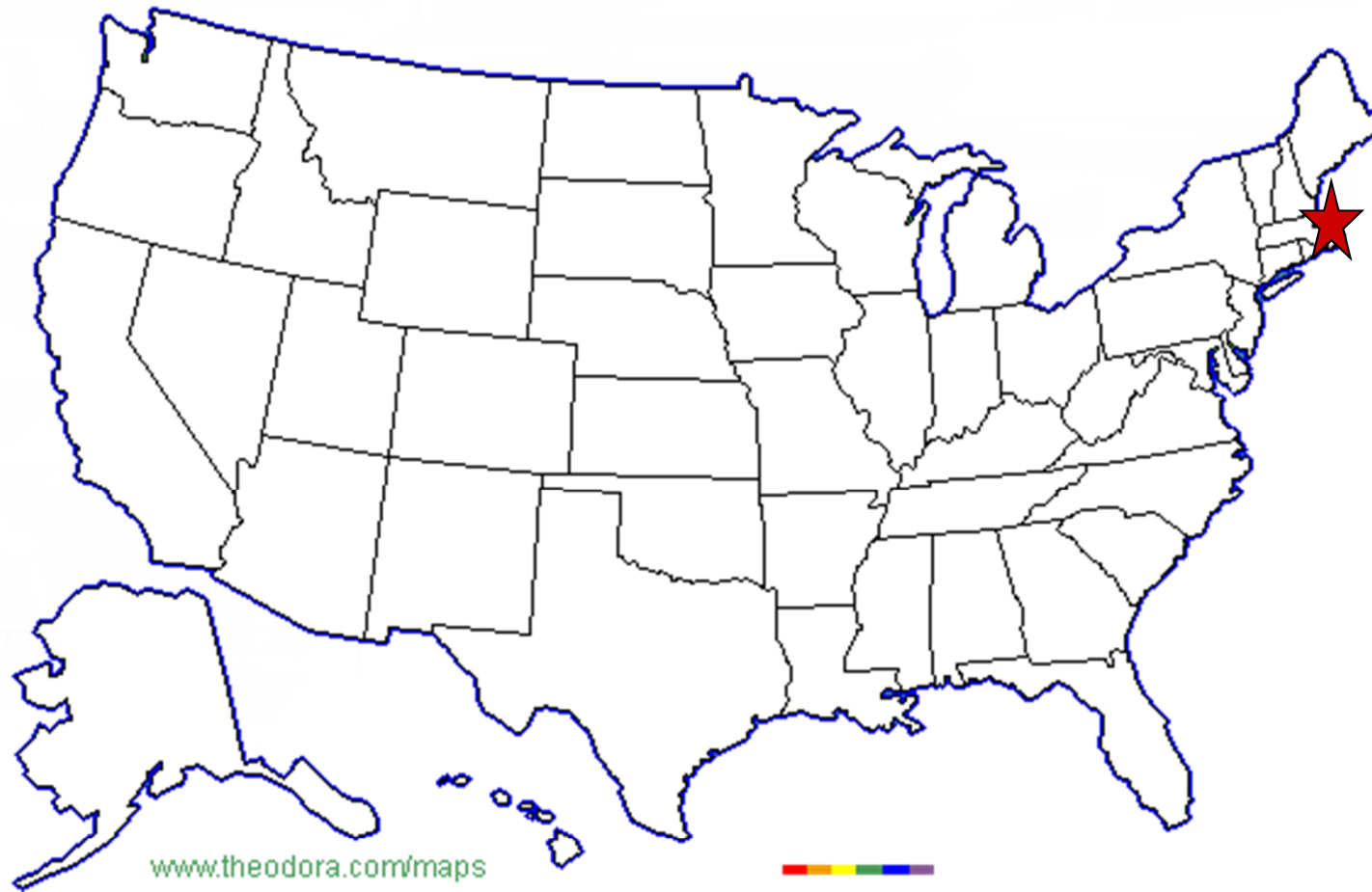


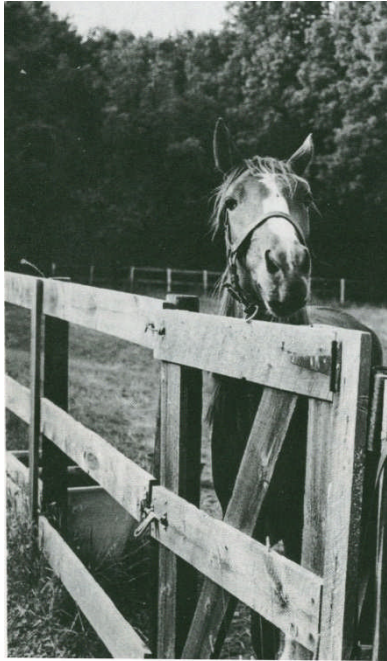
Is Phase Feeding Really Worth the Hassle?

Bob Goodband, Mike Tokach, Jason Woodworth
Steve Dritz, and
Joel DeRouchey,

KSUSwine.org

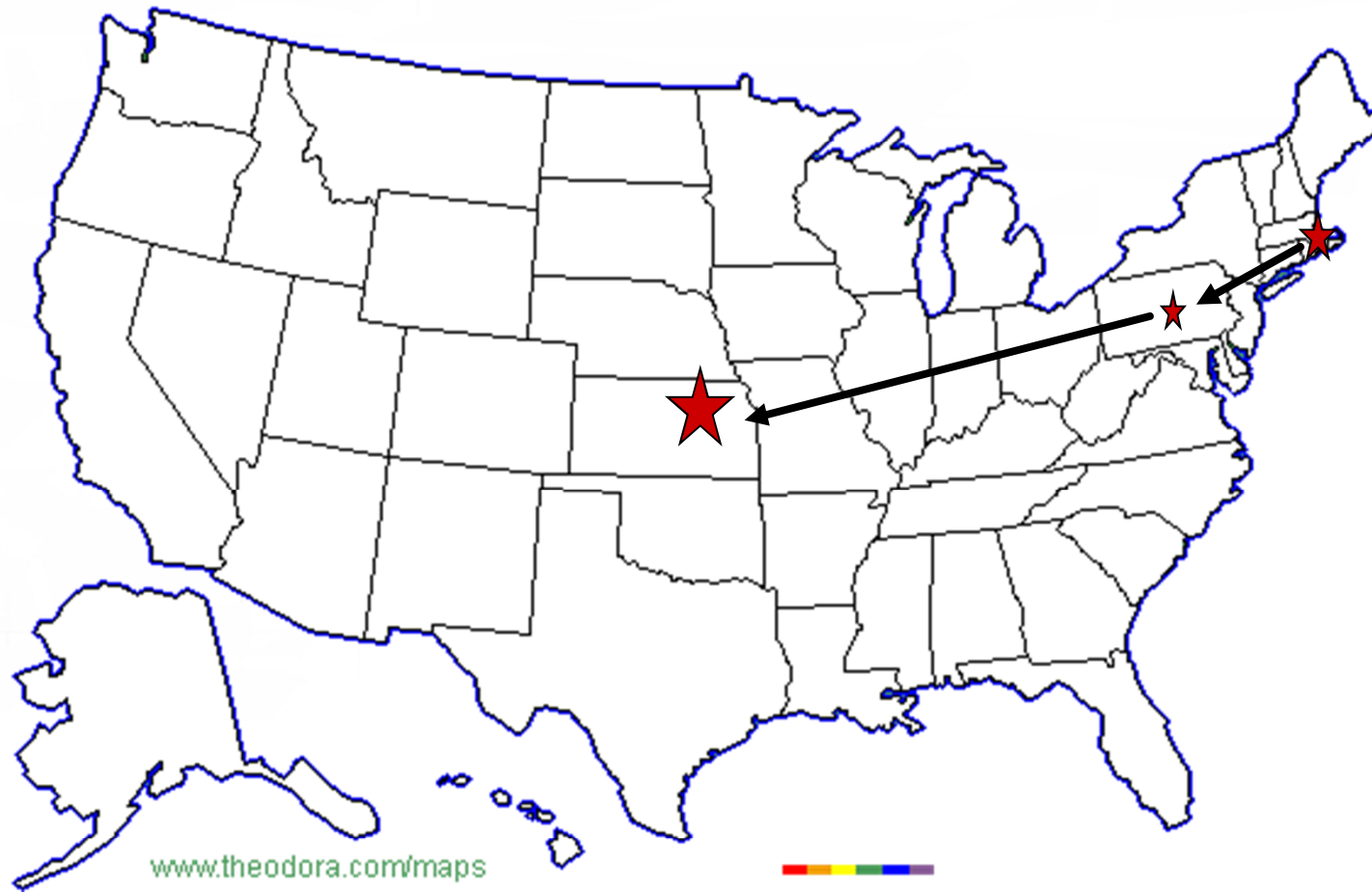




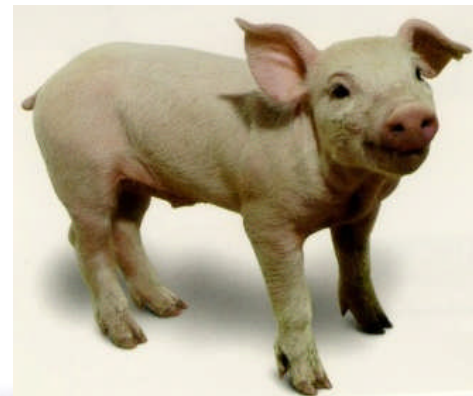




Mitzi Paloma, ch f 3
2:03.1







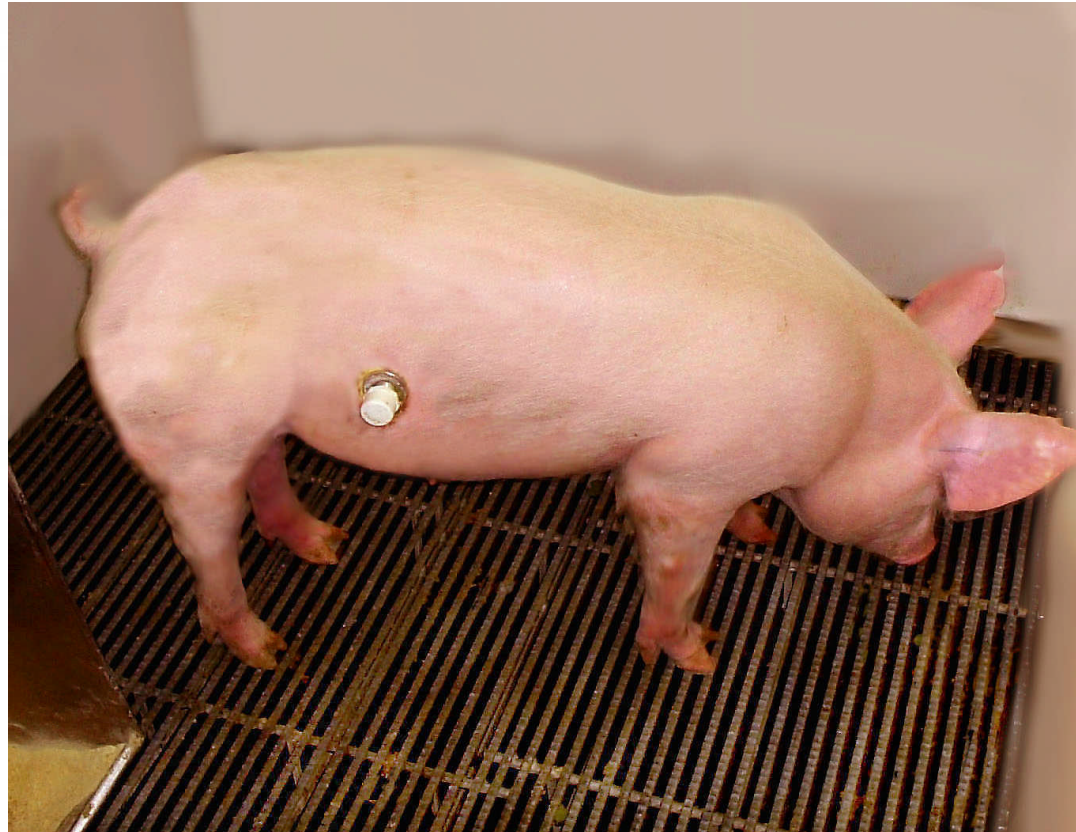
Knowledge
for Life



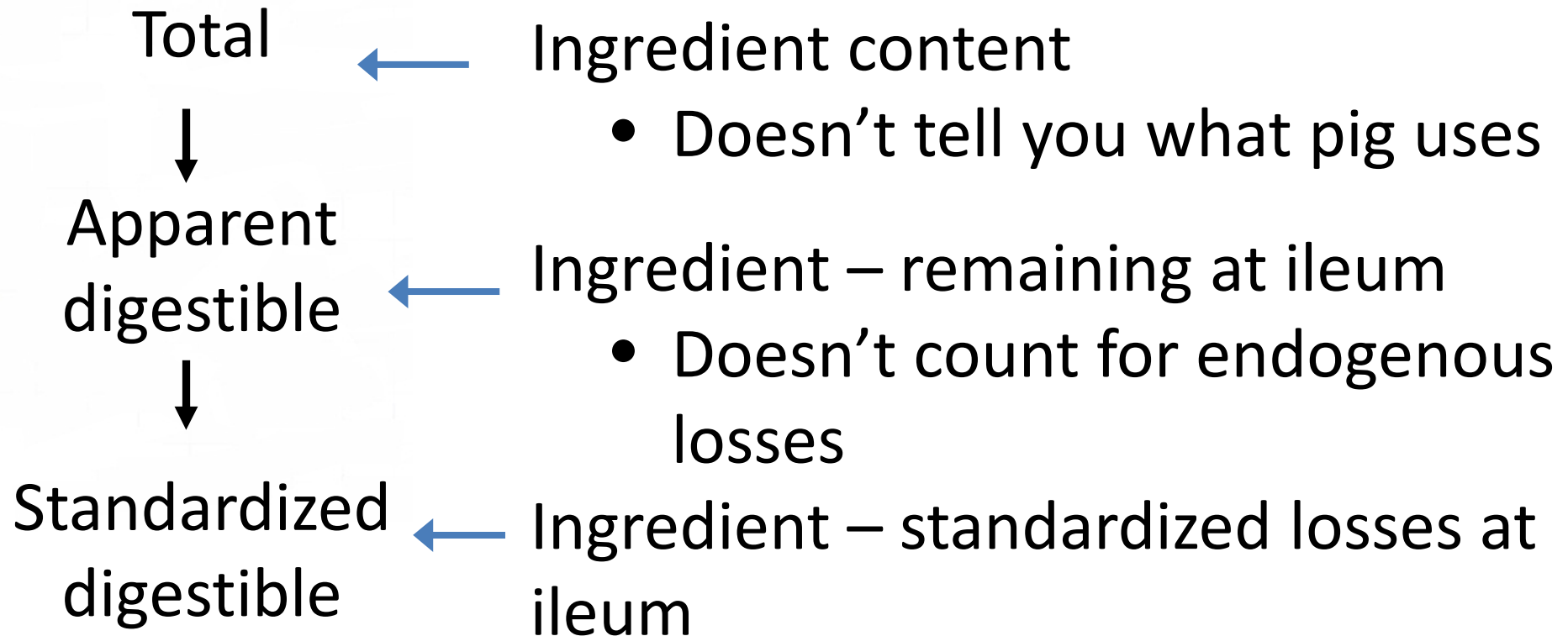
Outline

- Definitions – Digestible AA and Net Energy
- Practical steps in diet formulation
- Effects of phase feeding
- Feed Budgeting

