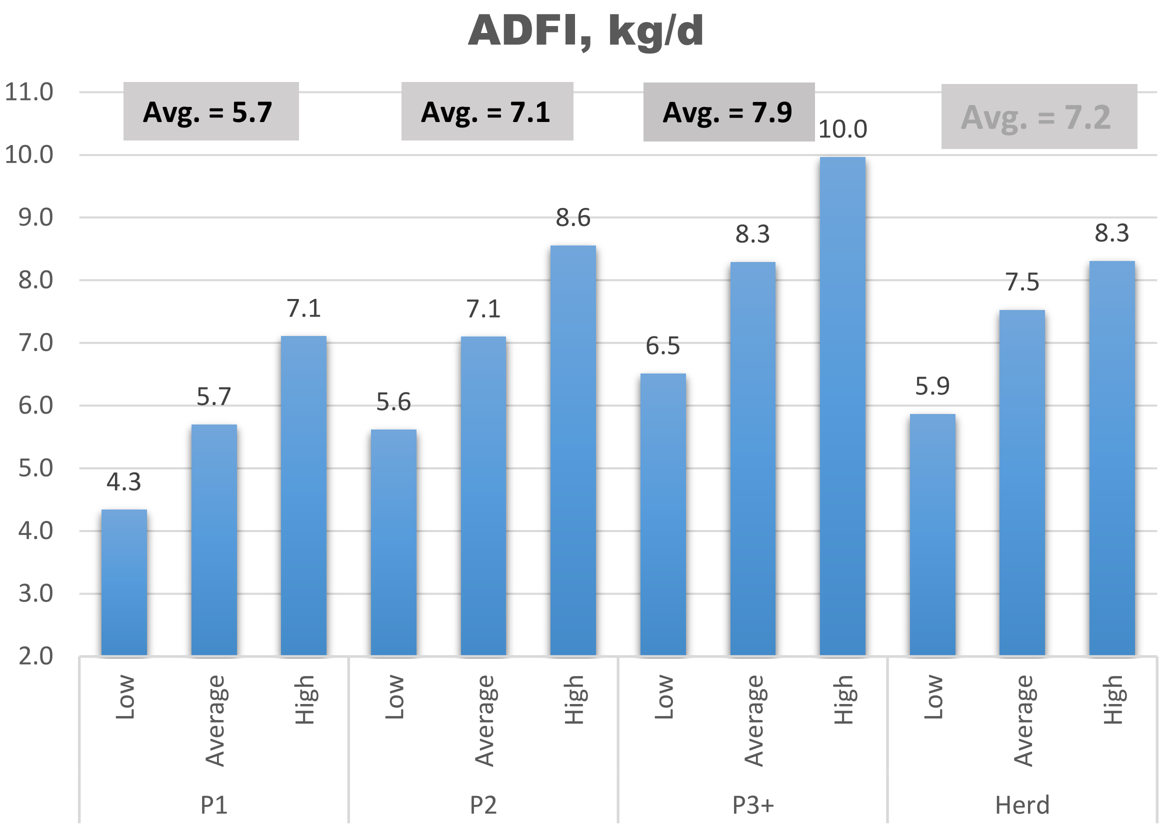
- P1 = 5.7 kg/d (12.5 lbs)
- P2 = 7.1 kg/d (15.6 lbs)
- P3+ = 7.9 kg/d (17.4 lbs)

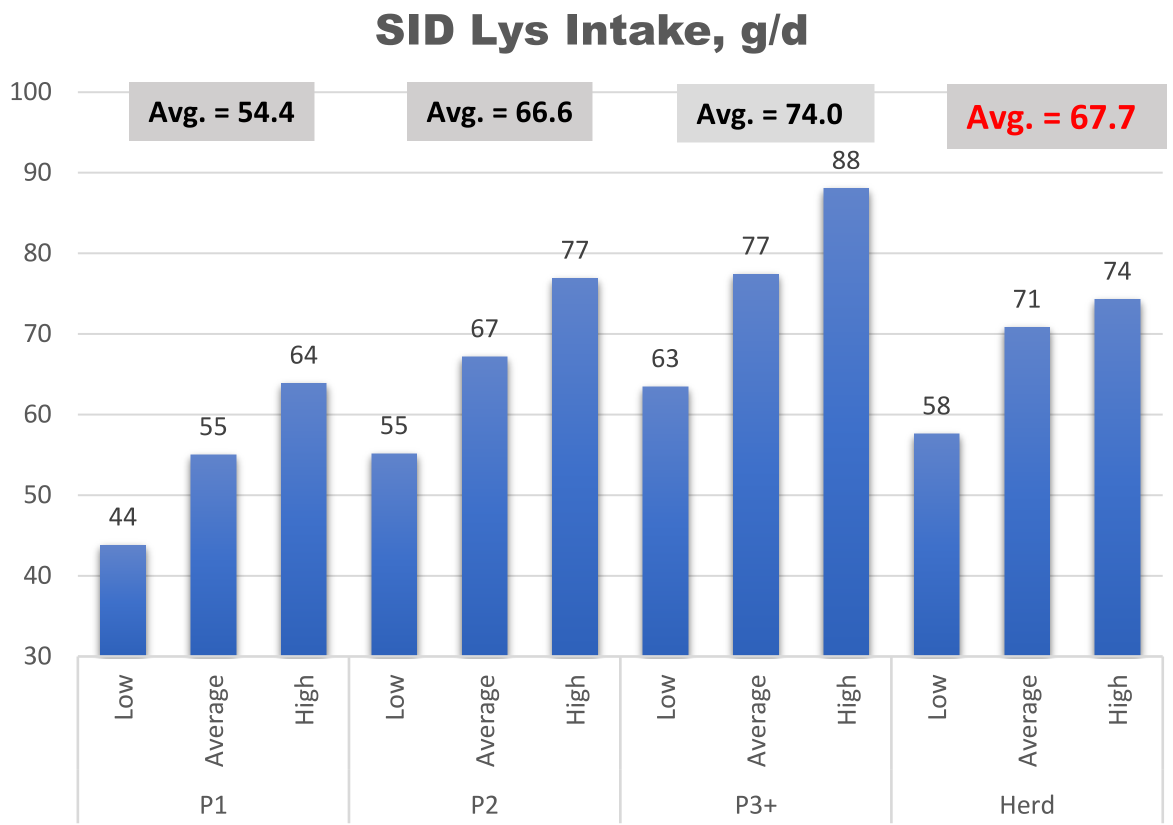
Understanding Intake Level within parity category

