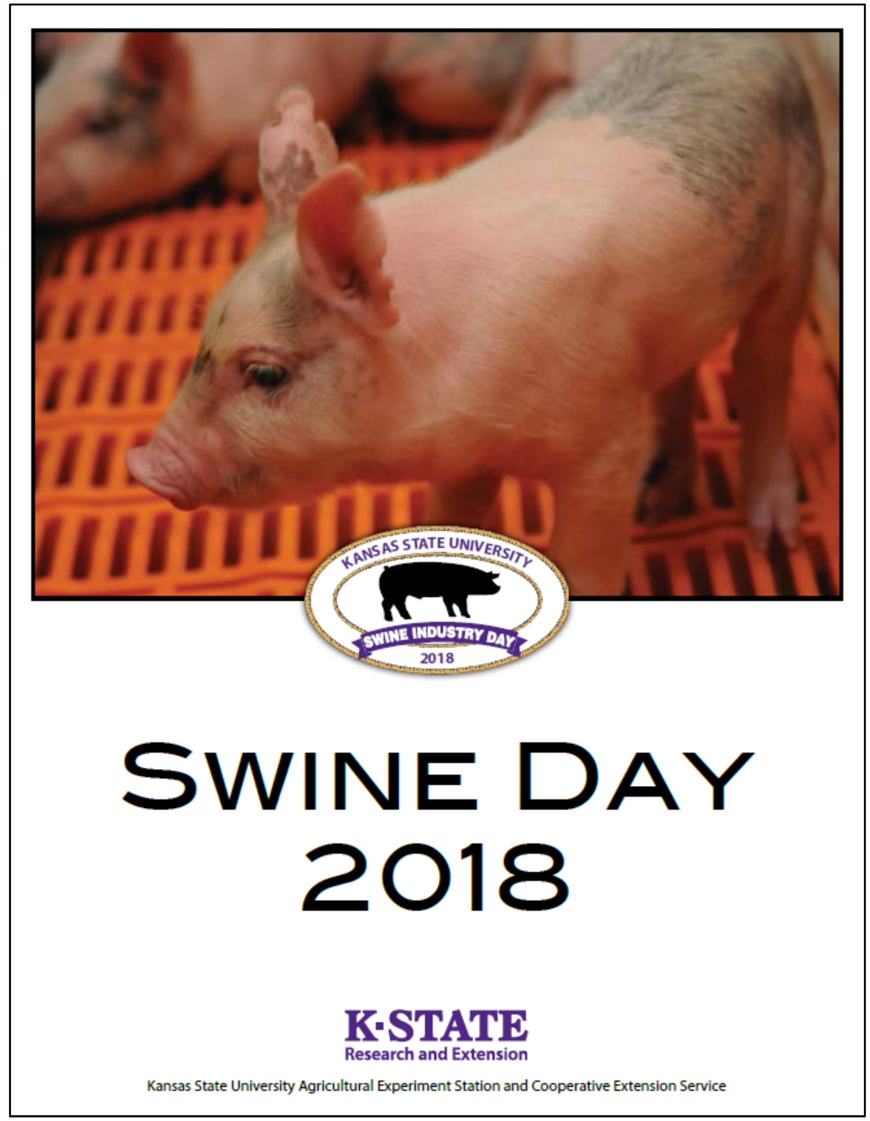
2018 Swine Day

available at: www.KSUswine.org

- 46 papers
- 54 experiments
- > 52,000 pigs



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Research and Extension

Knowledge for Life

Feeding The Breeding Herd

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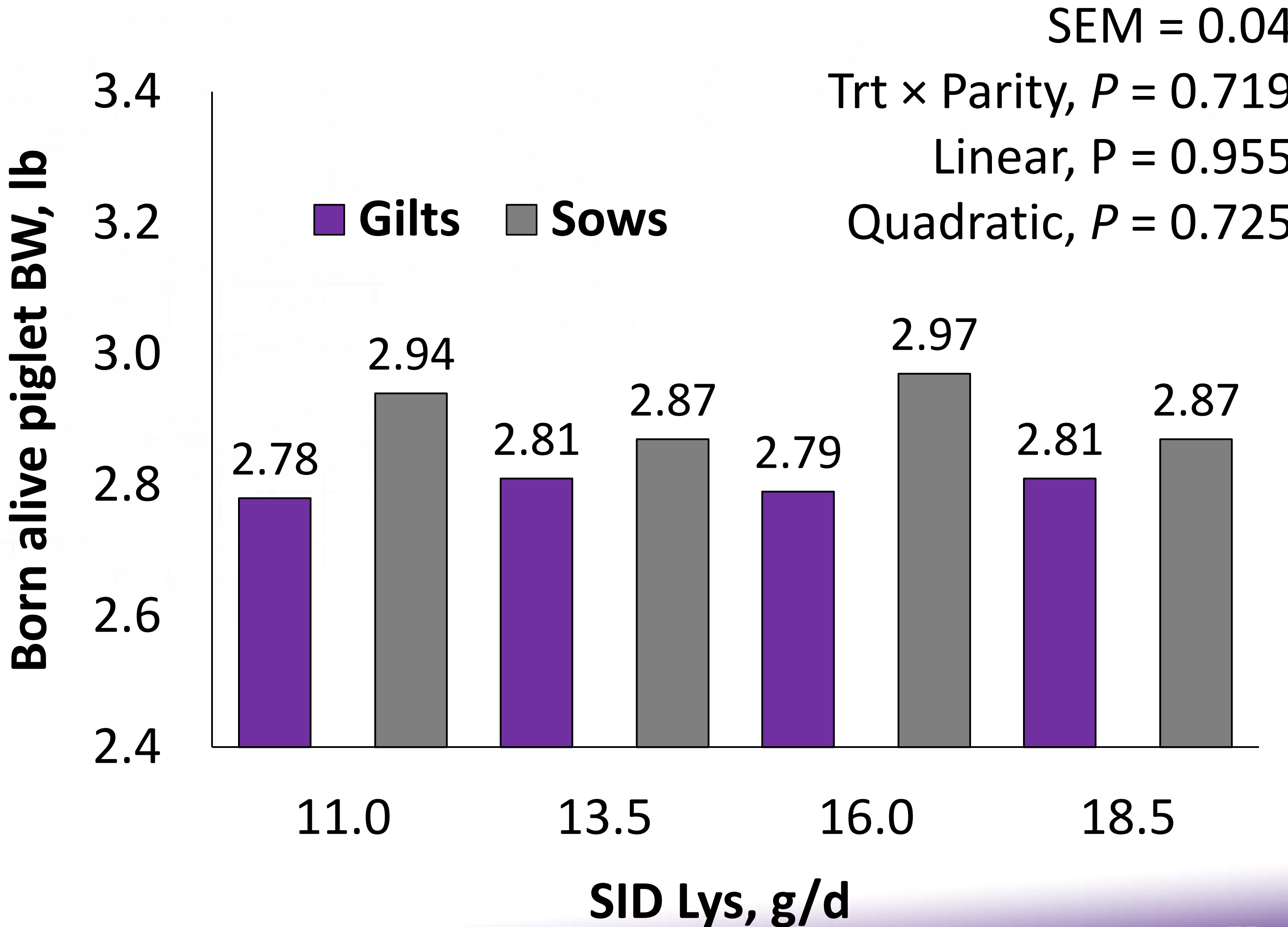
ADM Animal Nutrition

PIC

THOMAS LIVESTOCK CO. T.L.C. Creating Community Opportunities

Knowledge for Life

SID Lysine for gestating sows
Born alive piglet birth weight



Thomas et al., 2018

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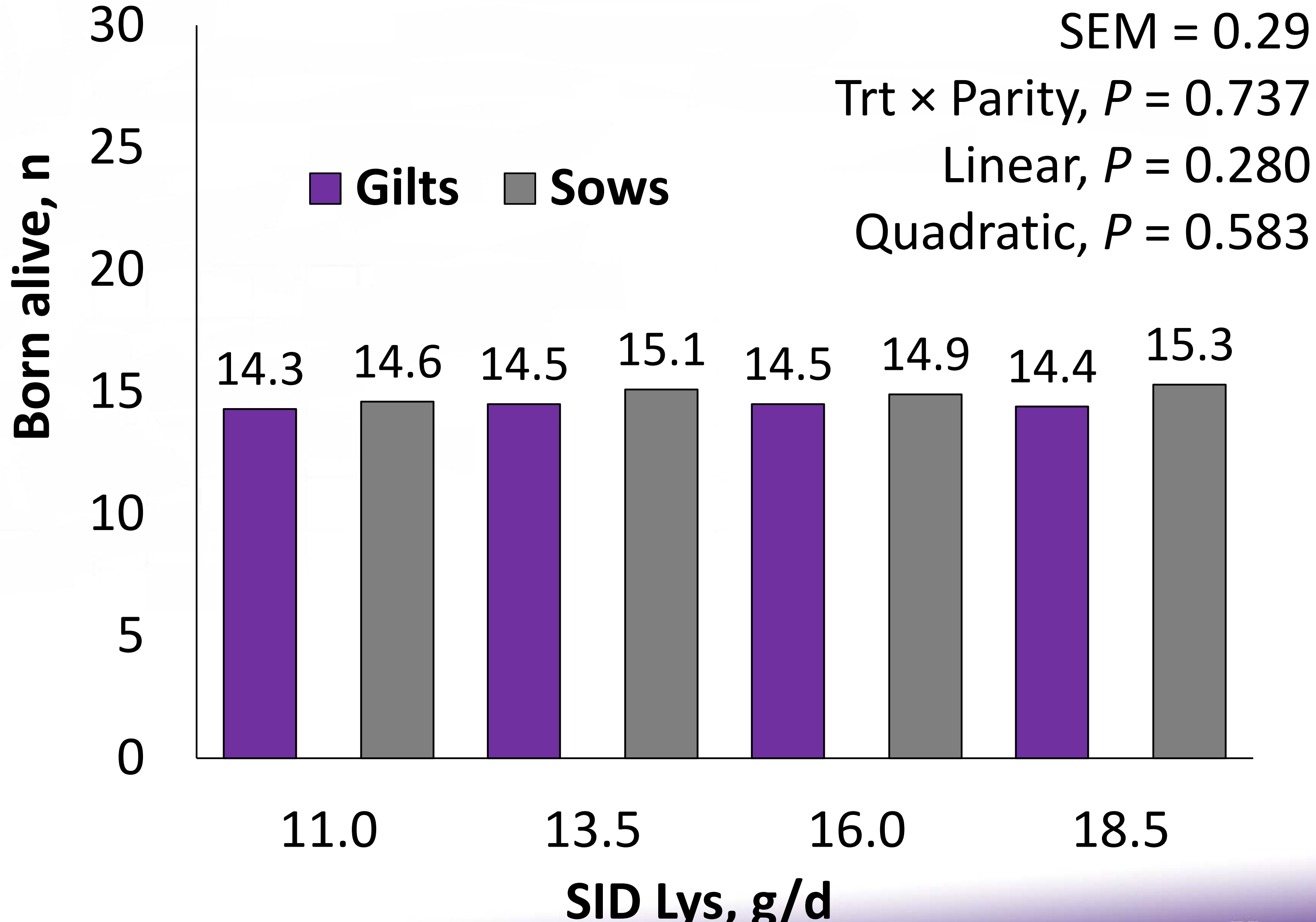
Knowledge for Life

SID Lysine for gestating sows
Number of pigs born alive



Thomas et al., 2018

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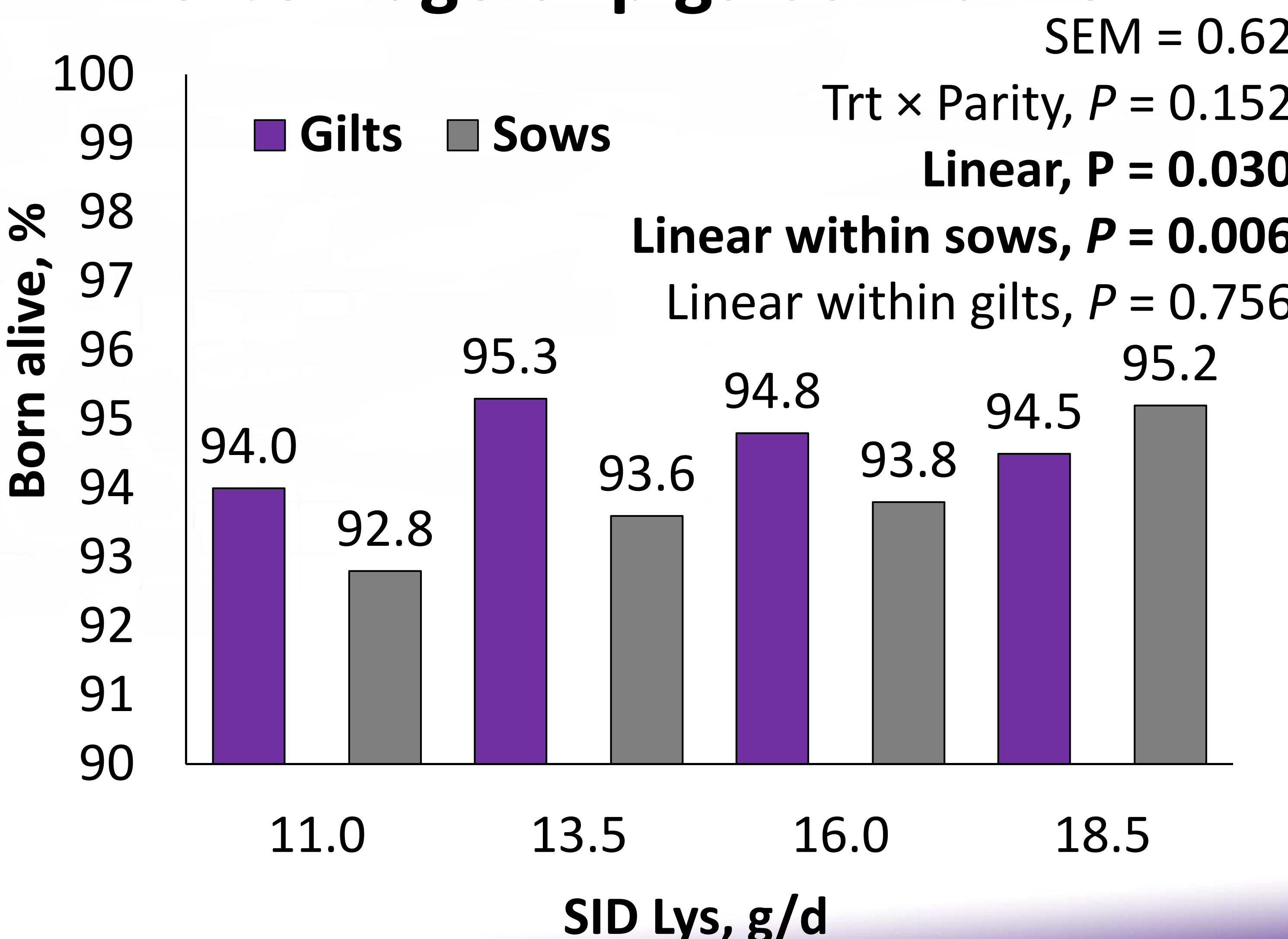
Knowledge for Life

SID Lysine for gestating sows
Percentage of pigs born alive



Thomas et al., 2018

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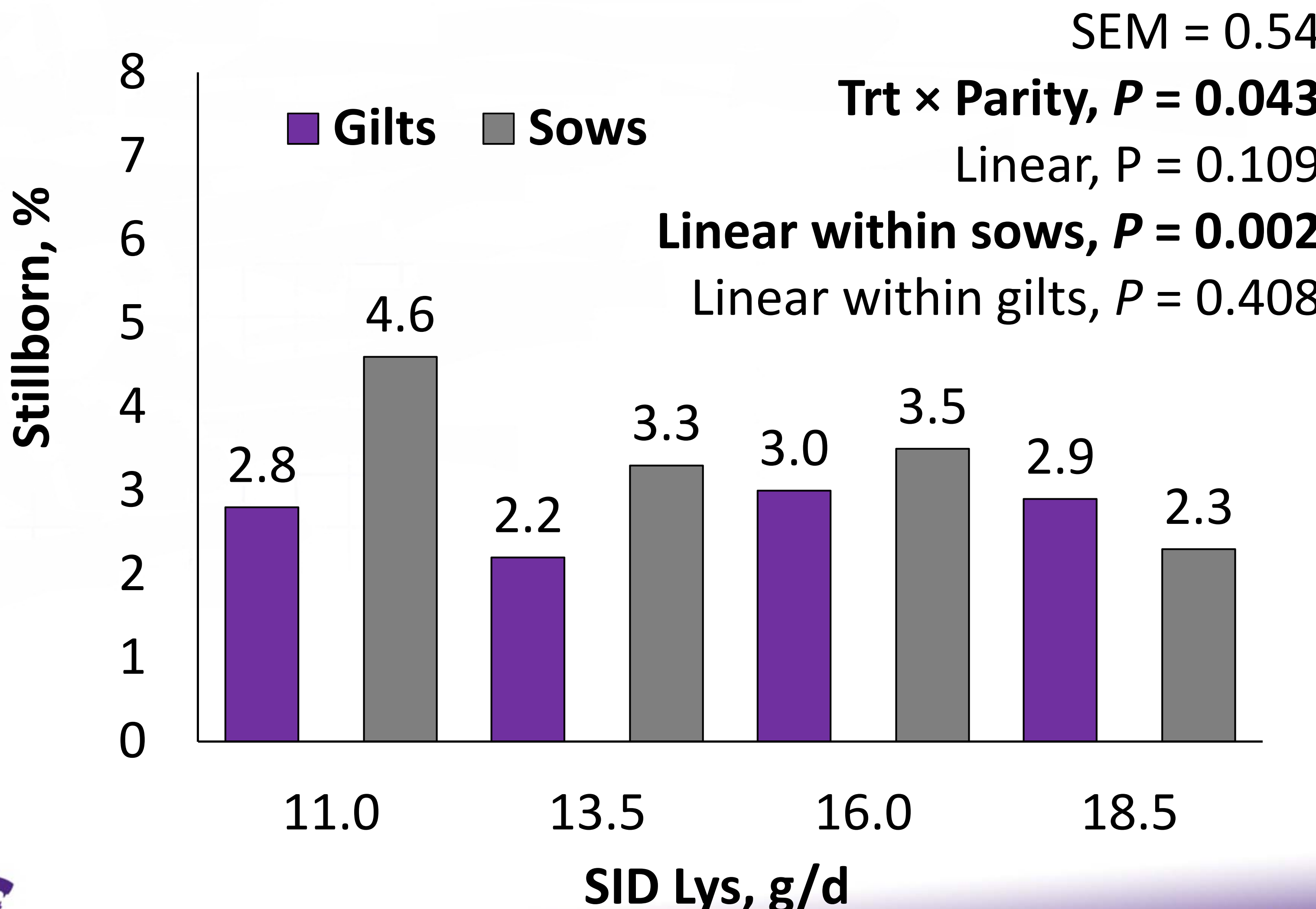
SID Lysine for gestating sows
Percentage of stillborns



Thomas et al., 2018

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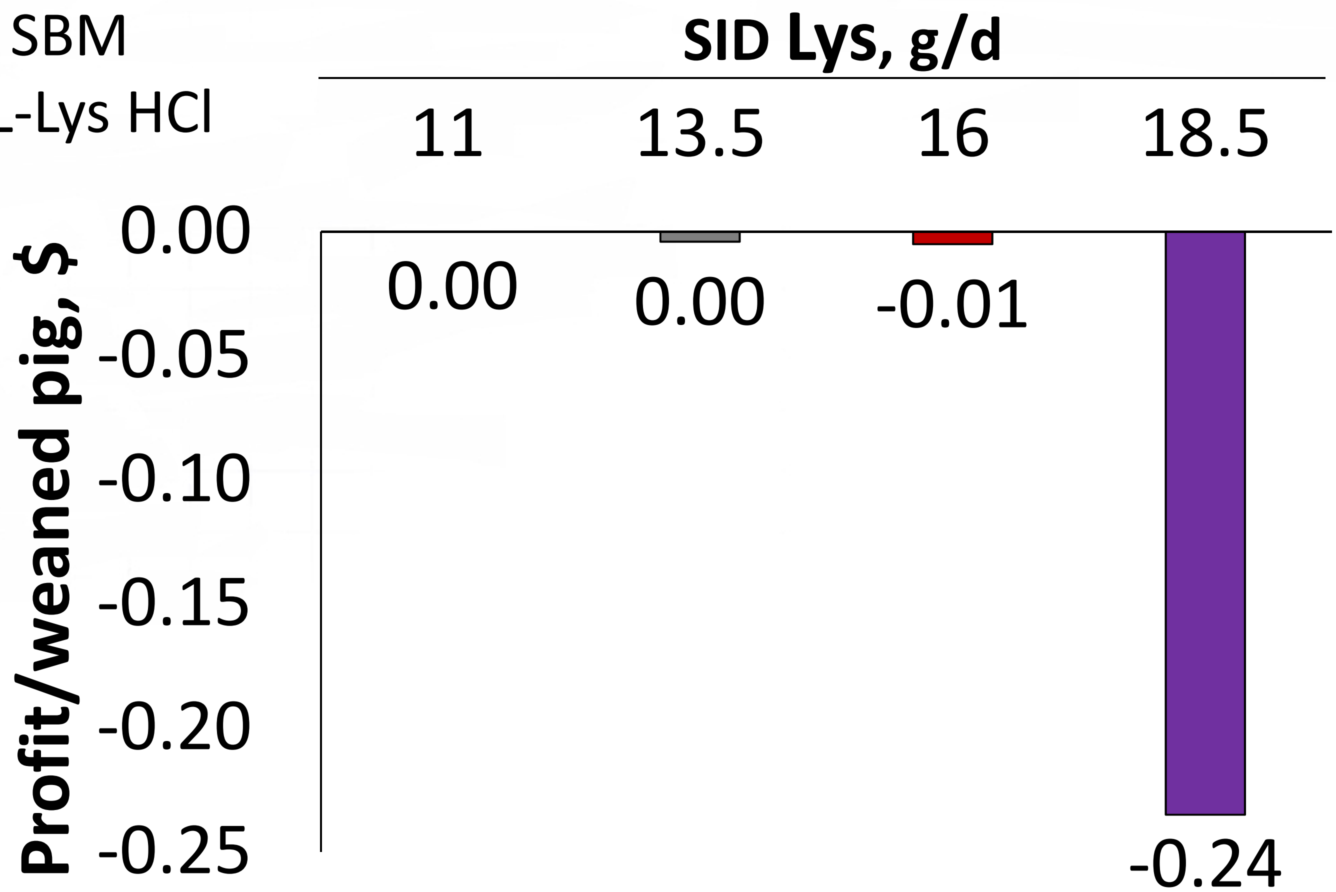
Knowledge for Life

SID Lysine for gestating sows
Profit Per Weaned Pig

$32/weaned pig
$308/ton SBM
$0.69/lb L-Lys HCl



Thomas et al., 2018

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Knowledge for Life

Increasing feeding duration of high dietary lysine and energy before farrowing on sow and litter performance

MN PORK BOARD

CHRISTENSEN FARMS

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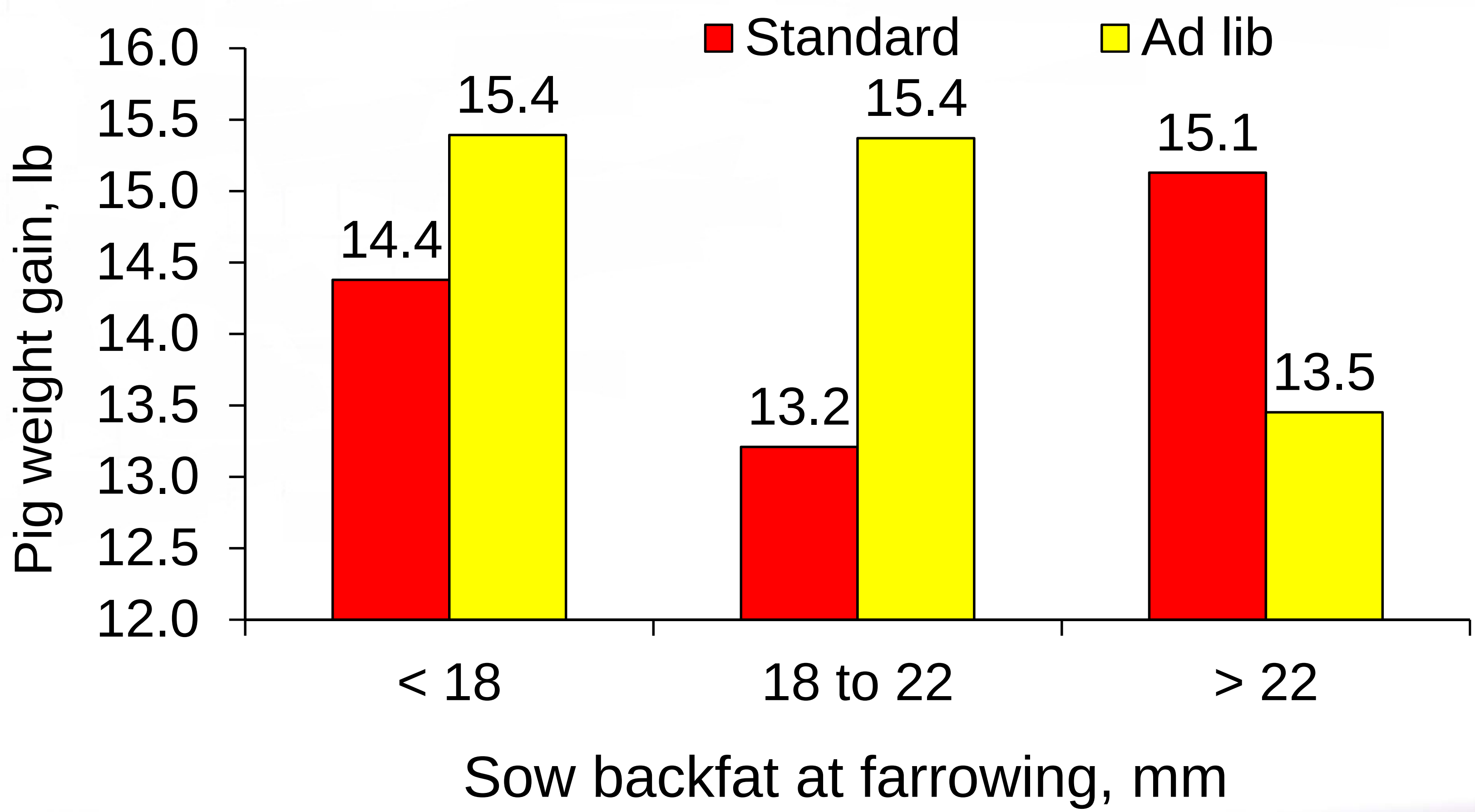
Knowledge for Life

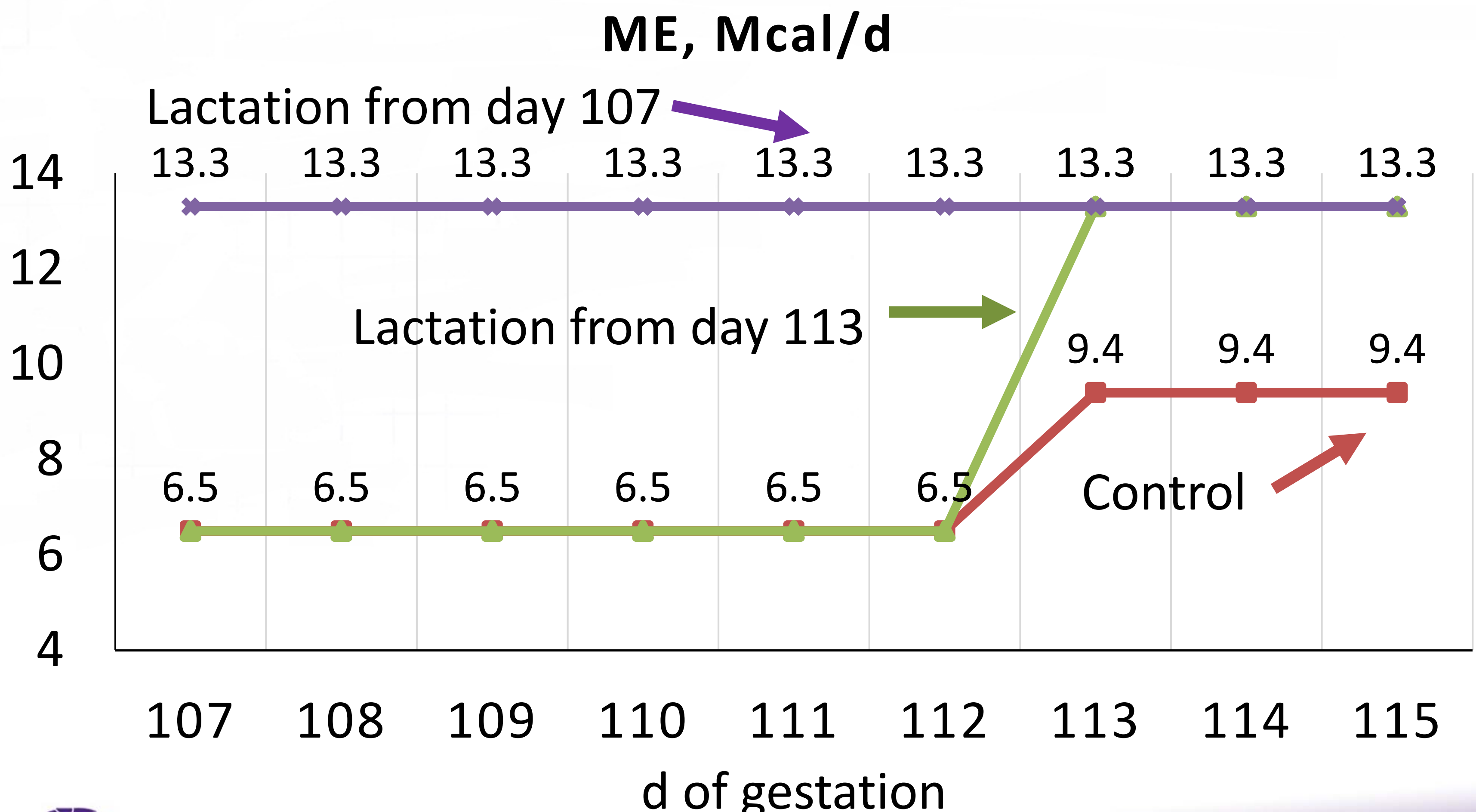
Influence of peripartum feeding of the sow on piglet weight gain

BF x feed *P < 0.035*



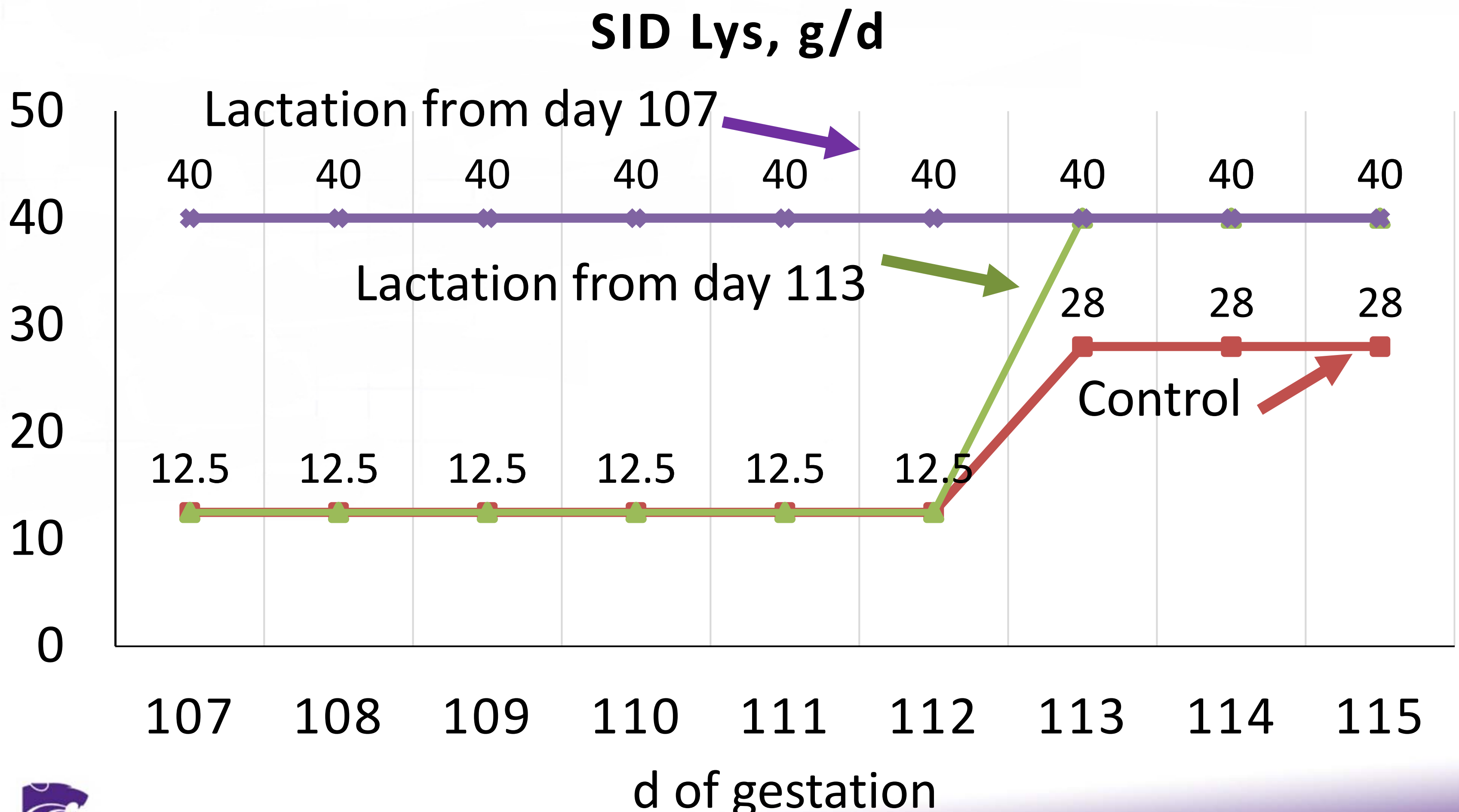
Cool et al. 2014

Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

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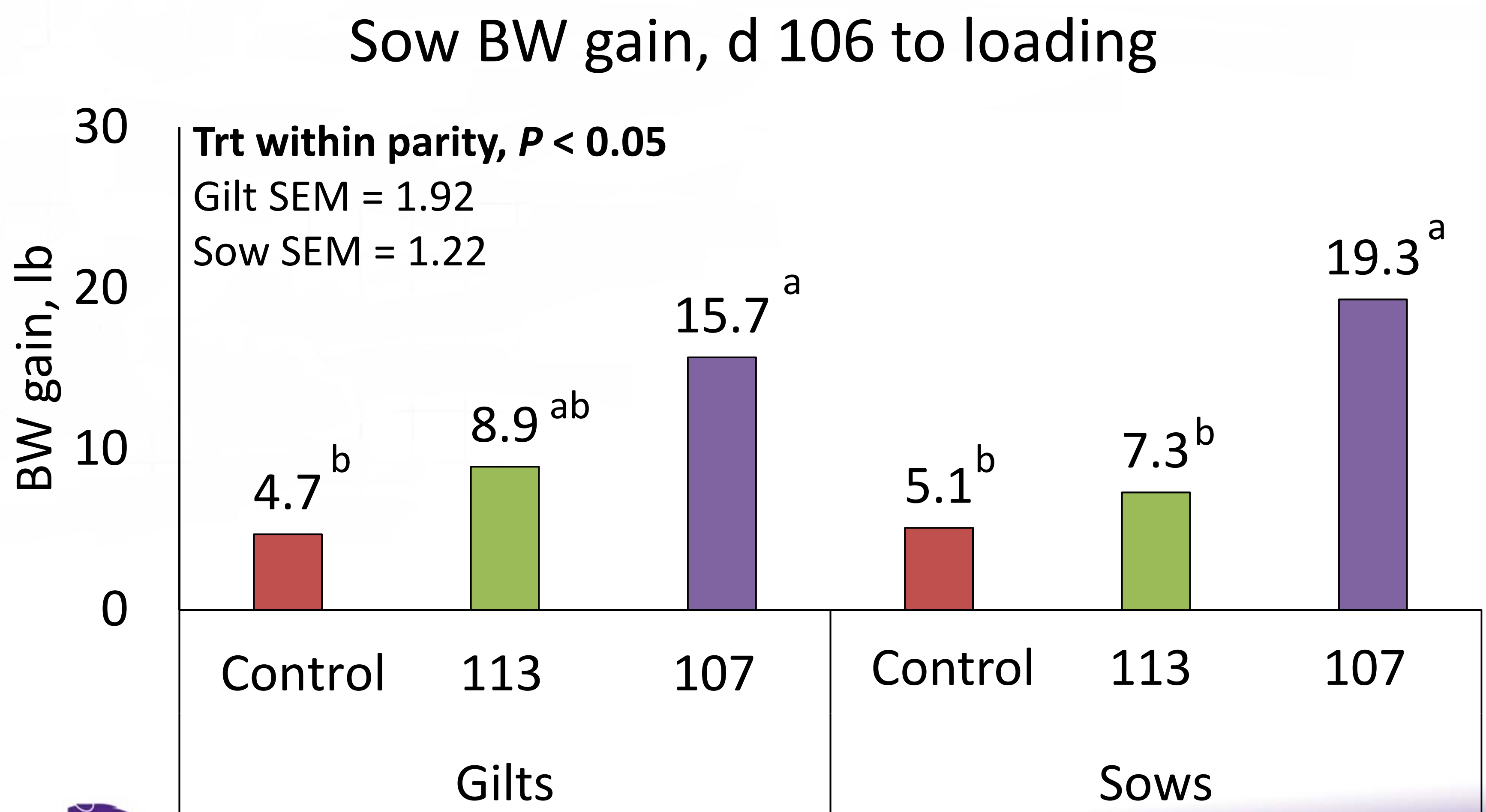
Knowledge for Life

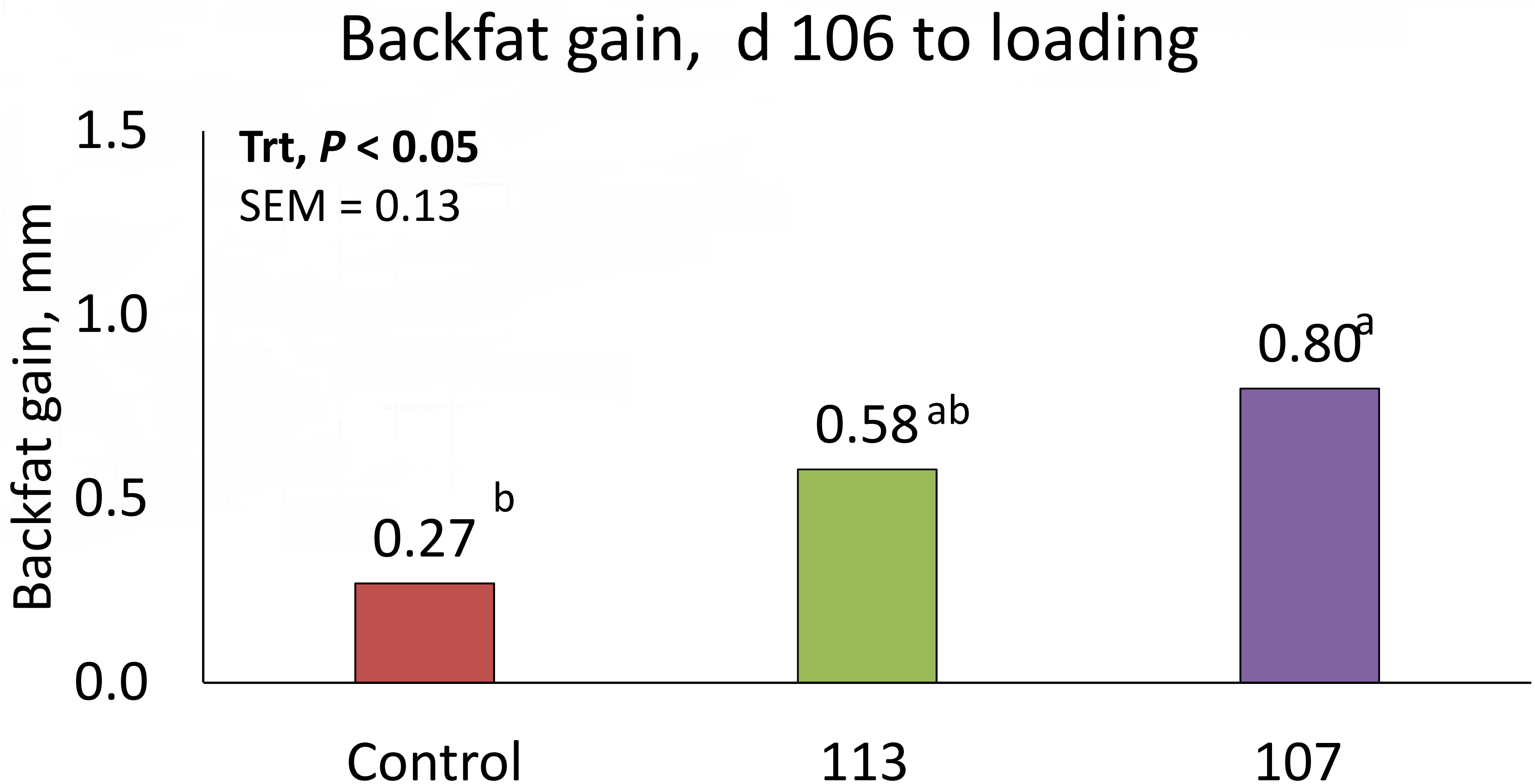
Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

