

PROBLEMS WITH LARGER CATTLE AT SLAUGHTER



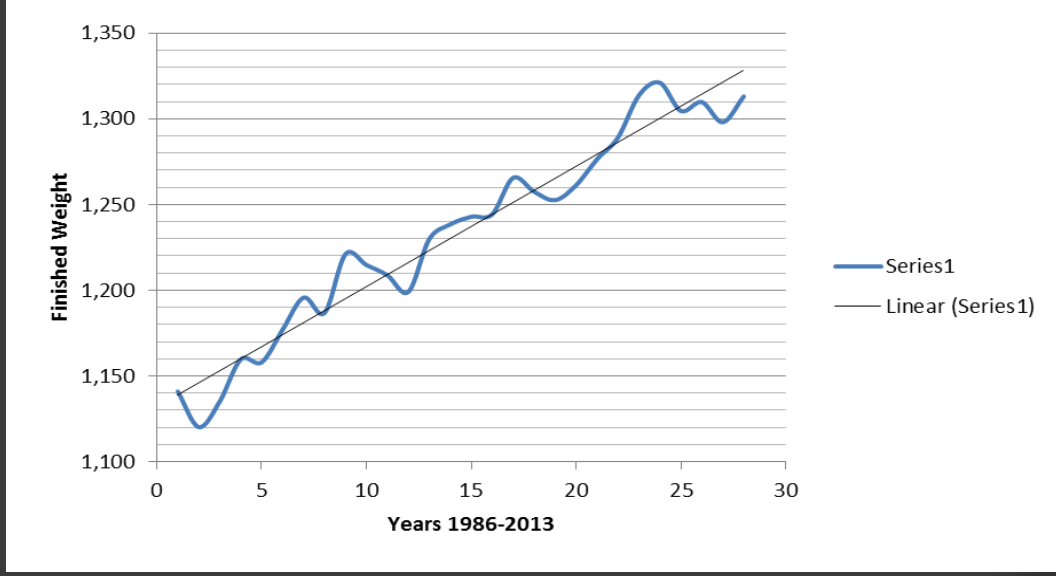
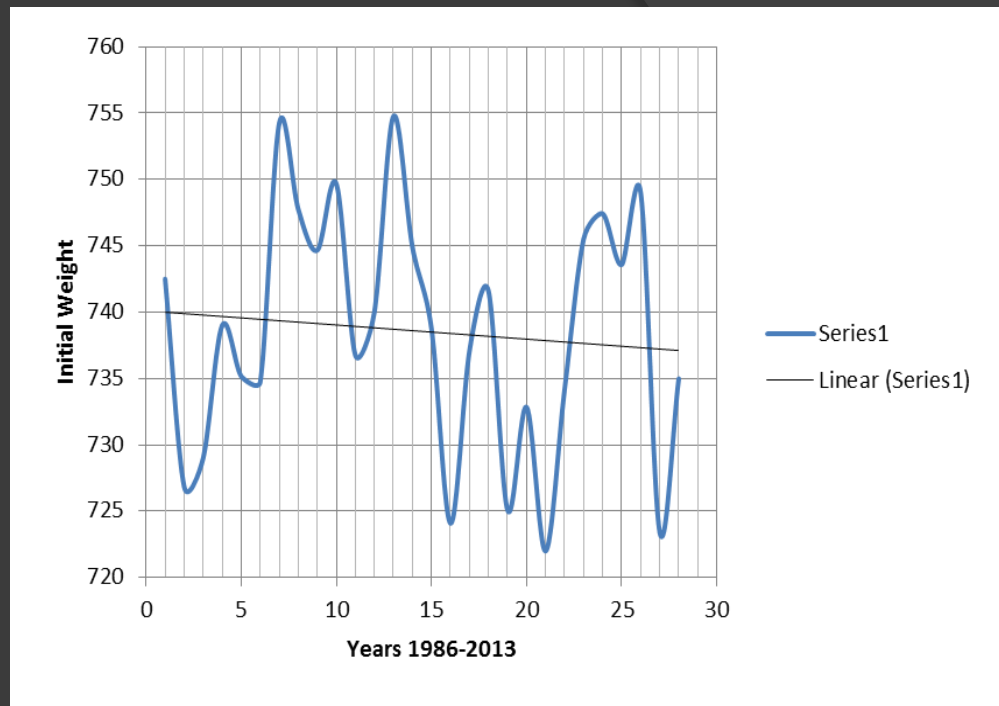