- Low intake – Quartile 1 (≤ 25%)
- Average Intake – Quartile 2-3
- High Intake – Quartile 4 (≥ 75%)

Over 3,500 sow feed intake records

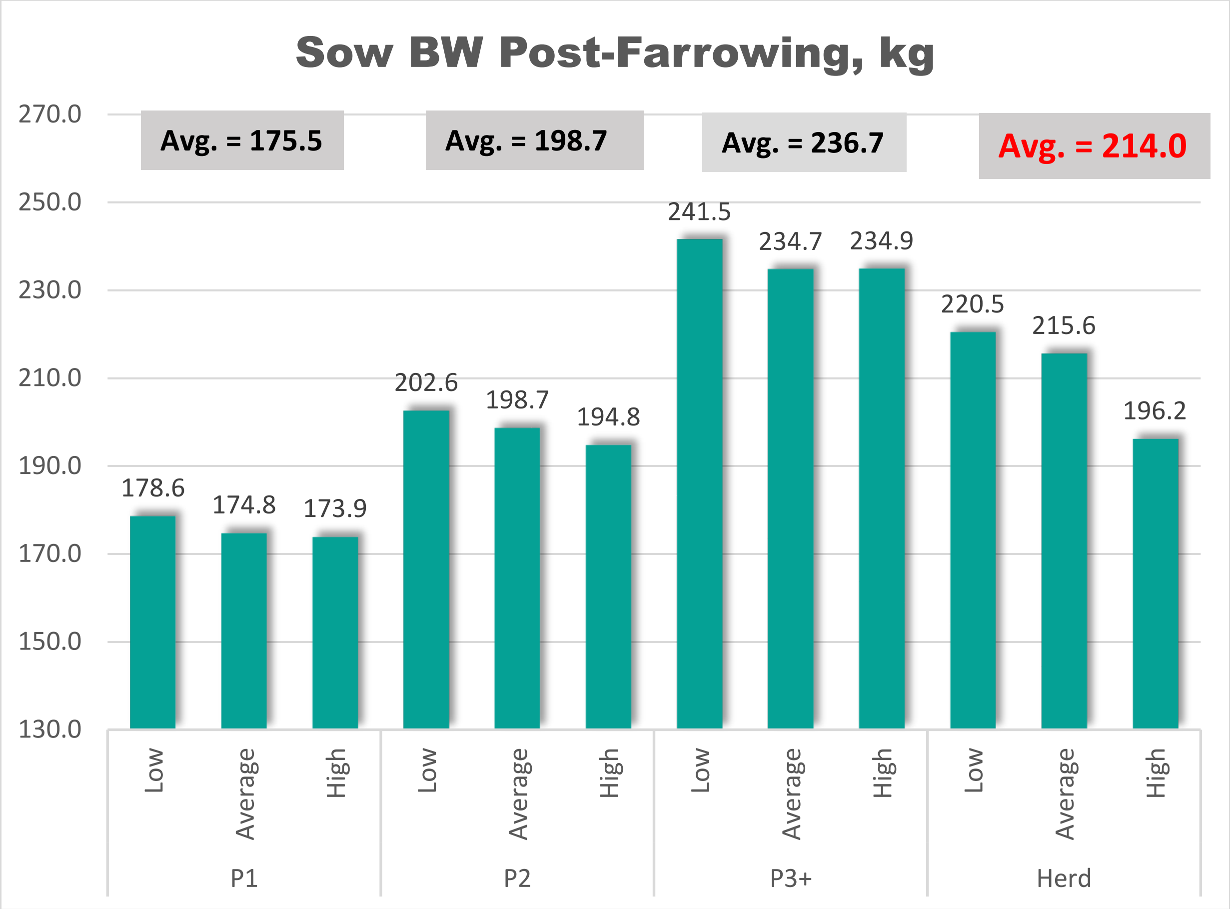
Up to 40% Variation in ADFI and 30% in Lys Intake