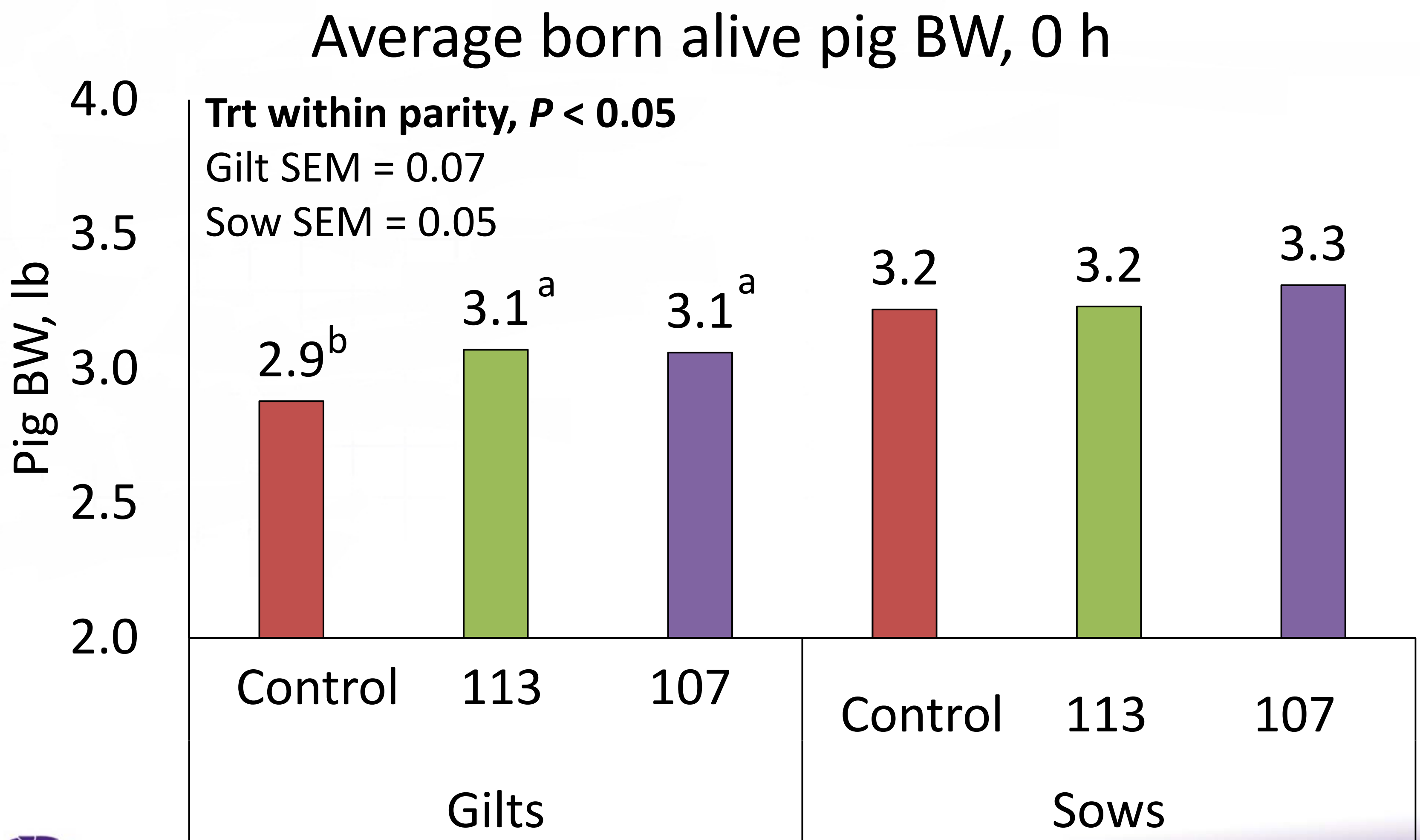
Knowledge for Life

Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

Increasing feeding duration of high dietary lysine and energy before farrowing



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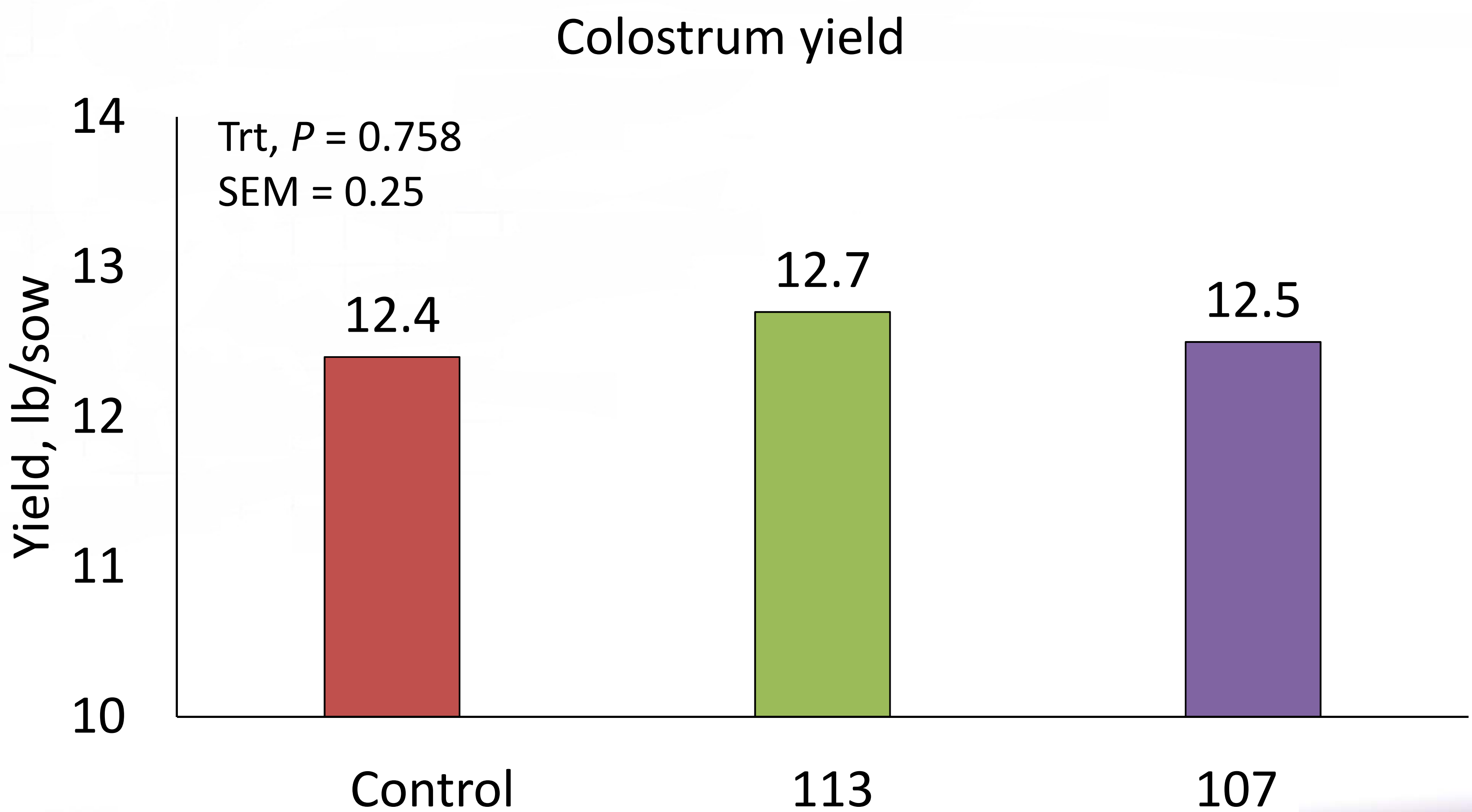
Gourley et al., 2018

Knowledge for Life

Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

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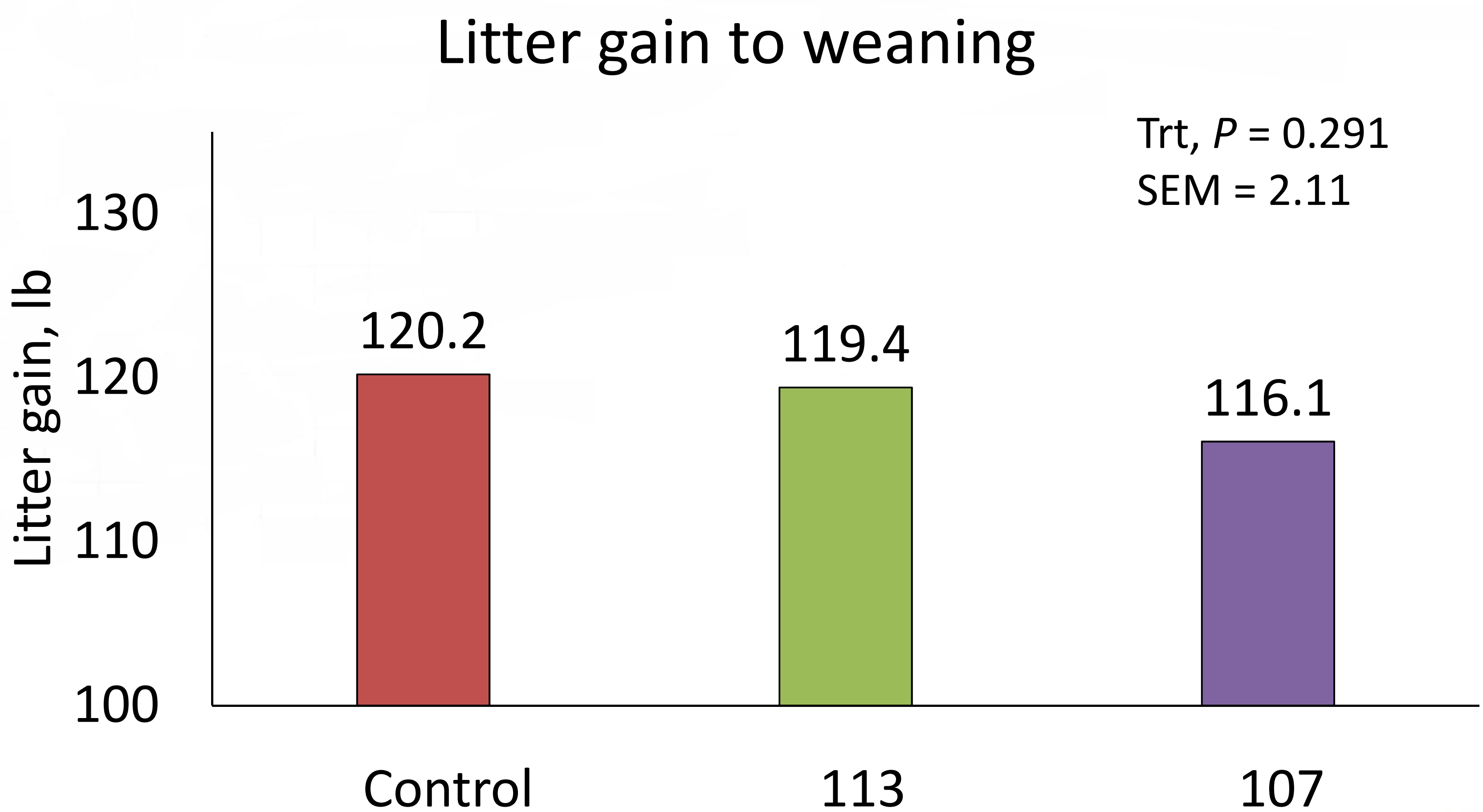
Knowledge for Life

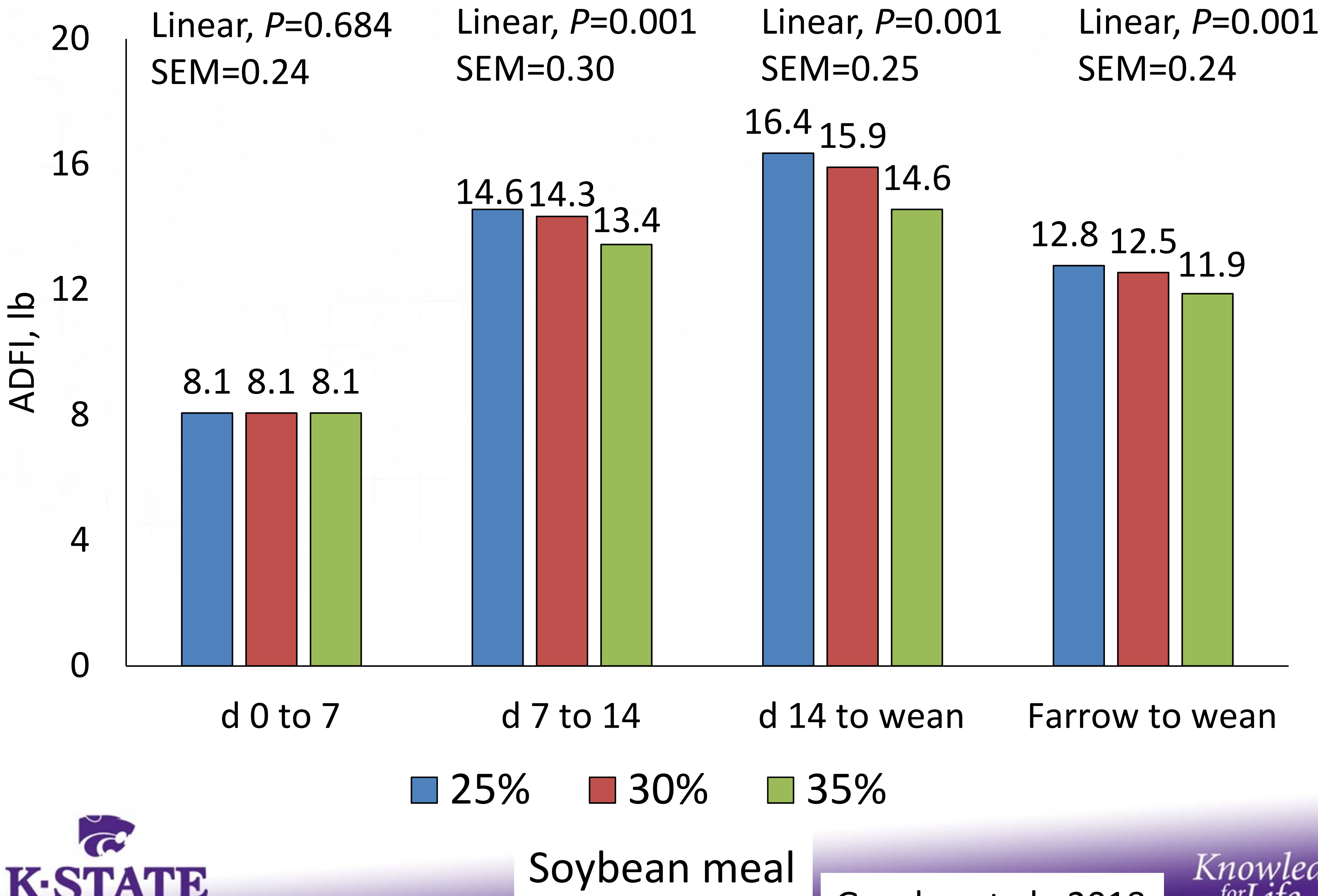
Increasing feeding duration of high dietary lysine and energy before farrowing



Gourley et al., 2018

Effect of soybean meal concentration on lactating sow diets on sow and litter performance

Effects of increasing soybean meal in lactation diets



Gourley et al., 2018

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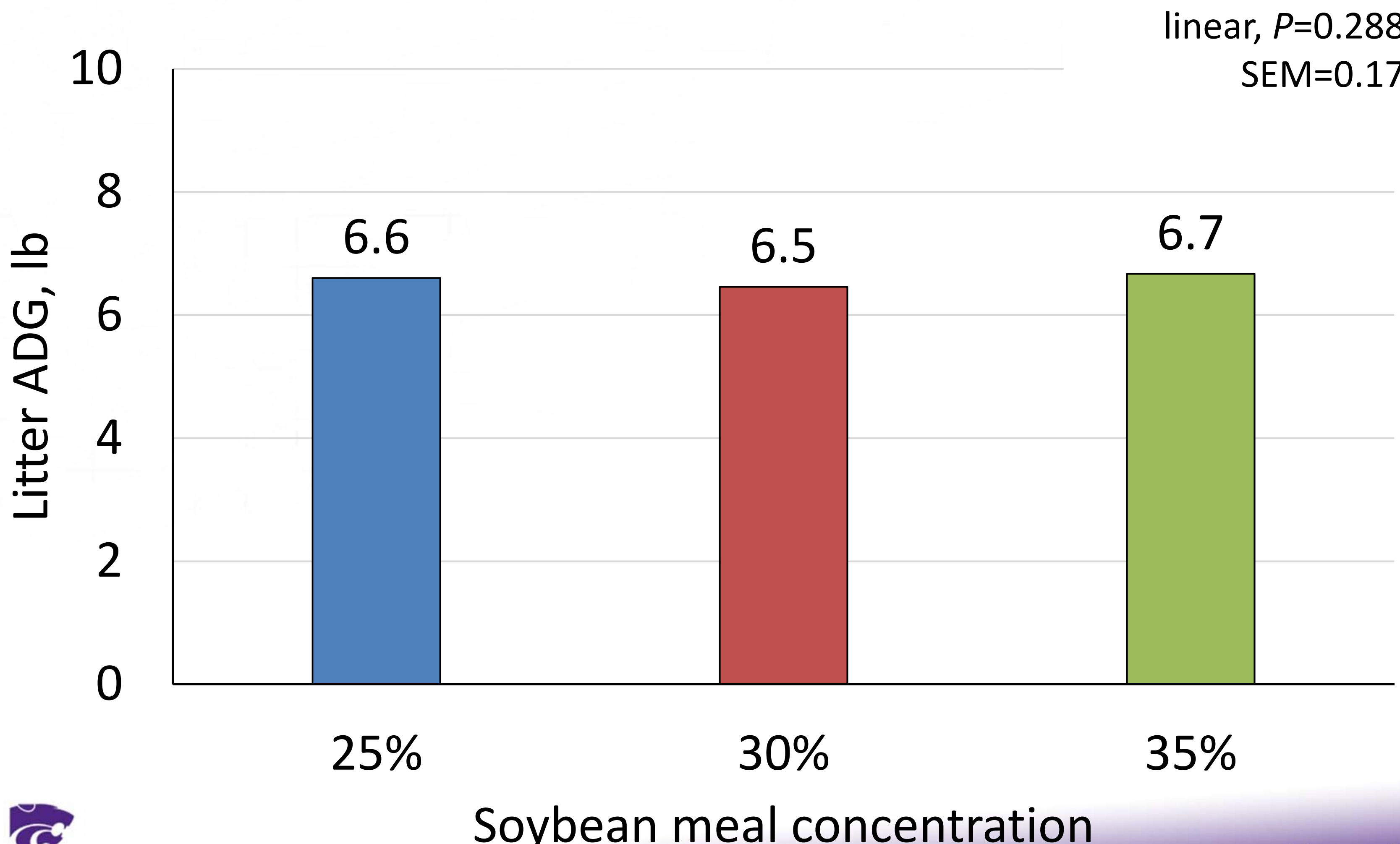
Effects of increasing soybean meal in lactation diets



Gourley et al., 2018

Recent Sow Research - Take Home Messages

1. Gestation – a wide range of lysine levels appear to be economical – suggest 13 g/day

2. Pre-farrowing (day 113+) - full feed lactation diet

3. Lactation- Keep soybean meal levels below 600 lb per ton

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Knowledge for Life

Effect of a *Bacillus*-based probiotic on sow and litter performance

- Objective of this study: evaluate the effect of supplementation of sow diets with *Bacillus subtilis* C-3102 during gestation and lactation on sow and litter performance
- 29 mixed-parity sows (DNA 241), KSU Swine Teaching and Research Center
- Fed from d 30 of gestation to weaning
- **Sow diet**: control diet or probiotic diet with *Bacillus subtilis* C-3102 (Calsporin®)
  - Gestation: probiotic diet top dressed with Calsporin® to achieve 500,000 CFU/g of diet
  - Lactation: probiotic diet supplemented with Calsporin® to achieve 1,000,000 CFU/g of diet

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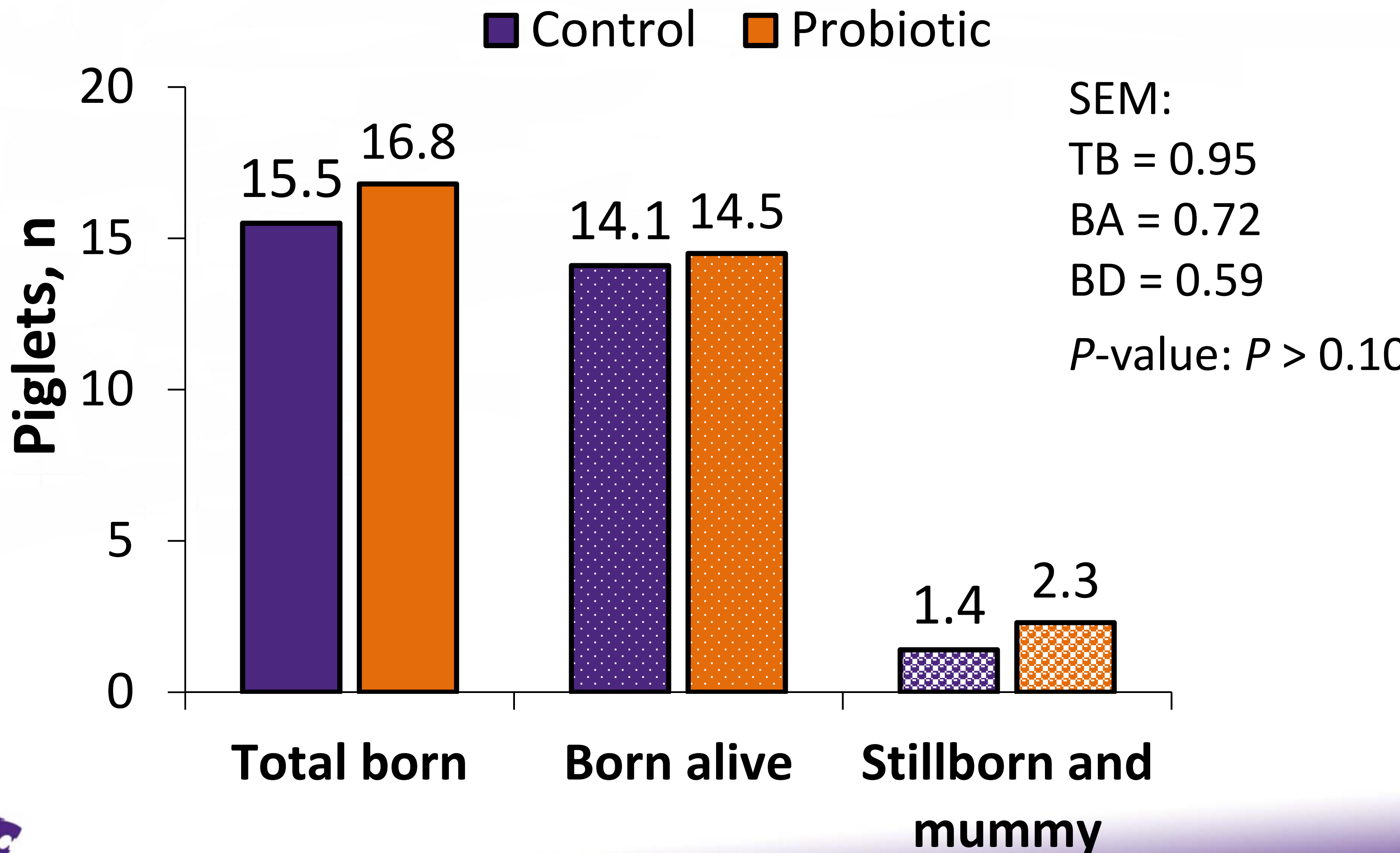
Menegat et al., 2018

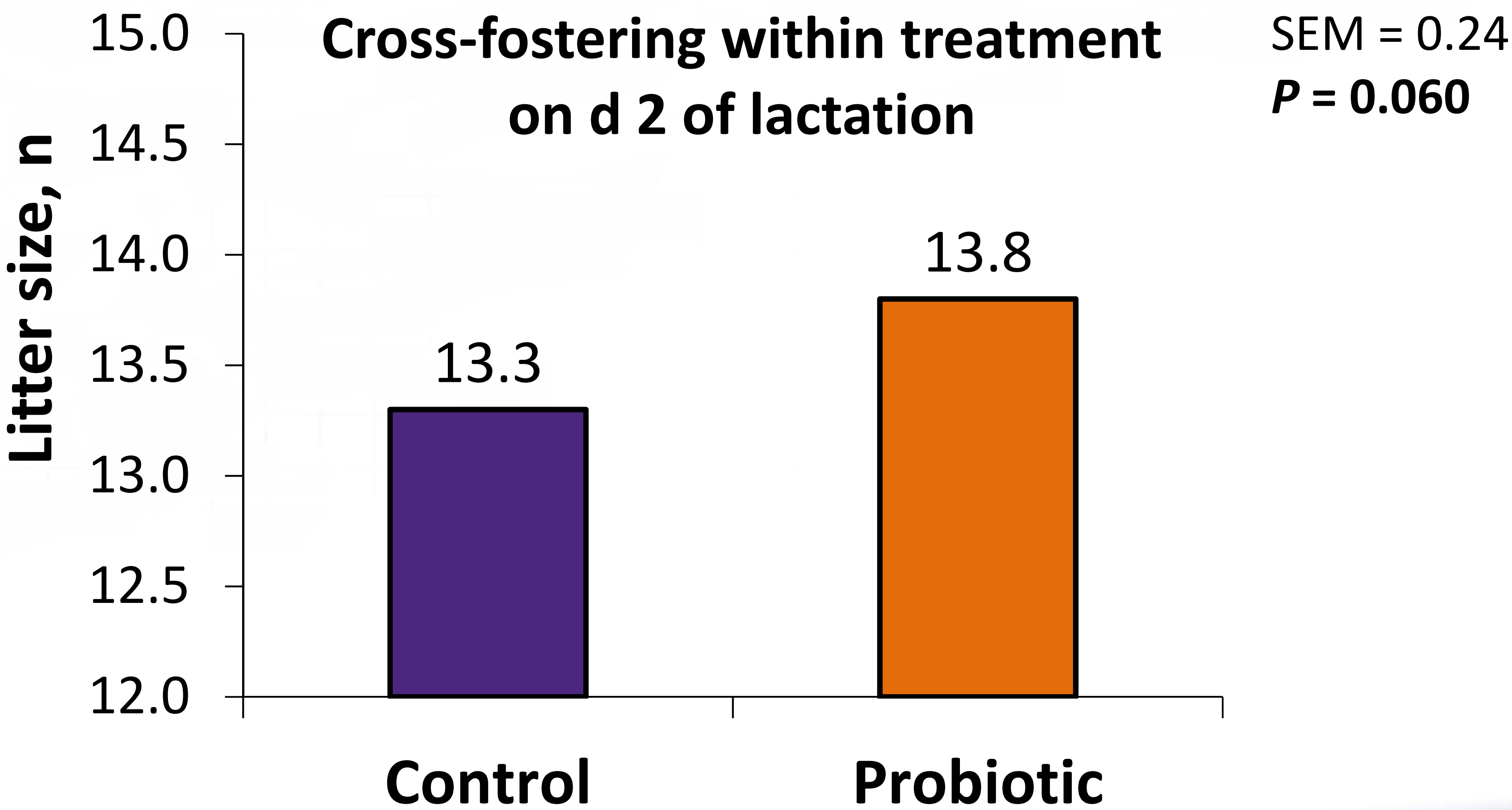
QTI ANIMAL HEALTH & NUTRITION

Effect of a *Bacillus*-based probiotic on sow farrowing performance



Menegat et al., 2018

Effect of a *Bacillus*-based probiotic on litter size at cross-fostering



Menegat et al., 2018

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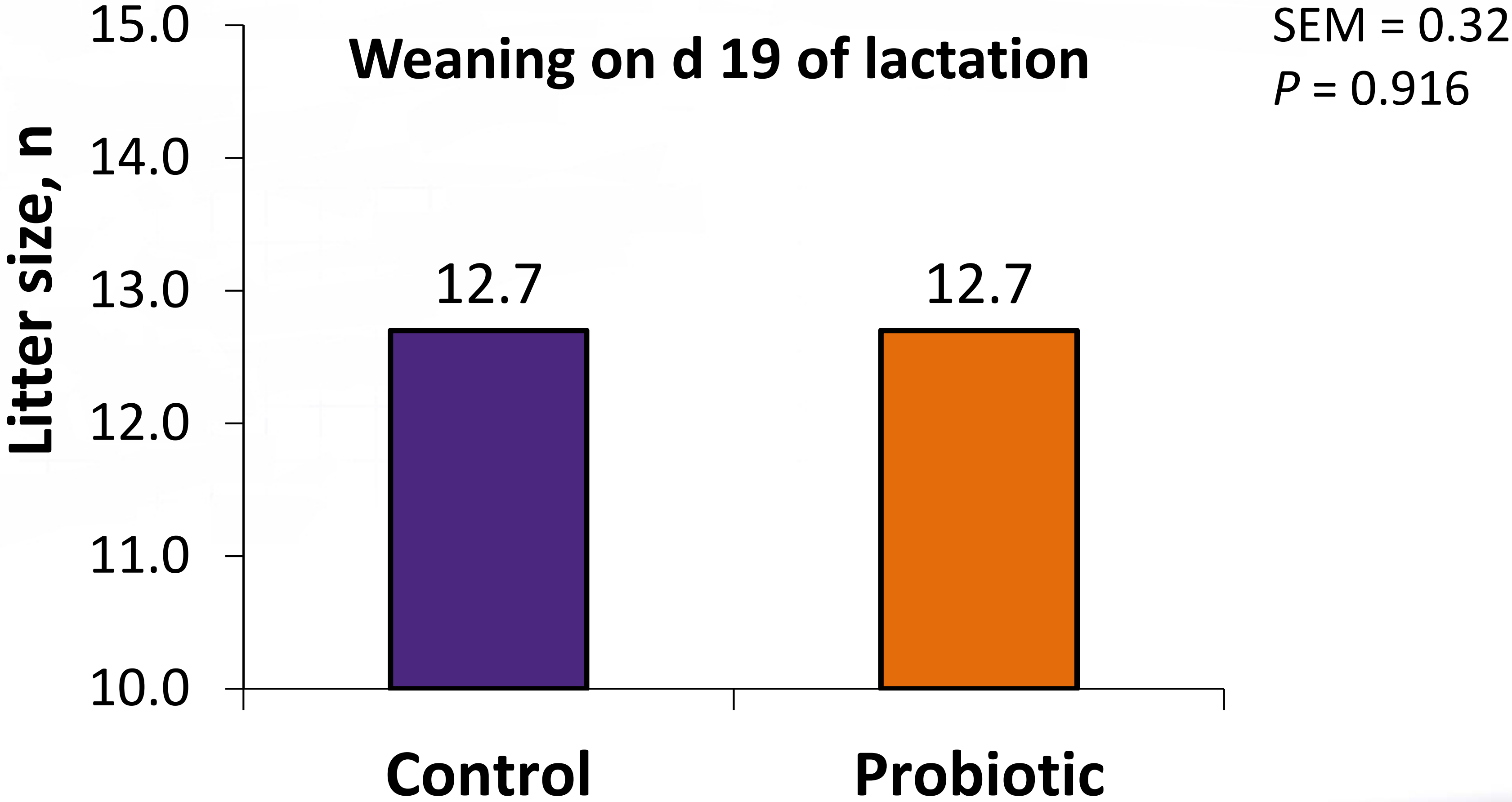
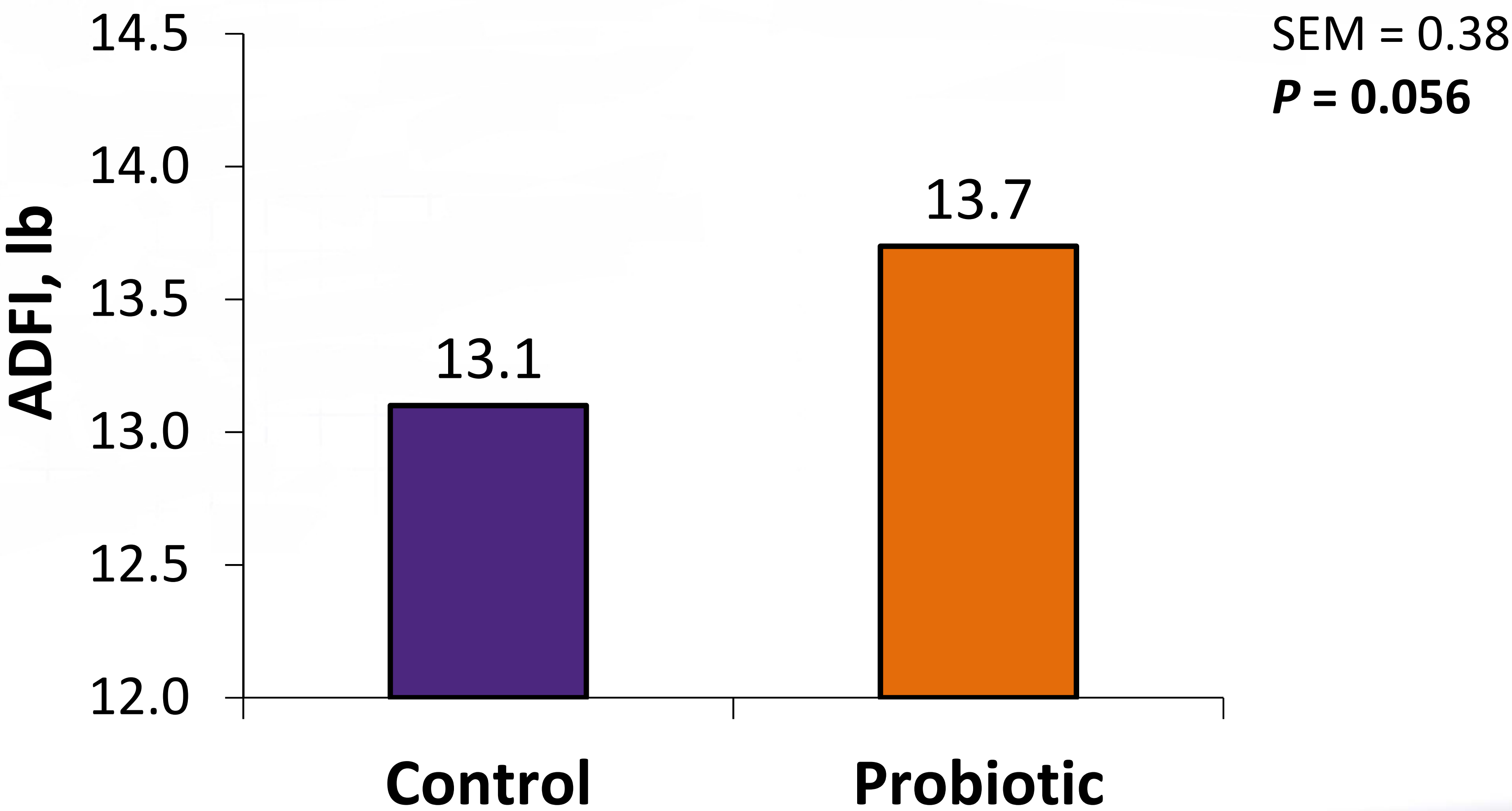
Knowledge for Life

Effect of a *Bacillus*-based probiotic on litter size at weaning



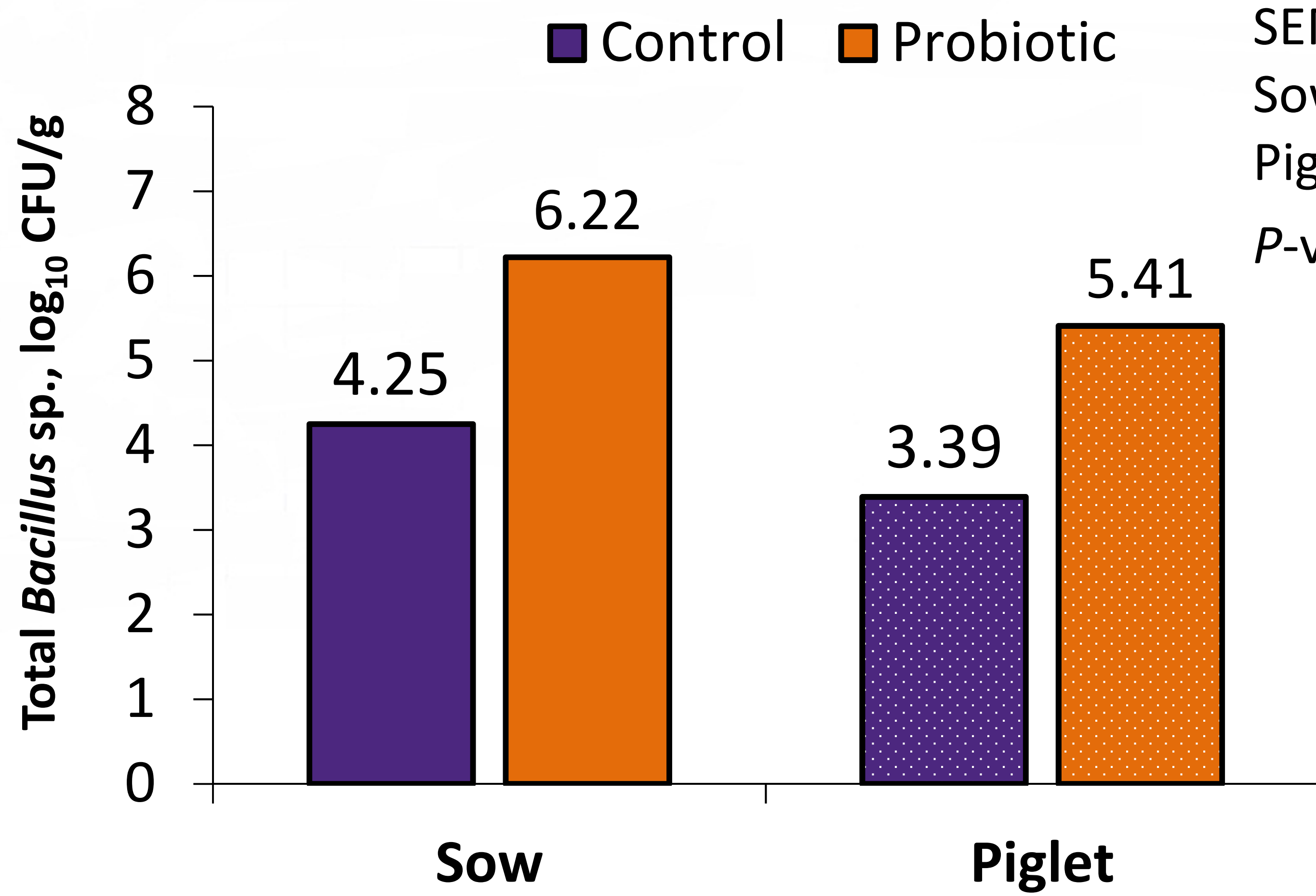
Menegat et al., 2018

Effect of a *Bacillus*-based probiotic on sow lactation feed intake



Menegat et al., 2018

Effect of a *Bacillus*-based probiotic on piglet total fecal *Bacillus* sp. at weaning



SEM:
Sow = 0.05
Pig = 0.20
P-value: ***P* < 0.01**

Menegat et al., 2018

Effect of a *Bacillus*-based probiotic and prebiotics on nursery pig ADG

- On day 19 post-farrowing, piglets were weaned and moved to nursery by sow treatment.
- **Sow diet**: control diet or probiotic diet with *Bacillus subtilis* C-3102 in gestation and lactation (Calsporin® at 500,000 and 1,000,000 CFU/g, respectively)
- **Nursery diet**: control diet or probiotic diet with *Bacillus subtilis* C-3102 and yeast cell wall prebiotic (BacPack ABF™ at 0.05% of diet)

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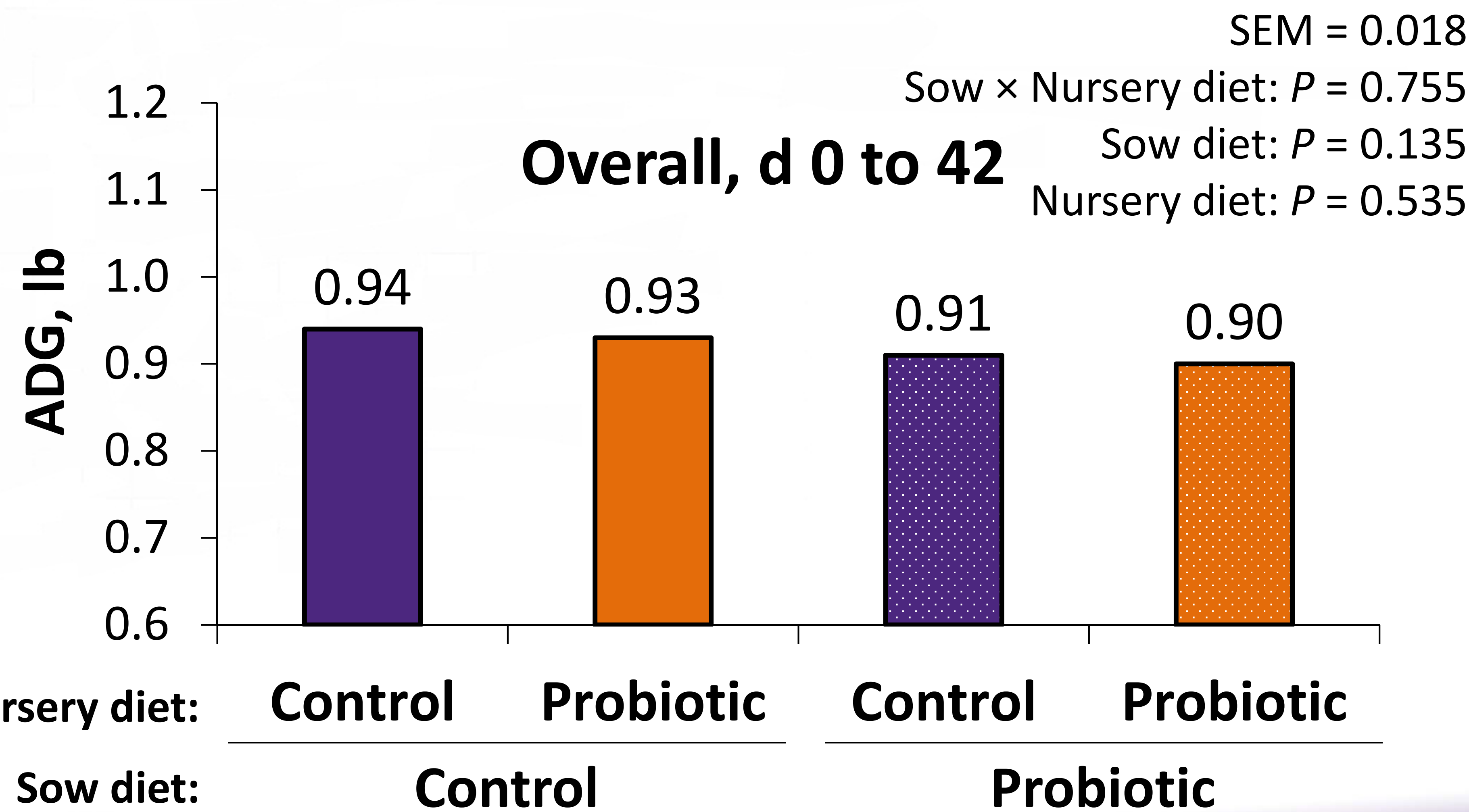
Menegat et al., 2018

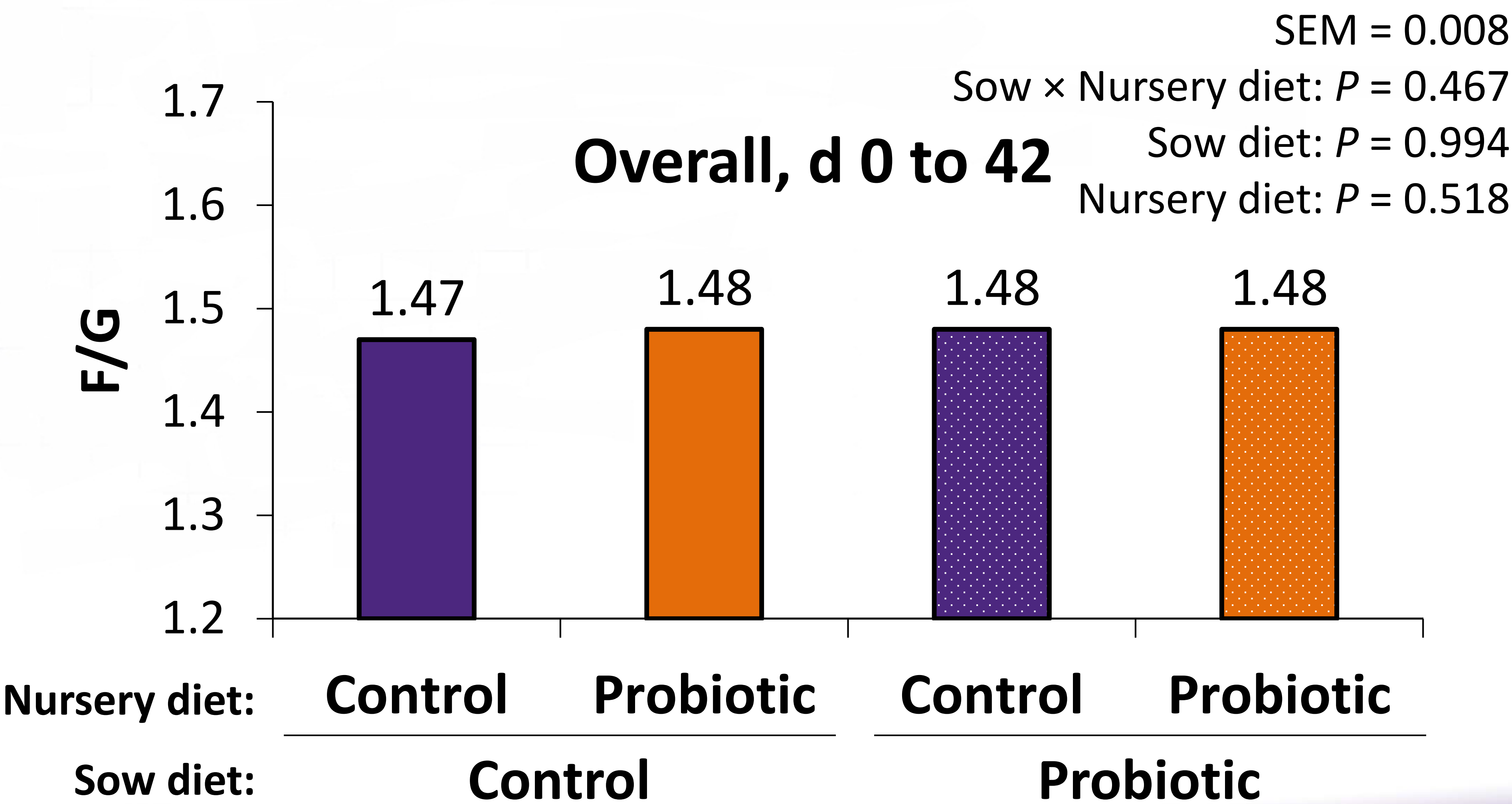
QTI™ ANIMAL HEALTH & NUTRITION

Effect of a *Bacillus*-based probiotic and prebiotics on nursery pig ADG



Menegat et al., 2018

Effect of a *Bacillus*-based probiotic and prebiotics on nursery pig F/G



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Menegat et al., 2018

Knowledge for Life

Effect of increasing Fe dosage in newborn pigs on suckling and subsequent nursery performance

H. Williams[1*], J. DeRouchey[1], J. Woodworth[1],

M. Tokach[1], S. Dritz[1], R. Goodband[1], and A. Holtcamp[2]

[1]Kansas State University, Manhattan

[2]Ceva, Lenexa, KS

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Knowledge for Life

Introduction

- Newborn piglets are more susceptible to iron deficiency.
  - Inadequate iron stores at birth
  - Rapid growth rate before weaning
- Injection of 200 mg of iron is commonplace in the swine industry at time of piglet processing.
  - Improved growth rate and iron status of piglets
- Concern over level provided with one injection opposed to giving a booster before weaning.

