Welcome to 2009 Swine Day!

KANSAS STATE UNIVERSITY

SWINE INDUSTRY DAY

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Outline for the Day

- Sow Research
  - Creep Feeding
  - Late Gestation Feeding
  - Importance of Birth Weight
- Nursery Research
  - Starter Diet Ingredients
  - Feed Additives
  - Lysine Requirements
- PCV2 Vaccination
- H_1N_1 Panel

Outline for the Day

- Grow-Finish Research
  - Feeder design and adjustment
  - Amino acid research
  - DDGS and other alternatives
  - Mycotoxins
  - Marketing
    - Mixing and topping pigs and Paylean use
- Kent Bang – Bank of the West
- Ice Cream Reception

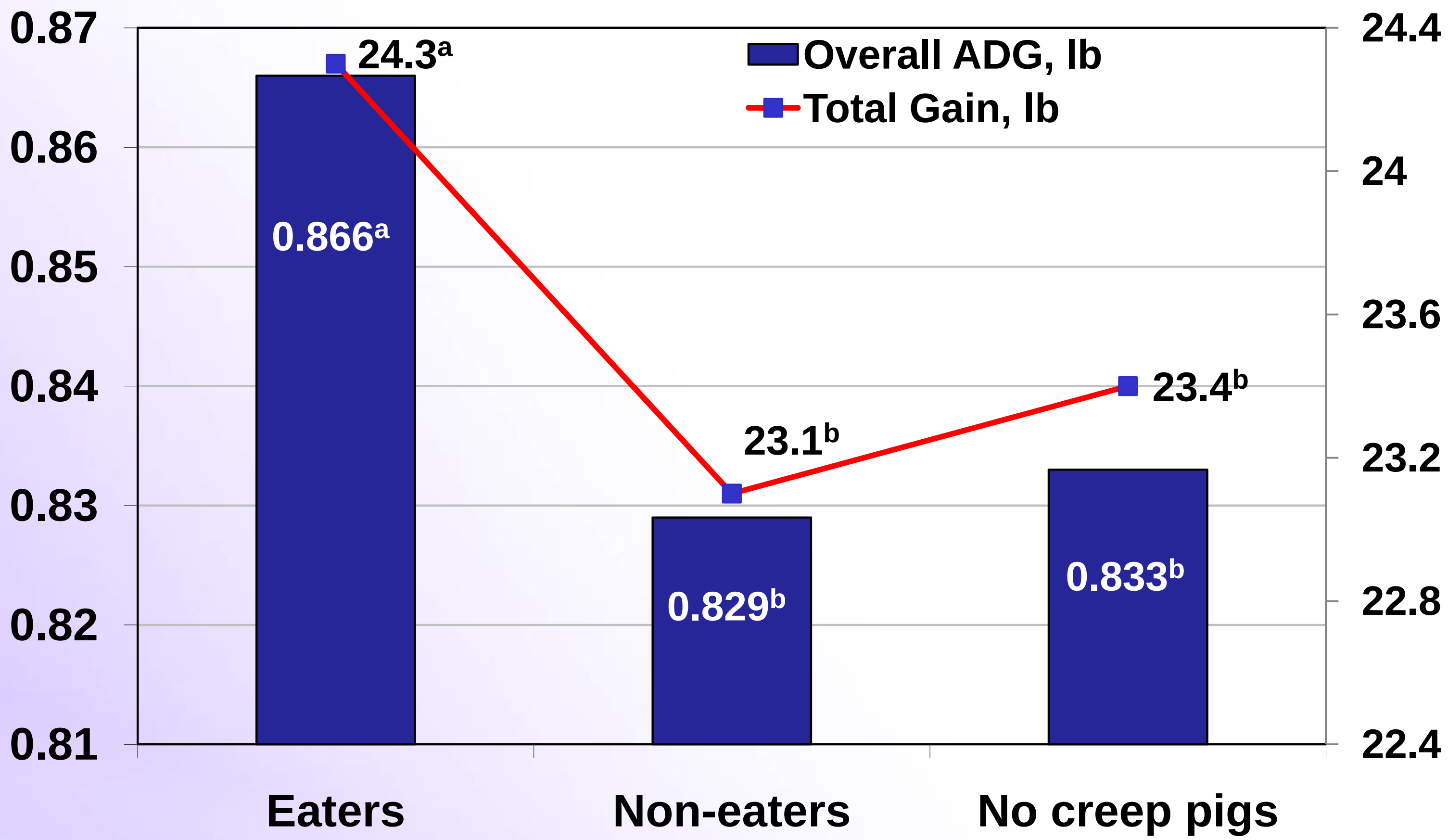
Creep Feeding

K-State Creep Feeding Research

Study #	No. of Litters	Topic
1	84	Creep feeding x lactation feed intake
2	54	Creep feeding duration
3	54	Creep feeder design
4	50	Feed flavors in creep feed
5	96	Creep diet complexity

Sulabo PhD Dissertation, 2009

Creep Feed Impact on Post-weaning Growth



a,b $P<0.05$

Sulabo et al., 2009

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Creep Feeder Design

Rotary feeder
with a hopper

Rotary feeder
without a hopper

Stainless
pan feeder

Sulabo et al., 2009

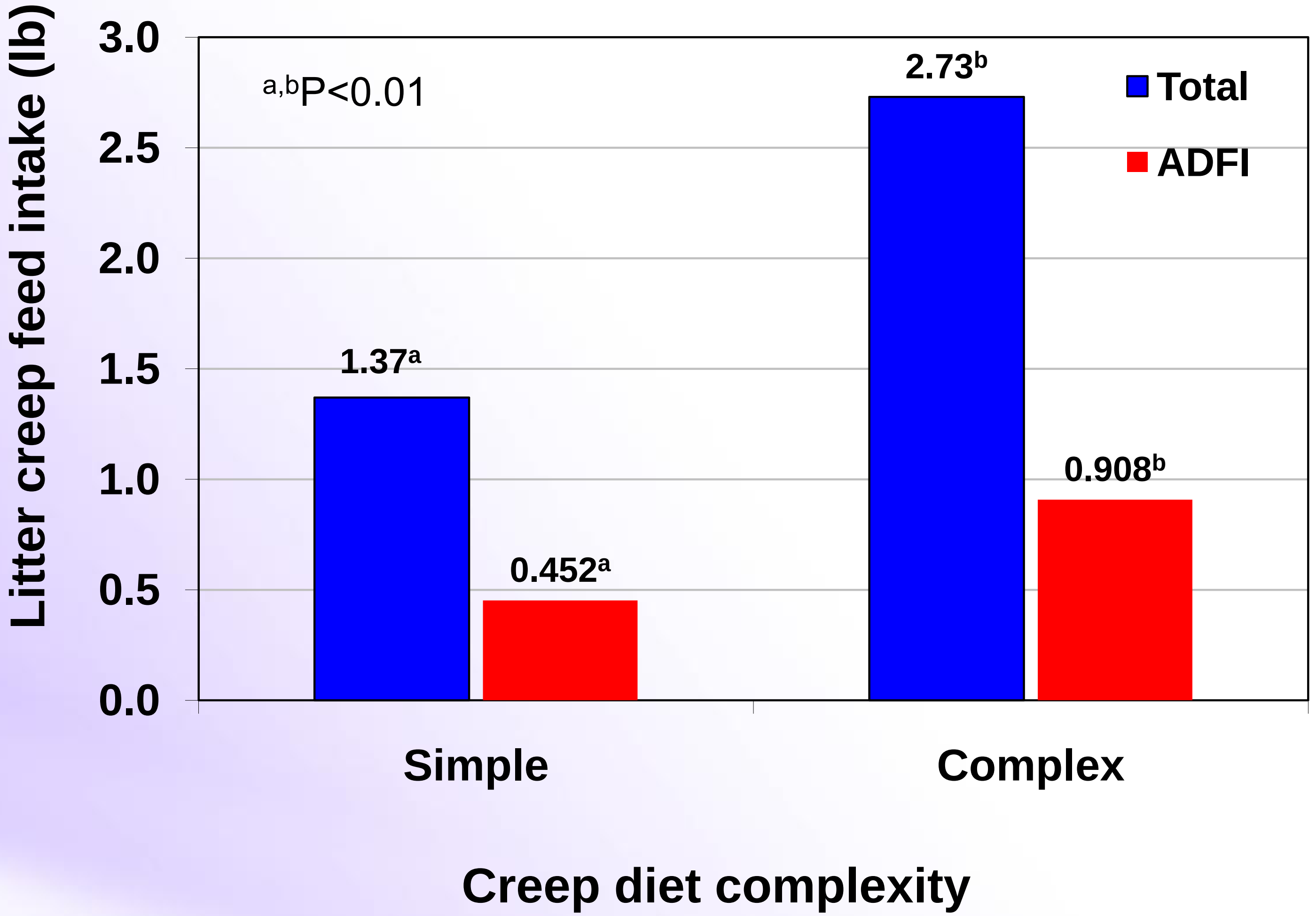
Materials and Methods (Exp. 5)

- 96 sows (PIC) and their litters
- Conducted in a commercial facility
- Dietary treatments:
  - **Treatment 1** – No Creep (n = 26)
  - **Treatment 2** – Simple creep diet (n = 26)
  - **Treatment 3** – Complex creep diet (n = 44)
- Creep fed from d 18 to 21 (weaning) using the rotary feeder with a hopper

Keesecker Agri Business, Inc.
Washington, Kansas

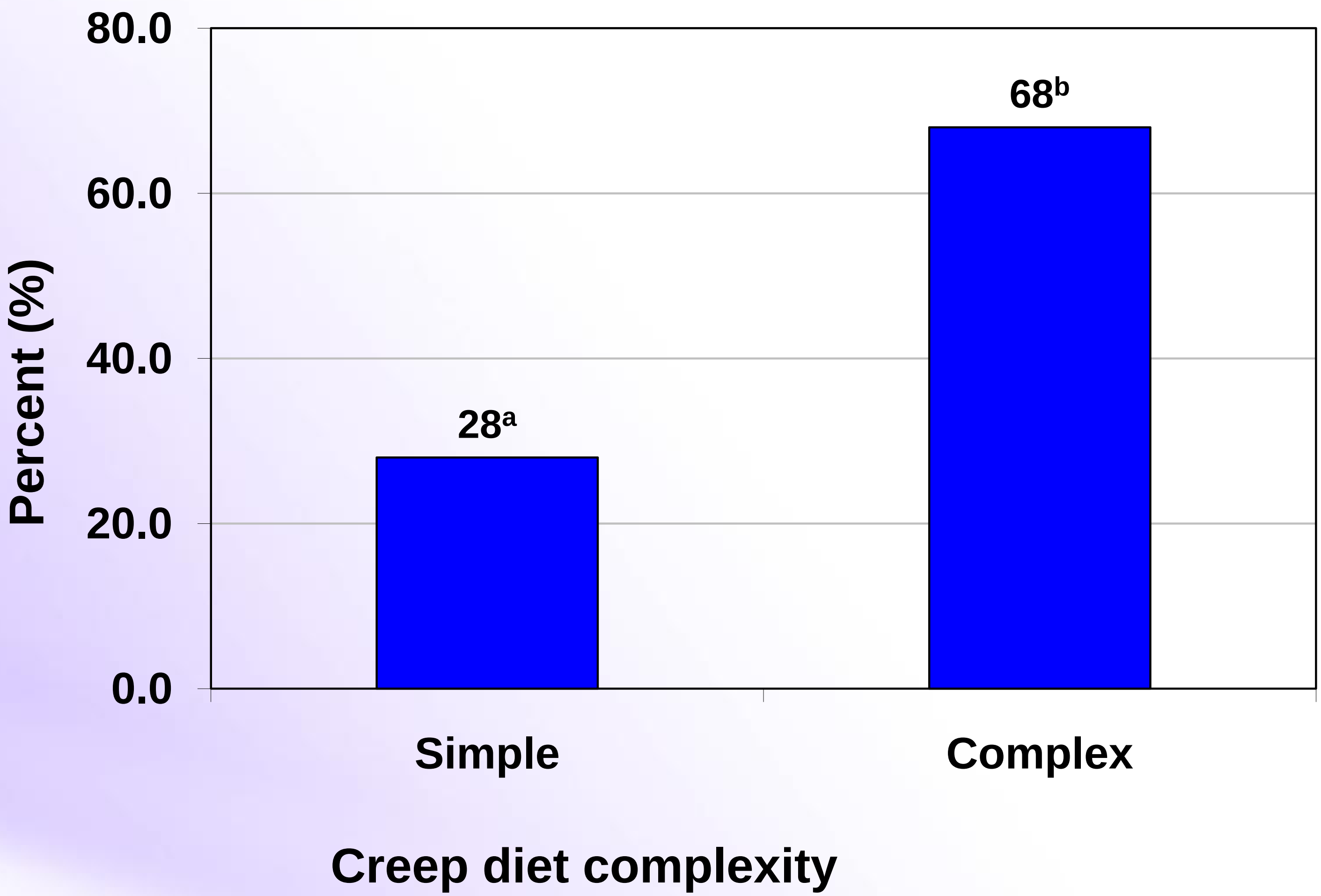
Sulabo et al., 2009

Exp 5 Simple (Sow Feed) vs Complex Creep (Pelleted Diet with Milk Products and Animal Proteins



Sulabo et al., 2009

Effect of creep diet complexity on the proportion of piglets consuming creep feed (Eaters)



[a,b]P<0.0001

Sulabo et al., 2009

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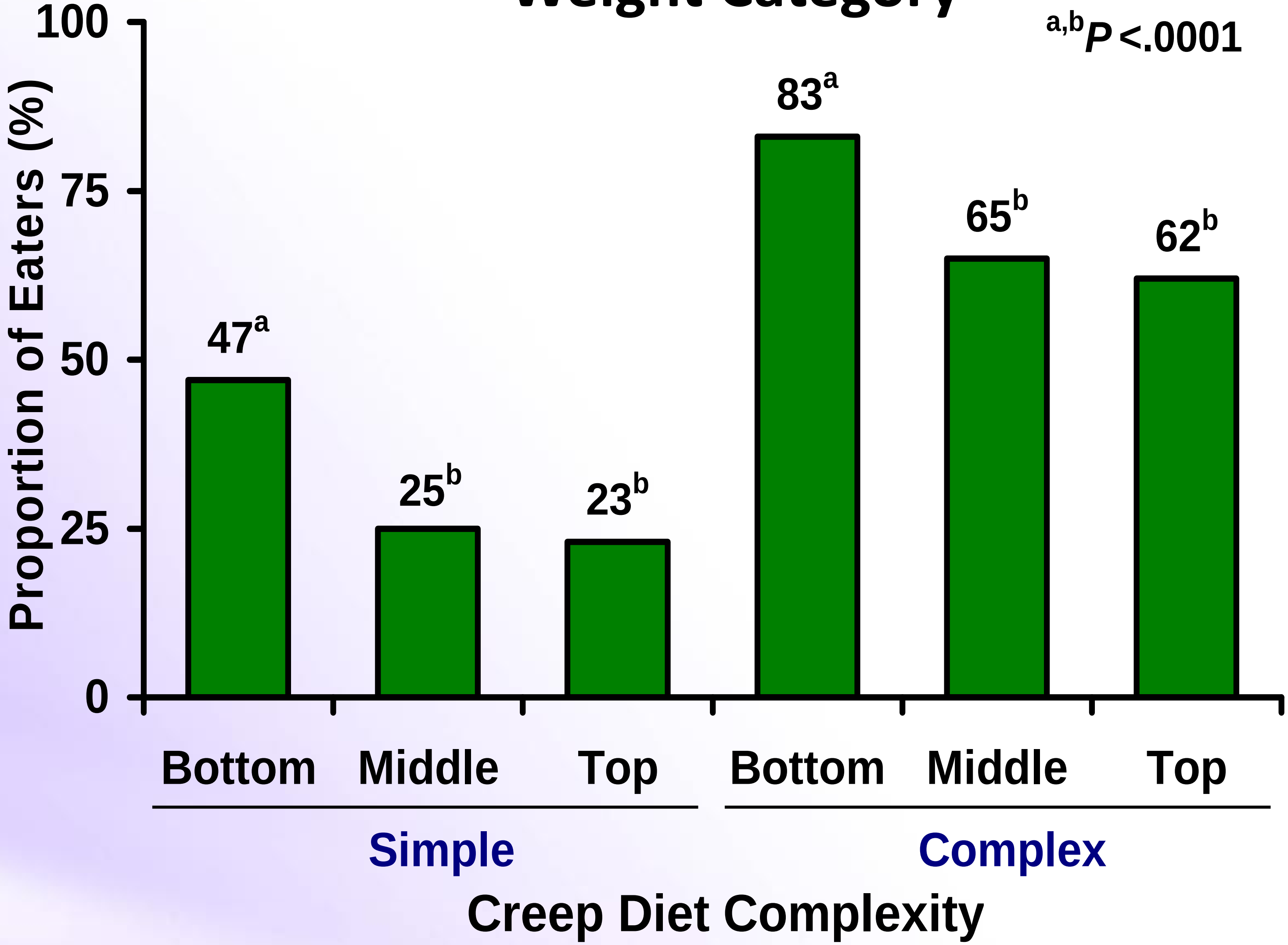
Proportion of Eaters According to Weight Category



Sulabo et al., 2009

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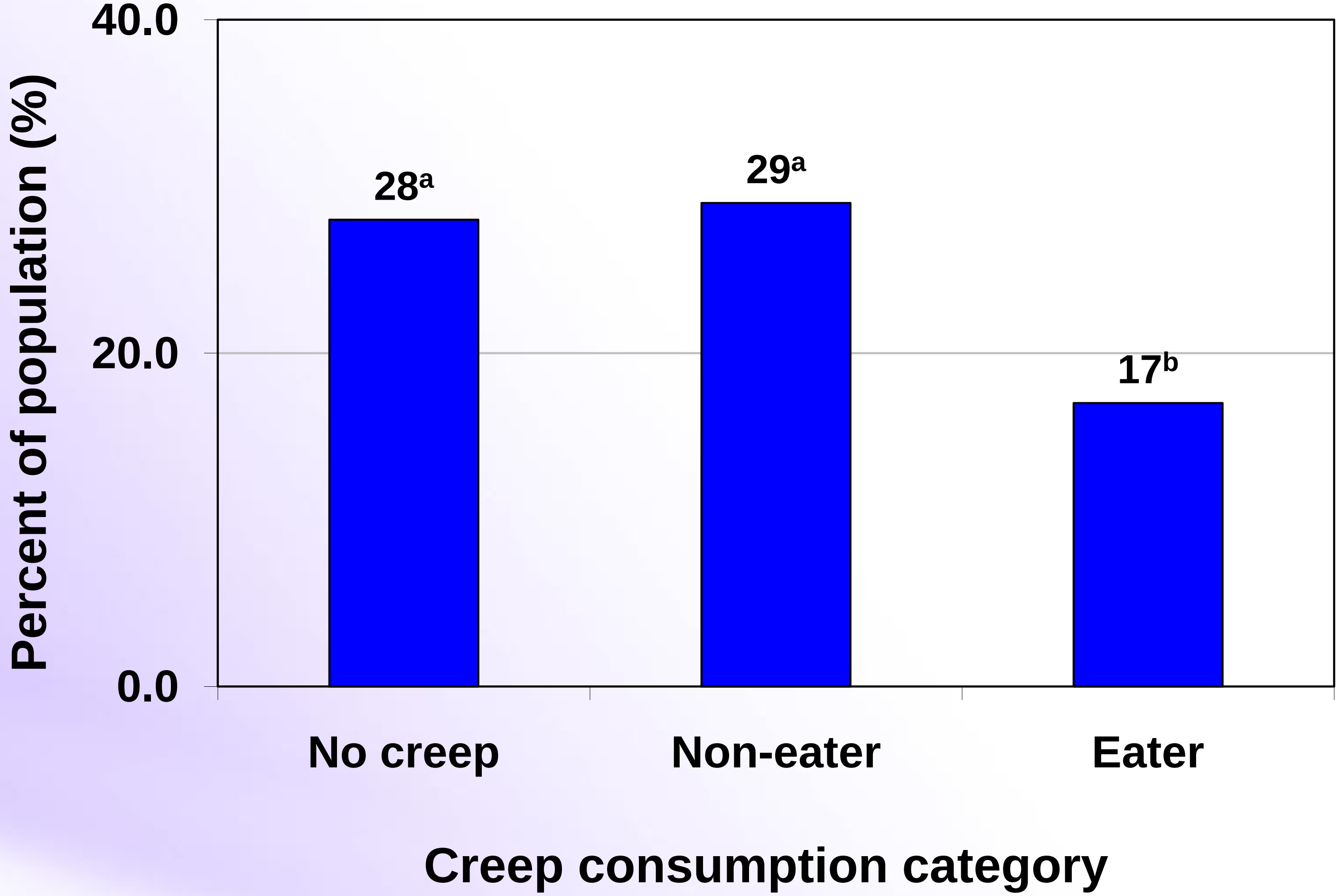
Percentage of pigs failing to gain weight during the initial 3 d after weaning



a,bP<0.0001

Sulabo et al., 2009

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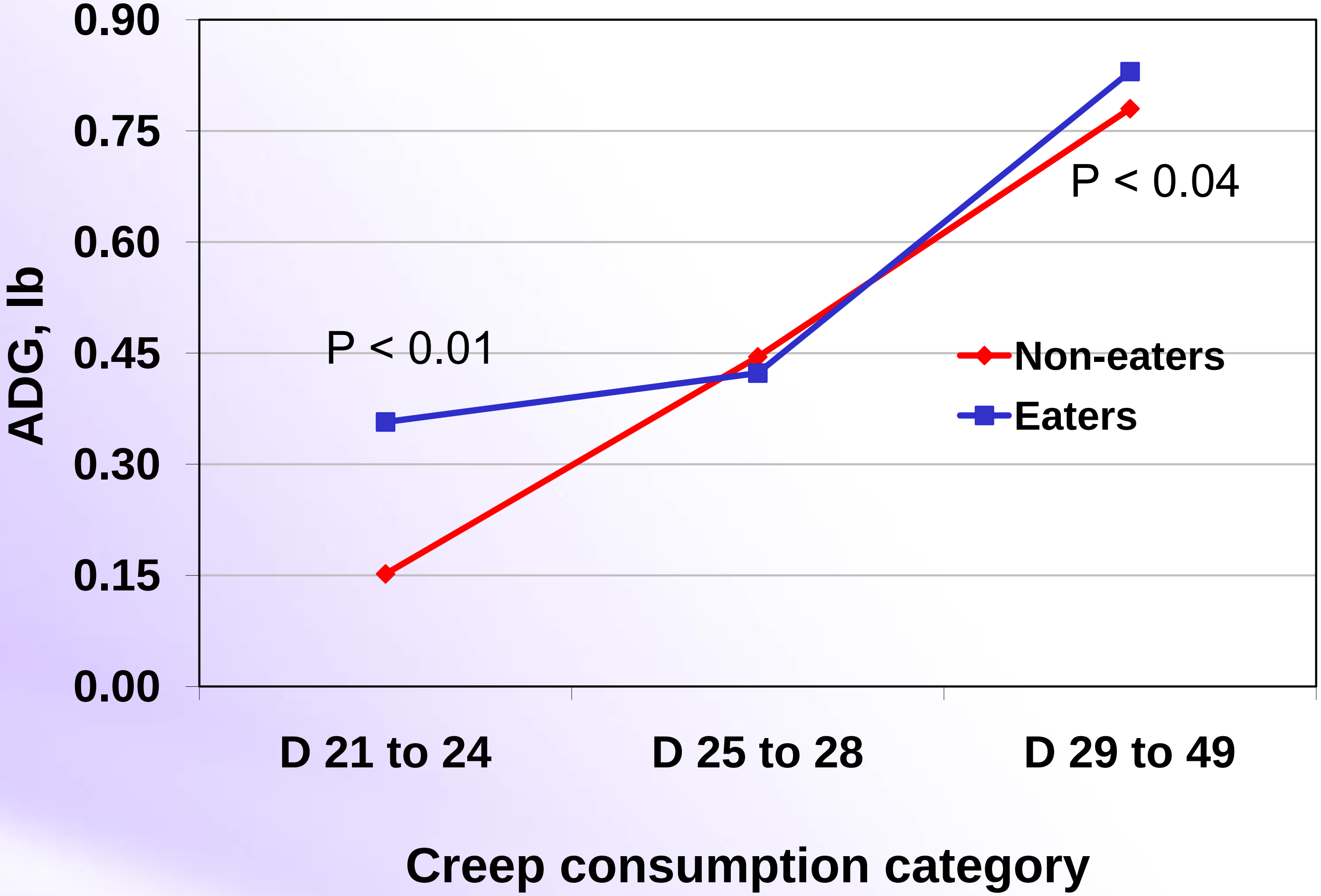
Influence of creep feed consumption on performance after weaning



D 21 to 49, lb/d

Non-eat 0.67

Eater 0.72

$P < 0.01$

Sulabo et al., 2009

Creep Feeding Practical Recommendations:

- Start 3 to 5 days before weaning
- Use appropriate creep feeder design and a complex creep feed
- Target 1.1 to 2.2 lb creep feed consumption per litter

Effect of Increased Late Gestation Feed Intake

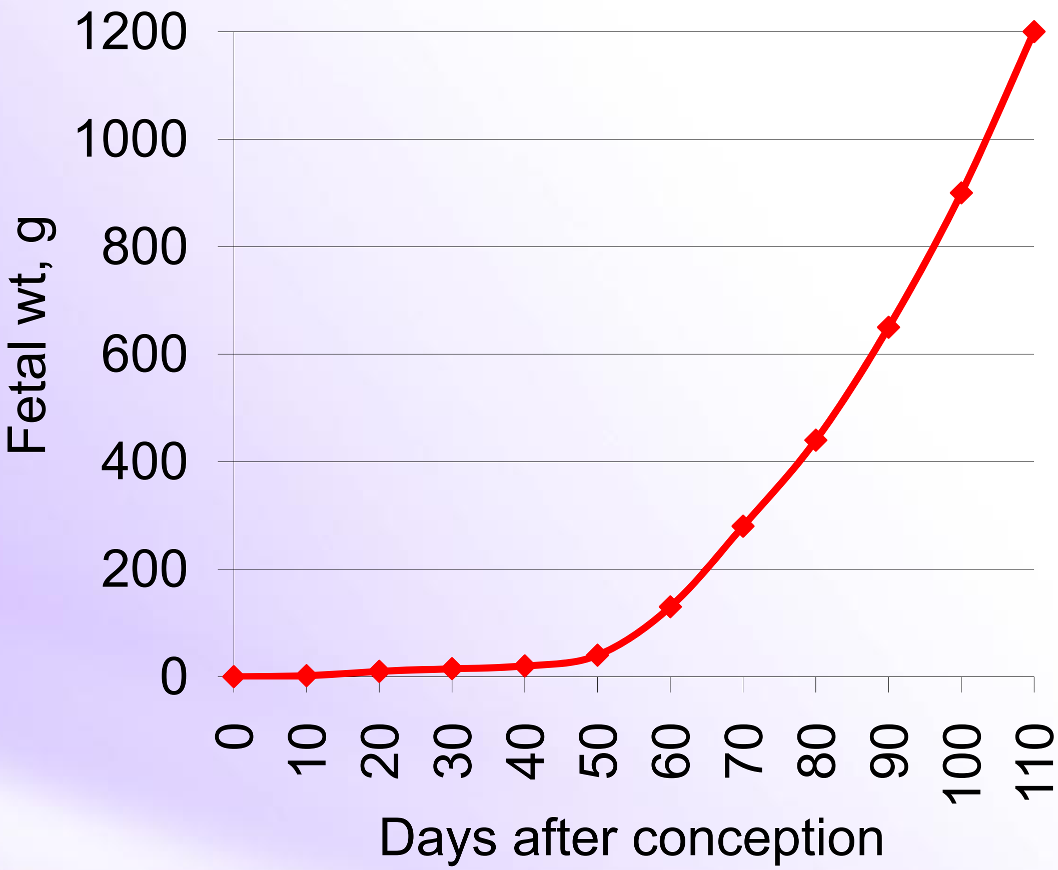
+2.0 lb from d 90 to 112

PIC 1050 Sows

Shelton et al., 2010

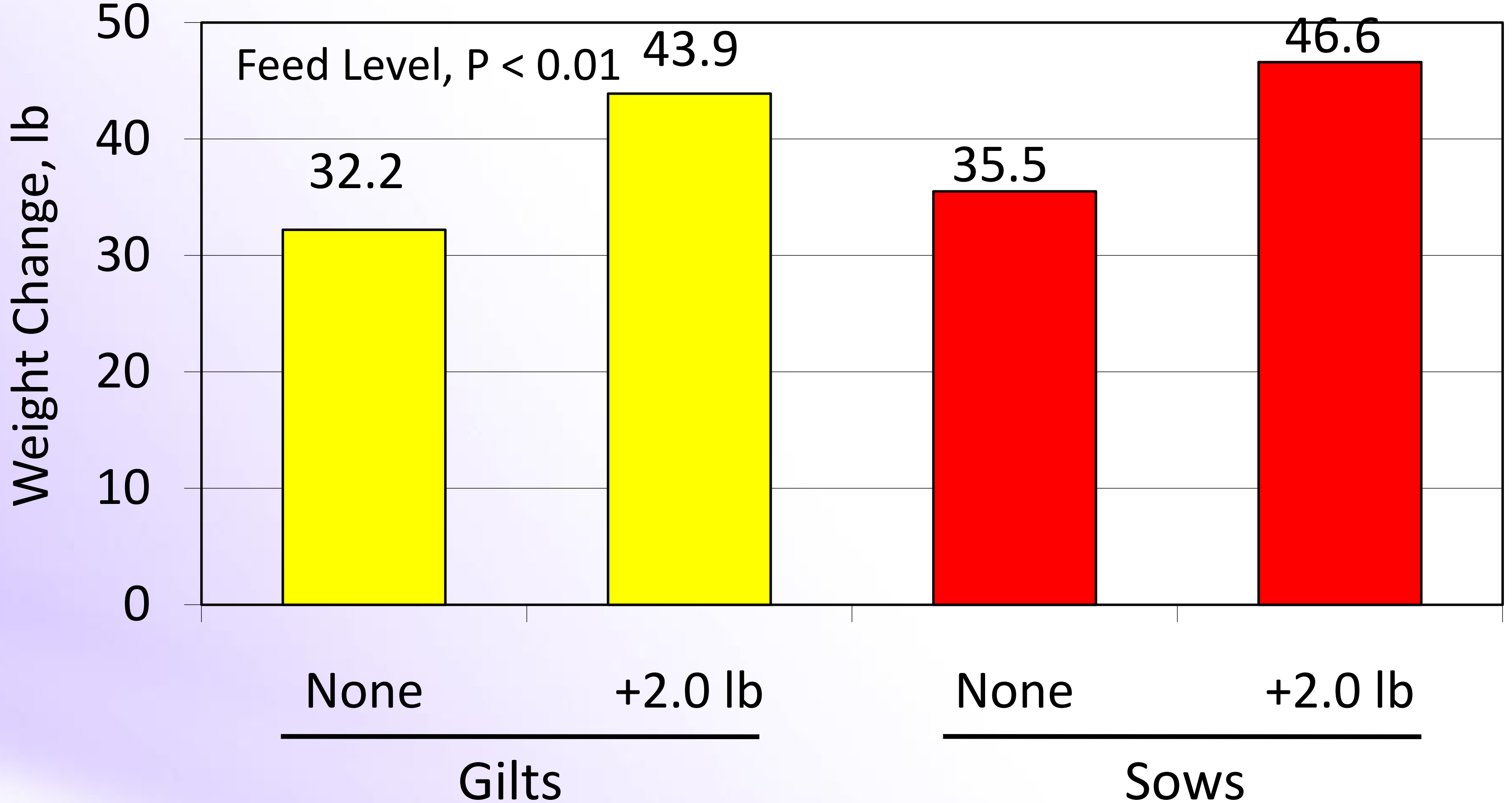
Kansas State University

Fetal Growth in Gestation



The majority of fetal growth occurs during the last 1/3 of gestation. As a result many producers increase feed intake in late gestation.

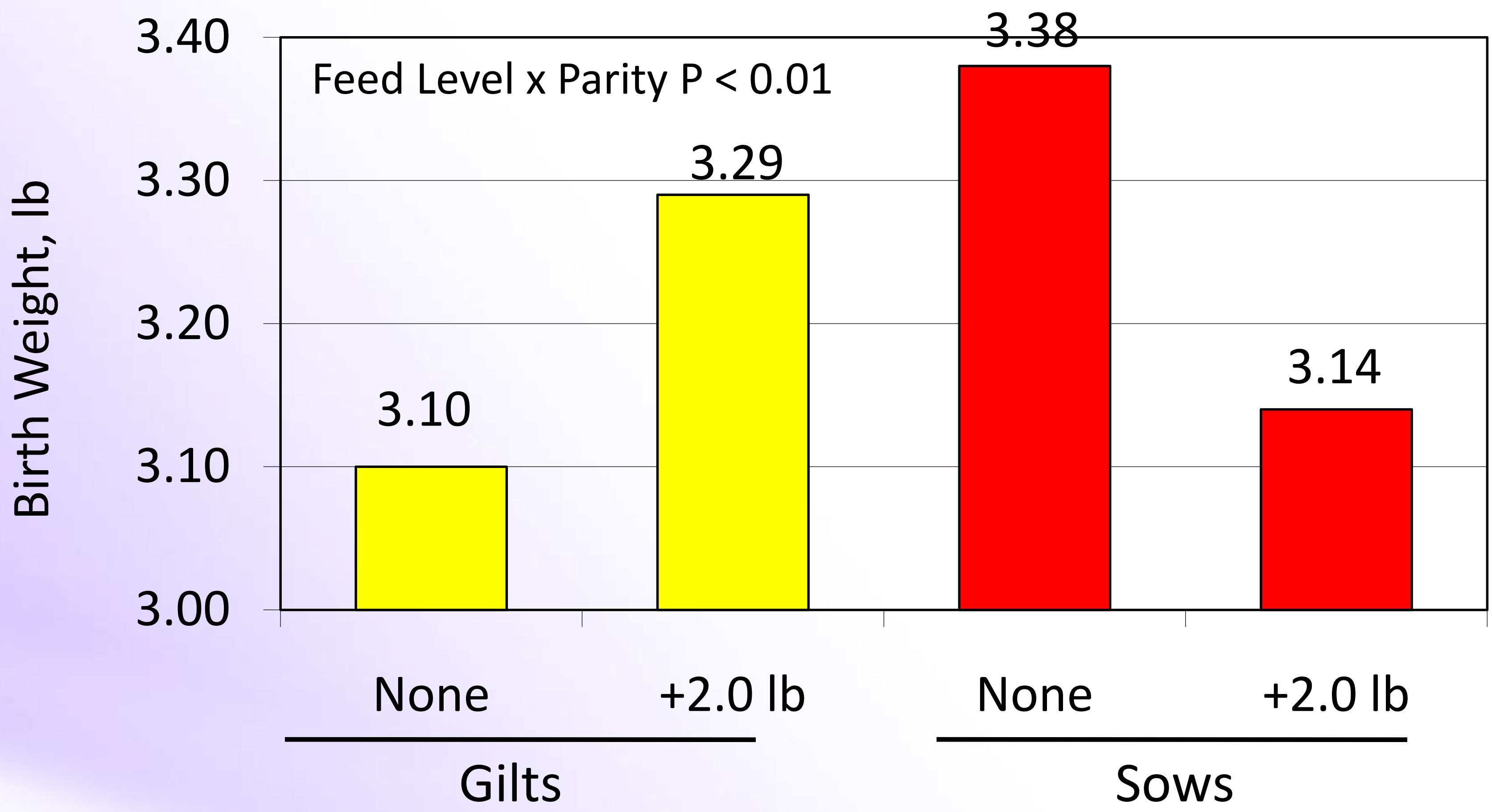
Gestation Weight Change d 90 to 112



Fat Depth, mm: 19.0 19.9 14.9 15.3

Shelton et al., 2010

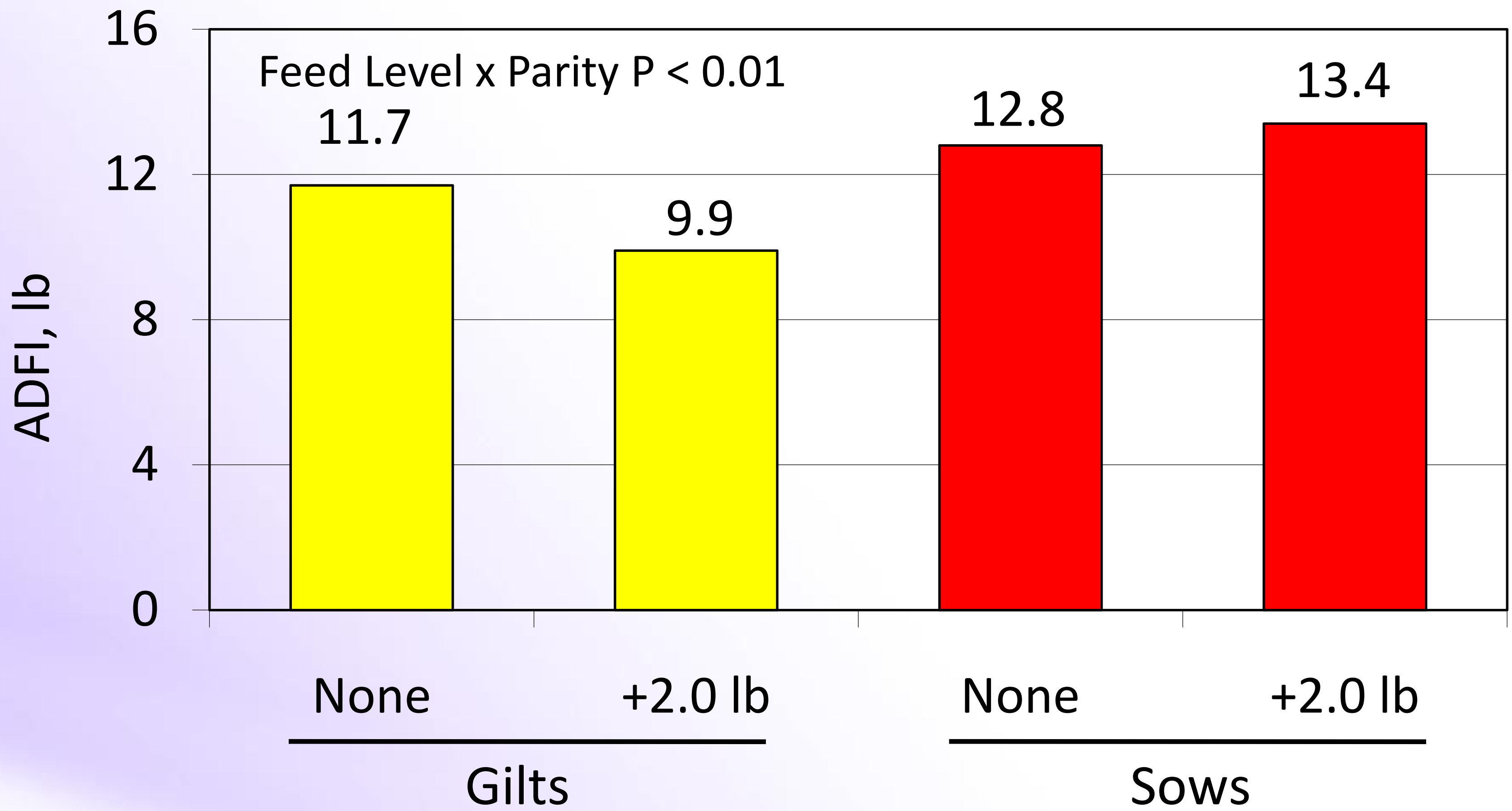
Piglet Birth Weight



Live Born: 13.8 12.9 11.2 12.3

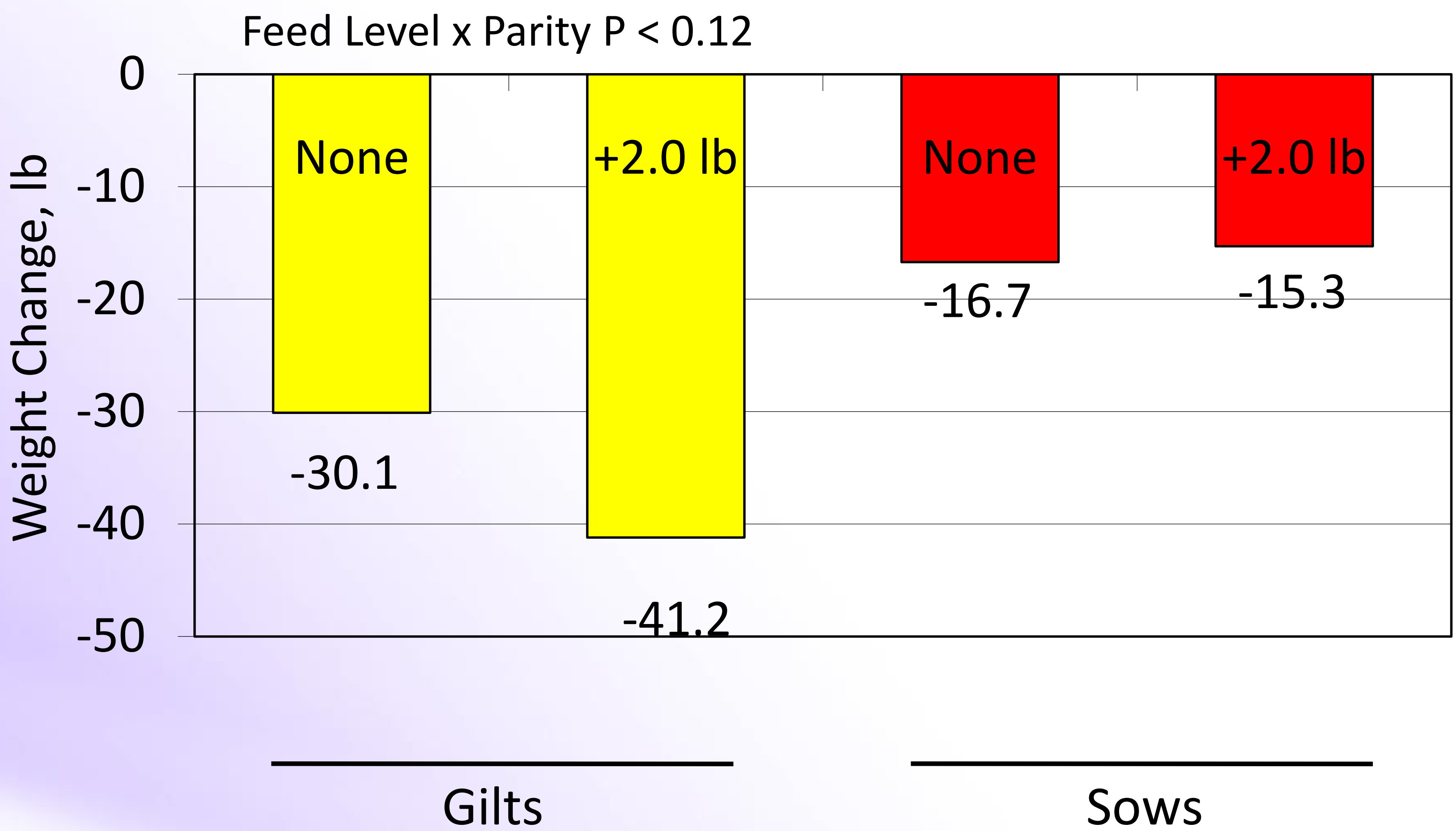
Shelton et al., 2010

Lactation Feed Intake



Shelton et al., 2010

Farrowing to Weaning Weight Change



Shelton et al., 2010

Summary – Increased Feed in Late Gestation

- Offered no benefit in sows
- Decreased lactation feed intake and increased weight loss in gilts with adequate or marginally excessive back fat
- Increased sow feed cost by $3.50 to $5.00 per sow
- **Bottom line**
    - Bump thin sows no more than 2 lb and no sooner than d 90 of gestation

Effect of Piglet Birth Weight and Litter Size on Subsequent Growth Rate

Bergstrom et al., 2009

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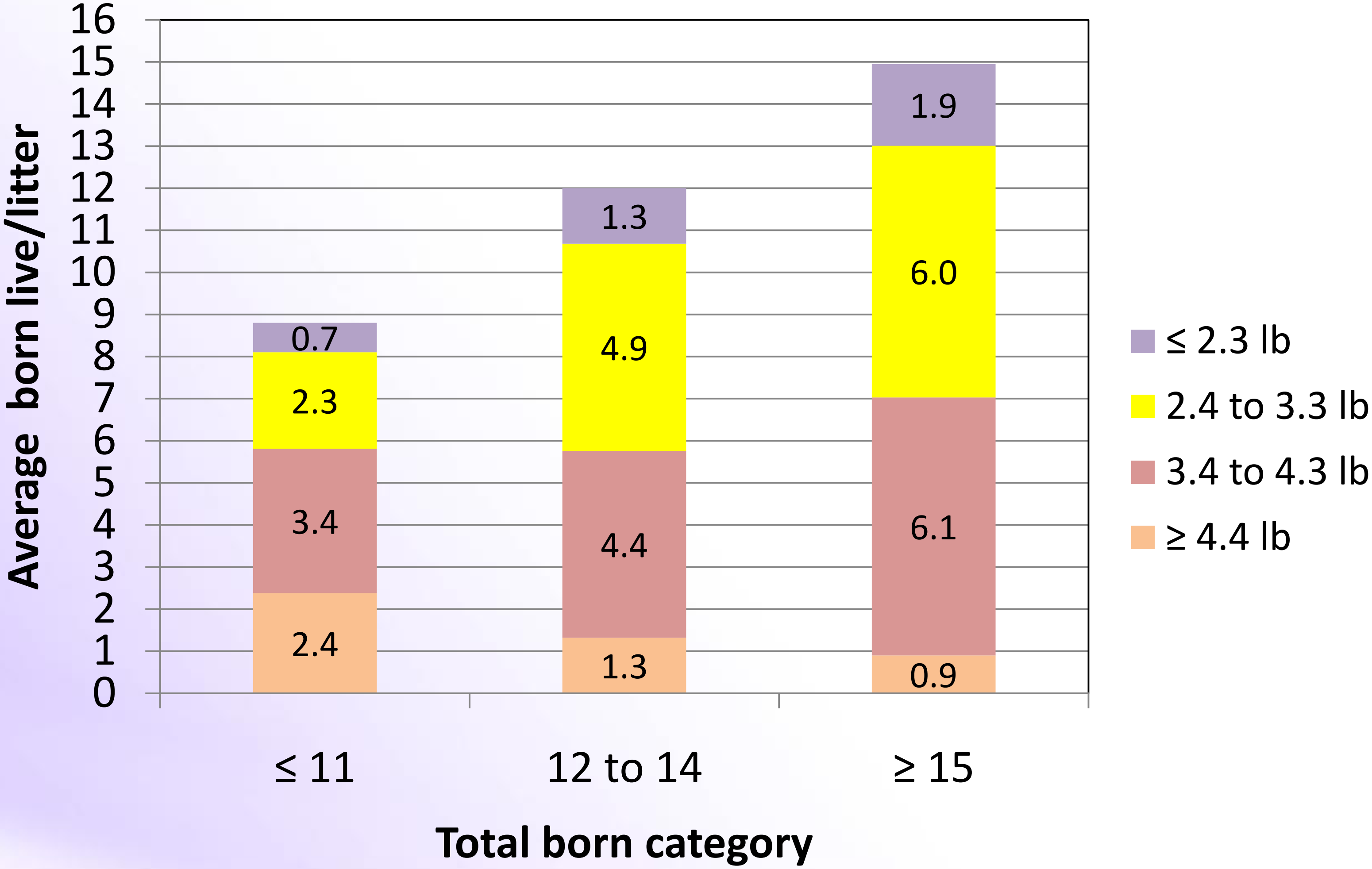
Procedures

- 2,204 pigs (PIC sired) from a commercial sow farm were weighed then weaned at 25 days of age
- 4 birth weight categories, lb
  - ≤ 2.3
  - 2.4 to 3.3
  - 3.4 to 4.3
  - ≥ 4.4
- 3 total born categories
  - ≤ 11
  - 12 to 14
  - ≥ 15

Keesecker Agri Business, Inc.