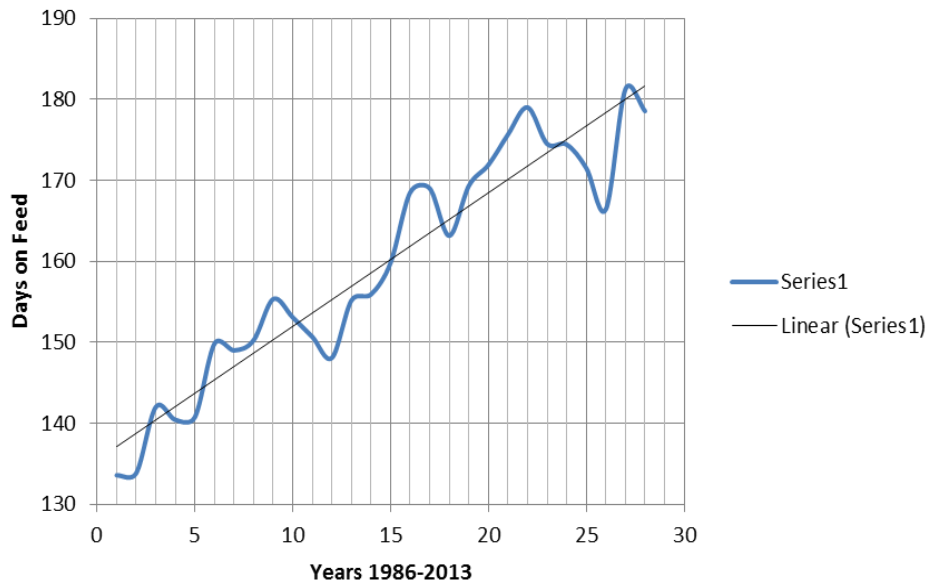
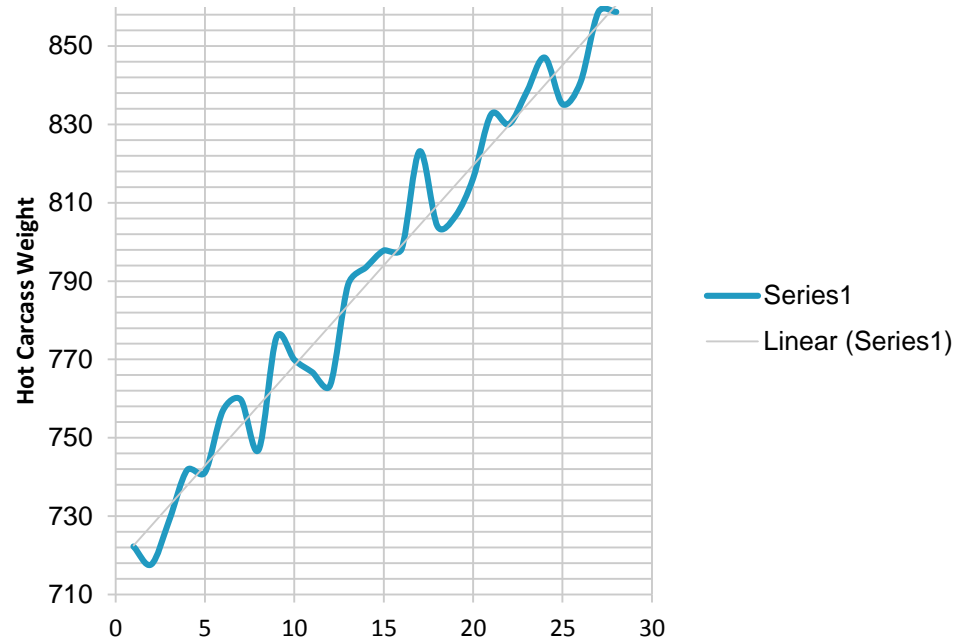
What Has The Industry Been Doing Lately?