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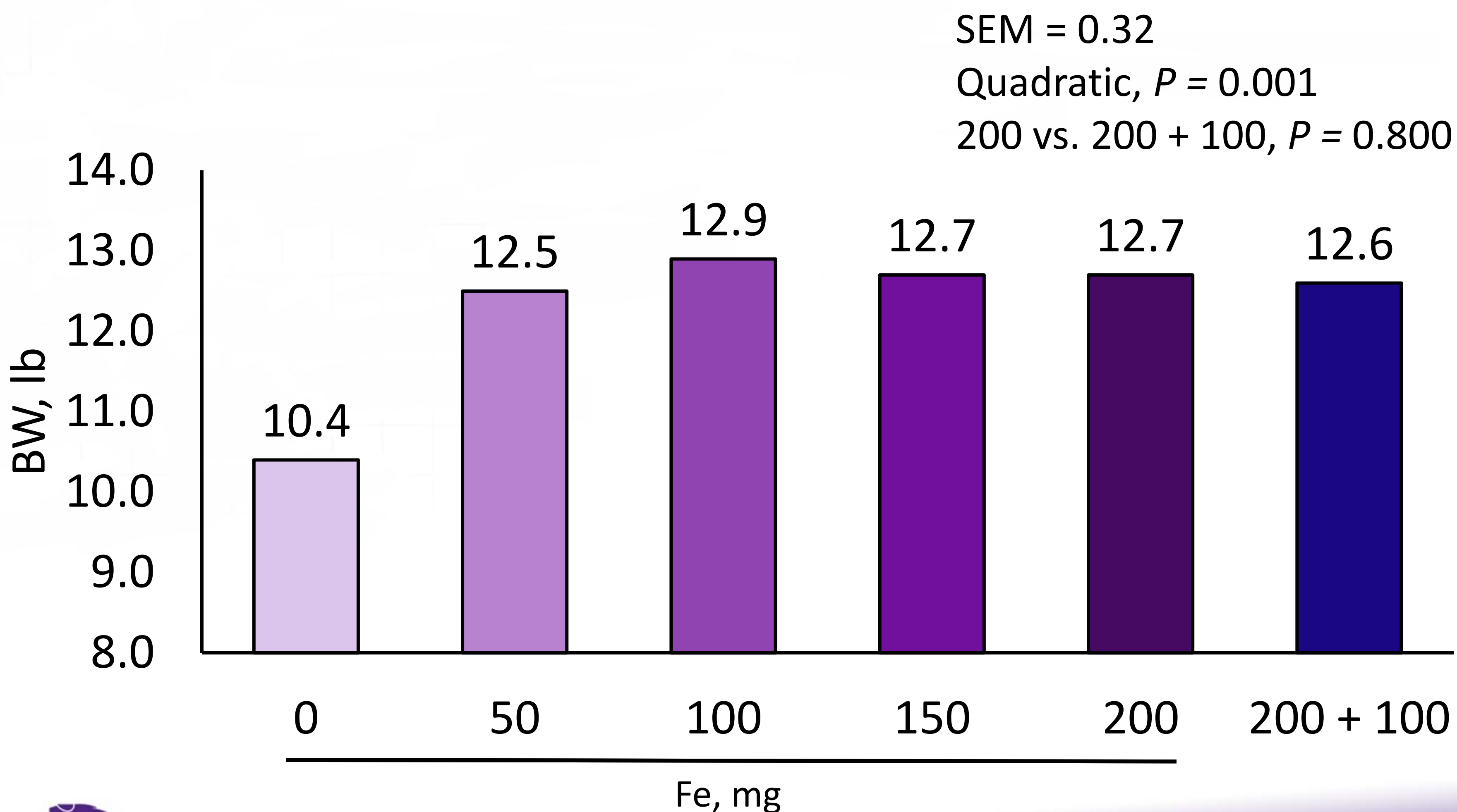
Joliff and Mahan, 2011; Starzyński et al., 2013

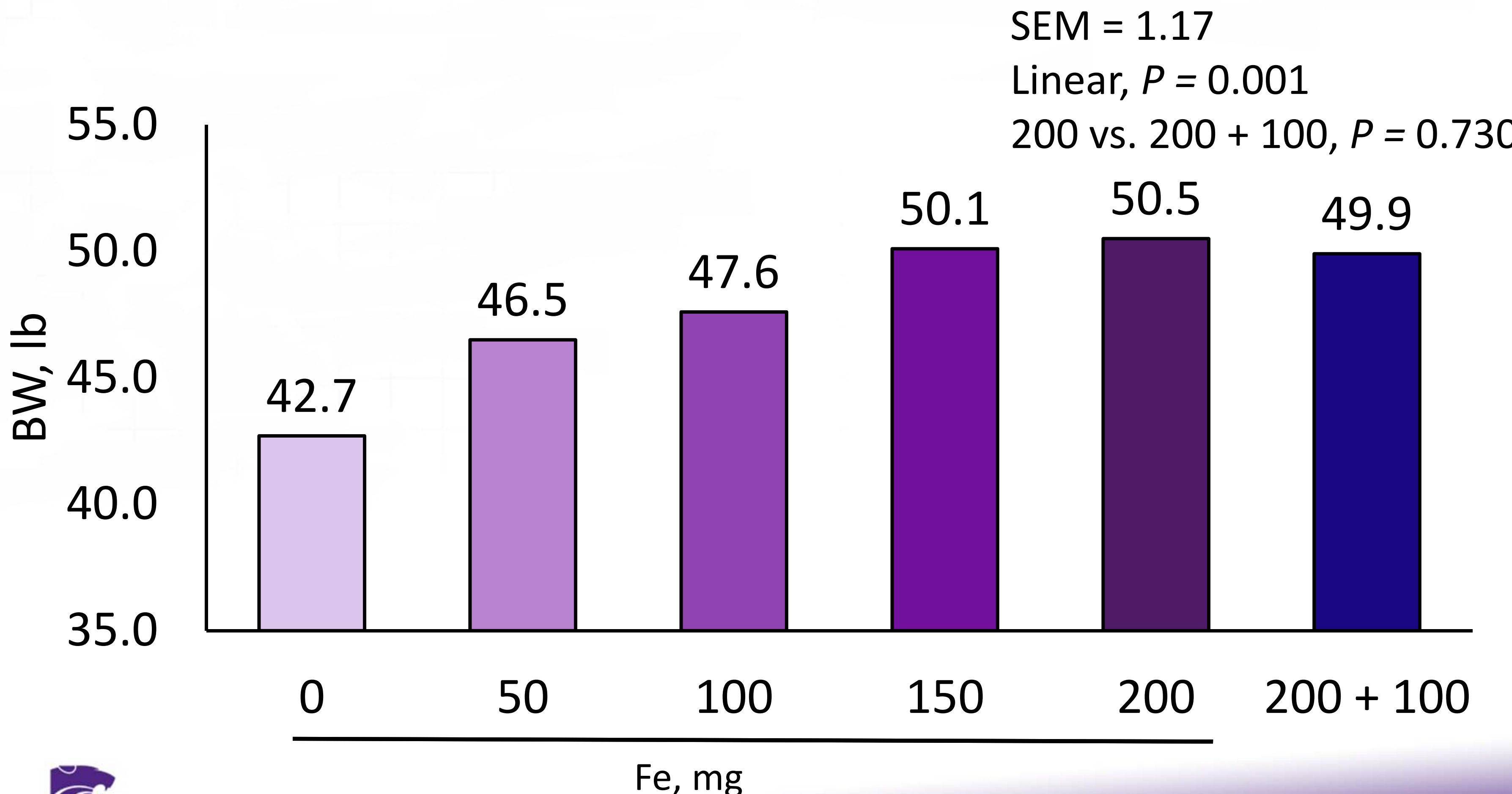
Knowledge for Life

Effects of Fe Dosage on Suckling Piglet Weaning Weight



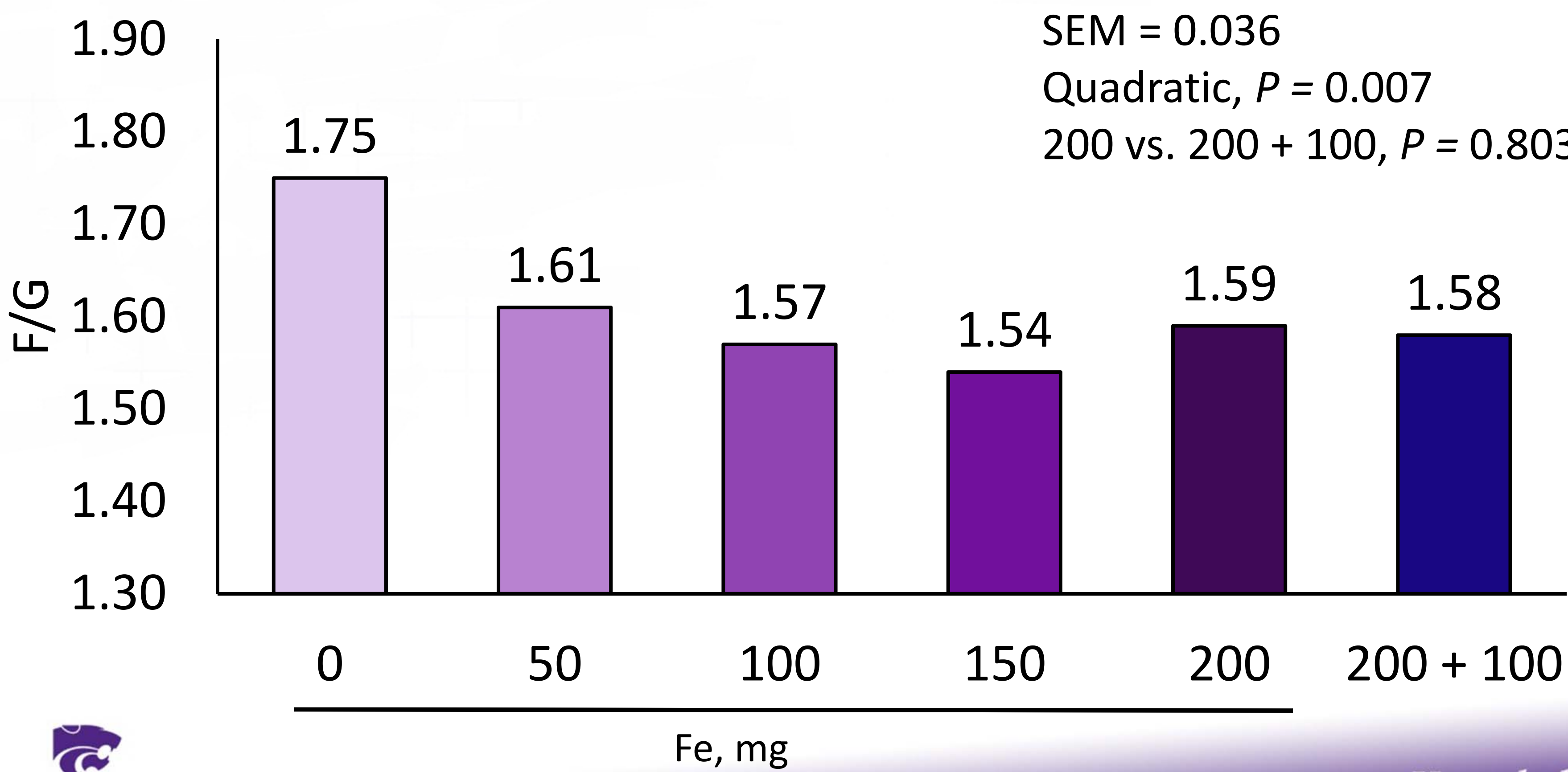
Williams et al., 2018

Effects of Fe Dosage on Nursery Ending BW



Williams et al., 2018

Effects of Fe Dosage on Nursery Feed Efficiency (d 0 to 42)



Williams et al., 2018

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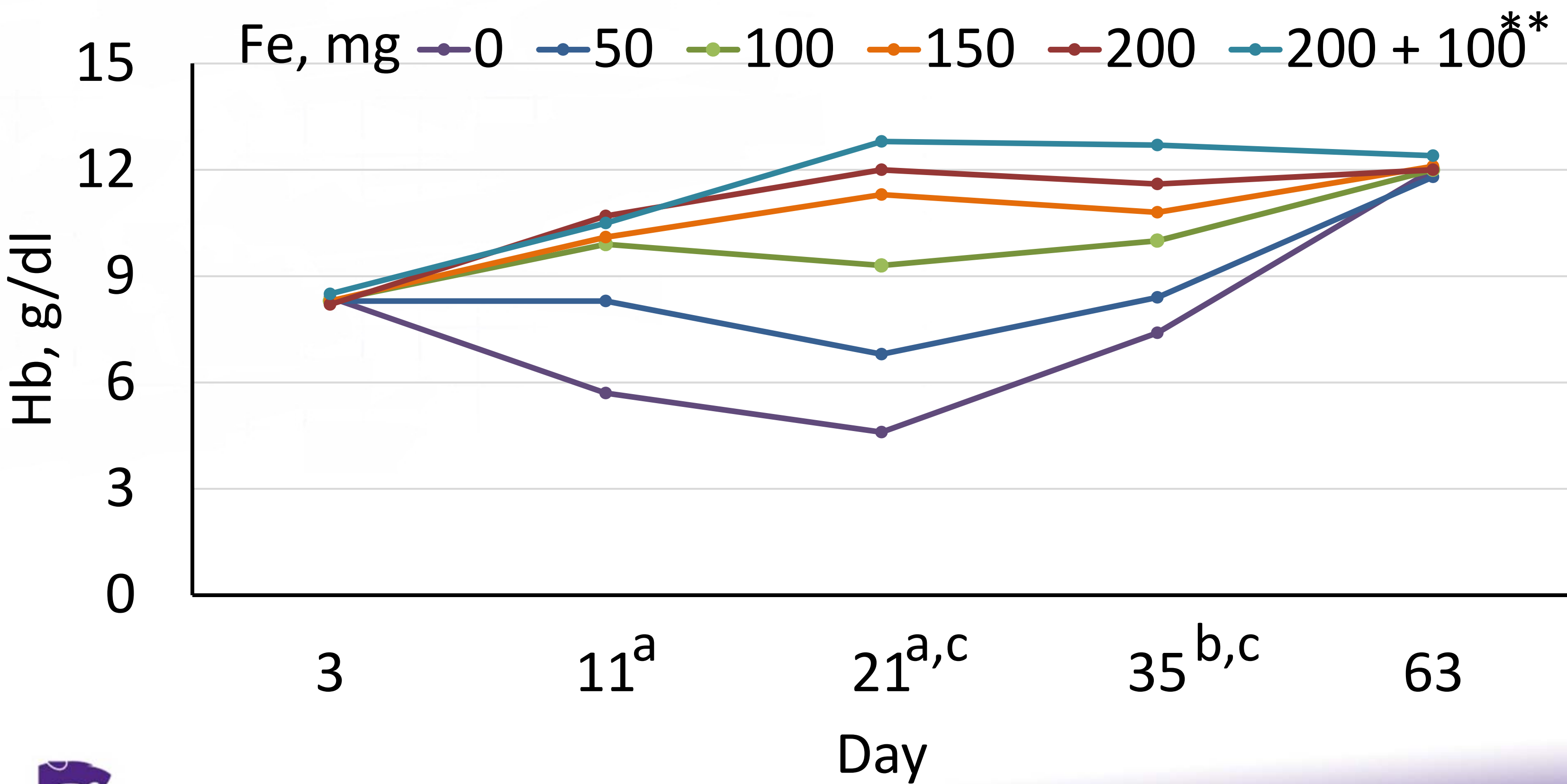
Knowledge for Life

Effects of Fe Dosage on Hemoglobin (d 0 to 63)

Trt x Day, $P = 0.001$
[a]Quadratic, $P < 0.05$
[b]Linear, $P < 0.05$
[c]200 vs. 200 + 100, $P < 0.05$

*SEM ranged from 0.22 to 0.24
**100 mg of Fe given at d 11



Williams et al., 2018

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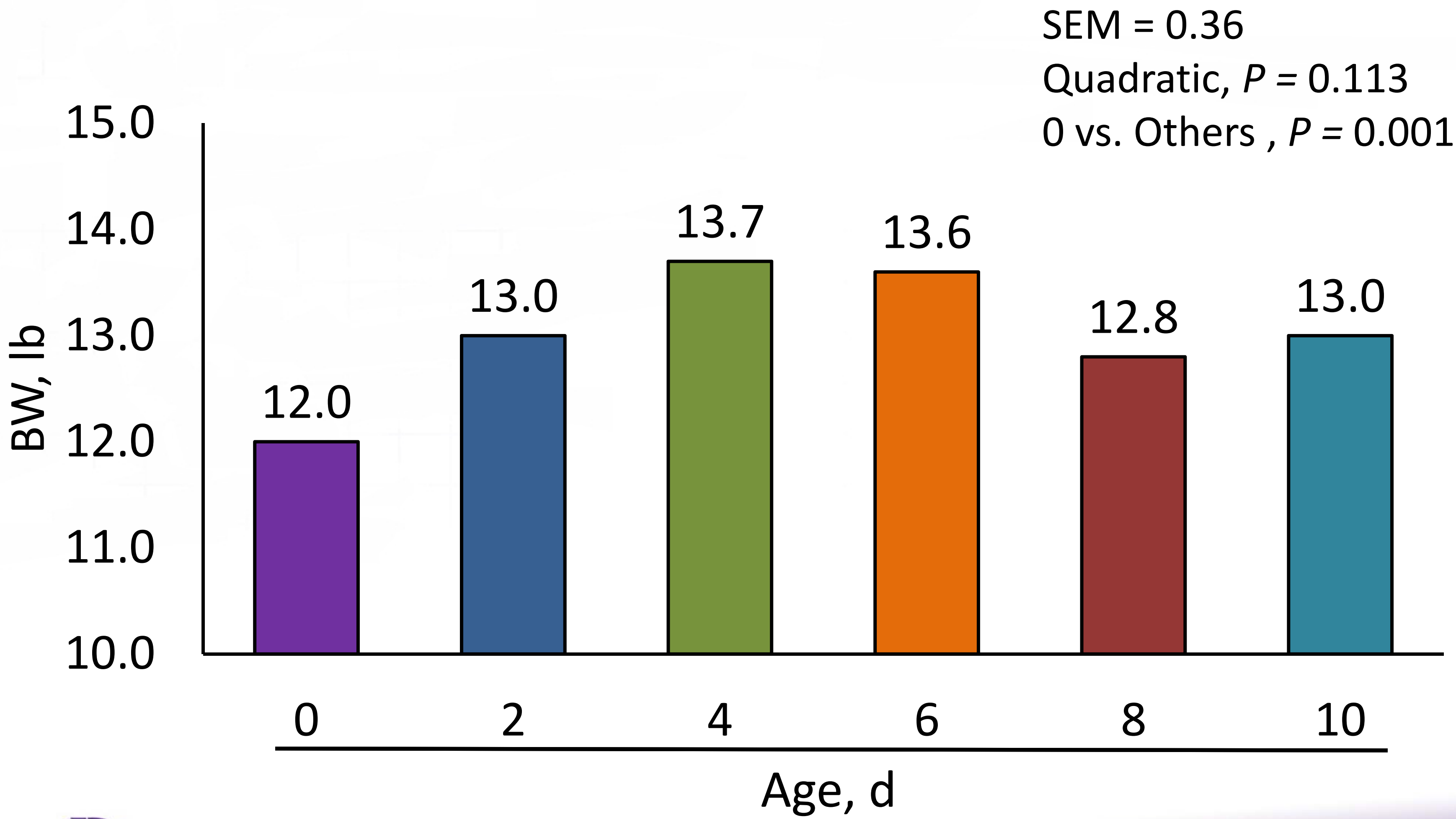
Knowledge for Life

Timing of 200 mg Injectable Fe on Suckling Piglet Weaning Weight



Williams et al., 2018

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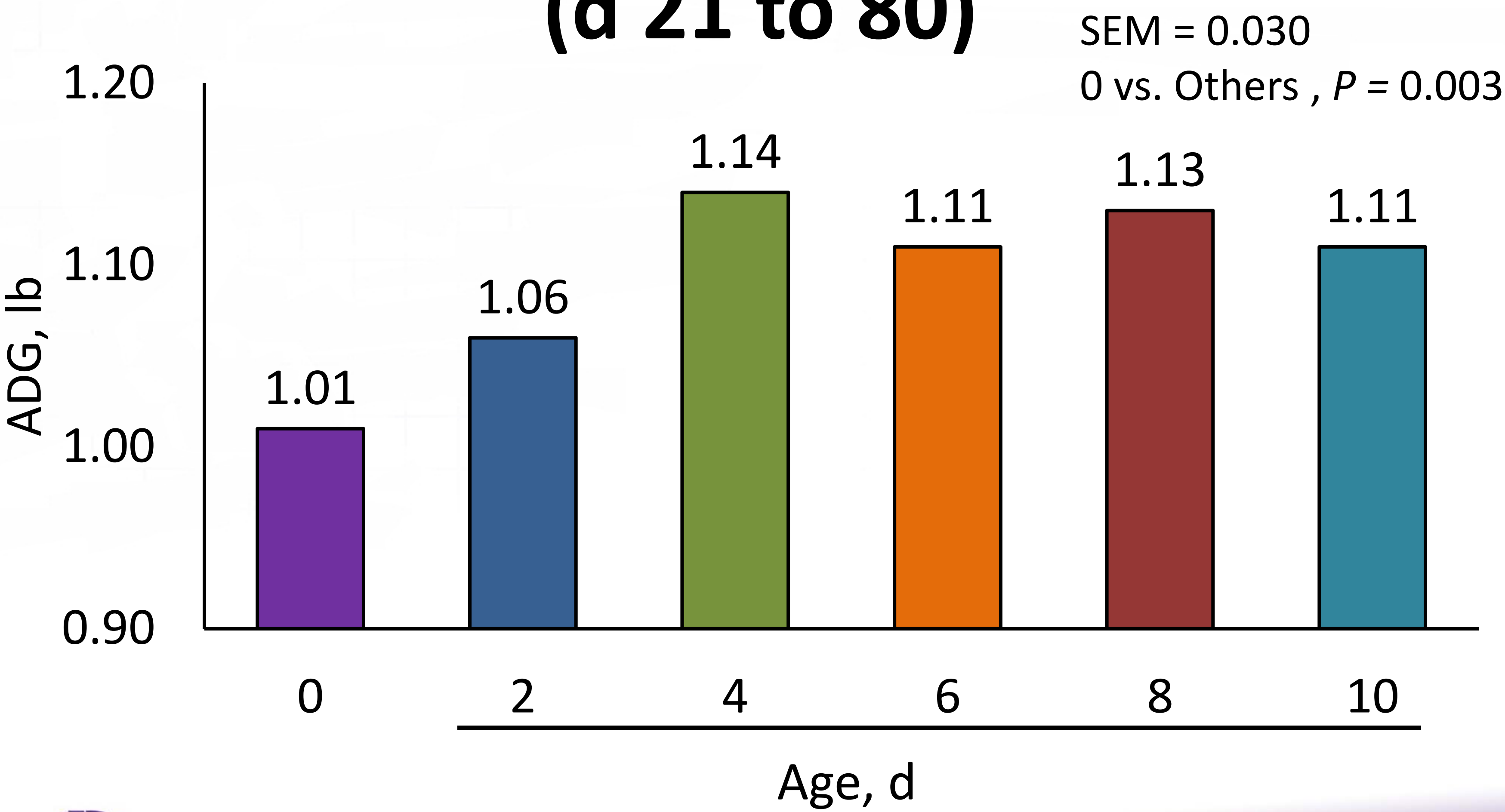
Timing of 200 mg of Injectable Fe on Nursery Average Daily Gain (d 21 to 80)



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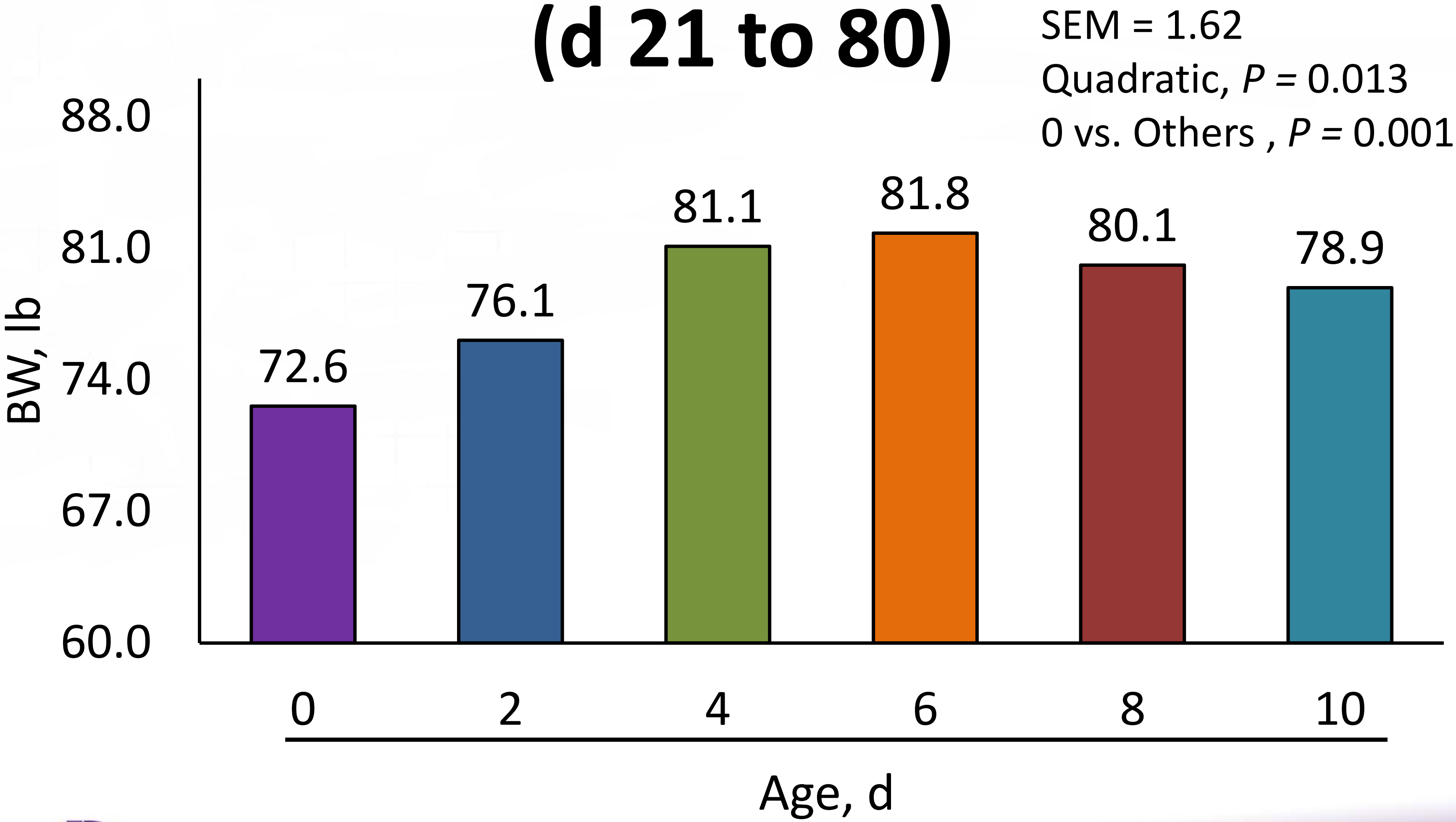
Williams et al., 2018

Knowledge for Life

Timing of 200 mg Injectable Fe on Nursery Ending BW (d 21 to 80)



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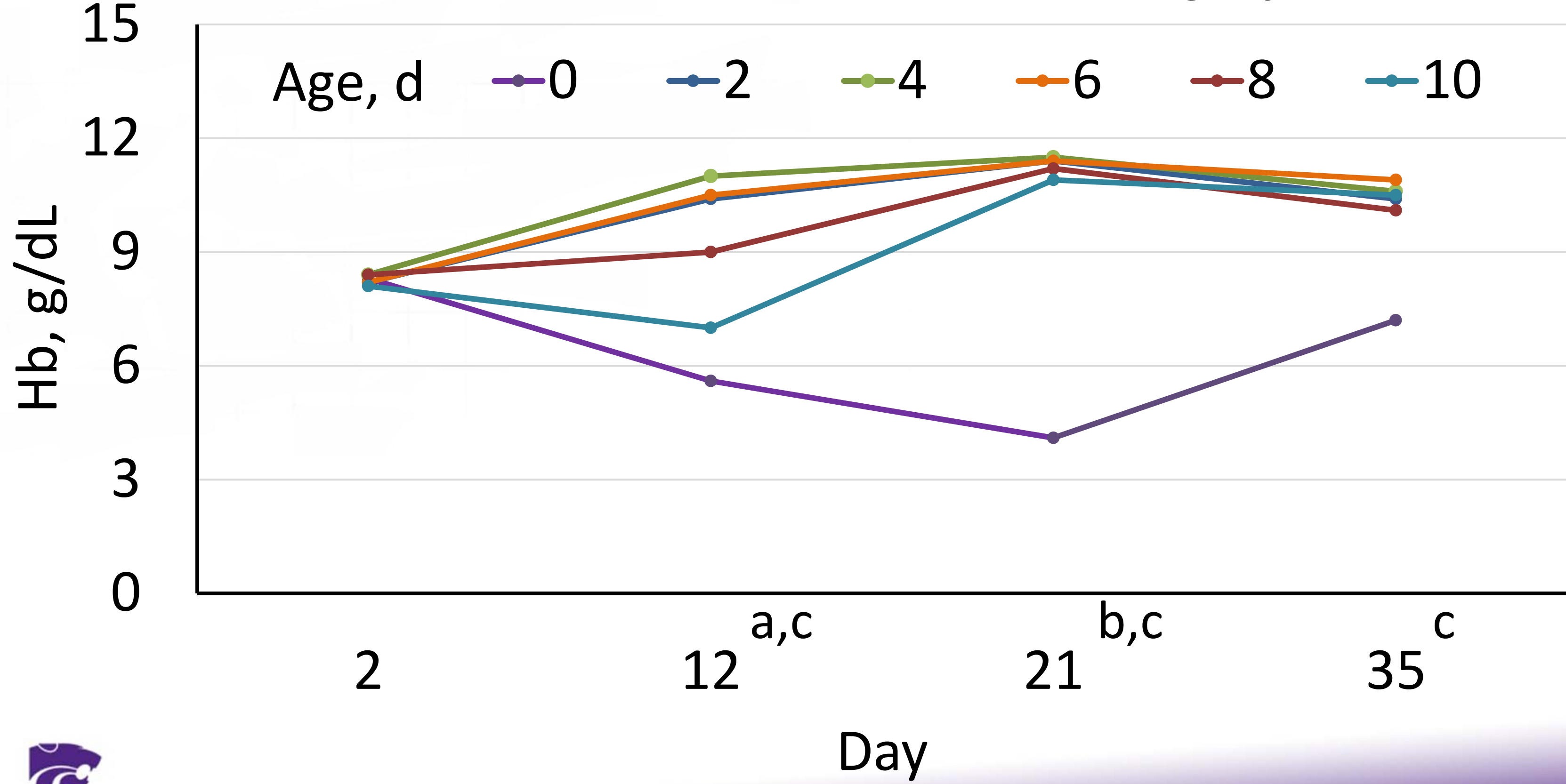
Williams et al., 2018

Knowledge for Life

Timing of 200 mg Injectable Fe on Hemoglobin (d 0 to 35)

Trt x Day, *P* = 0.001
[a]Quadratic, *P* < 0.05
[b]Linear, *P* < 0.05
[c]0 vs. Others, *P* < 0.05

**SEM ranged from 0.21 to 0.22*



Williams et al., 2018

Overview of Feed Science and Nutrition Research

- Phytase Stability
- Phosphorus Requirement
- Ca:P Ratio

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Research and Extension

Knowledge *for* Life

Pellet Mill Processing Parameters

- 245 mm × 1397 mm Wenger twin staff pre-conditioner
- 30 HP CPM 1012-2 HD Master Model
- 4.8 mm × 50.8 mm pellet die; L:D = 10.67
- 4.5 kg/min production rate (30% of rated throughput)

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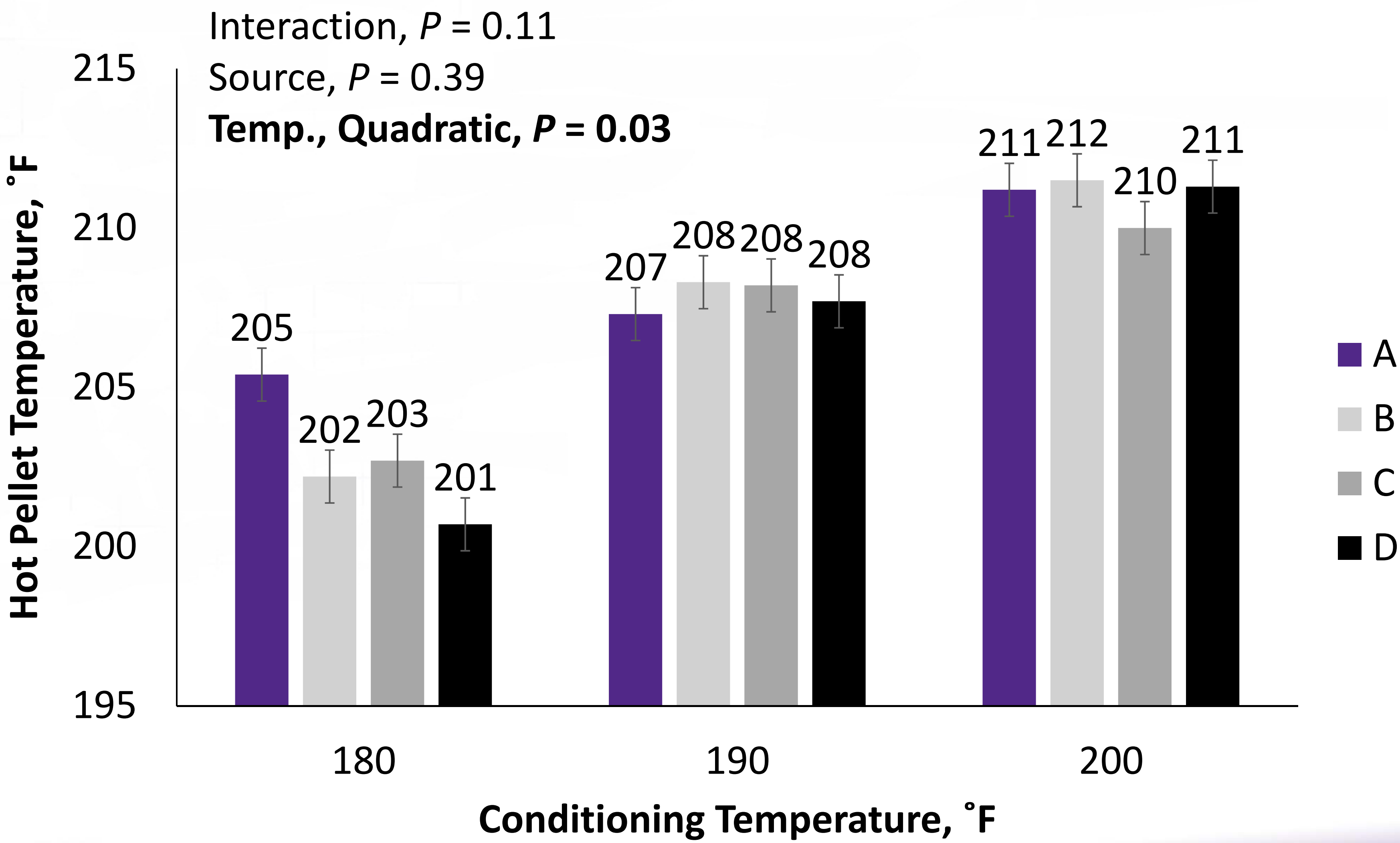
Truelock et al., 2018