Standardized Ileal AA Digestibility

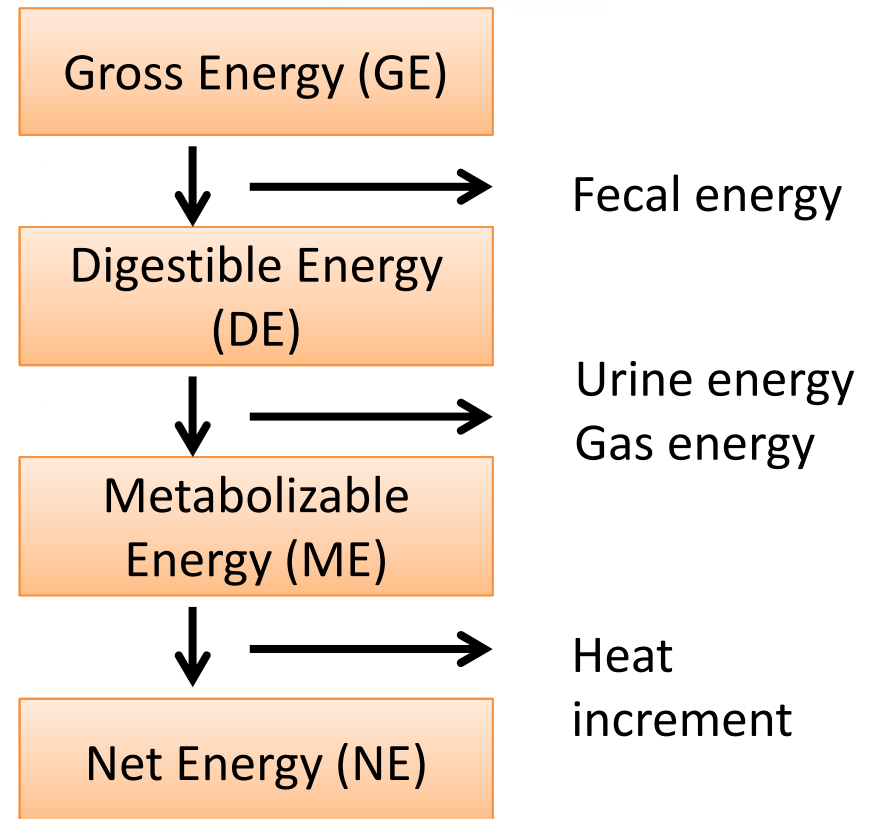


Amino Acid Digestibility

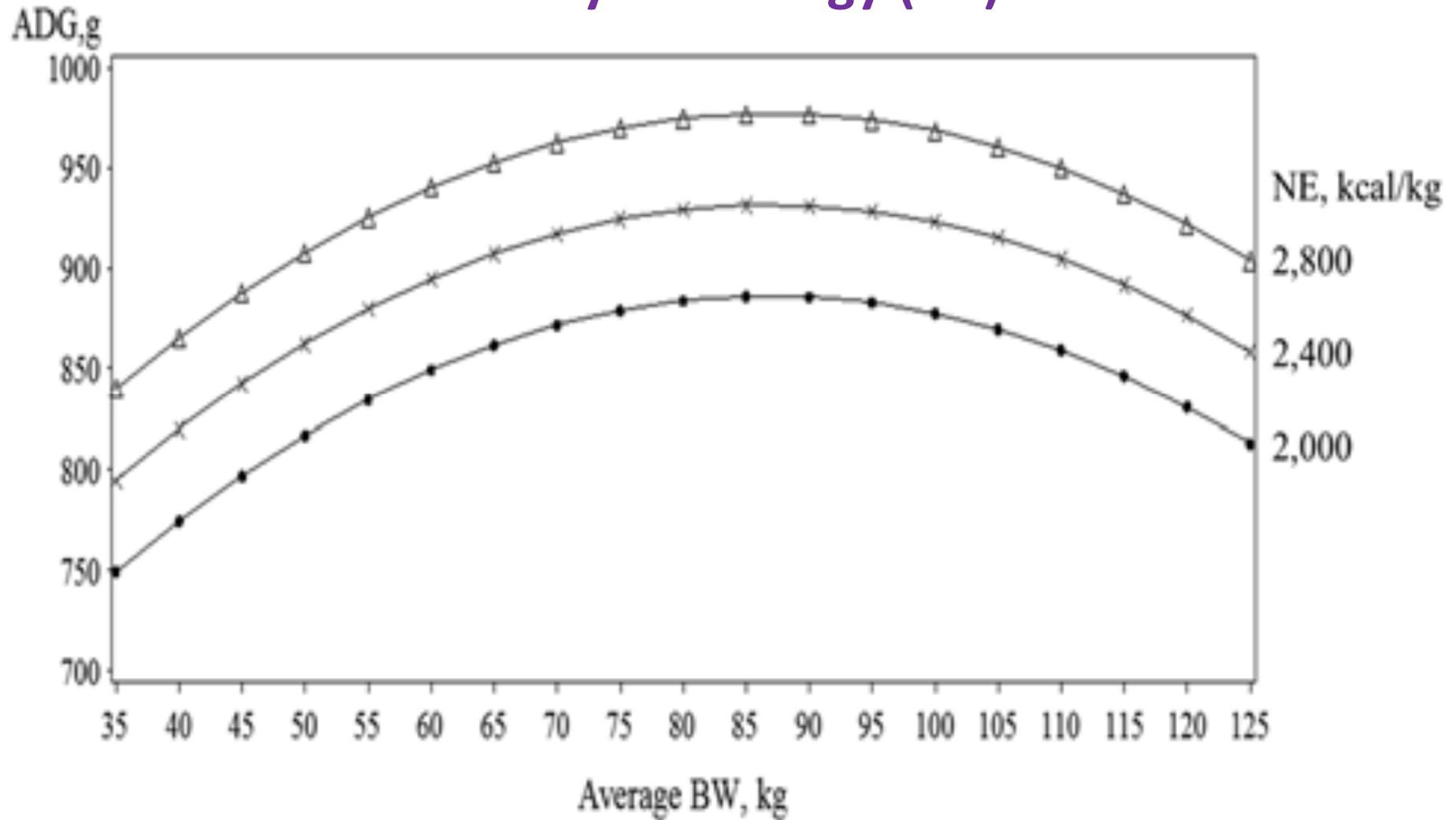


Regression Analysis to Predict Growth Performance from Dietary Net Energy in Growing-Finishing Pigs

- Low energy diets typically reduce feed cost but also lower growth performance
- Prediction of growth and feed efficiency is essential to quantify the feeding value dietary energy
- NE is the most accurate system to evaluate effect of energy on growth



Predicted ADG of pigs fed varying levels of dietary net energy (NE)



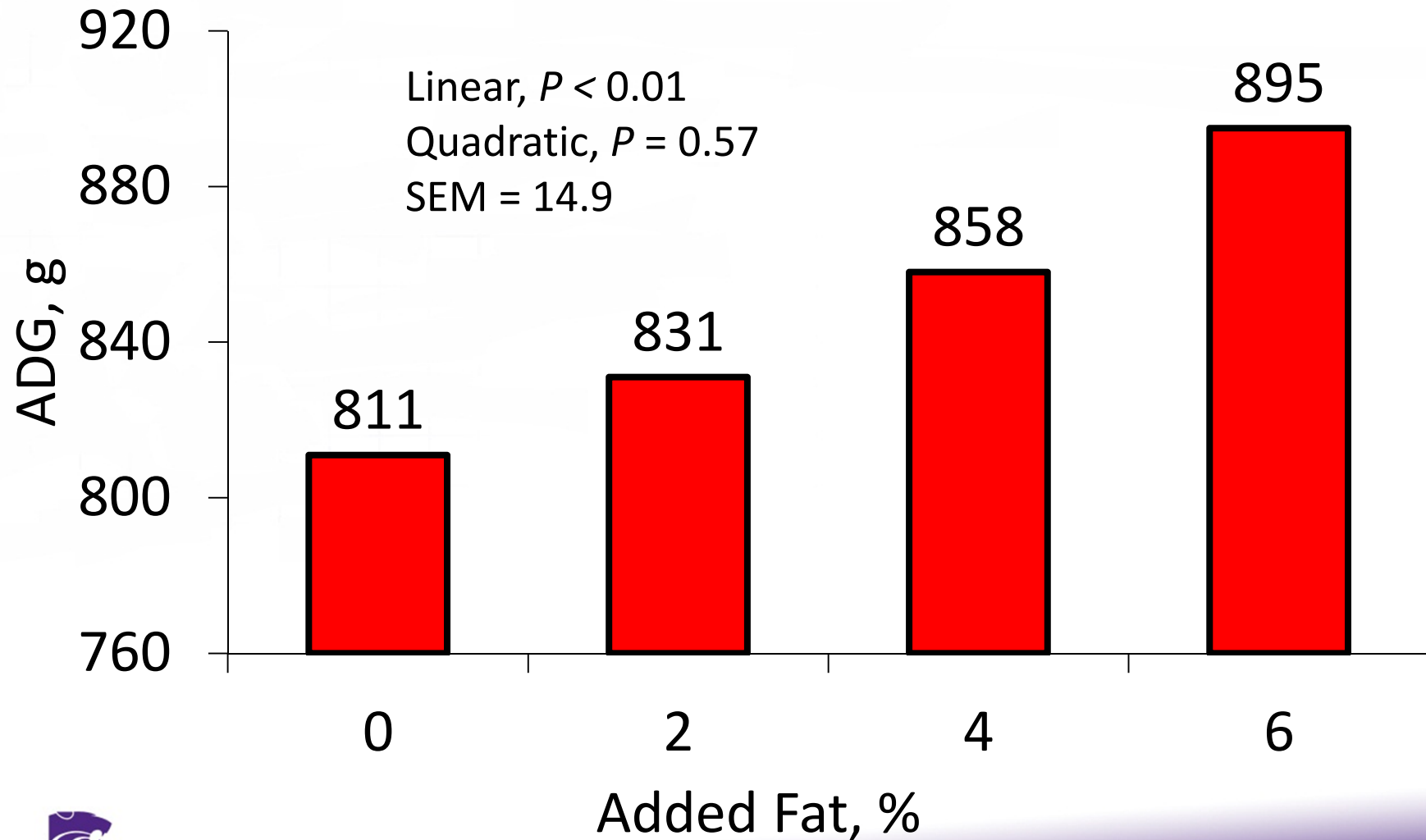
What are the production system's goals?

- Is the system reaching their packer's ideal weight range or not (fixed time basis)?
- Are there plenty of days available to take pigs to heavier weights?
- This will help establish a practical energy density of the diet.
 - Added fat or lower energy, high byproduct-based diets

Steps in Diet Formulation

1. Determine the most economical energy level
2. Determine the lysine:calorie ratio to use for the genetics and production situation
3. Determine the ratio for the other amino acids
4. Determine the ratio of phosphorus to energy
5. Set levels of vitamins, trace minerals, calcium, salt, and other ingredients.

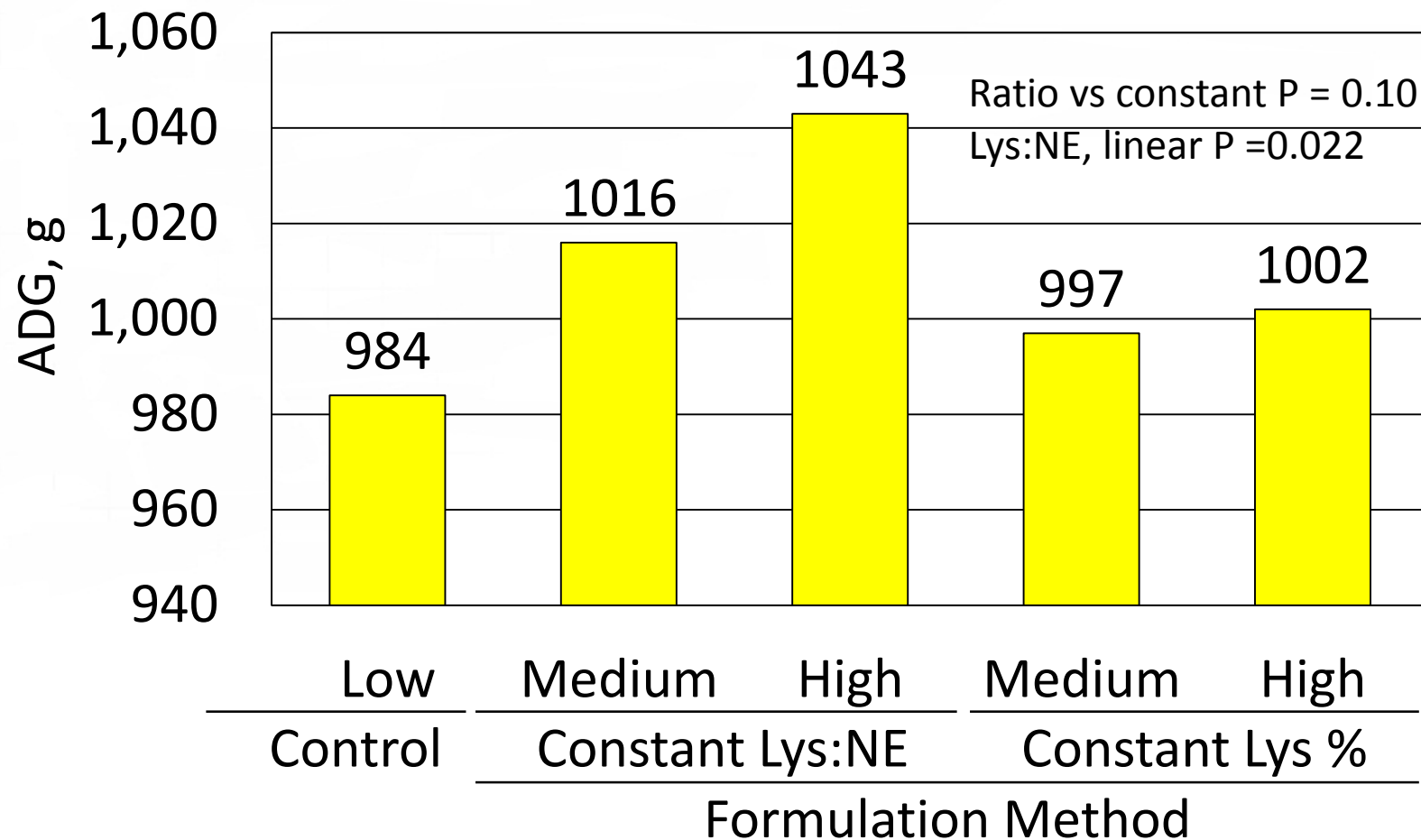
Effect added fat on growth performance of finishing pigs 36 to 59 kg



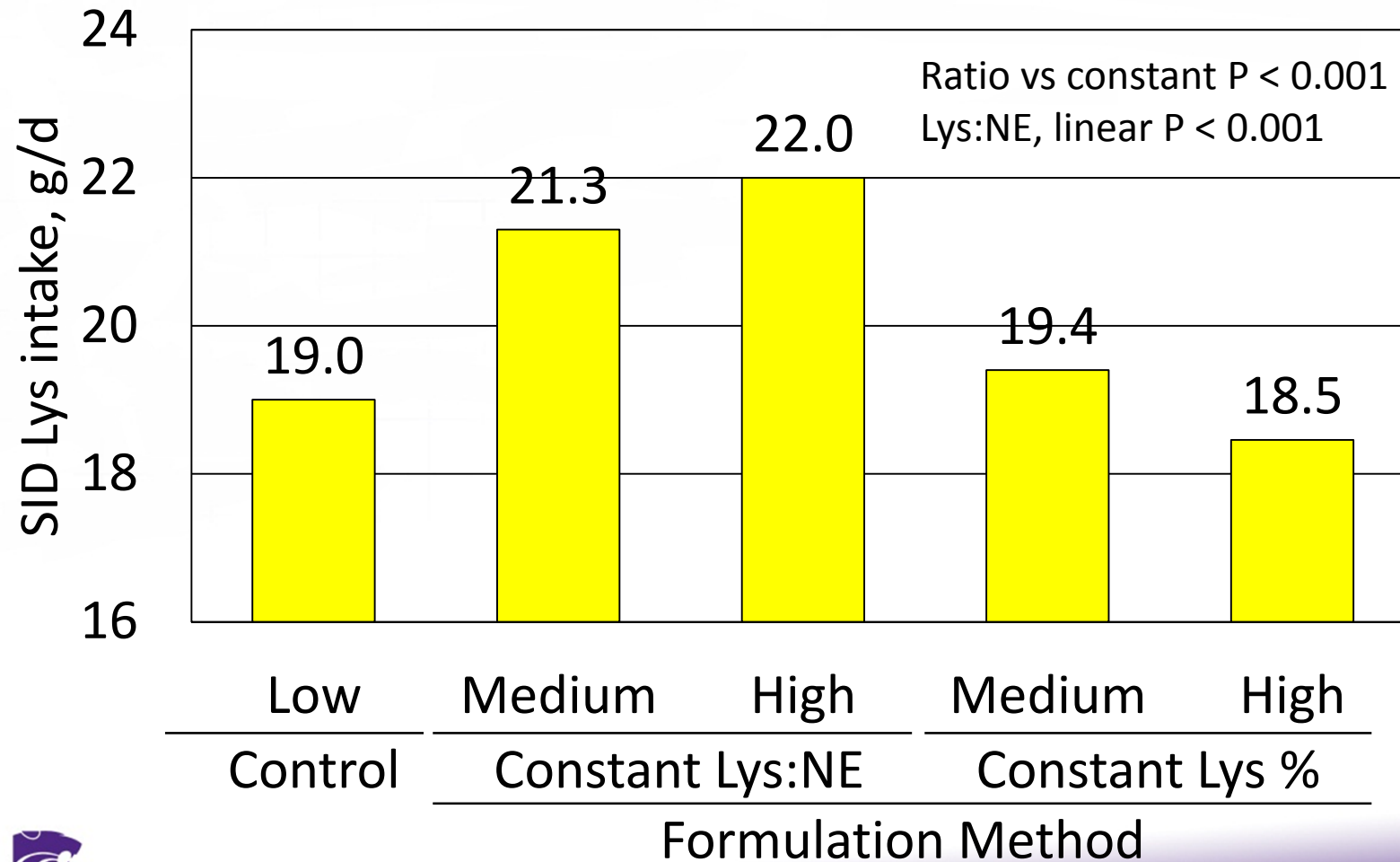
Steps in Diet Formulation

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Effects of dietary NE with constant SID Lys:NE ratio or constant percentage SID Lys on growth performance of growing-finishing pigs