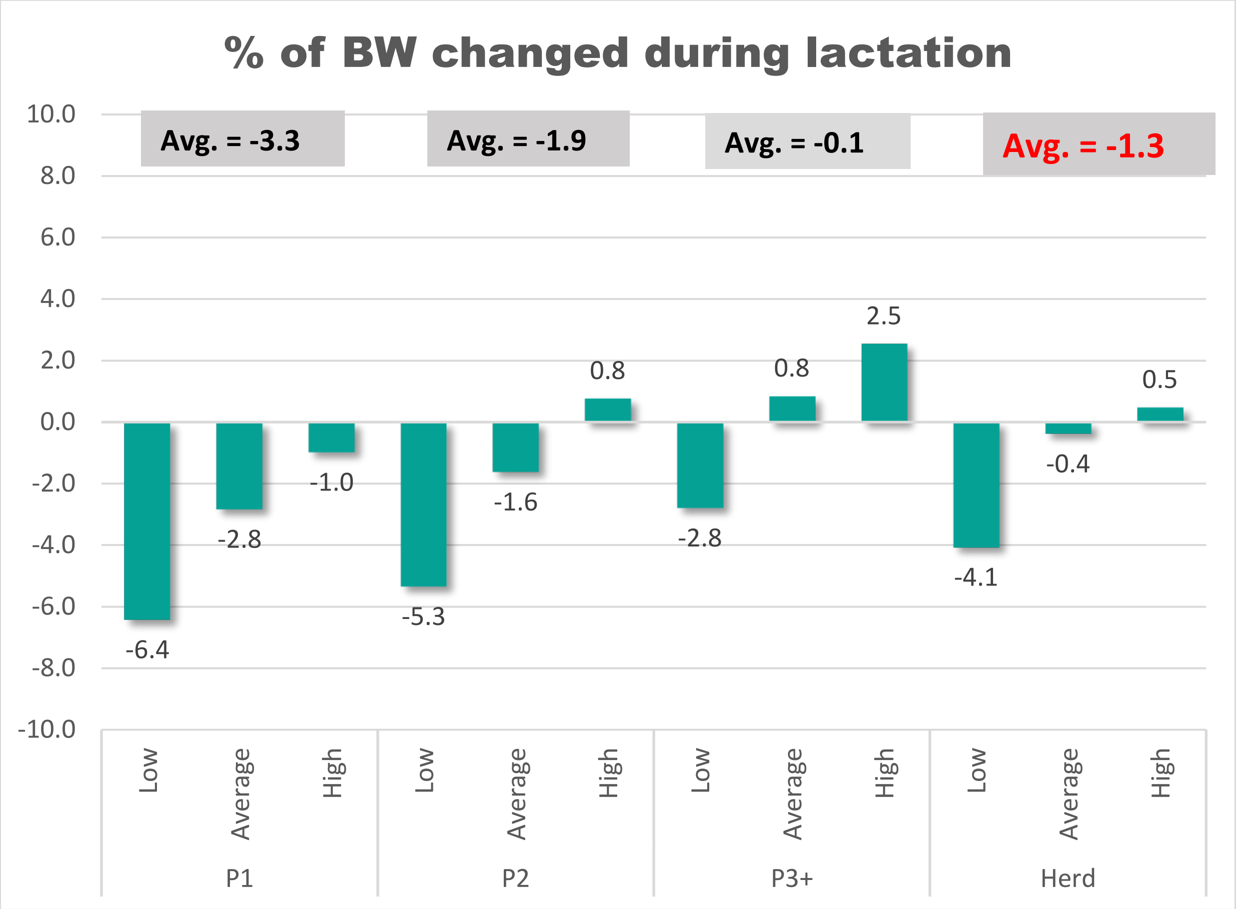




Jorge Estrada presenter

Heaviest Sows Had the Lowest ADFI and Lost More Condition Over Lactation