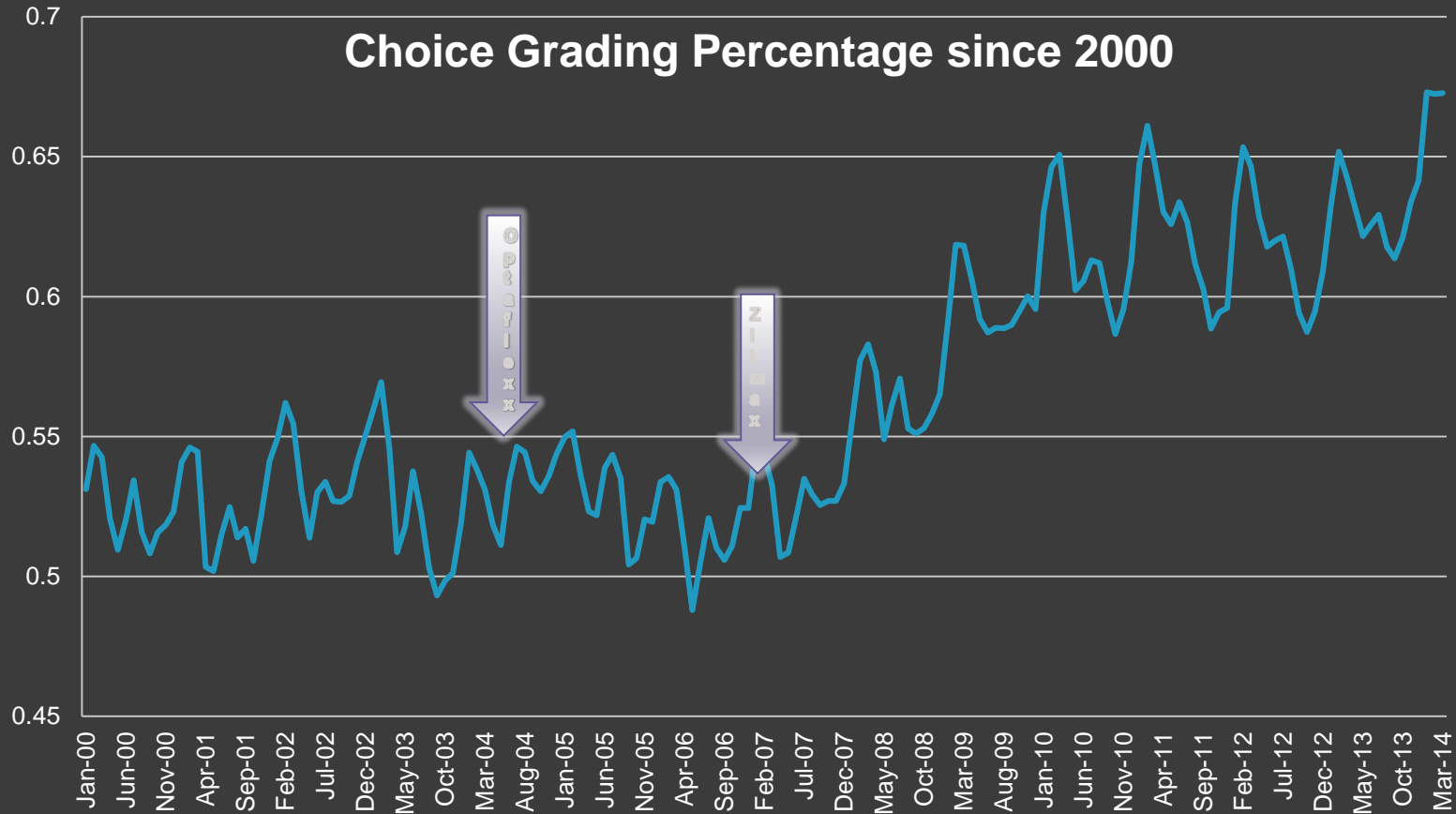
Historical Data



Historical Data



Choice Percentage since 2000



Source: Urner Barry Comtell

Two issues we have been examining associated with larger out weights

- Bruising on carcasses
- Fatigued cattle syndrome

Shipping cattle to slaughter

- ◎ 1995 National Beef Quality Audit:
 - Carcass bruising → \$4.03/animal = \$114 million/year