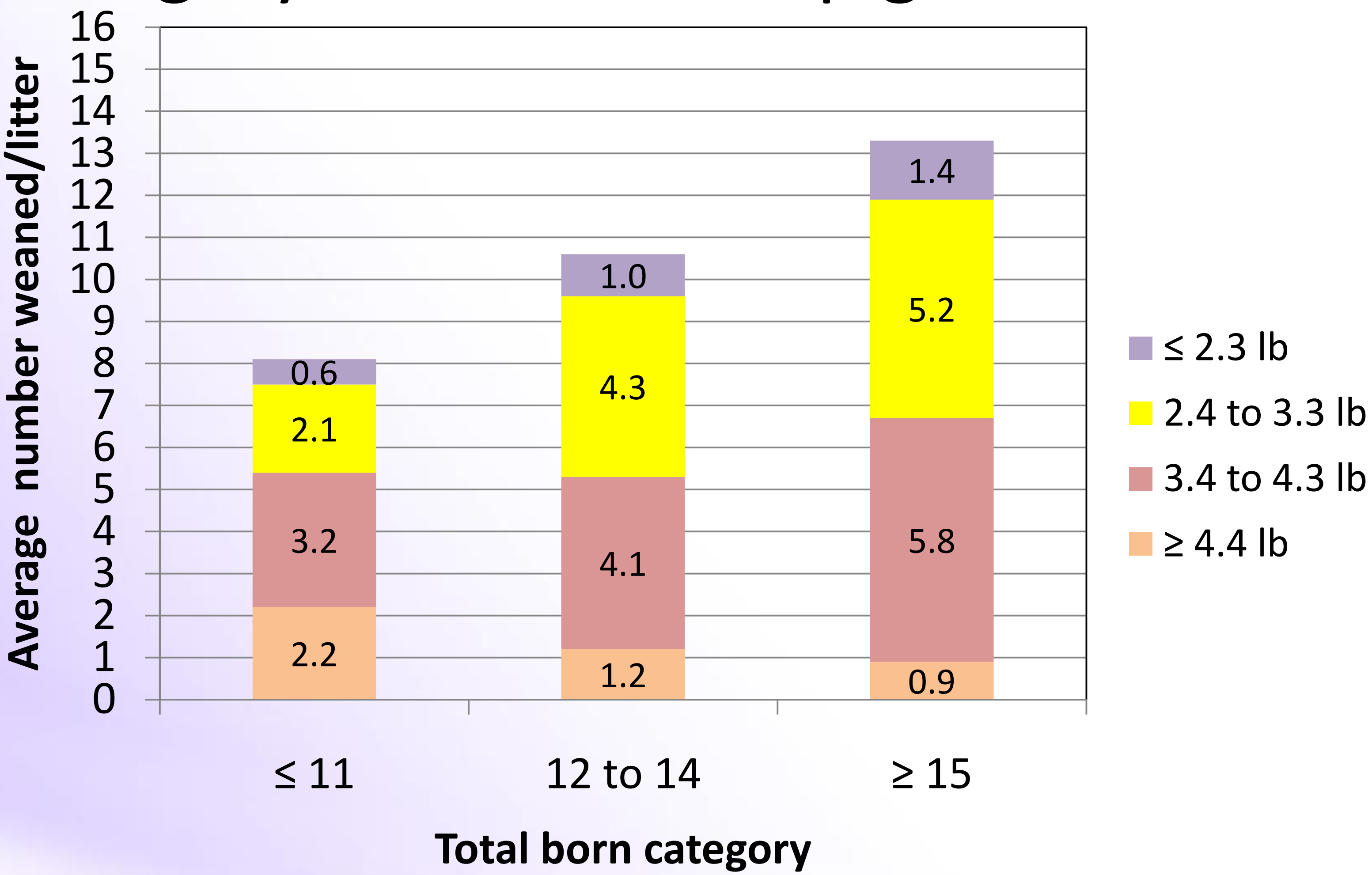
Washington, Kansas

Influence of total born category on weight of pigs born alive



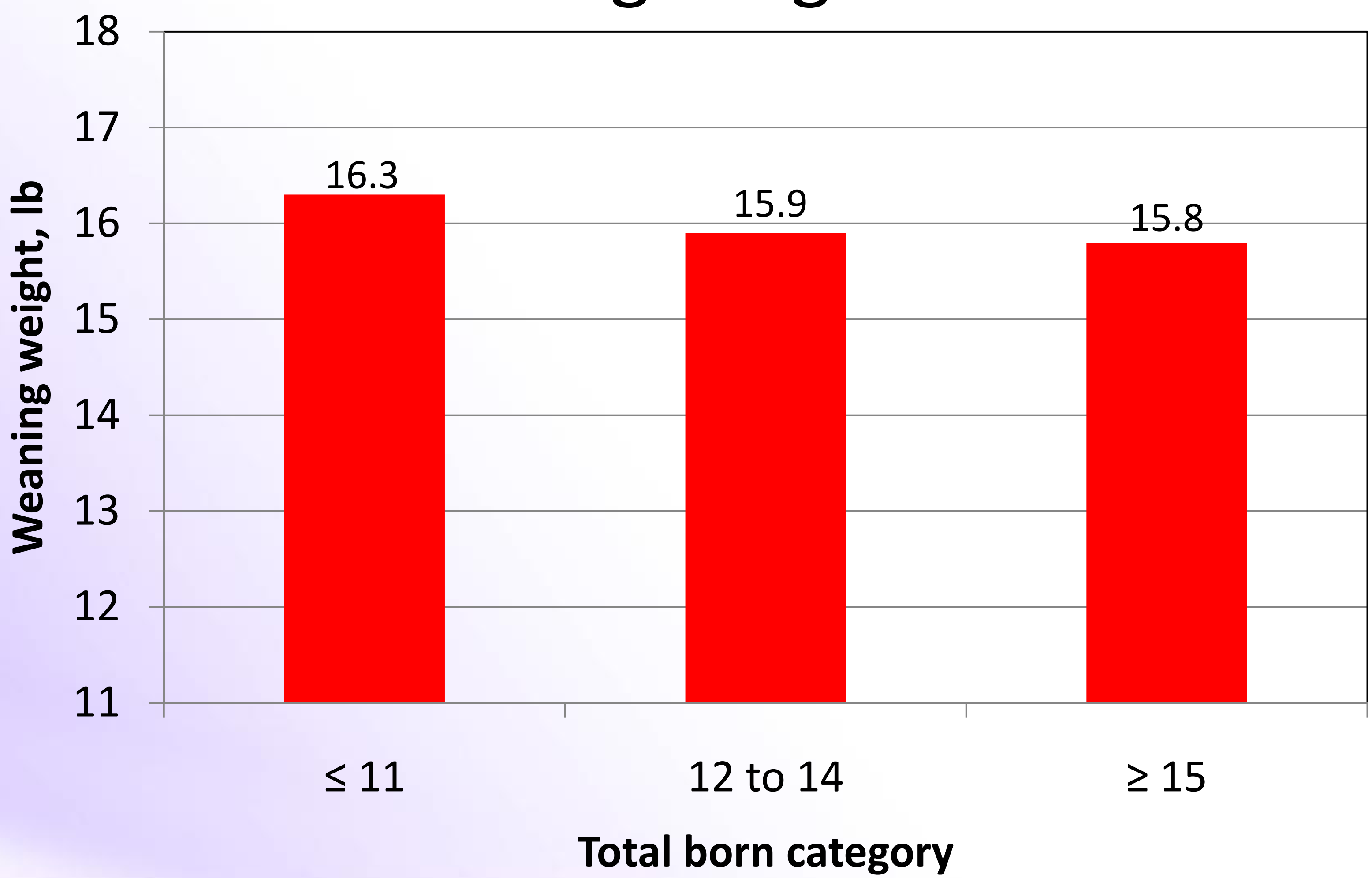
Bergstrom et al., 2009

Influence of total born and weight category on number of pigs weaned



Bergstrom et al., 2009

Influence of total born category on pig weaning weight



Bergstrom et al., 2009

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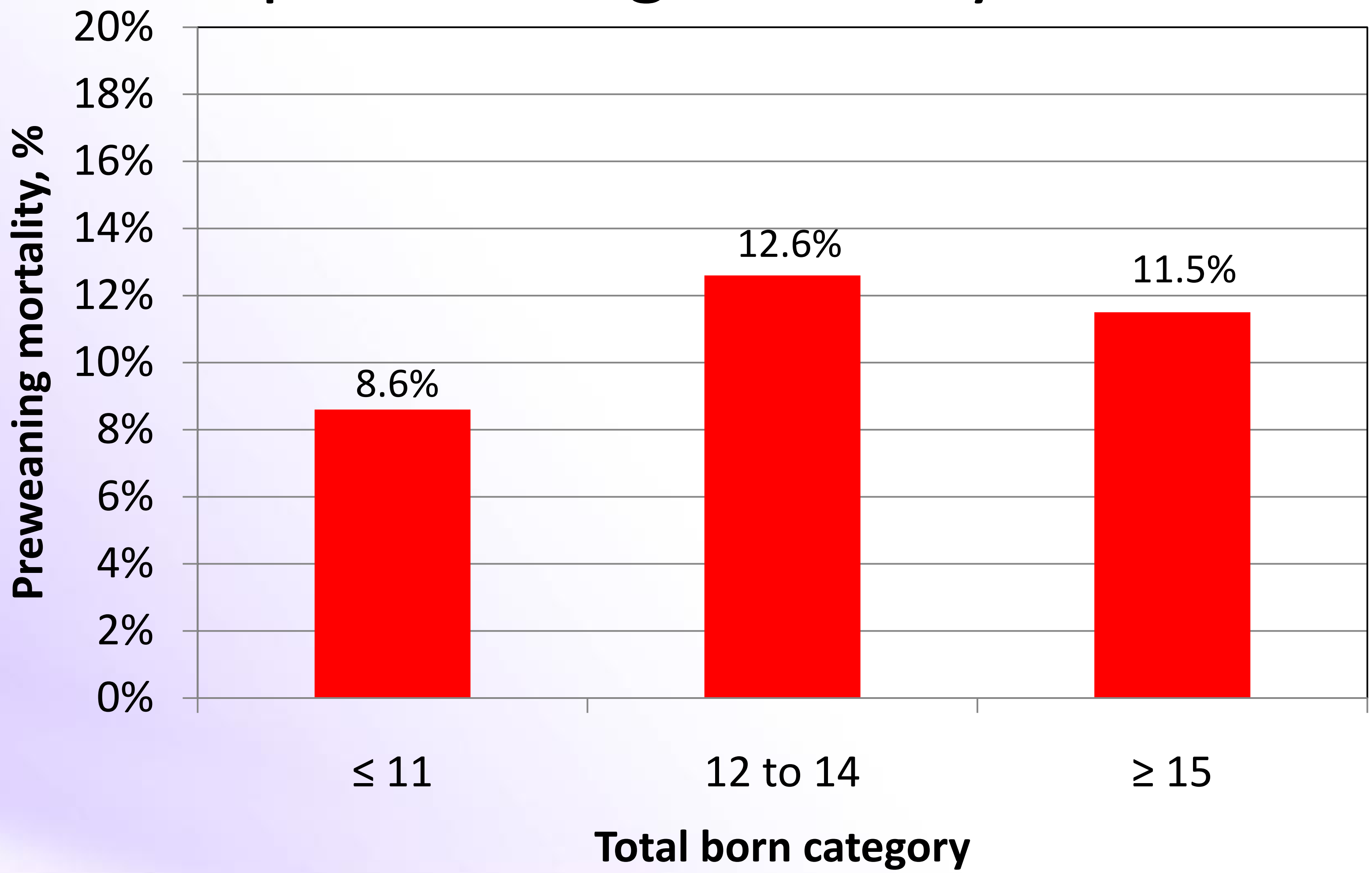
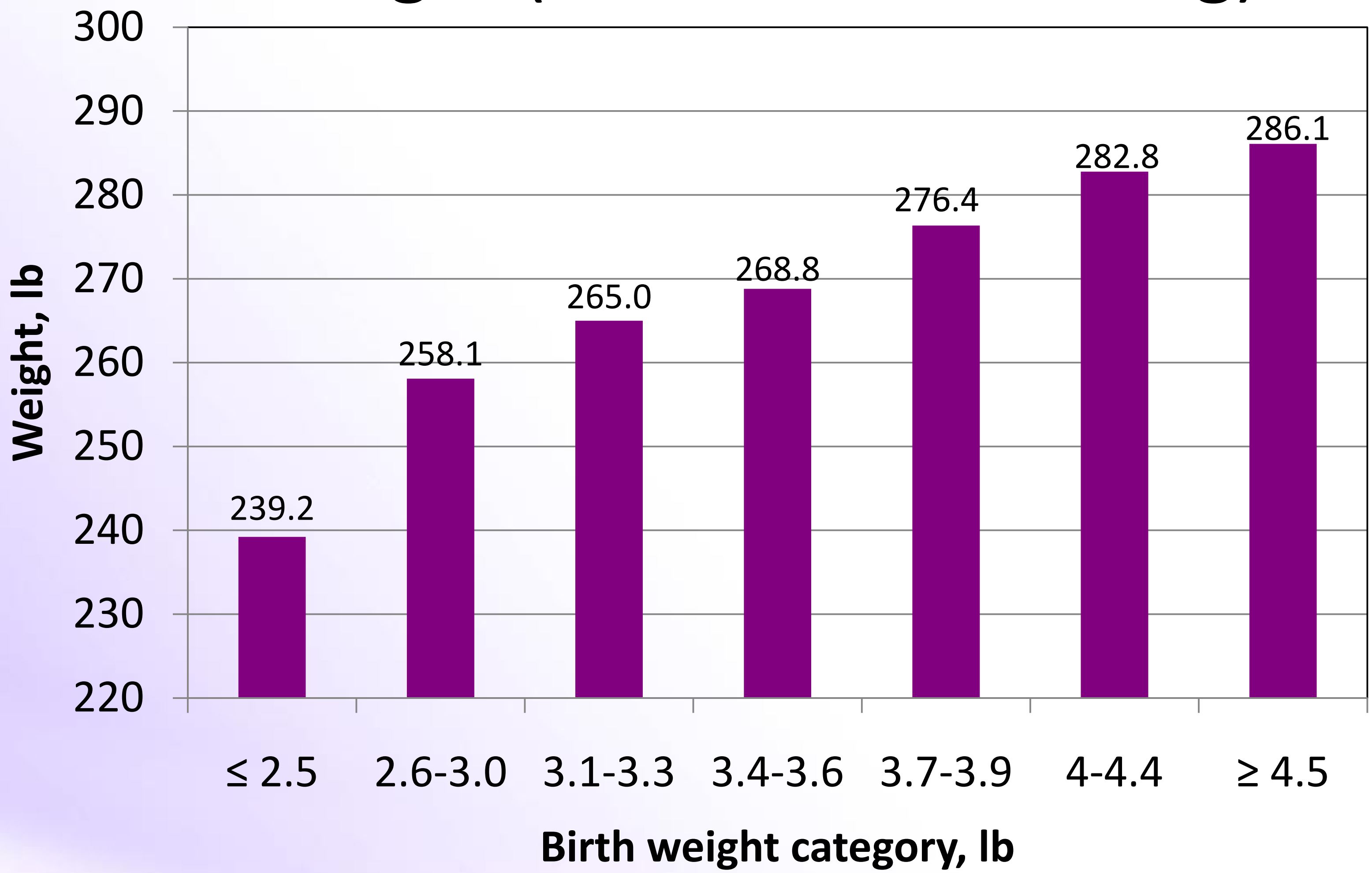
Influence of total born category on preweaning mortality



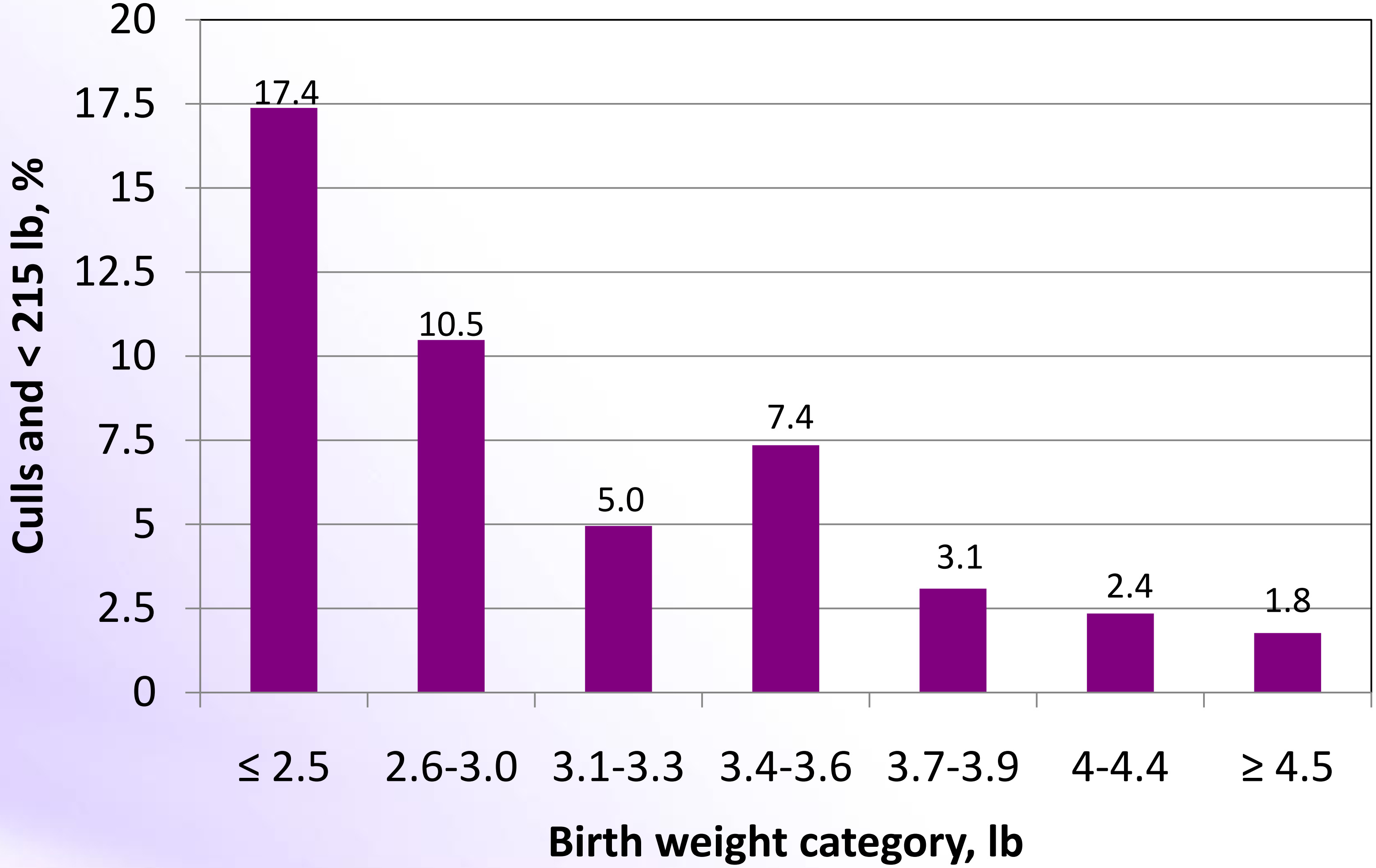
Bergstrom et al., 2009

Influence of birth weight category on pig market weight (d 156 after weaning)



Bergstrom et al., 2009

Influence of birth weight category on percentage of culls and pigs < 215 lb



Bergstrom et al., 2009

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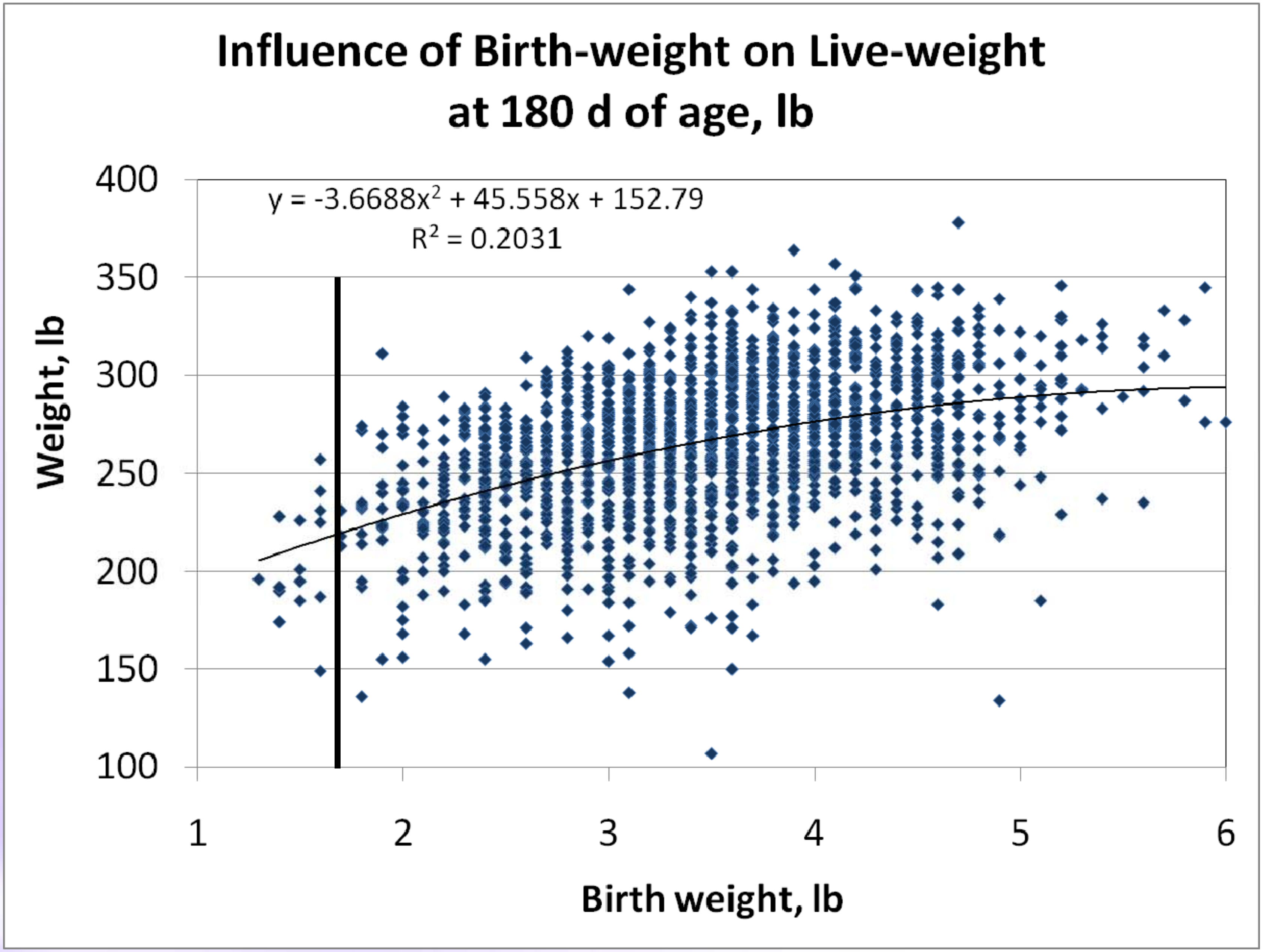

Bergstrom et al., 2009

Summary

- Larger litters will have more lightweight pigs than small litters but…
- Large litters still have more heavy pigs.
- Low birth weight pigs, < 1.5 to 2 lb are very unlikely to reach an acceptable market weight.

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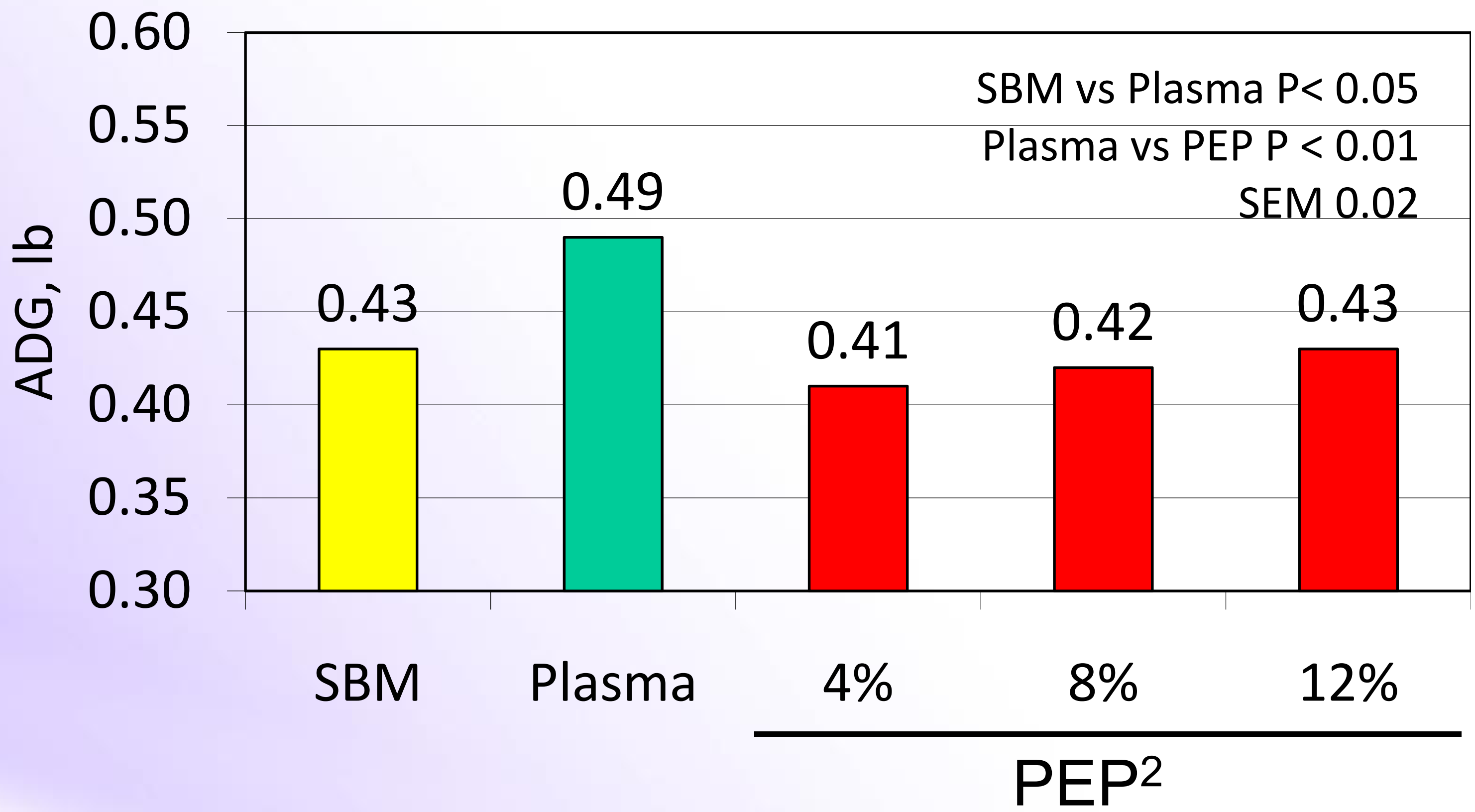
Lactation Feeding - Key Points

- Feed intake drives subsequent reproduction
- High producing maternal line sows with lower feed intake will continue to drive milk production at the expense of body stores
- **Many US swine producers are installing ad lib lactation feeders**

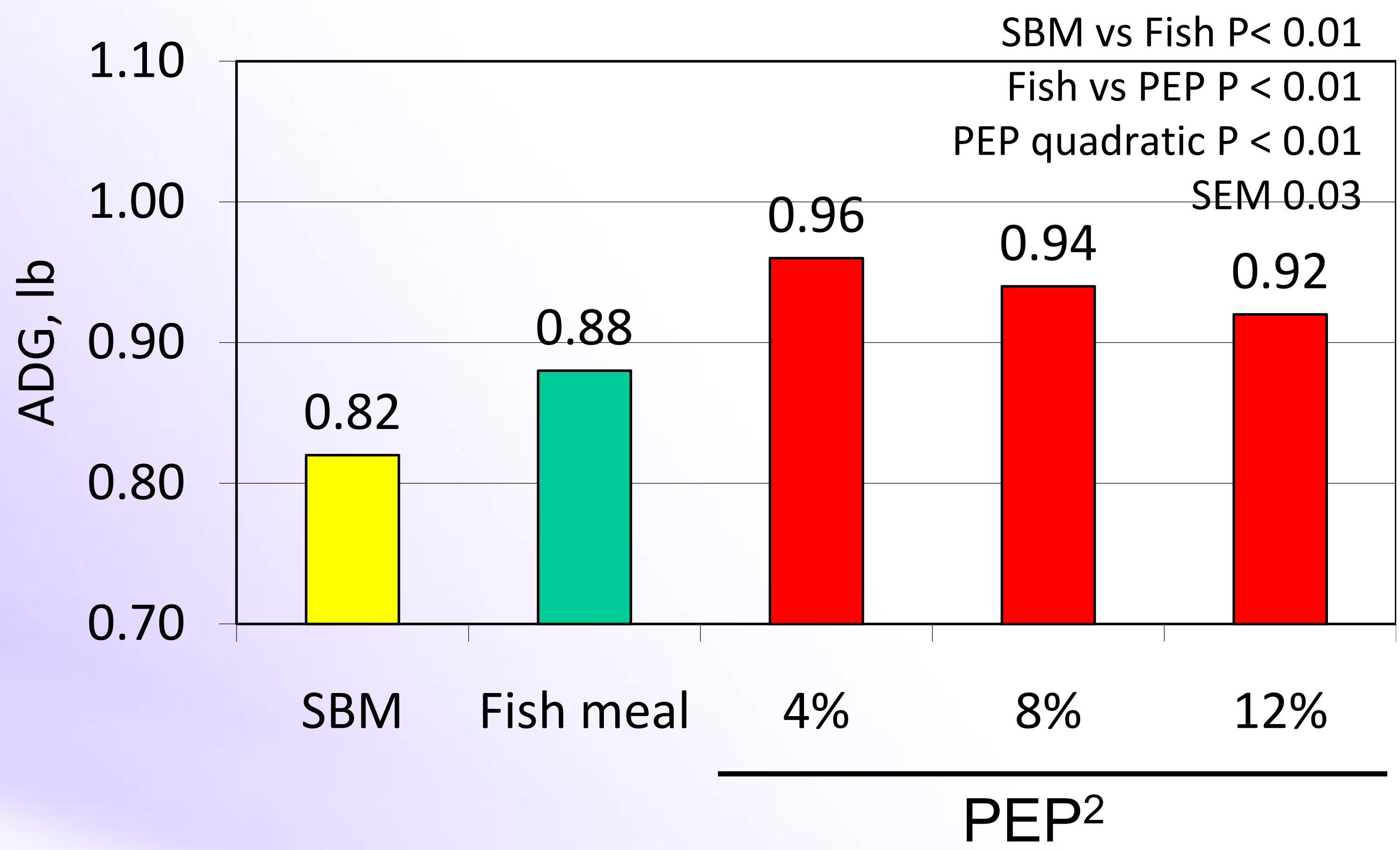
Nursery pig research

Influence of PEP2 on nursery pig performance (D 0 to 11)



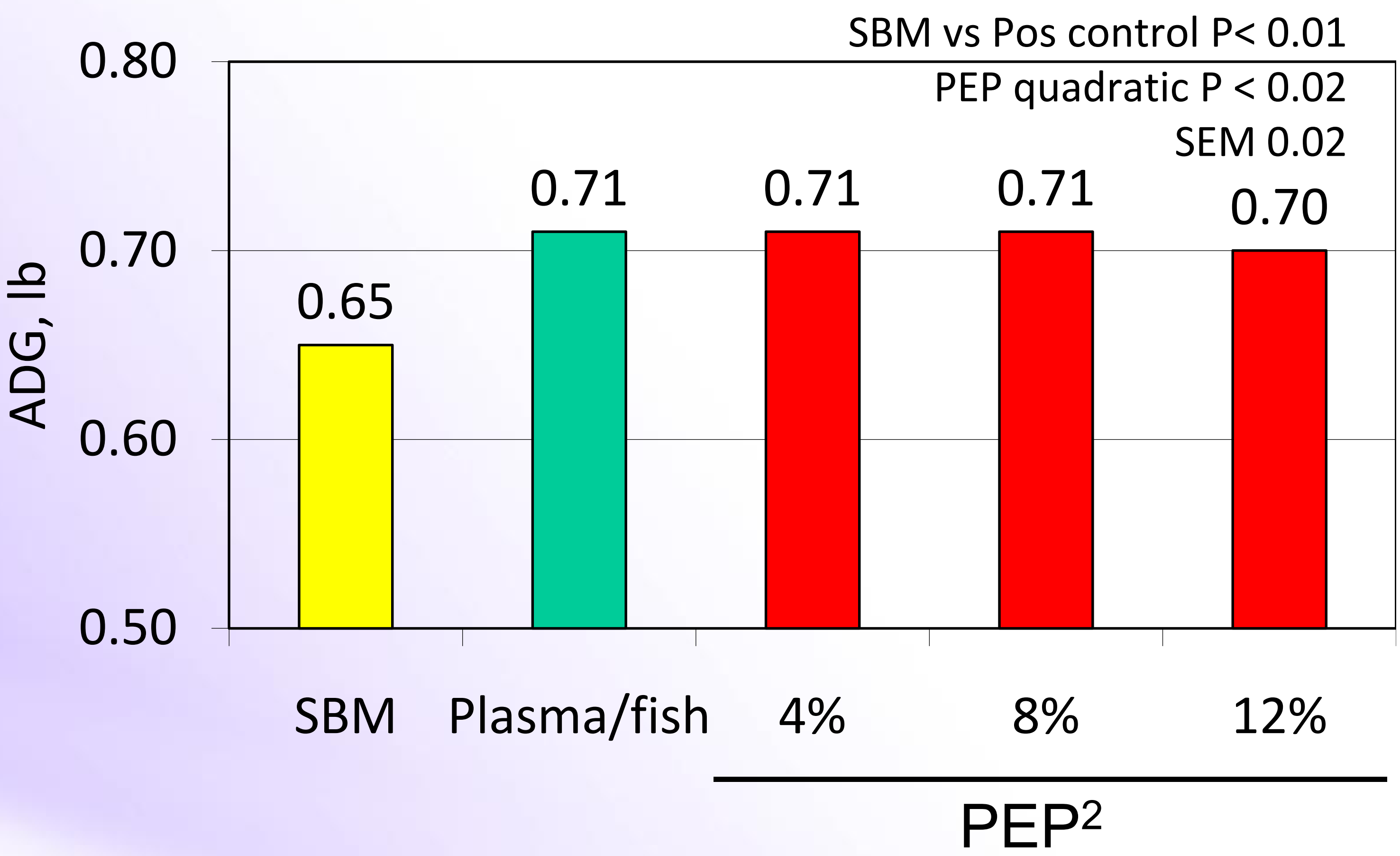
Myers et al., 2009

Influence of PEP2 on nursery pig performance (D 11 to 25)



Myers et al., 2009

Influence of PEP2 on nursery pig performance (D 0 to 25)



Myers et al., 2009

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PEP^2 Summary

- Pigs fed PEP^2 had greater ADG and improved F/G compared to pigs fed 4% select menhaden fish meal