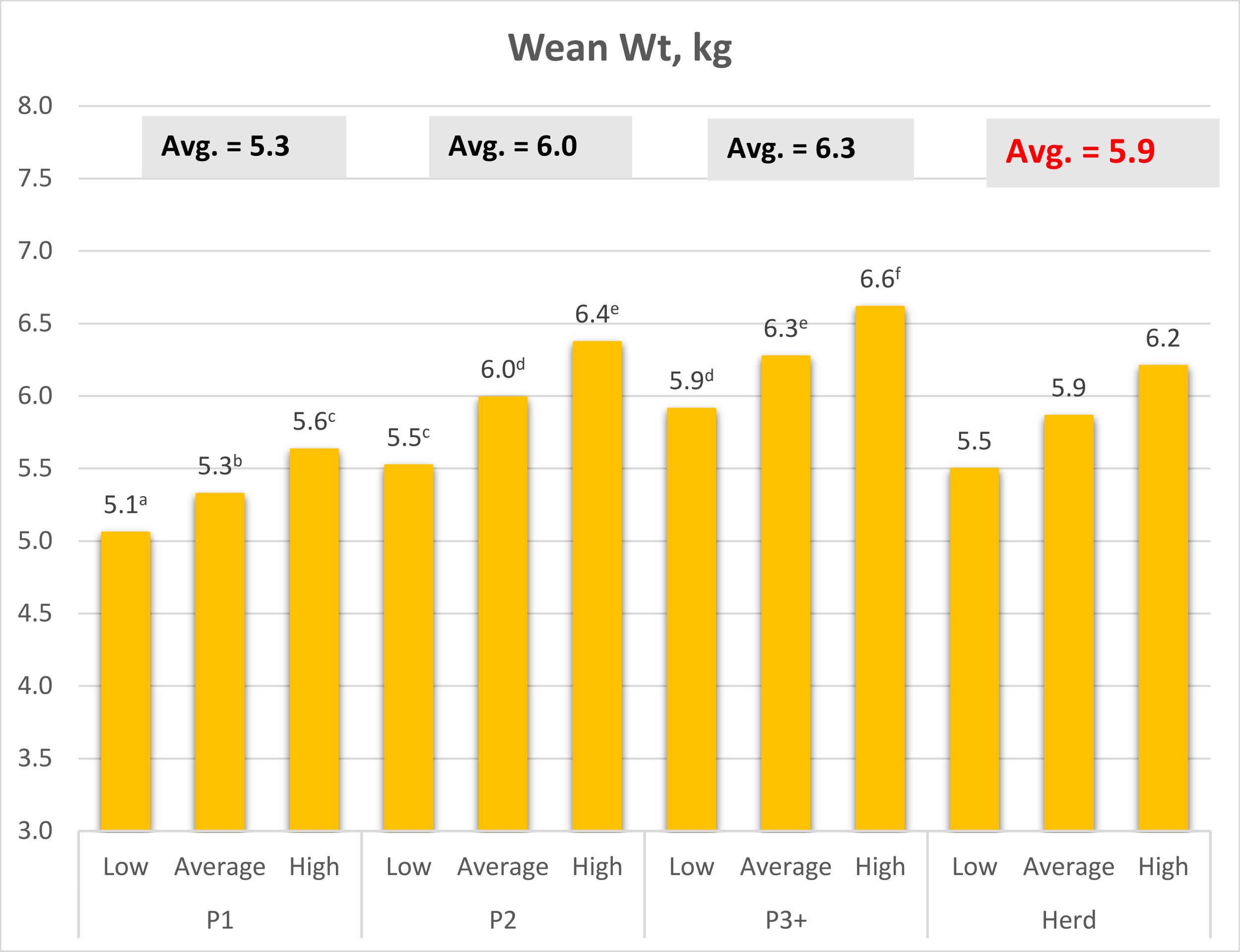


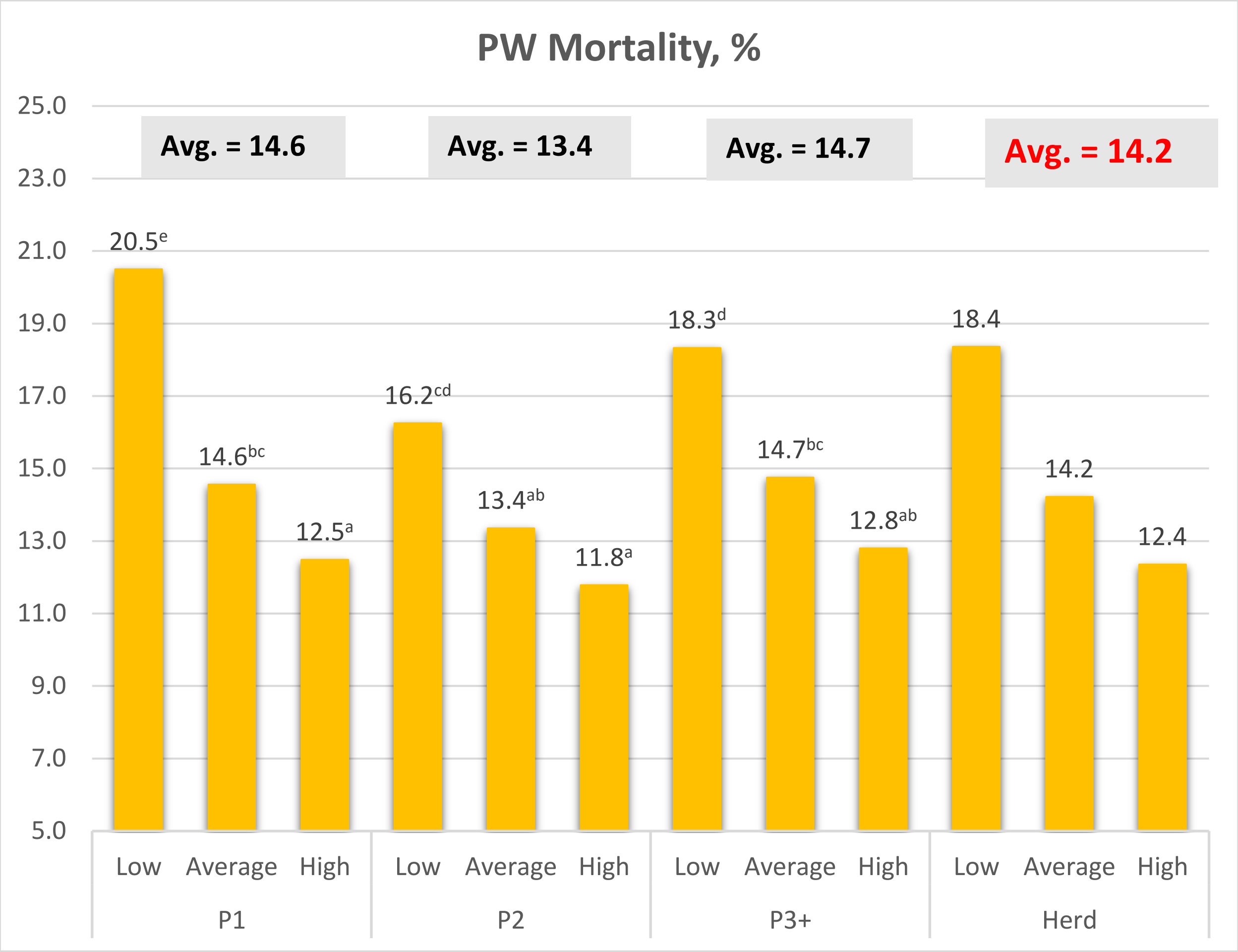
Caliper Units Change	-2.6	-2.3	-2.0	-1.5	-0.9	-0.2	-0.3	0.3	0.6	-1.0	-0.4	-0.7