- ◎ Adjusting for inflation, as of 2015:
 - Carcass bruising → \$6.26/animal = **\$188 million/year**

Population Descriptors

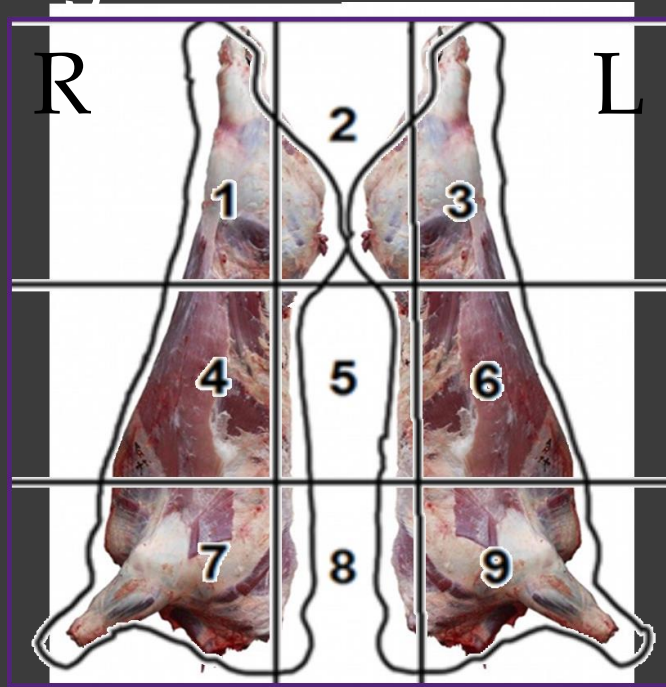
- ◎ 8,050 crossbred feedyard cattle
 - Southwest Kansas and West Texas Feedyards
- ◎ 774 ± 84 lbs. in Weight
- ◎ 148 ± 23.5 DOF

Bruising Measurements

- The bruising scoring system from Harvest Audit Program™ was used to score bruises
- Bruises scored for location and severity
 - Severity = size, NOT color
- Anatomical location and severity were evaluated subjectively by one trained observer