Effects of dietary NE with constant SID Lys:NE ratio or constant percentage SID Lys on growth performance of growing-finishing pigs



Protein and Amino Acids for Swine

**Once we determine
lysine requirements,
what about the
other amino acids?**

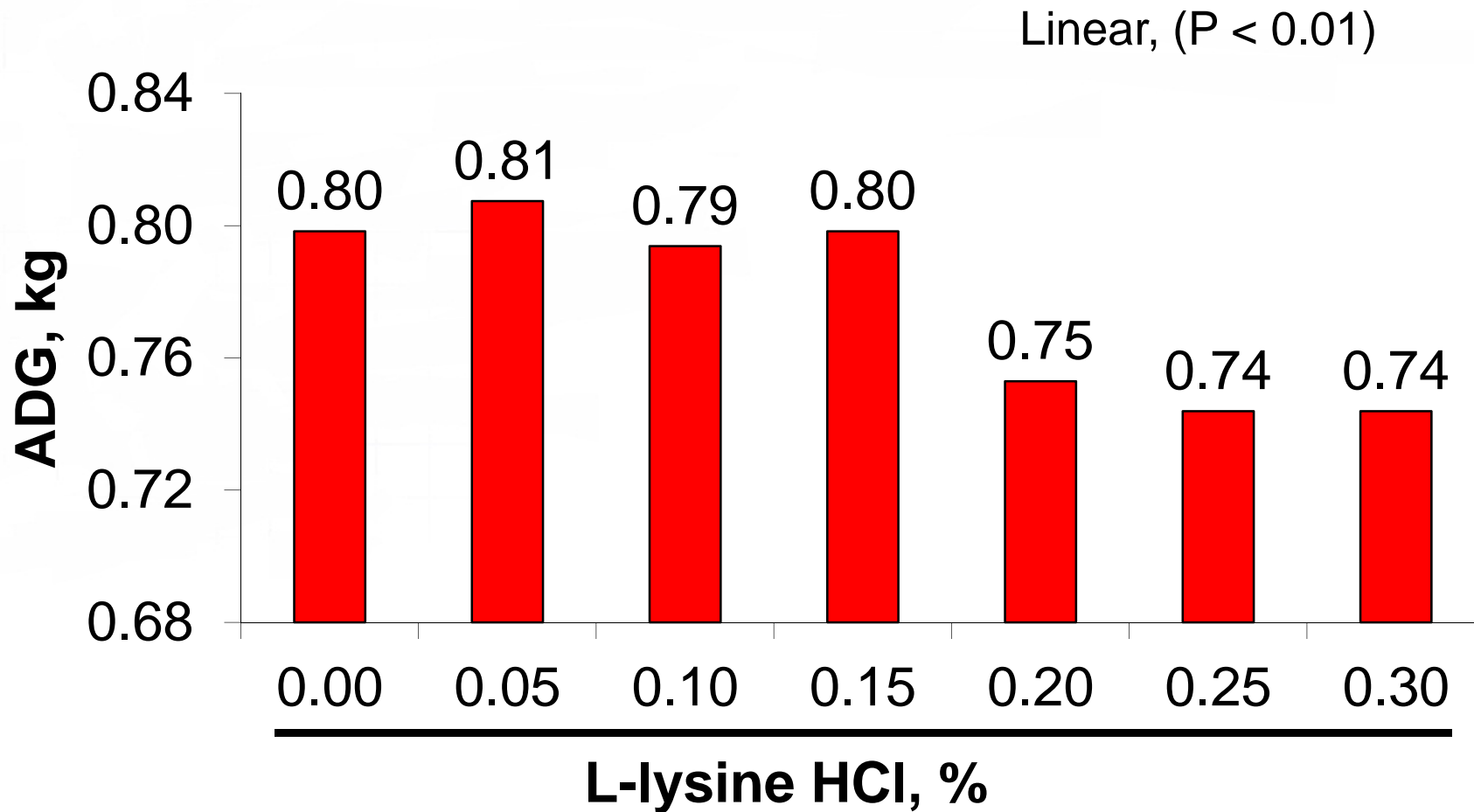


Amino Acid Ratio

	<u>A</u>	<u>B</u>
Lysine, % of diet	.60	.70
Threonine, % of diet	.40	.47
Threonine, % of lysine	67%	67%

When we increased lysine, we need to increase the other amino acids proportionally.

Effects of Removing Too Much Soybean Meal on Finishing Pig Growth Performance



Value of increased growth rate

- Cost of F/G is easy to calculate
- Cost of increased ADG depends on situation
 - Pigs can achieve the same market weight regardless of dietary energy (more days on feed)
 - Excess space – Value of gain = 0 or near 0
 - Market weight will increase when higher energy diets are fed (constant days on feed)
 - Limited space – Value of gain = market price or greater

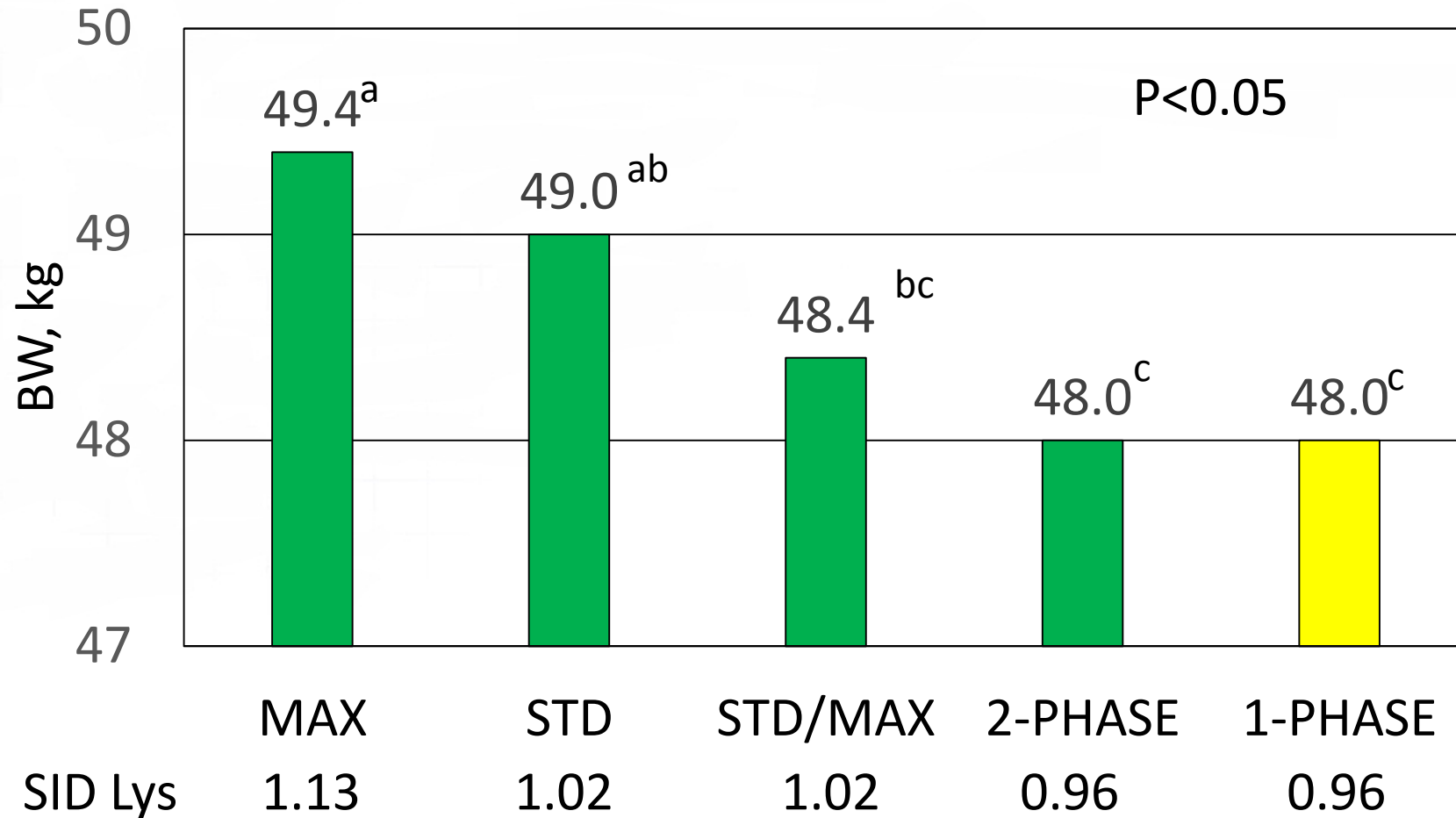
Is Phase Feeding Worth the Hassel???



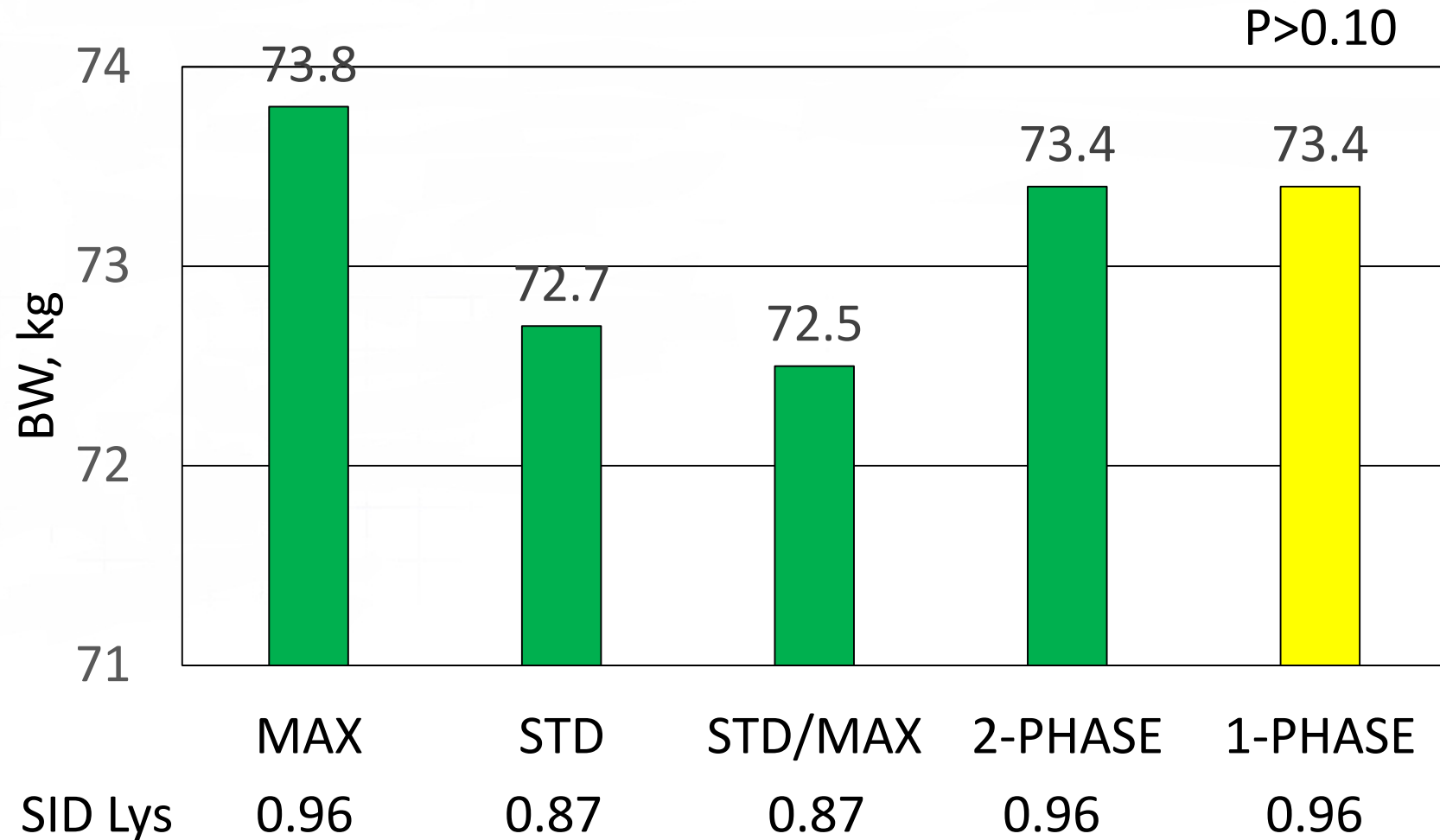
Description of Feeding Phases and Lysine Levels of Experimental Diets

	SID Lysine, %				
Weight, kg	MAX	SID	SID/MAX	2-PHASE	1 Phase
30 to 50	1.13	1.02	1.02	0.96	0.96
50 to 70	0.96	0.87	0.87	0.96	0.96
70 to 100	0.82	0.76	0.82	0.96	0.96
100 to 127	0.77	0.67	0.77	0.77	0.96

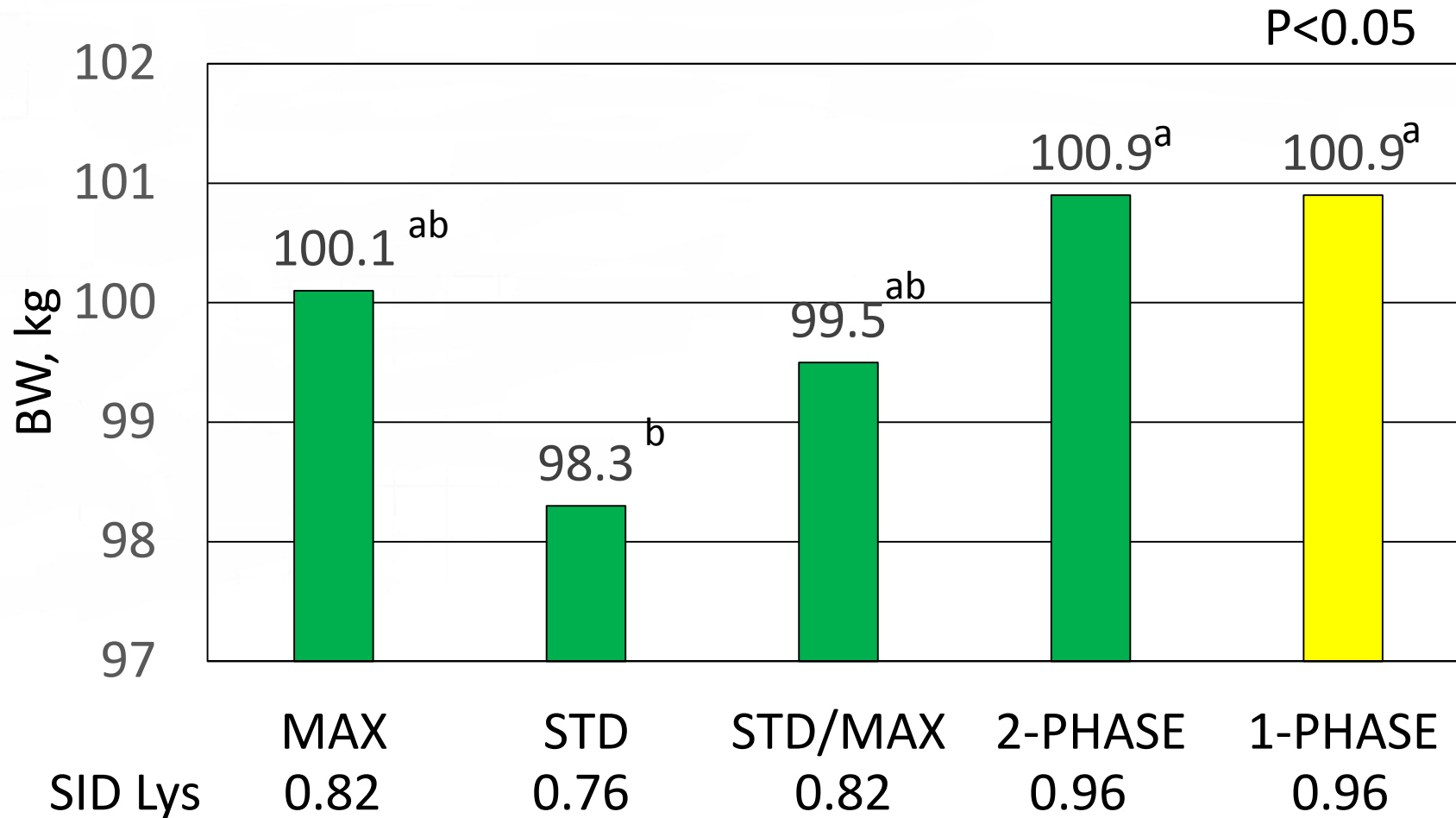
Effect of Phase Feeding Strategies on Body Weight (day 25)