Lightest sows within parity category have higher feed intake and lose less BW

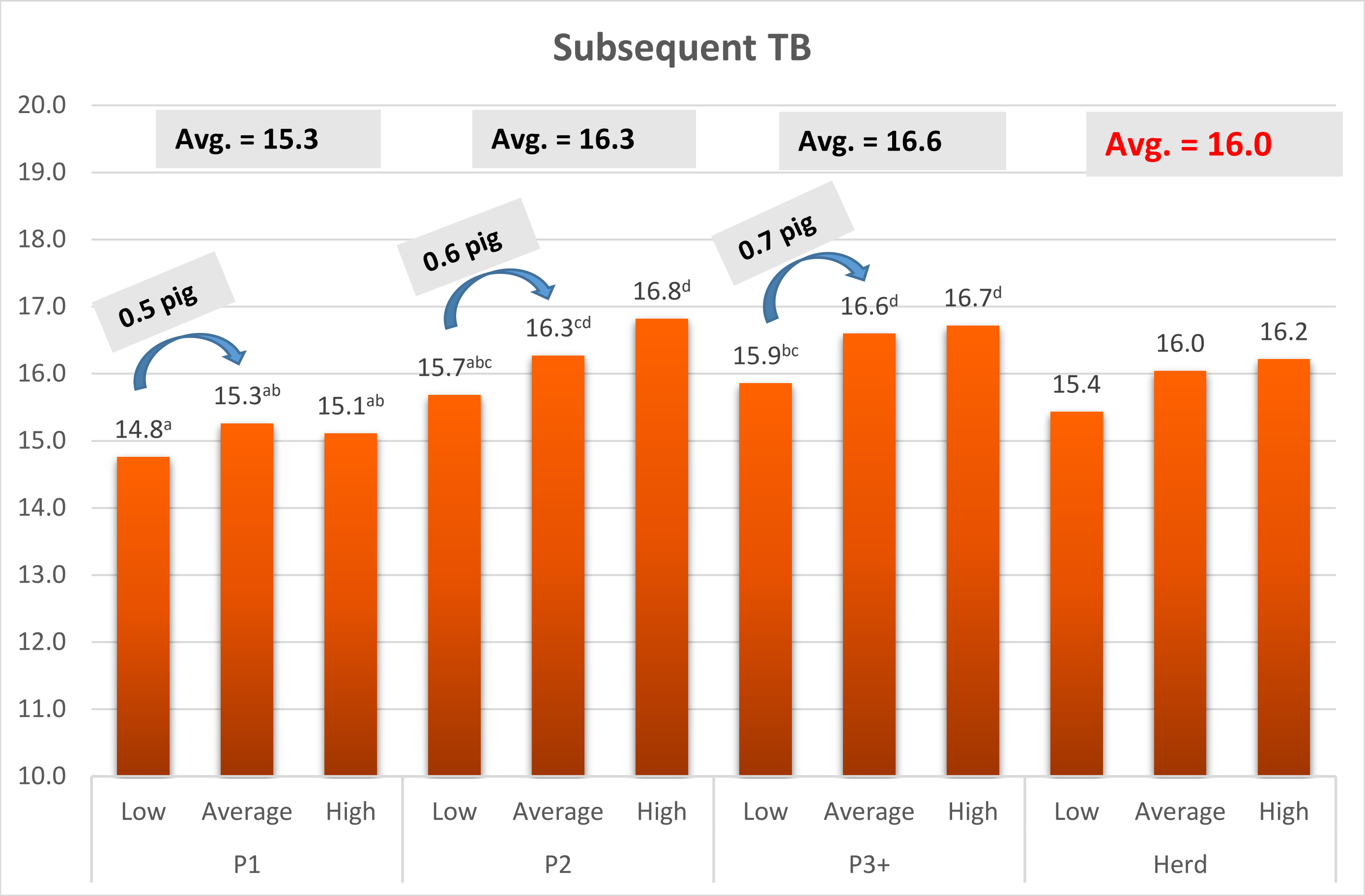
CVS

Low Feed Intake ↓0.4 kg WW & ↑4.2 Points PWM



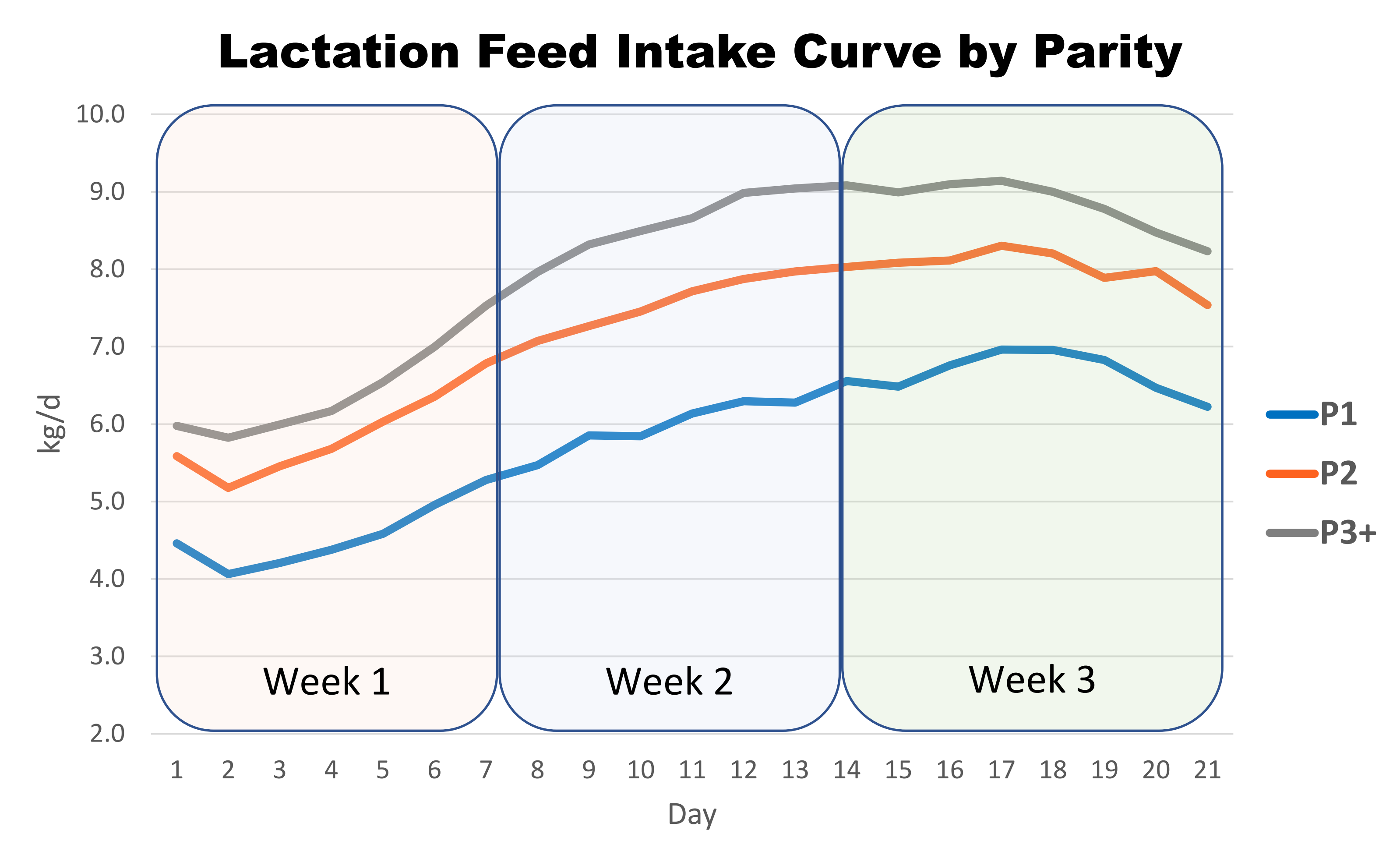


Low Feed Intake Resulted in Minus 0.6 pigs TB



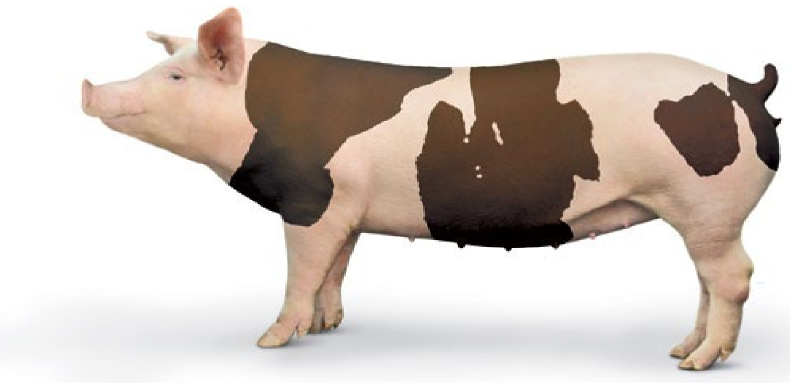
- ~0.6 pig opportunity for sows with low feed intake
- How to close the gap?
  - Management
  - Treatment
  - Diet design
  - Water intake

Effect of Level/Week on Performance



Sow Nutrition

- Sow farm is the work horse and through put is very important.
- Lactation Feed Intake is important for so many reasons.
- Under feeding amino acids in lactation will cost you in several areas.
- To maximum your nutrition program all teams must work together. (Production, Vet,
  - Nutritionist, Owner, etc)



Grow Finish

Liquid Feeding - Snackers

Impact of increasing standardized ileal digestible (SID) lysine:energy ratios on growth performance in late finishing