Knowledge for Life

Hot Pellet Temperature, °F



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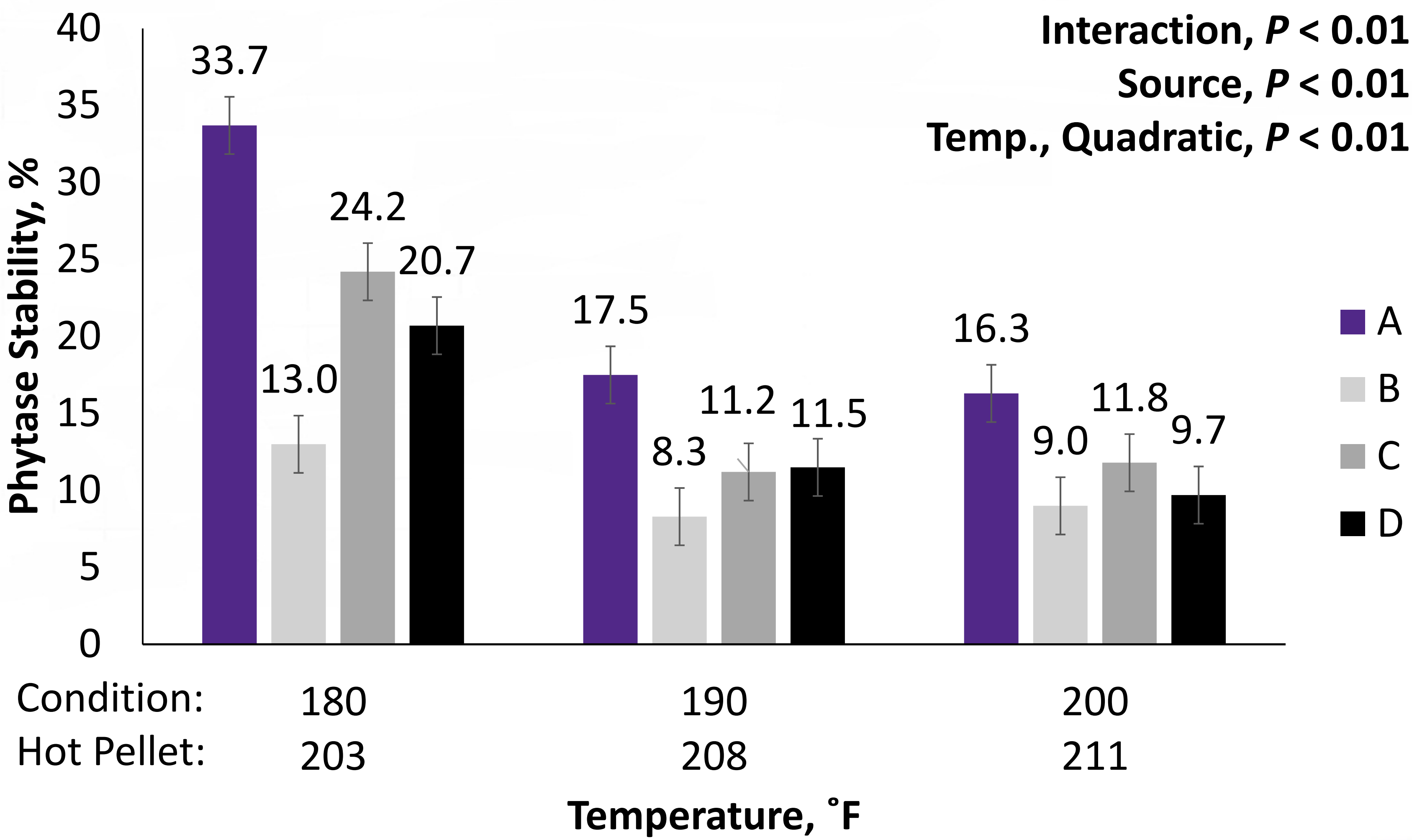
Truelock et al., 2018

Knowledge for Life

Phytase Stability, %



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Truelock et al., 2018

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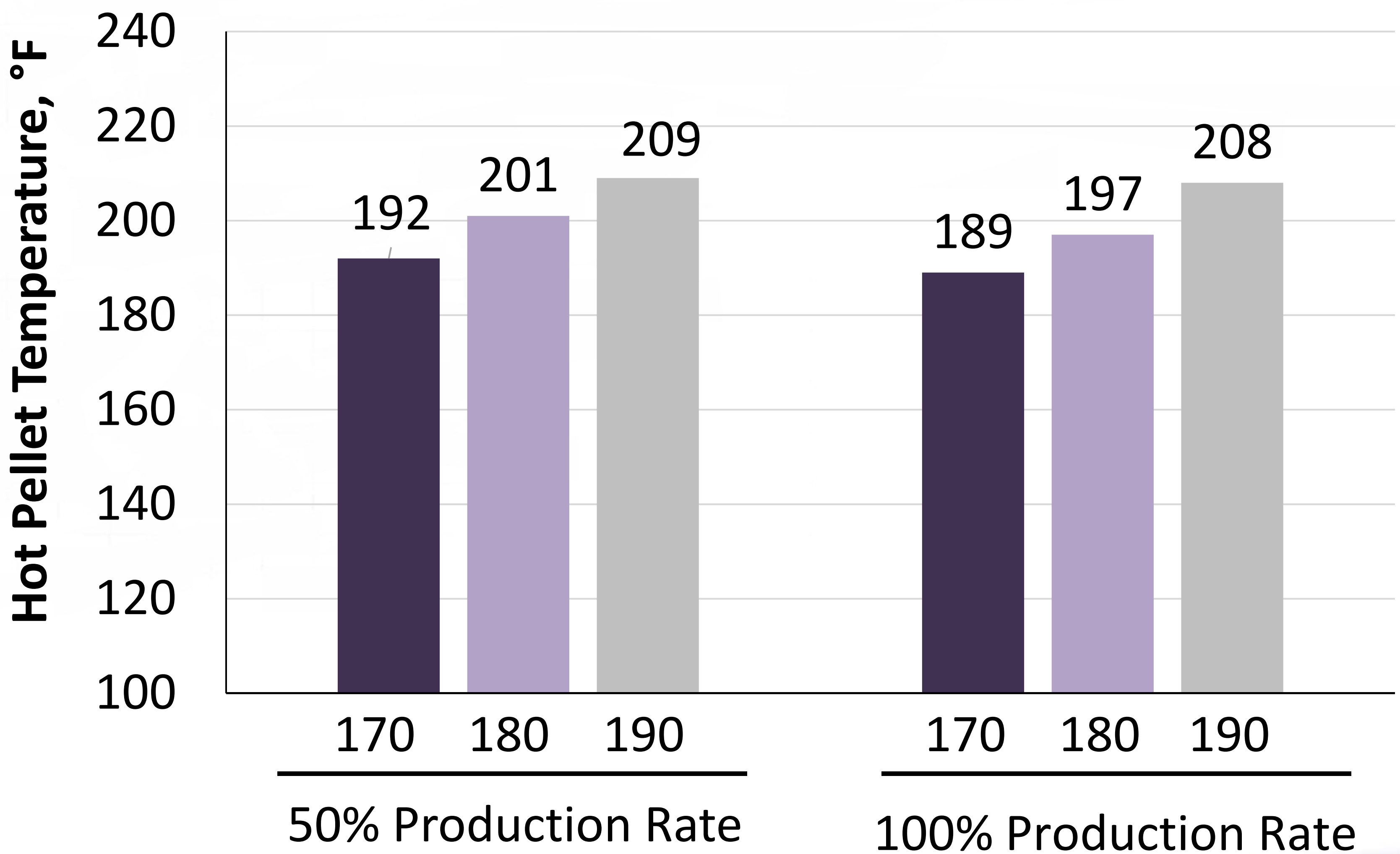
Hot Pellet Temperature, °F



Truelock et al., 2018

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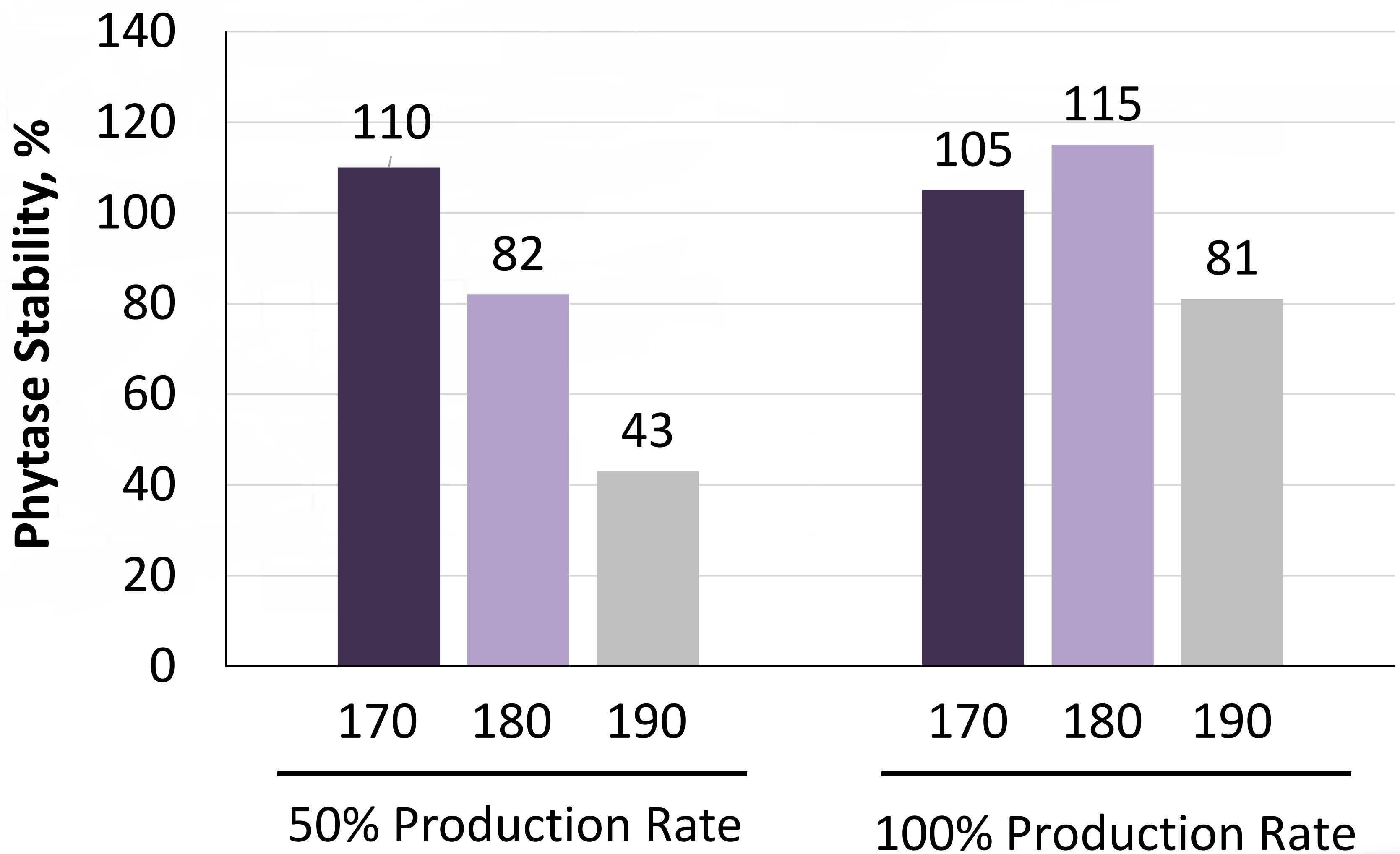
Conditioned Mash Phytase Stability, %



Truelock et al., 2018

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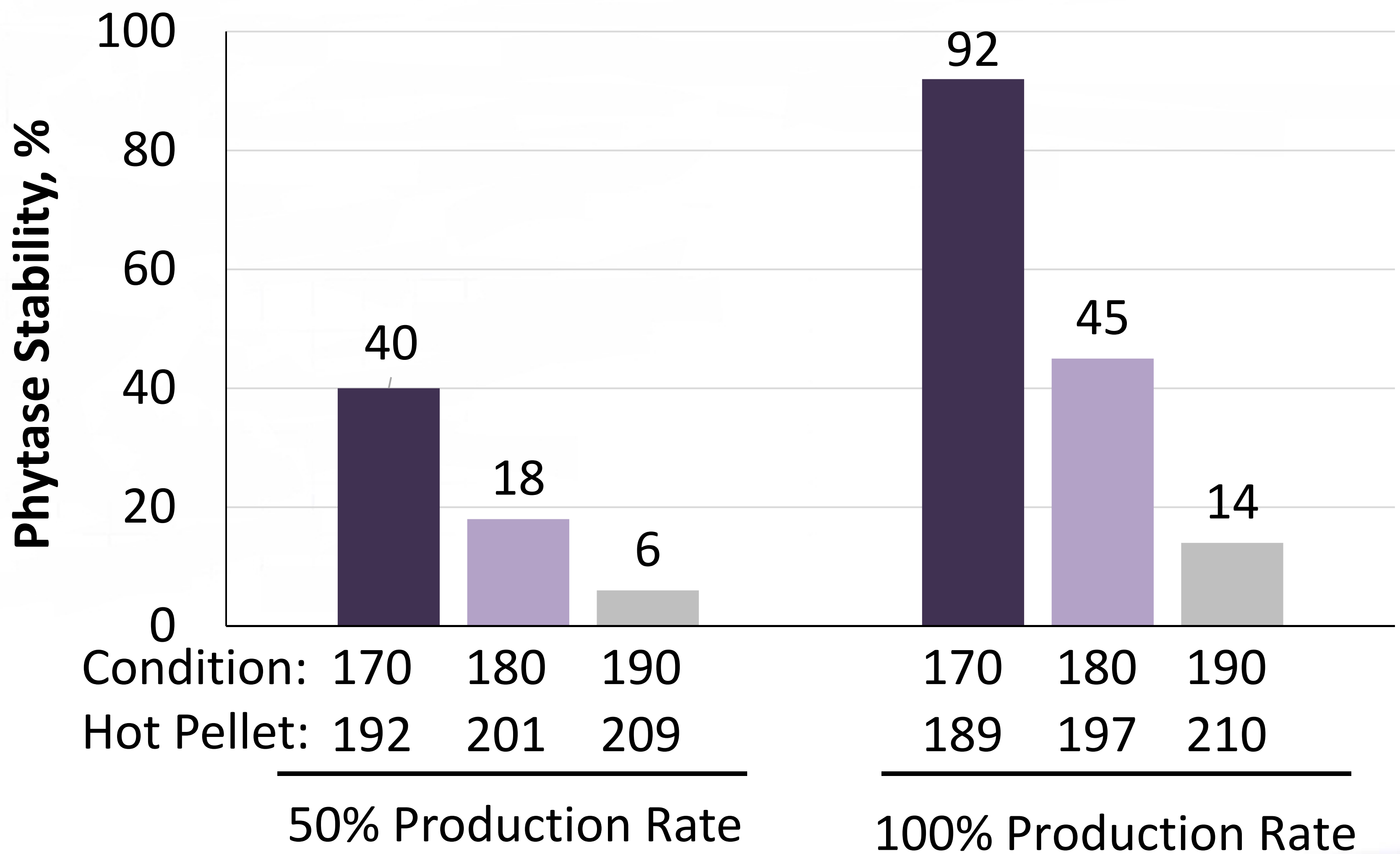
Pellet Phytase Stability, %



Truelock et al., 2018

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Pellet Mill Comparison

Detail	Model	1012-2		3016-4		7936-12	
	L:D ratio	8	12	8	12	8	12
Die work area ($inch^2$)		85	85	226	226	1379	1379
Effective length (inch)		1.50	2.25	1.50	2.25	1.50	2.25
Production rate (ton/hr)		1	1	5	5	60	60
Holes per Die		1,223	1,223	3,262	3,262	19,900	19,900
Volumn per die (inch3)		270	405	720	1,080	4,394	6,590

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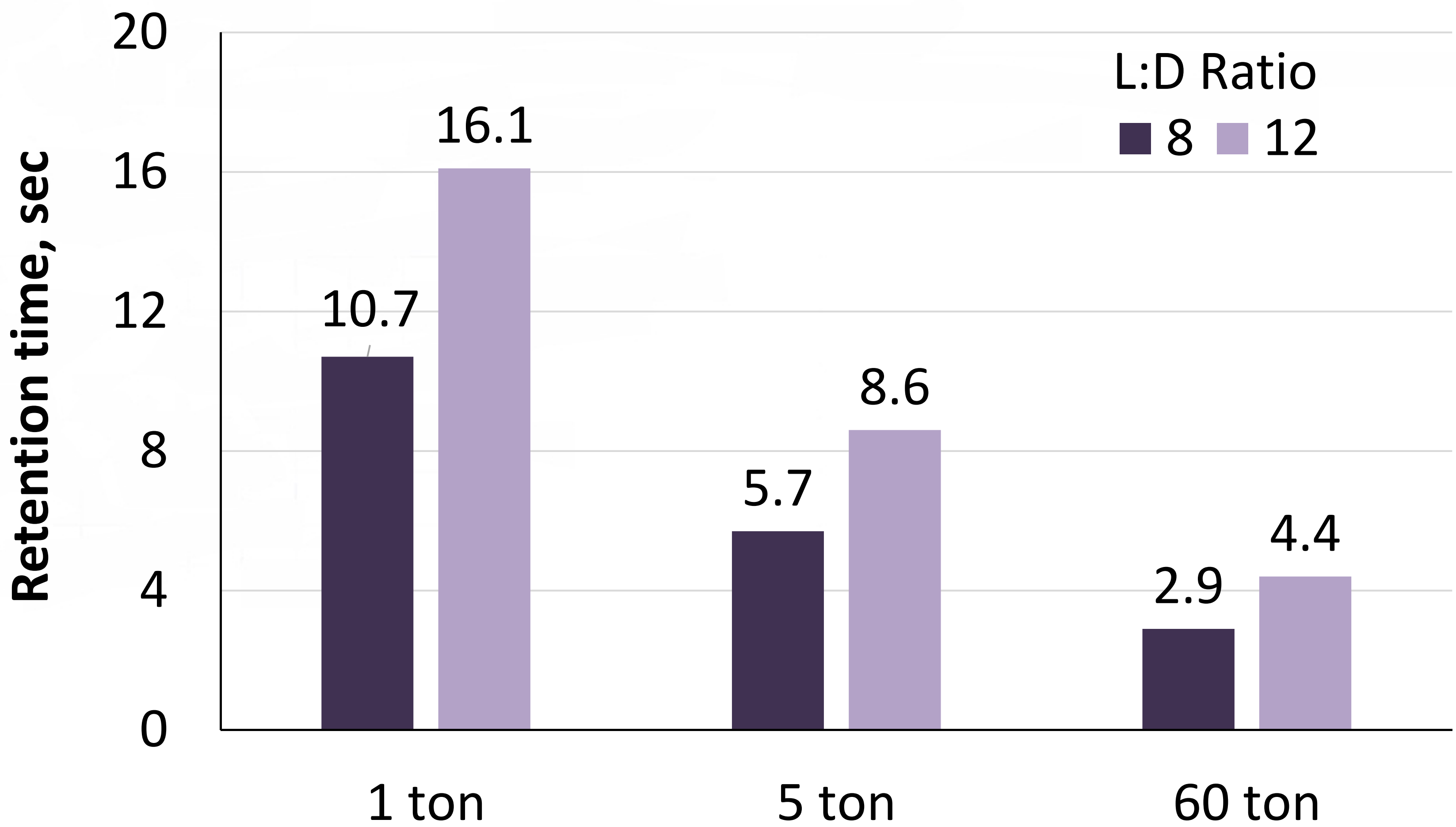
Saensukjaroenphon et al., 2018

Knowledge for Life

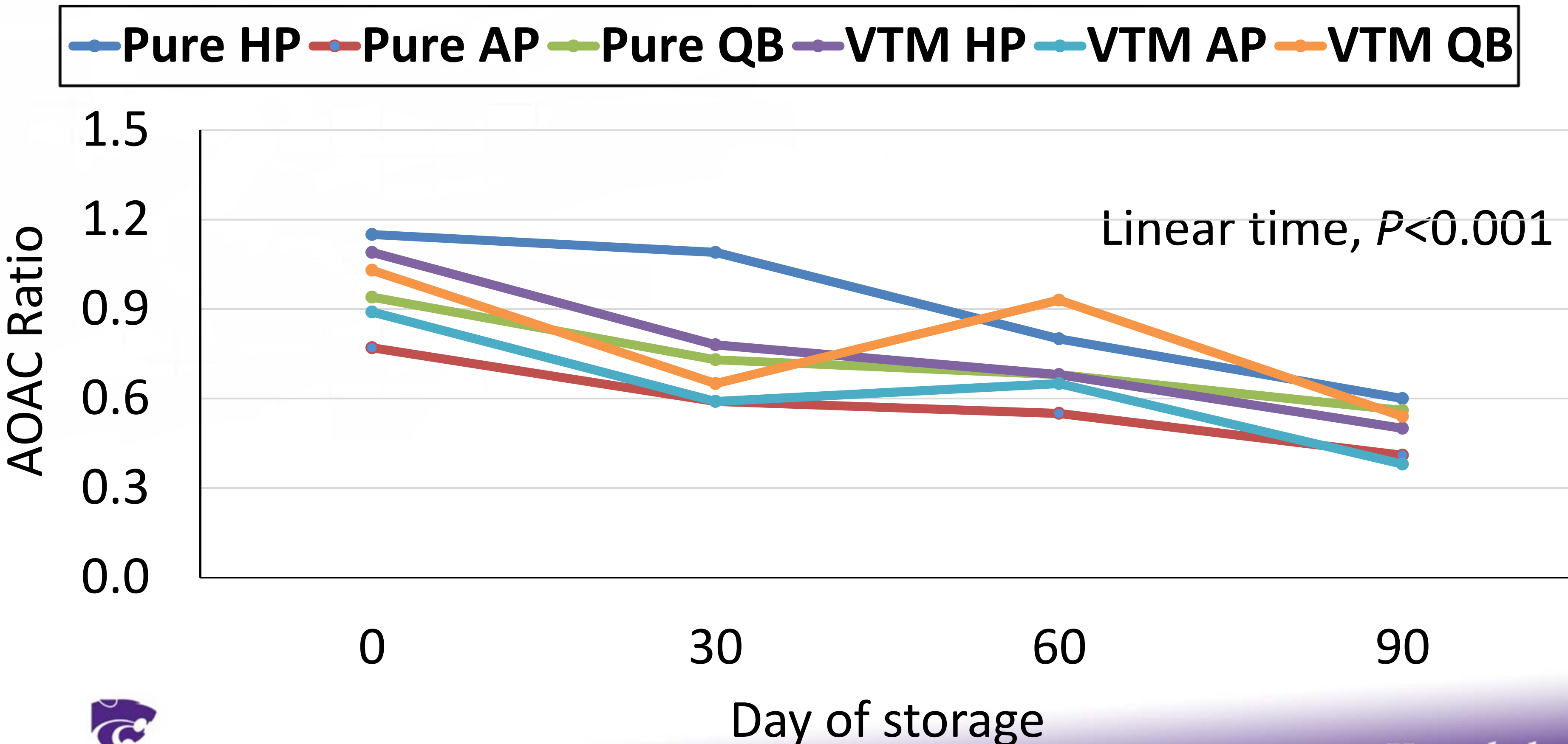
Die Retention Time, sec



Saensukjaroenphon et al., 2018

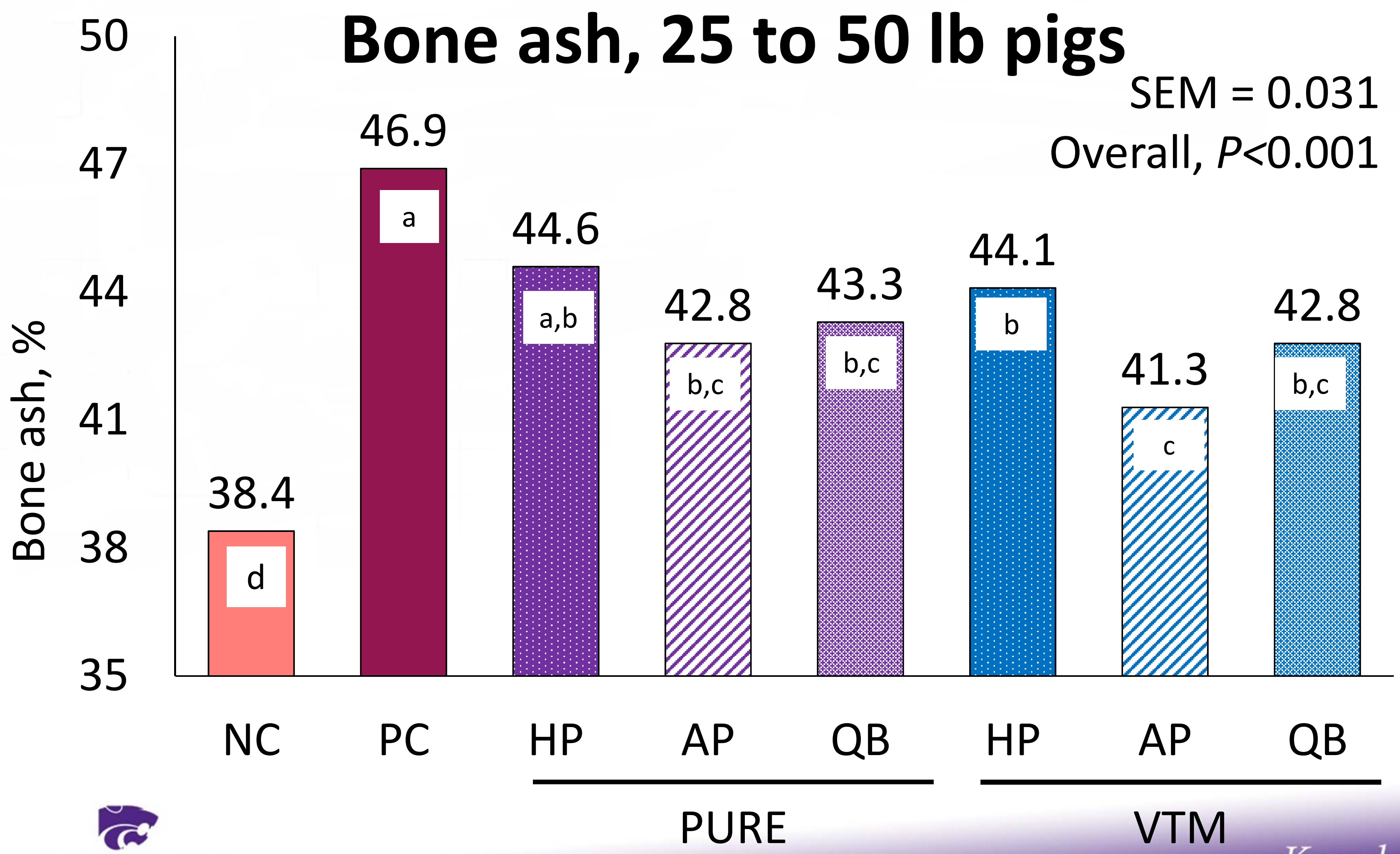
Effects of phytase source and storage time on phytase activity (85 F, 75% humidity)

Ratio of average AOAC analyzed values to calculated values.



Vier et al.,2018

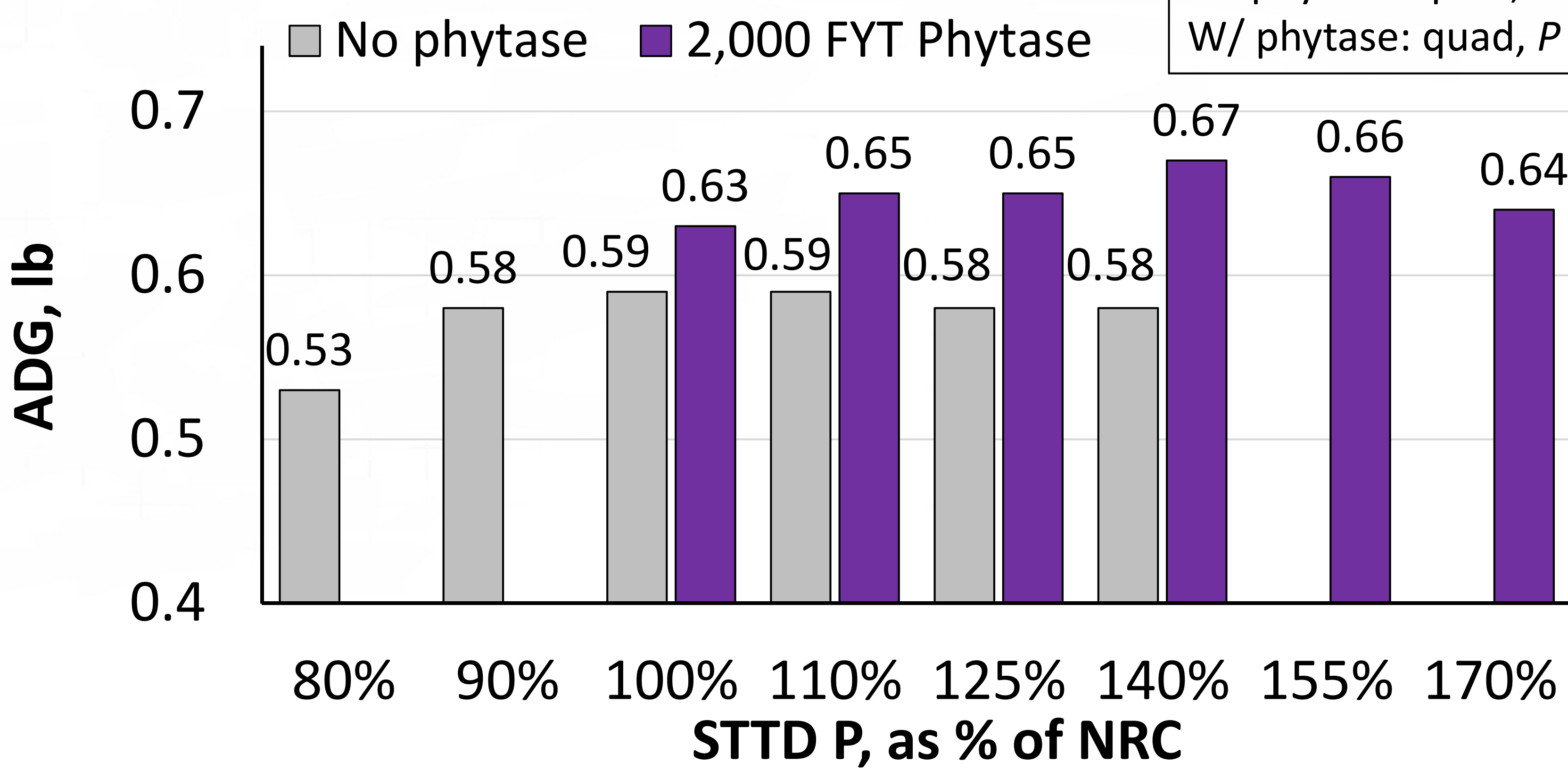
Effects of phytase source and storage time
(85 F, 75% humidity)



Vier et al.,2018

STTD P requirement of 13- to 28-lb pigs fed diets with or without phytase

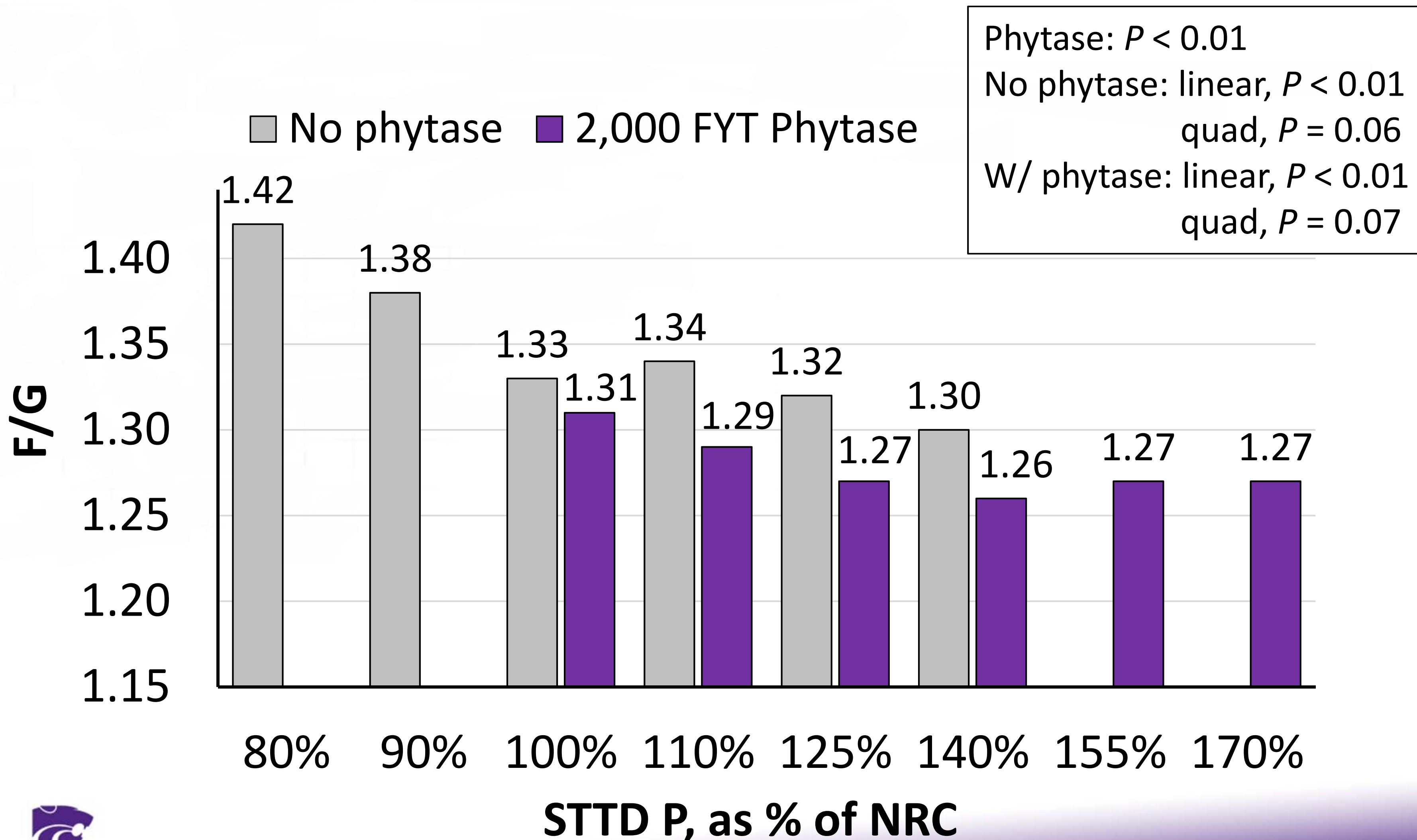
Phytase: $P < 0.01$
No phytase: quad, $P < 0.01$
W/ phytase: quad, $P = 0.03$



No phytase: 117% of NRC (99% performance at 106%)
W/ phytase: 138% of NRC (99% performance at 122%)

Wu et al., 2018

STTD P requirement of 13- to 28-lb pigs fed diets with or without phytase



Wu et al., 2018

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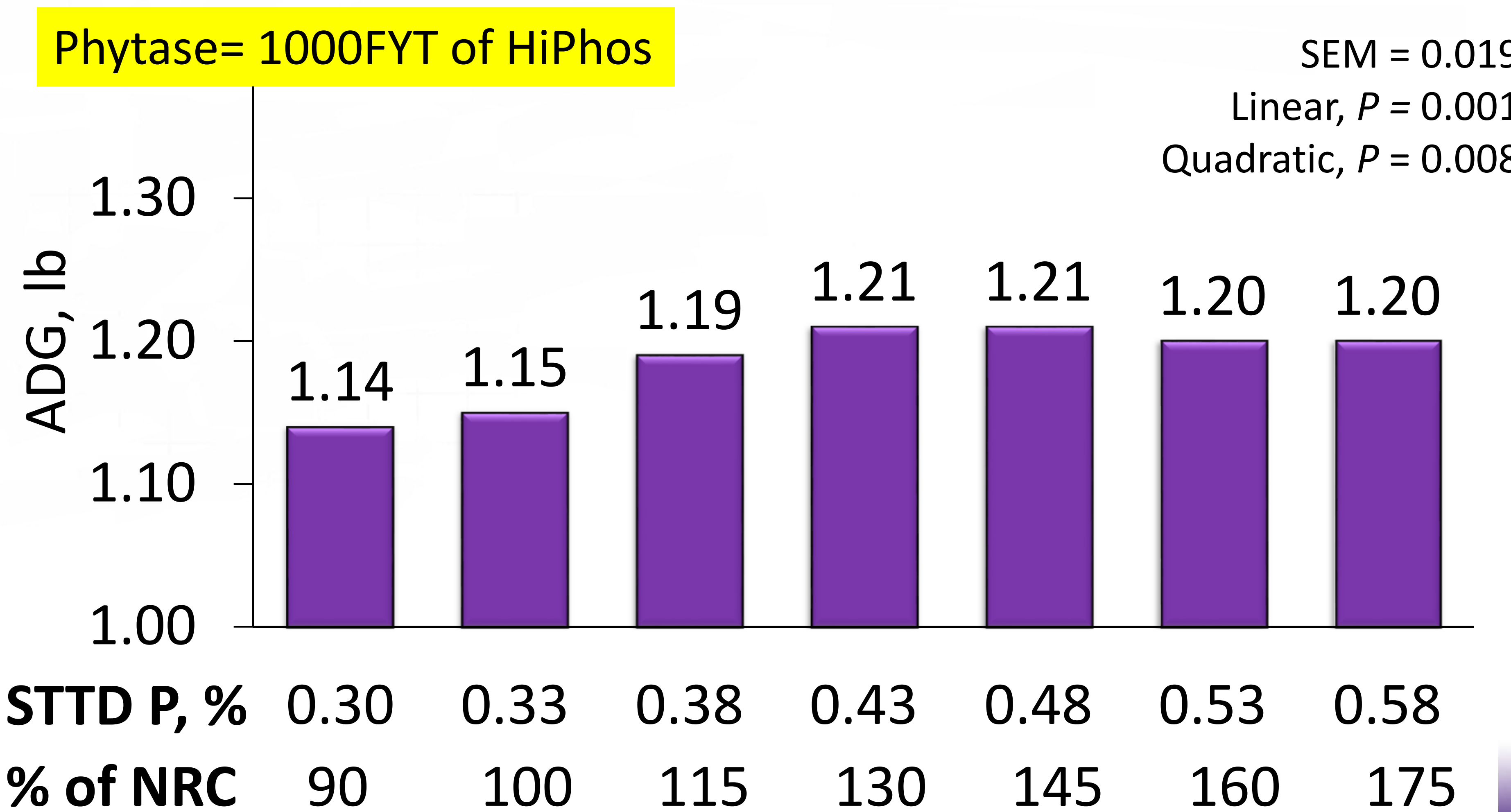
STTD P for nursery pigs fed diets with phytase