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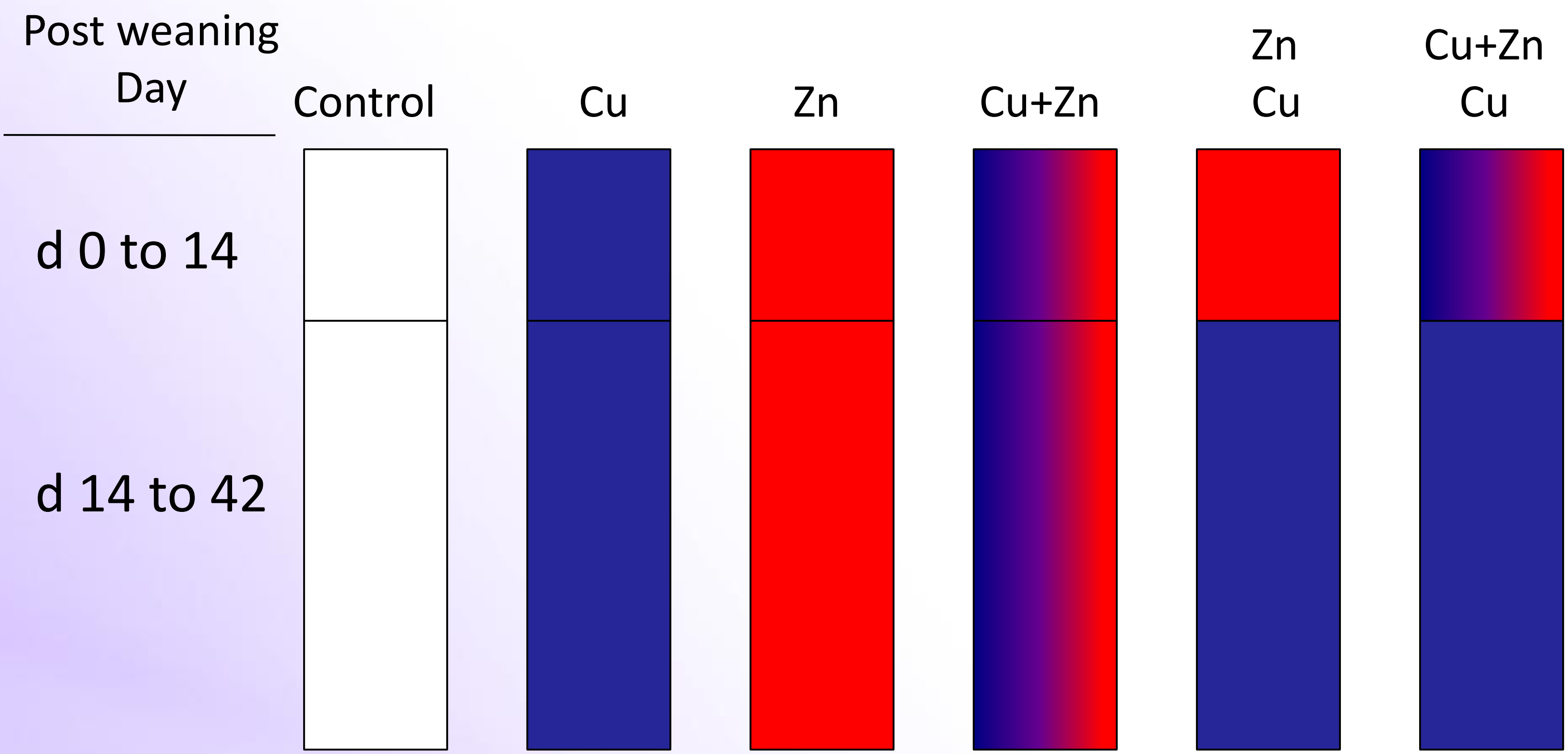
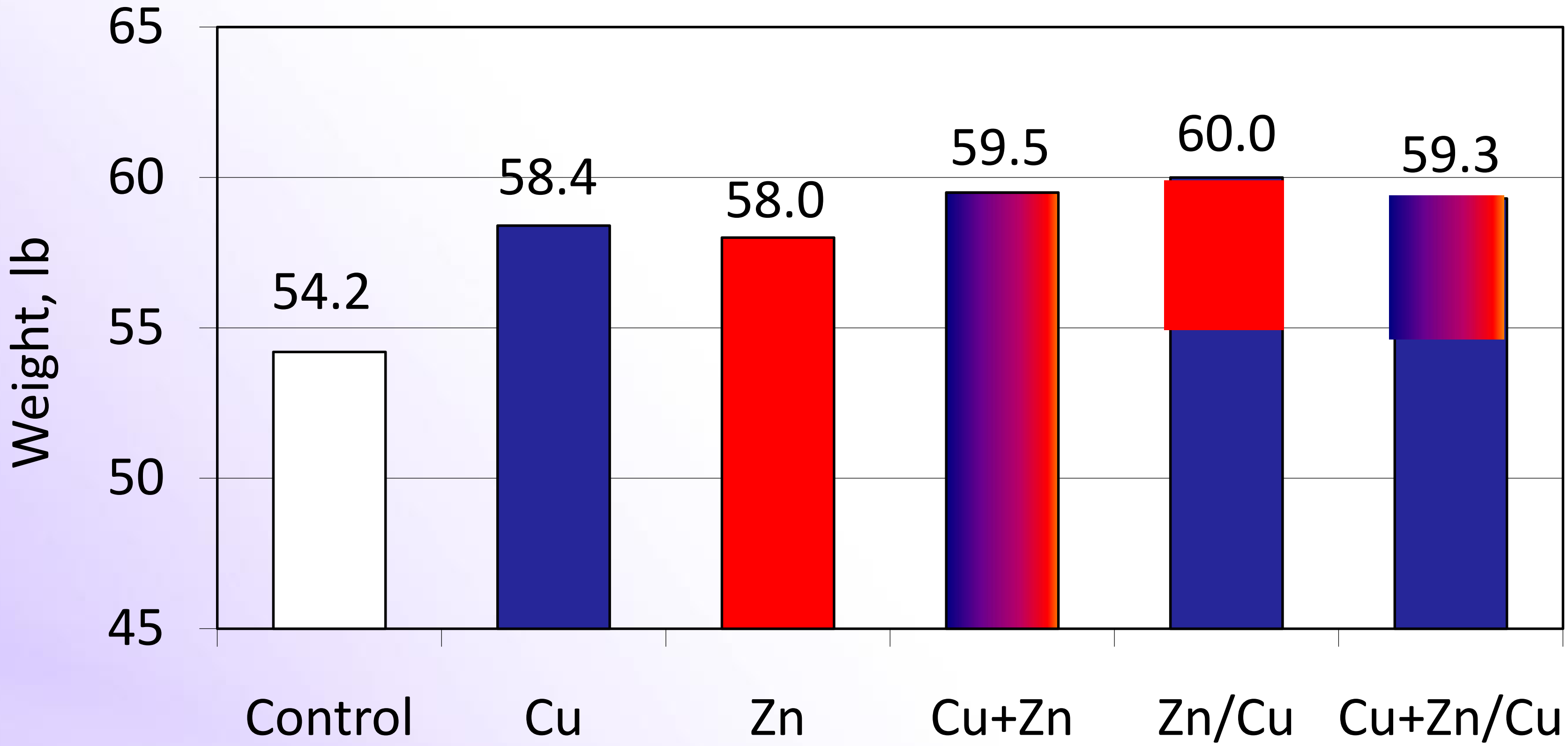
Nursery Growth Promoting Copper and Zinc



Zn= 3,000 ppm d 0 to 14 and 2,000 ppm d 14 to 42
Cu= 125 ppm

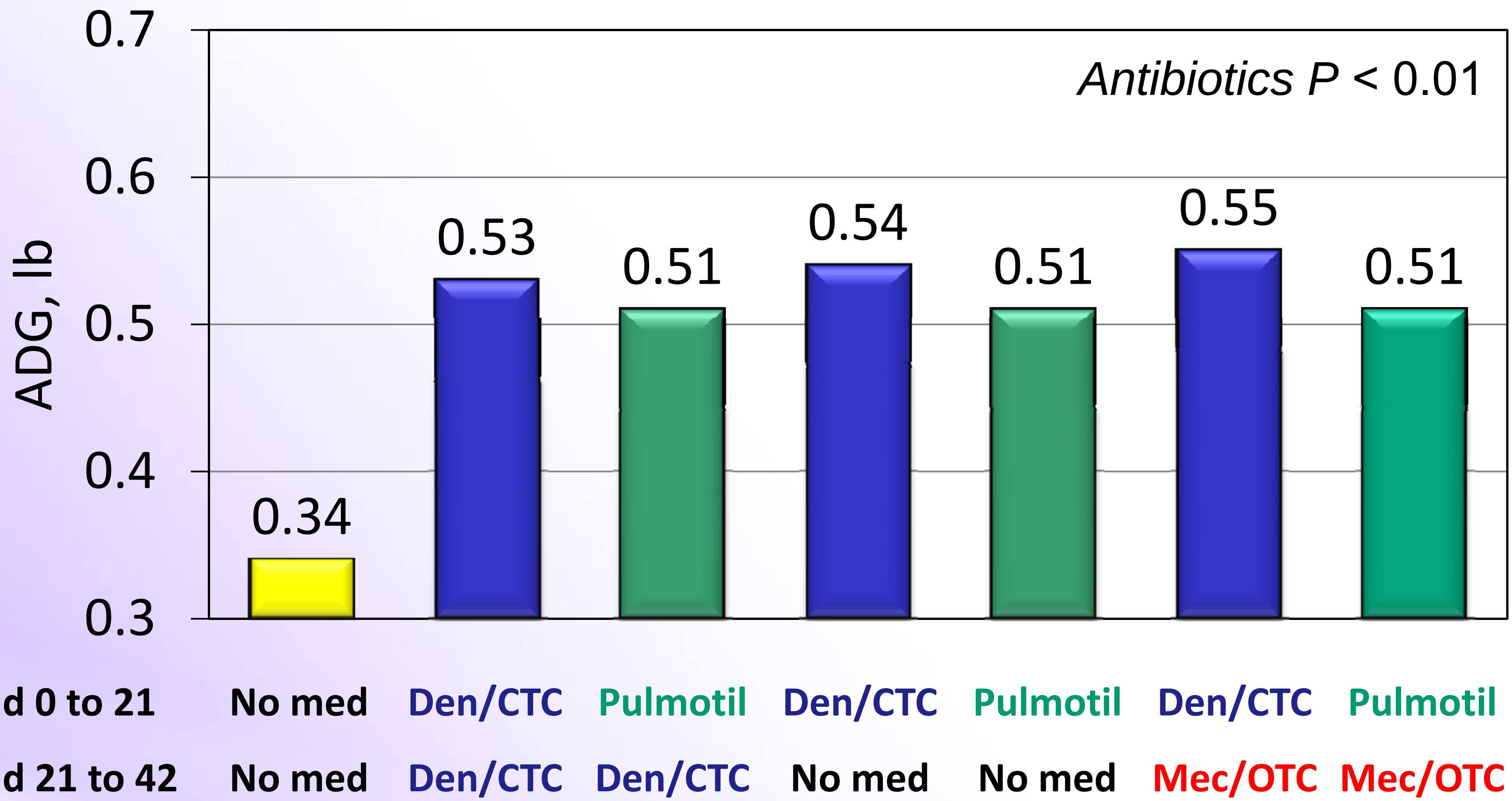
Nursery Growth Promoting Copper and Zinc



Zn from d 0 to 14 and Cu from 14 to 42 resulted in the heaviest Pig with $0.56 less cost per pig compared to Cu+Zn

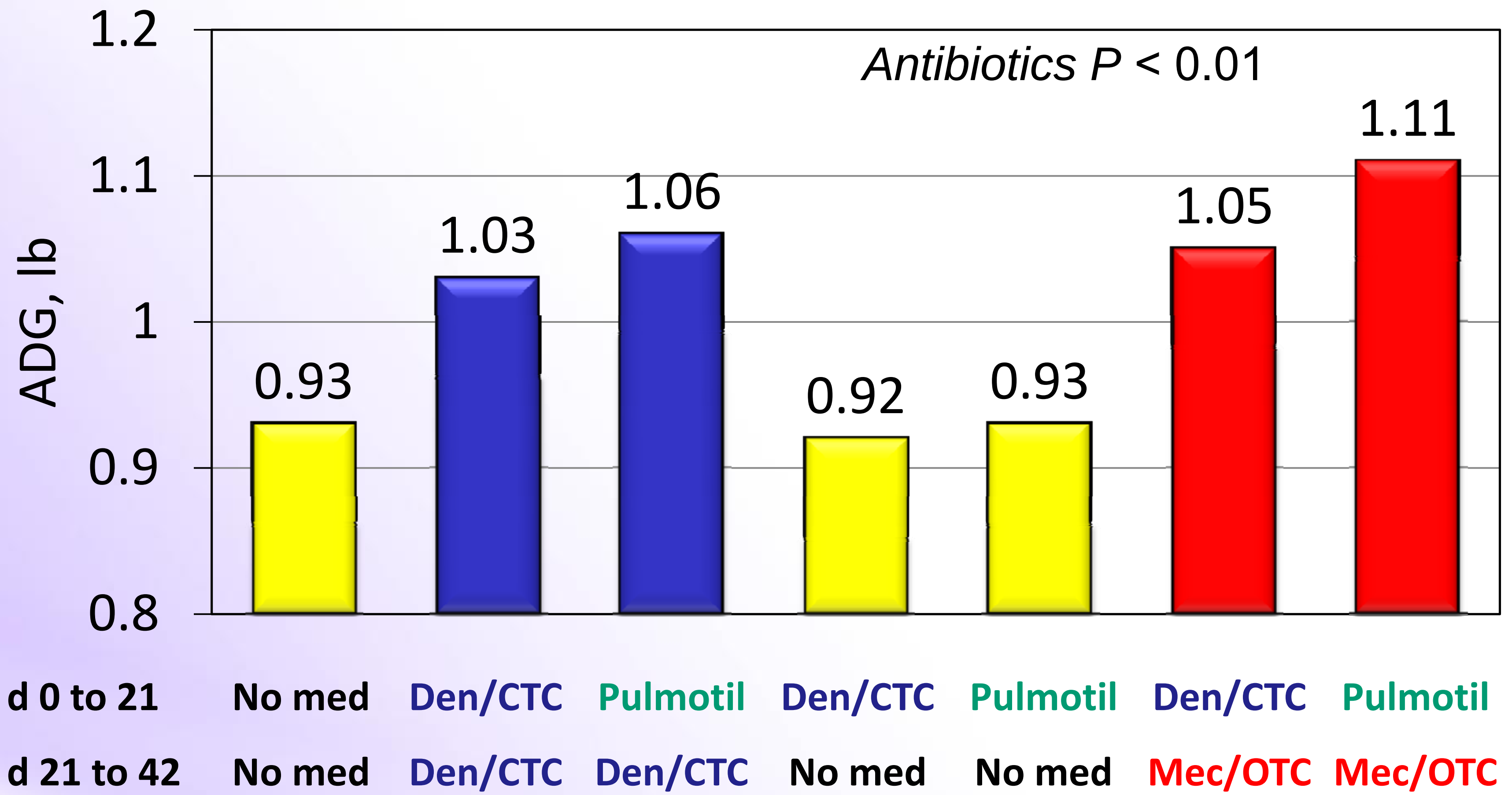
Shelton et al., 2009

Influence of dietary antibiotics on ADG (d 0 to 21)



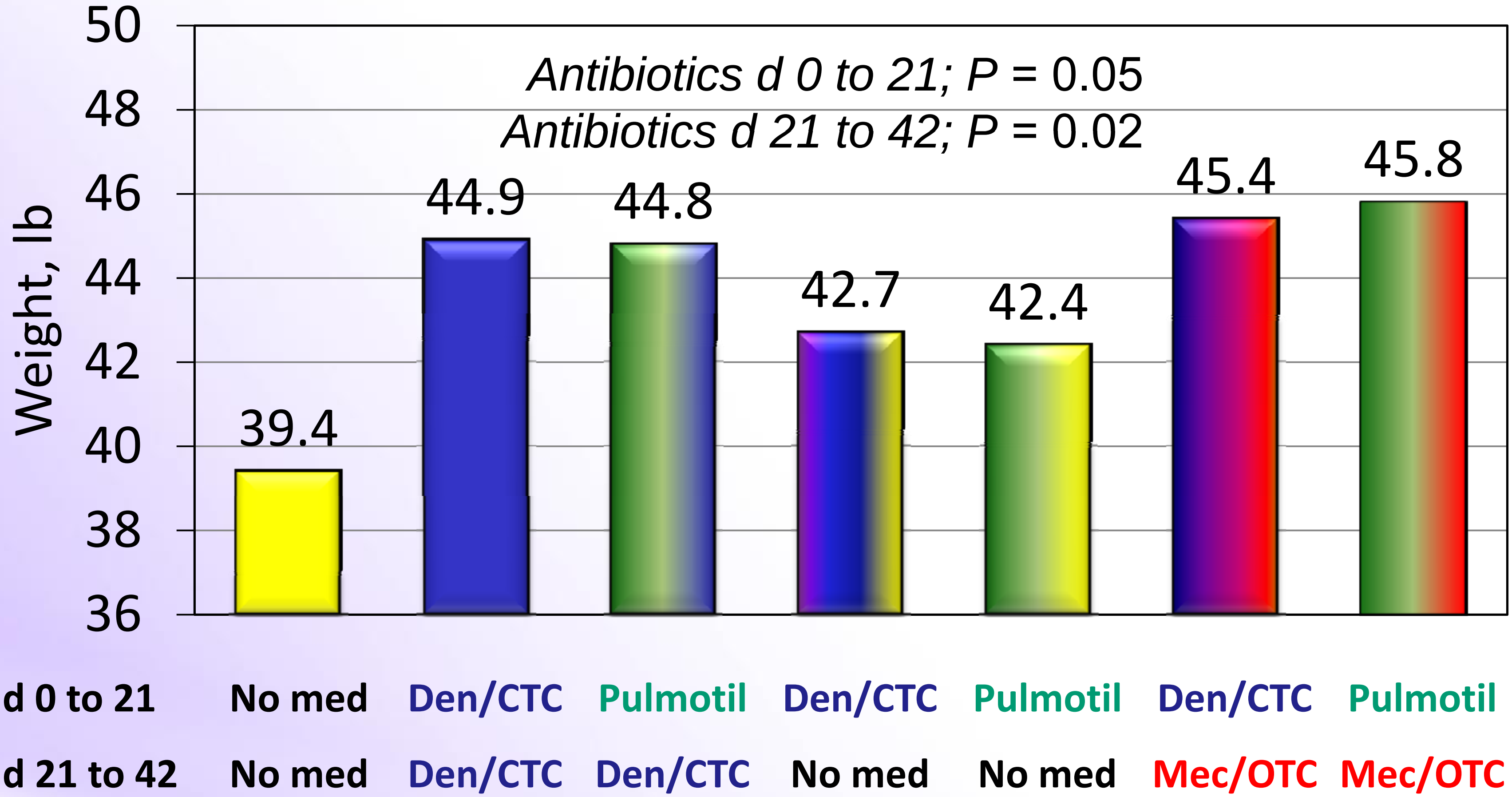
Steidinger et al., 2009

Influence of dietary antibiotics on ADG (d 21 to 42)



Steidinger et al., 2009

Influence of dietary antibiotics on final pig weight (d 42)

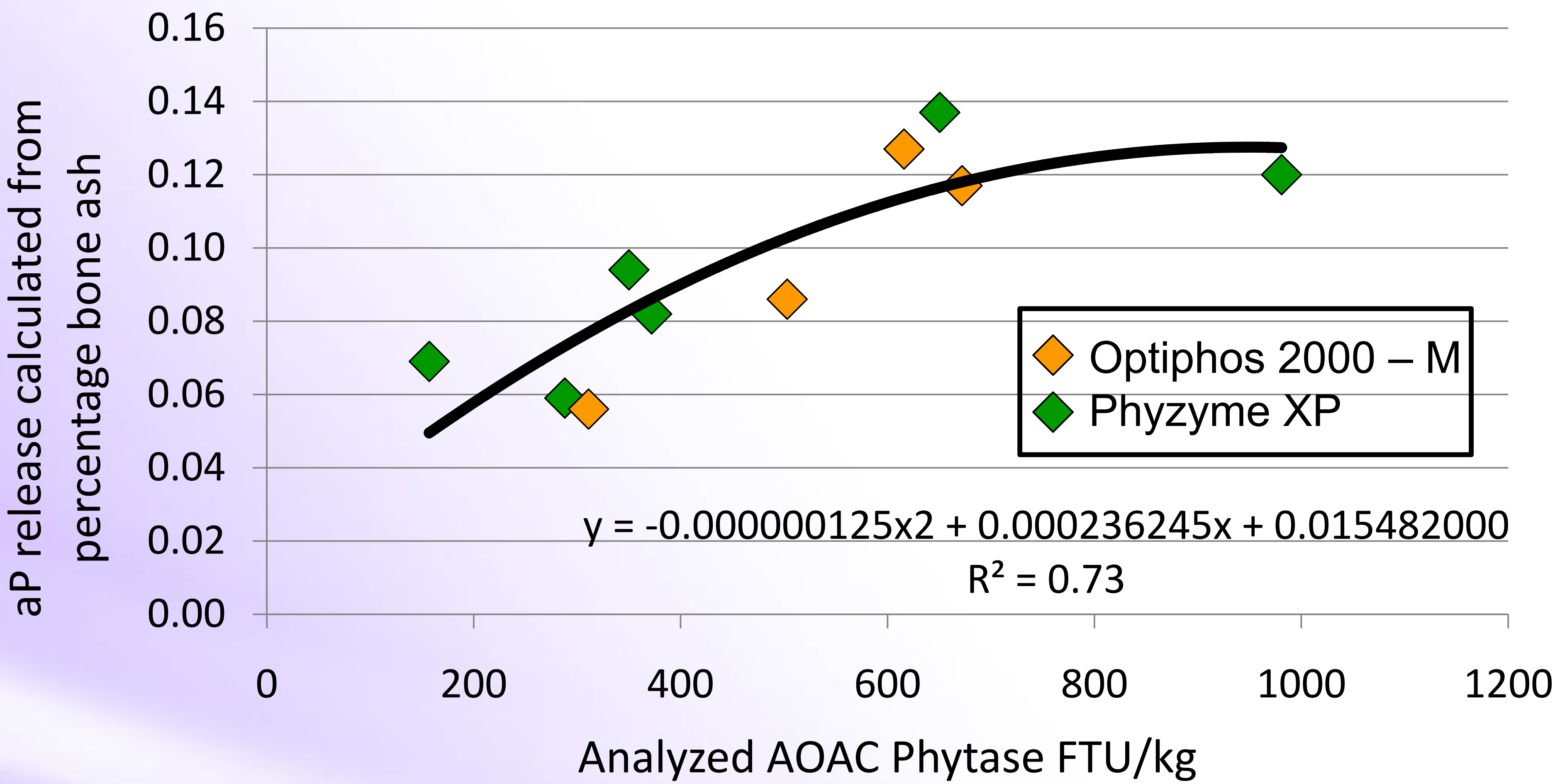


Steidinger et al., 2009

Antibiotic summary

- Adding antibiotics to the nursery diet improved pig performance and economic return

Available P released by phytase source and level



Jones et al., 2009

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Phytase stability trial

- 3 sources (Ronozyme P, Optiphos, Phyzyme)
- 2 coatings (Coated and uncoated)
- 3 forms (pure, vitamin premix VTM premix)
- 4 temperatures (-18, 5, 23, 37 C)
- 6 periods (0, 30, 60, 90, 120, 180 d)
- All analysis by DSM
- Source x coating x form x temperature x day interaction ($P < 0.001$)

Jones et al., 2010

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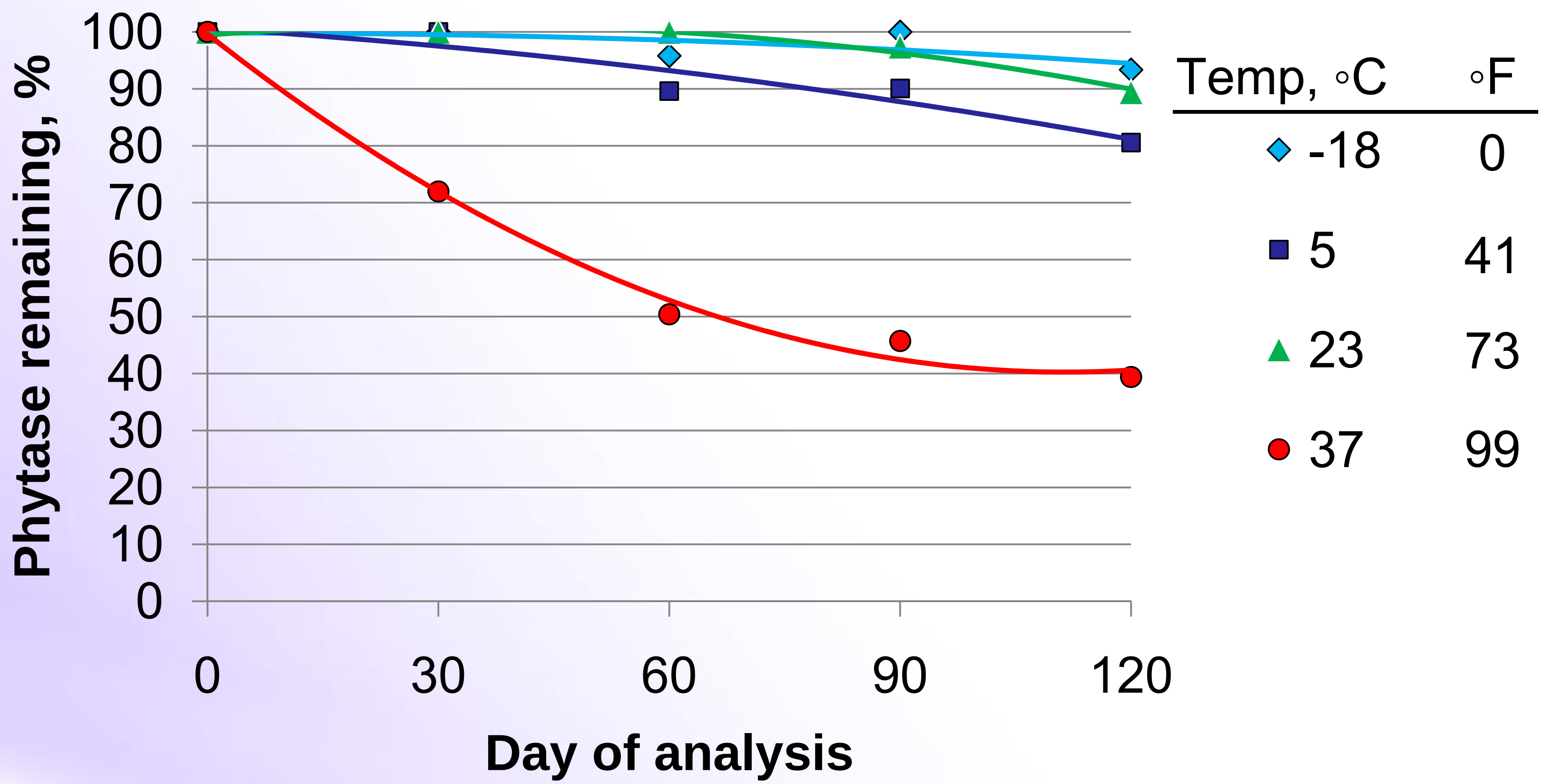
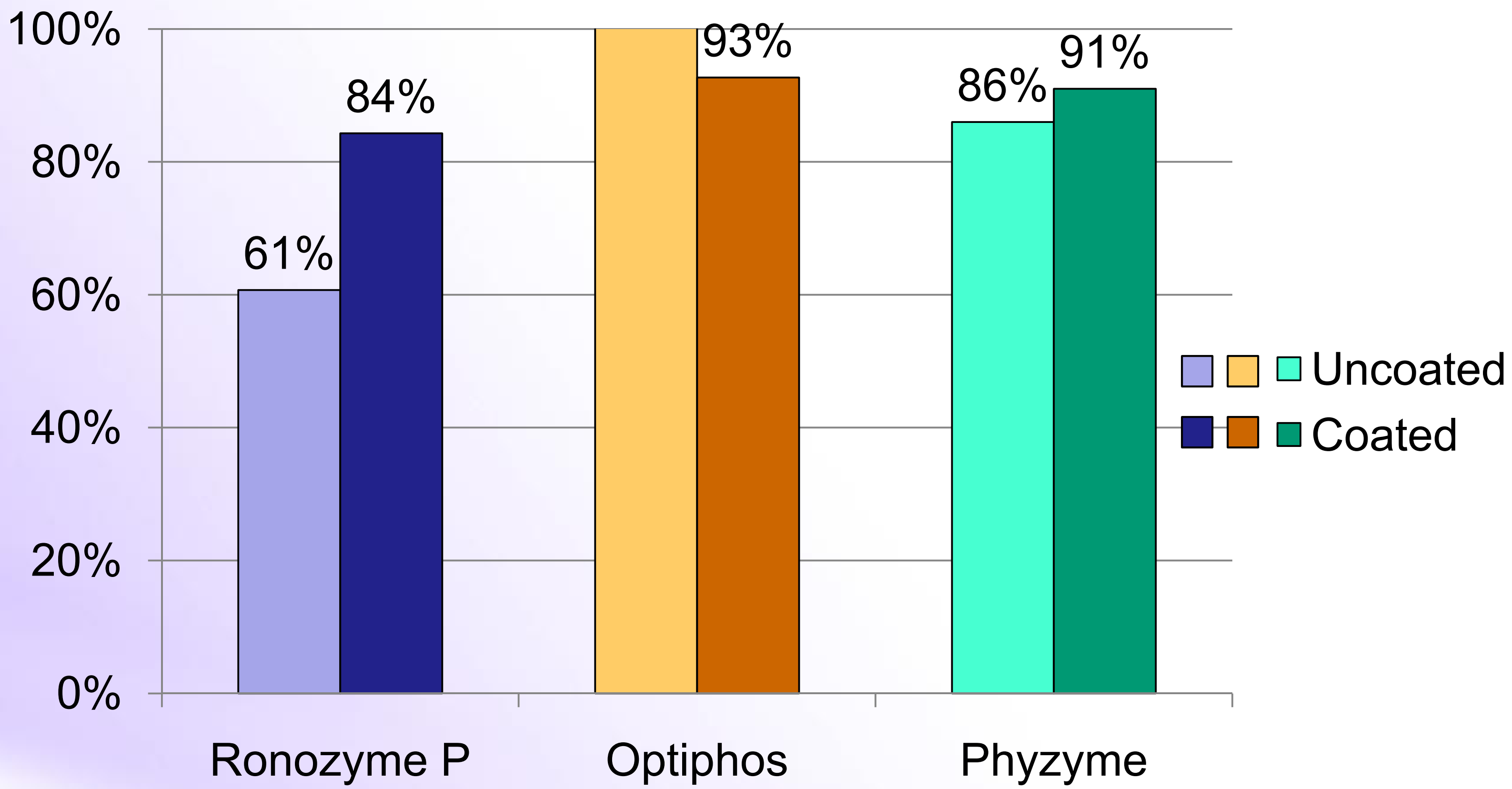
Phytase shelf life at different storage temperatures



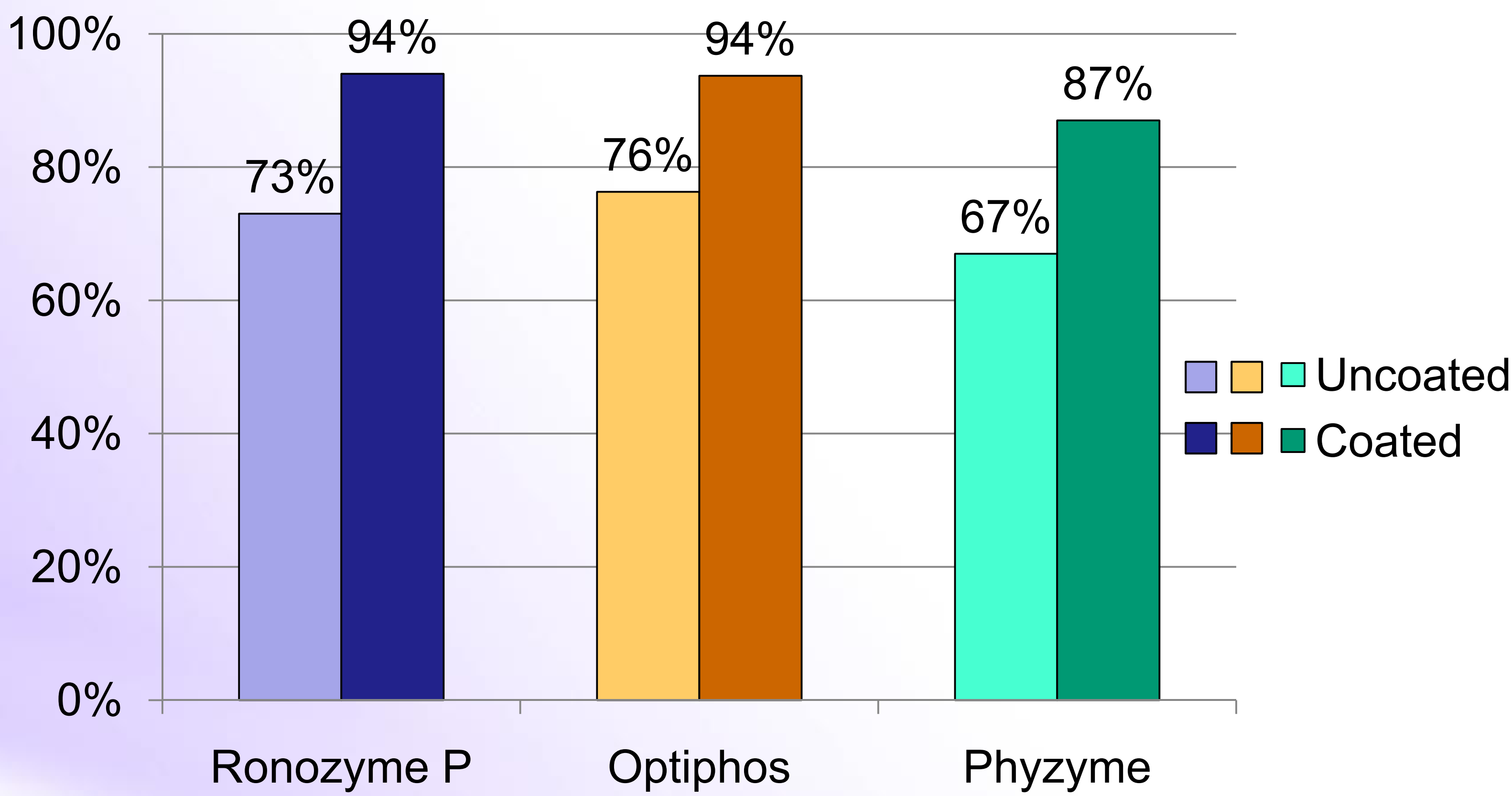
Jones et al., 2010

Phytase activity remaining in pure form at 23 C (73 F) at 180 days



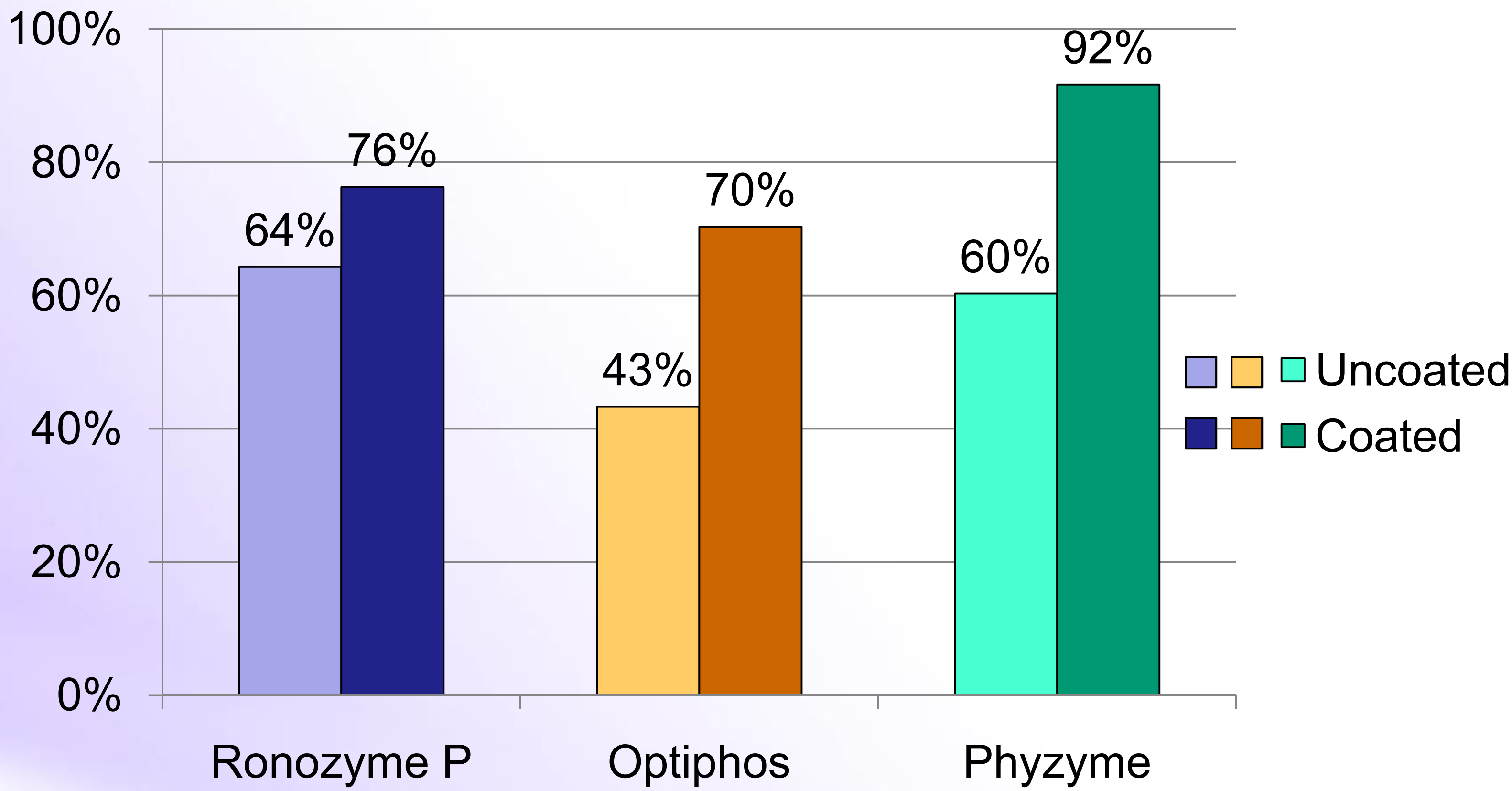
Jones et al., 2010

Phytase activity remaining in vitamin premix at 23 C (73 F) at 180 days



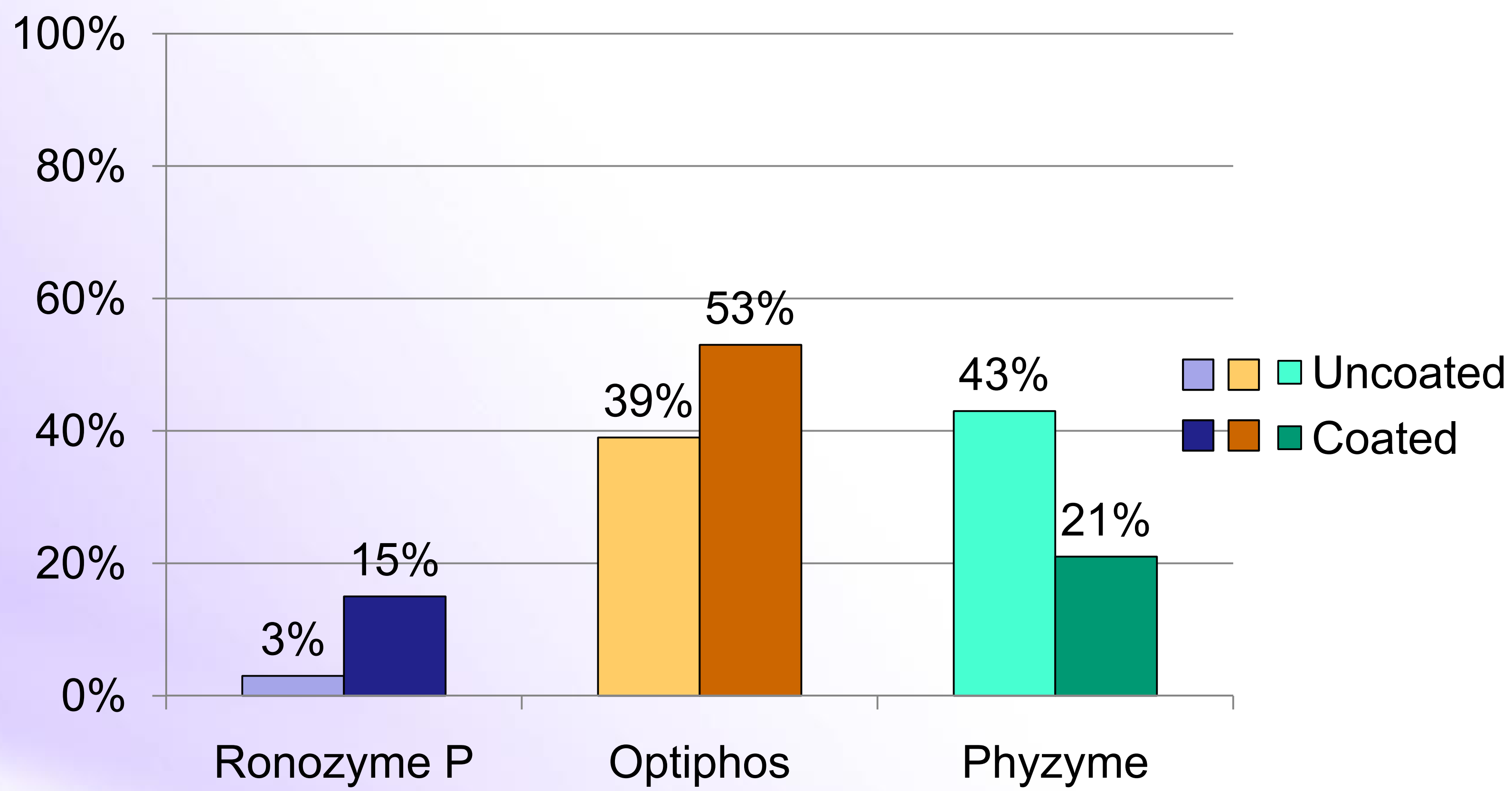
Jones et al., 2010

Phytase activity remaining in VTM premix at 23 C (73 F) at 180 days



Jones et al., 2010

Phytase activity remaining in pure form at 37 C (99 F) at 180 days



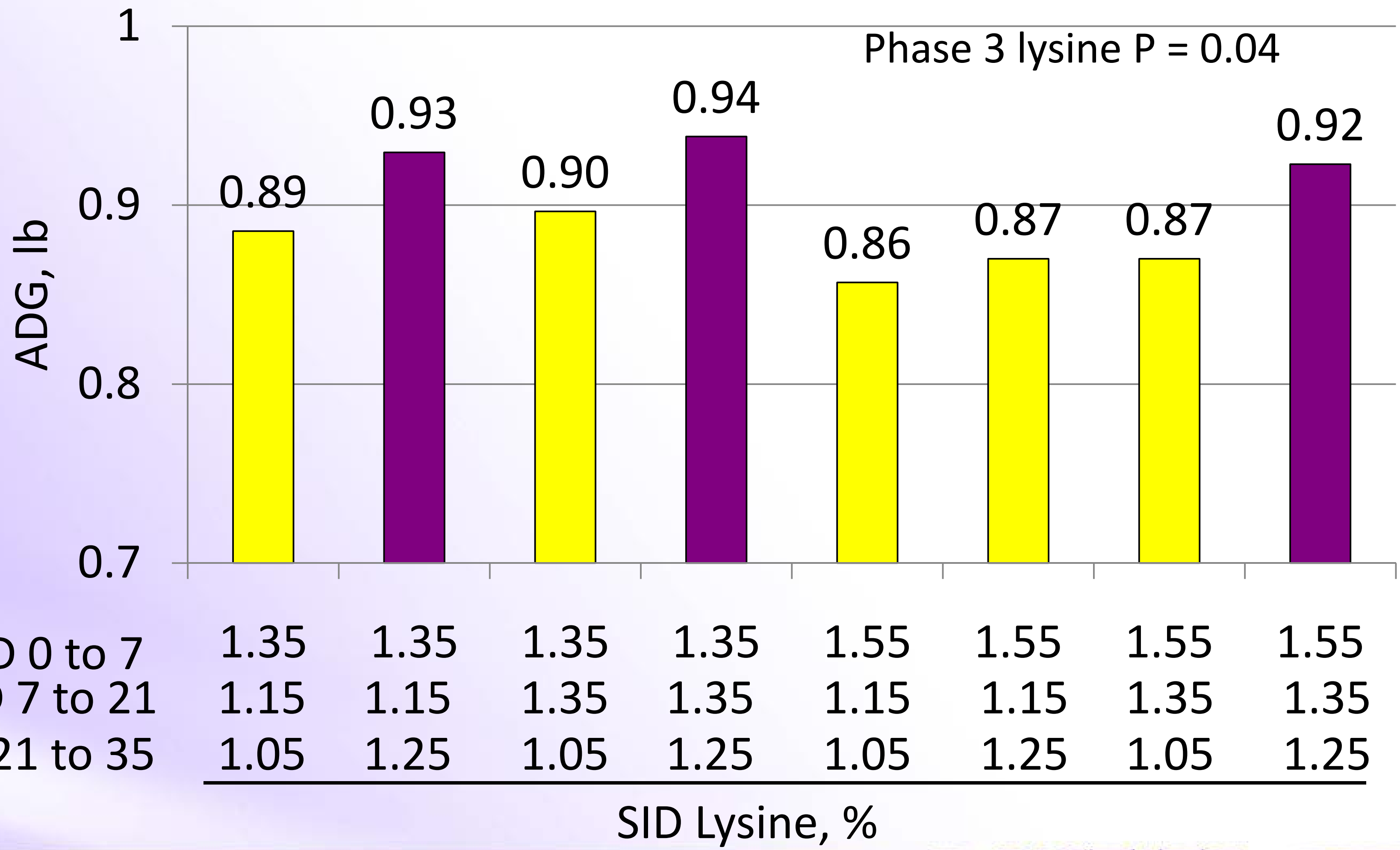
Jones et al., 2010

Phytase stability trial

- Source x coating x form x temperature x day interaction ($P < 0.001$)
- Pure products held at 23°C or less were the most stable.
- In premixes, longer storage time and higher temperature reduced phytase activity.
- Coating mitigated some of the negative effects of storage time and temperature for premixes.