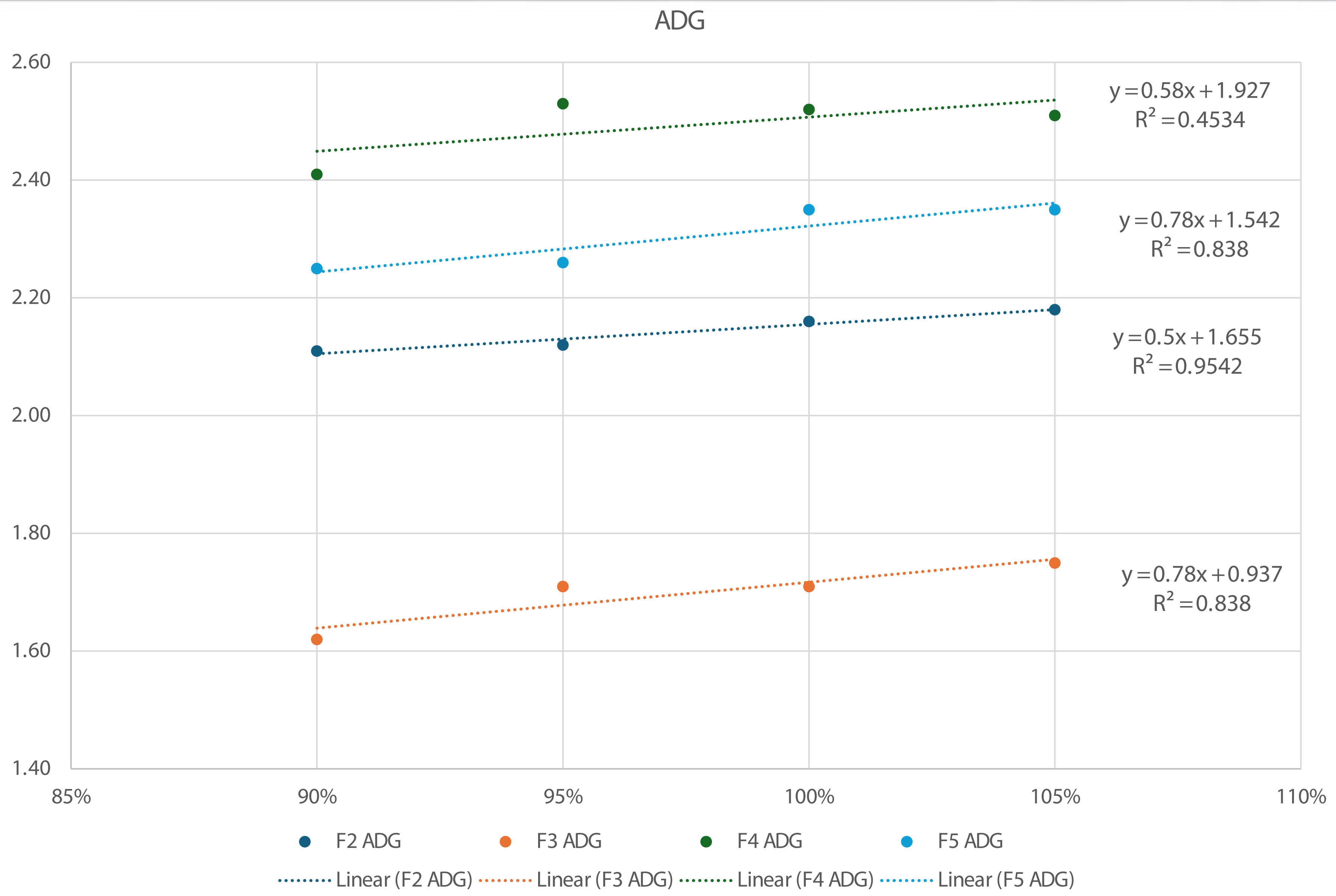
Treatments

		SID Lys, % of diet			
	Treatments SID Lys	1450 kcal ME / kg diet	1450 kcal ME /kg diet	1465 kcal ME /kg diet	1465 kcal ME / kg diet
	PIC 2021	**F2**	**F3**	**F4**	**F5**
T1	90%	0.835	0.71	0.64	0.60
T2	95%	0.882	0.75	0.68	0.63
T3	100%	0.928	0.79	0.71	0.66
T4	105%	0.975	0.83	0.75	0.70

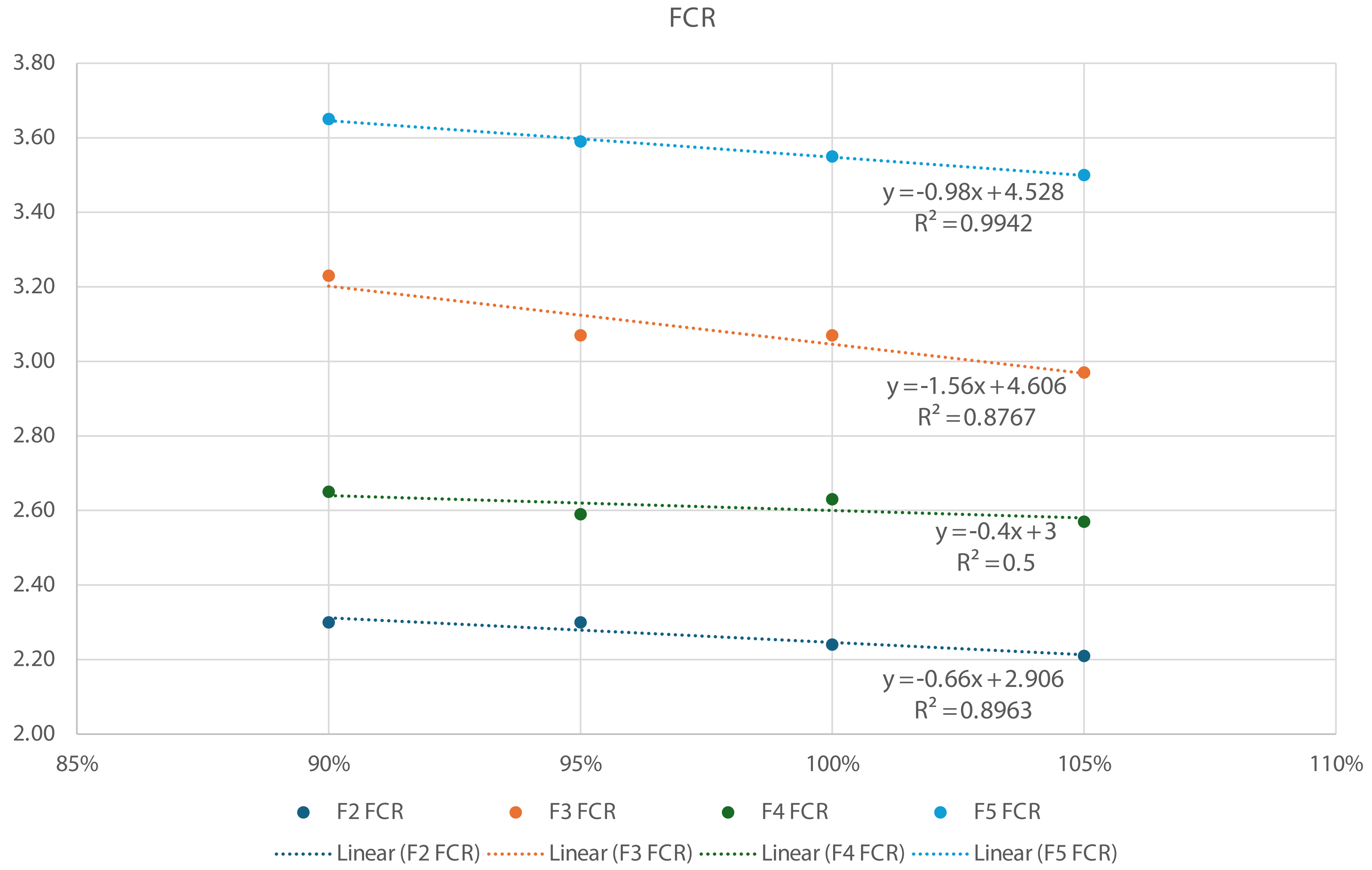
Phase	Body weight range (lbs)
F2	95 – 150
F3	150 – 200
F4	200 – 245
F5	245 - 290