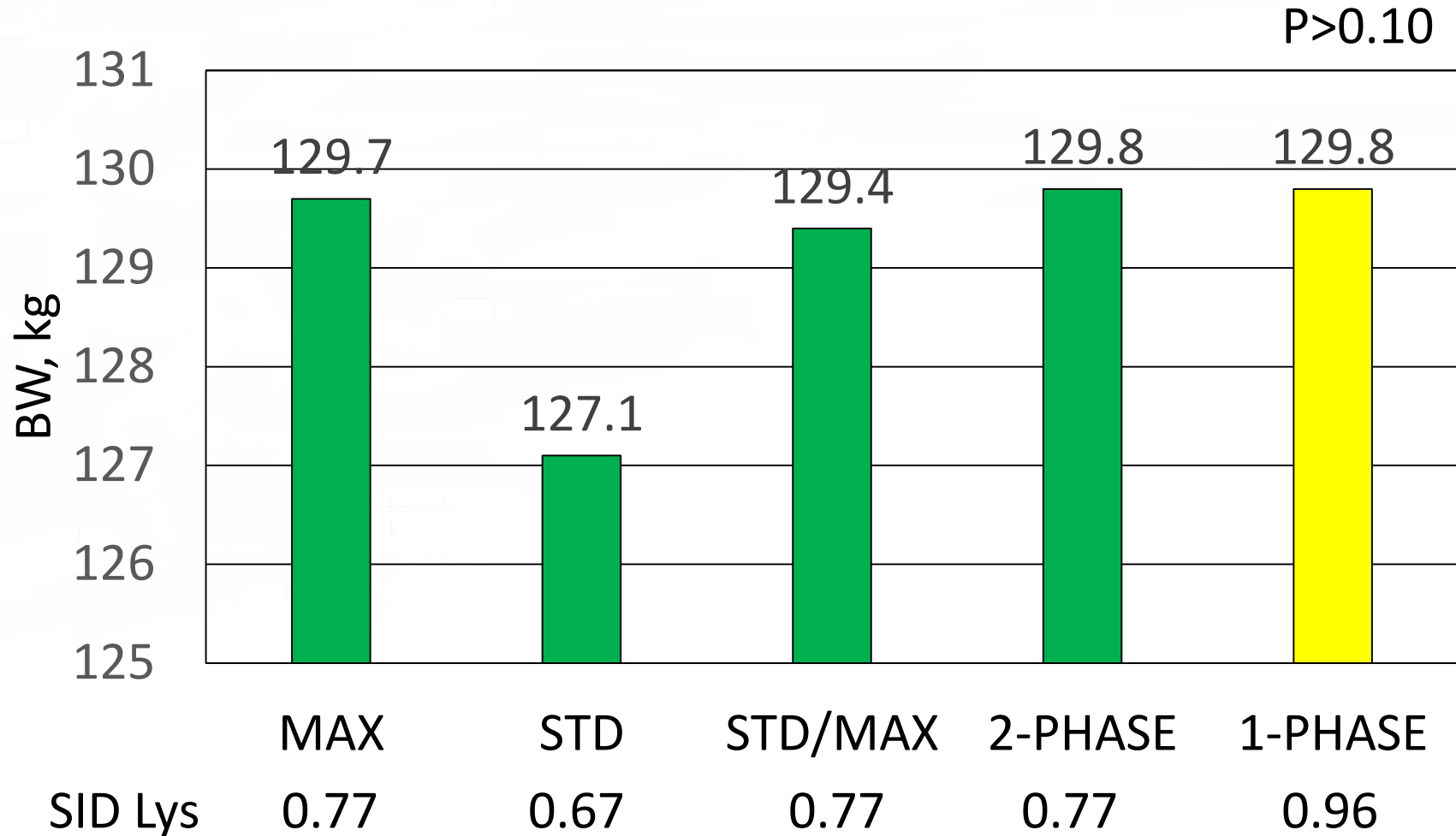
Effect of Phase Feeding Strategies on Body Weight (day 53)



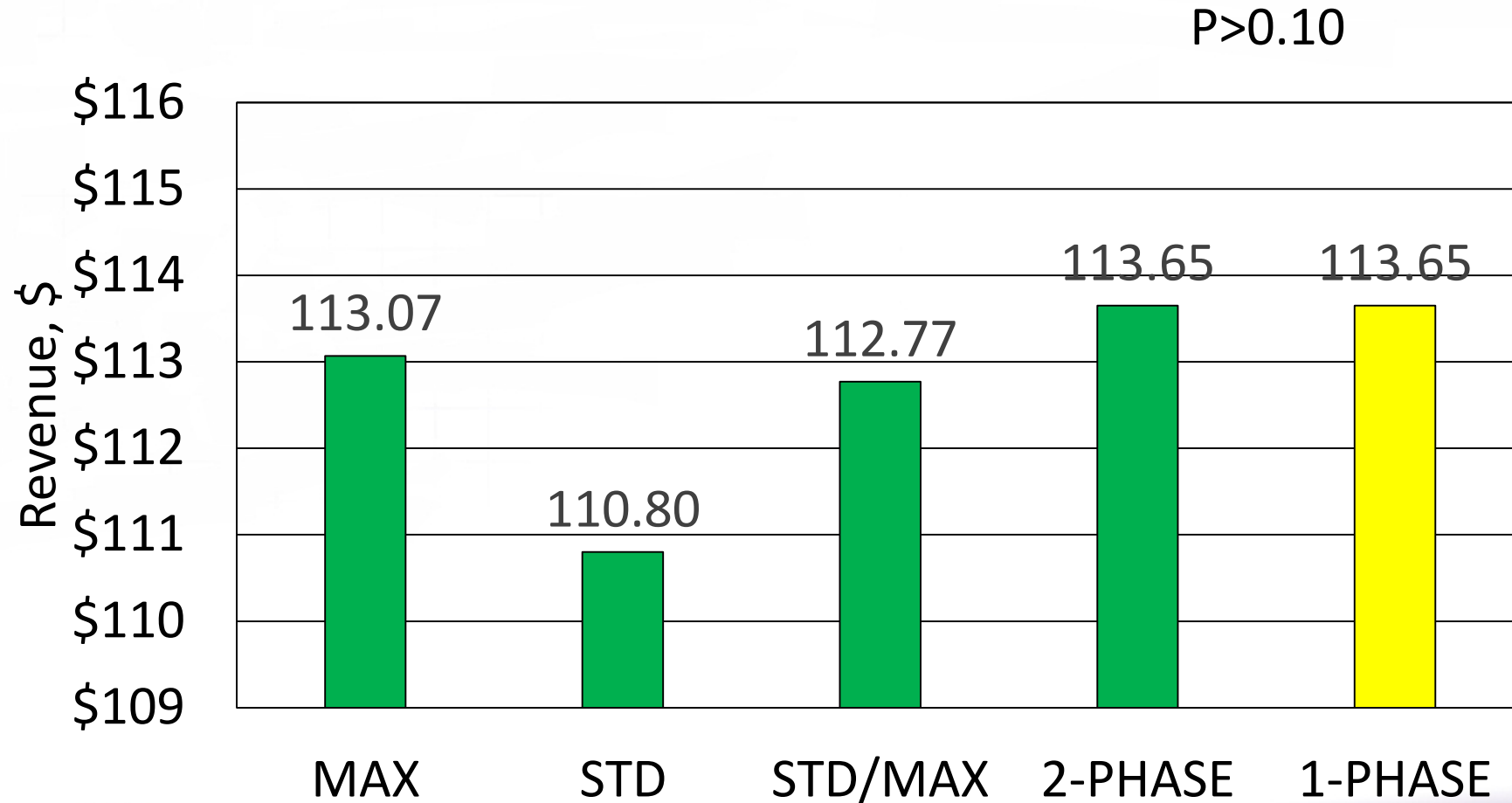
Effect of Phase Feeding Strategies on Body Weight (day 81)



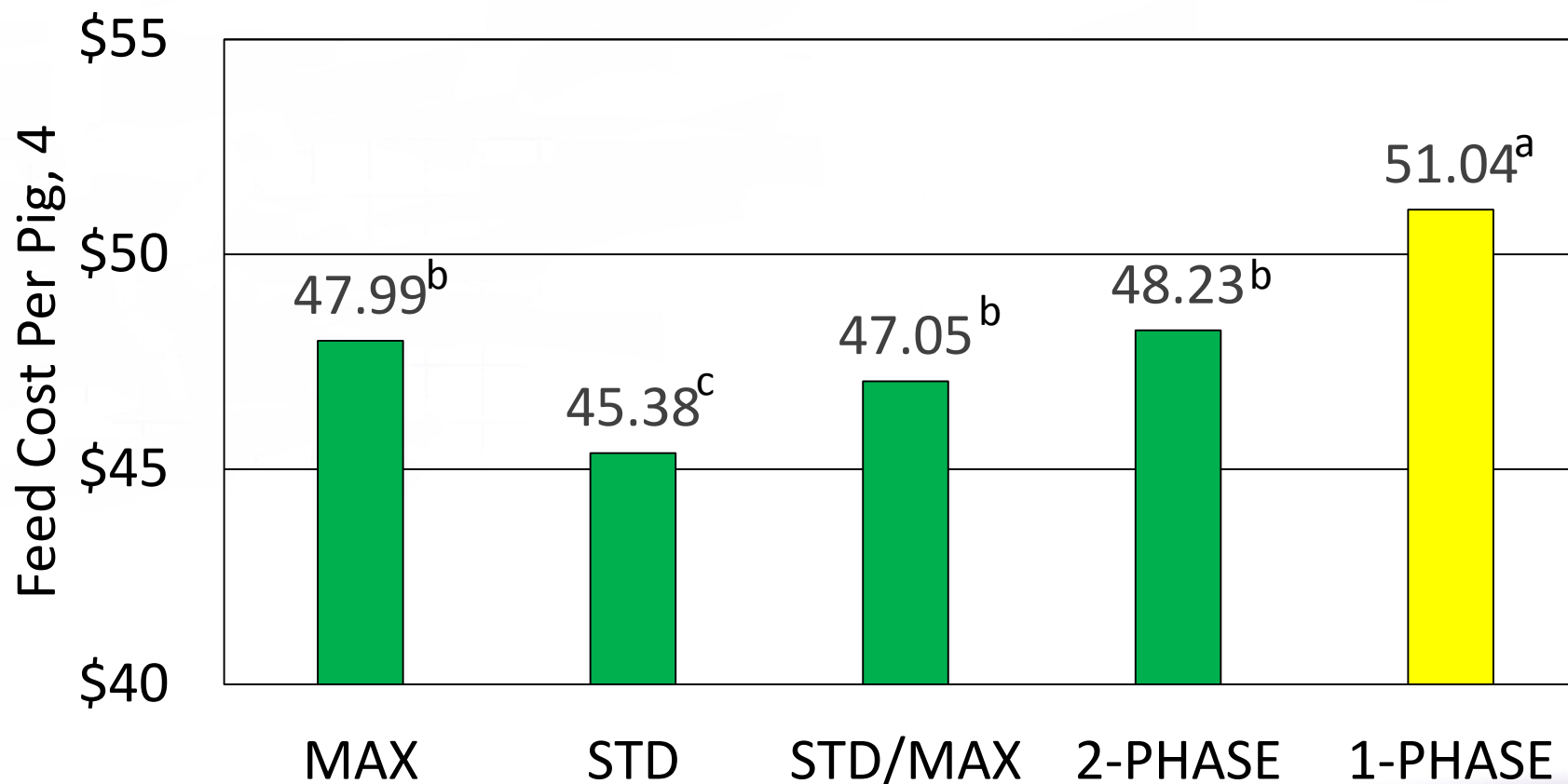
Effect of Phase Feeding Strategies on Body Weight (day 117)



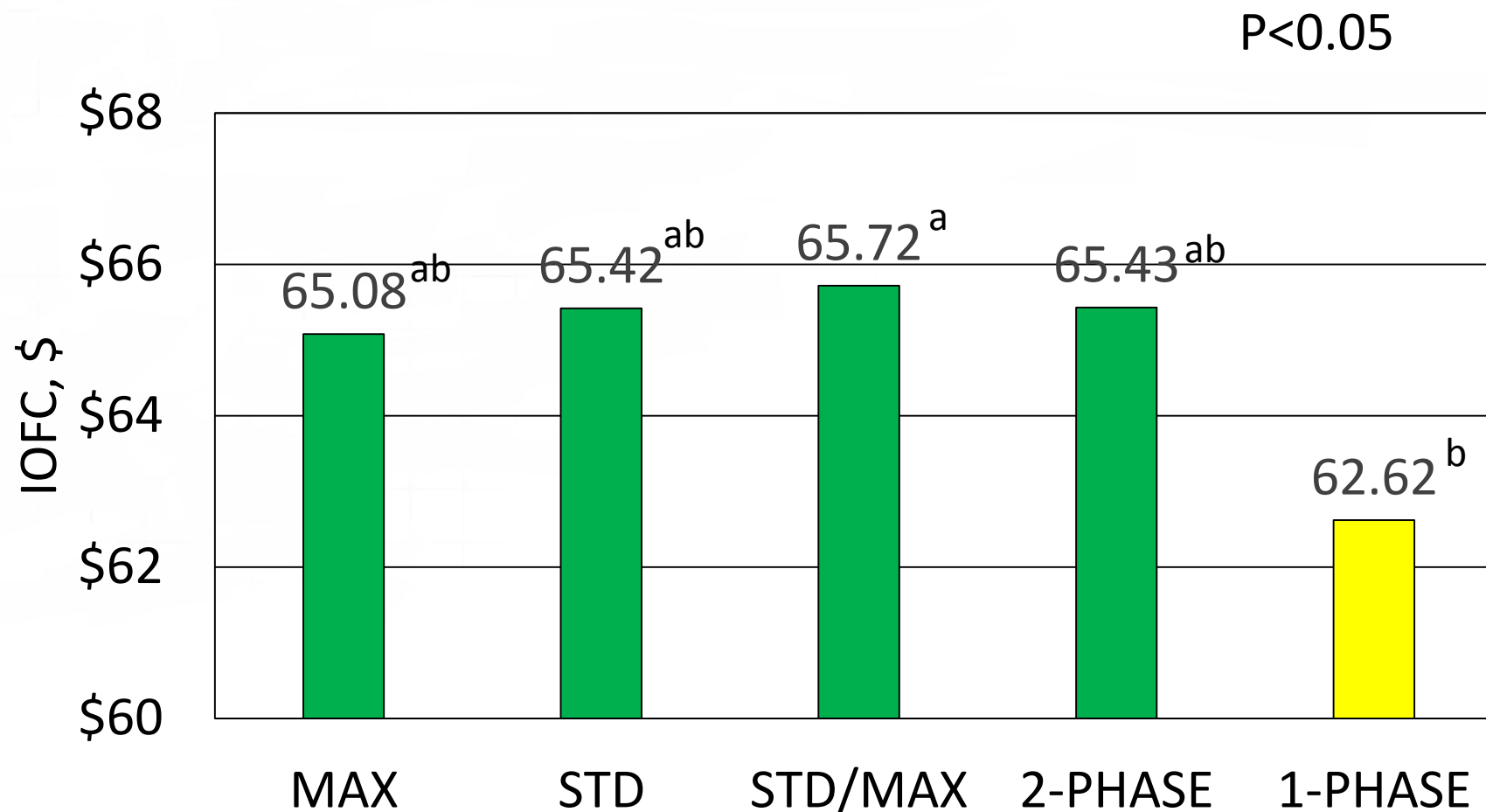
Effect of Phase Feeding Strategies on Net Revenue



Effect of Phase Feeding Strategies on Feed Cost Per Pig



Effect of Phase Feeding Strategies on Income over Feed Cost



Summary

- Feeding lysine levels for maximum growth and efficiency in either a 2- or 4-phase feeding program results in the same growth performance and feed cost.
- A broad range of lysine specifications within the levels tested herein can be utilized in grow-finish diets without compromising income over feed cost.