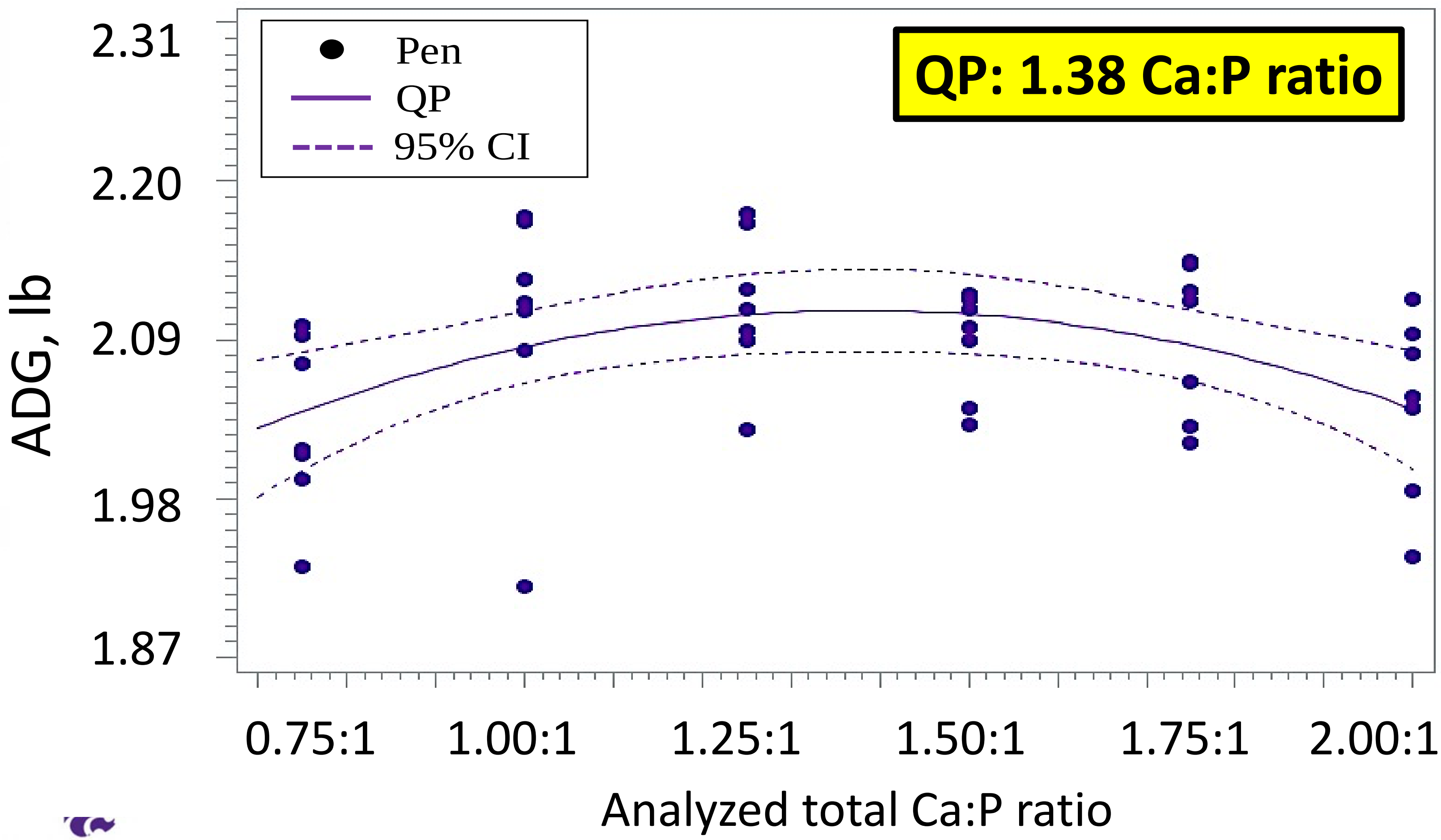
ADG, 25 to 50 lb



Vier et al.,2018

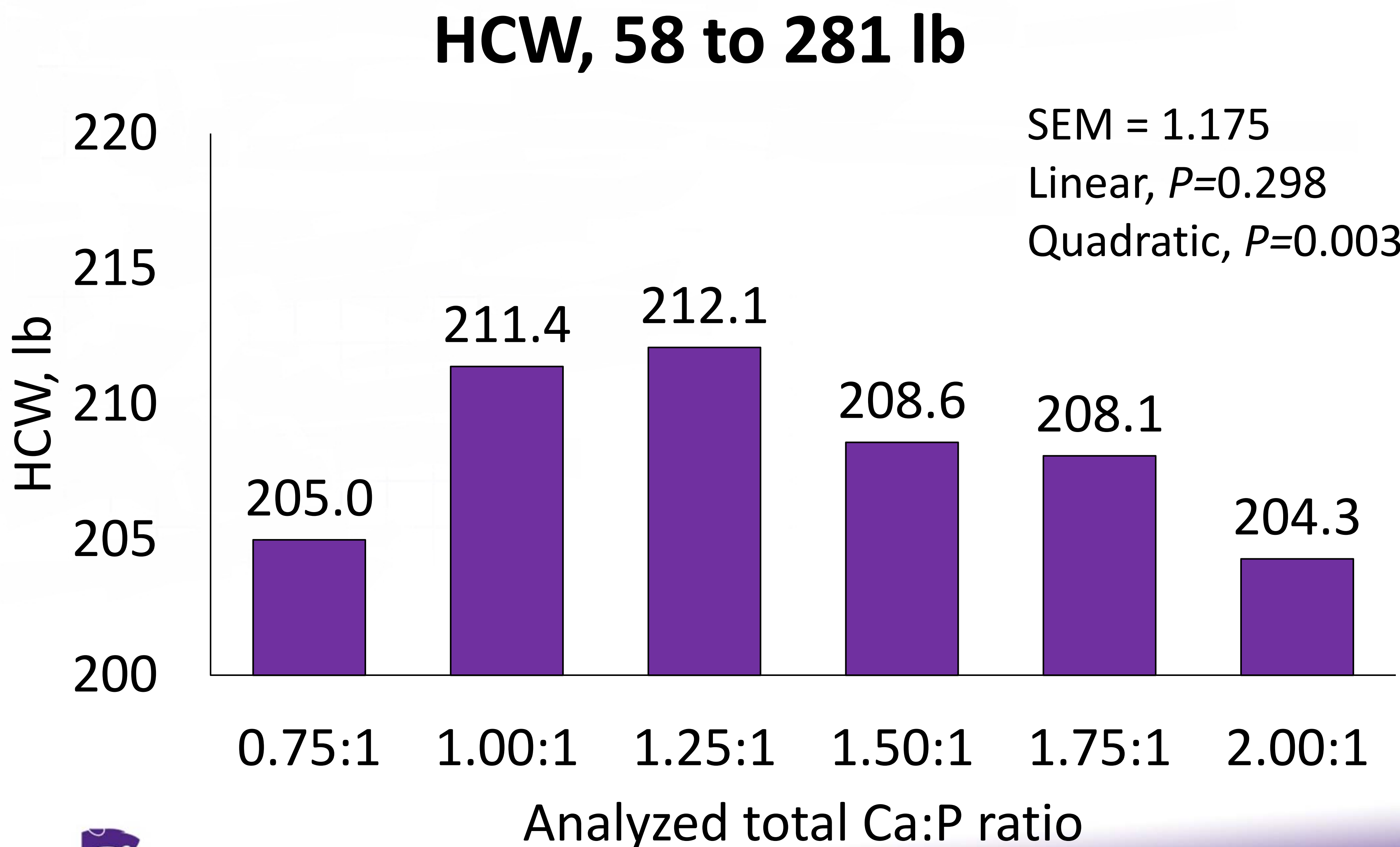
Effects of analyzed Ca:P ratio on pig performance

ADG, 58 to 281 lb



Vier et al.,2018

Effects of analyzed Ca:P ratio on pig performance



Vier et al.,2018

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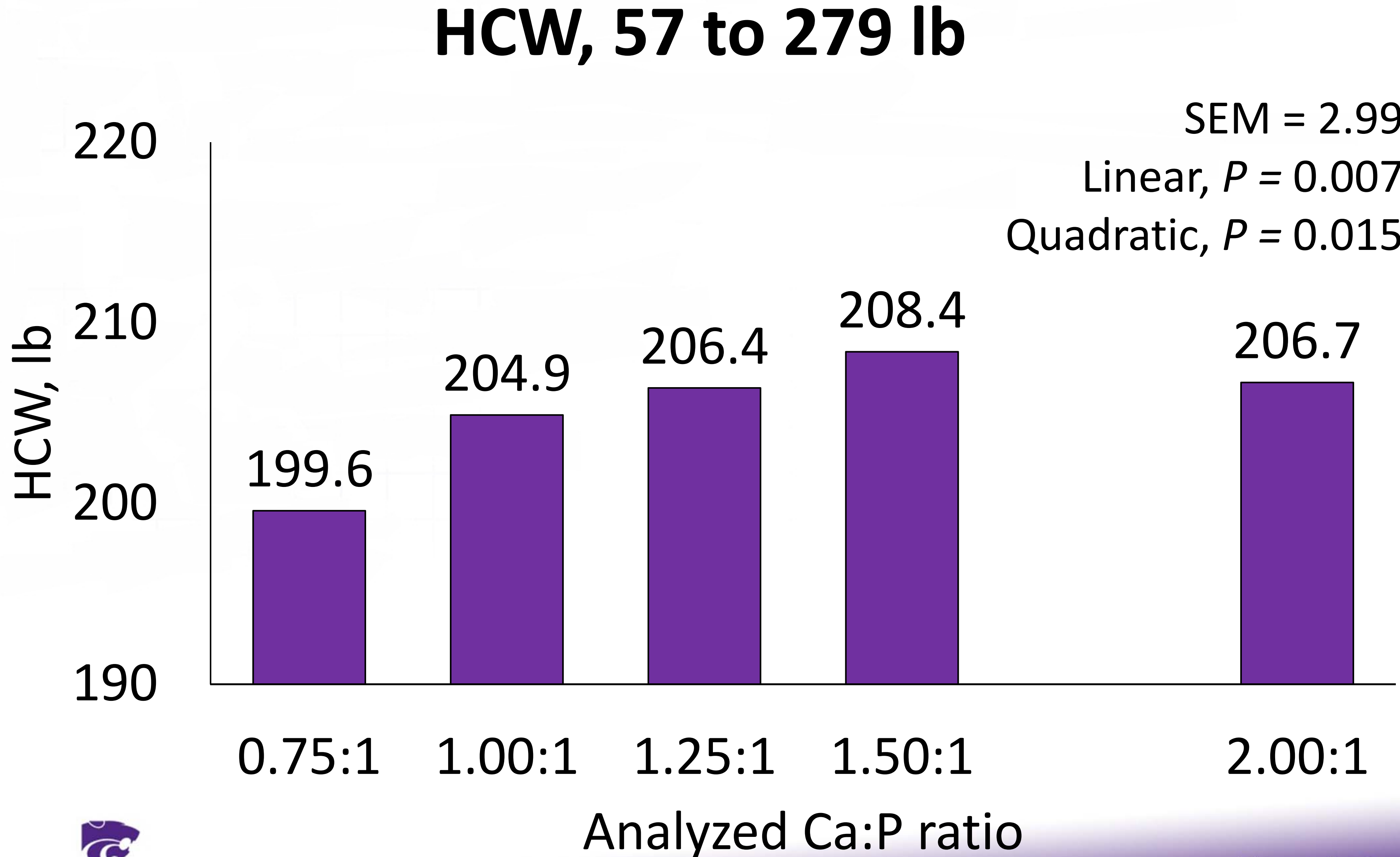
Effects of analyzed Ca:P ratio on pig performance



Phytase= 1000FYT of HiPhos

Vier et al.,2018

Amino acid research update

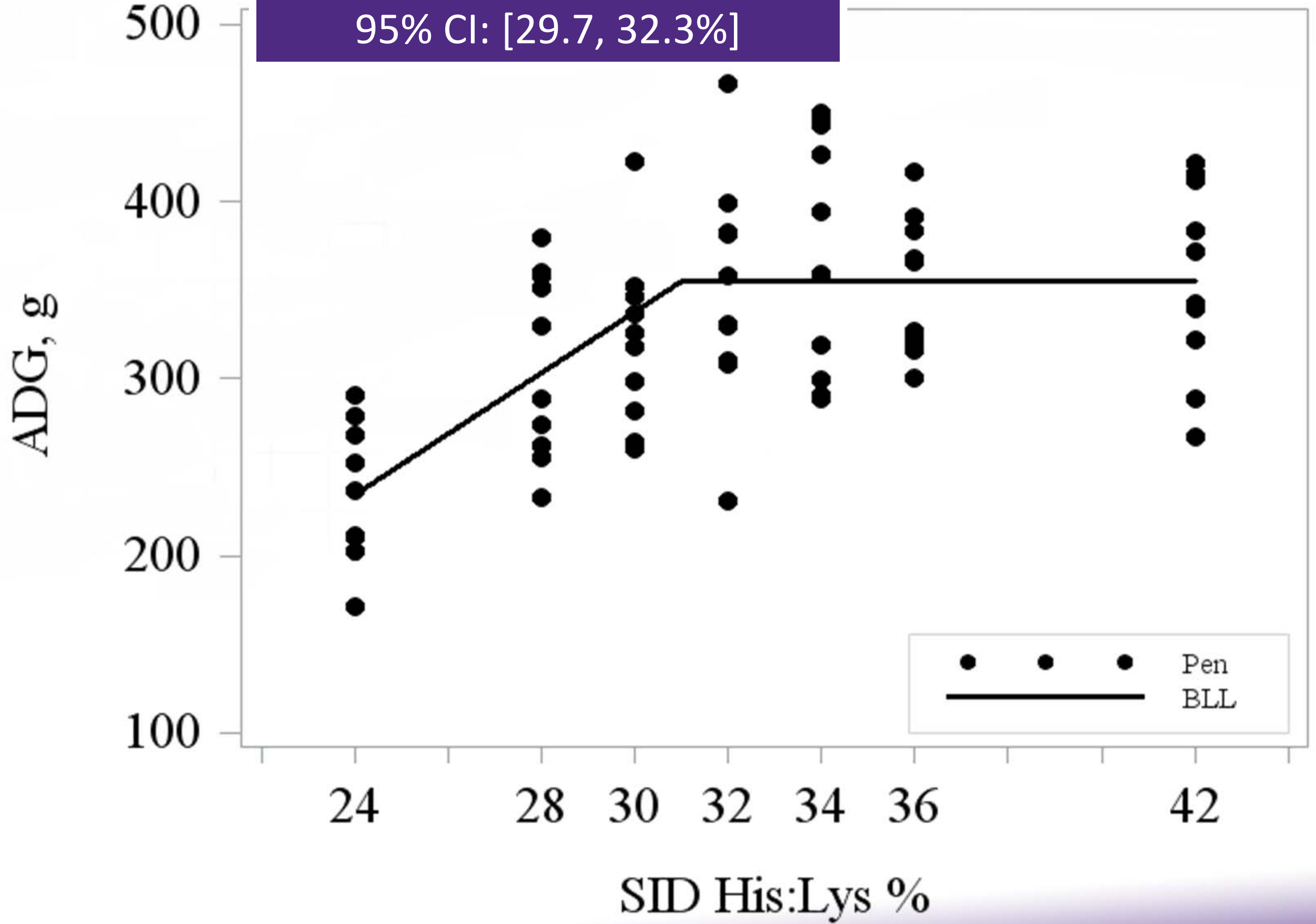
- The "next" limiting amino acid: histidine
- Phase feeding
  - 2017 Swine Day: could reduce phases to 2 phases in grow-finish if formulate lysine for max performance
- Diets with high corn levels or corn-byproducts have high leucine:lysine ratios.
  - Have lower feed intake and lower ADG.
  - Do these high ratios influence requirement to other amino acids?

SID His:Lys requirement for nursery pigs

- Practical nursery diets are formulated with increasing amounts of feed-grade amino acids
  - Currently added: Lys, Thr, Met, Trp, and Val
  - Soon: Isoleucine
- Histidine could be the sixth limiting amino acid in many of these diets
  - NRC (2012) suggests: 34% SID His:Lys
- Therefore, the SID His:Lys could dictate the maximum inclusion of other feed-grade amino acids

SID His:Lys requirement for ADG

Breakpoint: 31.0% SID His:Lys
95% CI: [29.7, 32.3%]



Cemin et al., 2018

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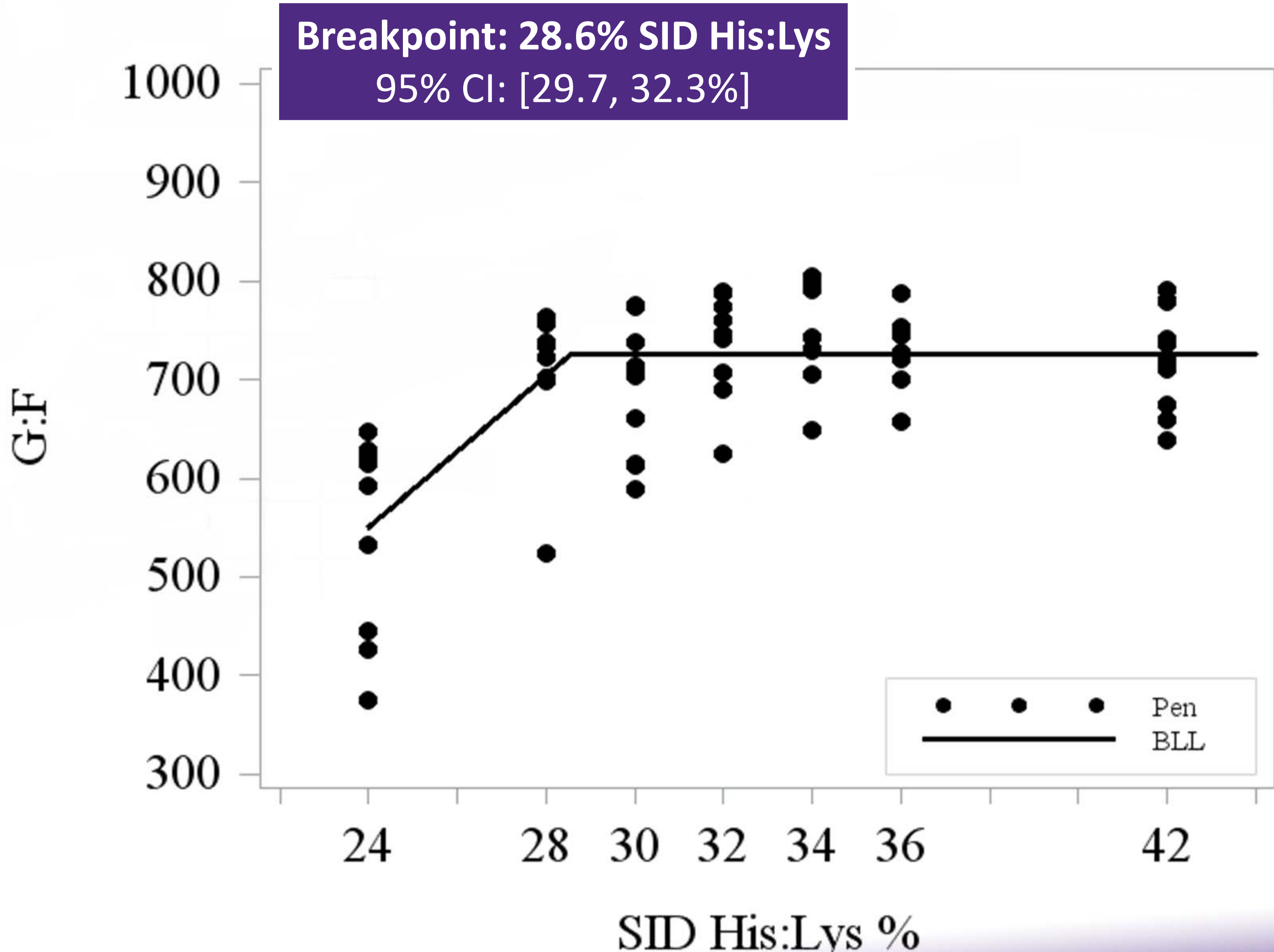
Knowledge for Life

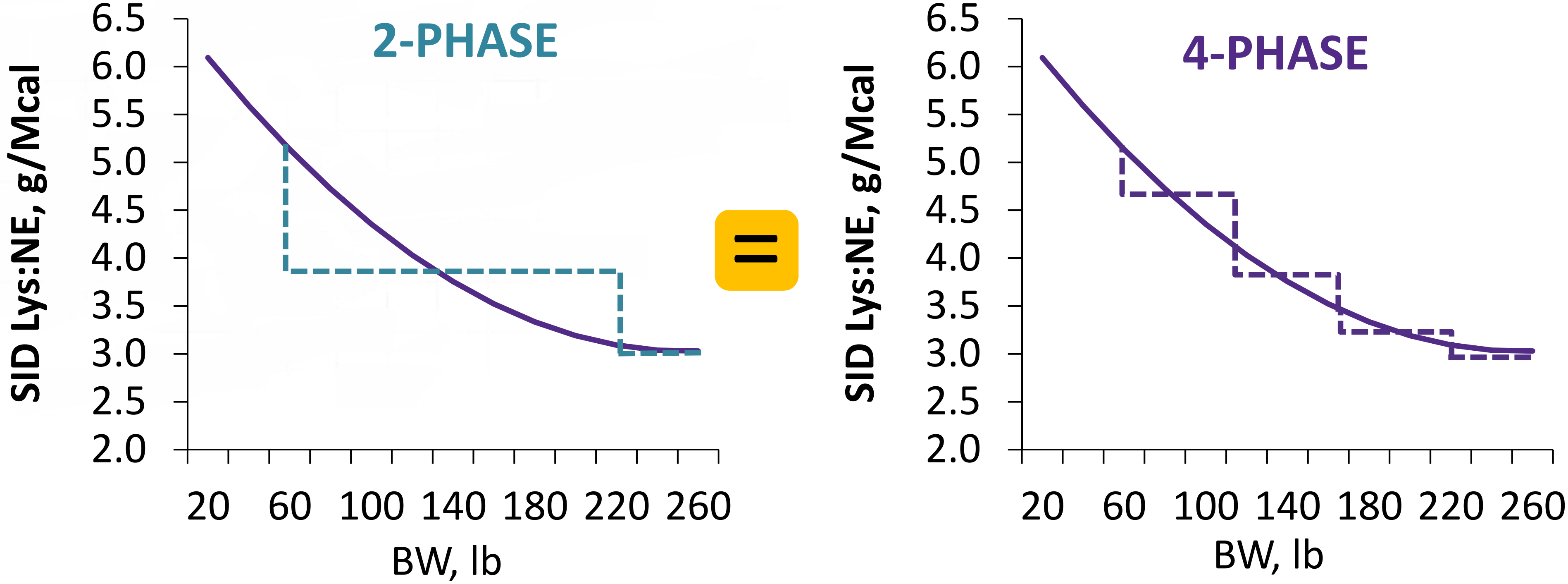
SID His:Lys requirement for feed efficiency



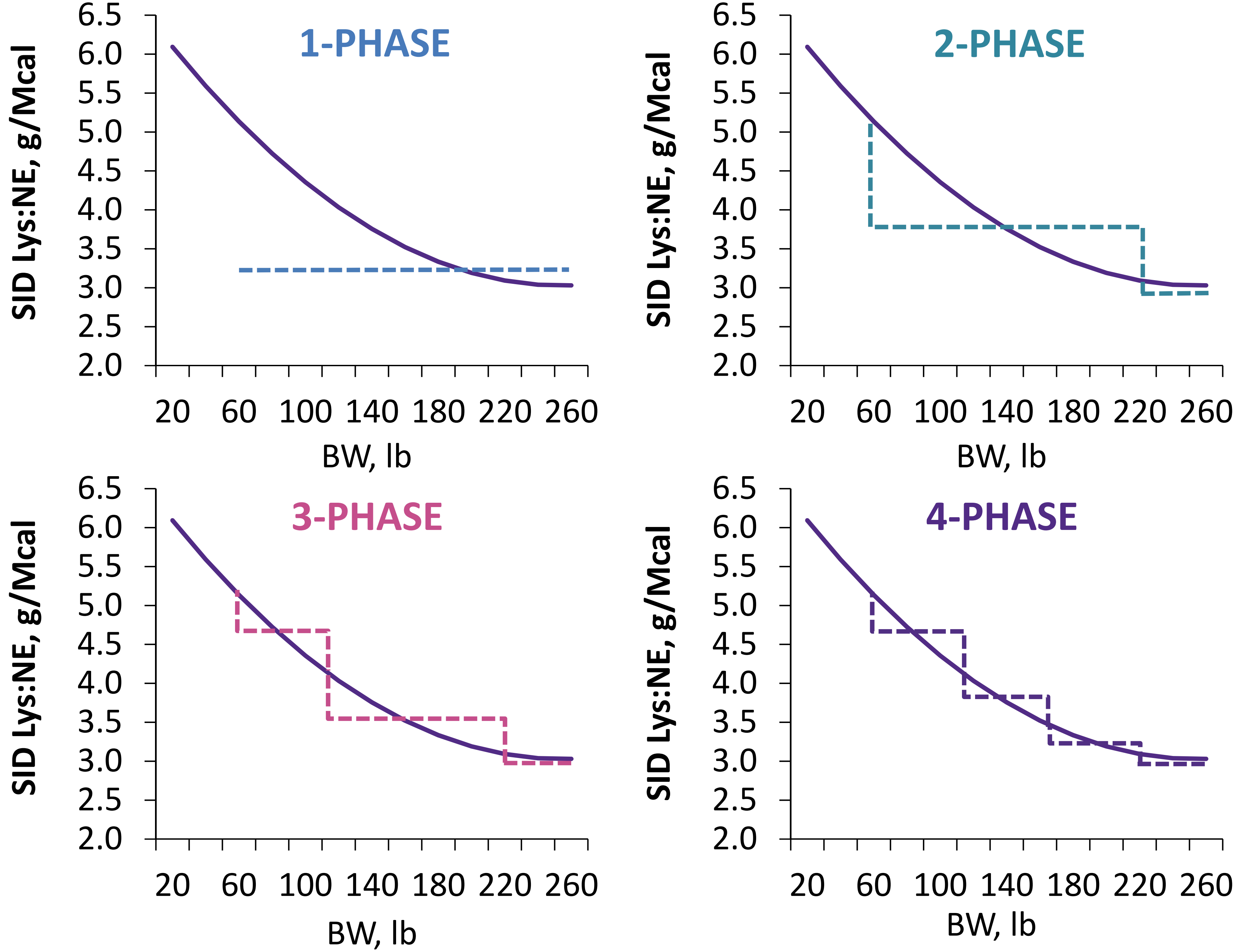
Cemin et al., 2018

Phase-feeding programs for grow-finish pigs

Simplification of phase-feeding:

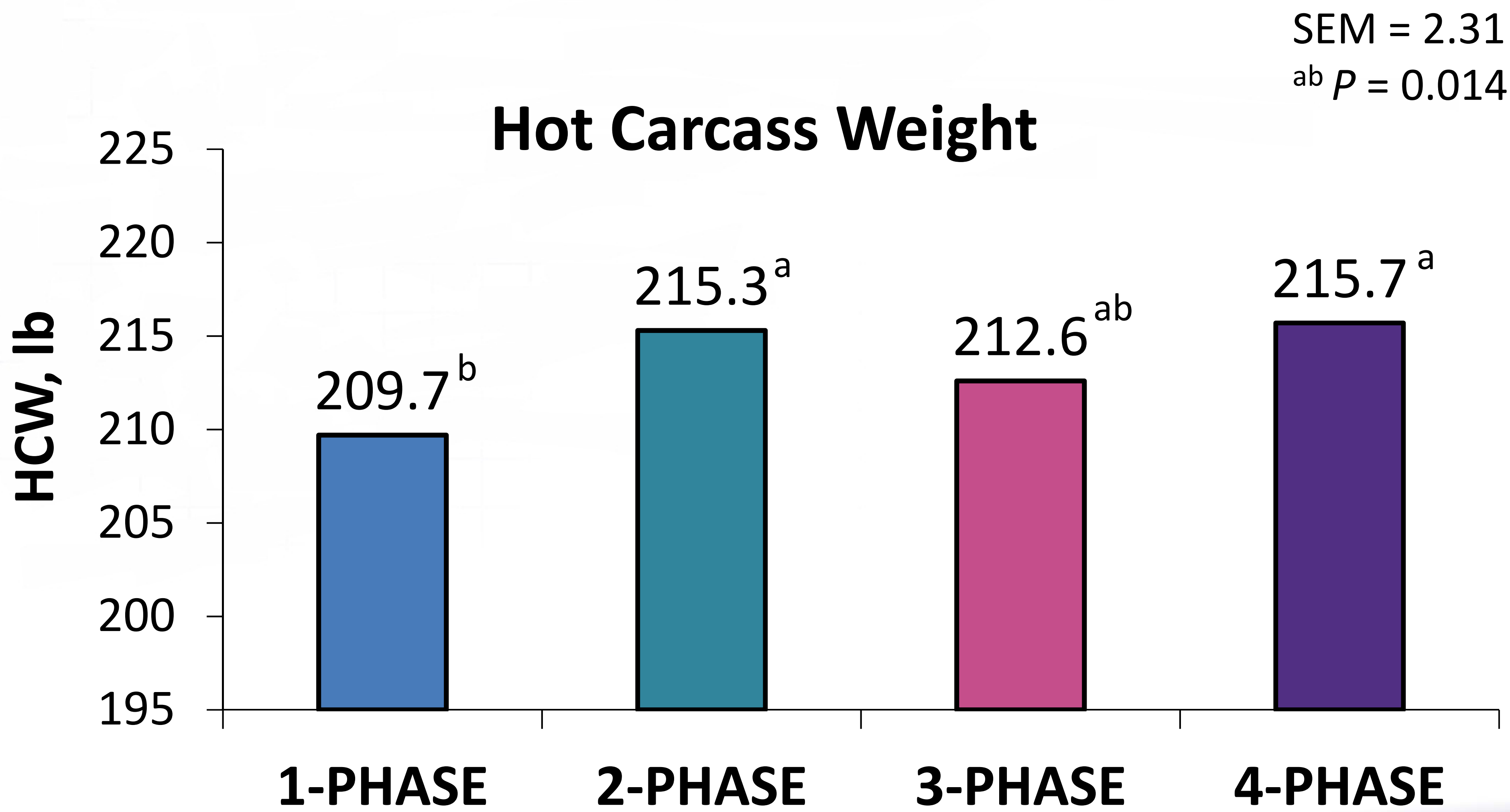


Menegat et al., 2017


1-PHASE
2-PHASE
3-PHASE
4-PHASE
SID Lys:NE, g/Mcal
BW, lb
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
20
60
100
140
180
220
260

Effect of phase-feeding program on HCW

Lysine at requirement for maximum performance

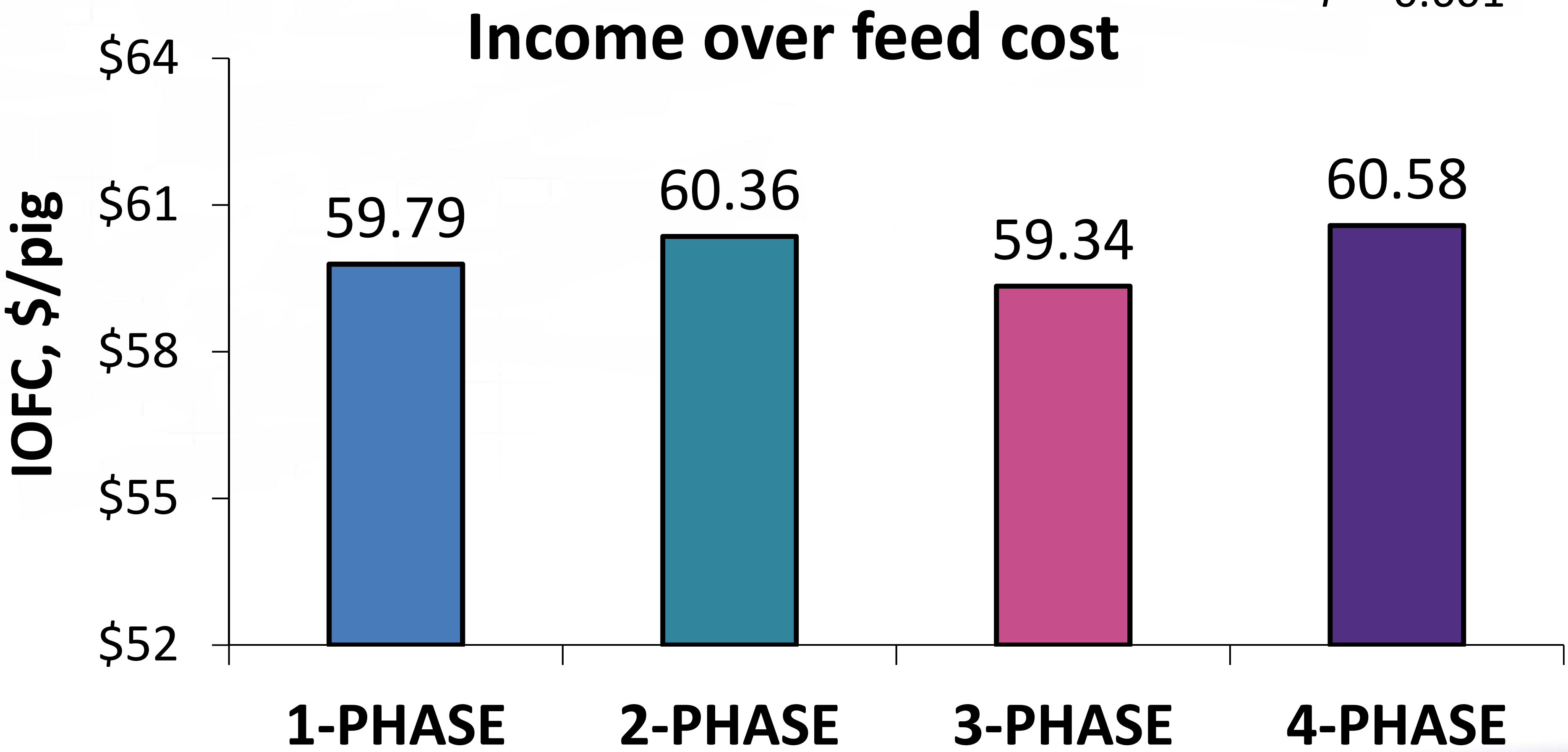


Menegat et al., 2018

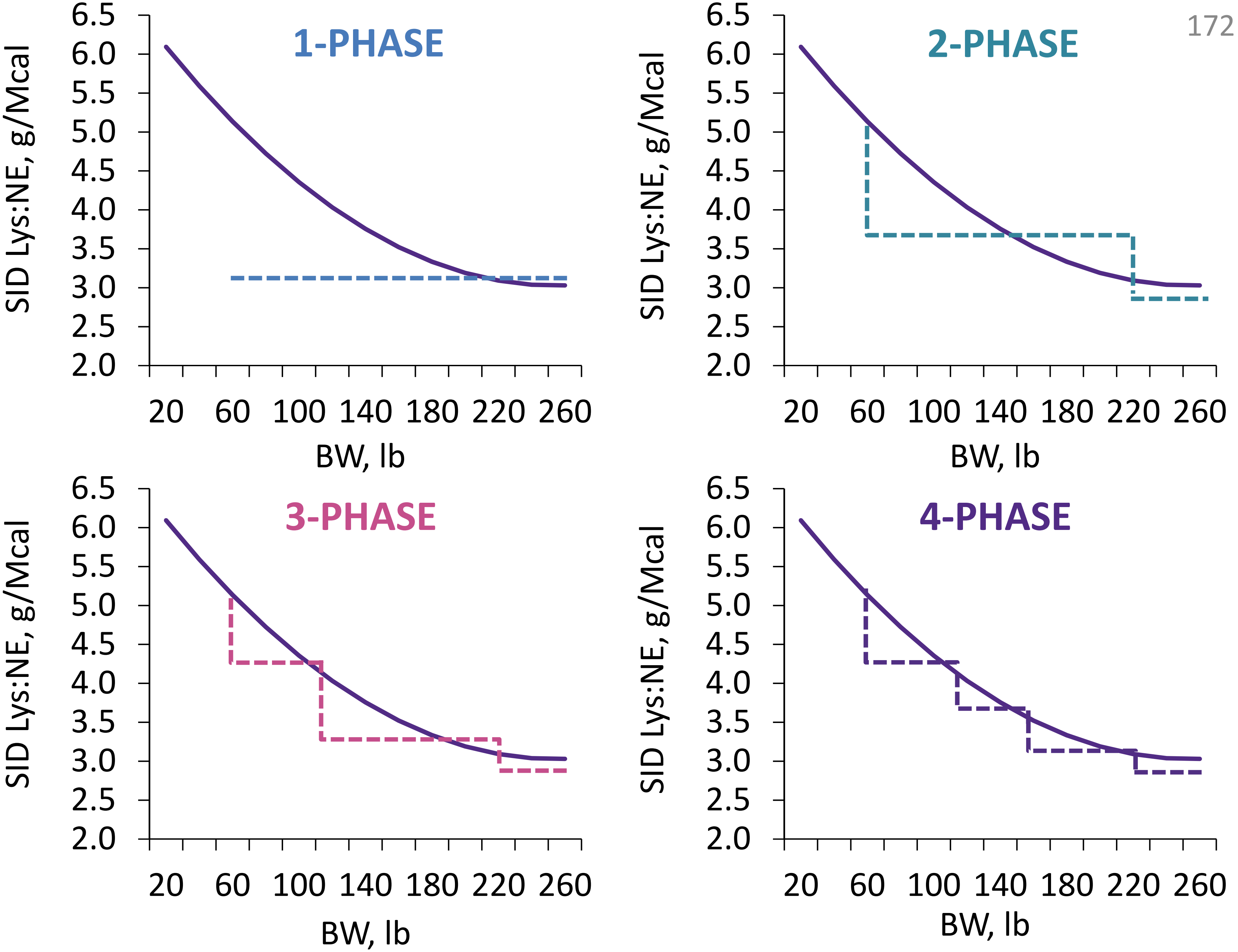
Effect of phase-feeding program on IOFC

Lysine at requirement for maximum performance

SEM = 0.83
P = 0.601



Menegat et al., 2018

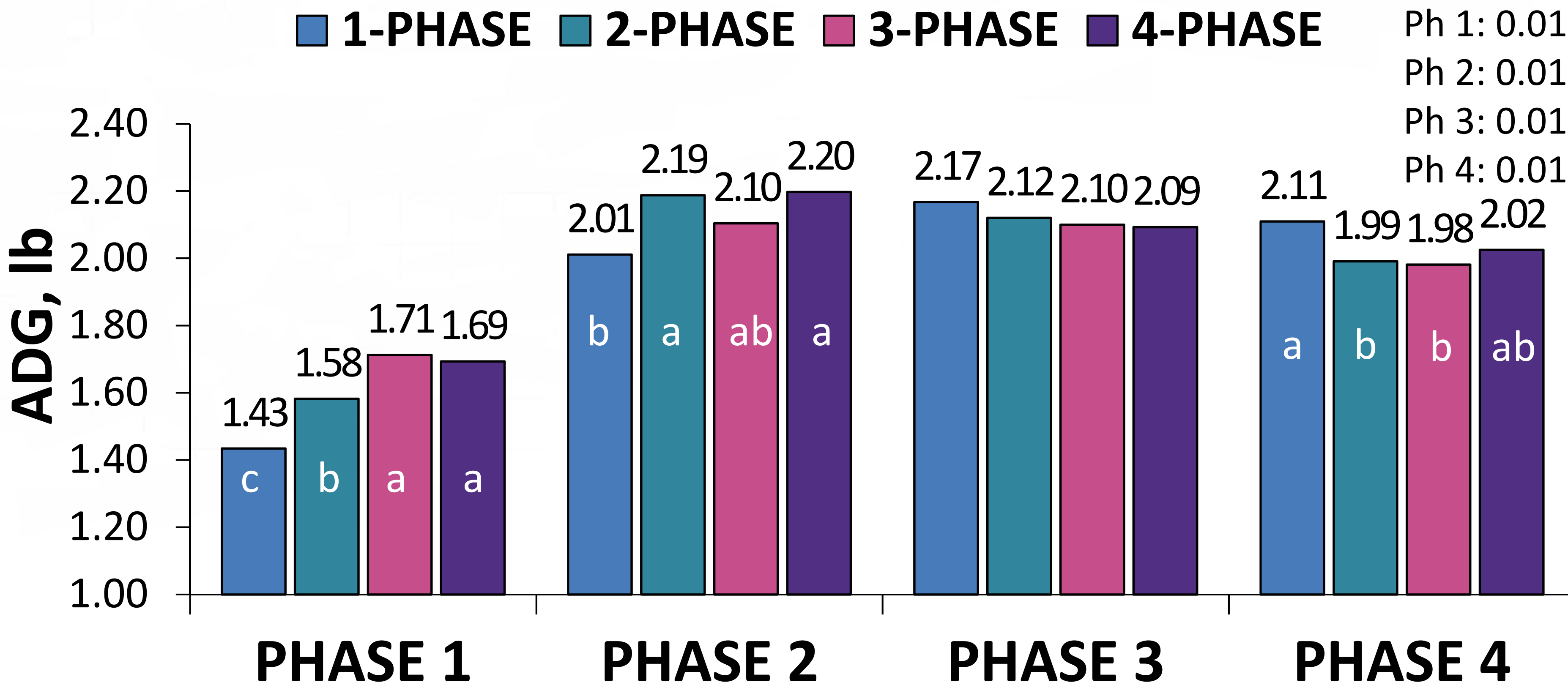

1-PHASE
2-PHASE
3-PHASE
4-PHASE
SID Lys:NE, g/Mcal
BW, lb
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
20 60 100 140 180 220 260

Exp. 3

Effect of phase feeding program on Average daily gain by phase

abc $P < 0.05$ within phase

SEM =
Ph 1: 0.011
Ph 2: 0.013
Ph 3: 0.015
Ph 4: 0.011



	PHASE 1				PHASE 2				PHASE 3				PHASE 4			
SID Lys, %	0.79	0.91	1.07	1.07	0.79	0.91	0.85	0.91	0.79	0.91	0.85	0.79	0.79	0.72	0.72	0.72

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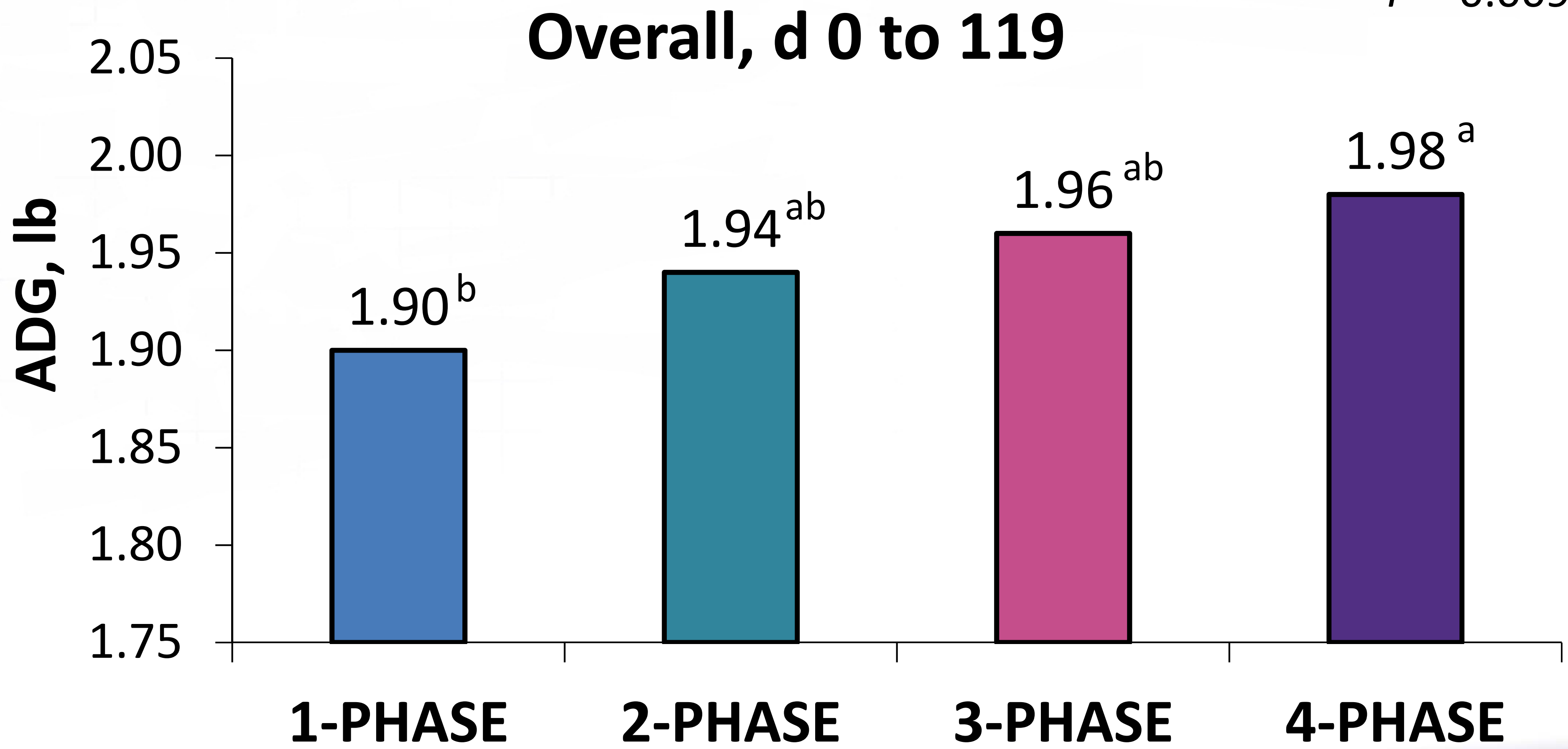
Menegat et al., 2018