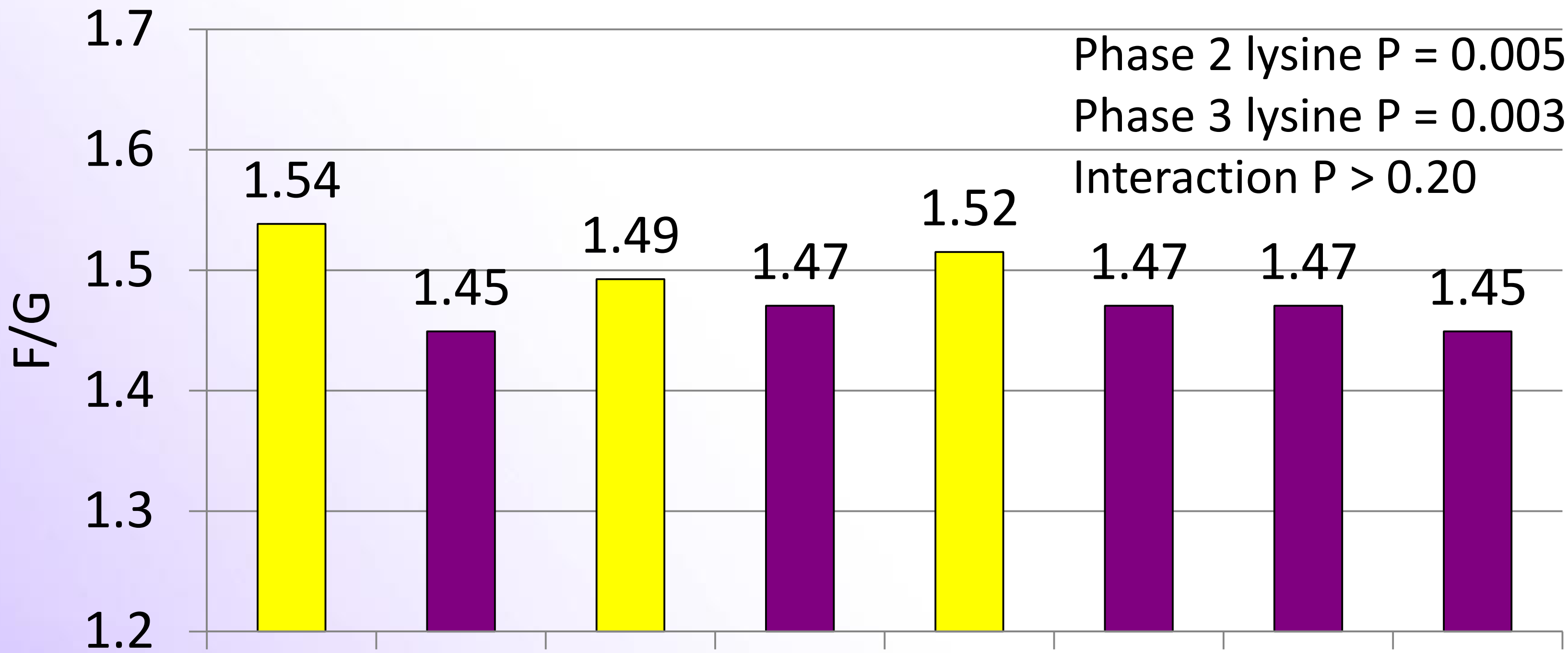
Jones et al., 2010

Influence of lysine level on nursery pig performance (d 0 to 35)



Nemechek et al., 2010

Influence of lysine level on nursery pig performance (d 0 to 35)



D 0 to 7	1.35	1.35	1.35	1.35	1.55	1.55	1.55	1.55
D 7 to 21	1.15	1.15	1.35	1.35	1.15	1.15	1.35	1.35
D 21 to 35	1.05	1.25	1.05	1.25	1.05	1.25	1.05	1.25

SID Lysine, %

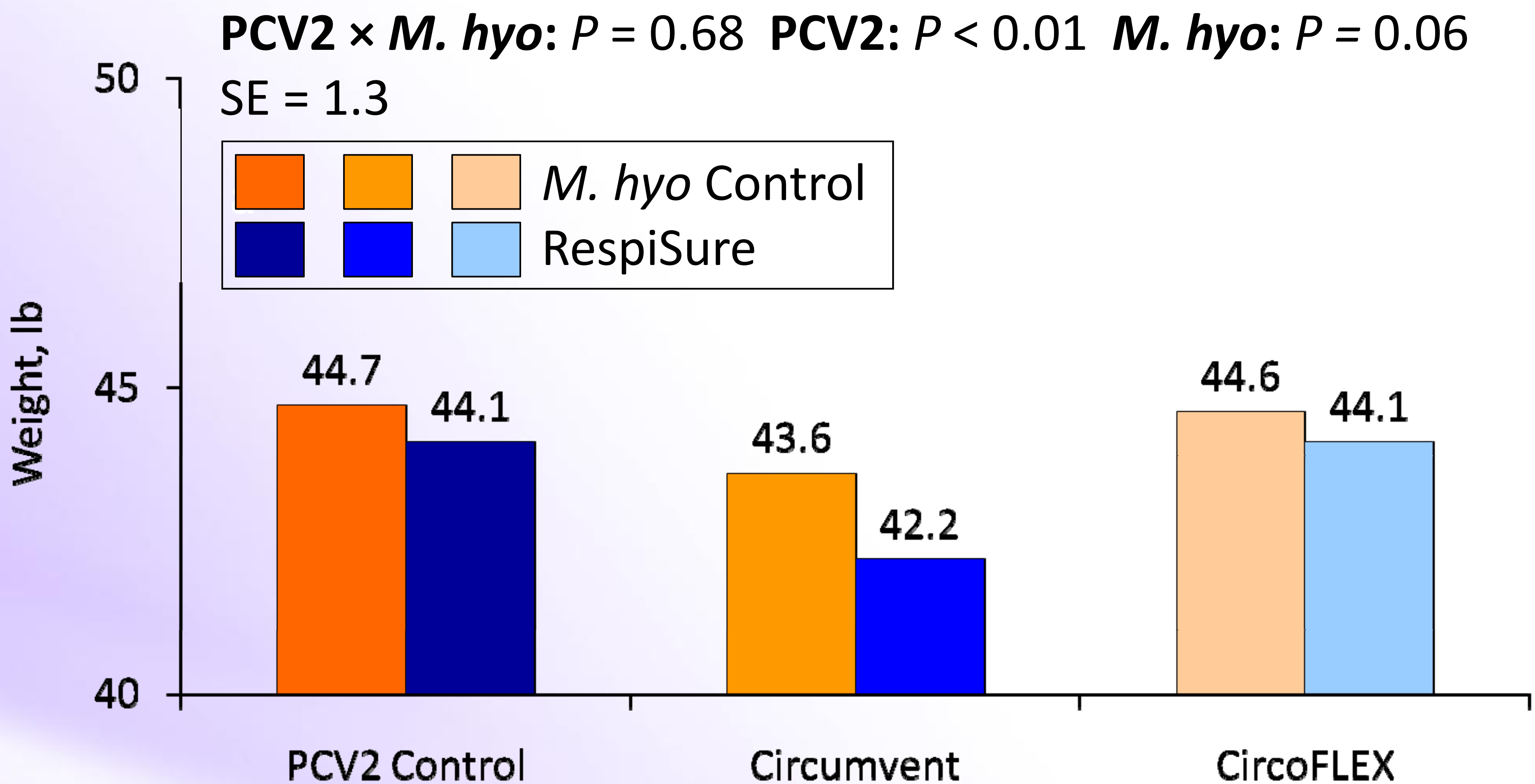
Nemechek et al., 2010

Lysine study summary

- Marginally deficient diets can be fed for the first 21 days after weaning provided that the late nursery diet is not deficient in lysine
- May provide more flexibility in diet formulation

Effect of Vaccination on Production Responses

Effect of PCV2 and *M. hyo* vaccination on nursery pig weight (d 35)



Potter et al., 2009

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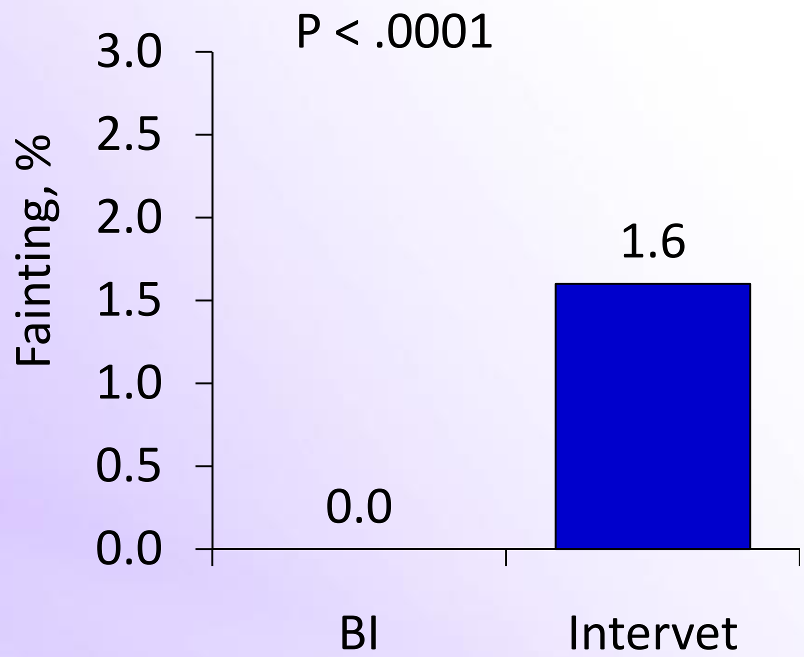
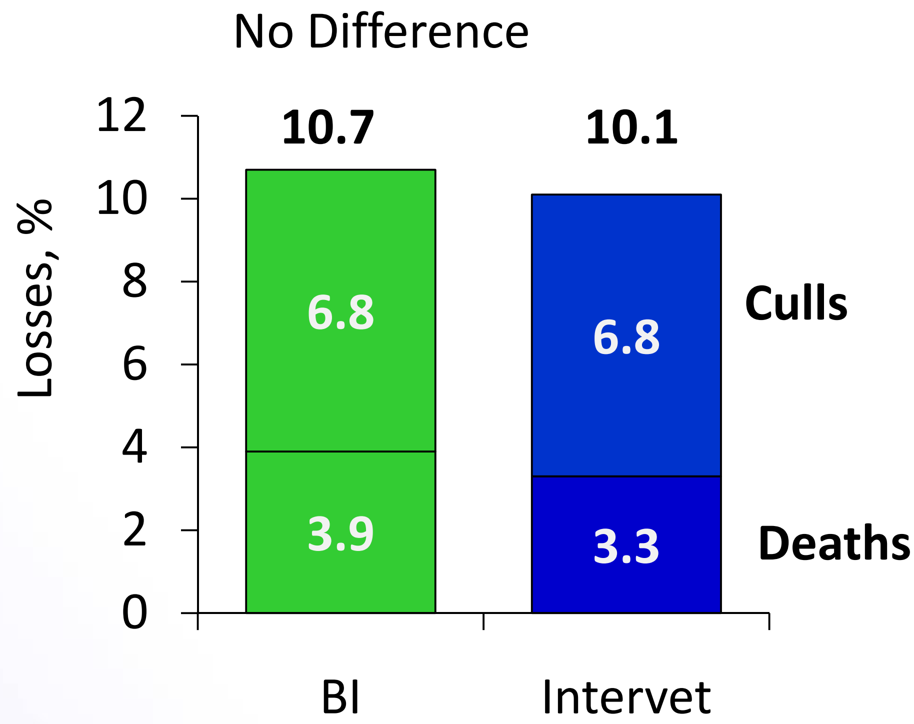
Effect of PCV2/*M. hyo* vaccine strategy on Fainting Pigs and Post Weaning Losses





Bergstrom et al., 2009

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Washington, Kansas

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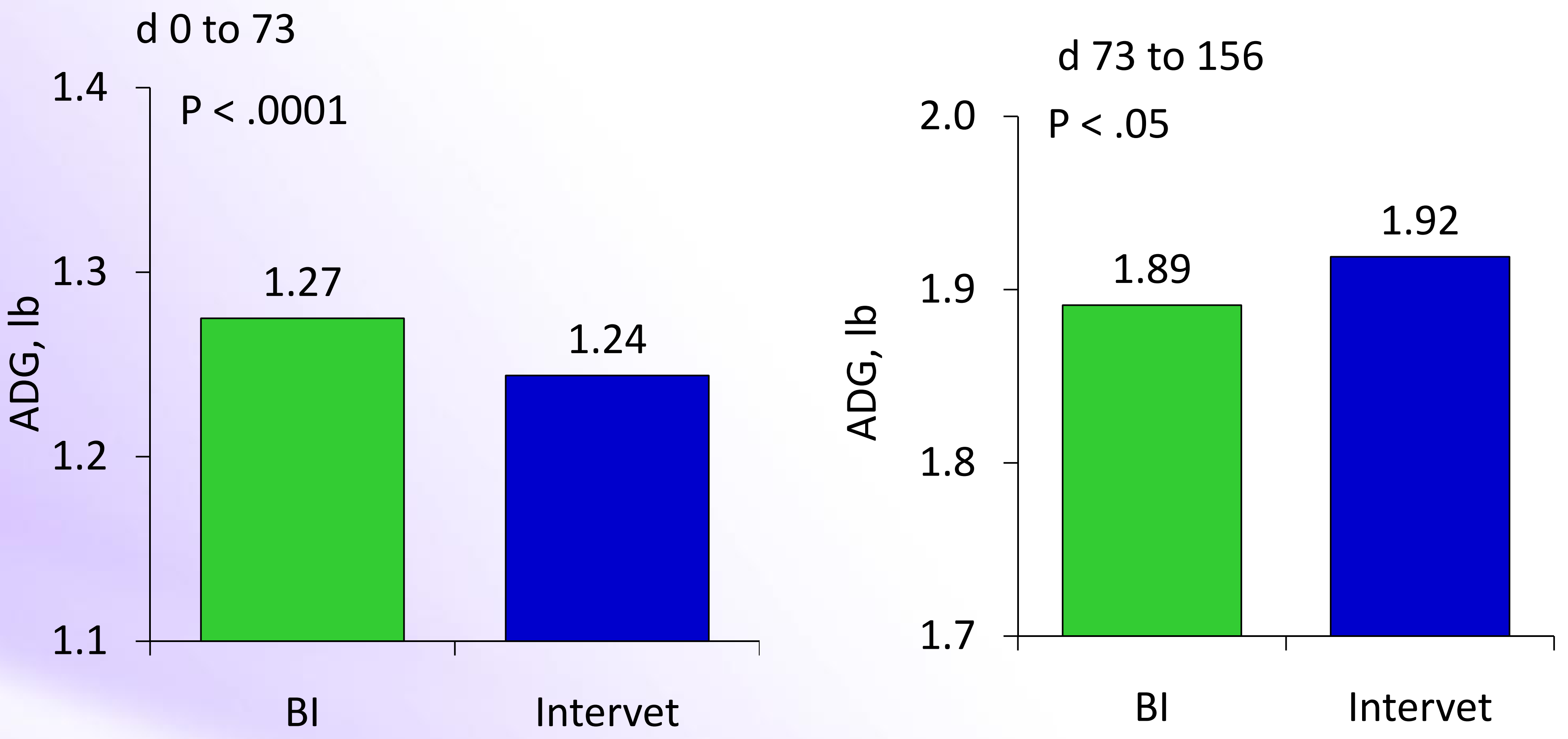
Effect of PCV2/*M. hyo* vaccine strategy on ADG



Bergstrom et al., 2009

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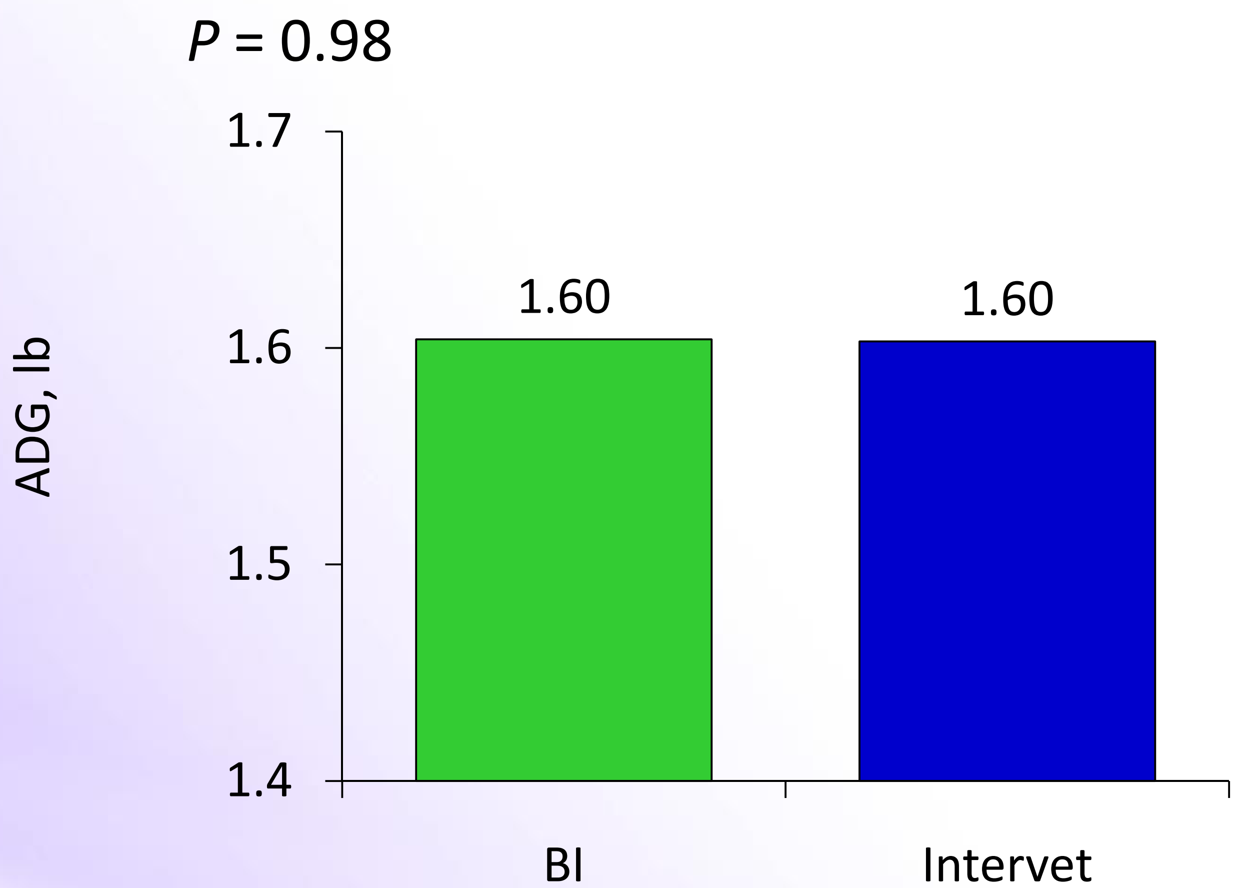
Effect of PCV2/*M. hyo* vaccine strategy on wean-to-finisher ADG (d 0 to 155)



Bergstrom et al., 2009

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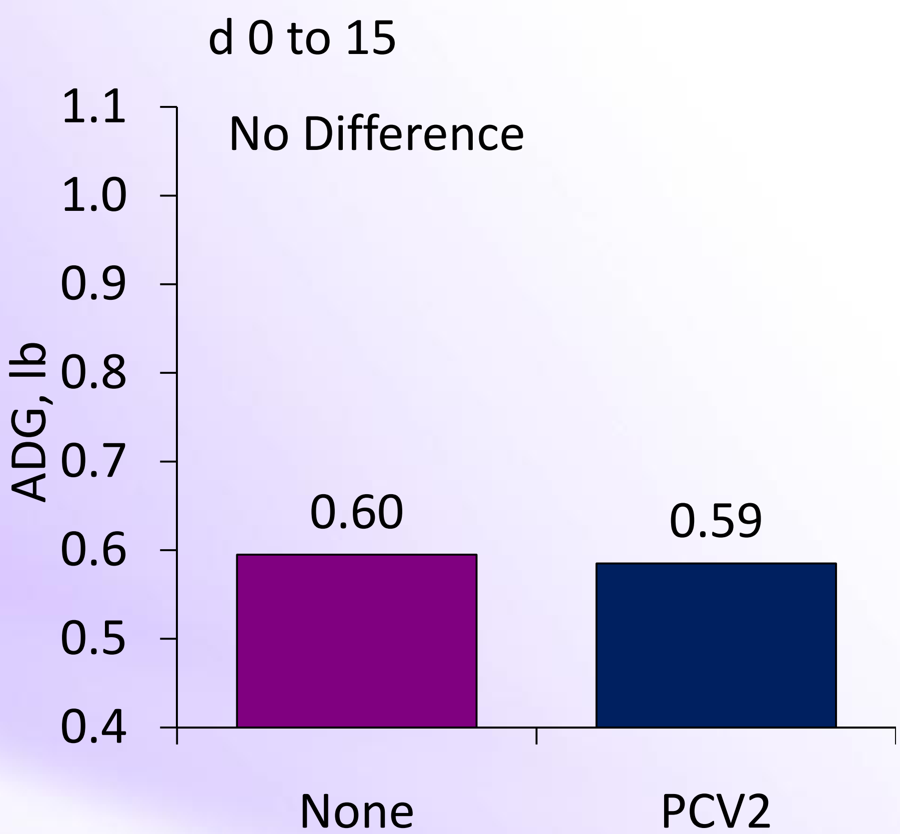
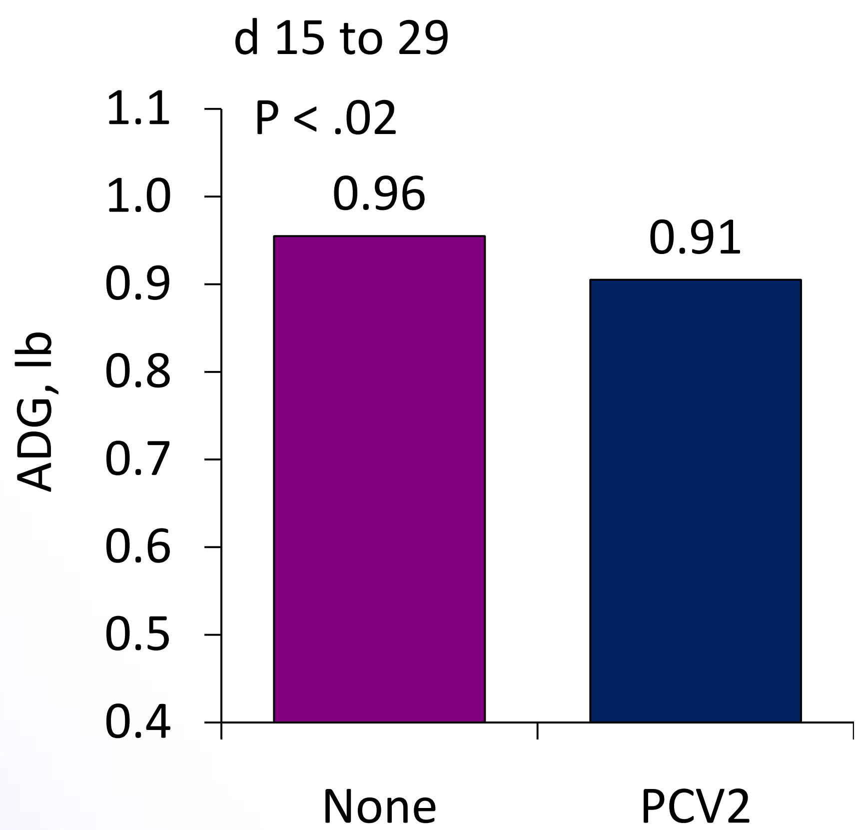
Effect of PCV2 vaccine strategy on ADG under a PRRS Challenge

d 0 and 15 = PCV2 Vaccination

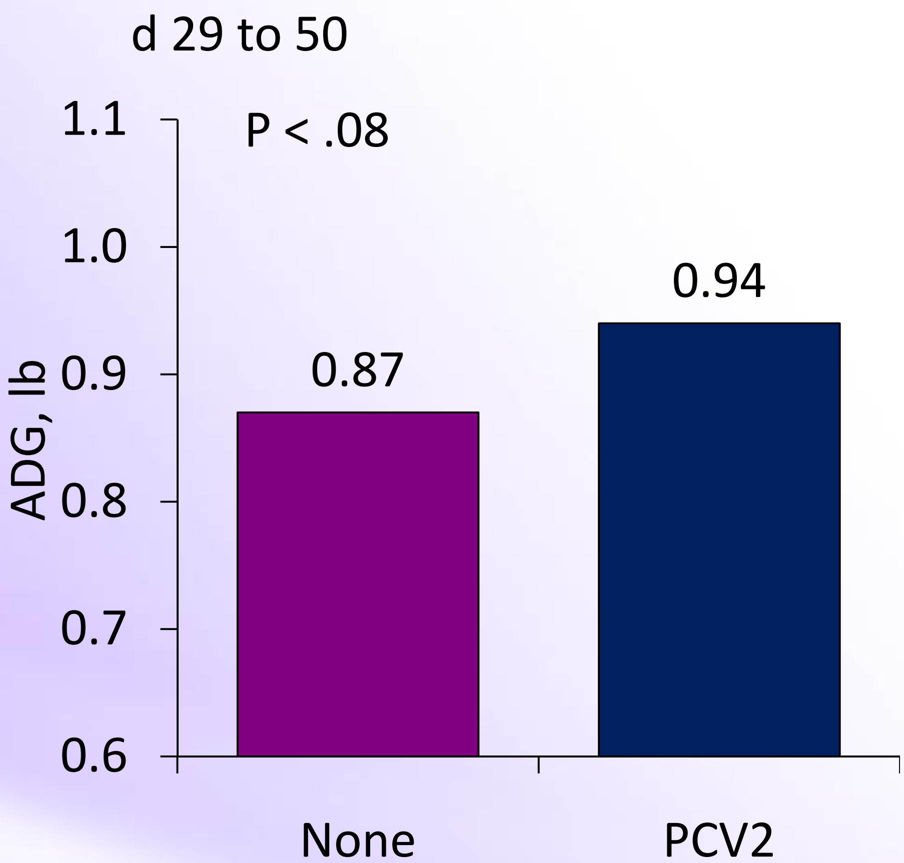


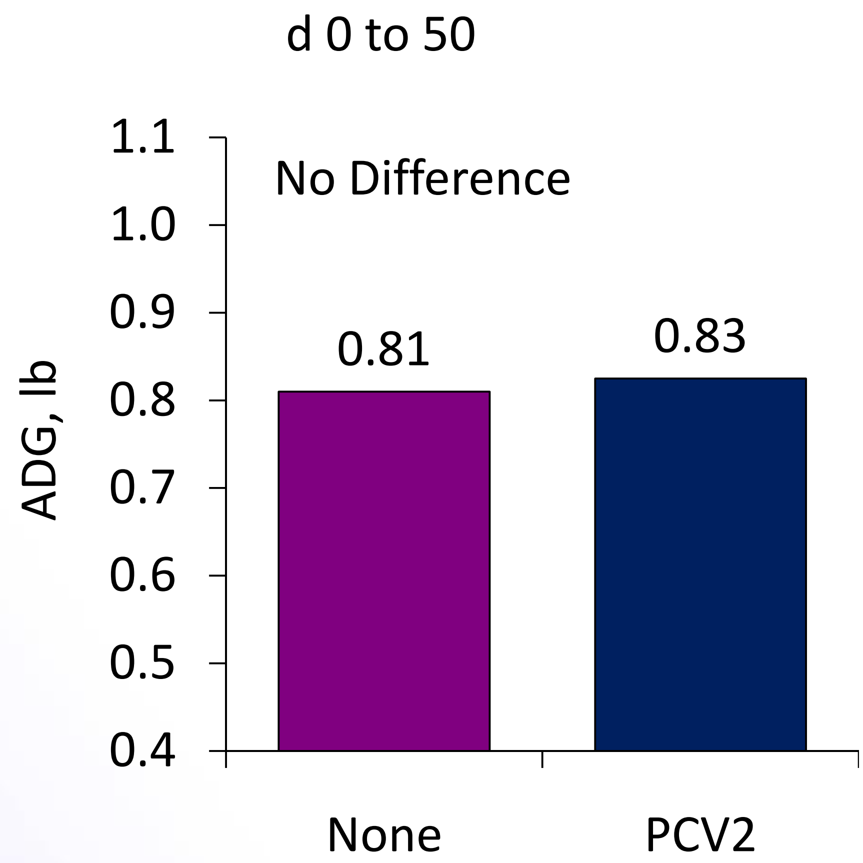


Shelton et al., 2009

Effect of PCV2 vaccine strategy on ADG under a PRRS Challenge

d 29= PRRS Challenge





Shelton et al., 2009

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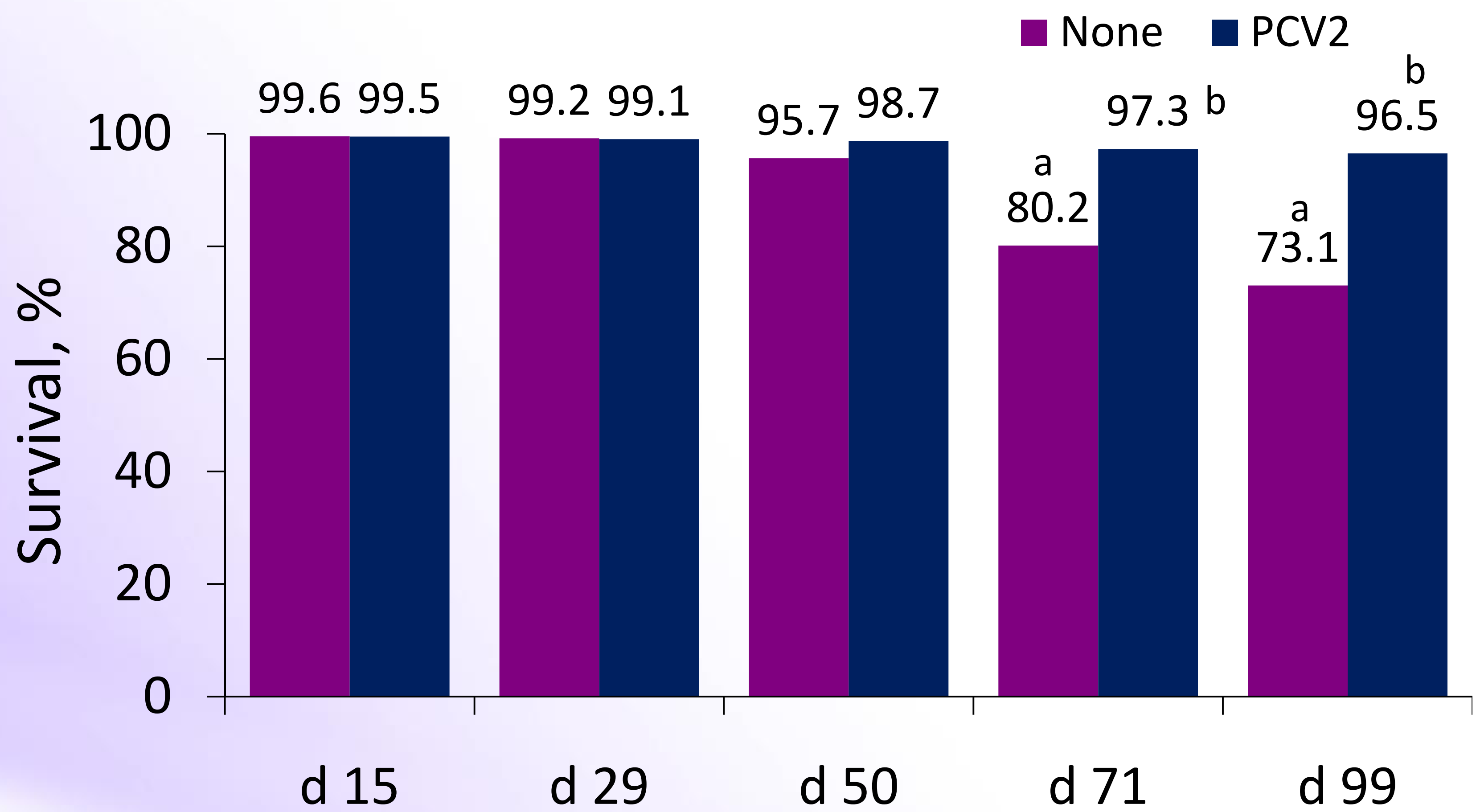
Effect of PCV2 vaccine on Survival under a PRRS Challenge



Shelton et al., 2009

New Horizon Farms LLP

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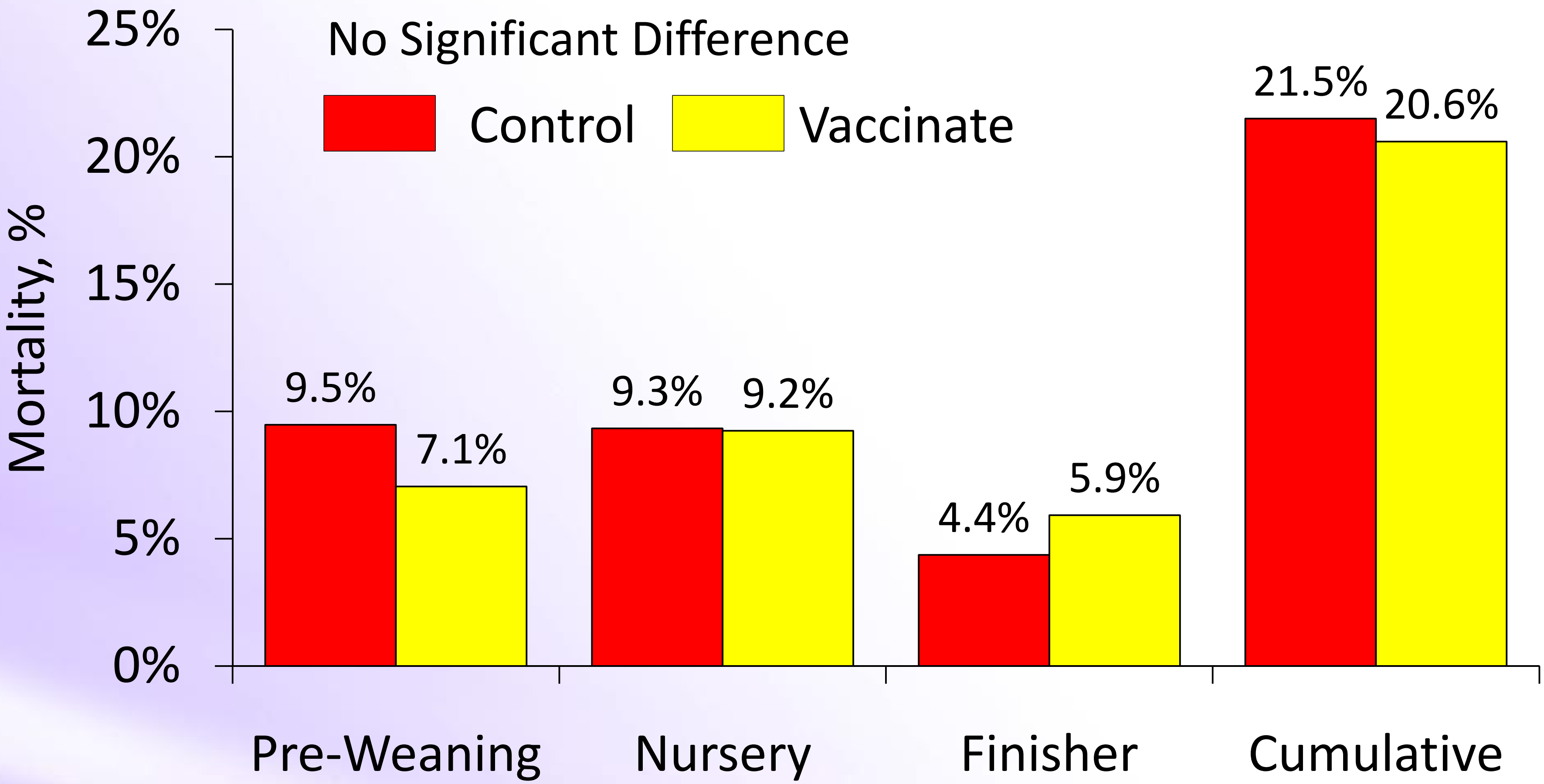
Sirrah PRRSV-RS Vaccine Trial

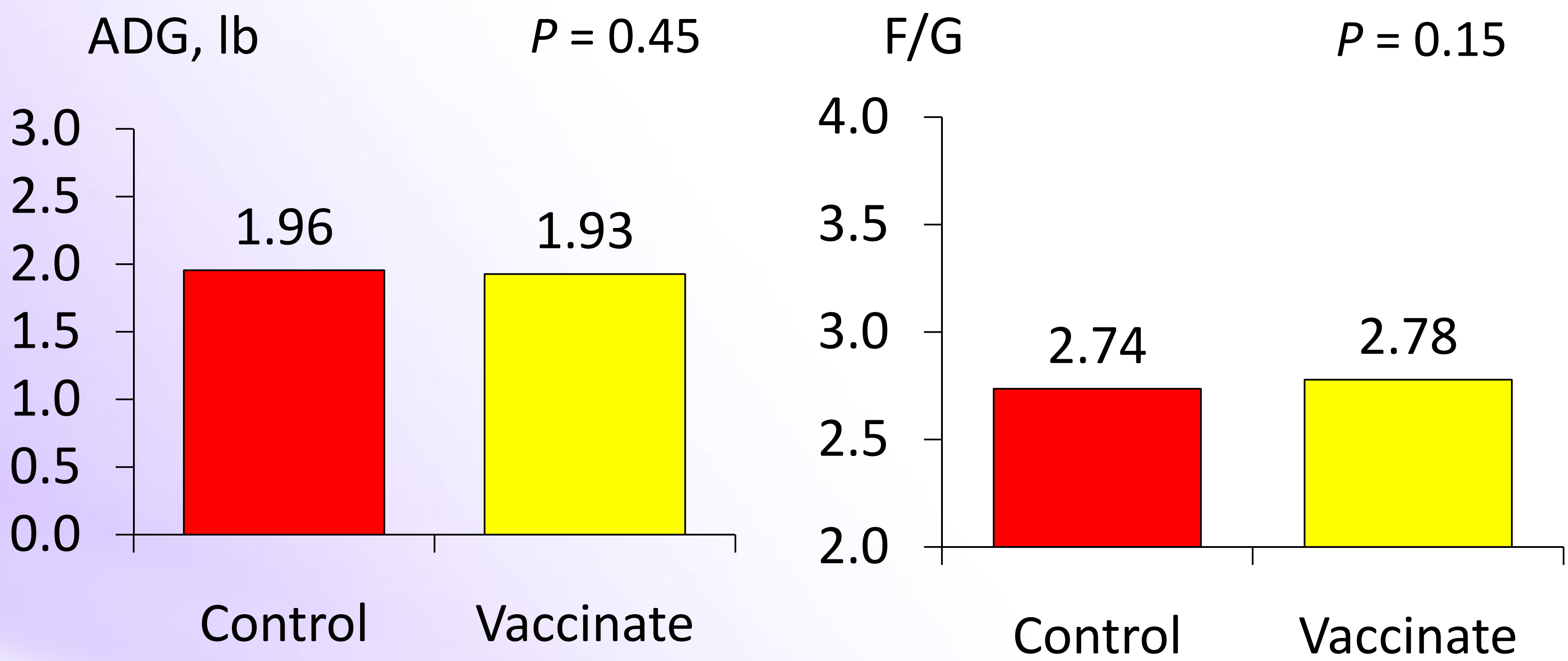
Potter et al., 2009

Effect of Sirrah PRRSV-RS Vaccine on Mortality



Potter et al., 2009

Effect of Sirrah PRRSV-RS Vaccine on Finisher ADG and Feed Efficiency



Potter et al., 2009

Key Take Home Messages for Vaccination Strategies:

- Some vaccines negatively impact nursery performance
  - The impact needs to be evaluated against effectiveness in the finisher
- Although overall growth rate was similar – pattern of growth rate was different between the two PCV2/*M. hyo* vaccination strategies
- We failed to find an impact on production parameters for the PRRS vaccine

Thank You!