	SID Lysine Level					*P*-values	
	90%	95%	100%	105%	SE	Linear	Quadratic
F2 phase (23 days)							
Allotment weight, lb	95.6	95.6	95.6	95.7	0.68	0.842	0.649
Final weight, lb[1]	144.2	144.5	145.3	145.9	0.79	0.012	0.807
ADG, lb[2]	2.11	2.12	2.16	2.18	0.02	0.008	0.875
ADFI, lb[2]	4.86	4.89	4.84	4.81	0.037	0.25	0.459
FCR[2]	2.30	2.30	2.24	2.21	0.015	<0.001	0.315
SID Lysine (g lys/kg gain)	19.1	20.2	20.7	21.4	0.133	<0.001	0.239
F3 phase (27 days)[3]							
Allotment weight, lb	141.2	140.2	140.4	140.3	1.04	0.532	0.606
Final weight, lb[1]	185	186.4	186.4	187.7	1.35	0.163	0.957
ADG, lb[2]	1.62	1.71	1.71	1.75	0.03	0.007	0.491
ADFI, lb[2]	5.23	5.24	5.22	5.20	0.073	0.688	0.835
FCR[2]	3.23	3.07	3.07	2.97	0.036	<0.001	0.339
SID Lysine (g lys/kg gain)	22.8	22.9	24.1	24.6	0.273	<0.001	0.518

	SID Lysine Level					*P*-values	
	90%	95%	100%	105%	SE	Linear	Quadratic
F4 phase (29 days)[4]							
Allotment weight, lb	190.3	190.1	190.3	190.2	1.13	0.998	0.855
Final weight, lb[1]	260.4	263.6	264	263.5	1.28	0.013	0.039
ADG, lb[2]	2.41	2.53	2.52	2.51	0.03	0.03	0.021
ADFI, lb[2]	6.37	6.56	6.64	6.44	0.076	0.281	0.002
FCR[2]	2.65	2.59	2.63	2.57	0.029	0.042	0.81
SID Lysine (g lys/kg gain)	16.86	17.43	18.6	19.07	0.202	<0.001	0.685
F5 phase (27 days)							
Allotment weight, lb	258.2	258.1	258.1	258.2	2.03	0.919	0.833
Final weight, lb[1]	303.3	303.8	304.1	304.2	2.17	0.42	0.783
ADG, lb[2]	2.25	2.26	2.35	2.35	0.043	0.04	0.896
ADFI, lb[2]	8.18	8.1	8.33	8.2	0.091	0.491	0.782
FCR[2]	3.65	3.59	3.55	3.5	0.048	0.022	0.986
SID Lysine (g lys/kg gain)	21.7	22.6	23.5	24.3	0.304	<0.001	0.922



ADG
2.60
2.40
2.20
2.00
1.80
1.60
1.40
85%
90%
95%
100%
105%
110%
y = 0.58x + 1.927
R² = 0.4534
y = 0.78x + 1.542
R² = 0.838
y = 0.5x + 1.655
R² = 0.9542
y = 0.78x + 0.937
R² = 0.838
F2 ADG
F3 ADG
F4 ADG
F5 ADG
Linear (F2 ADG)
Linear (F3 ADG)
Linear (F4 ADG)
Linear (F5 ADG)


FCR
3.80
3.60
3.40
3.20
3.00
2.80
2.60
2.40
2.20
2.00
85%
90%
95%
100%
105%
110%
y = -0.98x + 4.528
R² = 0.9942
y = -1.56x + 4.606
R² = 0.8767
y = -0.4x + 3
R² = 0.5
y = -0.66x + 2.906
R² = 0.8963
F2 FCR
F3 FCR
F4 FCR
F5 FCR
Linear (F2 FCR)
Linear (F3 FCR)
Linear (F4 FCR)
Linear (F5 FCR)

Lysine Levels

- Understanding the response to amino acids.
- Determining what levels you want to feed.
- You can slow down or speed up ADG for example.
- What is right for your system?
- Based on pig flow (long spaced or short).
- Market prices, etc.

Feed Budgets

- Feed budgets sound simple but one of the biggest opportunities.
- Wrong feed efficiency calculations causing producers to under feed or over feed phases.
- Have seen many times pigs are under fed causing phase changes to happen too fast and pigs are not at the correct weight for the next phase.
- Performance, vices, financial impacts.
- Adjust for mortality.