Knowledge for Life

Effect of phase-feeding program on ADG

Lysine at requirement for feed cost/lb of gain

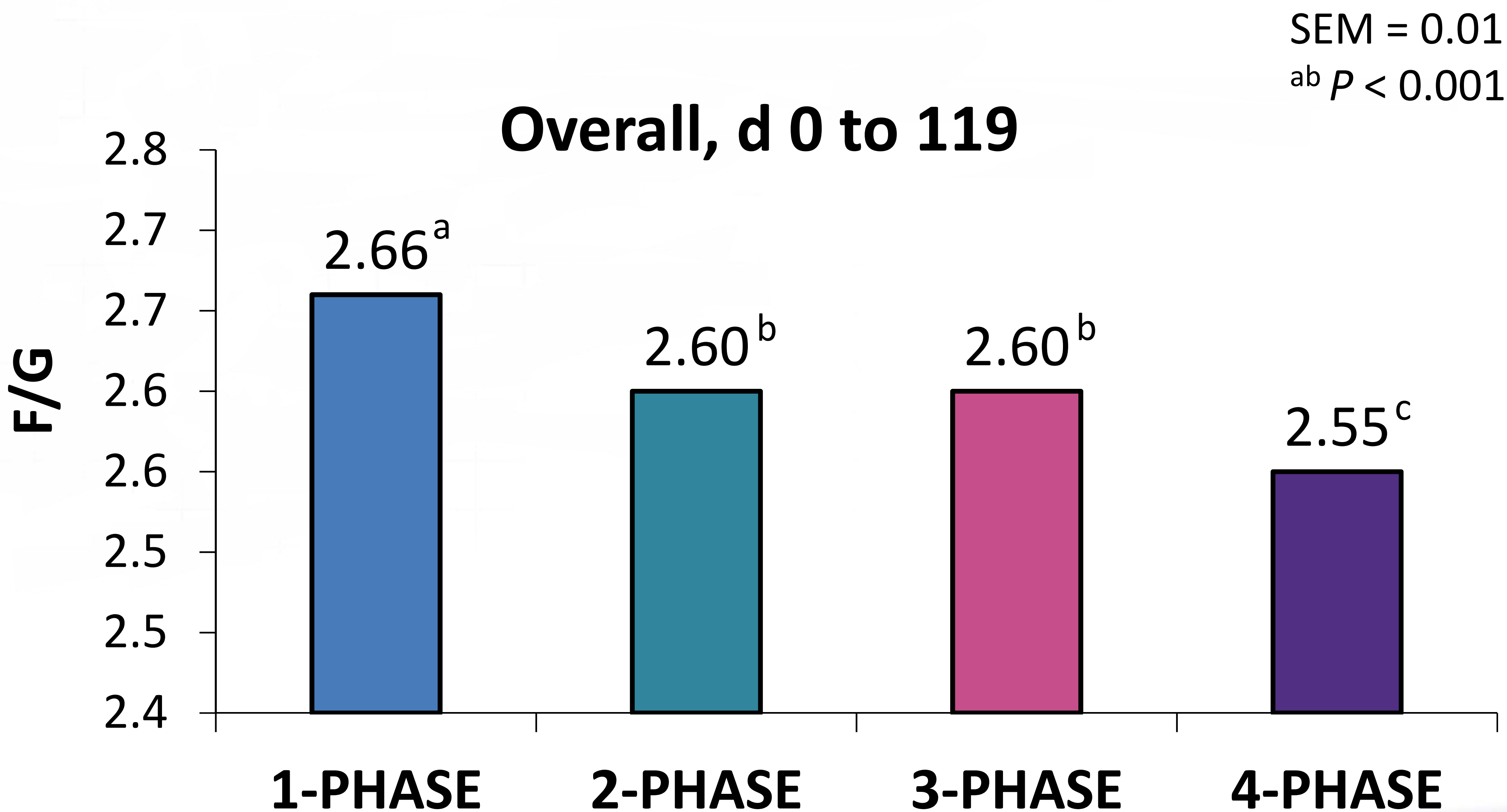
SEM = 0.02
ab P = 0.009



Menegat et al., 2018

Effect of phase-feeding program on F/G

Lysine at requirement for feed cost/lb of gain



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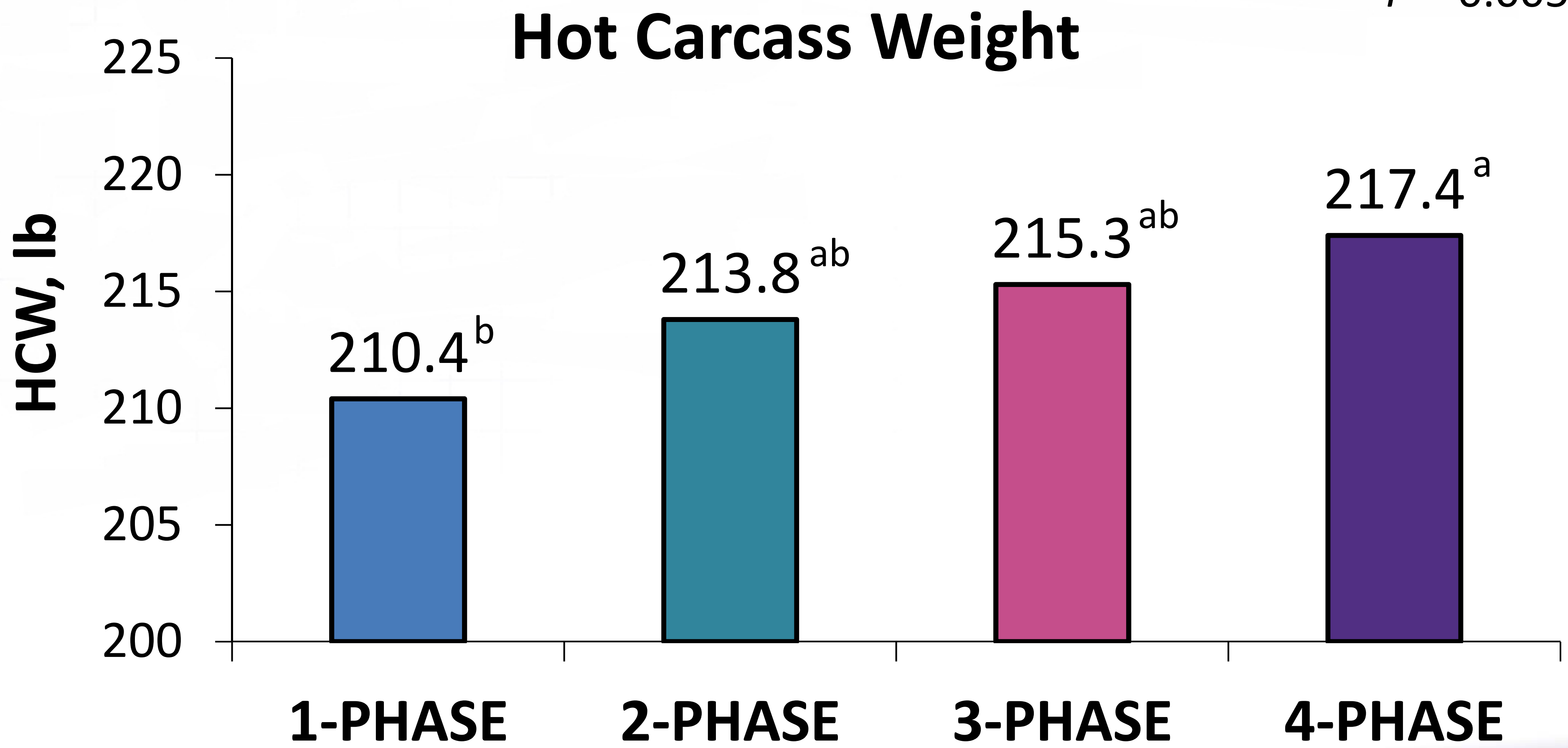
Menegat et al., 2018

Knowledge for Life

Effect of phase-feeding program on HCW

Lysine at requirement for feed cost/lb of gain

SEM = 1.61
ab $P = 0.005$



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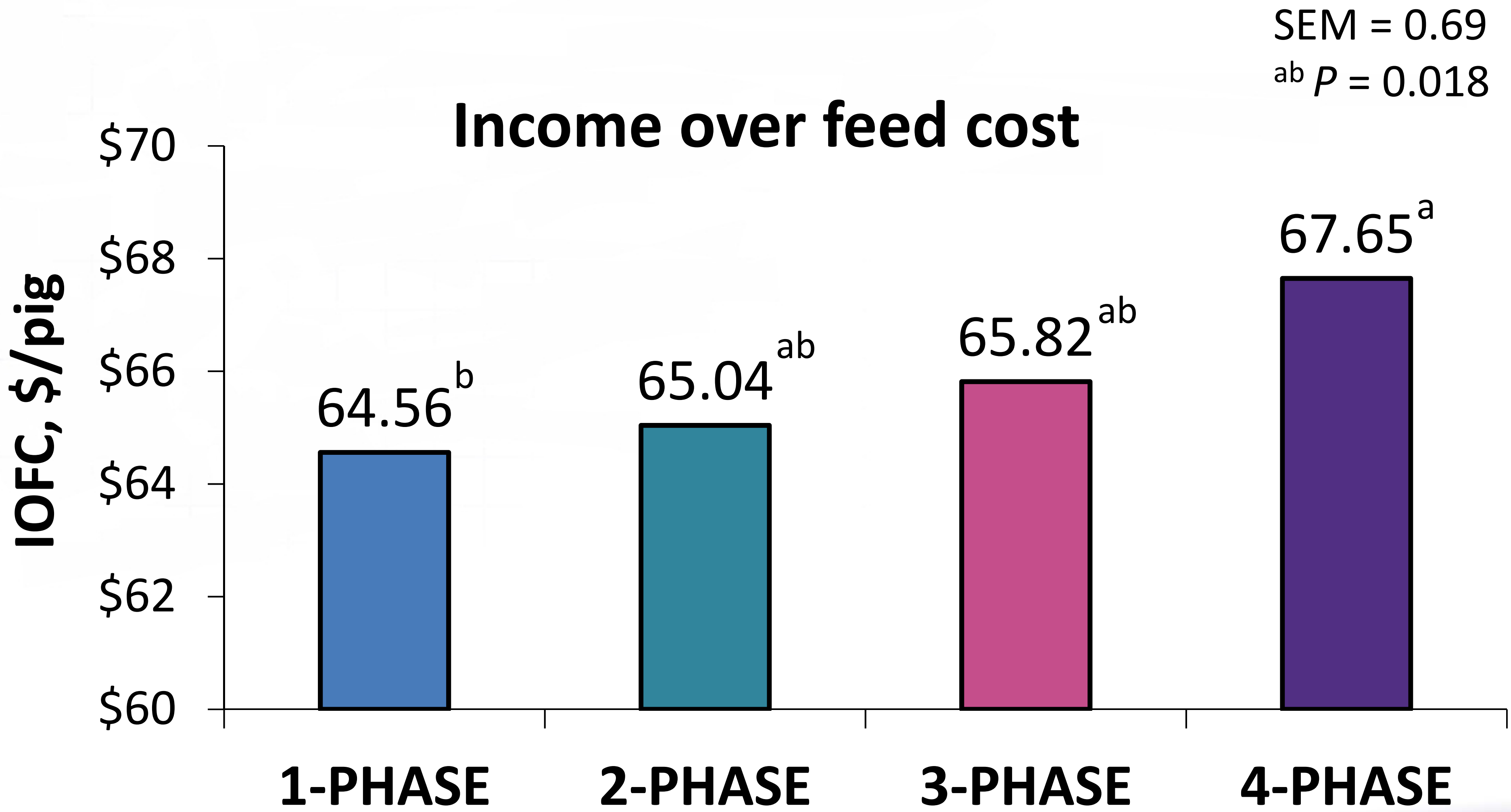
Menegat et al., 2018

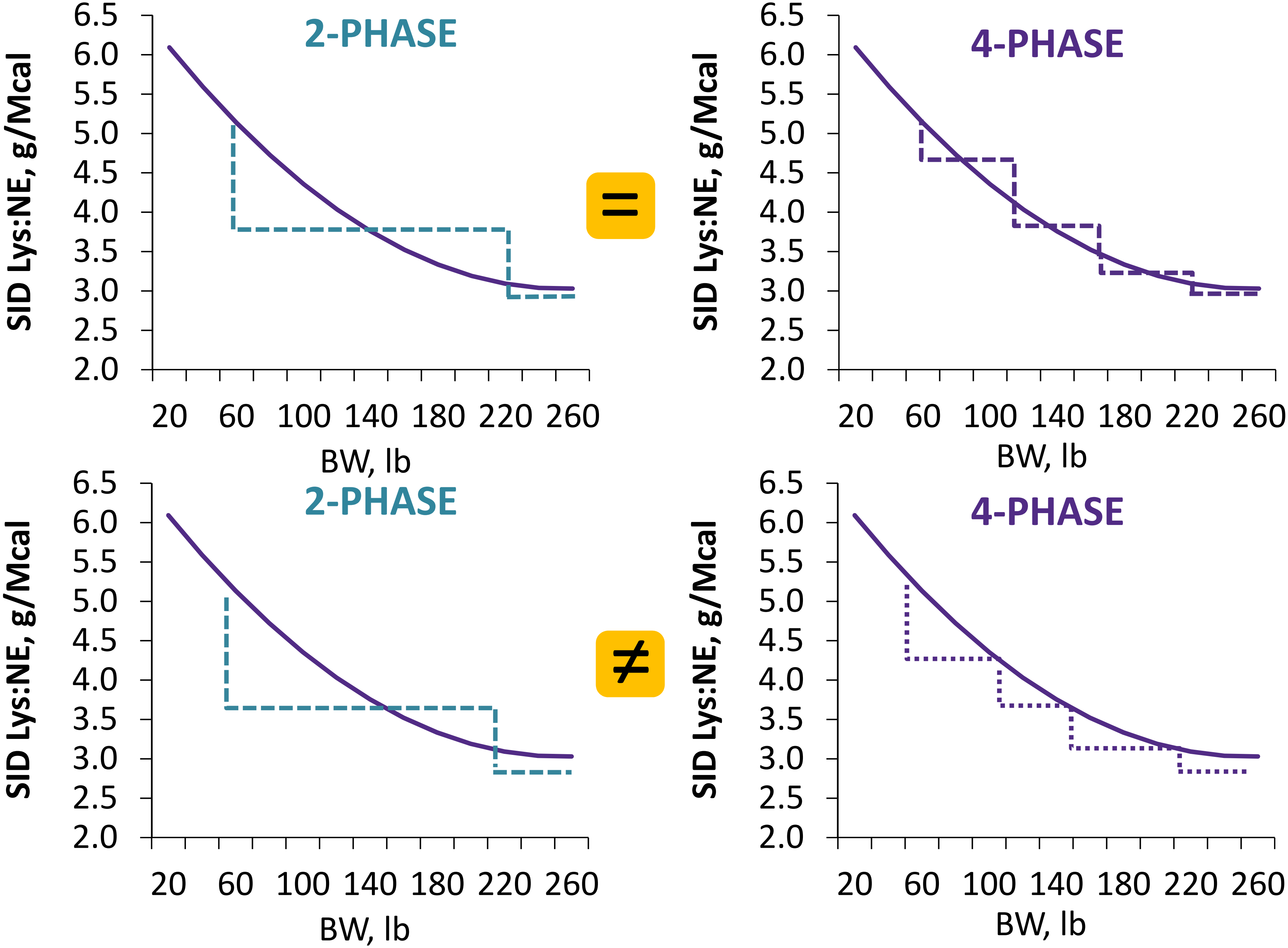
Knowledge for Life

Effect of phase-feeding program on IOFC

Lysine at requirement for feed cost/lb of gain

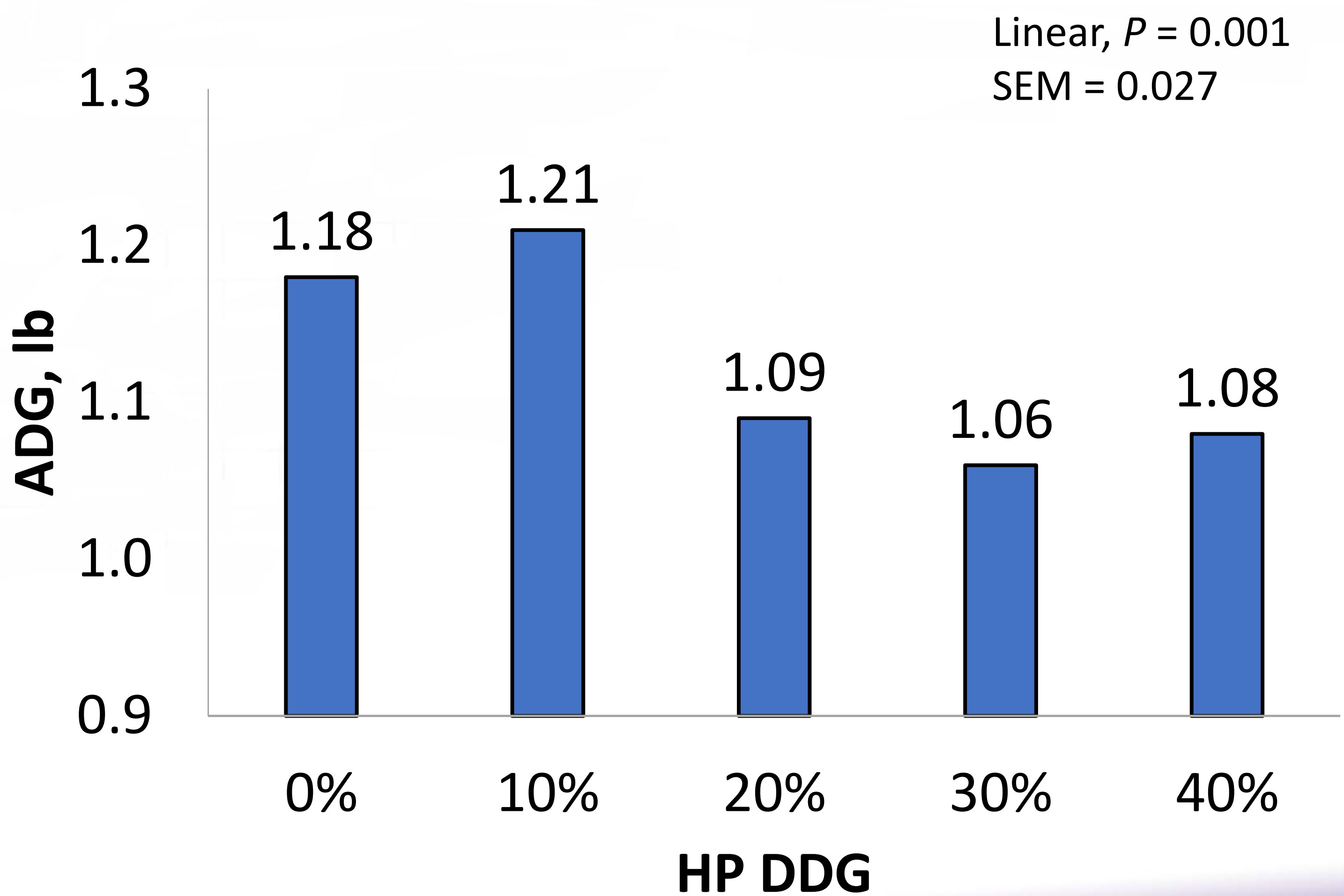


Menegat et al., 2018


2-PHASE
4-PHASE
=
2-PHASE
4-PHASE
≠
SID Lys:NE, g/Mcal
BW, lb
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
20
60
100
140
180
220
260

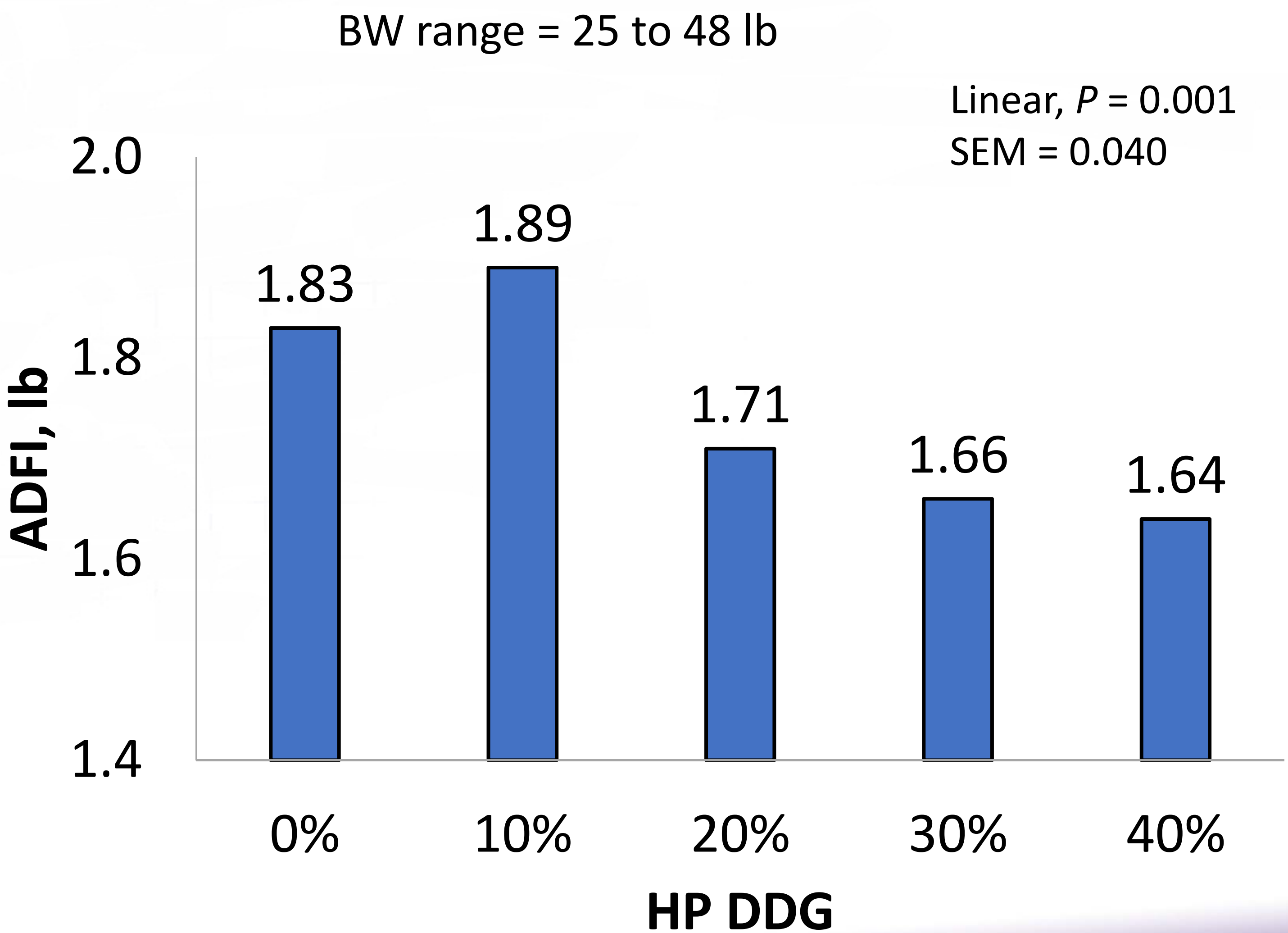
Effects of HP DDG on nursery pig performance

BW range = 25 to 48 lb



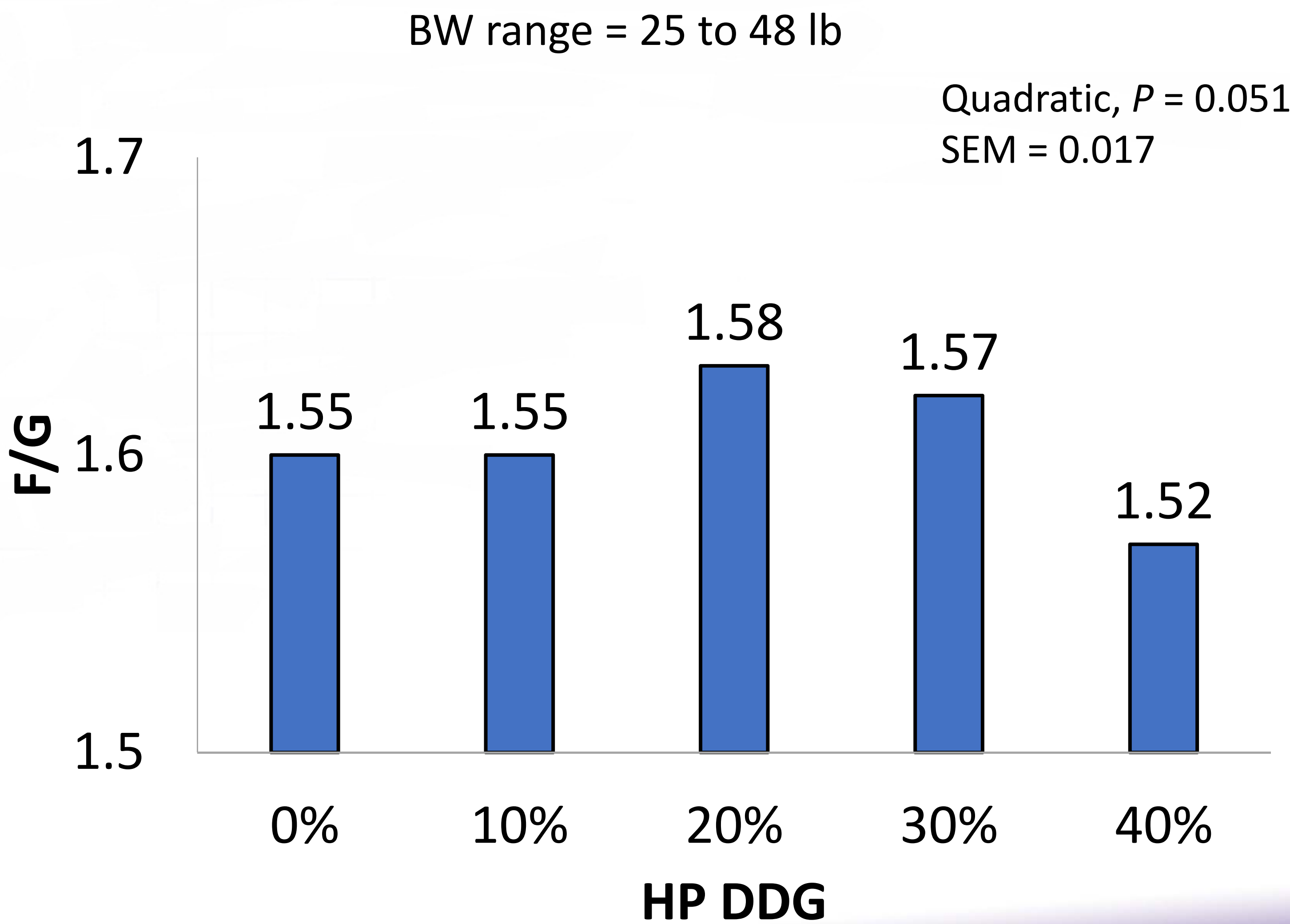
Cemin et al., 2018

Effects of HP DDG on nursery pig performance



Cemin et al., 2018

Effects of HP DDG on nursery pig performance



High protein DDGS

- 97% of productive energy of corn
- Linear reduction in ADG and ADFI. Why?
- Leucine? – Meta analysis by Cemin (2019)

$$\textbf{ADG, g} = -574.08 + 0.9652 \times \text{average BW (kg)}$$
$$+ 1.1977 \times \text{Leu:Lys}$$
$$+ 21.1981 \times \text{Ile:Lys} - 0.1530 \times \text{Ile:Lys} \times \text{Ile:Lys}$$
$$+ 10.7388 \times \text{(Ile+Val):Leu} - 0.0394 \times \text{(Ile+Val):Leu} \times \text{(Ile+Val):Leu}$$
$$- 0.5498 \times \text{Ile:Trp}$$

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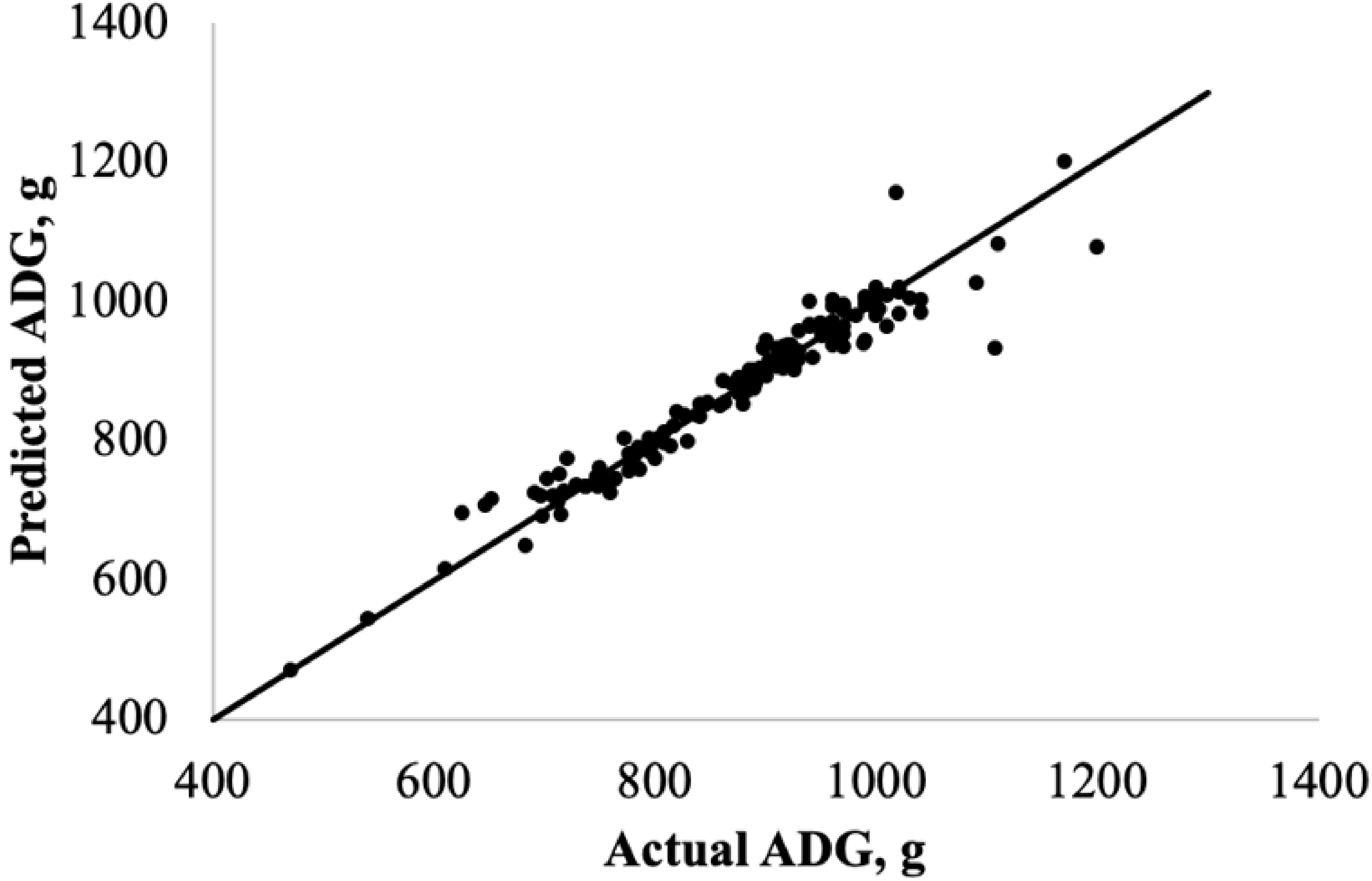
CJ

Cemin et al., 2019

Knowledge for Life

Predicting performance of pigs fed high corn byproduct diets

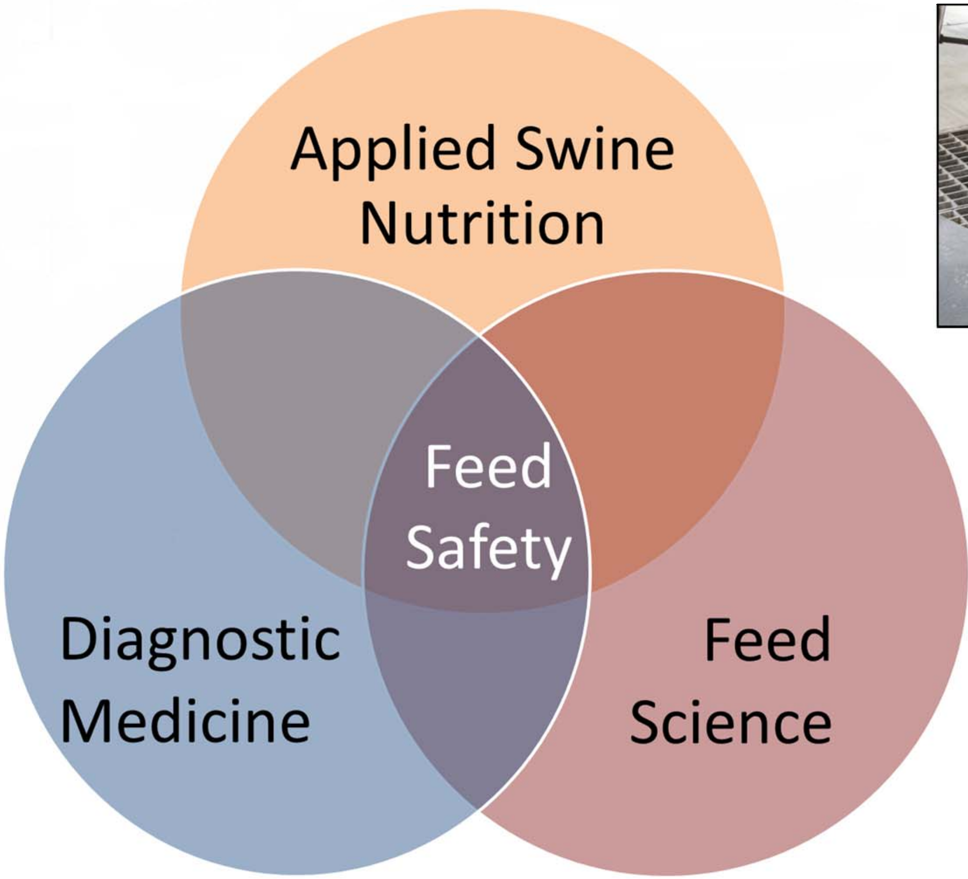


Cemin et al., 2019

Mycotoxins in 2018 Kansas corn crop

- Fumonisin toxicity
  - Pigs
    - Sample 1: B_1 = 753 ppm; B_2 = 223 ppm; B_3= 105 ppm
    - Sample 2: B_1 = 523 ppm; B_2 = 137 ppm; B_3= 69 ppm
  - Horses
- Desired fumonisin levels
  - < 10 ppm; concern between 5 and 10 ppm
  - If concerned, consider cleaning corn, remove dust & test
- Toxicologist: Dr. Steve Ensley

Feed Mill Biosecurity



Pathogen Transmission Through Feed

China Reports FMD, Culls 47 Cattle

SEPTEMBER 14, 2018 11:16 AM

News | Sep 10, 2018

Japan finds 1st Classical Swine Fever (CSF) case in 26 years

African swine fever found in animal feed raises China's contagion risk

Dominique Patton

3 MIN READ

BEIJING (Reuters) - Major Chinese animal feed maker Tangrenshen Group reported on Sunday that feed produced by one of its units had been contaminated with African swine fever, raising fears of its spread further across the country.