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Research and Extension

Grow-Finish Research Update

- Feeder design and adjustment
- Amino acid levels
- DDGS and other alternatives
- Mycotoxins
- Marketing
  - Mixing and topping pigs and Paylean use

Effects of feeder type and adjustment on finishing pig growth

Bergstrom et al. 2008

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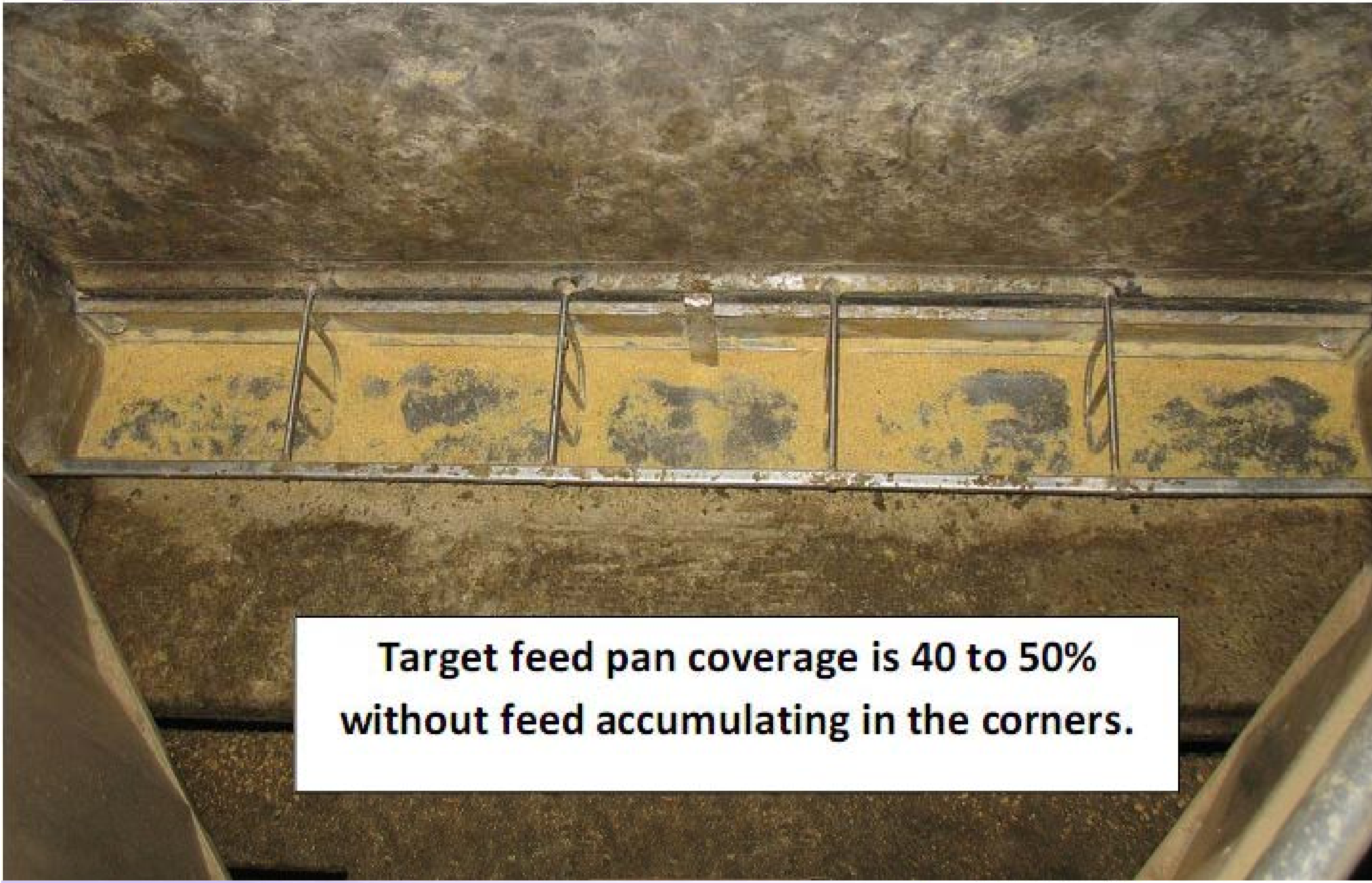
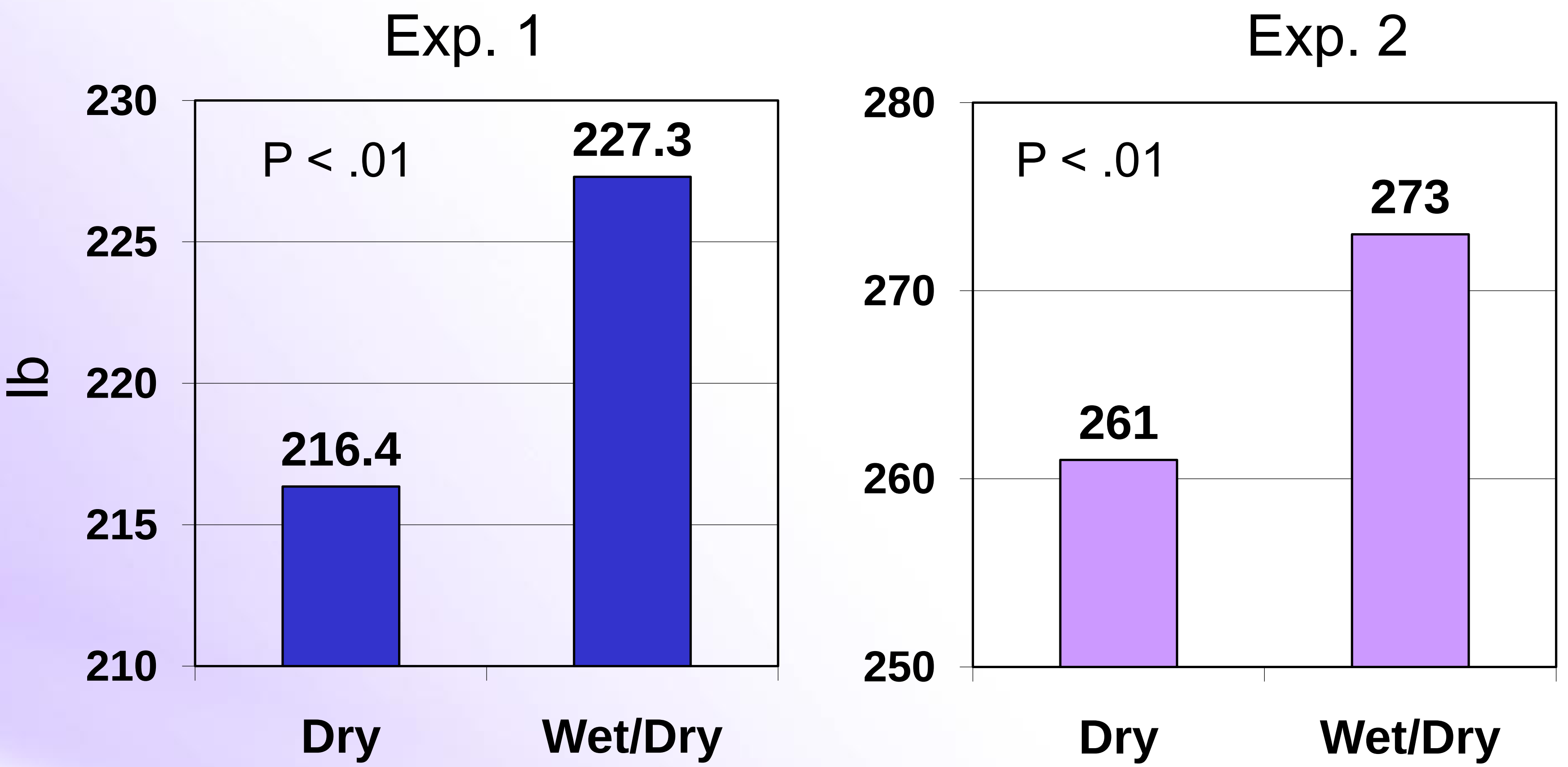
Proper Finishing Feeder Adjustment



Effects of feeder type on final weight



Bergstrom et al. 2008

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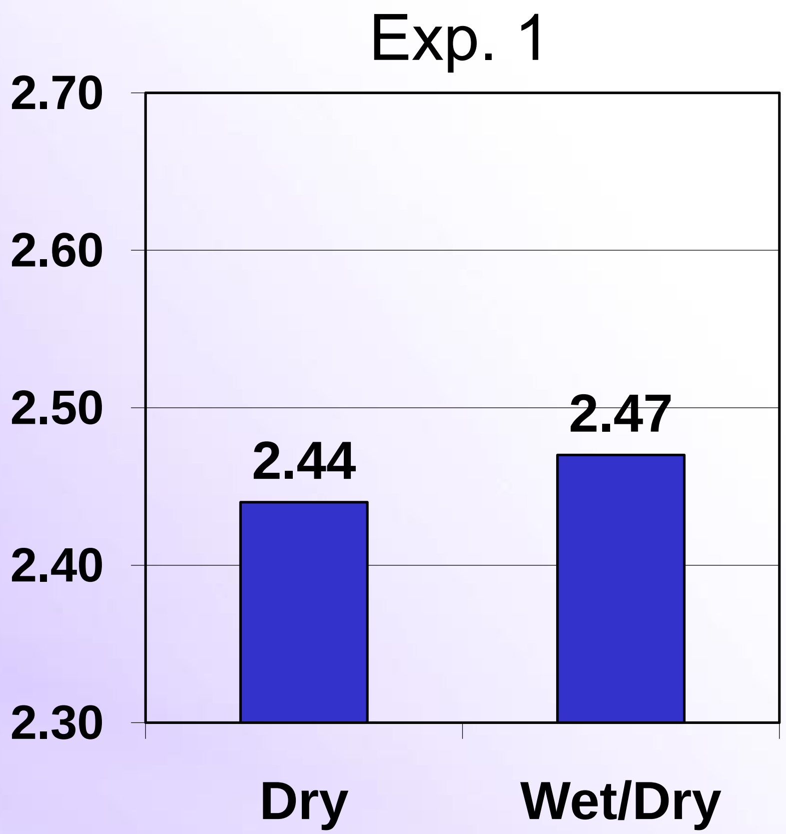
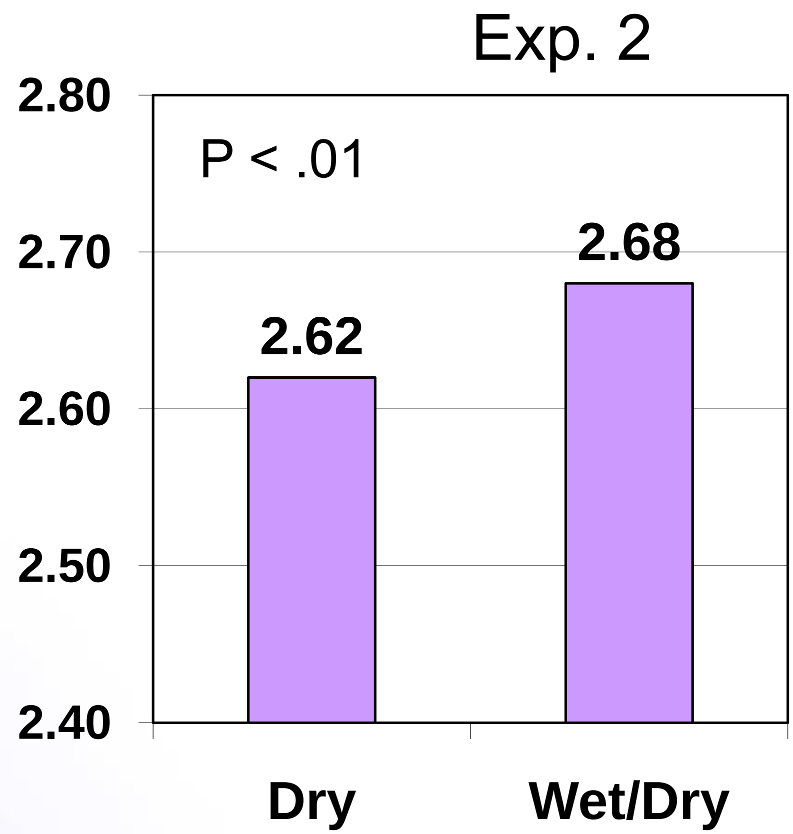
Effects of feeder type on F/G





Bergstrom et al. 2008

NEW HORIZON FARMS LLP

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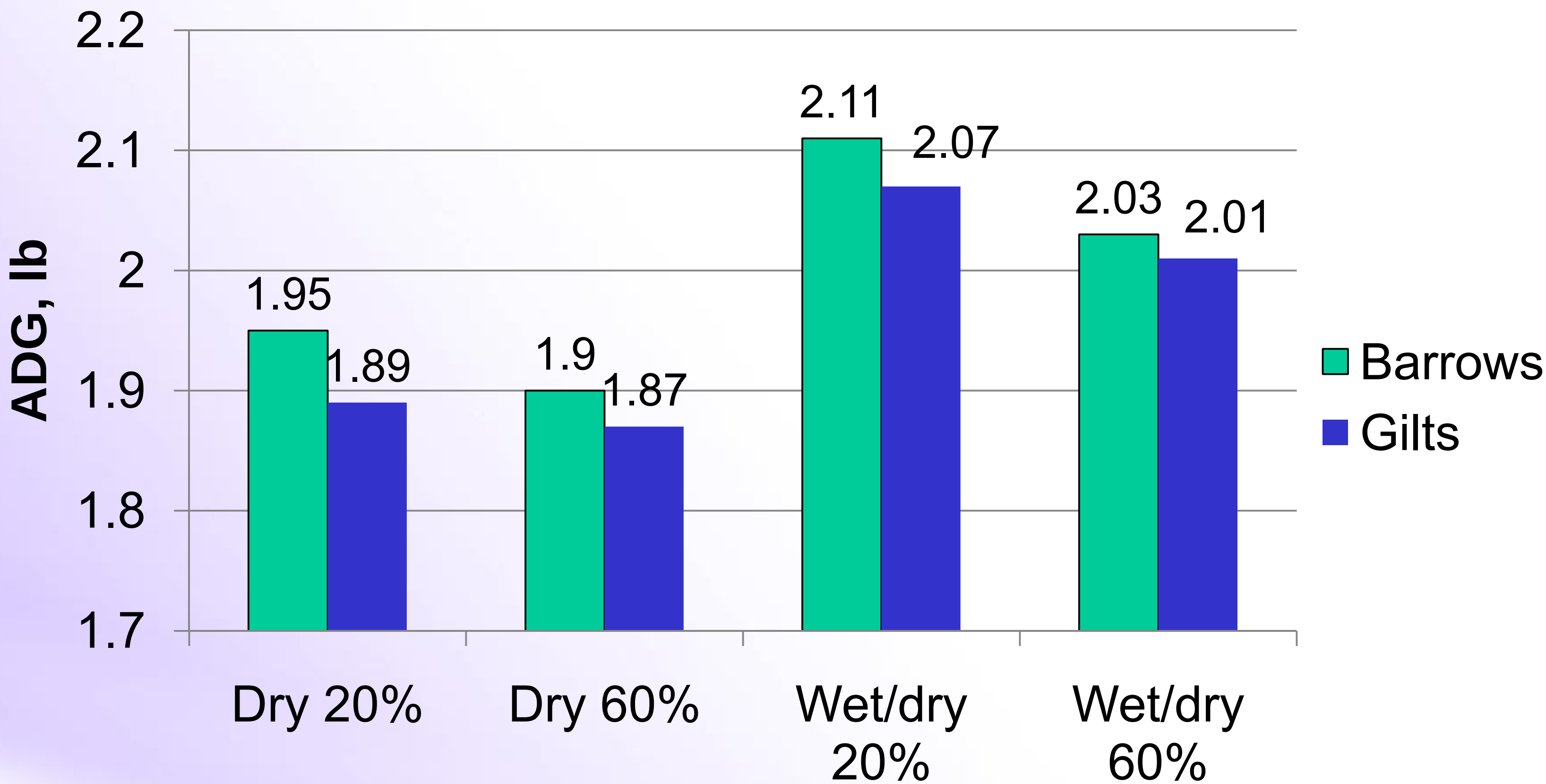
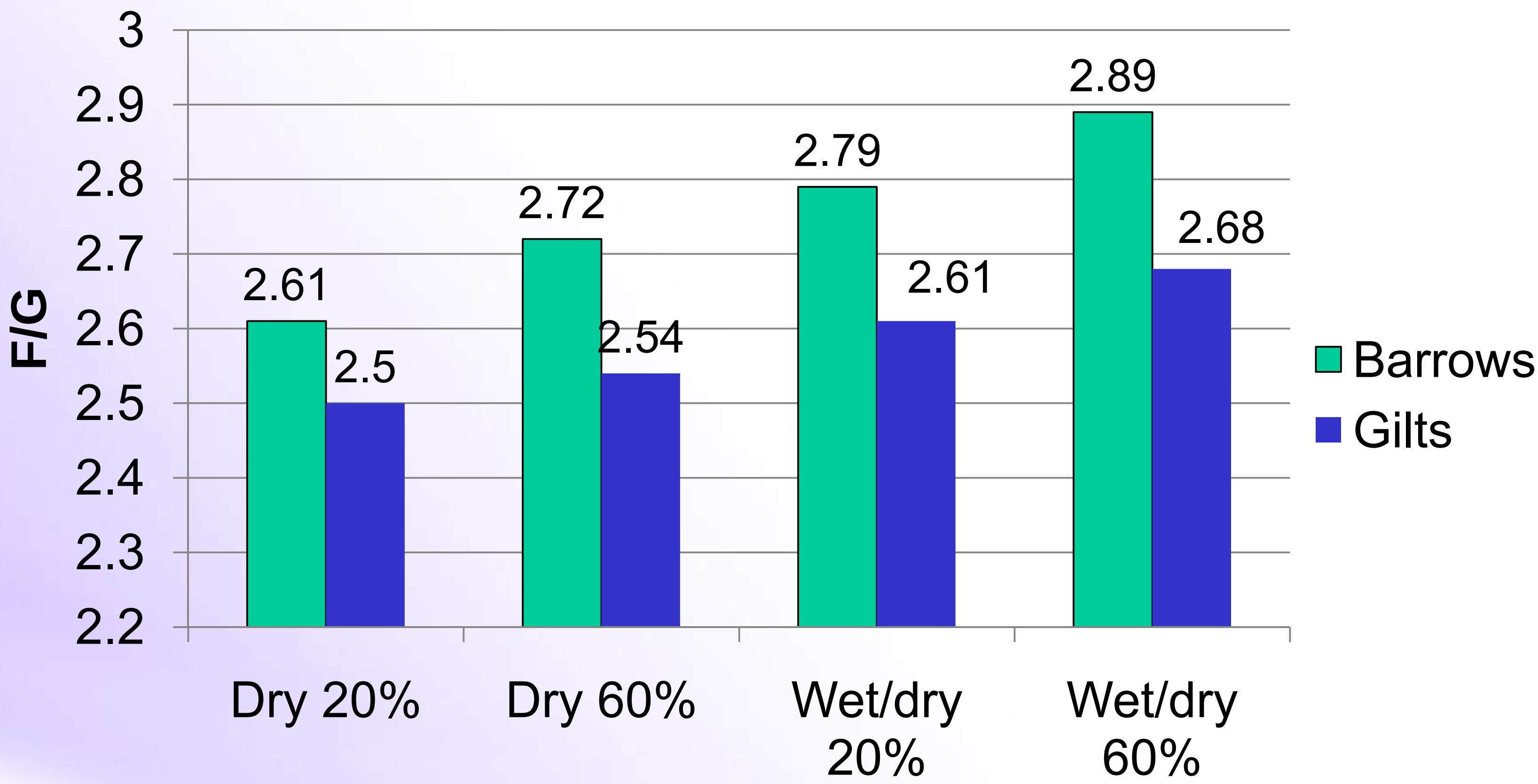
Influence of feeder type and DDGS level (20 or 60%) on pig performance



Bergstrom et al. 2009

Influence of feeder type and DDGS level (20 or 60%) on pig performance



Bergstrom et al. 2009

New Horizon Farms LLP

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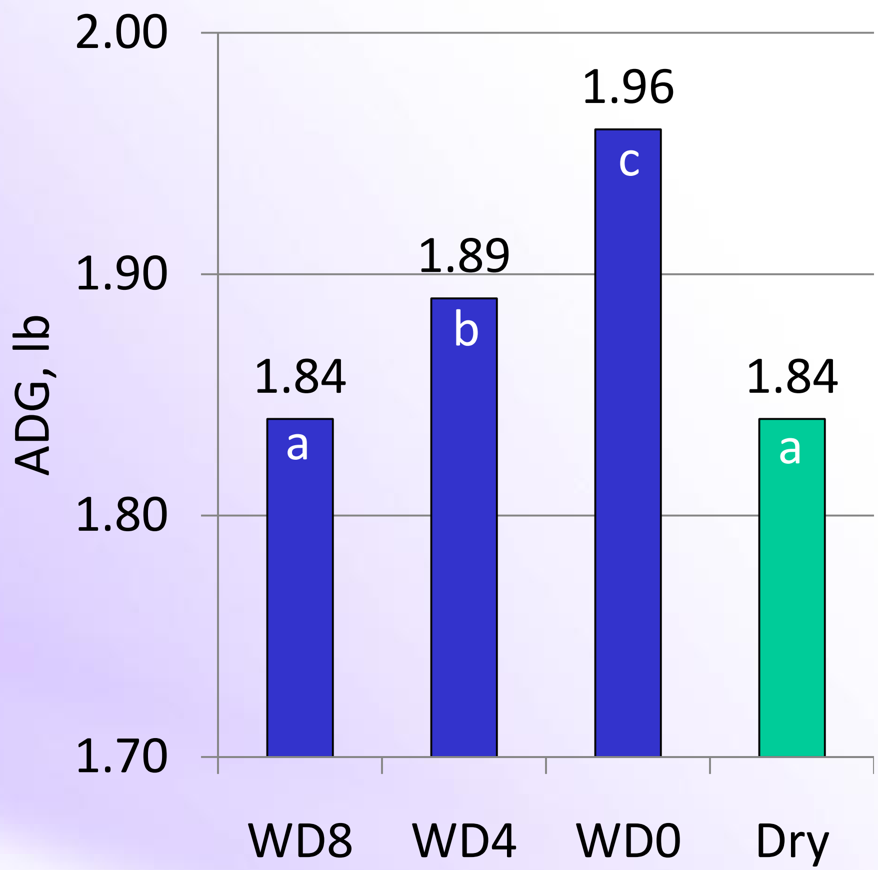
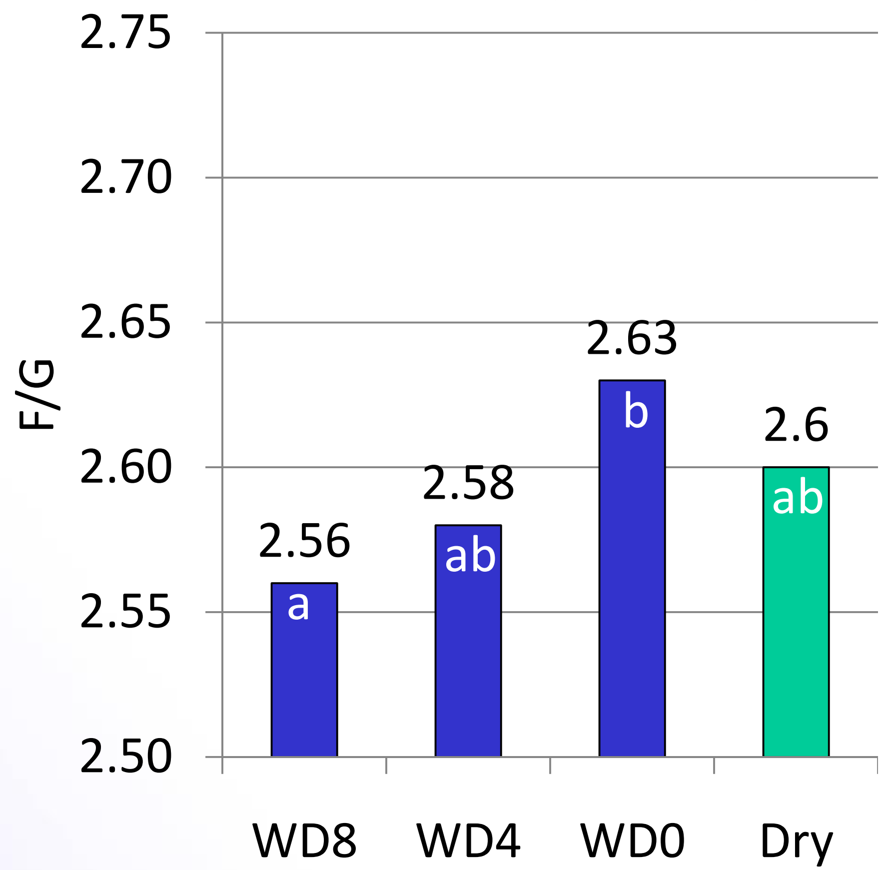
Effects of feeder design and changing water source at 4 and 8 weeks before market on pig performance



ab P< 0.05



Bergstrom et al., 2010

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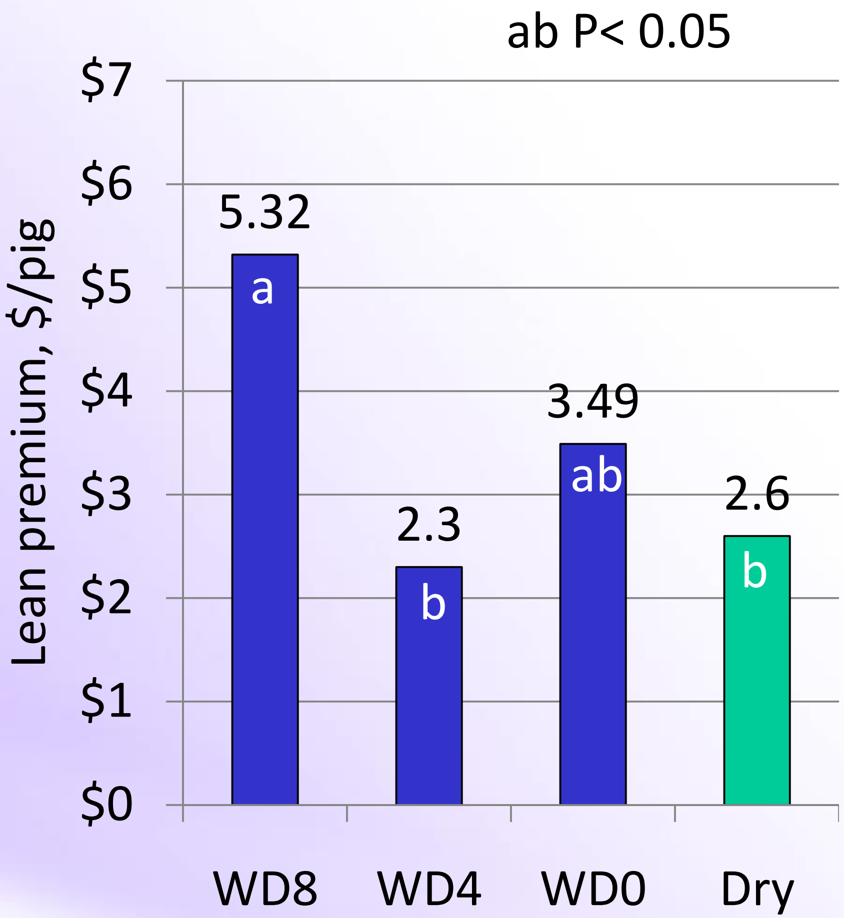
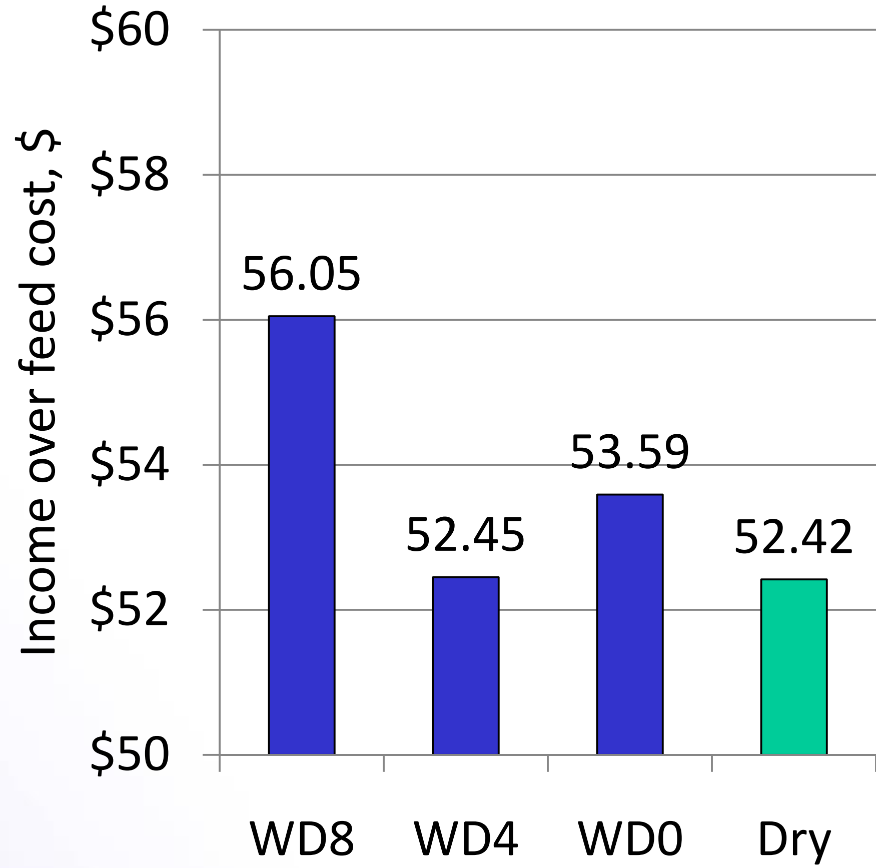
Effects of feeder design and changing water source at 4 and 8 weeks before market on pig performance





Bergstrom et al., 2010

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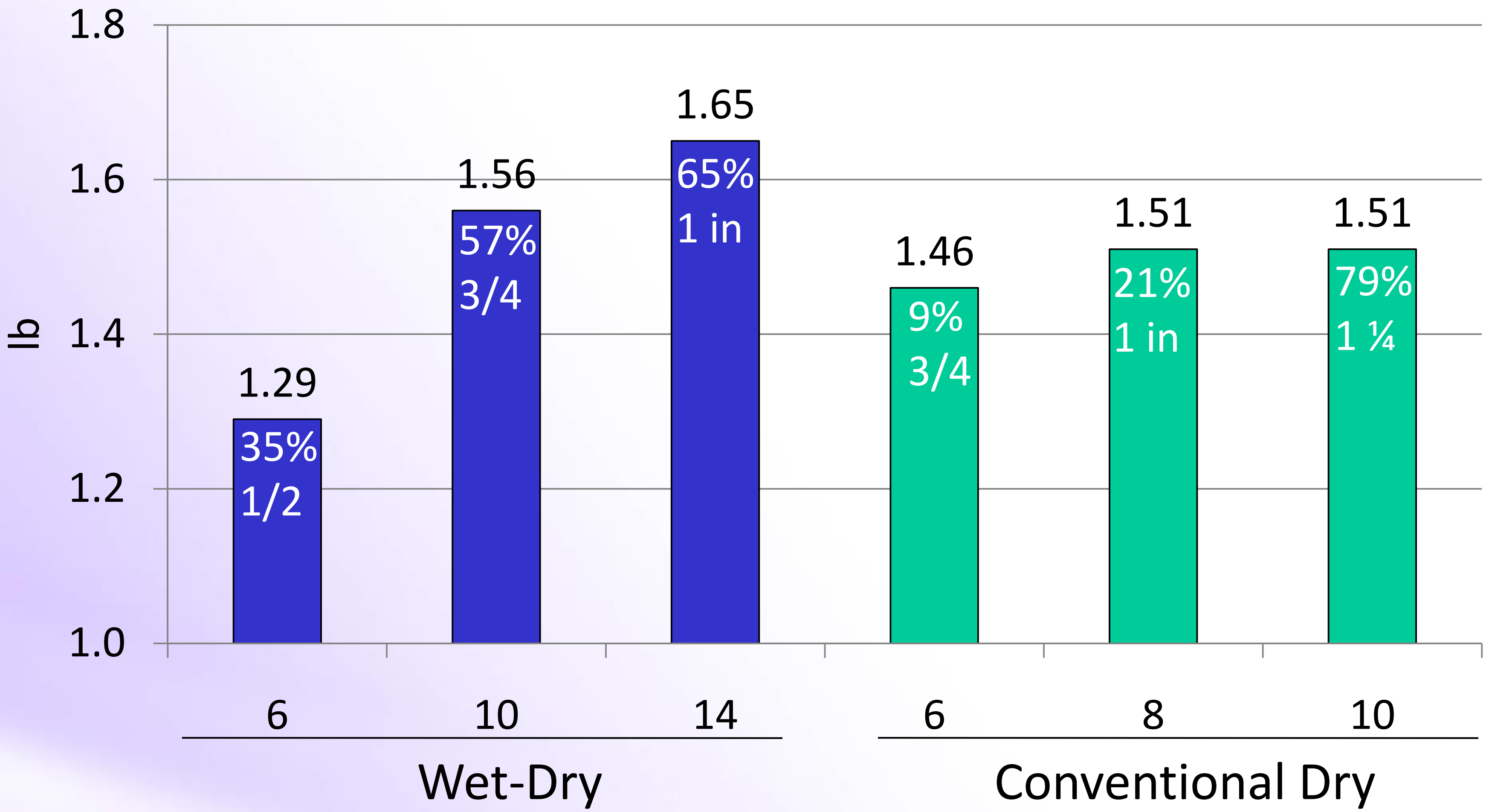
Effects of feeder design and adjustment on average daily gain from 42 to 85 lb



Bergstrom et al., 2010

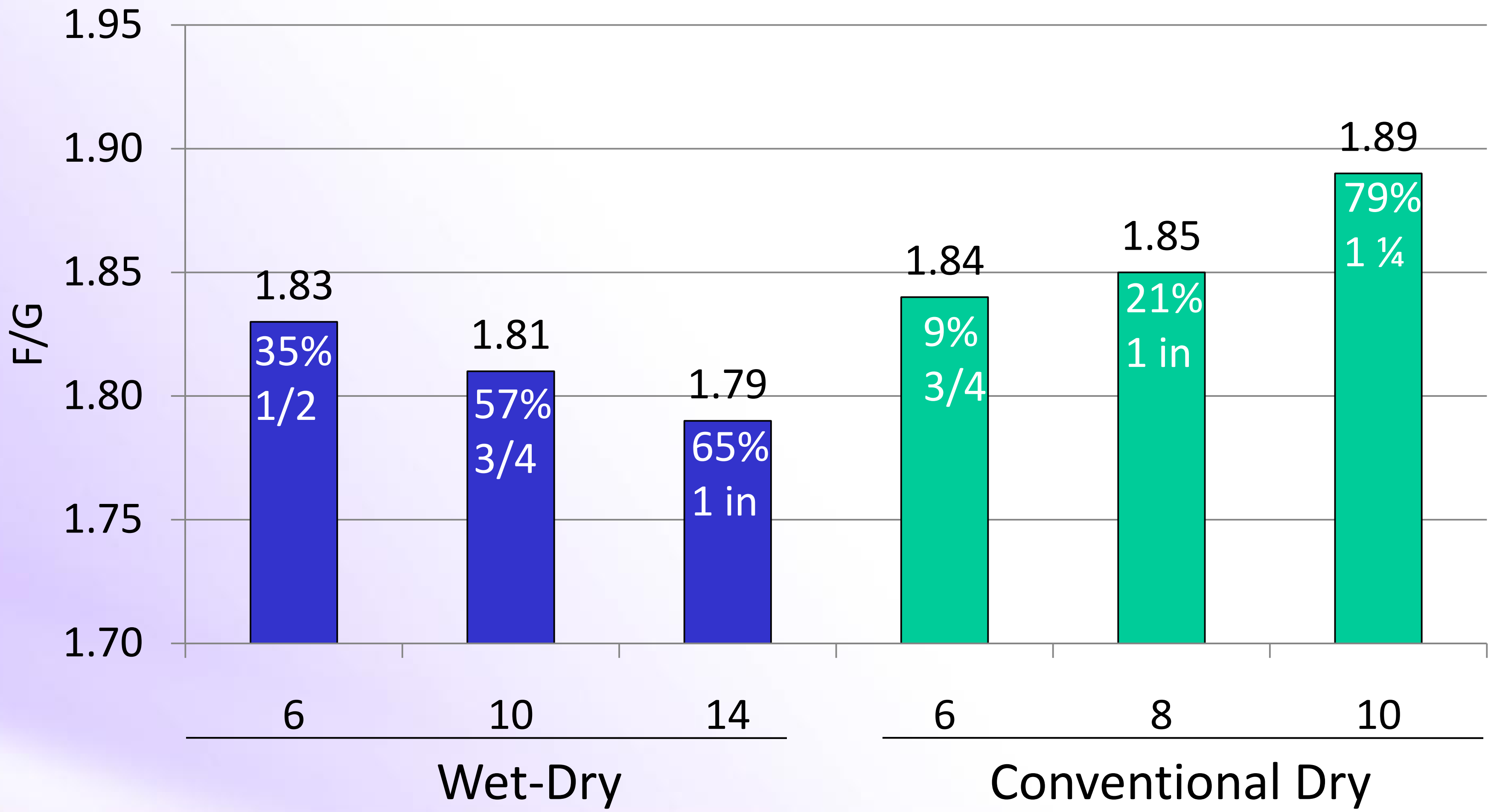
Effects of feeder design and adjustment on percentage pan coverage

Setting of 10 with a 0.75 inch opening and ~53% coverage

Setting of 14 with a 1 inch opening and ~73% coverage

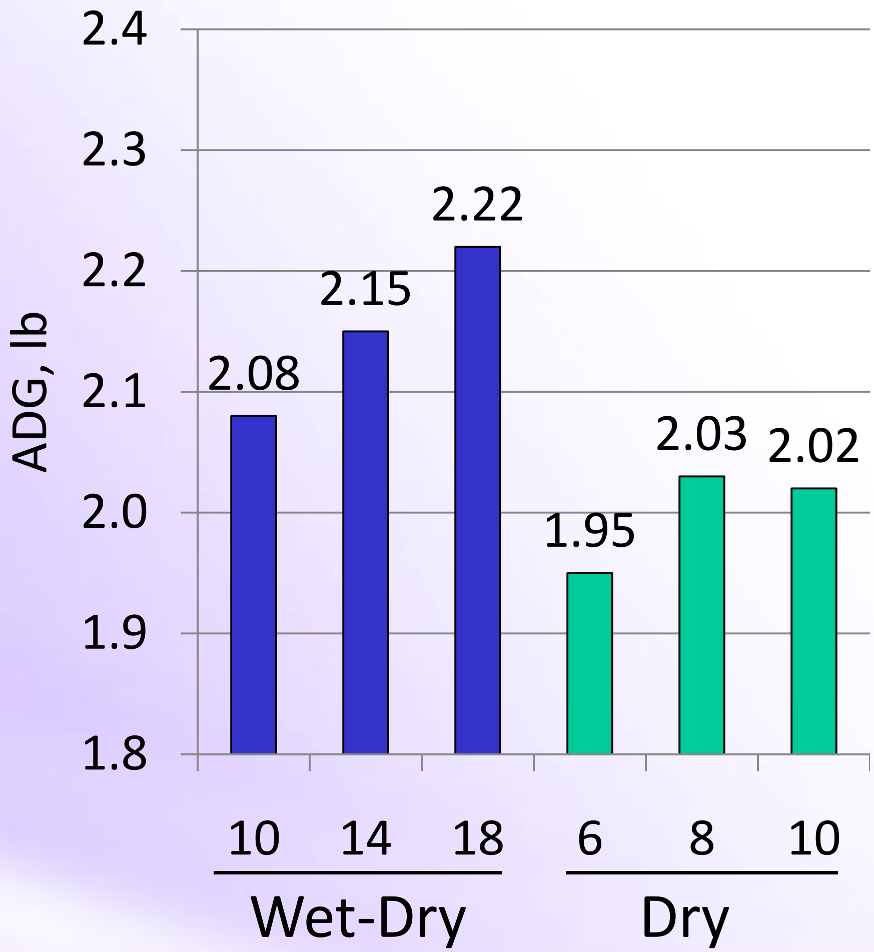
Bergstrom et al., 2010

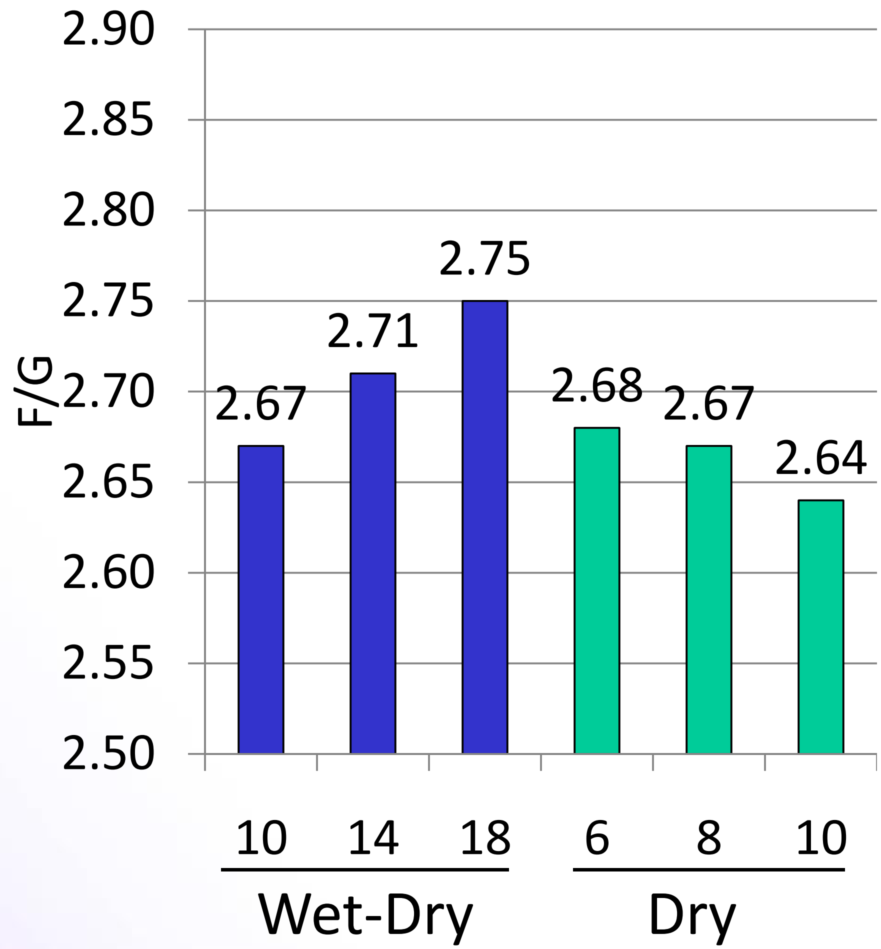
Effects of feeder design and adjustment on feed efficiency from 42 to 85 lb