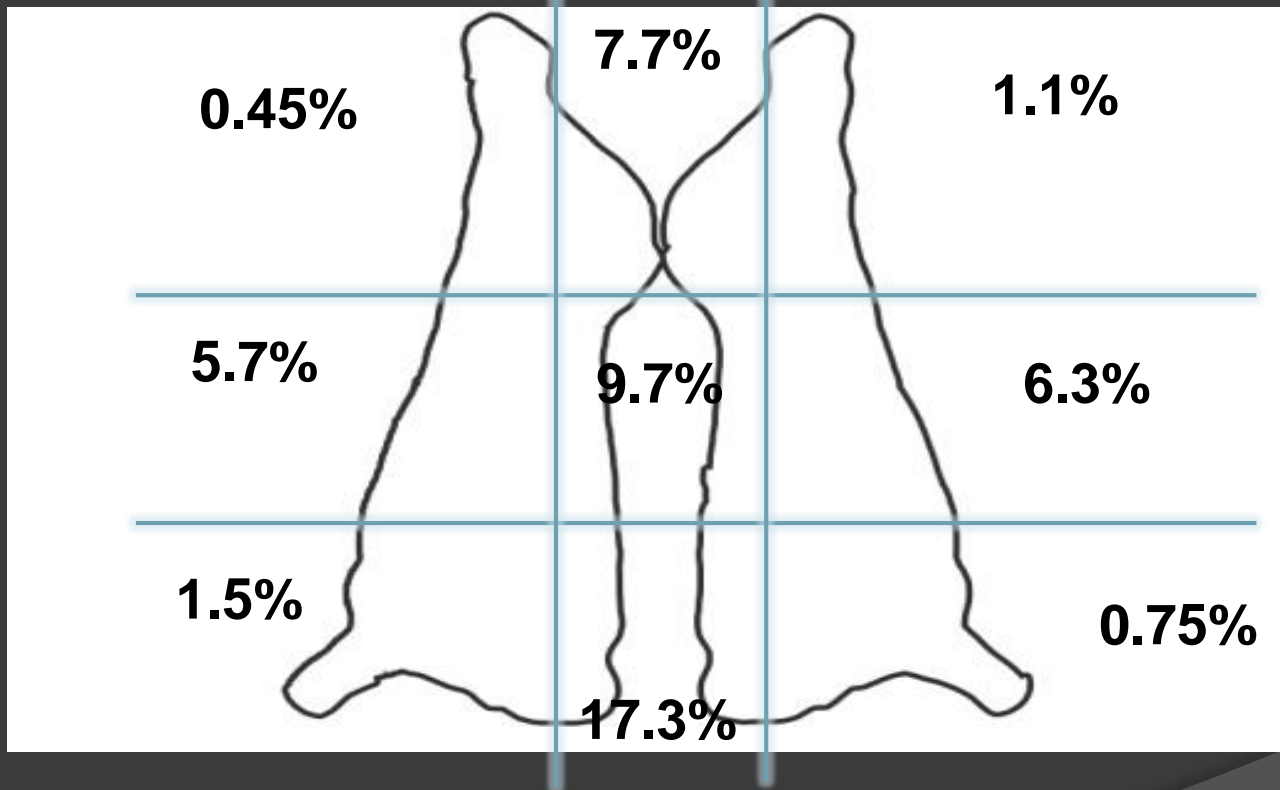
Anatomical Location

- Nine regions





Bruising Prevalence By Location



Conclusions

- The dorsal midline and central regions of the carcass are the most common locations to be bruised
- 53.5% of beef carcasses had at least 1 bruise

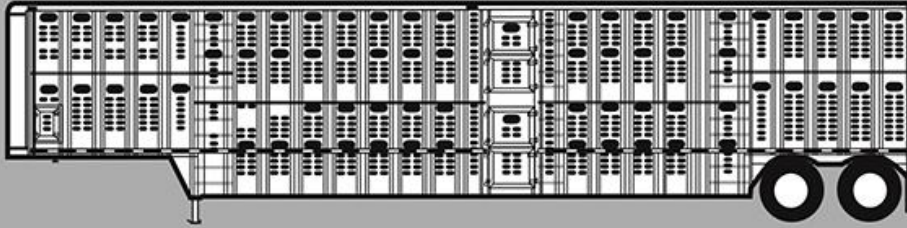




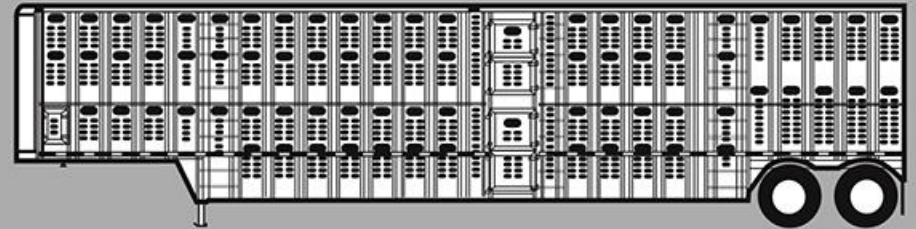
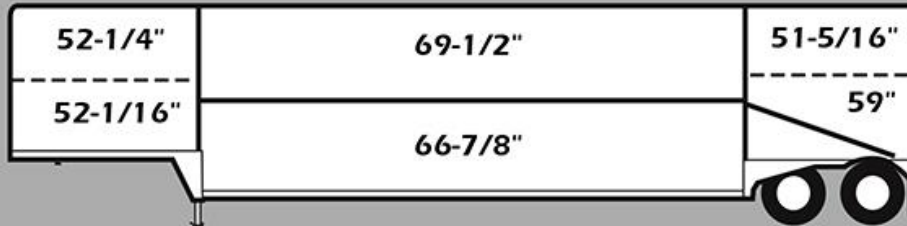
Conclusions

- Further research is needed to assess other factors that might have an influence on bruising prevalence of beef carcasses
 - Handling stress
 - Trailer design
 - Facilities