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K-State Outreach Associated with Pathogen Survival in Feed in 2018

2018 Meeting

Allen D. Leman Swine Conference

MIDWEST

ASAS Midwestern Section and ADSA Midwest Branch

SCIENTIFIC SESSIONS & BUSINESS MEETING

Omaha, NE • March 12 – 14, 2018

2018 ISU James D. McKean Swine Disease Conference

FEED AND PET FOOD JOINT CONFERENCE

ST. LOUIS | SEPT 17-19, 2018

AD ASTRA PER ASPERA

Kansas Department of Agriculture

USAHA

UNITED STATES ANIMAL HEALTH ASSOCIATION

Boehringer Ingelheim

USDA

DEPARTMENT OF HEALTH & HUMAN SERVICES • USA

FDA

美国动物科学学会 American Society of Animal Science

巨泰实业集团 GENTECH INDUSTRIES GROUP

猪营养国际论坛

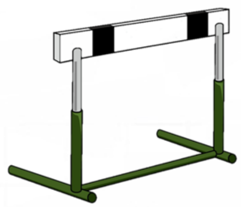
International Swine Industry Symposium

ASAS动物营养学术研讨会

ASAS Animal Nutrition Academic Conference

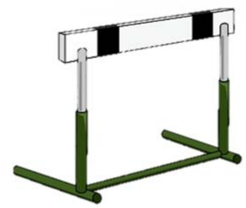
2018 / 论坛：10月24-25日 研讨会：10月26日

Feed Biosecurity: Hurdles to Prevent Pathogen Transfer through Feed



Exclude High Risk Ingredients

Extend Biosecurity Practices from Farms to Mills



Active Mitigation

Exclude High Risk Ingredients from Mills

- High risk ingredients:
  - Have the potential to have pathogen contamination
    - Source location, agricultural practices, transportation
  - Have characteristics to harbor virus that can survive at infectious levels
    - Porcine-based, vegetable carriers, natural protein, high surface area:mass ratio

Extend Biosecurity from Farms to Mills

- Use receiving mats/funnels
- Route vehicle traffic strategically
- Use your own employees to unload
- Start treating your mill like your farm: physical barriers, foot baths, zoning
- In high stress times, sanitize trucks

Pictures by Scott Dee and Jason Woodworth

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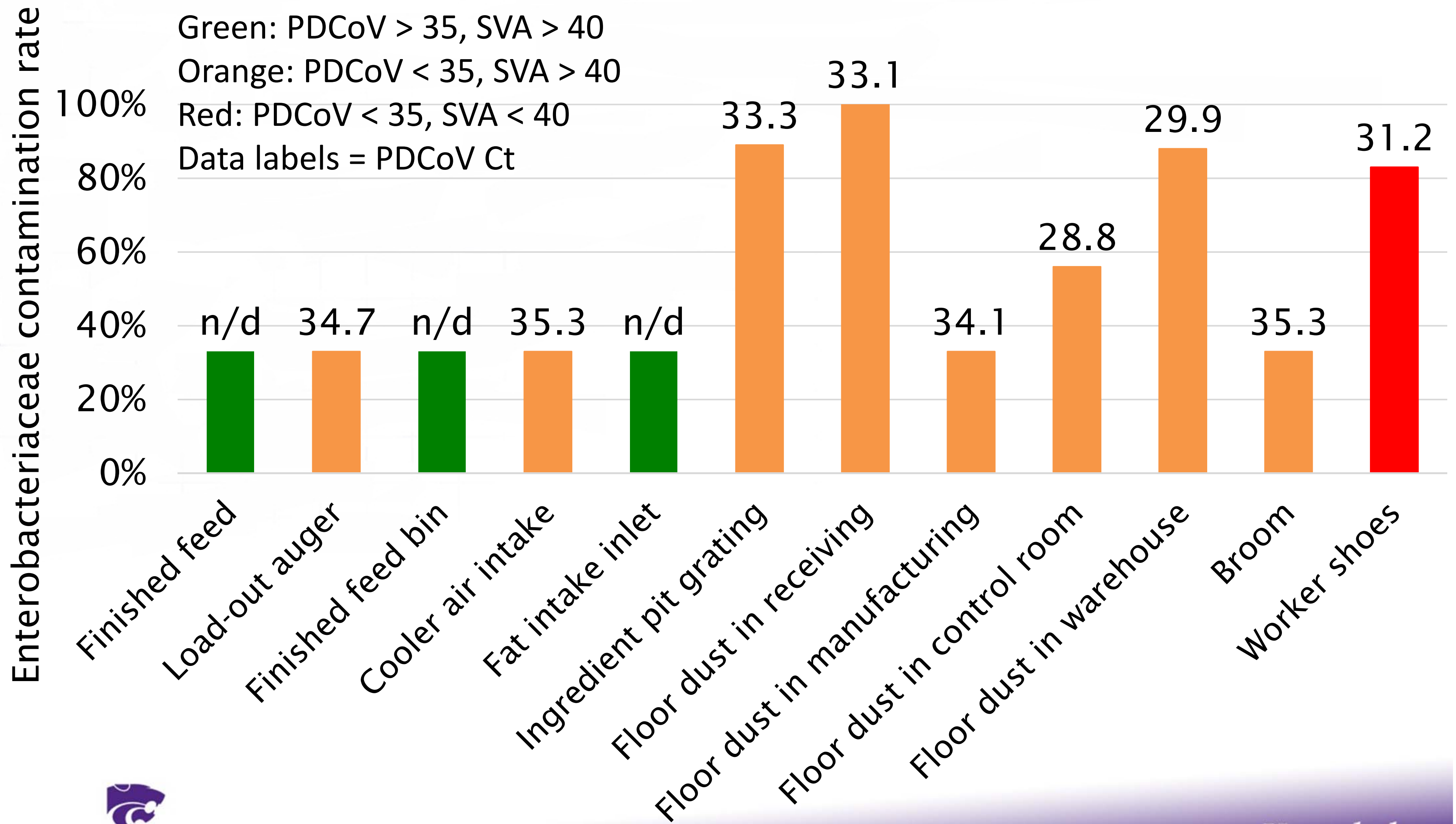
Consider Surveillance to Find Weak Points in Biosecurity Compliance



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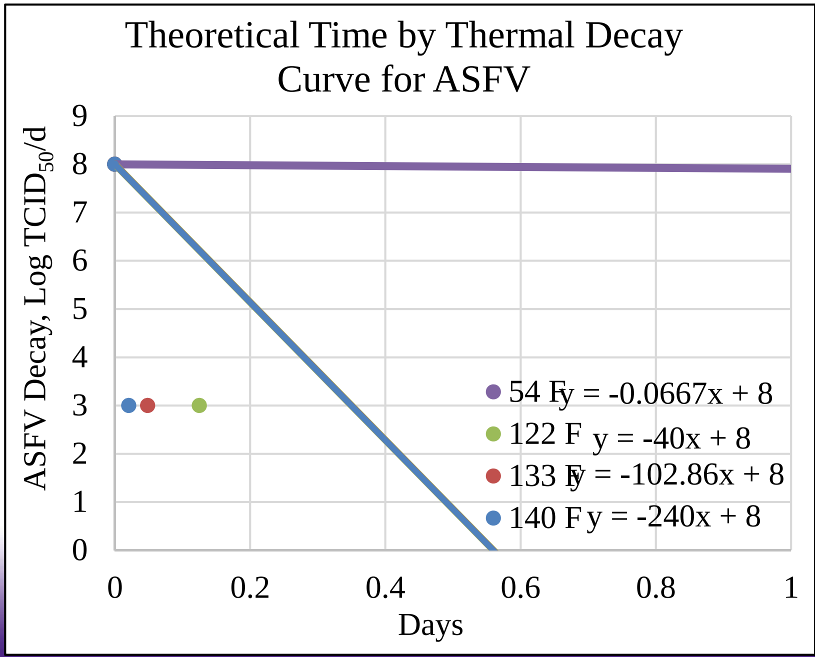
Funded by SHIC

Knowledge for Life

Active Mitigation: Your Last Hurdle

- Quarantine via ASFV half-life
  - ***<u>Viral decay is time × temp dependent</u>***
  - ASFV is stable at cold temps, but is sensitive to heat
  - Currently no direct time × temp for ASFV
  - Extrapolation of other data suggests ASFV risk will be lowered with higher temp
- Consider MCFA or formaldehyde-based products



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Updated Feed Safety Resources
www.ksuswine.org

KANSAS STATE UNIVERSITY

Search web, people, directories

Browse A-Z   Sign in

K-State home » College of Agriculture » ASI » Research and Extension » Swine » Feed Safety Resources

Animal Sciences and Industry

KSUSwine.org Home

- Feeder Adjustment Cards
- Calculators (Energy, Ingredient, F/G and Pig Space Tools)
- Gestation Feeding Tools
- Particle Size Information
- Premix & Diet Recommendations
- Swine Nutrition Guide
- Marketing Tools
- Swine Day
- Swine Podcasts
- Swine Profitability Conference
- Swine Facilities

Animal Sciences and Industry

Kansas State University
232 Weber Hall
Manhattan, KS 66506-8028

785-532-6533

Email: asi@ksu.edu

Feed Safety Resources

General

Webinar on Current Status of Viral Transmission in Feed

Frequently Asked Questions about ASFV and CSFV in Feed

Questions to ask your feed supplier

Feed mill biosecurity

- Review of strategies to impact swine feed biosecurity
- K-State publication
- AFIA guide
- Videos on feed mill biosecurity (PEDv focus)
  - Introduction to feed manufacturing
  - Feed biosecurity: Receiving procedures
  - Feed biosecurity: People and vehicles
  - Feed biosecurity: Ingredients
- Feed mill biosecurity audits
  - K-State Feed Mill Biosecurity Audit
  - PIC feed mill assessment form
  - Sampling for pathogen surveillance
  - Feed sampling video
  - Sources of pathogen entry into feed mills

Virus survival in feed or feed ingredients

- Holding Time Calculation for Feed Ingredients
- Transboundary survival of PEDV in ingredients
- Transboundary survival of viruses in ingredients
- Transmission of orthoreovirus in blood meal

Other Feed Safety Resources

- Swine Health Information Center
- American Association of Swine Veterinarians
- National Pork Board
- National Pork Producers Council
- Secure Pork Supply
- World Organization for Animal Health (OIE)

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Best strategy to prevent pathogen entry:

1. Exclude high risk ingredients from diets and mills
2. Extend biosecurity practices to feed mills
   – Monitor pathogen loads to identify potential entry risks
3. Proactively mitigate to further reduce risk

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Frequently Asked Questions about ASFV and CSFV in Feed

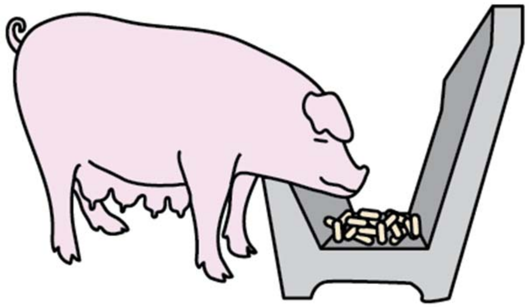
By: Cassie Jones, Jason Woodworth, Steve Dritz, Megan Niederwerder, Mike Tokach, Bob Goodband, and Joel DeRouchey; Kansas State University, Manhattan

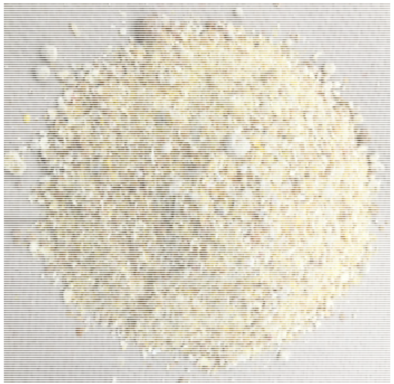
With the recent occurrences of African Swine Fever Virus (ASFV) and Classical Swine Fever Virus (CSFV) in countries important for U.S. trade, there have been many questions about how to best

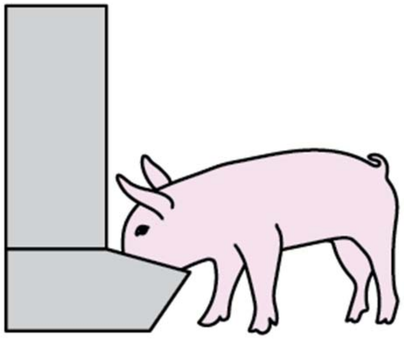
www.ksuswine.org

RESEARCH UPDATE:
Risk of African Swine Fever Virus (ASFV) Introduction and Transmission in Feed

Megan C. Niederwerder, DVM, PhD
Assistant Professor
Department of Diagnostic Medicine/Pathobiology
College of Veterinary Medicine
Kansas State University







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FAD Important to U.S. Industry

- ASFV Risk: presence in **China**, lack of an effective **vaccine**, **stability** in environment

Updated: September 2018

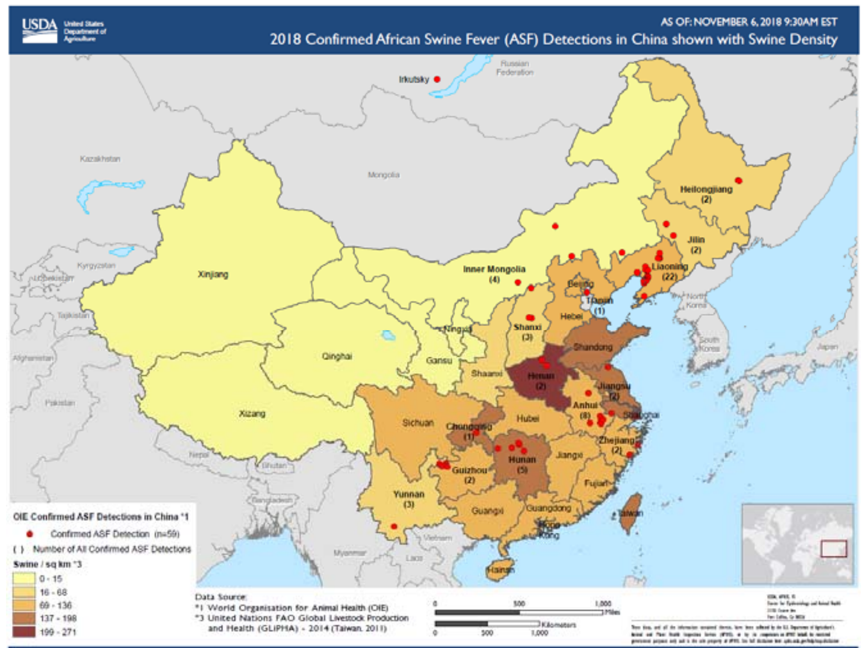
Criteria for Average Risk Score

1) Likelihood of entry

2) Economic effects on production post entry

3) Effects on domestic and international markets

Representative Virus Affecting Swine	Production Impact	Domestic/Foreign Market Impacts	Likelihood of Introduction into the U.S. or Emergence of a Domestic Disease	Numerical Average
Foot and mouth disease virus	9	9	9	9.0
African swine fever virus	9	9	7	8.3
Classical swine fever virus	9	9	5	7.7
Pseudorabies virus →	8	8	5	7.0



https://www.swinehealth.org/swine-disease-matrix/
https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/swine/asf-china.pdf

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3 Part Approach

1. Determine **survival** in feed and feed ingredients under transboundary model
2. Investigate **oral infectious dose** through natural feeding and drinking behavior
3. Assess tools for **mitigating** risk of virus transmission in feed and feed ingredients

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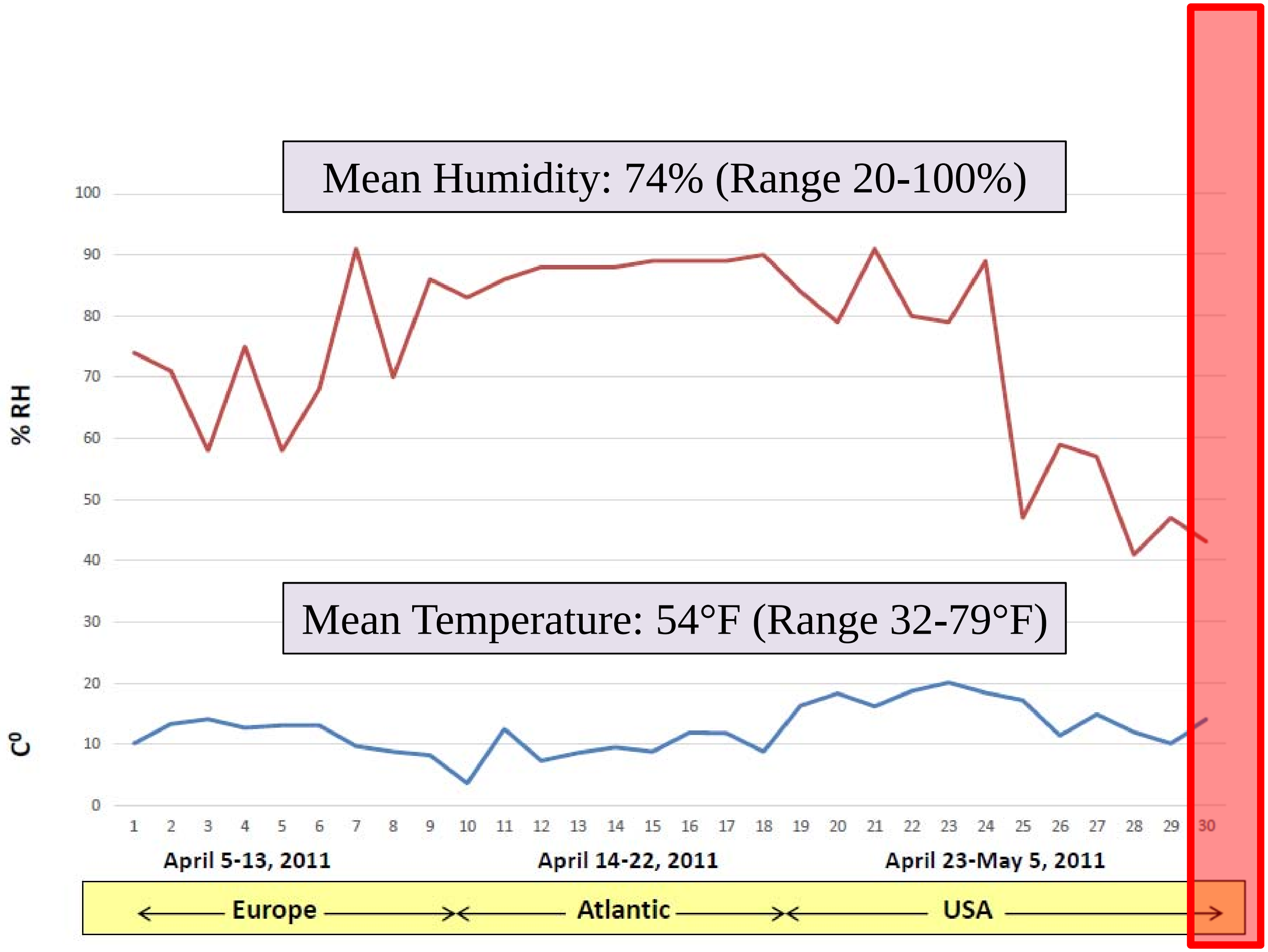
Transboundary Model



Dee et al., 2018

KANSAS STATE UNIVERSITY

ASFV in Feed Ingredients

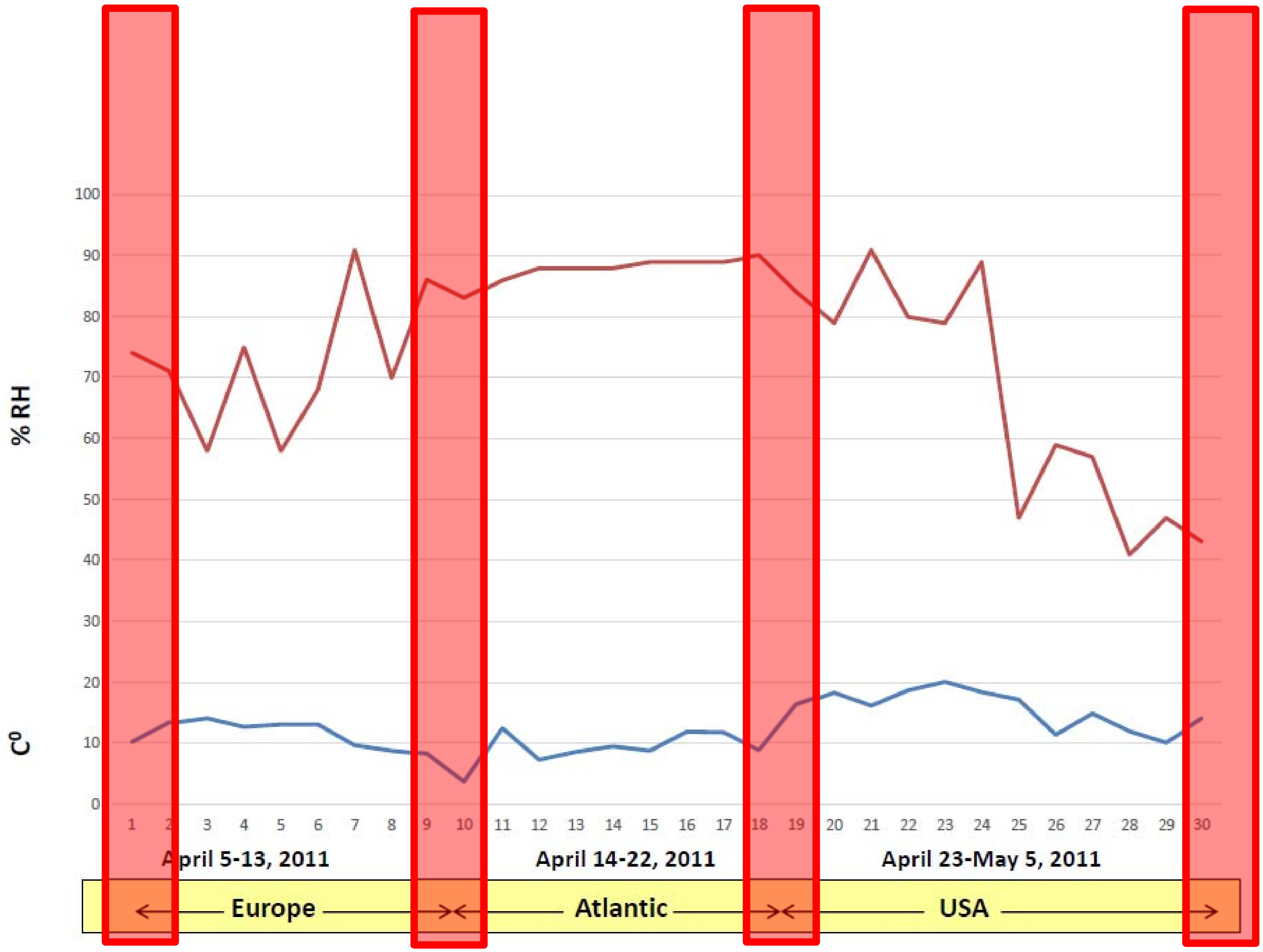
Ingredient	ASFV
Soybean meal-Conventional	(+)
Soybean meal-Organic	(+)
Soy oil cake	(+)
DDGS	(-)
Lysine	(-)
Choline	(+)
Vitamin D	(-)
Moist cat food	(+)
Moist dog food	(+)
Dry dog food	(+)
Pork sausage casings	(+)
Complete feed (+ control)	(+)
Complete feed (- control)	(-)
Stock virus control	(+)

Ingredient	SVA (FMDV)	RSV 174	BVDV (CSFV)	VSV	CDV (NiV)	IAV-S
Soybean meal-Conventional	(+)	+)	(-)	(-)	(-)	(-)
Soybean meal-Organic	(-)	-)	(-)	(-)	(-)	(-)
Soy oil cake	(+)	-)	(-)	(-)	(-)	(-)
DDGS	(+)	+)	(-)	(-)	(-)	(-)
Lysine	(+)	-)	(-)	(-)	(-)	(-)
Choline	(+)	-)	(-)	(-)	(-)	(-)
Vitamin D	(+)	-)	(-)	(-)	(-)	(-)
Moist cat food	(+)	-)	(-)	(-)	(-)	(-)
Moist dog food	(+)	-)	(-)	(-)	(-)	(-)
Dry dog food	(+)	-)	(-)	(-)	(-)	(-)
Pork sausage casings	(+)	-)	(-)	(-)	(-)	(-)
Complete feed (+ control)	(+)	-)	(-)	(-)	(-)	(-)
Complete feed (- control)	(-)	-)	(-)	(-)	(-)	(-)
Stock virus control	(-)	-)	(-)	(-)	(-)	(-)

Dee et al., 2018

Kansas State University

Transboundary Model



Dee et al., 2018

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3 Part Approach

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Oral Dose Model

- 14 replicates = 84 total pigs (7-8 weeks old)
  - Natural drinking and consumption of feed
- ASFV Georgia 2007
  - Challenge doses: $10^0 – 10^8$ $TCID_{50}$

Niederwerder et al., 2018 Submitted to *EID*

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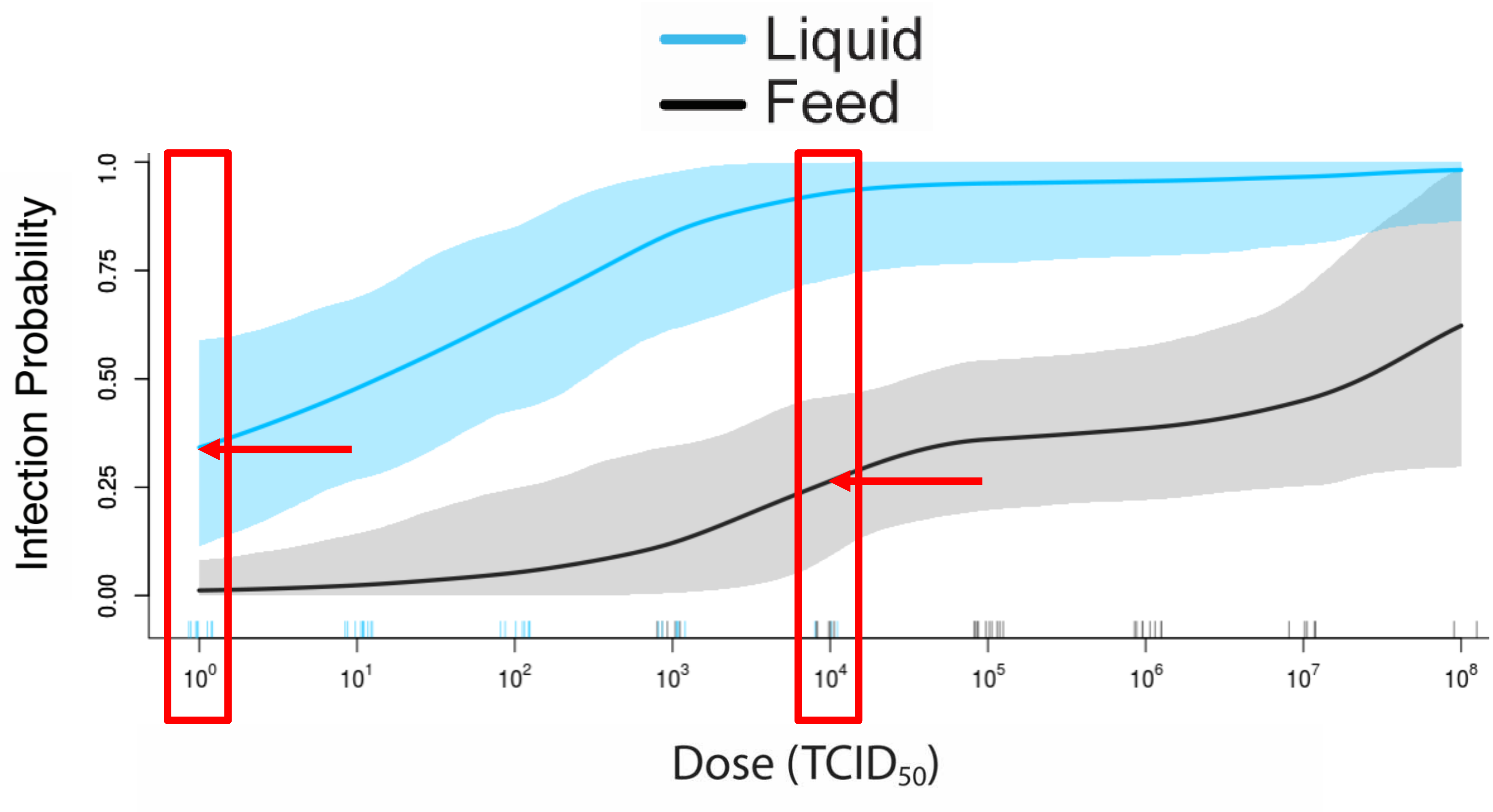
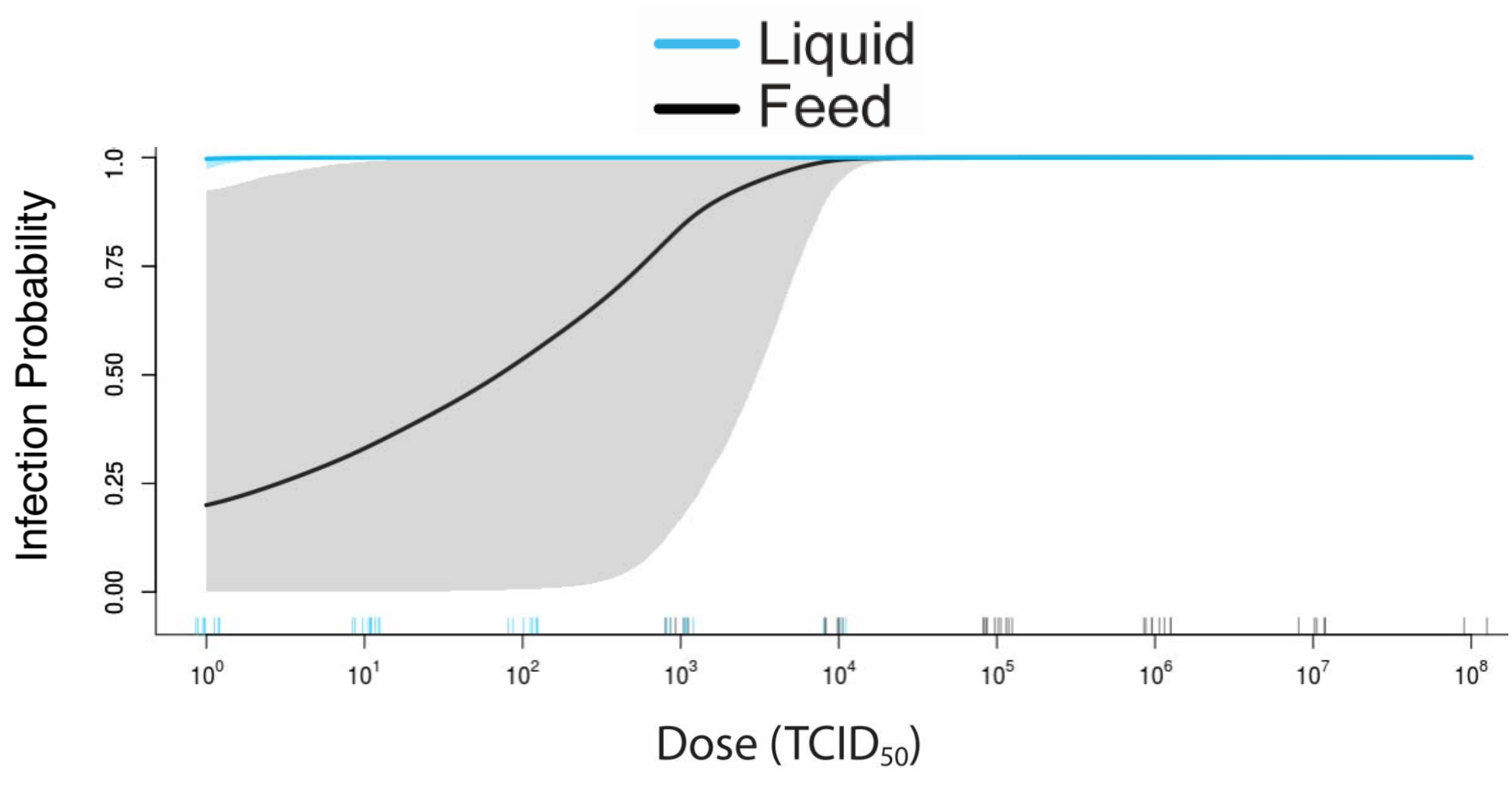
Probability of Infection



Niederwerder et al., 2018 Submitted to *EID*

Multiple Exposures



Niederwerder et al., 2018 Submitted to *EID*

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3 Part Approach

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3. Assess tools for **mitigating** risk of virus transmission in feed and feed ingredients

SHiC Swine Health Information Center

State of Kansas NBAF Fund

pork checkoff

Kansas State University

What are we doing in feed mills?

Biosecurity Audit

List of all ingredients in the mill

Review and classify into negligible or moderate risk

Ingredients:

- Review protocols from suppliers
- Specify all carriers are North America origin
- Porcine and other animal protein products:
    - None in the mill
- Bulk ingredients
    - None used from outside North America or Europe

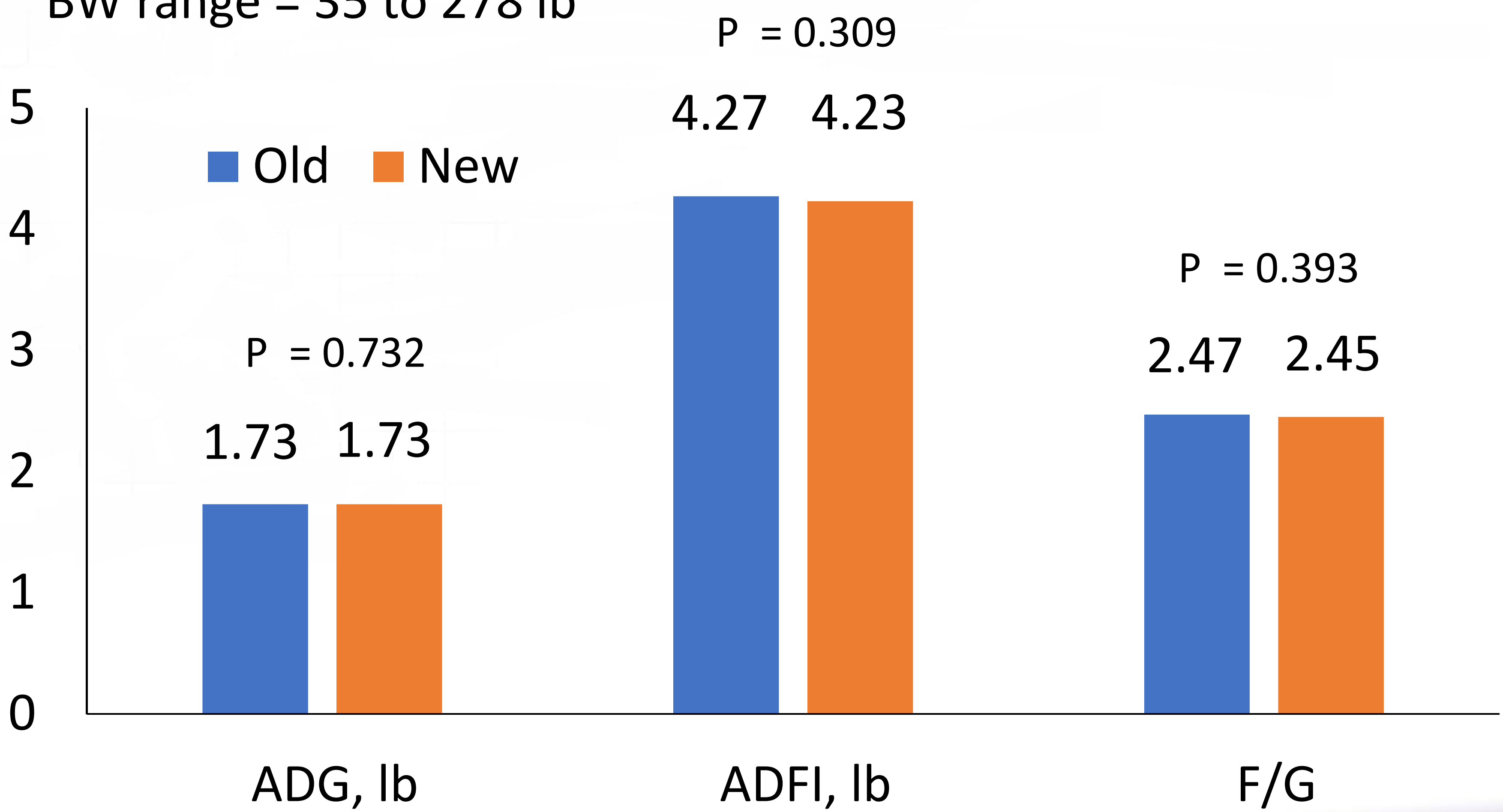
Vitamin levels for finishing pigs

Vitamin	Units/lb	Old	New
Vitamin A	IU	1,600,00	750,000
Vitamin D	IU	400,000	300,000
Vitamin E	mg	8,000	8,000
Vitamin K	mg	800	600
Vitamin B12	mg	7	6
Niacin	mg	15,000	9,000
Pantothenic acid	mg	5,000	5,000
Riboflavin	mg	1,500	1,500

Del Tuffo et al., 2018

Vitamin levels for finishing pigs

BW range = 35 to 278 lb



Del Tuffo et al., 2018

K·STATE Research and Extension

Knowledge for Life

Projecting changes in pig growth, pork quality, eating experience, and muscle physiology due to increasing live and carcass weights

pork checkoff

ILLINOIS

PIC

USDA ARS

Smithfield

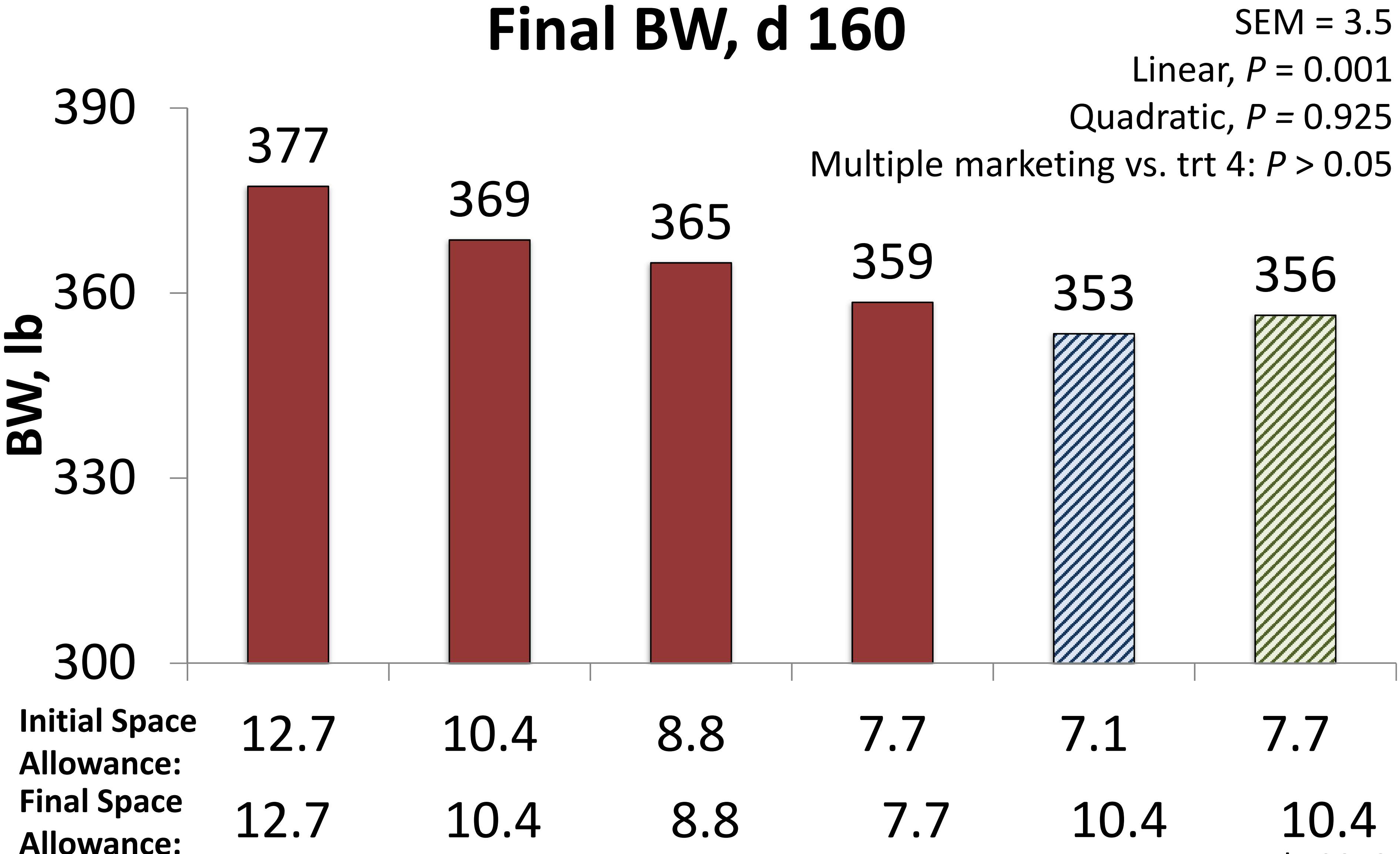
HOLDEN farms

K·STATE Research and Extension

Knowledge for Life

Effects of space allowance and marketing strategy for heavy weight pigs

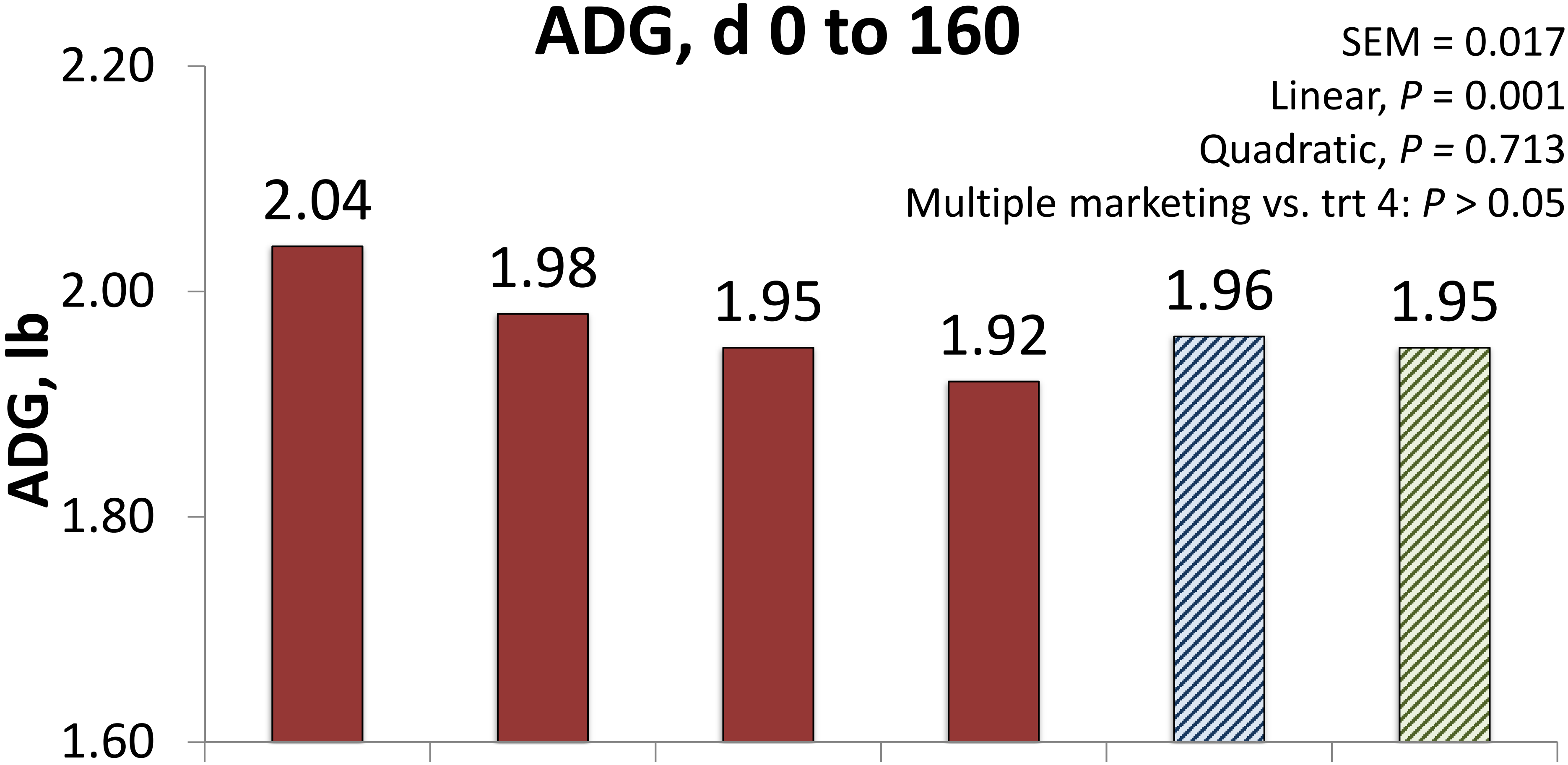
Final BW, d 160



Lerner et al., 2018

Effects of space allowance and marketing strategy for heavy weight pigs

ADG, d 0 to 160

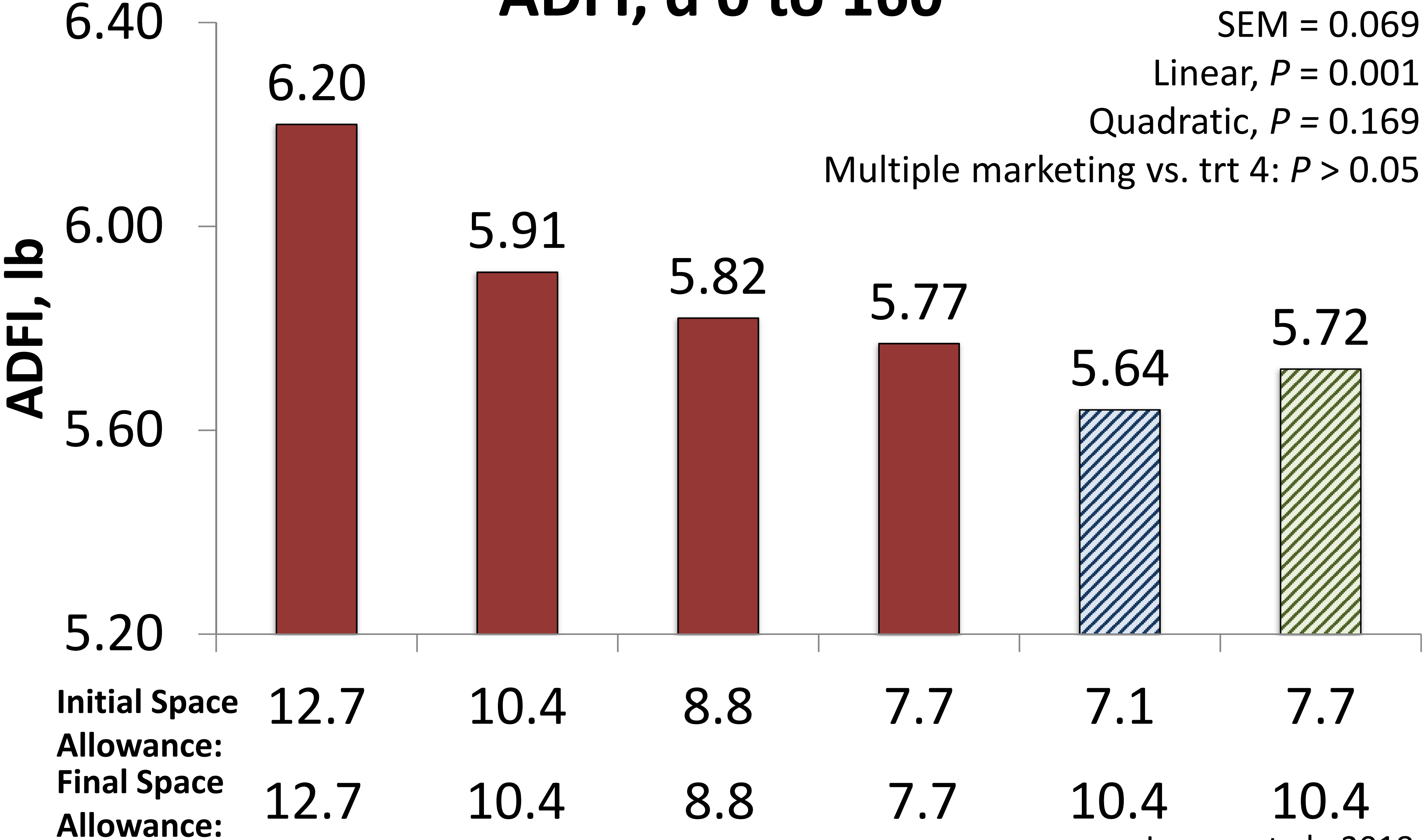


Initial Space Allowance:	12.7	10.4	8.8	7.7	7.1	7.7
Final Space Allowance:	12.7	10.4	8.8	7.7	10.4	10.4