Bergstrom et al., 2010

Effects of feeder design and adjustment on feed efficiency through 270 lb





Bergstrom et al., 2010

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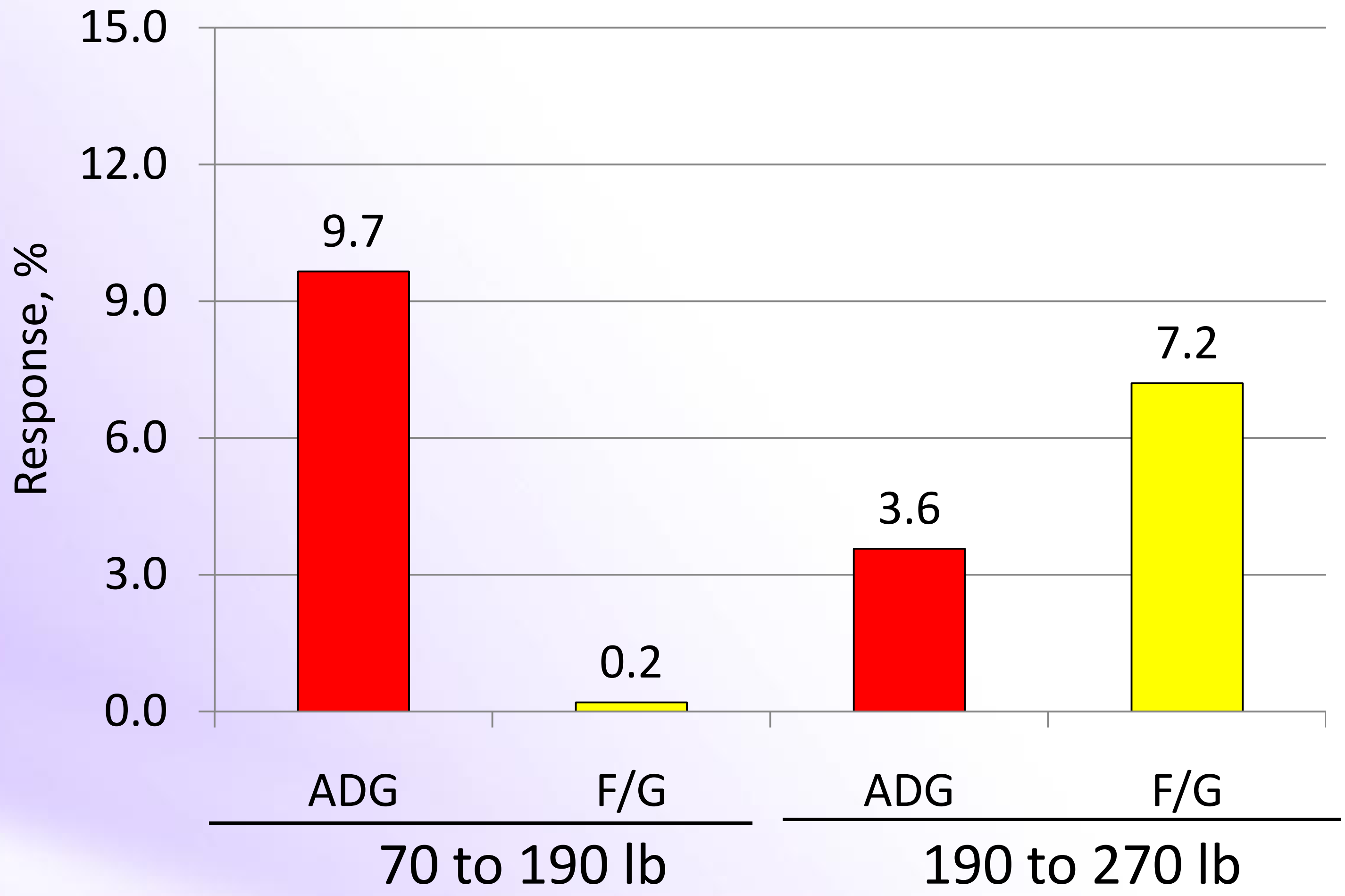
Percentage difference in ADG and F/G with more open adjustment (18 vs 10) for wet/dry feeder



Setting	inch
6	½
10	¾
14	1
18	1¼

Bergstrom et al., 2010

Current Feeder Recommendations

- Dry feeders
  - 50% of pan should be covered with feed
    - 1 to 1.25 inch below adjustment gate
  - Minimum of 2 inch of feeder space/pig
- Wet/dry feeders
  - Increased weight gain and intake compared to dry feeders
  - Still determining optimal feeder settings
    - 1.25 inch opening from placement to 200 lb
    - 0.75 inch opening after 200 lb

New KSU Swine Finishing Barn

- First pigs placed in early December 2008
- Eight research projects completed or in progress:
  1) DDGS x dietary enzyme
  2) Four separate lysine requirement experiments
  3) Feeding blended diets or corn-supplement blend
  4) DDGS x wheat midds
  5) Feeder space x feeder adjustment

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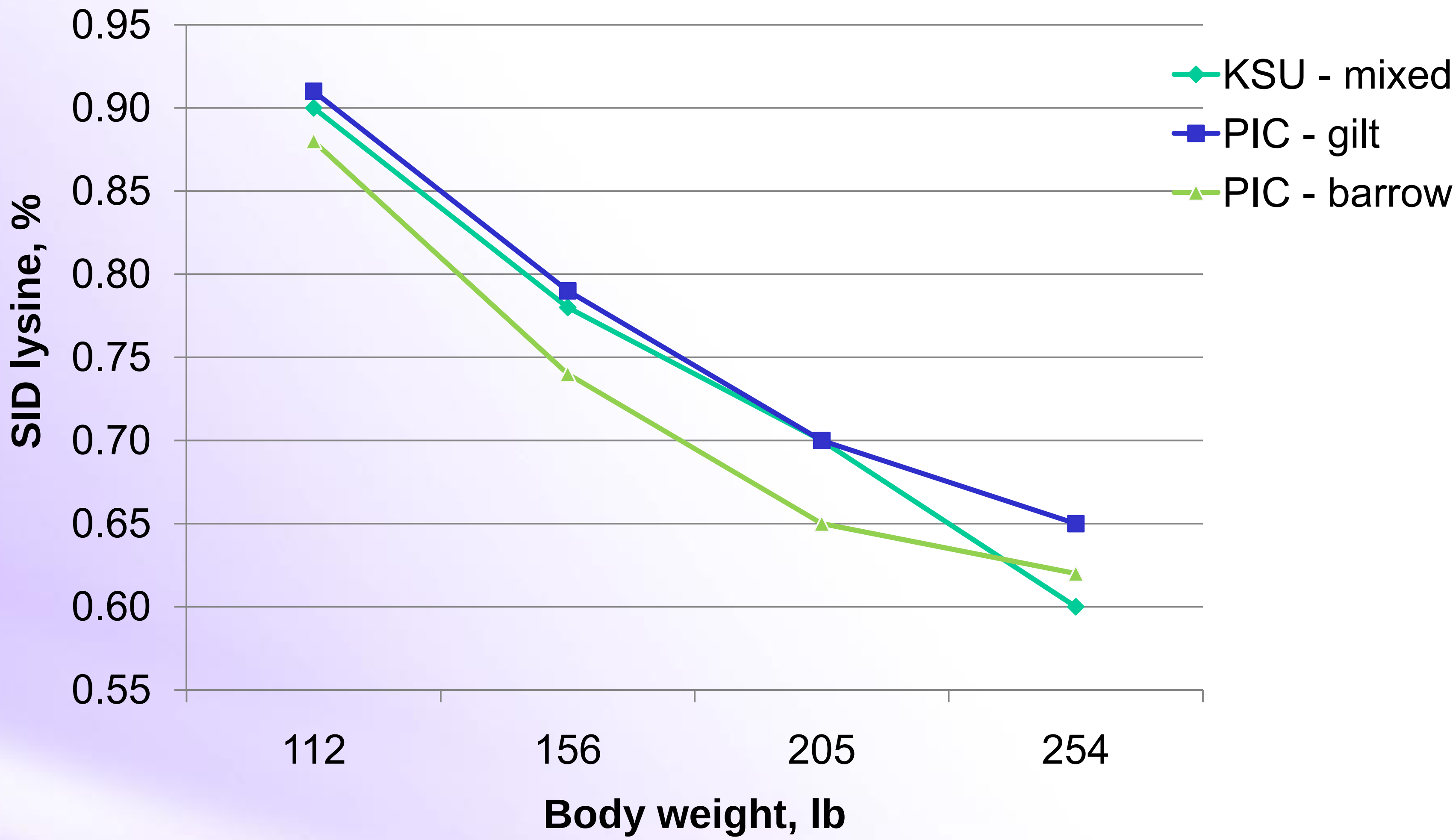
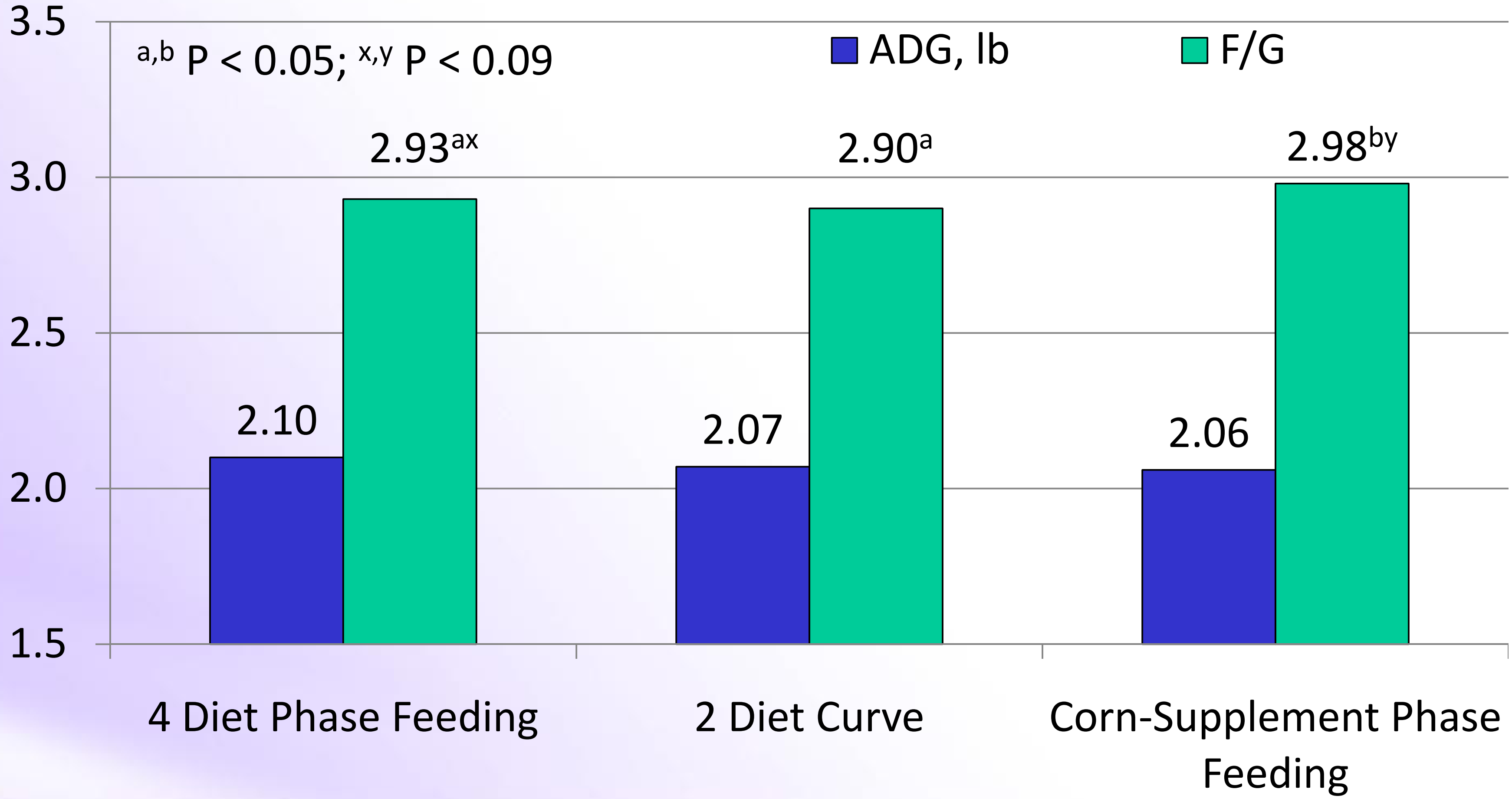
SID lysine requirements in the new KSU finishing barn (no added fat diets)



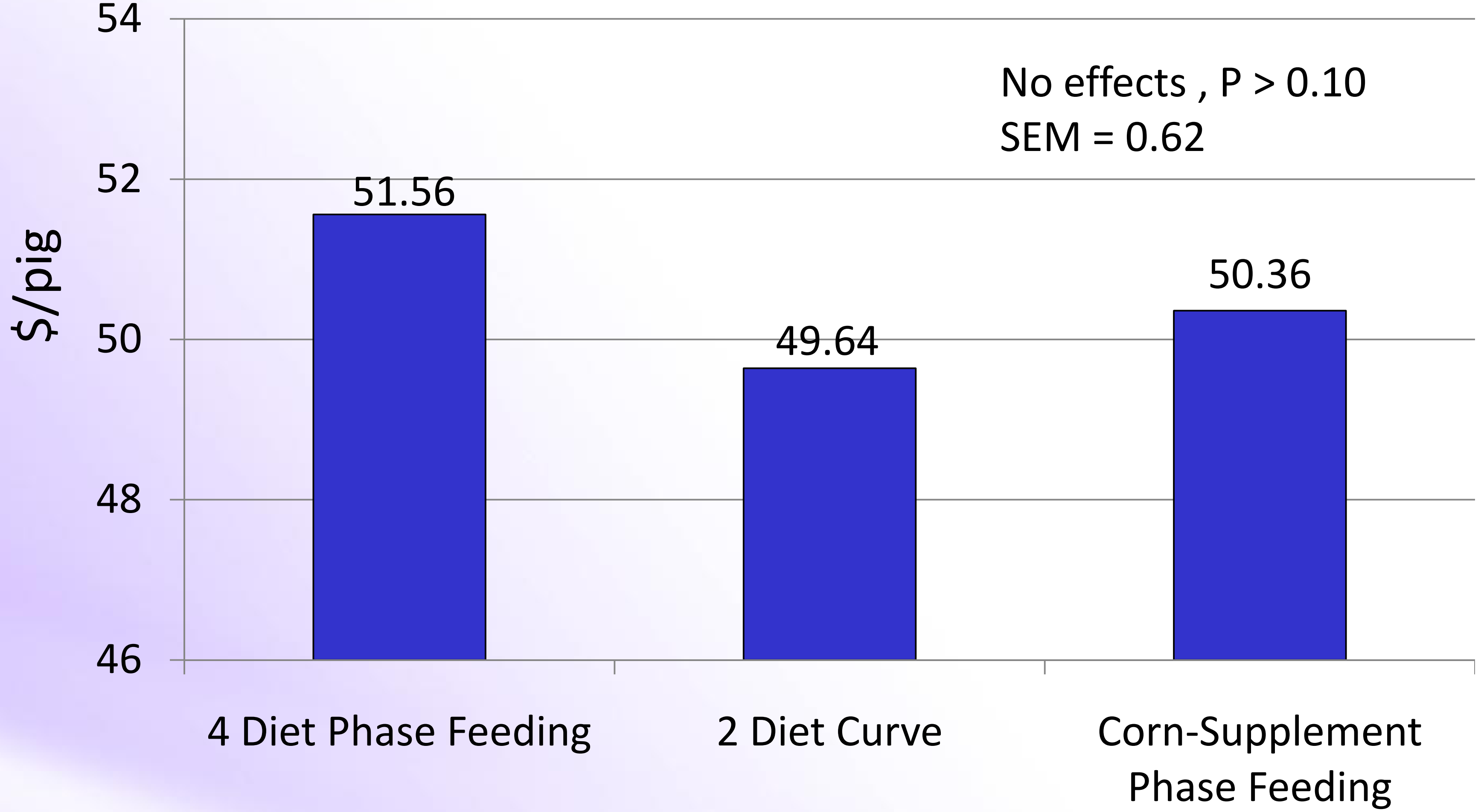
Bergstrom et al., 2009

Feed blending using the FEEDPro system on growth performance



Sulabo et al., 2010

Feed blending using the FEEDPro system on feed cost/pig



Sulabo et al., 2010

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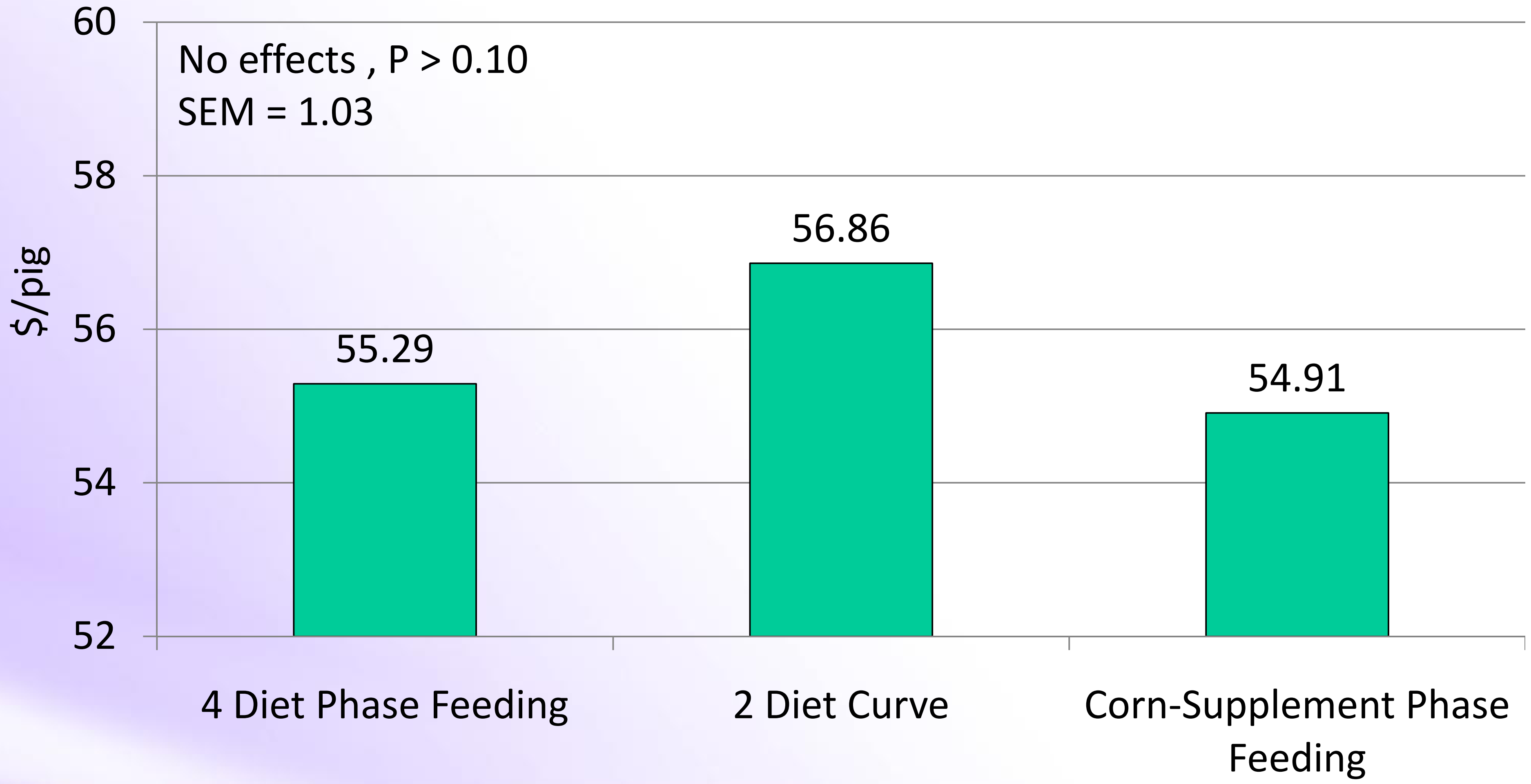
Feed blending using the FEEDPro system on income over feed cost



Sulabo et al., 2010

Use synthetic amino acids continue to be used economically in finishing diets

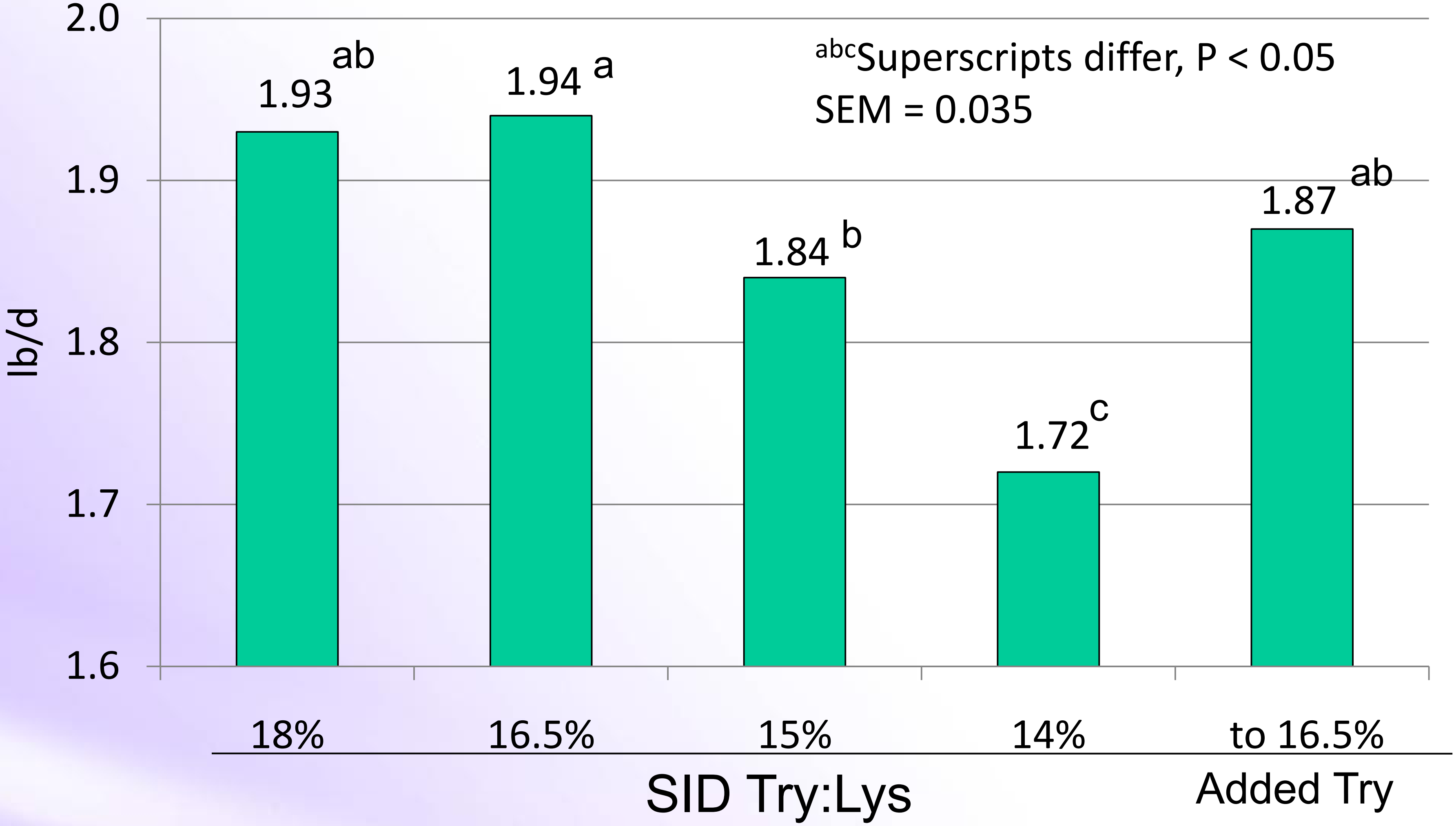
Low Protein Amino Acid Price Calculator

	Price, $	
Corn	3.80	$/bu
Soybean meal	300	$/ton
L-Lysine	0.85	$/lb
DL-Methionine	2.00	$/lb
L-Threonine	1.20	$/lb

Savings per pig with AA fortified diet, $	$ 0.44

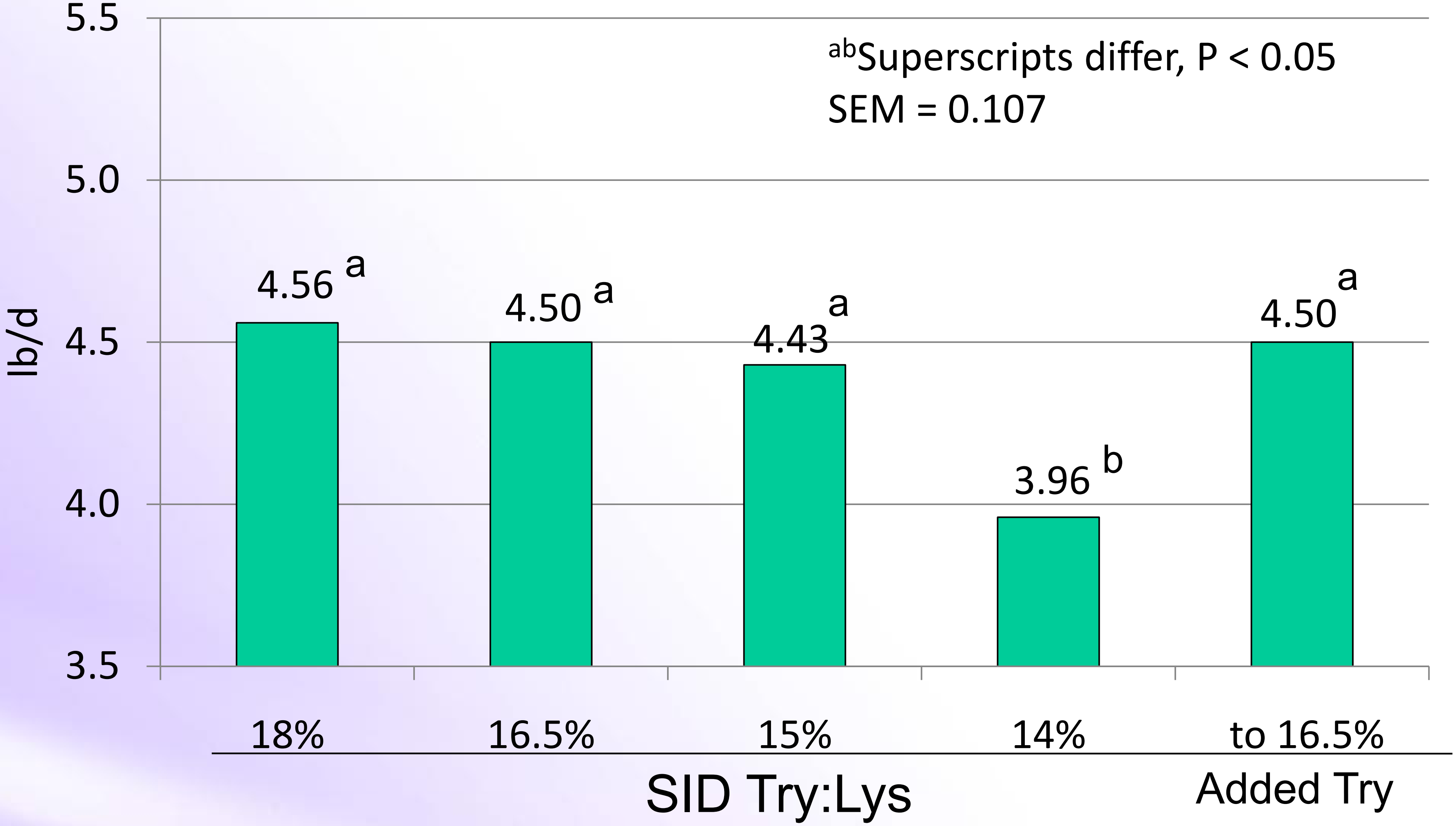
When supplementing Lysine, Threonine, and Methionine – Tryptophan is typically the limiting amino acid in growing pig diets

Effect of TID Try:Lys on finishing ADG (d 0 – 42; initial BW 80 lb)



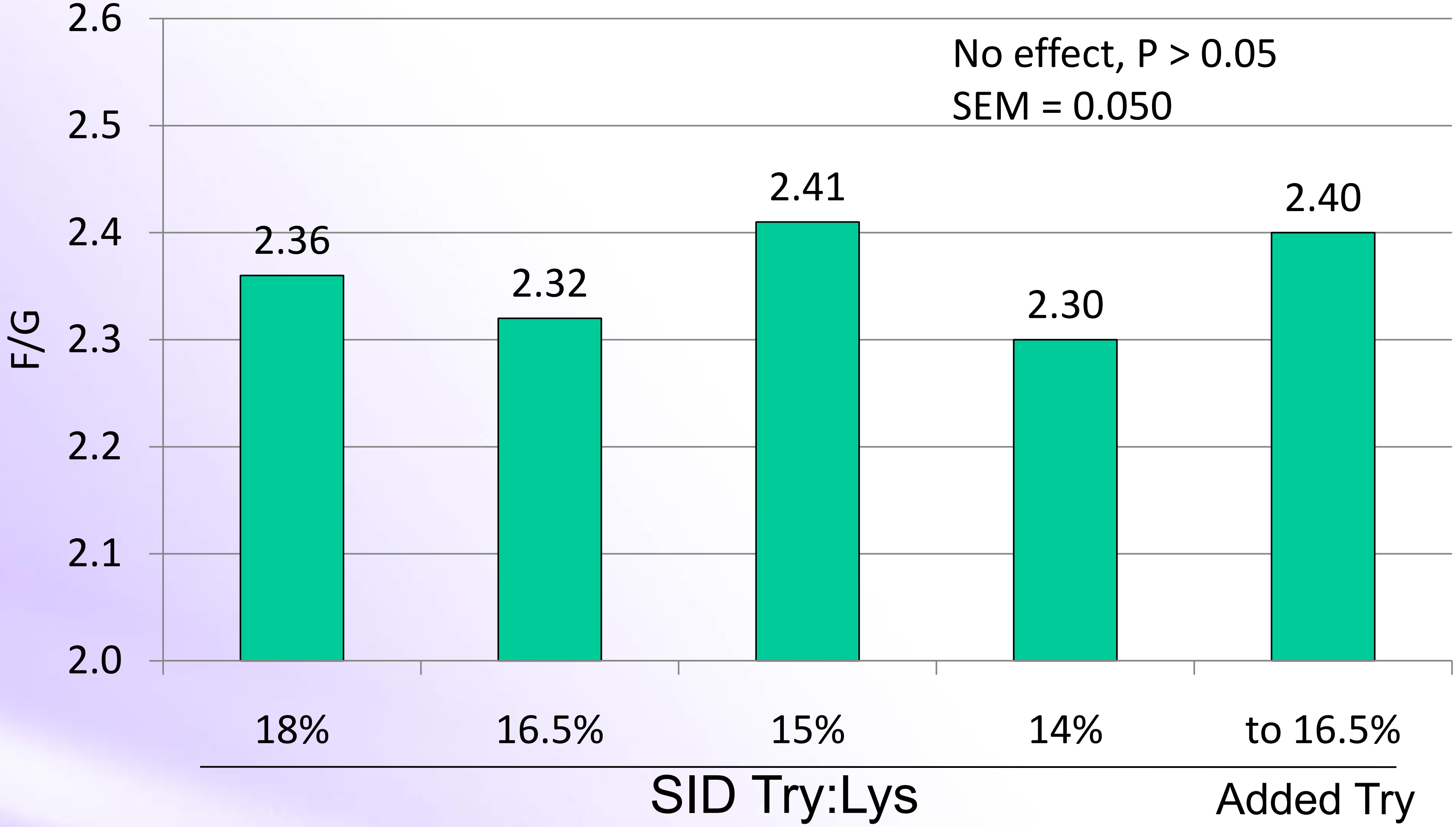
Barnes et al., 2010

Effect of TID Try:Lys on finishing ADFI (d 0 – 42; initial BW 80 lb)



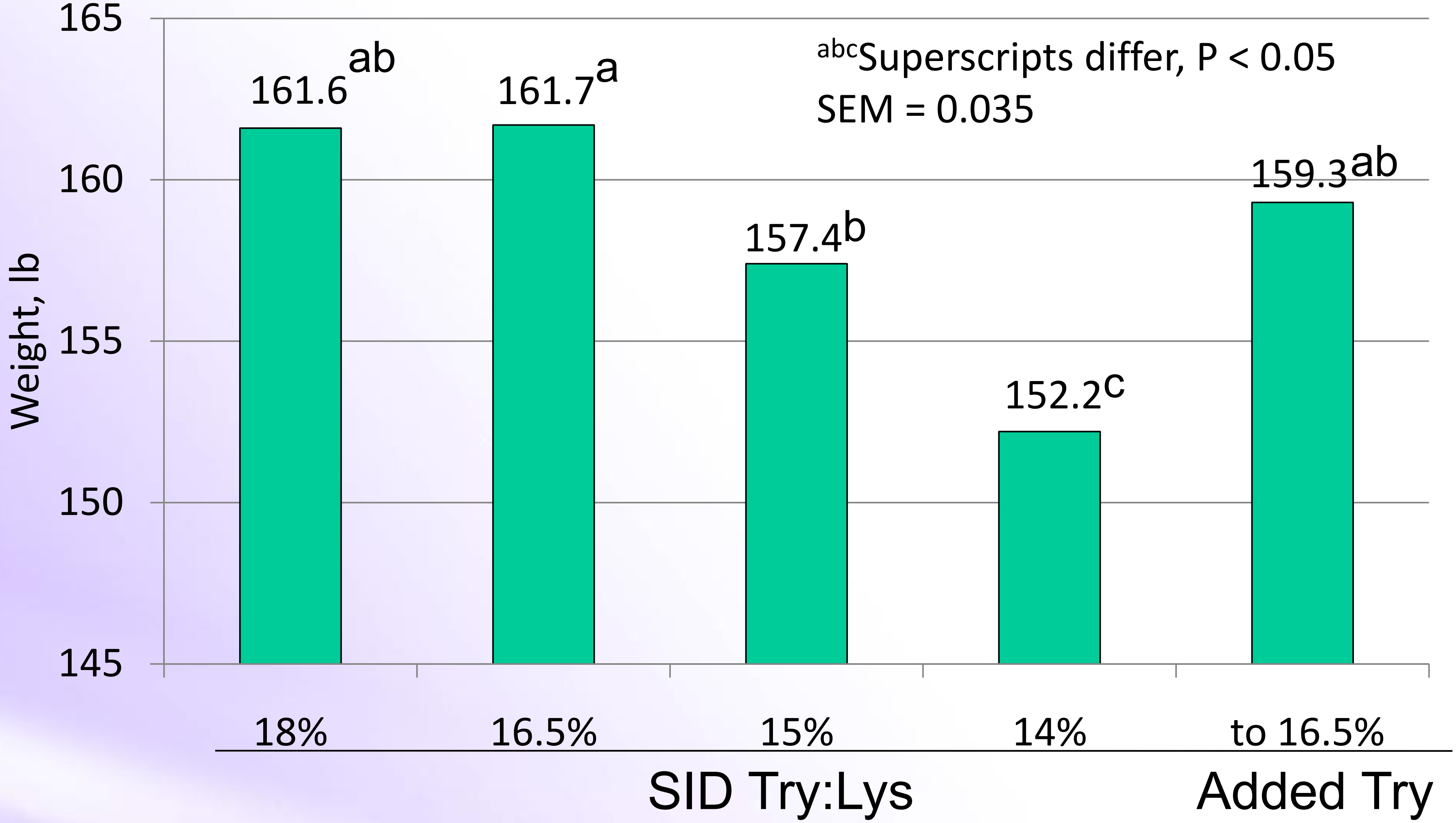
Barnes et al., 2010

Effect of TID Try:Lys on finishing F/G (d 0 – 42; initial BW 80 lb)



Barnes et al., 2010

Effect of TID Try:Lys on finishing ADG (d 0 – 42; initial BW 80 lb)



Barnes et al., 2010

Grow-Finish Research Update

- Feeder design and adjustment
- Amino acid levels
- DDGS and other alternatives
- Mycotoxins
- Marketing
    - Mixing and topping pigs and Paylean use

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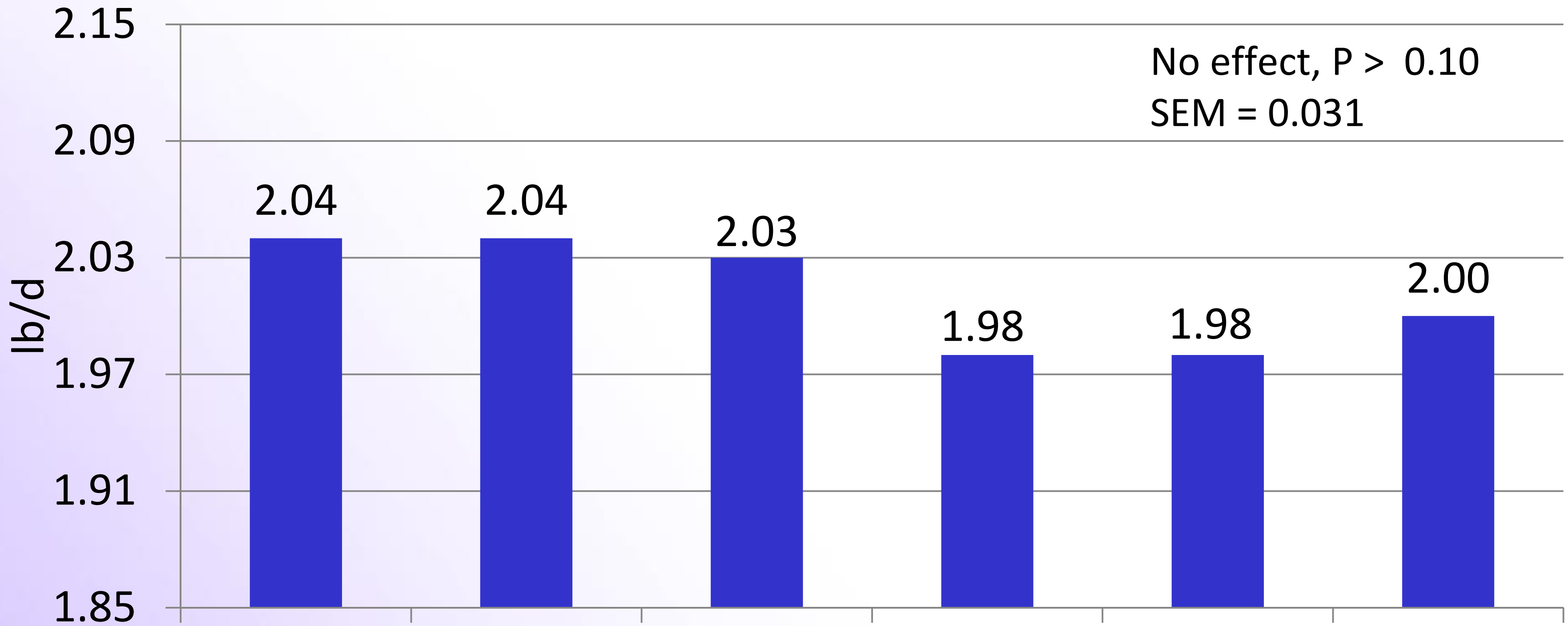
DDGS Value Calculator with no performance change

Corn, $/bu	$ 3.80
SBM, $/ton	$ 300
Monocal, $/ton	$ 510
Limestone, $/ton	$ 45
Lysine HCl, $/lb	$ 0.85
DDGS, $/ton	$ 135

	DDGS, %		
	10%	20%	30%
Change in diet cost, $/ton	**-$6.22**	**-$10.77**	**-$14.00**
Approximate savings, $/pig	**$1.87**	**$3.23**	**$4.20**
Breakeven price, $/ton	**$197.23**	**$188.83**	**$181.68**