Feed Budgeting

2- or 3-phases

K-State Grow-Finish Feed Budget

Feed Budget		
Closeout Feed Efficiency		
Initial wt	Final wt	F/G
25	115	2.8

Initial wt	Final wt	kg/pig
20	70	117
70	115	145
115	115	0
115	115	0
115	115	0
115	115	0
115		

K-State Grow-Finish Feed Budget

Feed Budget		
Closeout Feed Efficiency		
Initial wt	Final wt	F/G
25	115	2.8

Initial wt	Final wt	kg/pig
20	50	65
50	90	112
90	115	85
115	115	0
115	115	0
115	115	0
115		

Feed Budgeting

4-phases with different F/G

K-State Grow-Finish Feed Budget

Feed Budget		
Closeout Feed Efficiency		
Initial wt	Final wt	F/G
25	115	2.8

Initial wt	Final wt	kg/pig
20	45	53
45	70	64
70	95	76
95	115	69
115	115	0
115	115	0
115		

K-State Grow-Finish Feed Budget

Feed Budget		
Closeout Feed Efficiency		
Initial wt	Final wt	F/G
25	115	3

Initial wt	Final wt	kg/pig
20	45	57
45	70	69
70	95	81
95	115	74
115	115	0
115	115	0
115		

Conclusions

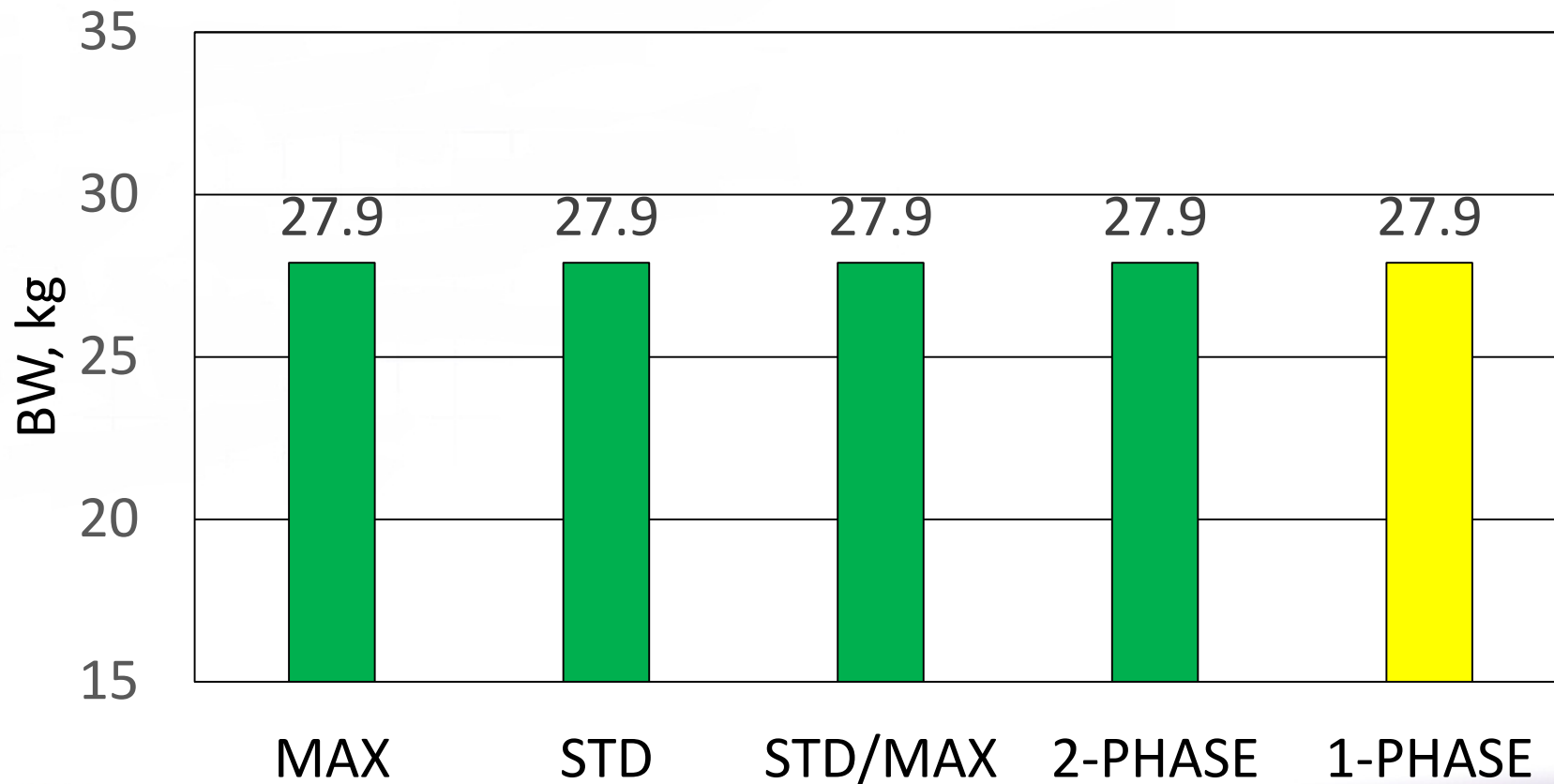
- We have made no allowance for nitrogen excretion.
- Using a feed budget can simplify when to order and change diets.
- When it comes down to it, I'd sure feel a lot more comfortable with a 4- to even 3-phase feeding program.

Thank You!!



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Effect of Phase Feeding Strategies on Initial Weight (day 0)



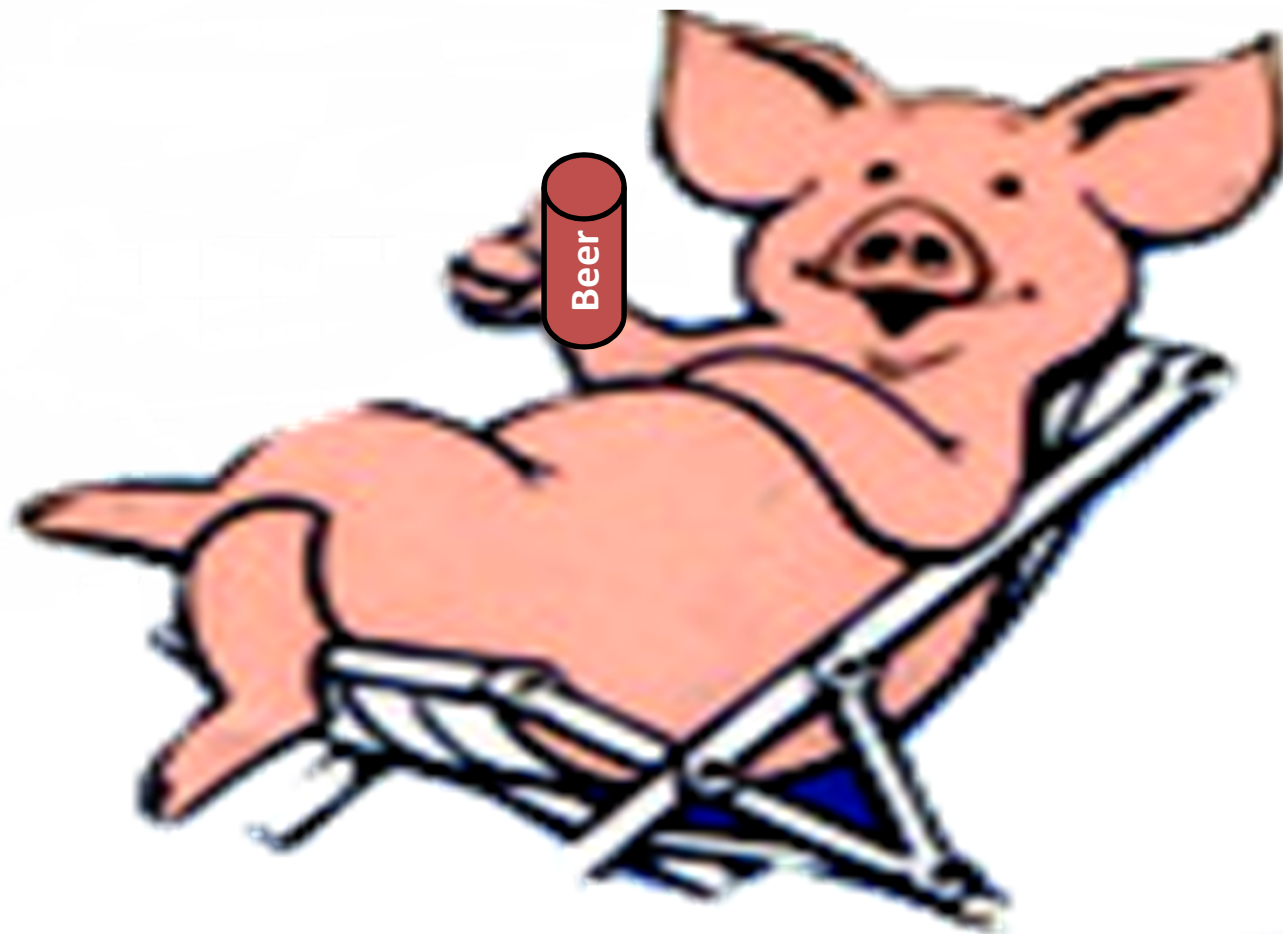
The End !!!!!



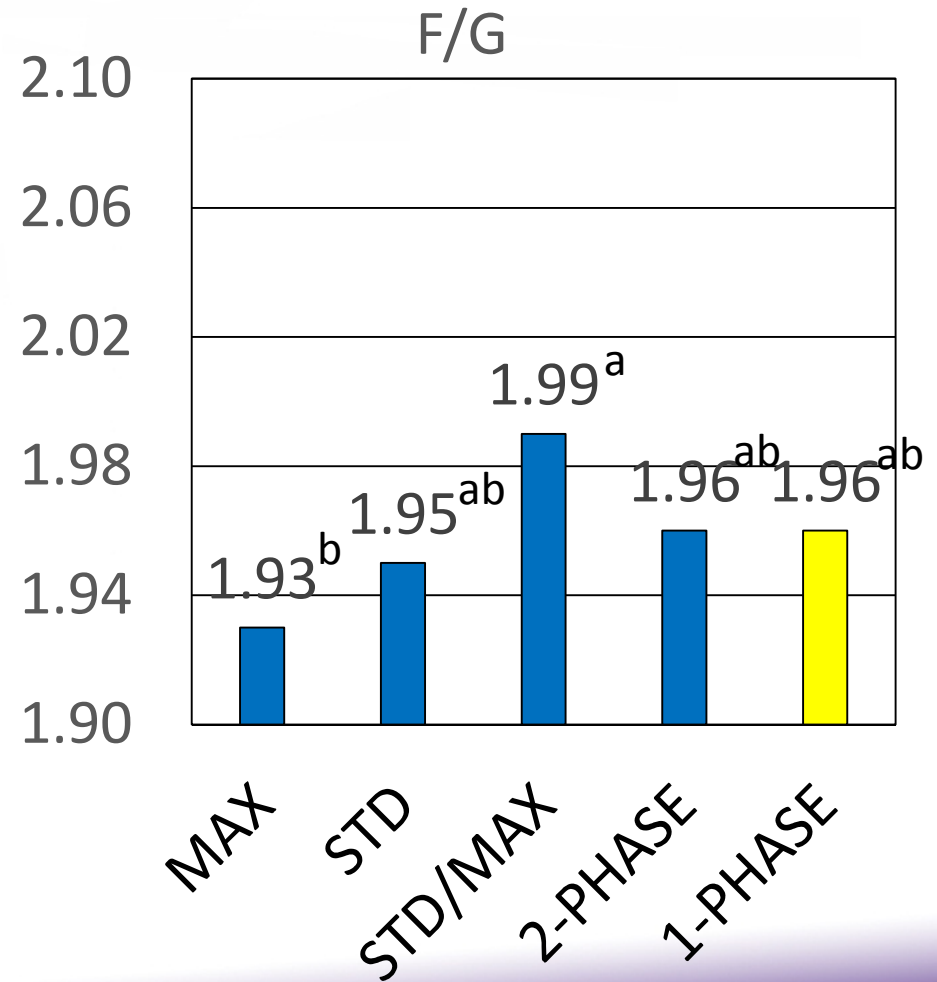
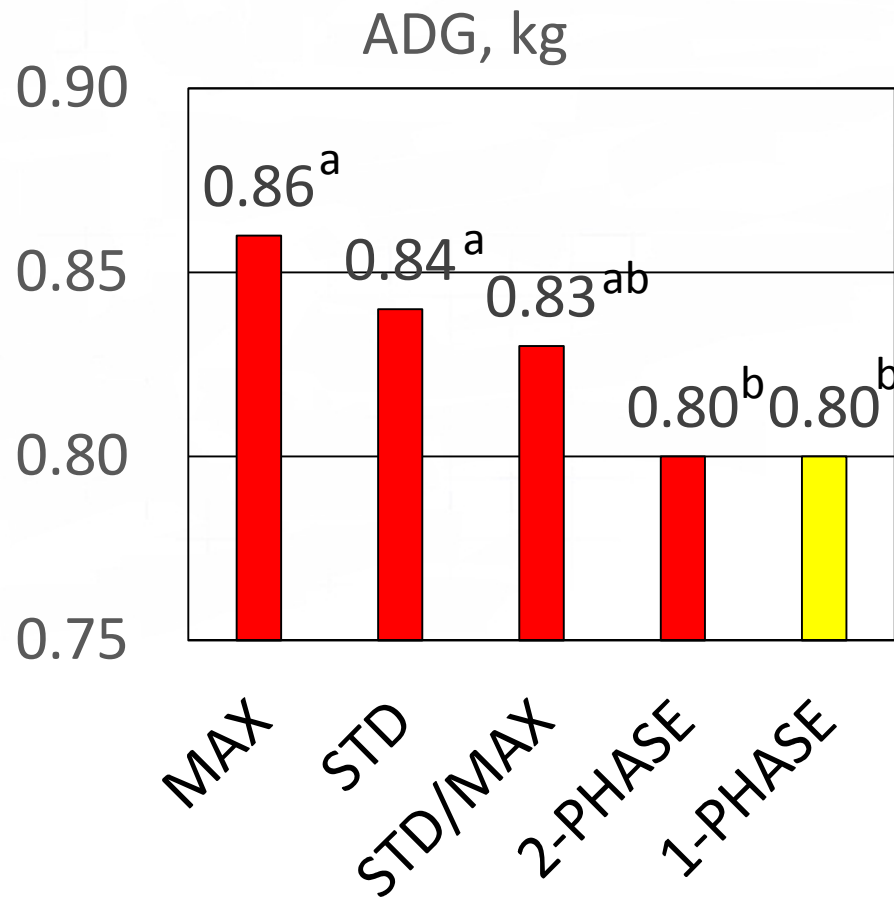
K-STATE
Research and Extension

*Knowledge
for Life*

Thank You!!!!

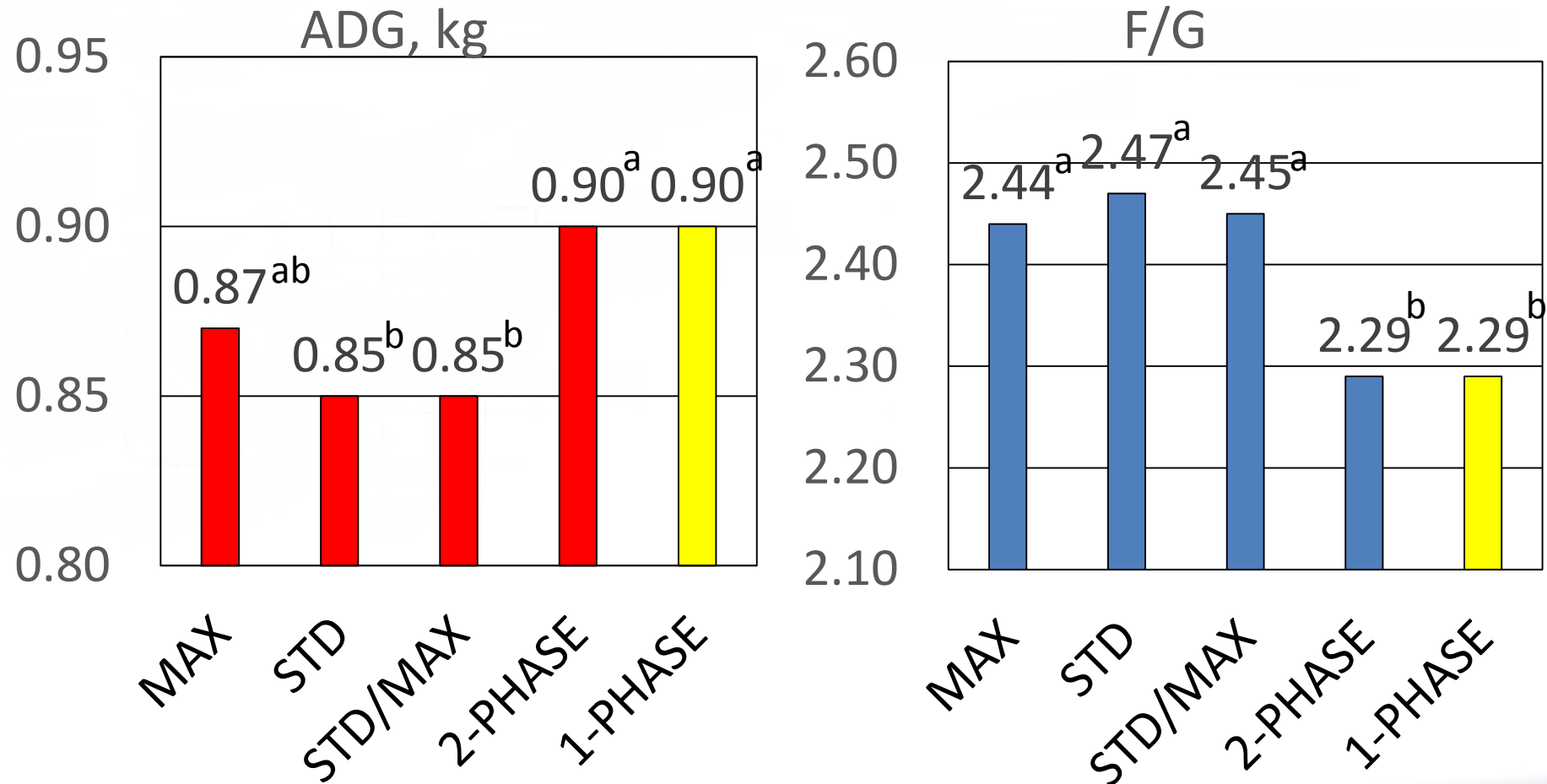


Effect of Phase Feeding Strategies on Growth Performance (day 0 to 25)