K-State Grow-Finish Feed Budget Program

Gilt Feed Budget				Barrow Feed Budget				Mixed Sex Feed Budget		
Closeout Feed Efficiency				Closeout Feed Efficiency				Closeout Feed Efficiency		
Initial wt	Final wt	F/G		Initial wt	Final wt	F/G		Initial wt	Final wt	F/G
50	270	2.8		50	270	2.85		50	270	2.8

Initial wt	Final wt	lb/pig		Initial wt	Final wt	lb/pig		Initial wt	Final wt	lb/pig
50	75	**50**		50	70	**40**		50	75	**50**
75	130	**128**		70	110	**91**		75	130	**128**
130	170	**109**		110	150	**104**		130	170	**109**
170	220	**154**		150	200	**149**		170	220	**154**
220	235	**50**		200	235	**117**		220	235	**50**
235	280	**162**		235	265	**108**		235	265	**106**
280				265				265		

Delivery size: 3 tons

Diet Identification Numbers

Two sets of diets can be entered for each sex (ex. season, genotype, etc.)

Please enter the diet descriptions here: Sequence 1 Sequence 2

Grow-finish feed budget | Grow-finish computer template | Grow-finish hand template

GROWTH AND FEED INTAKE CURVES

PIC337RG SIRED PIGS FROM WEAN TO 28 WEEKS OF AGE

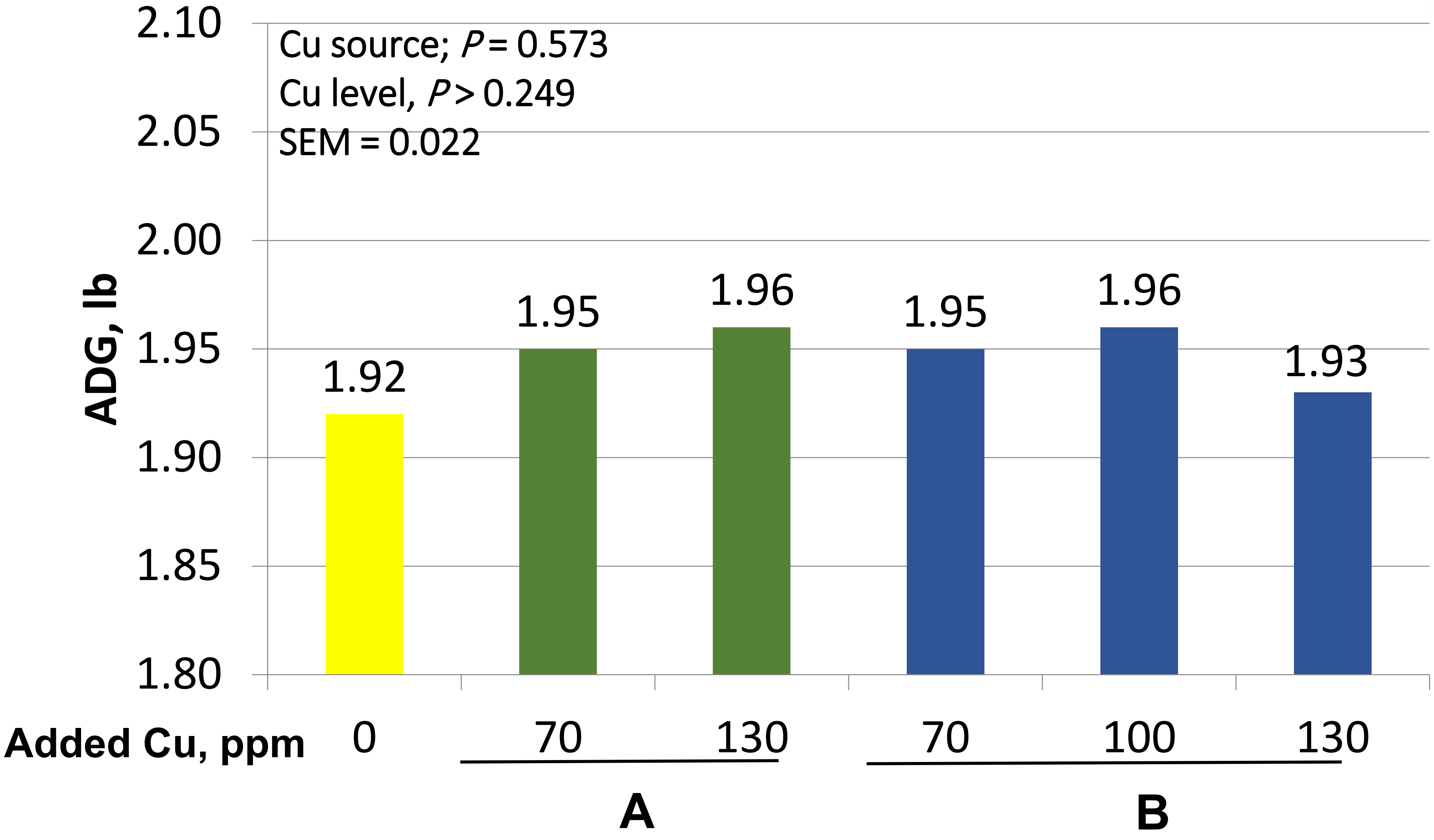
Age Days / Weeks	Weight, lb.	Average Daily Gain, lb. / day	Weekly Feed Intake, lb.	Cumulative Average Daily Gain, lb. / day	Cumulative Feed Intake, lb.	Cumulative Feed Conversion
21 / 3	12.0					
28 / 4	14.5	0.36	2.65	0.36	2.65	1.06
35 / 5	19.0	0.64	5.32	0.50	7.97	1.14
42 / 6	25.0	0.86	7.70	0.62	15.67	1.21
49 / 7	32.0	1.00	9.70	0.71	25.37	1.27
56 / 8	41.5	1.36	13.95	0.84	39.32	1.33
63 / 9	52.1	1.51	16.70	0.95	56.02	1.40
70 / 10	63.1	1.57	18.50	1.04	74.52	1.46
77 / 11	75.1	1.71	21.83	1.13	96.35	1.53
84 / 12	87.9	1.83	24.96	1.20	121.31	1.60
91 / 13	101.5	1.94	27.94	1.28	149.25	1.67

Feed Additives

Feed Additives

- Depending on economics, feed when gain is most valuable.
  - Most common answer
- Cost savings or cost neutral.
- Feed mill ingredient options.
  - What ingredients are available vs not
- Health interventions, mainly in nursery diets.
  - Probiotics, acids, enzymes, etc
- VTM – level and source of minerals, do you include other additives?

Cu source on finishing pig ADG (82-285 lb)



Carpenter et al., 2016

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