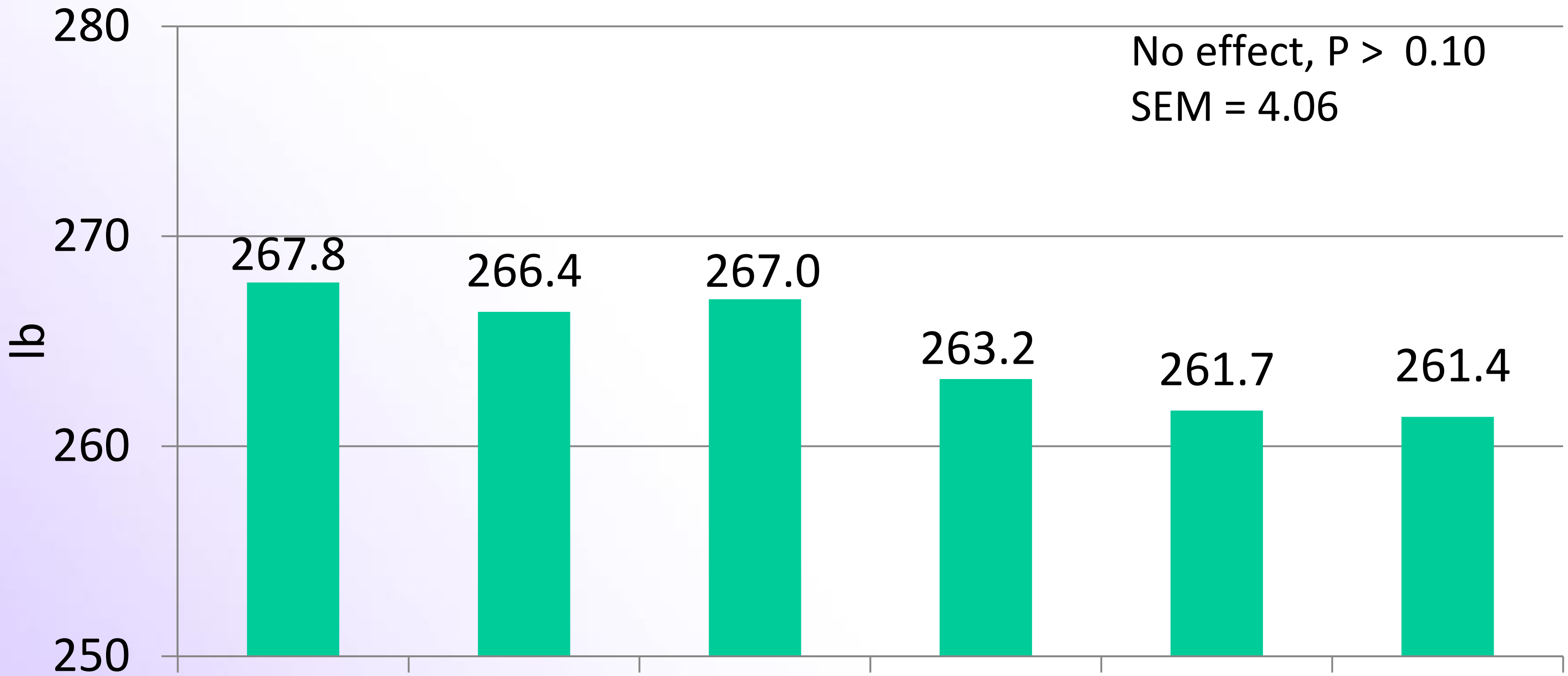
DDGS step-down or withdrawal regimen on ADG



	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

DDGS step-down or withdrawal regimen on final BW



			DDGS, %			
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

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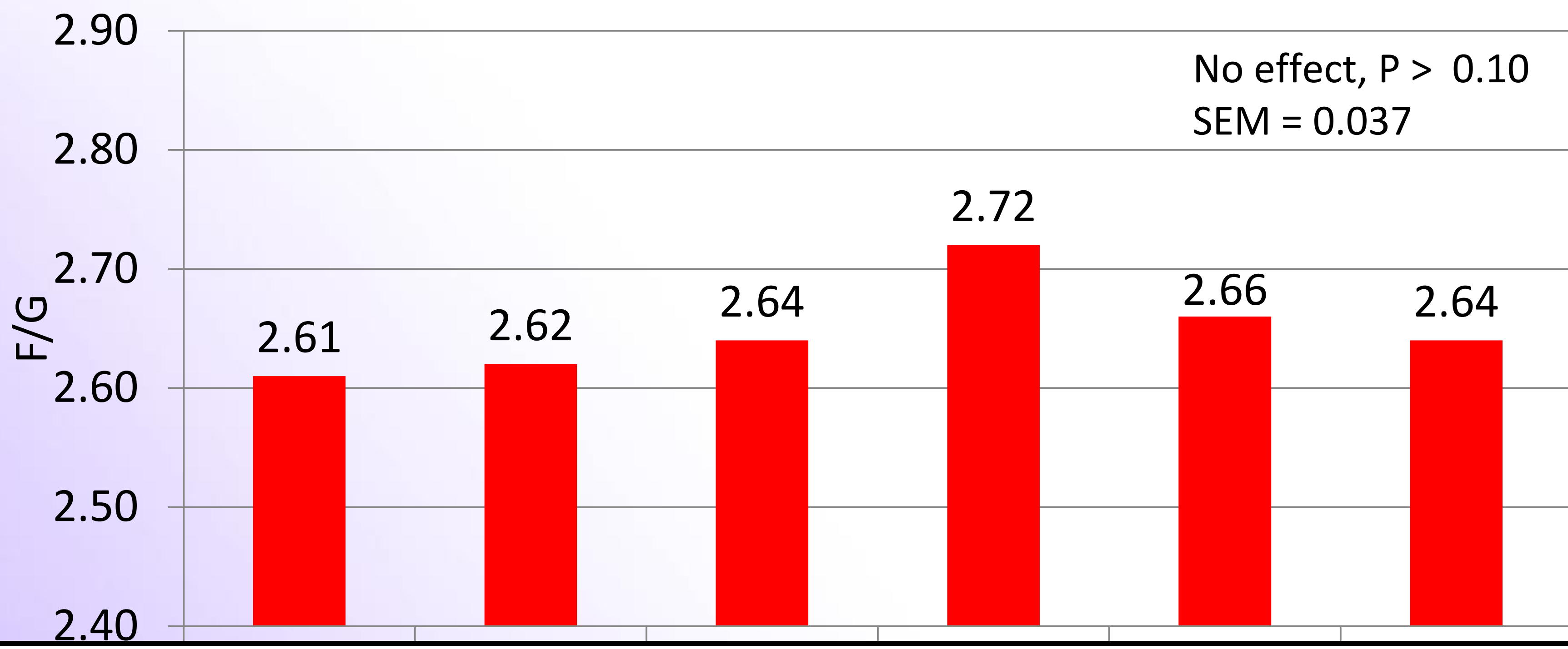
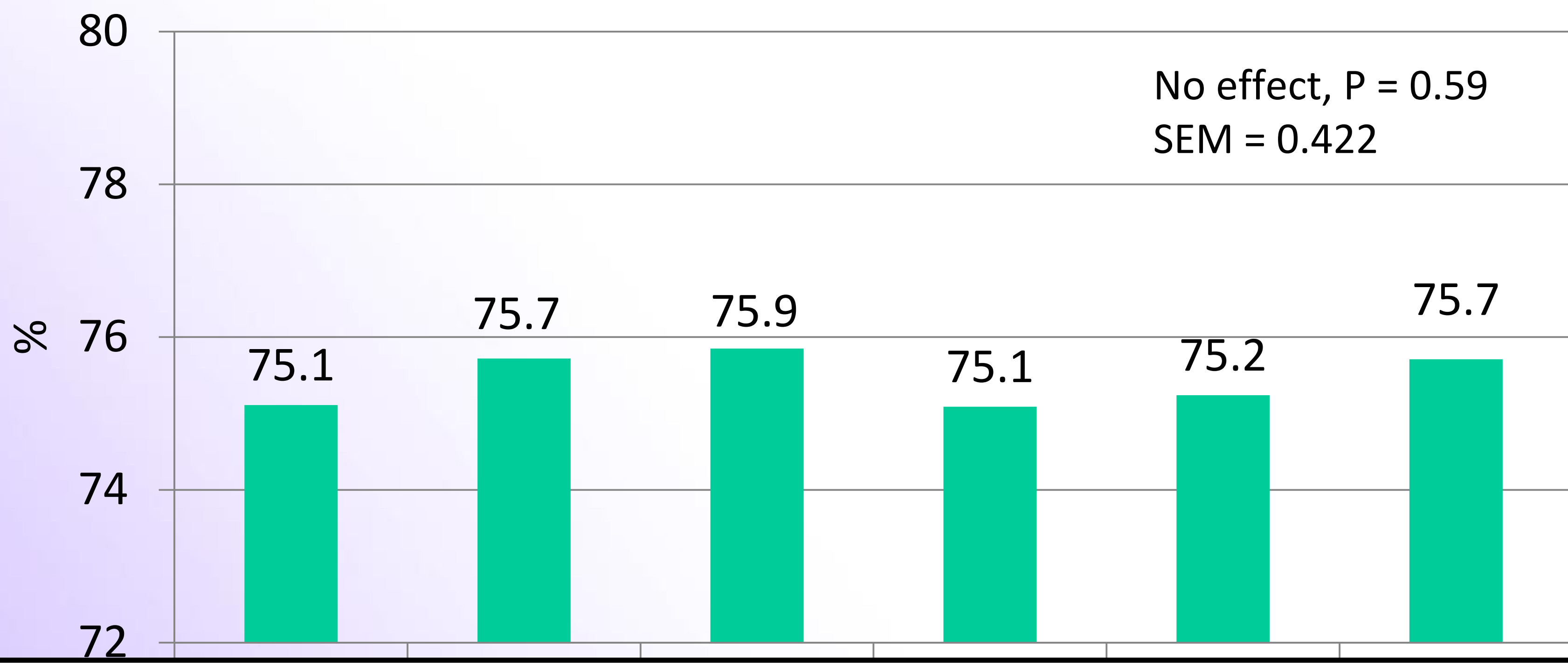
DDGS step-down or withdrawal regimen on F/G



	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

DDGS step-down or withdrawal regimen on carcass yield

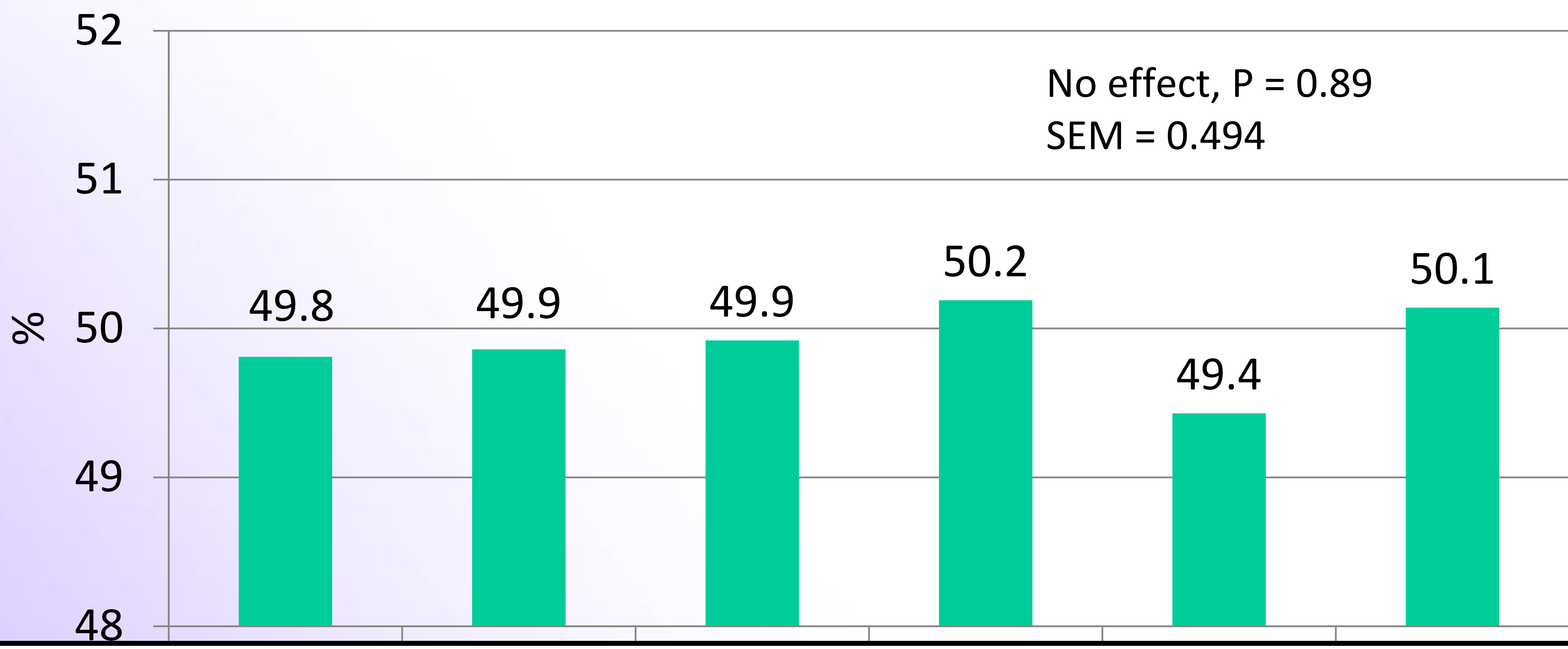


	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

Kansas State University

DDGS step-down or withdrawal regimen on FFLI

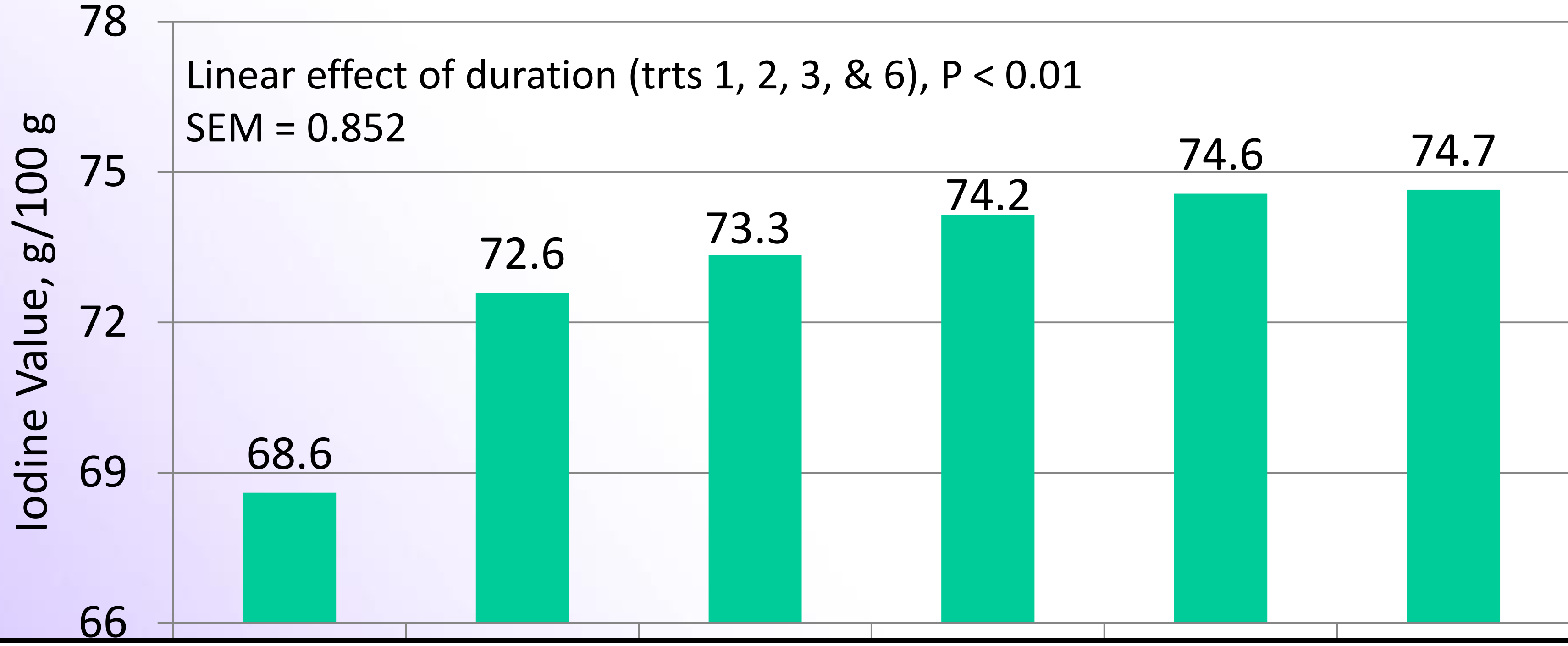


	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

K-STATE Kansas State University

DDGS step-down or withdrawal regimen on jowl fat iodine value



	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

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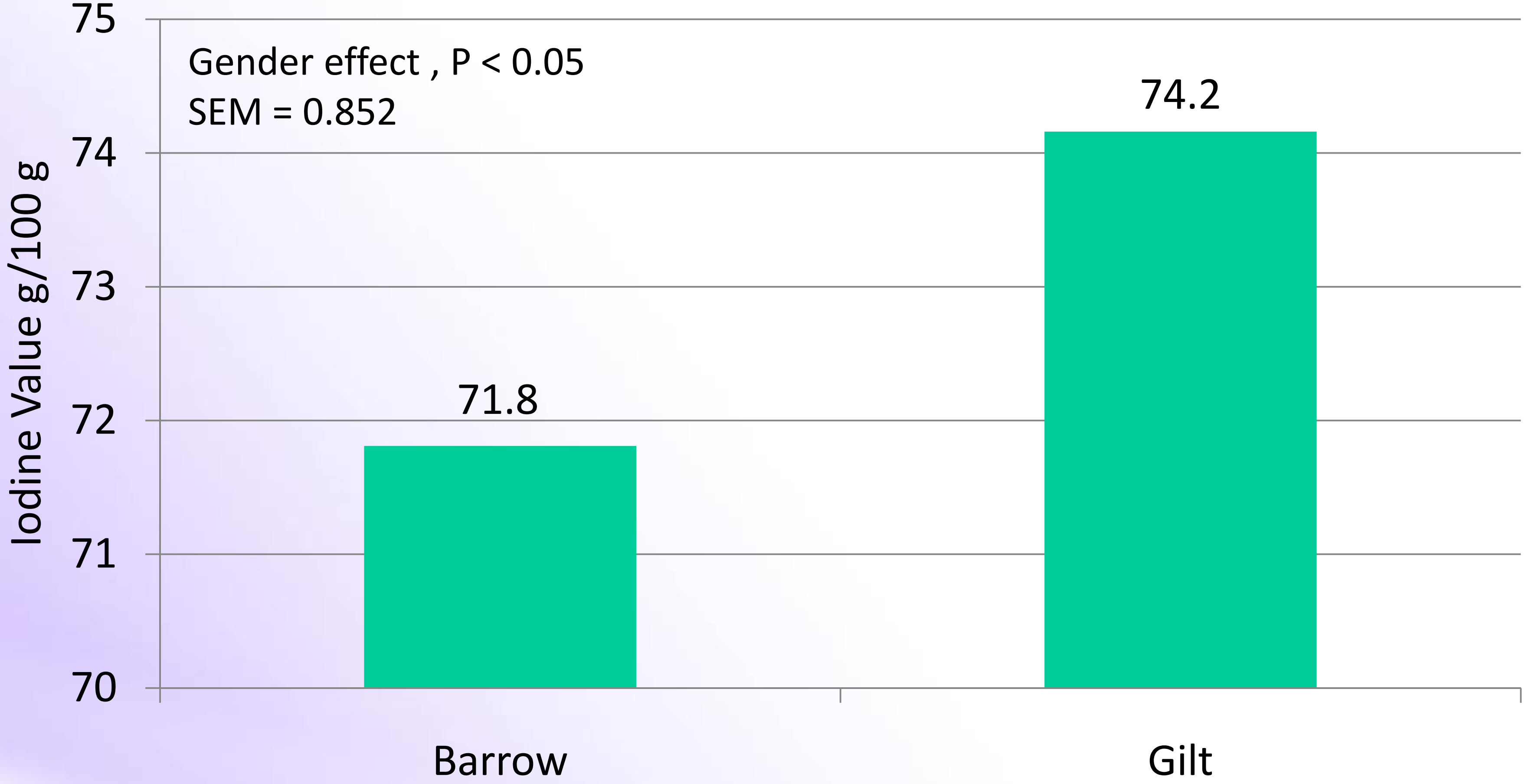
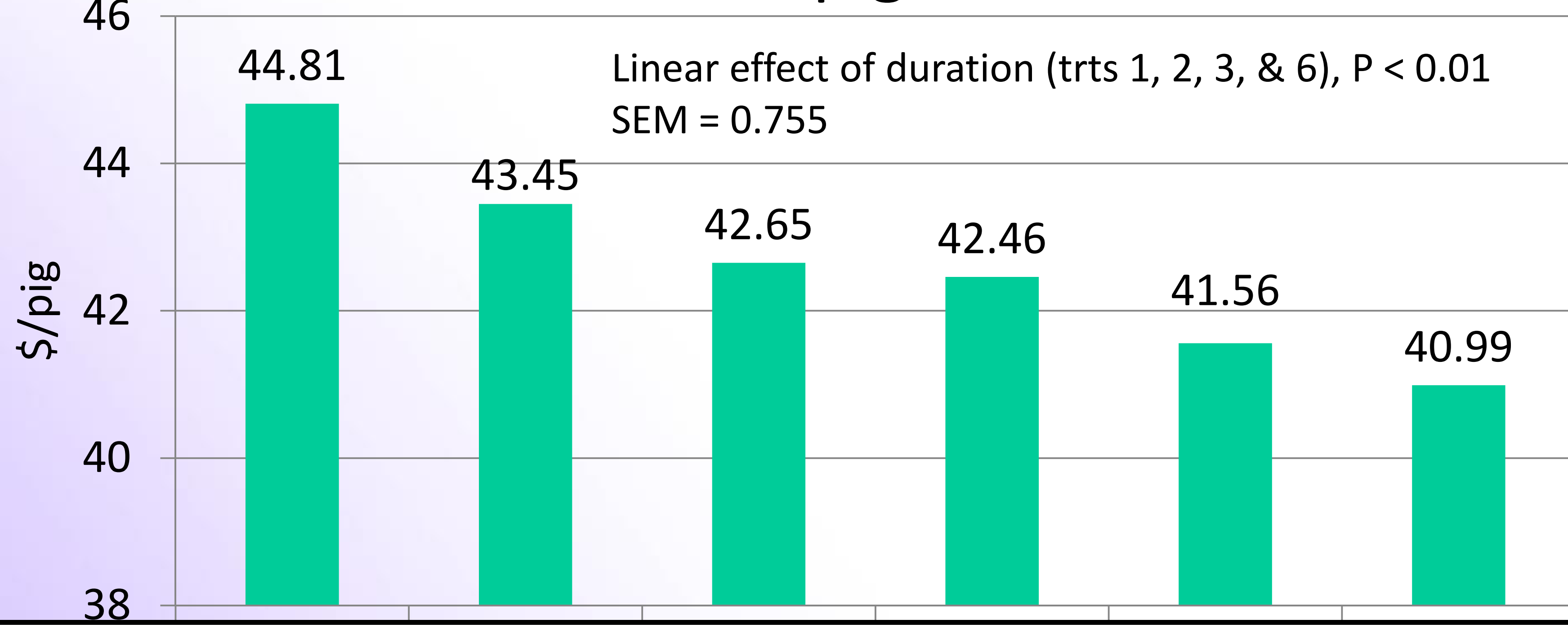
DDGS step-down or withdrawal regimen on jowl fat iodine value by gender



Jacela et al., 2009

DDGS step-down or withdrawal regimen on feed cost/pig



	DDGS, %					
d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

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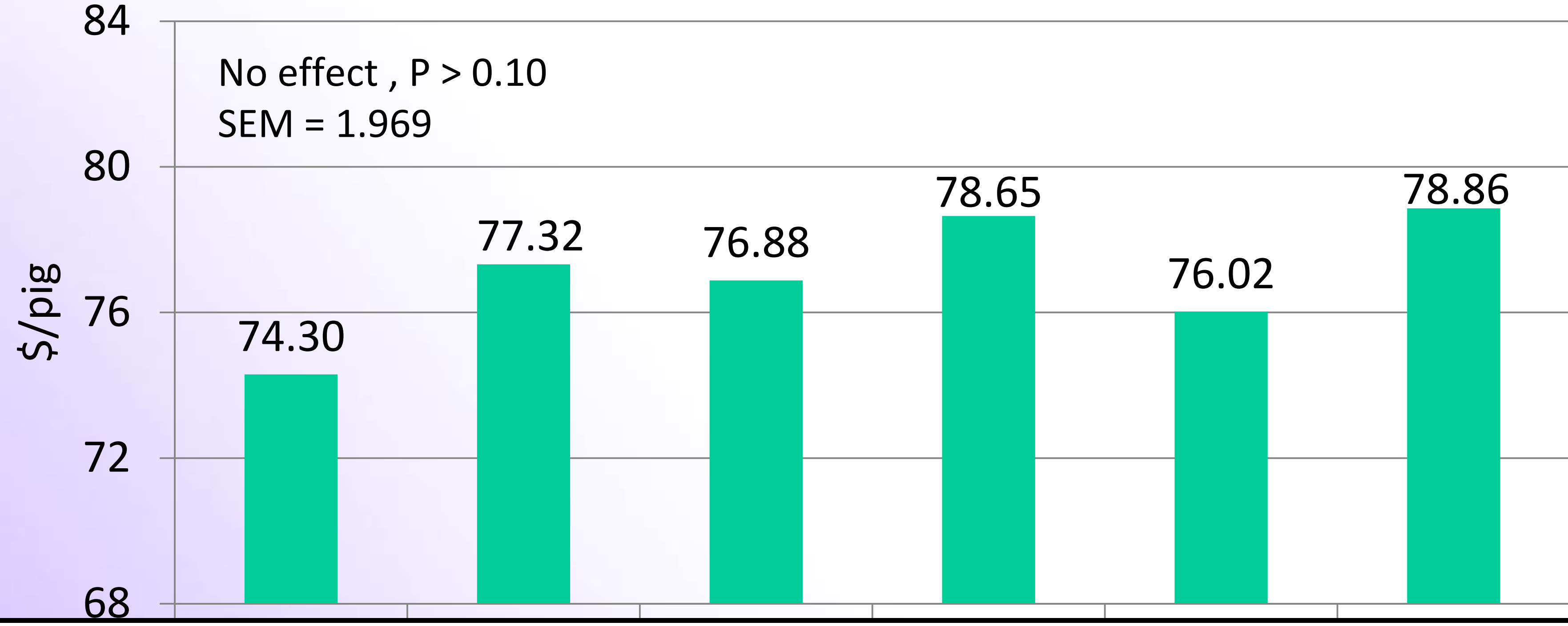
DDGS step-down or withdrawal regimen on income over feed cost



DDGS, %

d 0 to 48:	0	30	30	30	30	30
d 48 to 69:	0	0	30	15	30	30
d 69 to 89:	0	0	0	15	15	30

Jacela et al., 2009

Meta analysis of dietary enzymes on growth of finishing pigs

Details of individual experiments included in the meta-analysis

Experiment	Duration, d	Start weight, lb	DDGS, %	Enzyme activity of product
1	92	65.3	15	ß-mannanase
2	56	75.8	15	ß-glucanase, cellulase, and protease
3	90	101.5	45 and 60	Proprietary blend of enzymes
4	66	87.4	30	Bacterial endo-1,4-beta-xylanase

Jacela et al., 2009

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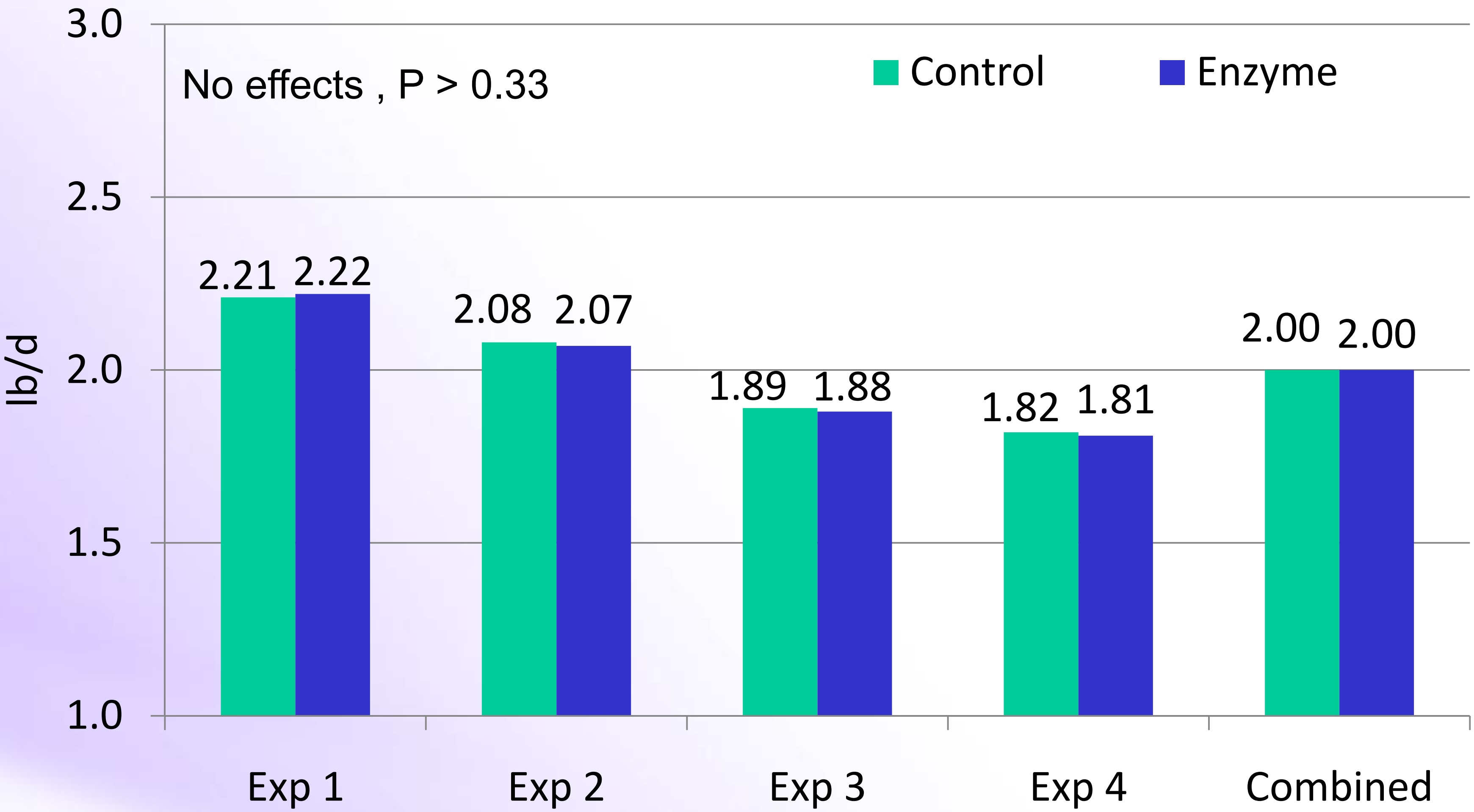
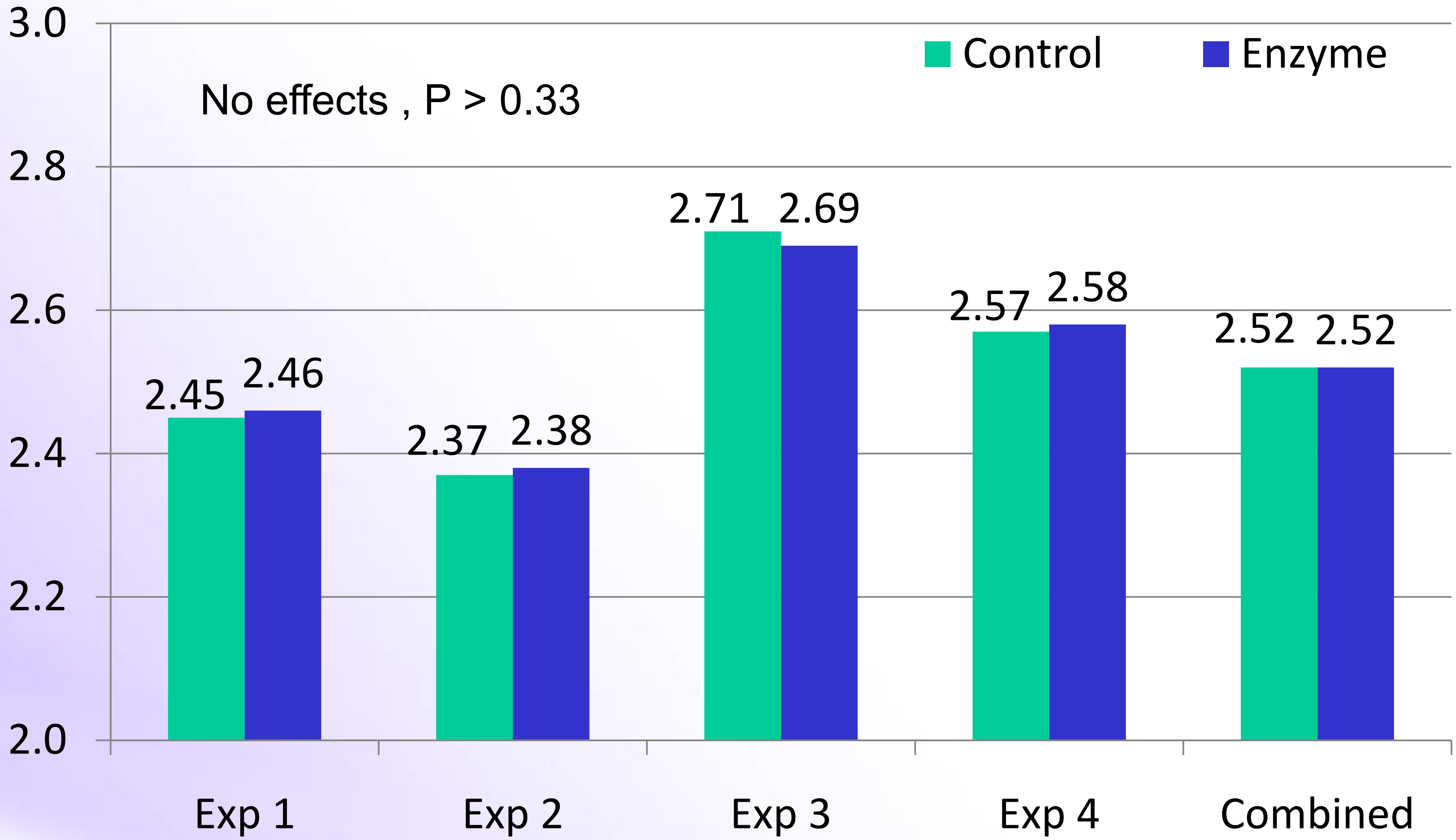
Meta analysis of dietary enzymes on ADG



Jacela et al., 2009

Meta analysis of dietary enzymes on F/G



Jacela et al., 2009

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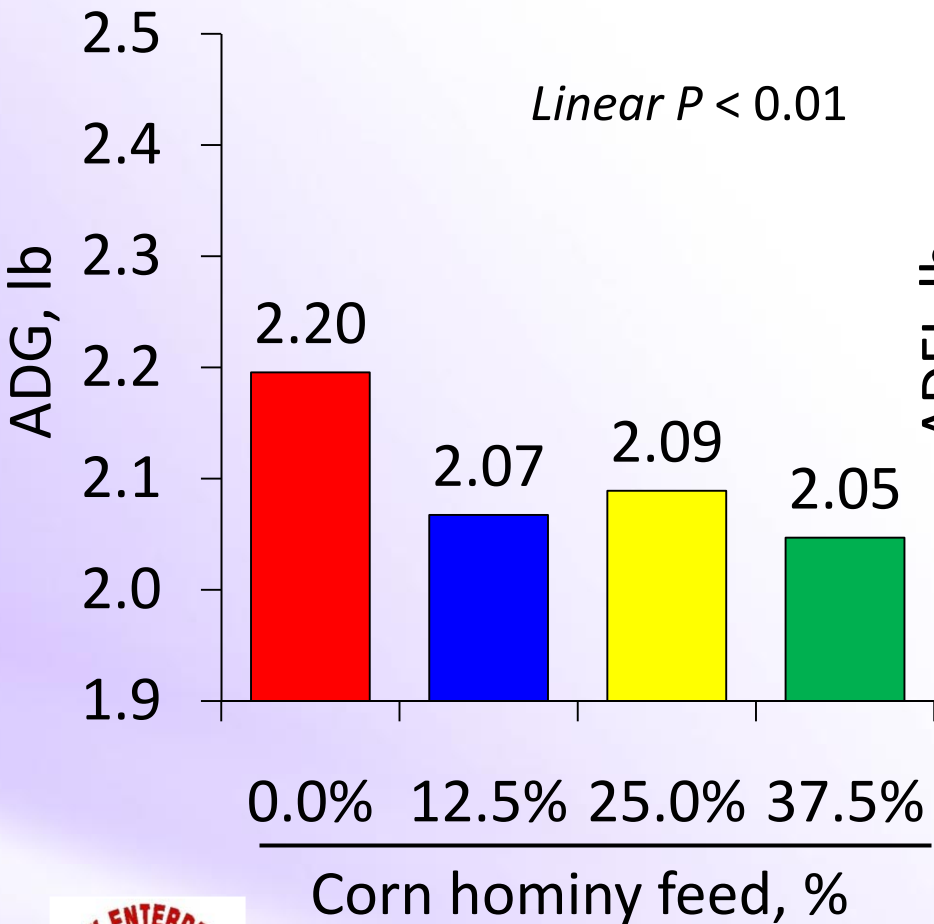
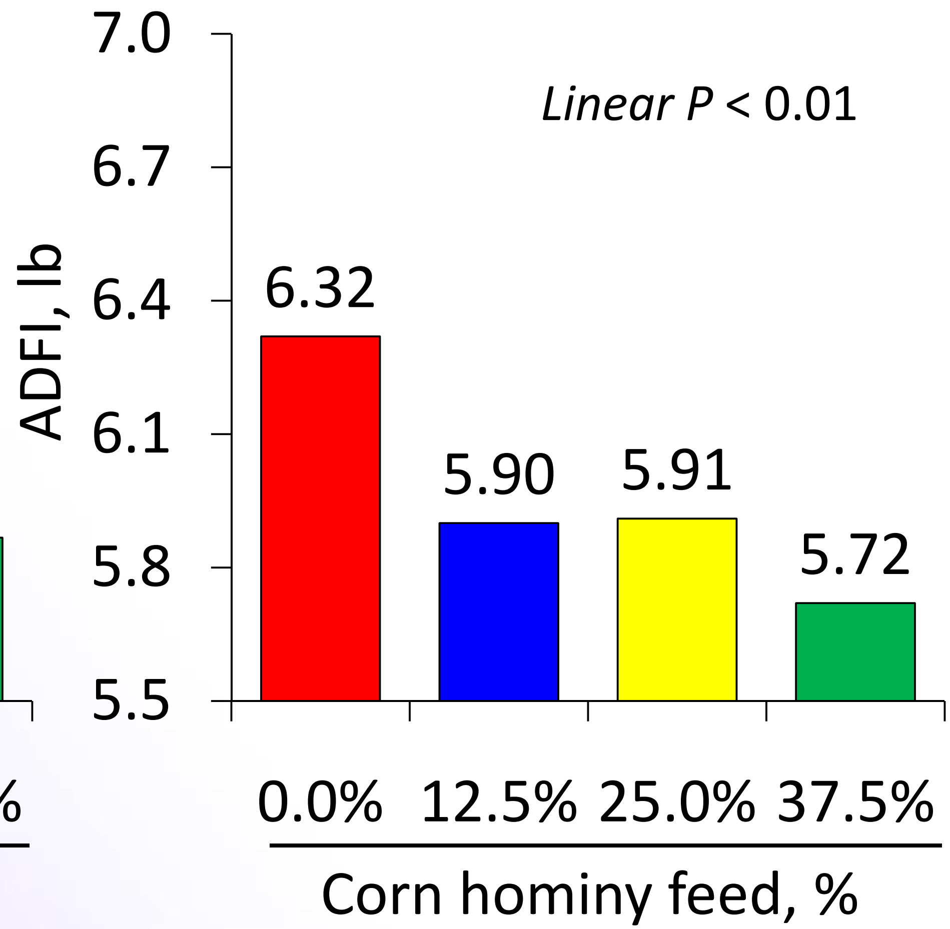
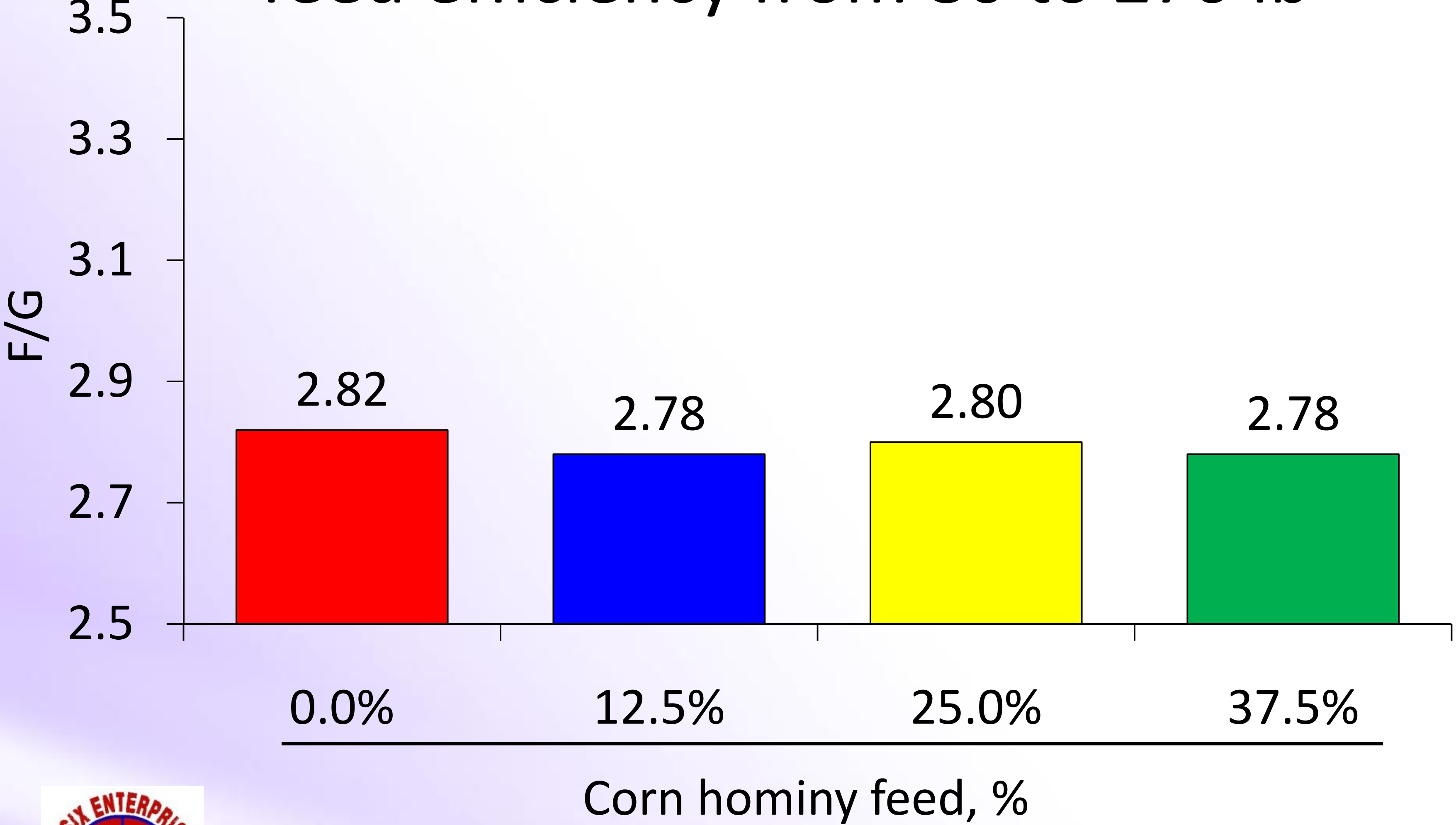
Effect of corn hominy feed on average daily gain from 80 to 270 lb