P<0.05

Effect of Phase Feeding Strategies on Growth Performance (day 25 to 53)



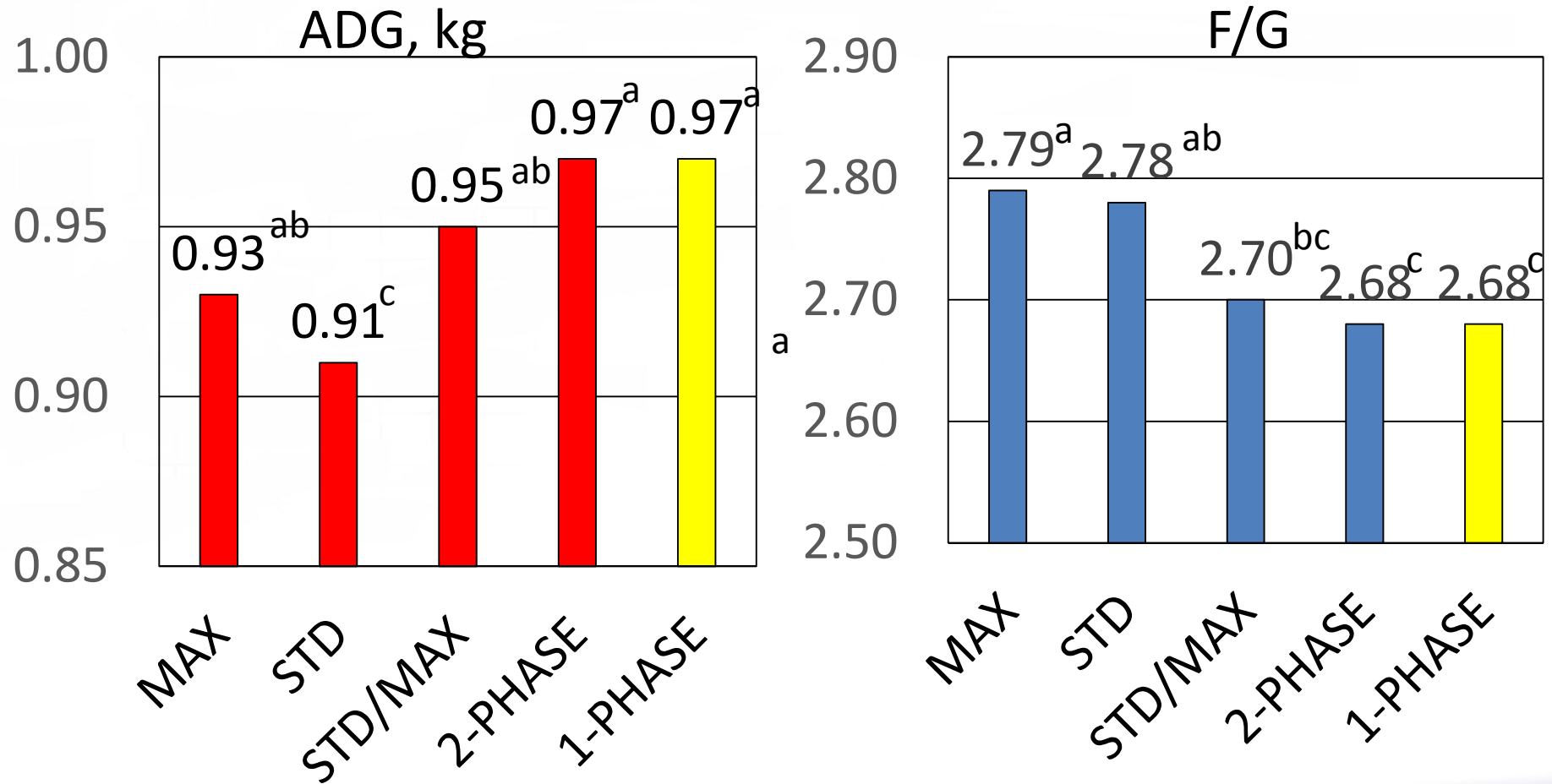
P>0.05

Menegat et al, 2017

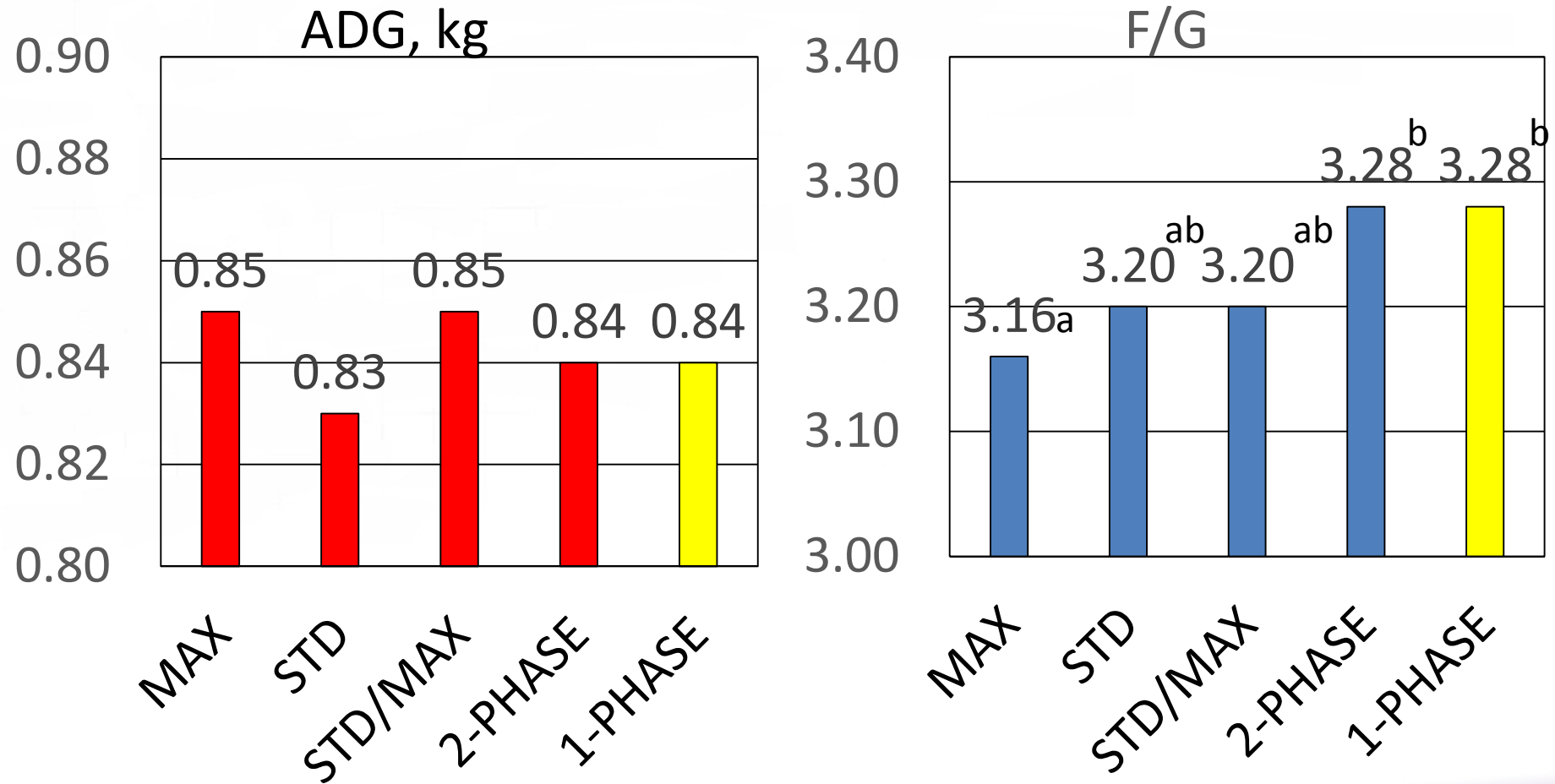
Value of increased growth rate

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 - Pigs can achieve the same market weight regardless of dietary energy (more days on feed)
 - Excess space – Value of gain = 0 or near 0
 - Market weight will increase when higher energy diets are fed (constant days on feed)
 - Limited space – Value of gain = market price or greater

Effect of Phase Feeding Strategies on Growth Performance (day 53 to 81)



Effect of Phase Feeding Strategies on Growth Performance (day 81 to 117)



P>0.10

Menegat et al, 2017

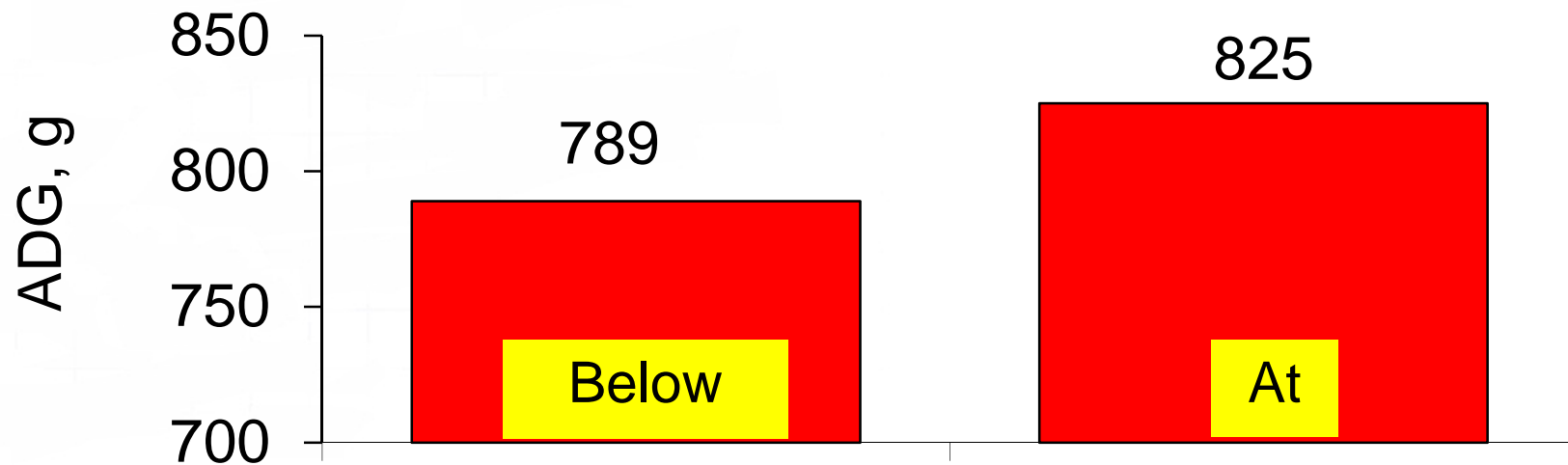
Conclusions

- A single-phase feeding program will not necessarily affect overall growth performance based on compensatory gain.
- However, a single-phase feeding program will be approximately \$3.00 less profitable than a 2 or 4 phase program.

Average Daily Gain

Early Finishing: day 0 to 55, (30 to 77 kg)

P < 0.01



day 0 to 27, Lysine % 0.99

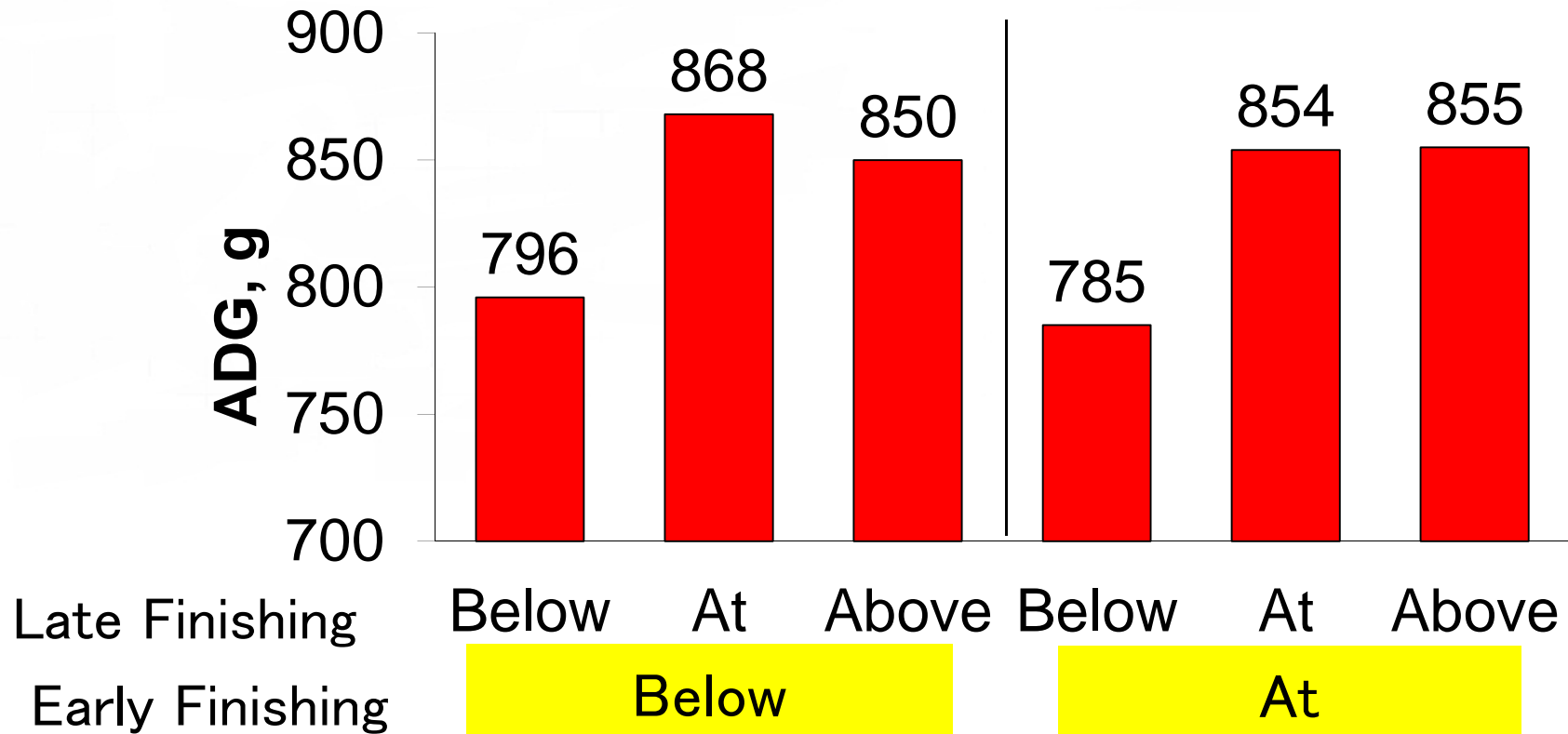
1.18

day 27 to 55, Lysine % 0.81

0.91

Average Daily Gain Day 83 to 104, (90 to 115 kg)

Early, P<0.01
Late, Linear P<0.01



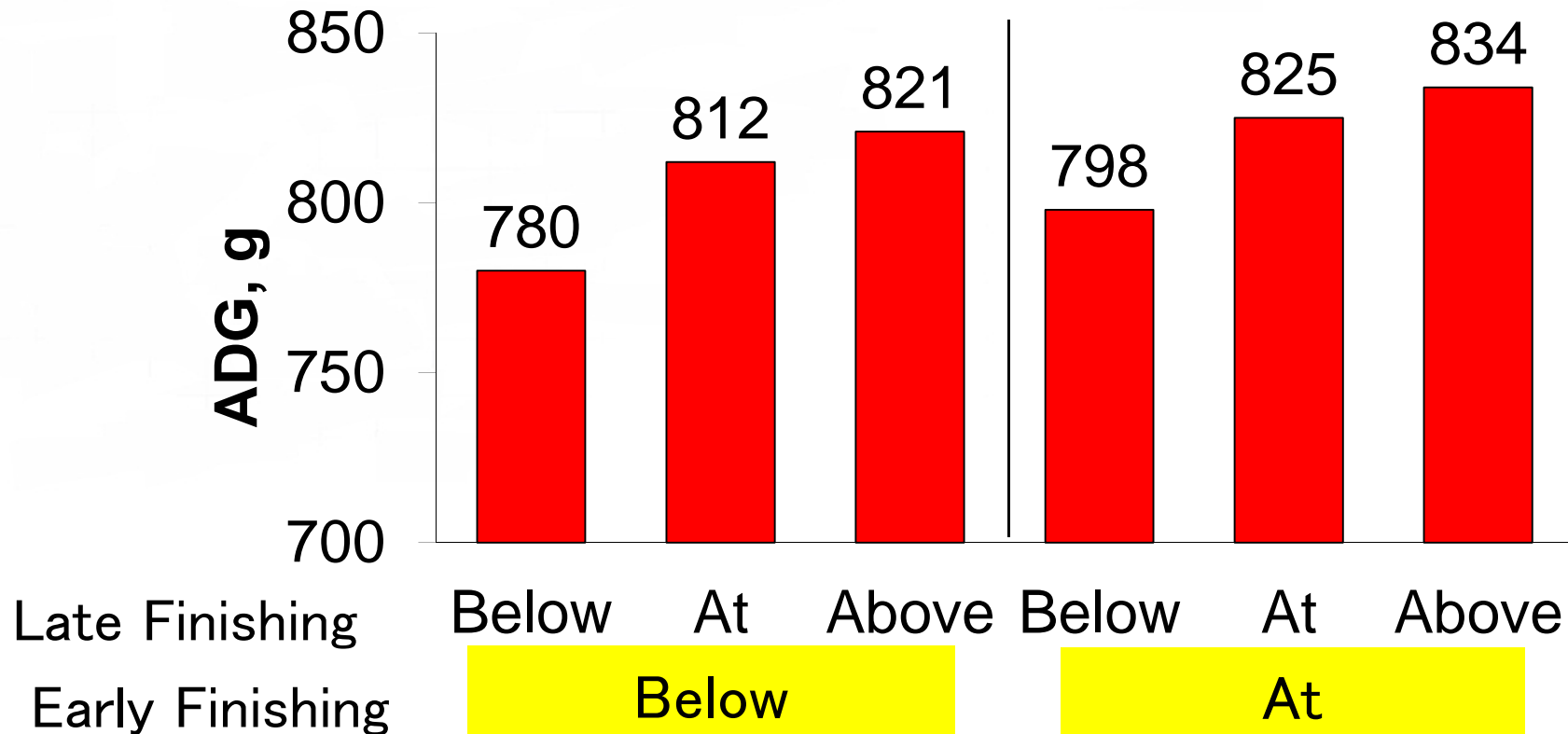
Average Daily Gain

Overall: day 0 to 104, (30 to 115 kg)