Lerner et al., 2018

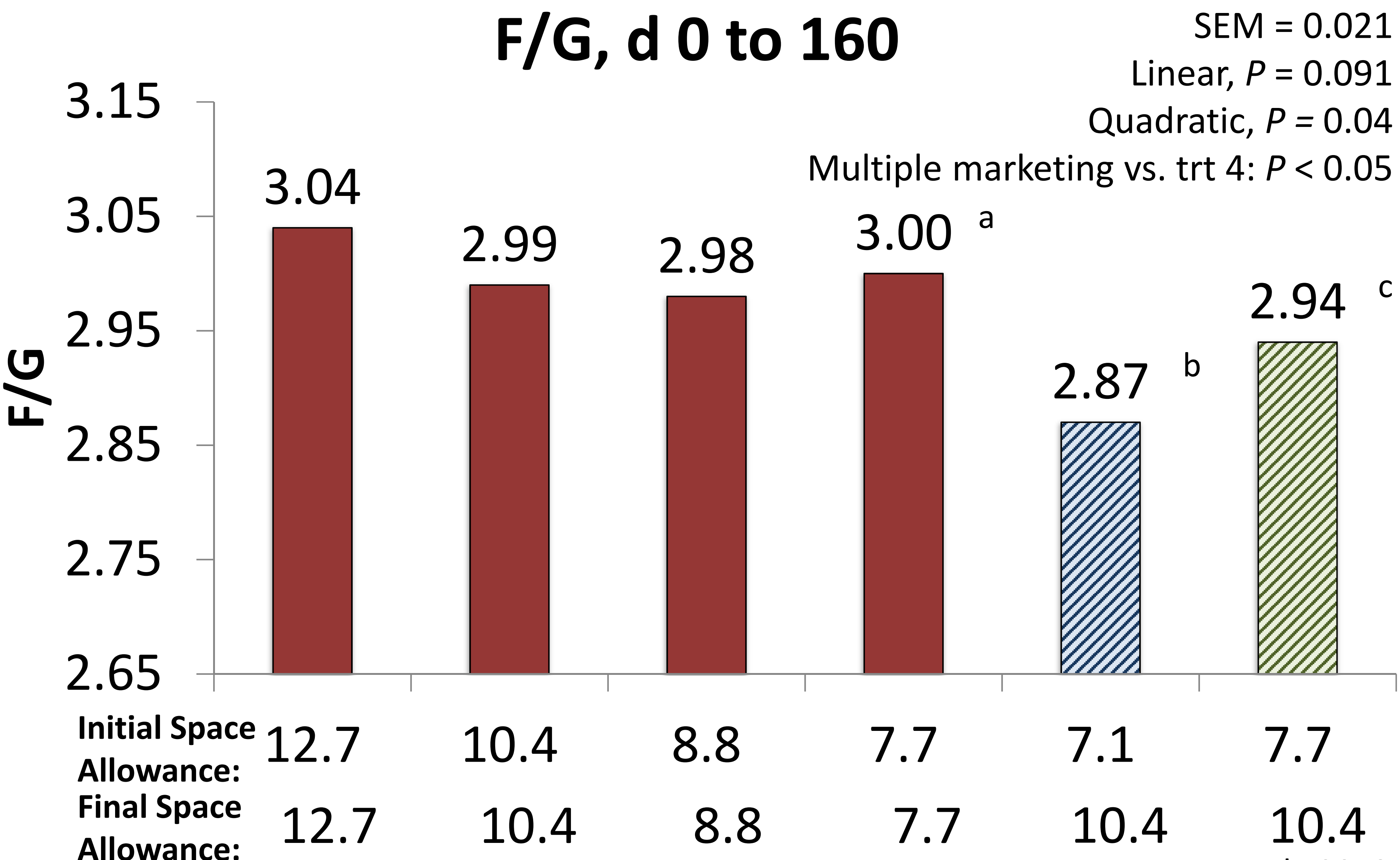
Effects of space allowance and marketing strategy for heavy weight pigs

ADFI, d 0 to 160



Lerner et al., 2018

Effects of space allowance and marketing strategy for heavy weight pigs



Lerner et al., 2018

Consumer Preference & Palatability

Hot Carcass Weights

Light – Less than 246.5 lbs; **LT**

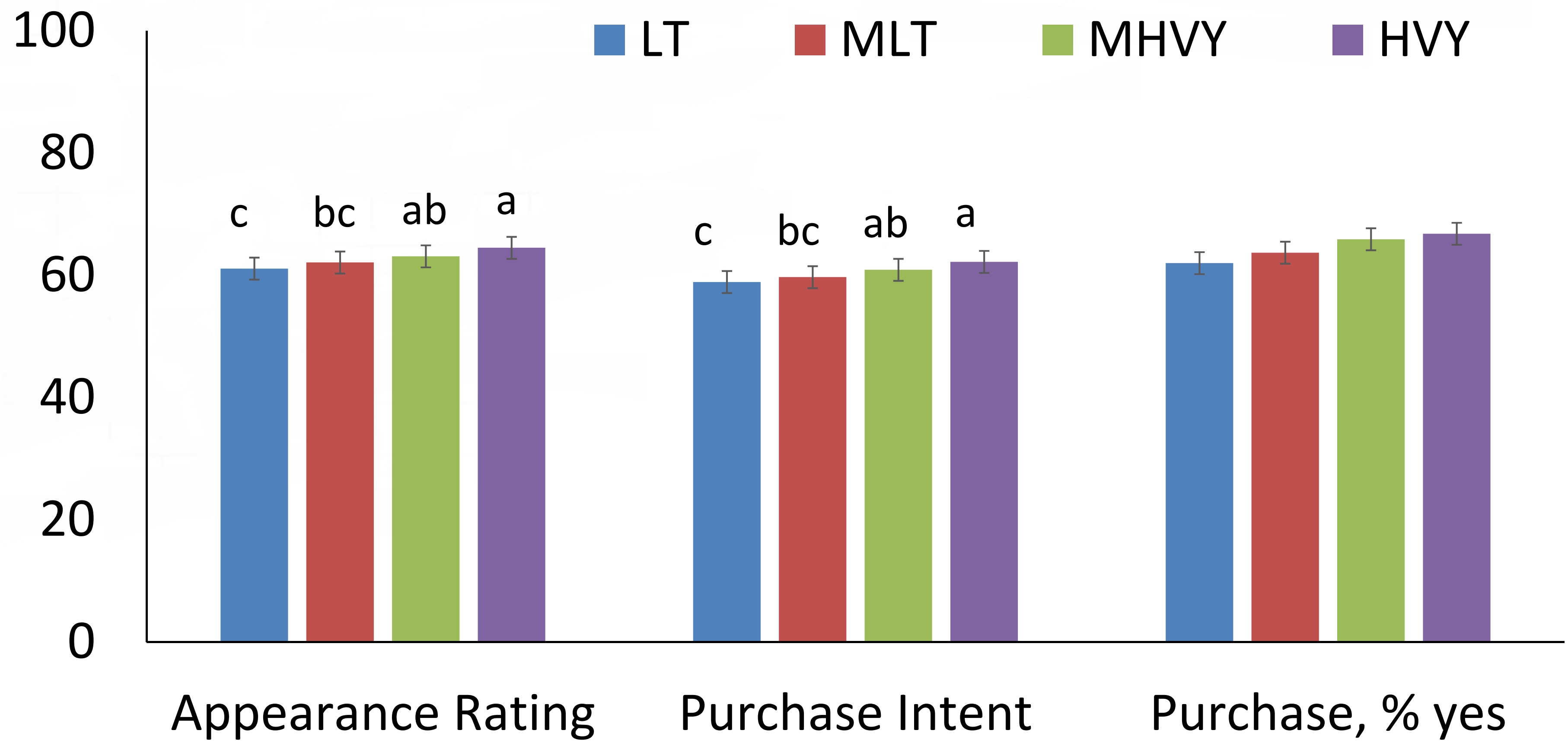
Med Light – 246.6 to 262.5 lbs; **MLT**

Med Heavy – 262.5 to 276.5 lbs; **MHVY**

Heavy – 276.5 lbs and greater; **HVY**

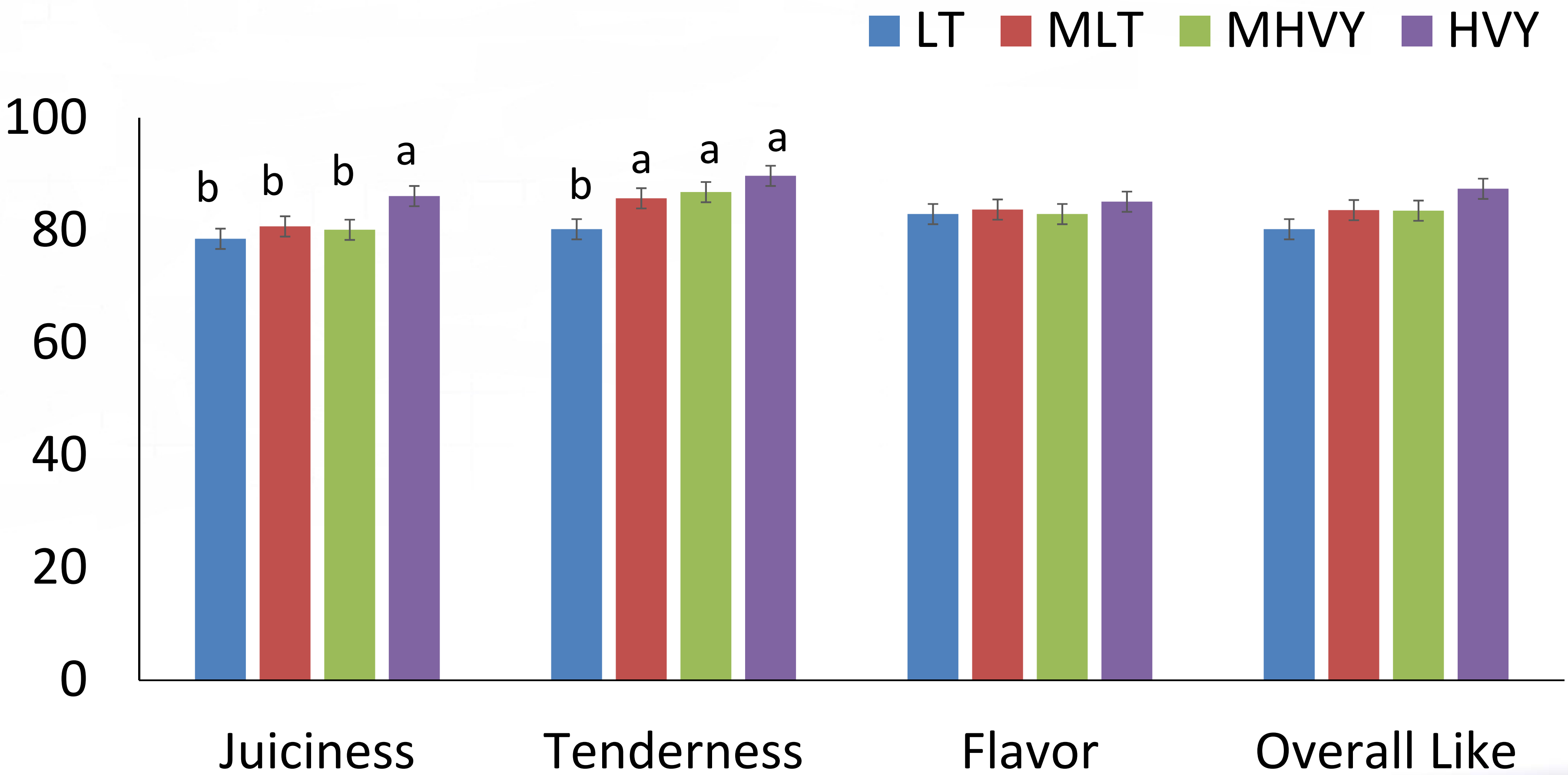
Rice et al., 2018

Consumer Appearance, purchase intent ratings for chops from varying carcass weight categories



Rice et al., 2018

Percentage of consumers who indicated the sample was acceptable for juiciness, tenderness, flavor, and overall for varying hot carcass weights

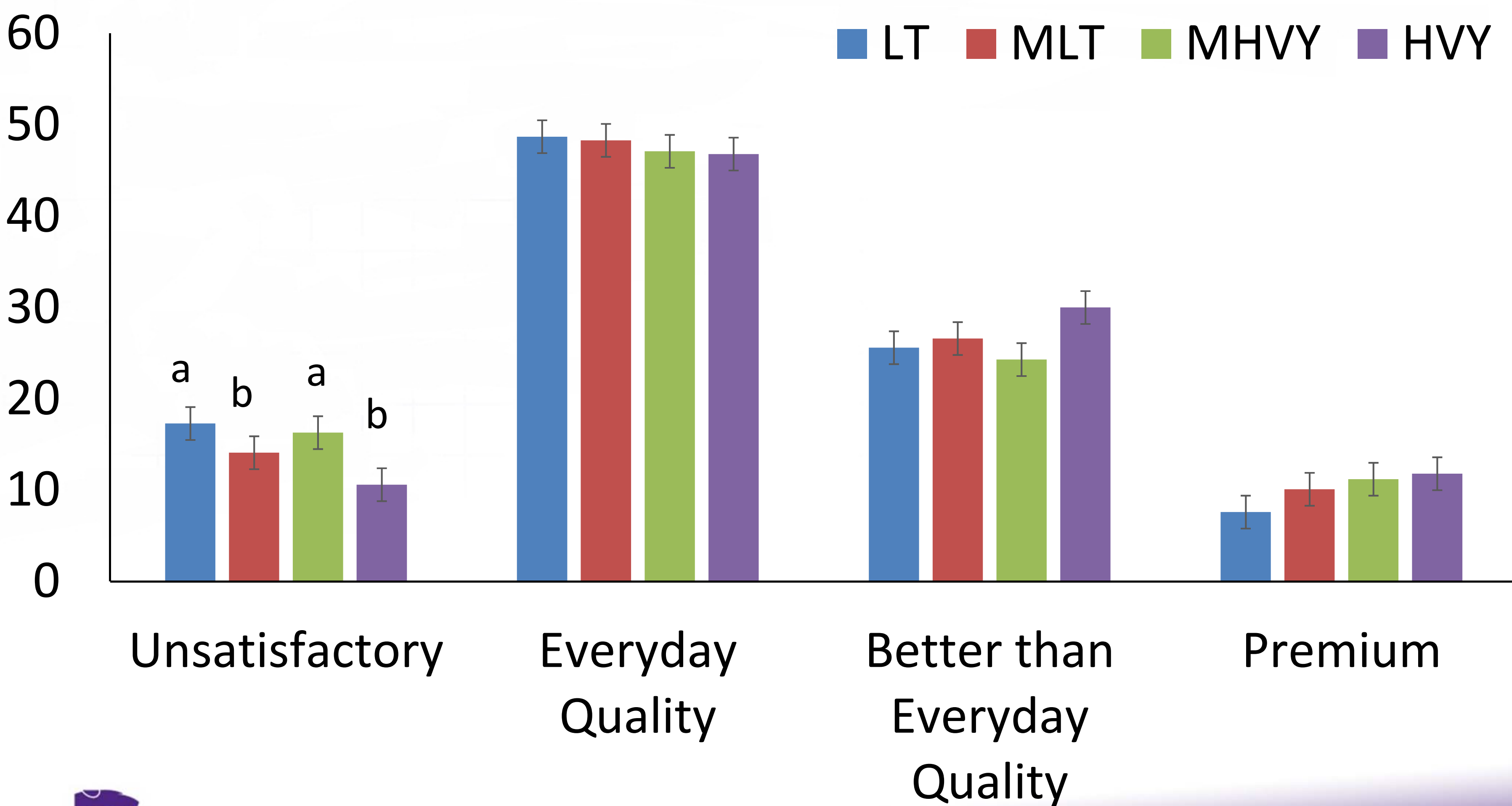


K·STATE
Research and Extension

Rice et al., 2018

Knowledge for Life

Consumer perceived quality for varying hot carcass weights

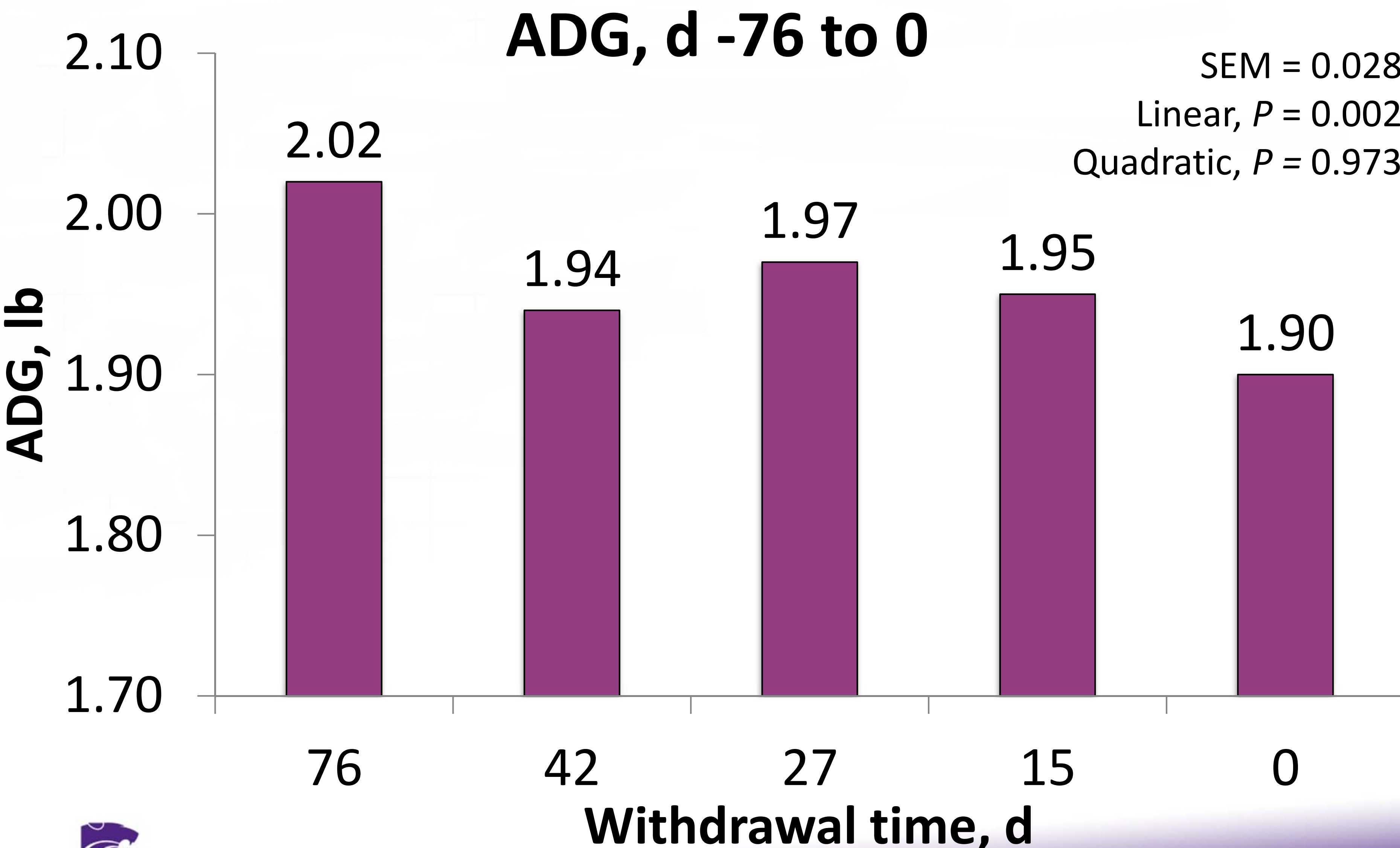


Rice et al., 2018

K·STATE Research and Extension

Knowledge for Life

Effects of DDGS withdrawal prior to market



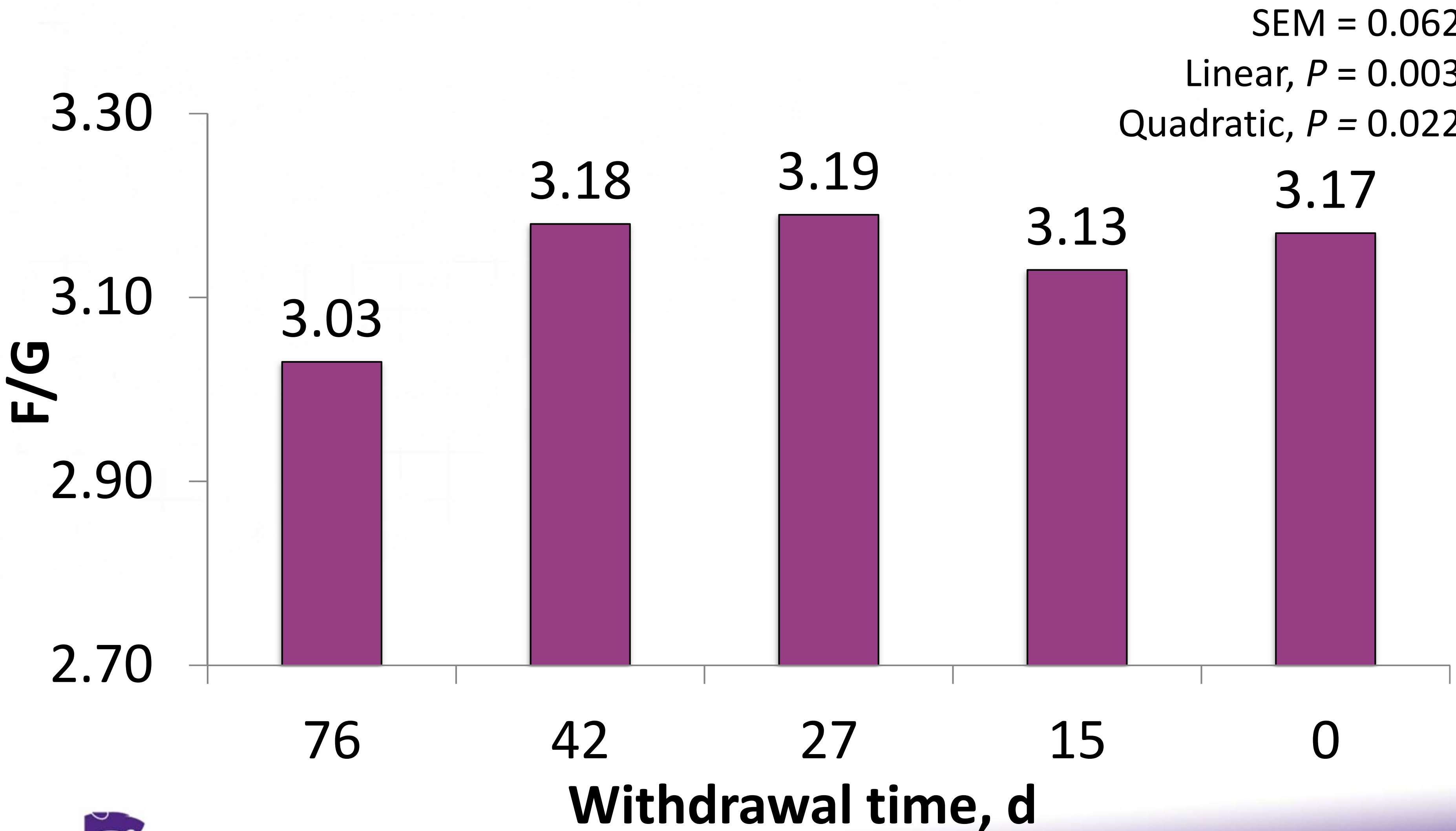
Lerner et al., 2018

K-STATE Research and Extension

Knowledge for Life

Effects of DDGS withdrawal prior to market

F/G, d -76 to 0

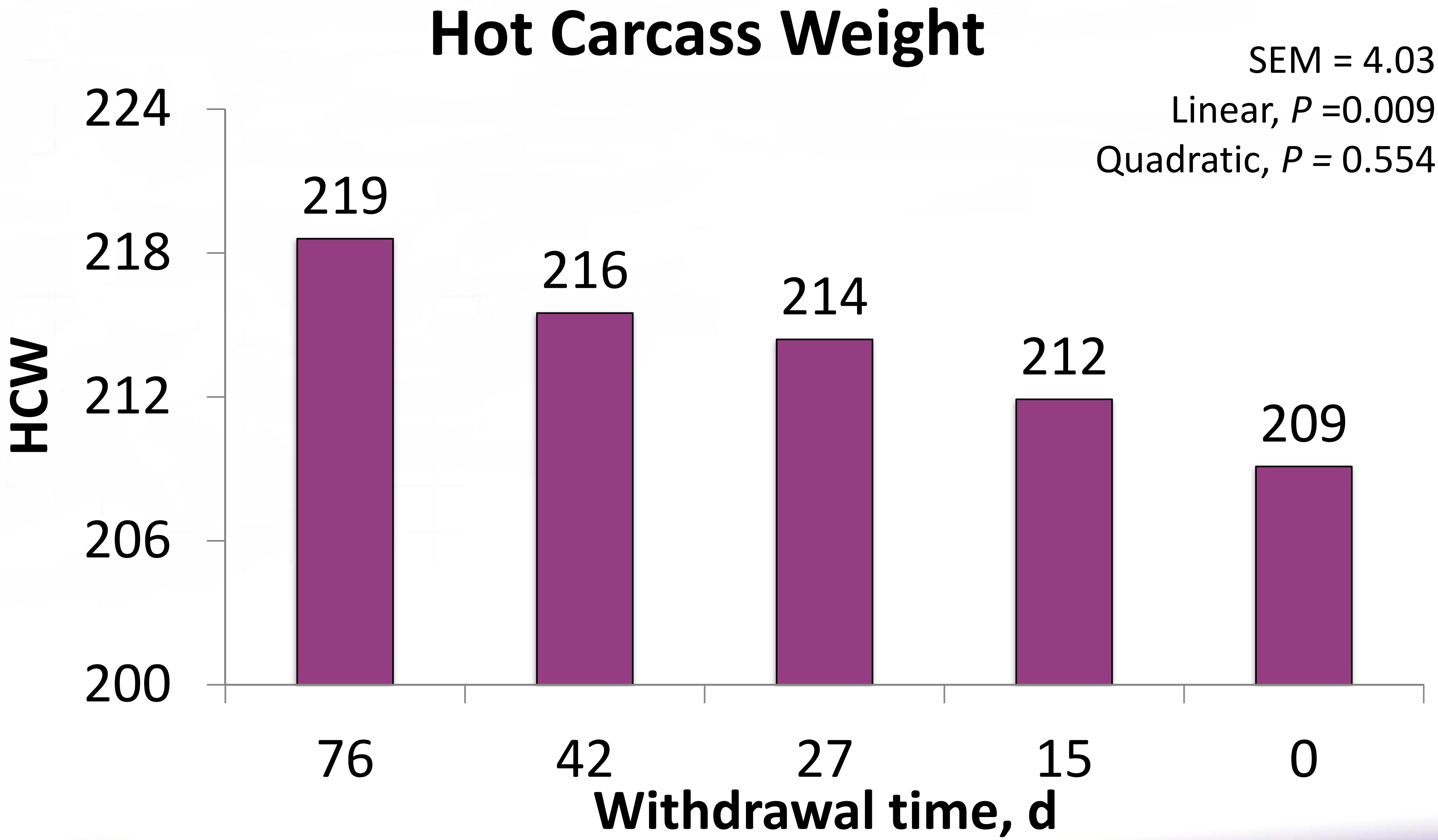


K·STATE Research and Extension

Lerner et al., 2018

Knowledge for Life

Effects of DDGS withdrawal prior to market



Lerner et al., 2018

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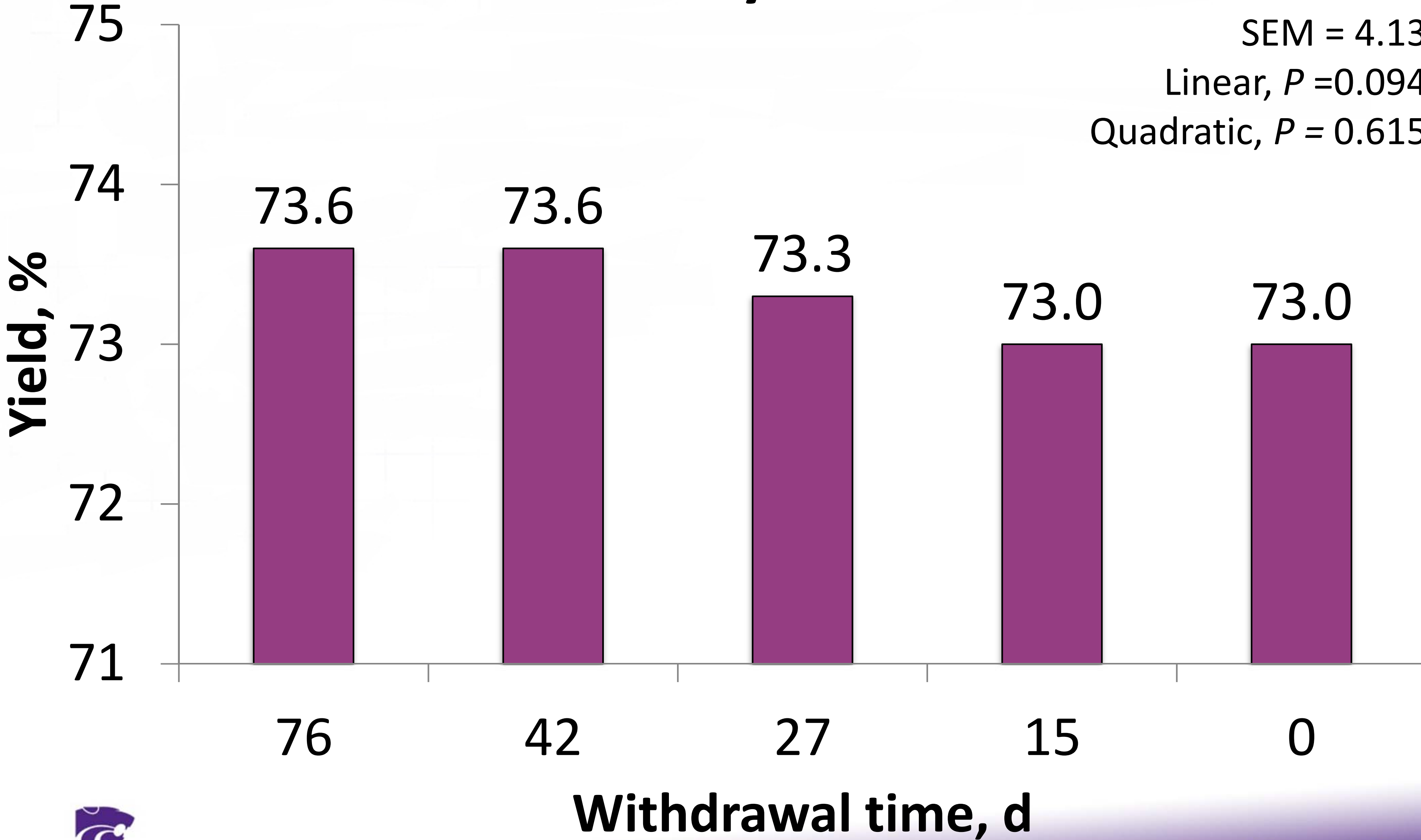
Knowledge for Life

Effects of DDGS withdrawal prior to market

Carcass yield



Lerner et al., 2018

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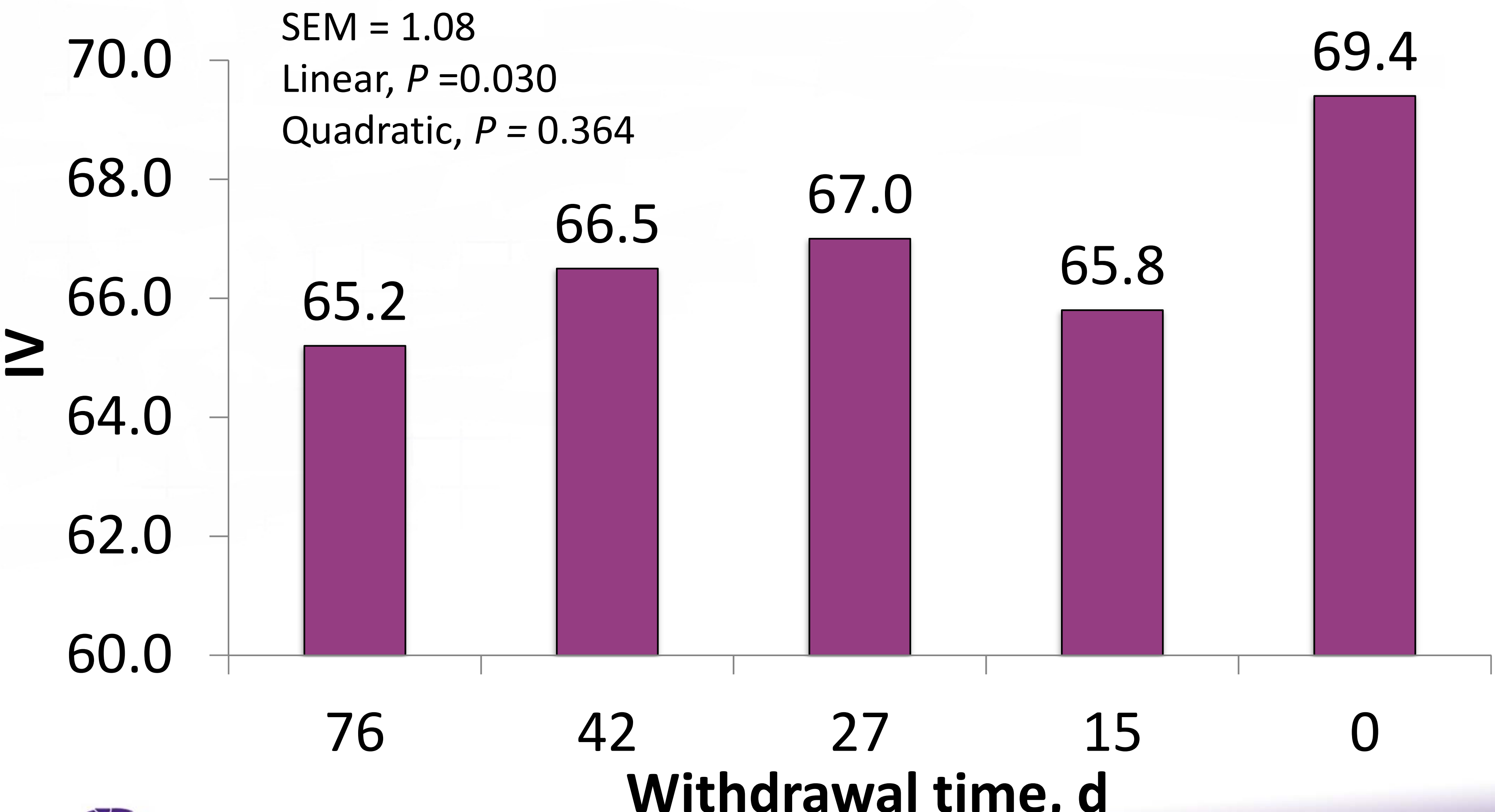
Knowledge for Life

Effects of DDGS withdrawal prior to market Iodine value of belly fat



Lerner et al., 2018

K·STATE Research and Extension

Knowledge for Life

“Other” research in 2018 KSU Swine Day

- Lysine fermentation byproduct for sows
- Vaccination timing on nursery pig performance
- Sugar beet pulp on finishing pig performance
- Added fat for grow-finish pigs
- Isoflavone in low CP diets for late finishing pigs
- Quality of premium pork loins
- Particle size variation impact on pig performance
- Pellet binders for high fat diets
- Tylosin route of administration on antimicrobial resistance
- Number of drinkers for finishing pigs
- Dietary iron source for nursery pigs
- Probiotics for nursery pigs
- More medium chain fatty acid work
- Sodium metabisulfite on nursery pig growth
- Amount of finishing diet that can be fed in nursery for wean-to-finish pigs
- Insoluble fiber source for nursery pigs
- Soybean meal level in late nursery diets

Building Memorable Experiences

Graduate Student Achievements - Congratulations!

- **Annie Lerner** - International Ingredients Pinnacle Award
- **Jordan Gebhardt** - AASV 1st place poster presentation
- **Kiah Gourley** – K-State Donoghue Graduate Scholarship
- **Henrique Cemin** – Midwest ASAS 1st place poster presentation, Evonik Future Leaders Scholar, Feed Energy Excellence in Ag Scholarship, College of Ag Nunemacher Scholarship, Pureitein Agri-LLC Scholarship
- **Hayden Williams** - Pureitein Agri-LLC, Bob and Karen Thaler Graduate Student Swine Nutrition Scholarship
- **Lori Thomas** – K-State Donoghue Graduate Scholarship
- **Mariana Menegat** - Midwest ASAS 1st place PhD oral presentation, National ASAS Young Scholar
- **Madie Wensley -** K-State Donoghue Graduate Scholarship
- **Ashton Yoder** – Midwest ASAS 3rd place MS poster presentation
- **Roger Cochrane** – Midwest ASAS Young Scholar

Undergraduate Achievements - Congratulations!

Midwest ASAS Undergraduate Competitions

- Oral Competition
  - 1st: Katelyn Thomson, mentored by the Applied Swine Nutrition Team
- Poster Competition I:
  - 1st: Abbie Smith, mentored by Dr. Cassie Jones
- Poster Competition II:
  - 1st: Ethan Sylvester, mentored by Dr. Cassie Jones
- Poster Competition III:
  - 1st: Haley Wecker, mentored by Dr. Chad Paulk
  - 3rd Michael Braun, mentored by Dr. Chad Paulk

- Chloe Creager - Top 3 Poster Presentation Award from Gamma Sigma Delta Undergraduate Research Showcase.
- Chloe Creager and Gage Nichols - Each won Gamma Sigma Delta Undergraduate Research Award.
- Katelyn Thompson - Represent K-State at the Undergraduate Research Day at the Capitol.

Building Unique Experiences

Mar'Quell Collins

Building Tomorrow's Swine Leaders

West Finishing Barn
1980: $100,000

Finishing Barn
2009: $850,000

Farrowing &
Old Nursery
1968

Breeding
1968

Cost are at the time
of construction

Office, Classroom, &
Student Apartments
1968

South Nursery
2014: $350,000

Gestation
2000: $250,000

Existing Farrowing House

Existing Nursery

Phase 1 and 2 Focus

- Phase 1: Replace aging nursery facility built in 1968
  - Expected cost: $350,000
  - Why – facilities are required to train undergraduate and graduate students and to conduct breakthrough and exploratory research before taking to field research facilities.
- Phase 2: Replace farrowing facility built in 1968
  - Expected cost $300,000
  - Similar to the nursery facility, the farrowing facility is critical for training of students and conducting research.

Financial and effort efficiencies would be gained by constructing Phase 1 & 2 at the same time

Phase 3 and 4 Focus

- Phase 3: New on-site student housing and classroom at the K-State Teaching and Research Center
  - Expected cost $300,000
  - Original building was built 50 years ago in 1968. Although it has been remodeled over the years to accommodate farm biosecurity, it is nearing the end of its useful life.
  - Facility would include an apartment to house 3 student employees and provide an office, workshop, and classroom.
- Phase 4: Establishment of endowed chairs and professorships
  - Endowed chairs and professorships are needed to ensure swine positions are maintained in the long-term future at Kansas State University and for salary to be competitive with industry positions.
  - Endowed Professorships require a $1 million endowment
  - Endowed Chairs require a $2 million endowment

Current Status

- Generous and unsolicited gift of $250,000 was already provided by Roy and Linda Henry
- Additional momentum to cover Phase 1
- Raise remaining funds from industry friends, partners, and beneficiaries of our program
- Goal: New farrowing house and nursery in use by 2020