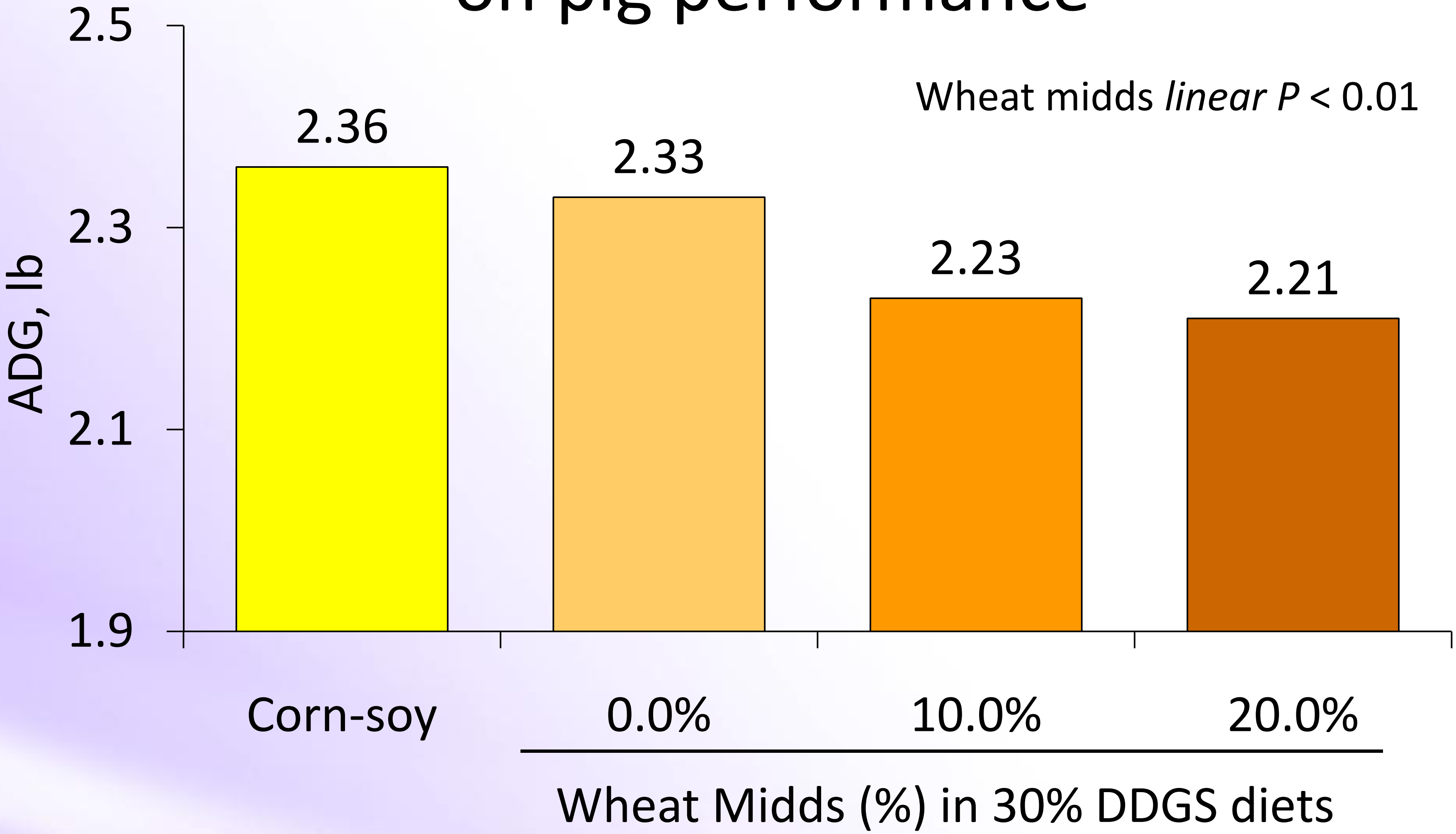
Potter et al., 2009

Effect of corn hominy feed on feed efficiency from 80 to 270 lb



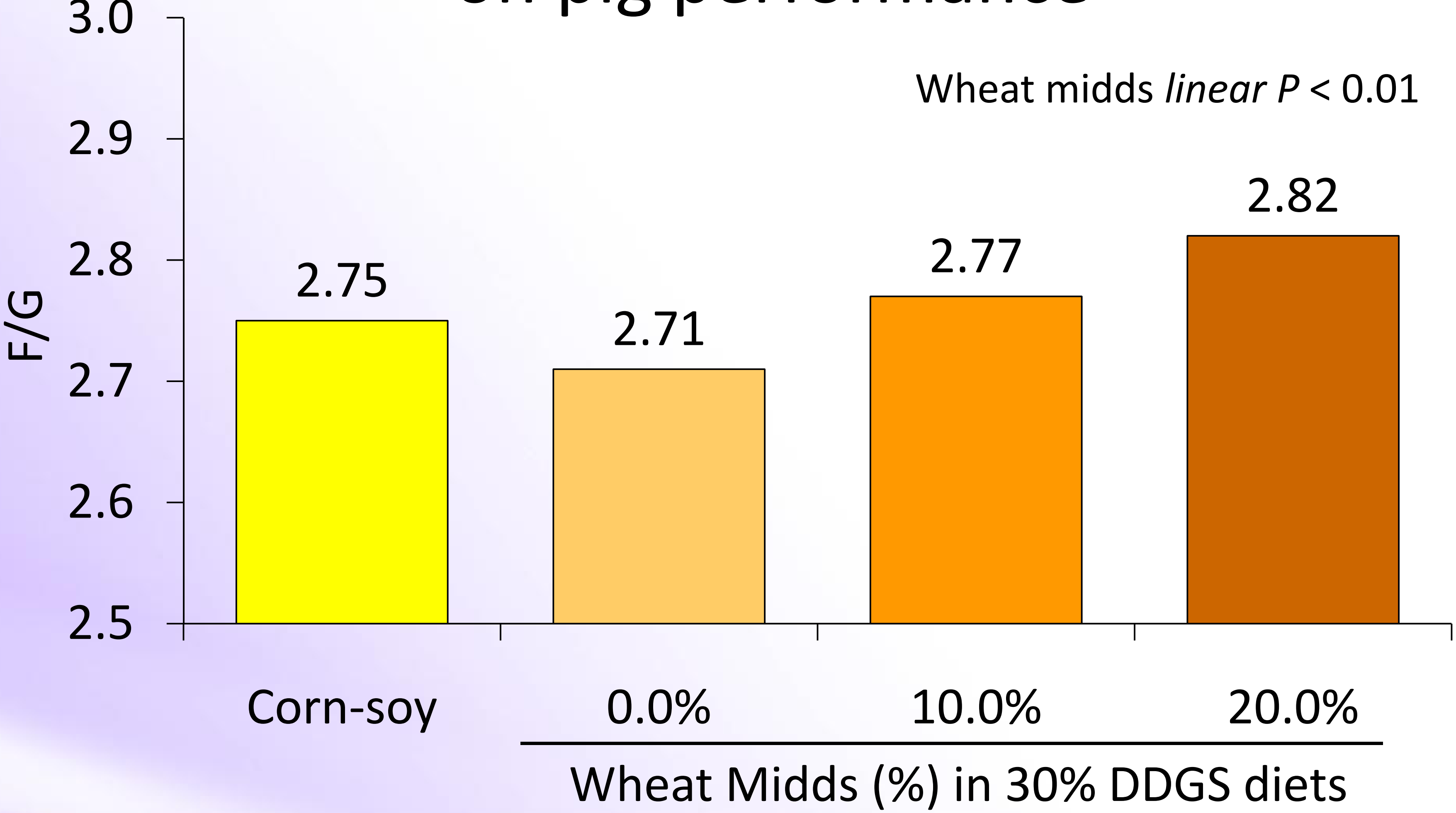
Potter et al., 2009

Effect of DDGS and wheat midds on pig performance



Barnes et al., 2010

Effect of DDGS and wheat midds on pig performance



Barnes et al., 2010

Mycotoxins and New Crop Corn

- Observations of black mold on corn in Kansas and surrounding states
  - Most test results have shown limited mycotoxin contamination
  - Deoxynivalenol (DON), also commonly known as vomitoxin, has been the most common this year
    - > 1 ppm may reduce feed intake and rate of gain
    - > 5 ppm may result in feed refusal
    - > 10 ppm may result in vomiting
- DDGS – 3 times the level of original corn level

Mycotoxins – What can we do?

- Collect a good sample to test if suspected
- Screen/clean the grain – molds are in the dust and stressed small kernels
- Blend contaminated grain with clean grain to get below a maximum threshold for feeding
- Separate contaminated grain and feed higher levels to finishing pigs or sell for cattle feed
- Binders – generally do not help with vomitoxin
  - Balance binder cost with other alternatives

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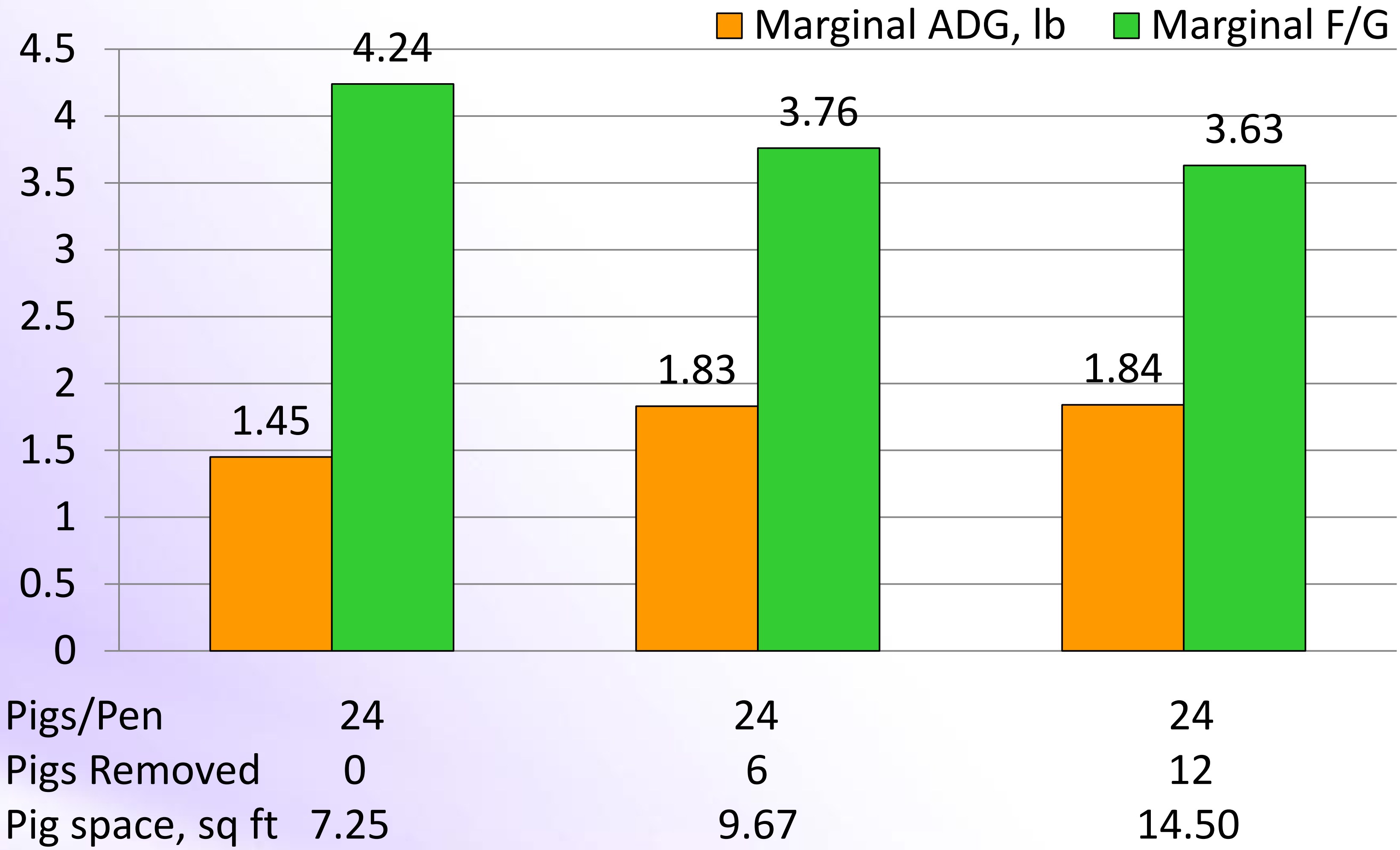
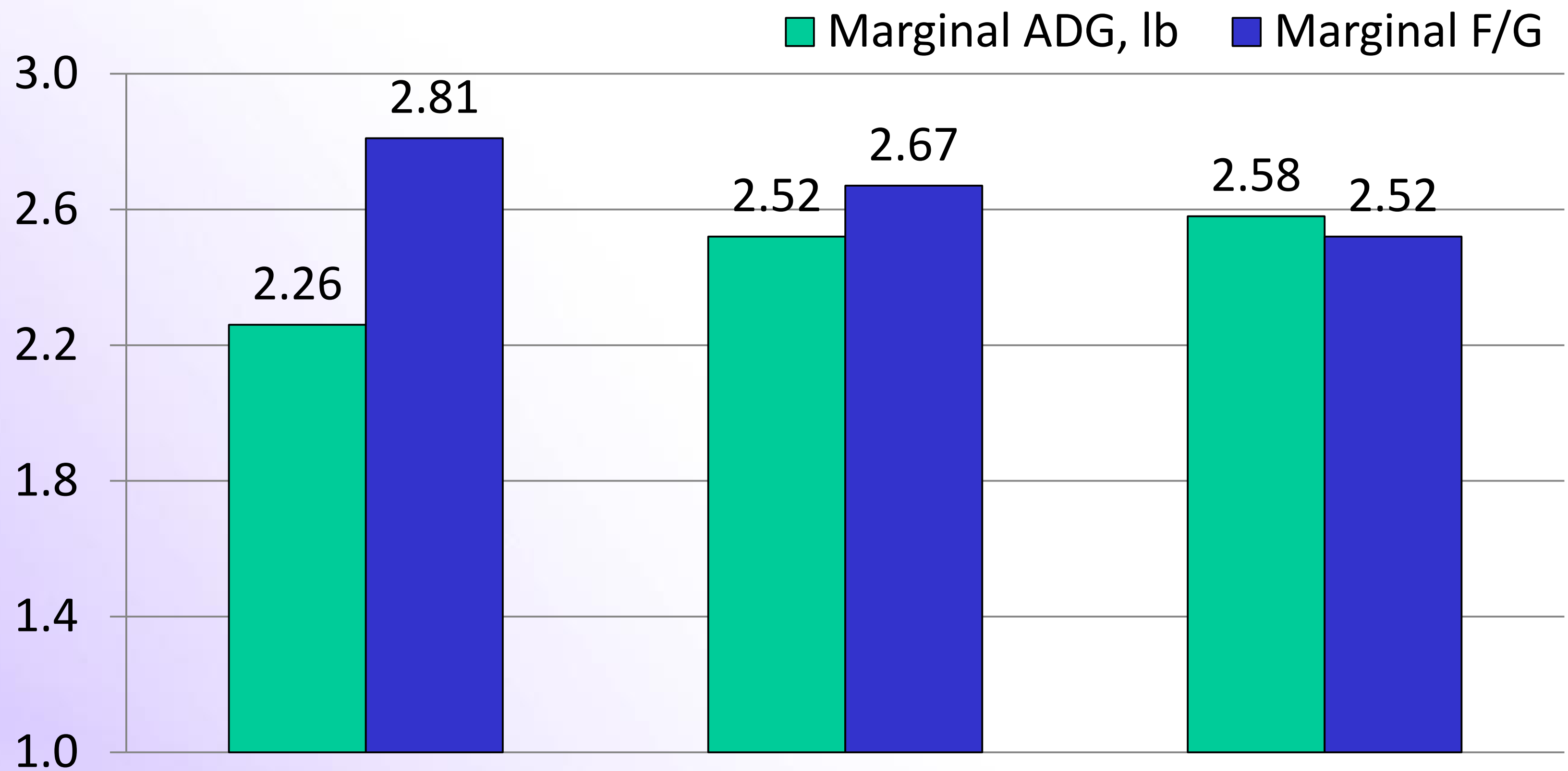
Managing Pigs at Close Out

Impact of pen unloading on feed efficiency and average daily gain



Boyd et al., 2008

Impact of pen unloading on feed efficiency and average daily gain



Pigs/Pen	25	25	25
Pigs Removed	0	2	4
Pig space, sq ft	7.2	7.8	8.6

Jacela et al., 2009

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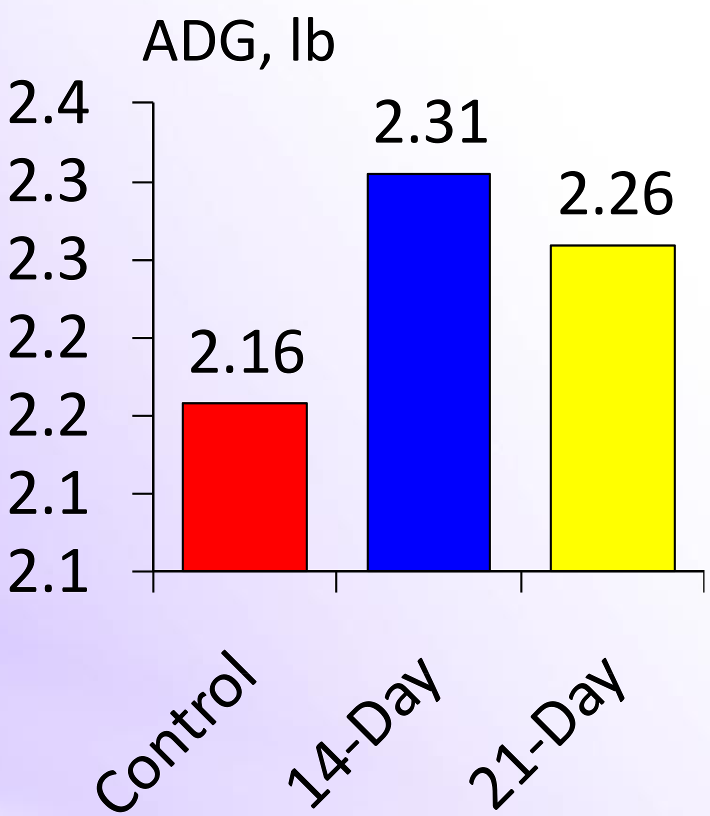
Impact of pen unloading on profit per pig

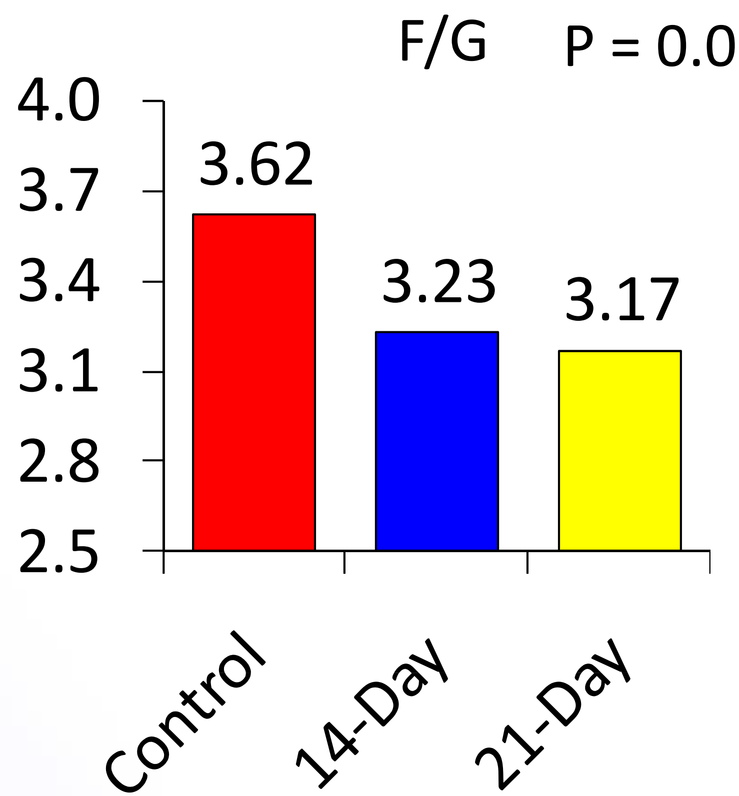
Pigs/Pen	25	25	25
Pigs Removed	0	2	4
Pig space, sq ft	7.2	7.8	8.6

Jacela et al., 2009

K·STATE Kansas State University.

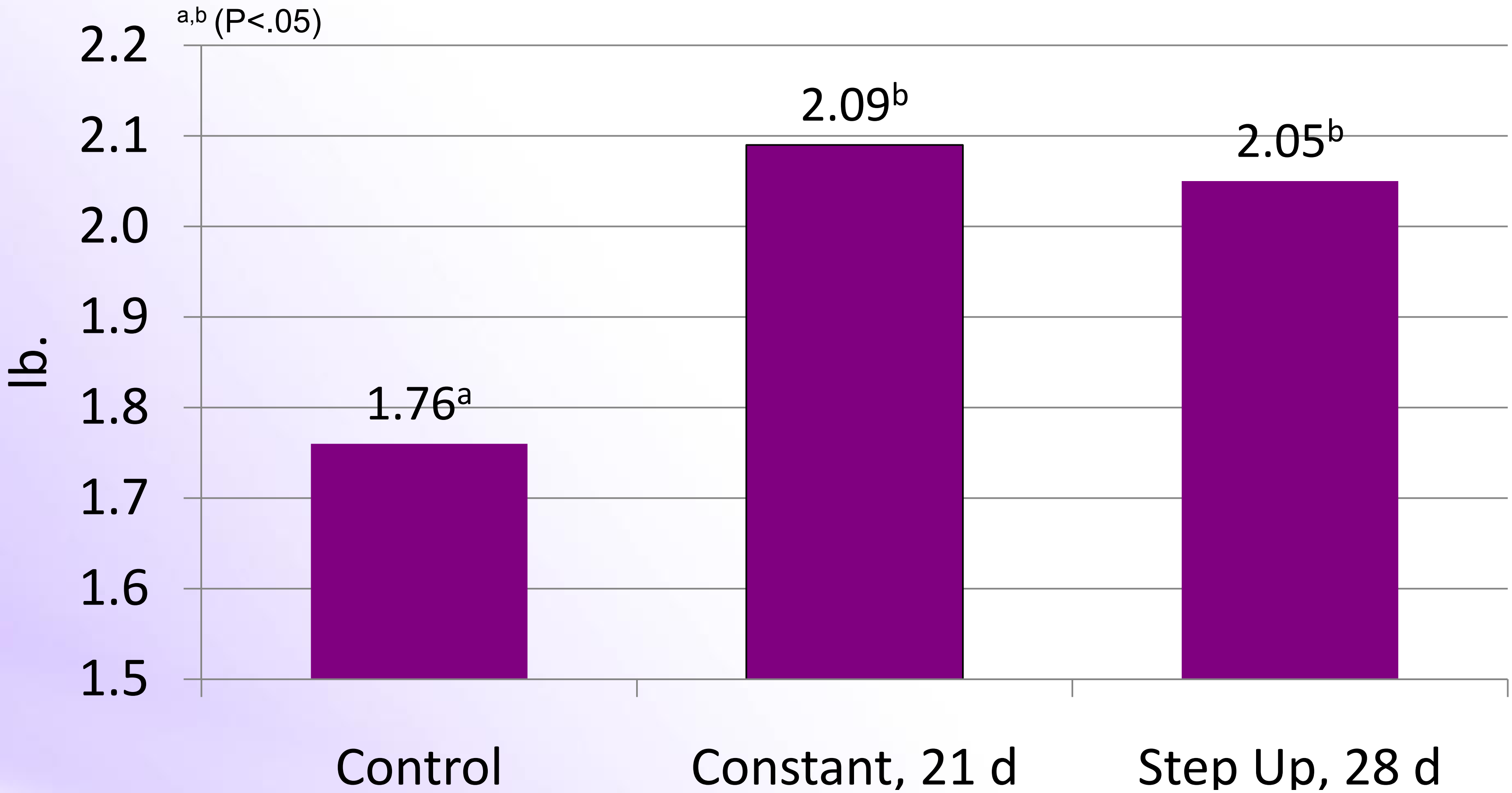
Effect of Paylean on Day 0 to 21 Average Daily Gain and Feed Efficiency





Potter et al., 2009

Effects of different Paylean feeding programs on average daily gain



Jacela et al., 2009

NEW HORIZON FARMS LLP

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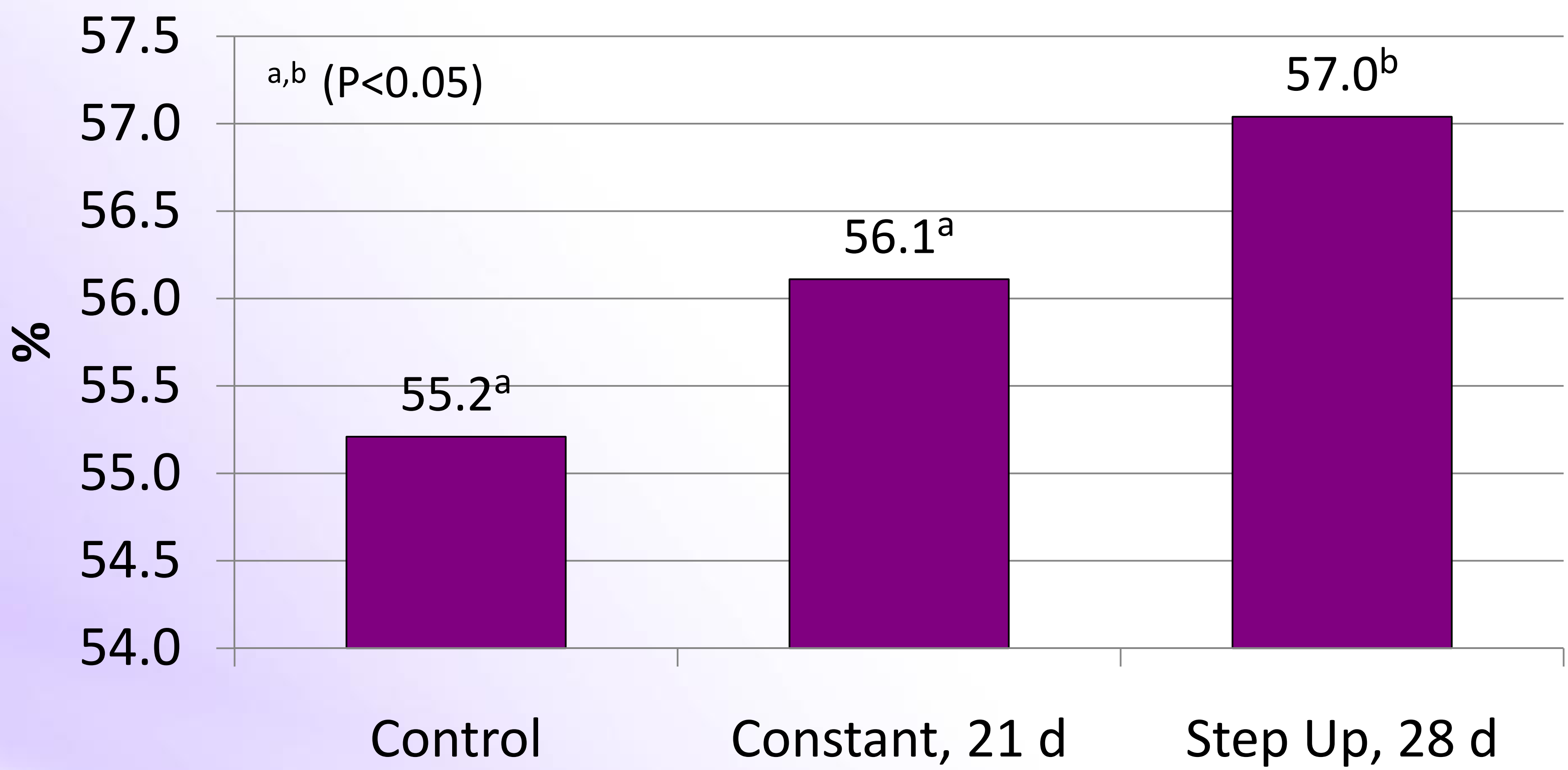
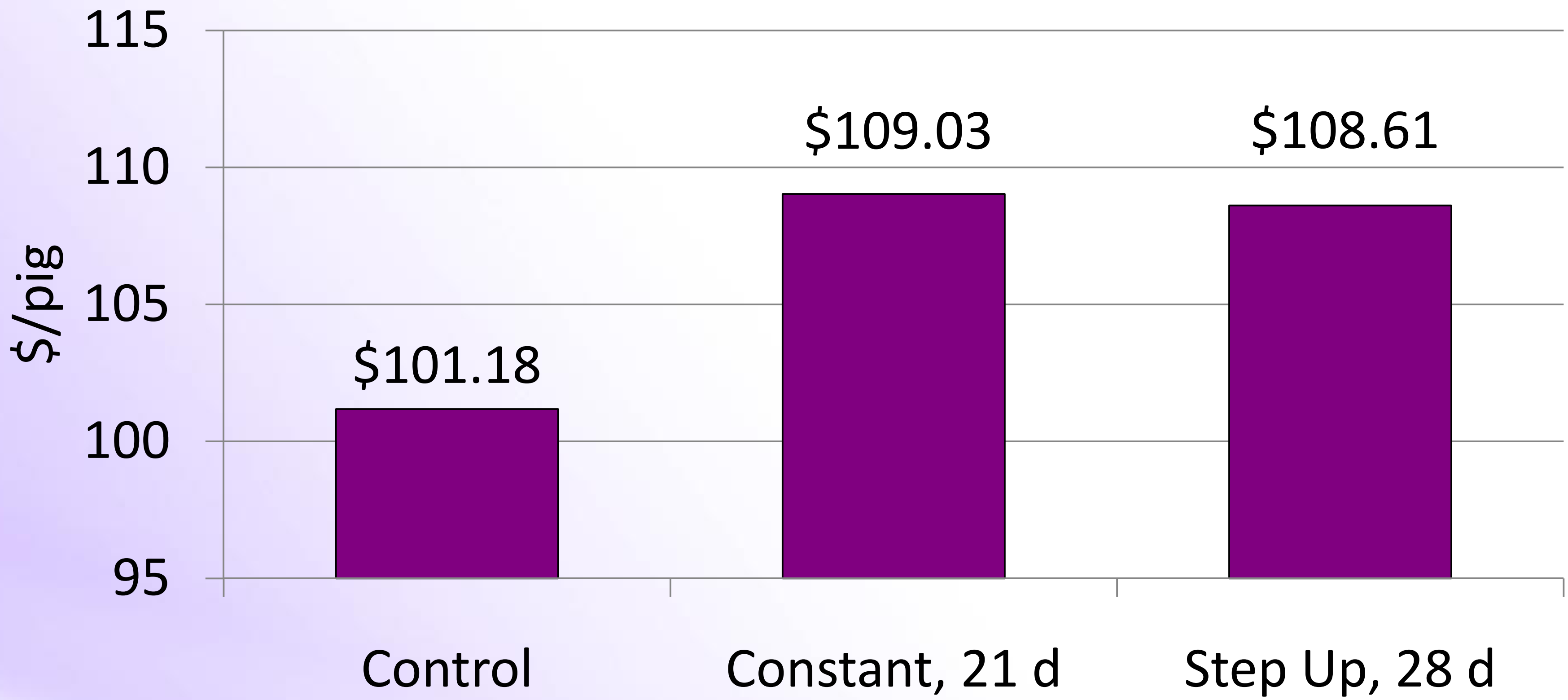
Effects of different Paylean feeding programs on percentage lean



Jacela et al., 2009

Effects of different Paylean feeding programs on income over feed cost



Jacela et al., 2009

NEW HORIZON FARMS LLP

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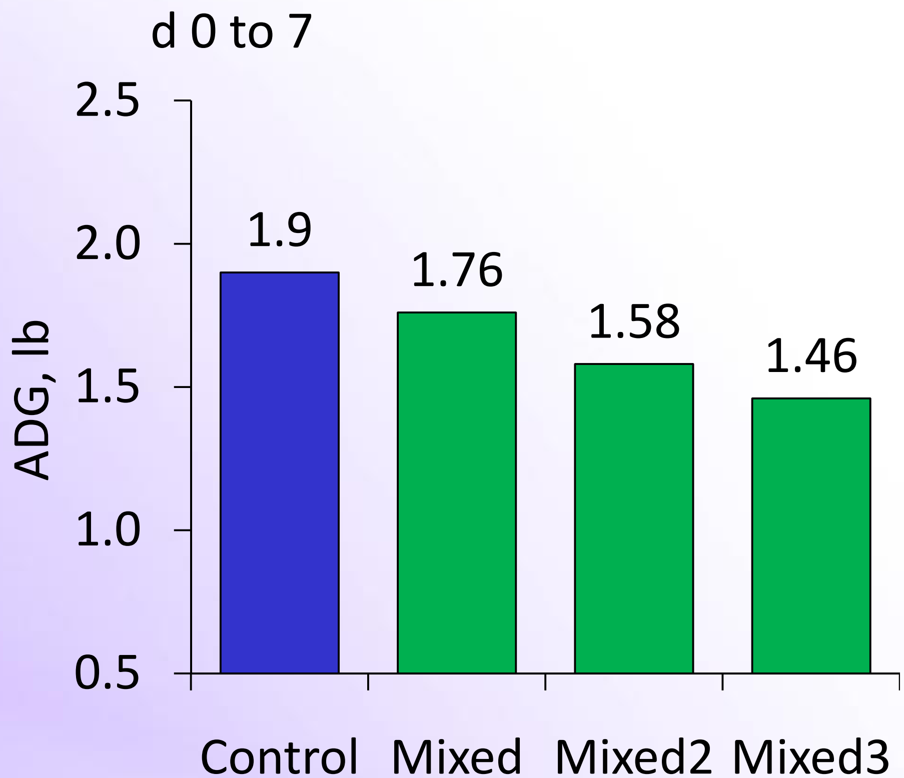
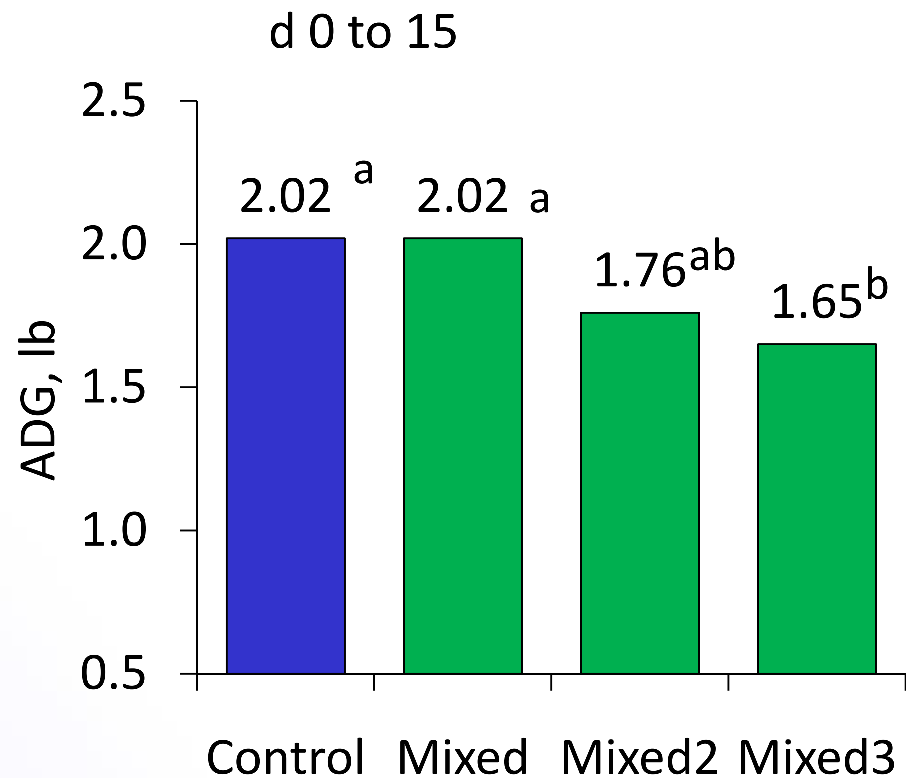
Effect of Mixing Pigs at 260 lb on ADG





	Control	Mixed	Mixed2	Mixed3
Pigs/pen:	12	12	20	20
No/Barns:	1	2	2	1

	Control	Mixed	Mixed2	Mixed3
Pigs/pen:	12	12	20	20
No/Barns:	1	2	2	1

J-SIX ENTERPRISES LIVESTOCK DIVISION

Potter et al., 2010

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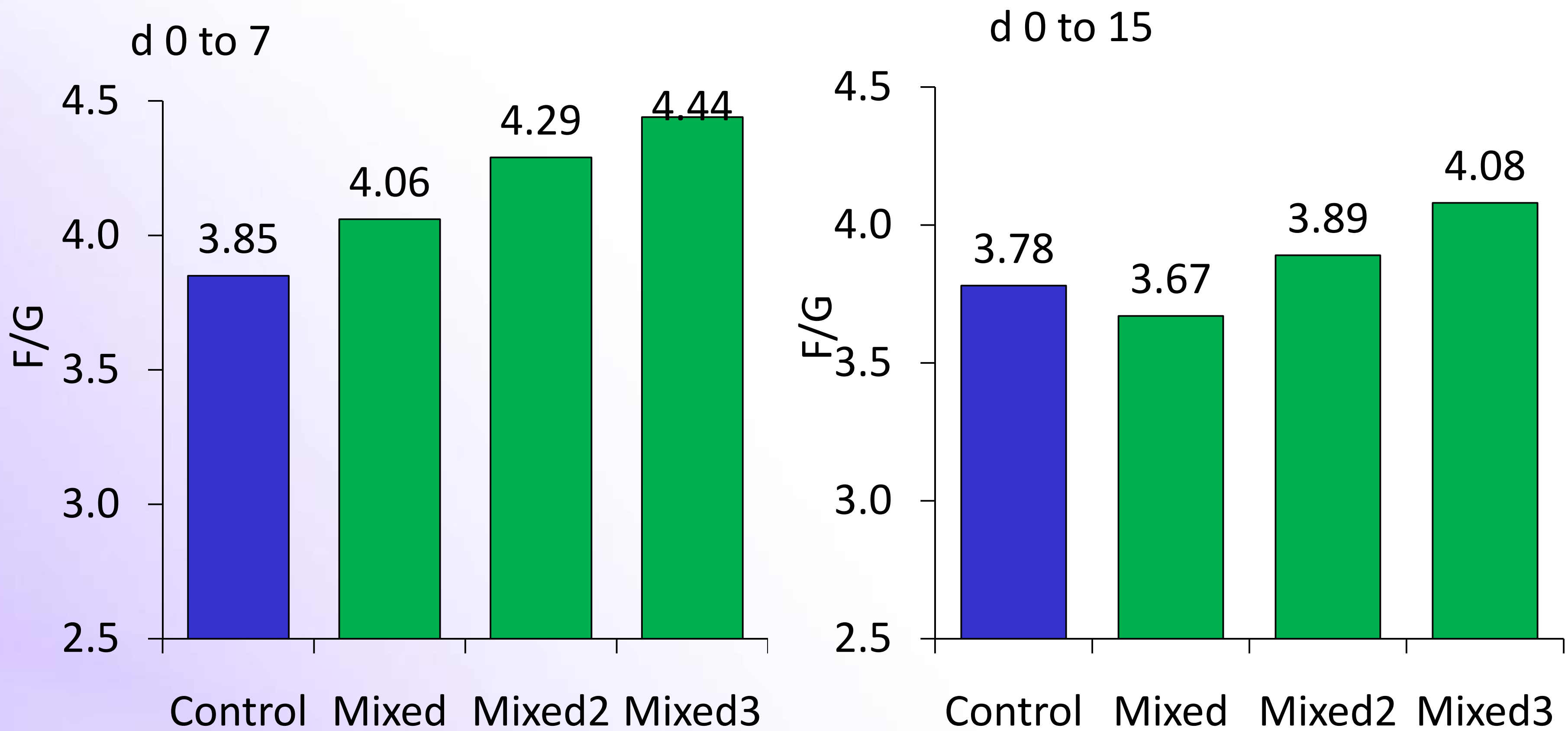
Effect of Mixing Pigs at 260 lb on F/G



	Control	Mixed	Mixed2	Mixed3	Control	Mixed	Mixed2	Mixed3
Pigs/pen:	12	12	20	20	12	12	20	20
No/Barns:	1	2	2	1	1	2	2	1

Potter et al., 2010

Key Take Home Messages for Managing Pigs at Close Out:

- Top a minimum of 2 pigs from each pen 15 to 20 d prior to closeout
  - Gate cut pigs into pens so pigs can be marketed uniformly
  - Limit further tops unless pigs will be heavier than top of the grid
- Feed Paylean for 14 to 21 d prior to closeout
  - Shorter durations if achieving optimum market weight
  - Longer durations will continue to improve lean but little benefit in growth rate
- If allowed enough time - mixing pigs at closeout is not detrimental to growth rate
  - Enables more efficient site utilization
  - Feed efficiency is poor in the immediate period after mixing
  - FG Improves over time as growth rate and feed intake increases

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Thank You!

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Research and Extension