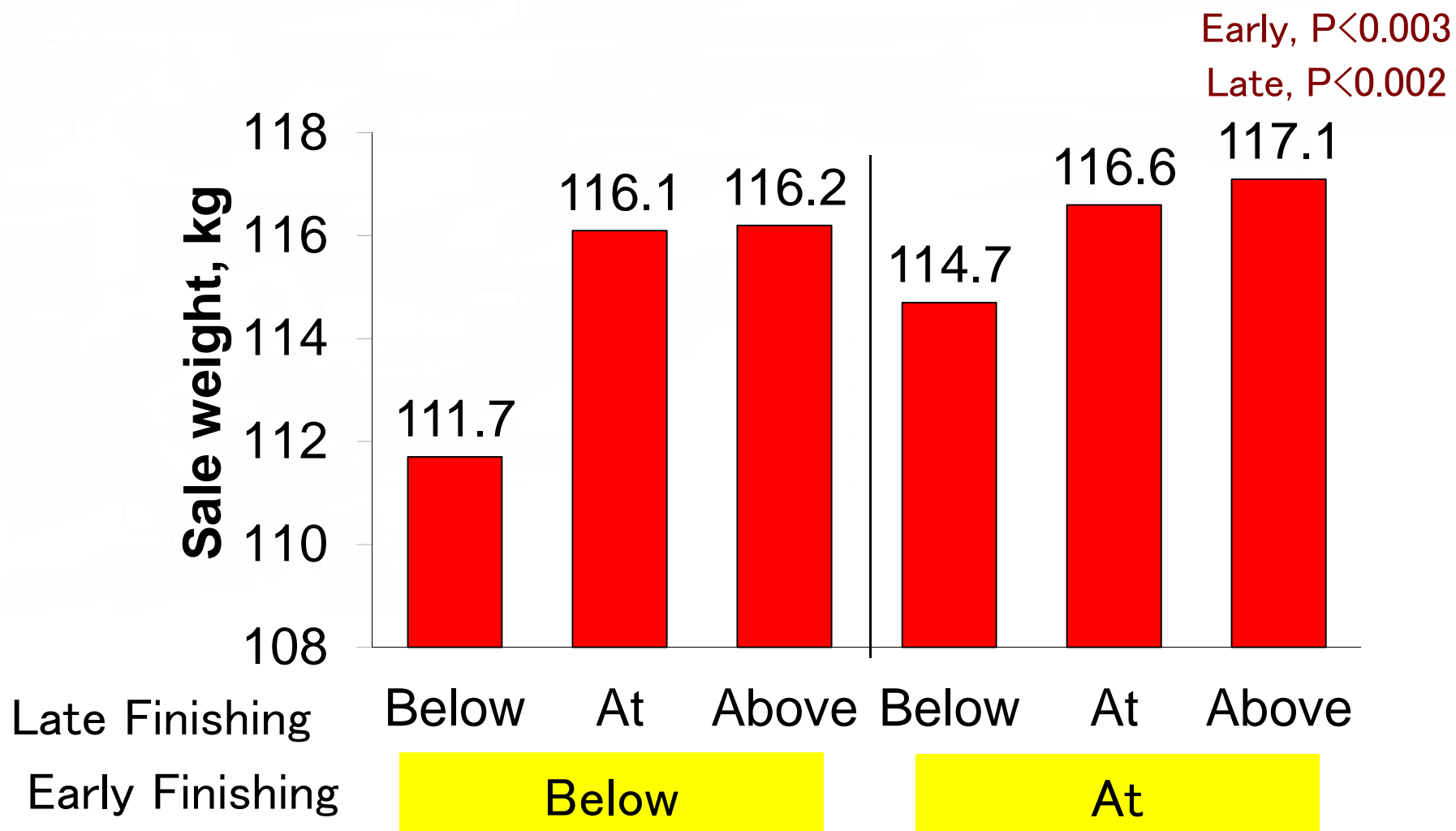
SE = .02

Early, P<0.01

Late, Linear P<0.01



Sale Weight



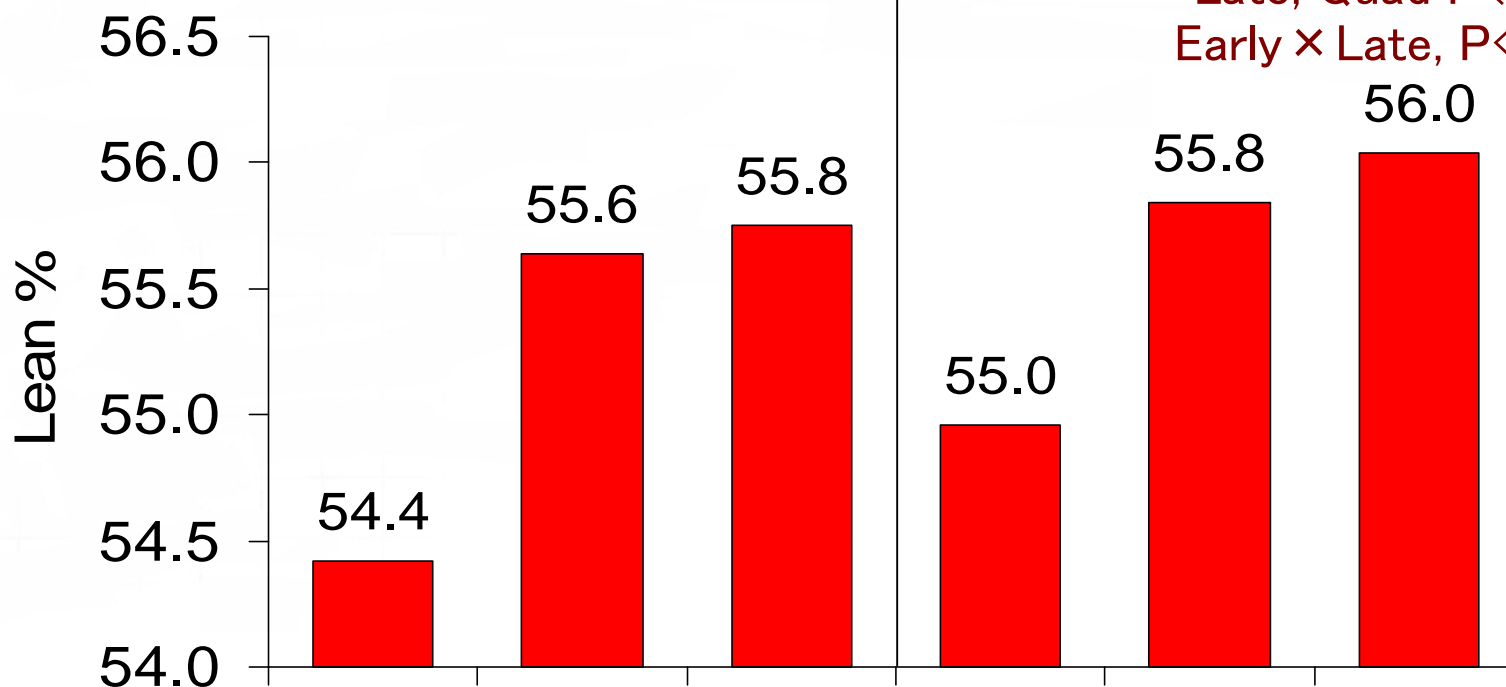
Lean Percentage

SE = 0.16%

Early, $P > 0.14$

Late, Quad $P < 0.01$

Early \times Late, $P < 0.01$



Late Finishing

Below

At

Above

Below

At

Above

Early Finishing

Below

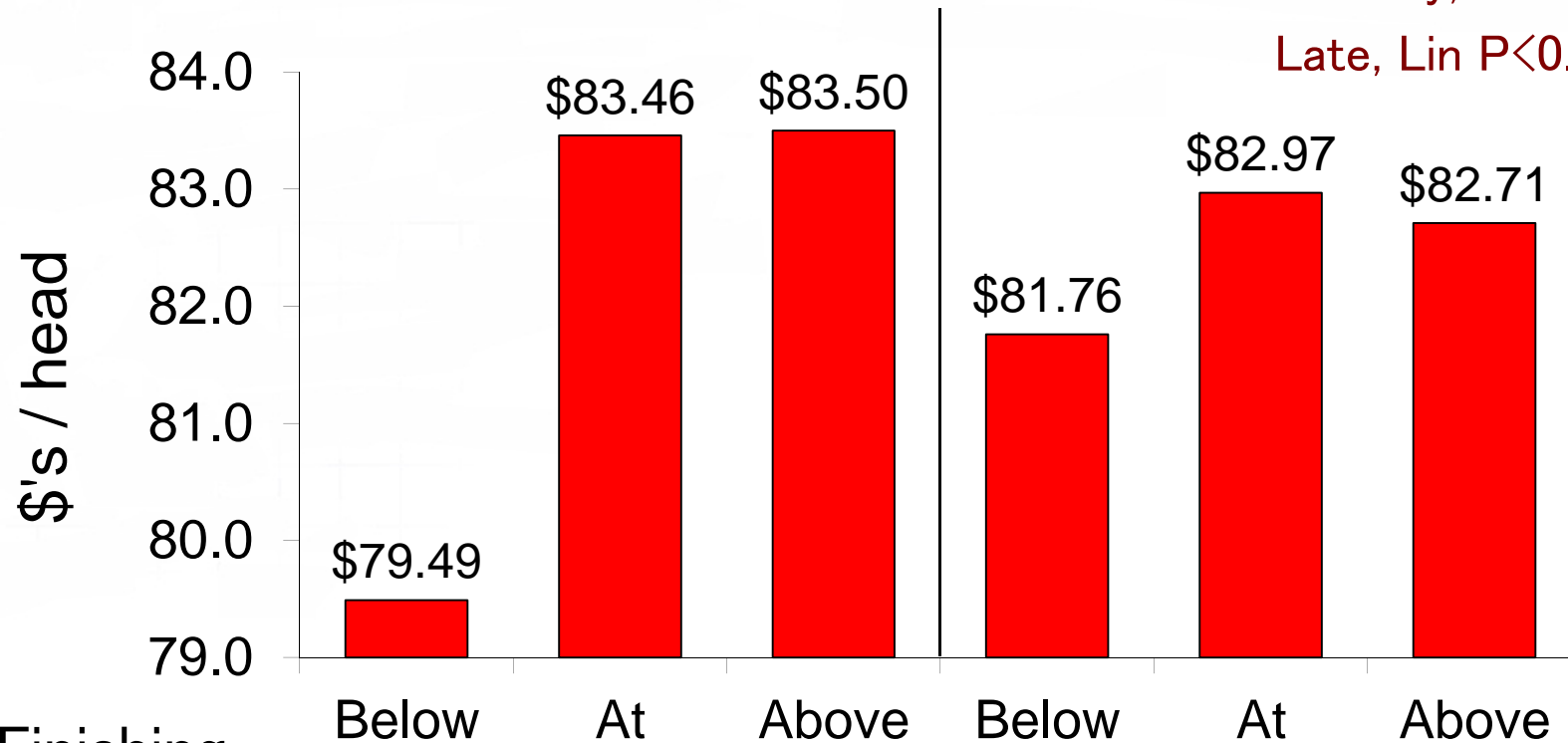
At

Income over Feed Costs

SE = \$1.33

Early, P>0.62

Late, Lin P<0.02



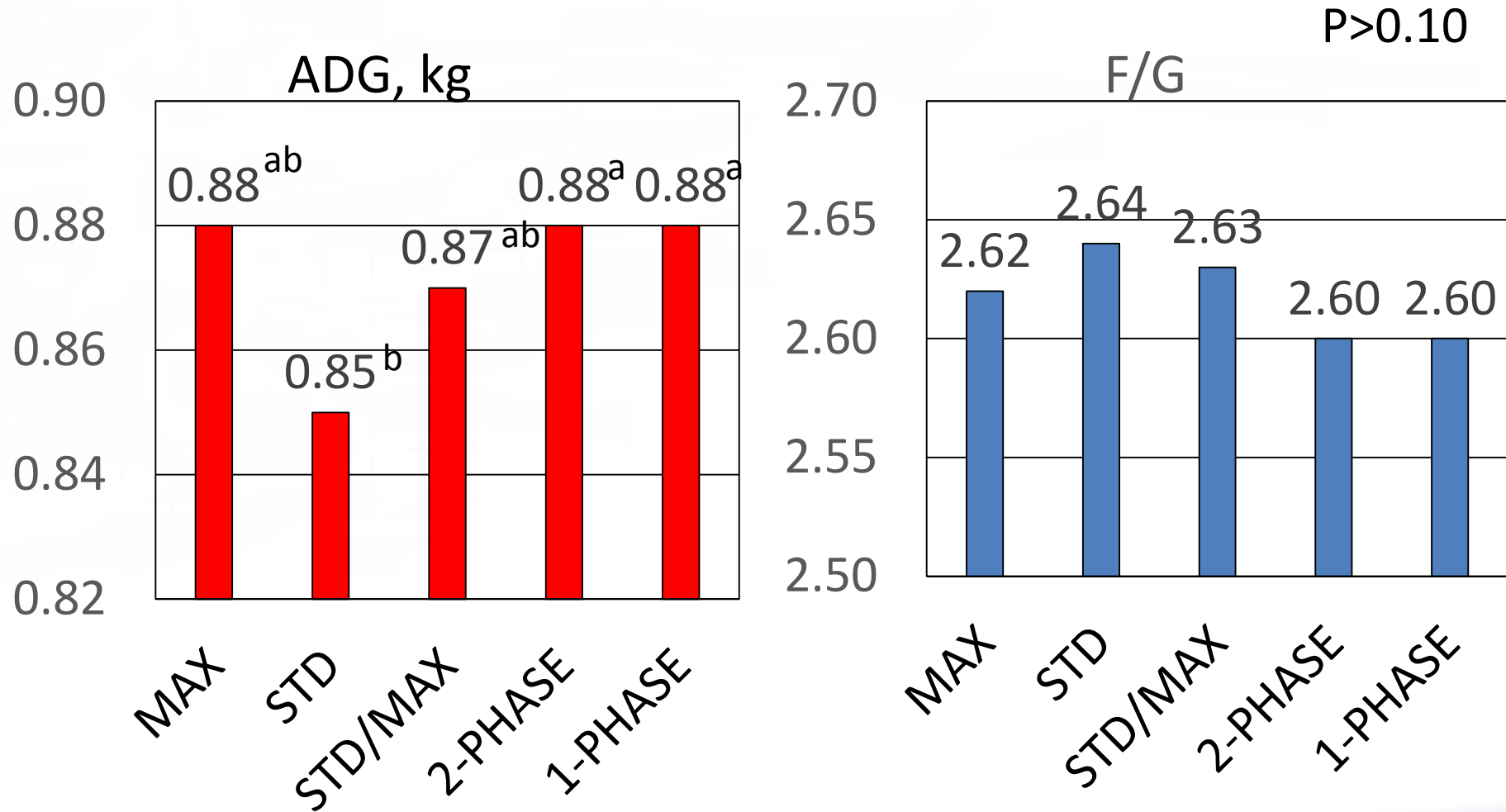
Late Finishing

Early Finishing

Summary

- These studies suggest that as long as lysine requirements are being met in mid-late finishing (80 kg to slaughter), feeding slightly below the lysine requirement for optimal performance in early finishing reduces feed costs, and without sacrificing overall IOFC.

Effect of Phase Feeding Strategies on Growth Performance (day 0 to 117)



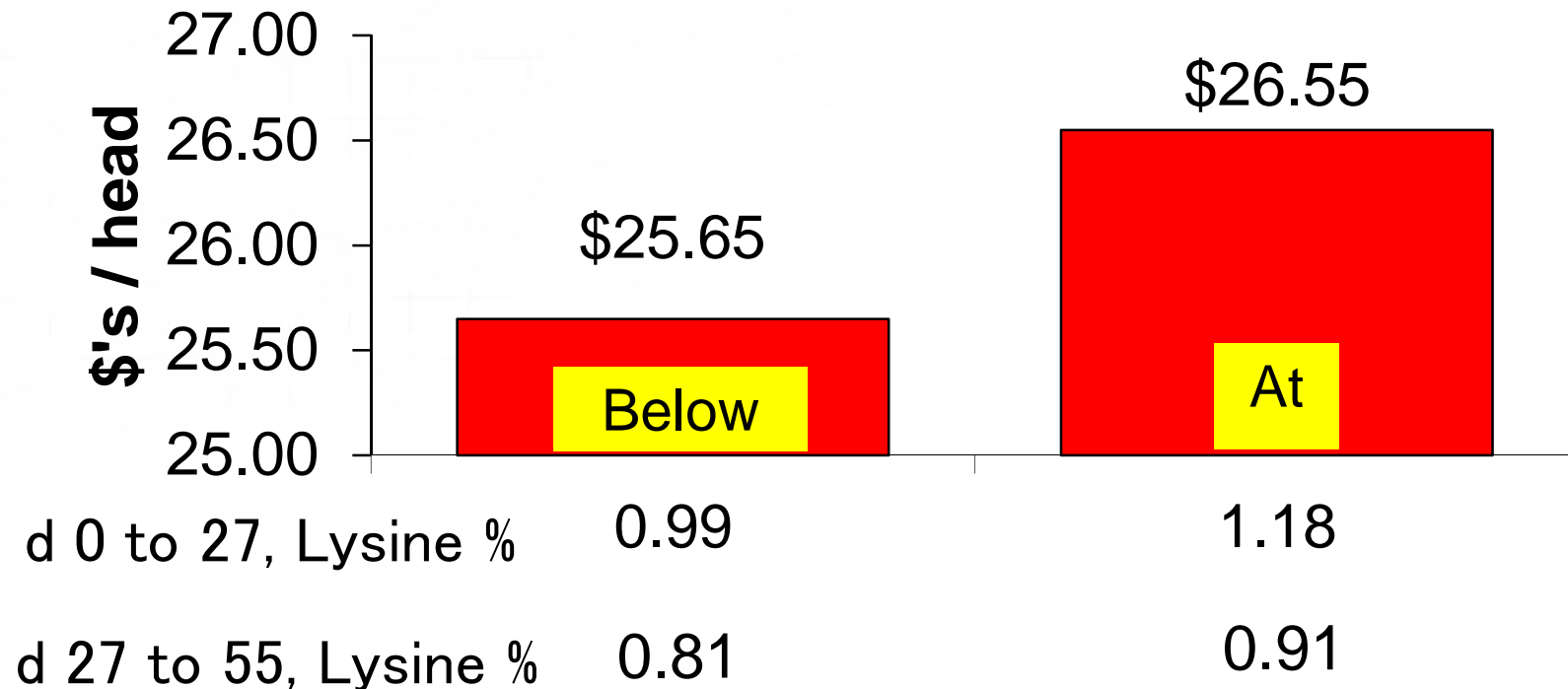
Income over Feed Costs day 0 to 55, (30 to 77 kg)

Assumes: \$ 40.00/cwt live

IOFC = Value of Gain – Cost of Gain

SE = \$0.26

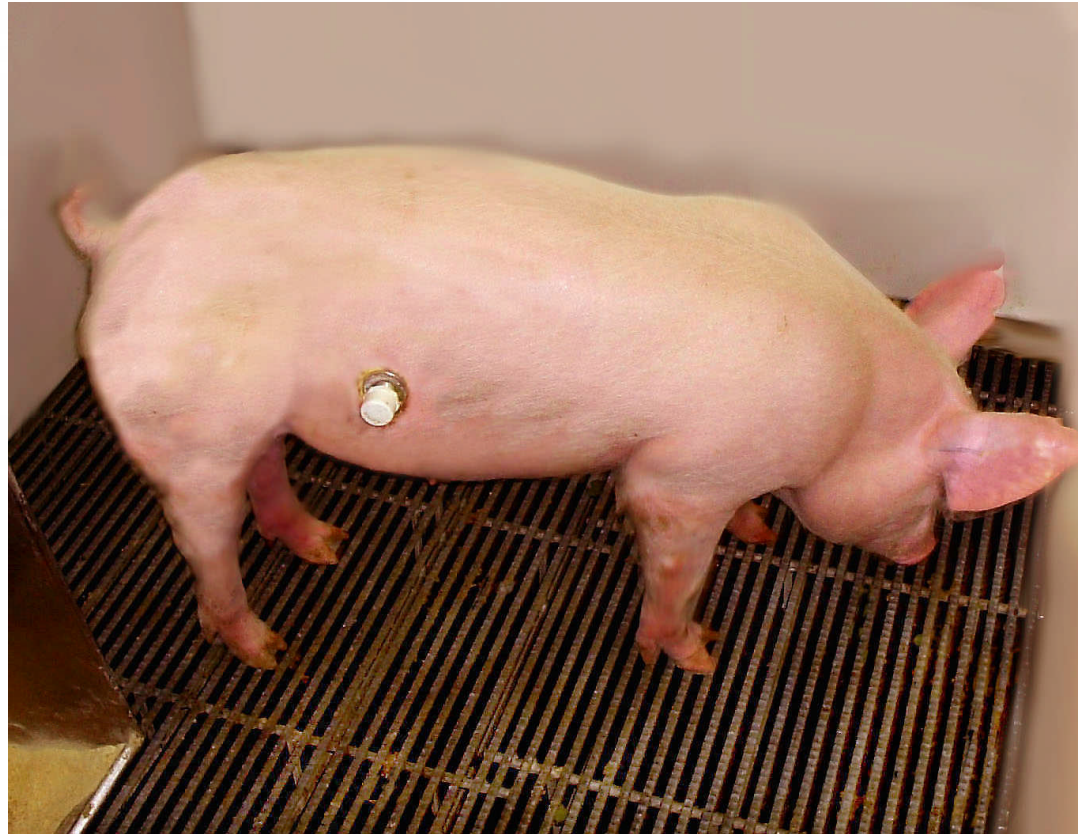
P <0.01



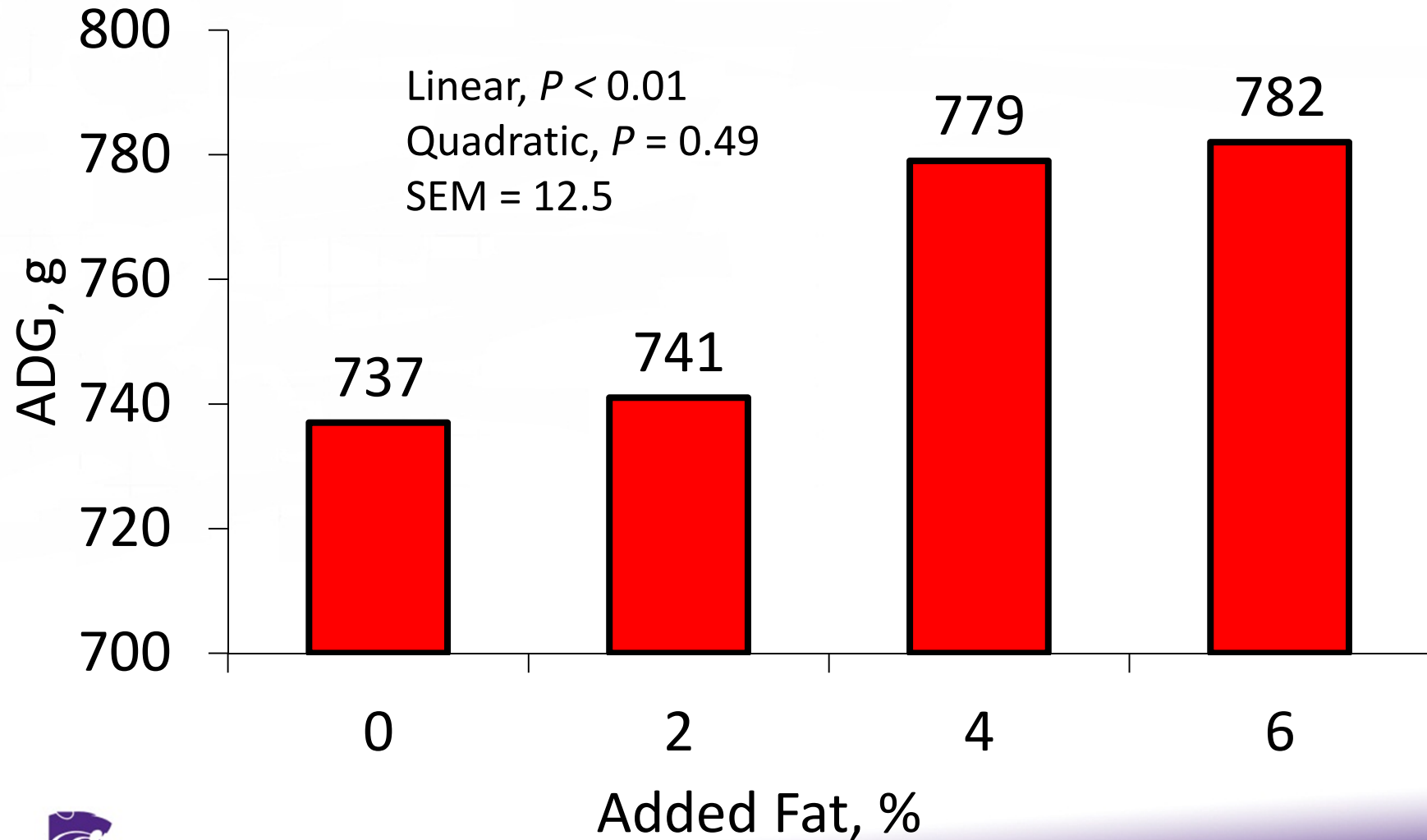
Standardized Ileal Digestibility

- Standardized ileal digestibility (SID)- takes into account nutrients from digestive enzymes and slough intestinal cells
 - Measures enzyme and sloughed cell contributions by feeding nutrient free diet
 - greatest precision potential
 - requires cannula and nutrient free diet

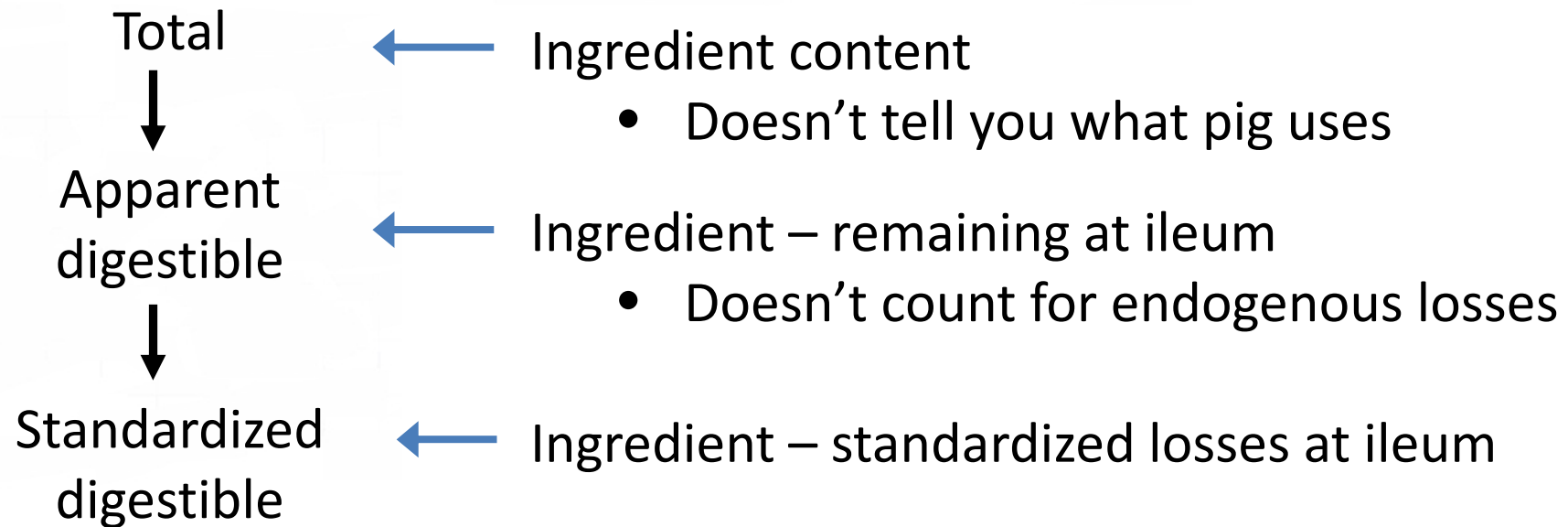
Standardized Ileal AA Digestibility



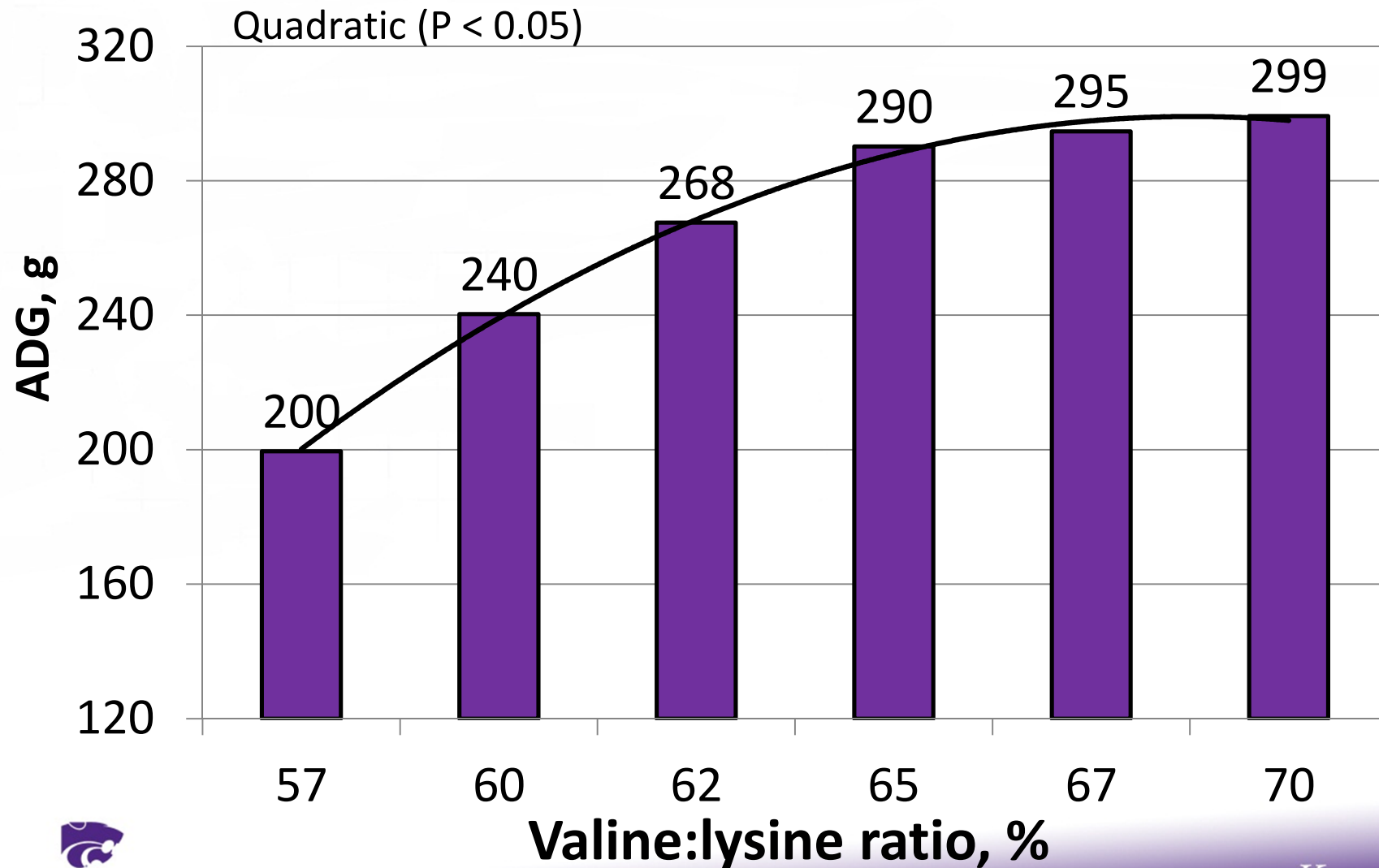
Effect added fat on growth performance of finishing pigs 36 to 120 kg



Amino Acid Digestibility



Evaluation of valine:lysine ratio on growth performance of nursery pigs (7 to 12 kg)



Effect of Phase Feeding Strategies on Feed Cost Per Kg Gain