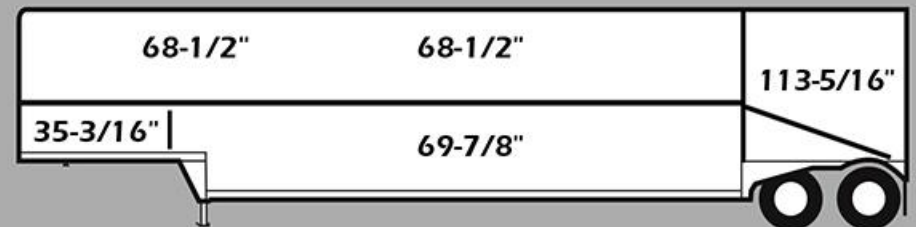




PSDCL-402 Cattle/Calf Model



PSDCL-406 Fat Cattle Model



Results: Trailer Type

	Combo	Fat	Unclassified	Total
Plant 1	8	117		125
Plant 2	64	32	2	98
Plant 3	86	2		88
Total	158	151	2	311

Results: Traumatic Event Prevalence by Trailer Type

	Average Prevalence
Combo	19.4%
Fat	20.4%
Grand Total	19.8%



Fed cattle welfare and transport: Where are we going ?

- Designed experiments are possible
 - Compare “fat” vs. “combo” trailers
 - Logistics are key!
 - Feedyard
 - Driver
 - Packing facility



DESCRIPTION OF A NOVEL FATIGUED SYNDROME OF FINISHED FEEDLOT CATTLE FOLLOWING TRANSPORTATION



D.U. Thomson, G.H. Loneragan, B.Bawa, S. Ensley and J.N. Henningson

J. Amer. Vet. Med. Assoc. Vol 247, No. 1, p 66-72.

- ⦿ Tachypnea
 - Abdominal component
- ⦿ Lameness
- ⦿ Muscle tremors
- ⦿ Reluctance to move
- ⦿ Hoof wall slough



EFFECTS OF STRESS ON CATTLE WITH HEREDITARY MUSCULAR HYPERTROPHY

I.H.G. Holmes, 2 C. R. Ashmore and D. W. Robinson
JOURNAL OF ANIMAL SCIENCE, vol. 36, no. 4, 1973

- ◎ **16 Hereford heifers; 16 Double-muscled cattle (varying ages)**

- ◎ **A) *Nutritional Stress.***
 - Food withheld 2 days prior to slaughter (Water available)

- ◎ **B) *Simulated Physiological Stress.***
 - Epinephrine, @ 6.6 mg/100 kg injected s.c. 48 h & 24 h pre-slaughter (*Ashmore et al., 1971*)

- ◎ **C) *Exercise.***
 - Animals driven slowly by horse in a 300 m circular lane until exhausted
 - Run ≥ 8 km w/ five halts ~ 8 min. each for blood sampling
 - Total exercise $\sim 1\text{-}3/4$ hours.

Comparison of lactate and creatine kinase levels in cattle relative to β AA feeding status and time to relative to slaughter

	Control Pre	Zilpaterol Pre	Ractopamine Pre	Control Slaughter	Zilpaterol Slaughter	Ractopamine Slaughter	Adverse Event
Lactate, mM/L	2.71	2.27	1.89	13.1	11.5	12.0	25.6
CK, IU/L	217.1	156.2	205.5	523.6	776.4	728.7	6889.5

Lactate for hogs: 11 mM/L lactate normal at slaughter while 30 mM/L = downers



Impacts of Handling at the Time of Shipping to Harvest in Cattle Not Fed a Beta Adrenergic Agonist

D.A. Frese, C. D. Reinhardt, S. J. Bartle, D.N. Rethorst, J. P. Hutcheson,
W.T. Nichols, B.E. Depenbusch, M.E. Corrigan, and **D. U. Thomson**,

Journal of Animal Science, Accepted November 2015

Materials and Methods

- ① 10 groups of 4 head black steers
 - Near market weight
 - Generalized complete block design.
- ① Stratified by backfat and weight
 - Pre-allotment screening
 - Blocked by walk/run paired groups
- ① Randomly assigned to treatment
 - Aggressive
 - Four at a time
 - Kept at a minimum of a trot
 - Low-stress
 - Four at a time
 - Kept at a walk
 - Lead rider
- ① Animals handled around ~400 meter course
 - Maximum of four laps
- ① Sample collections
 - Baseline
 - ~ ½ mile
 - ~ 1 mile
 - 1 hour rest
 - 2 hours rest

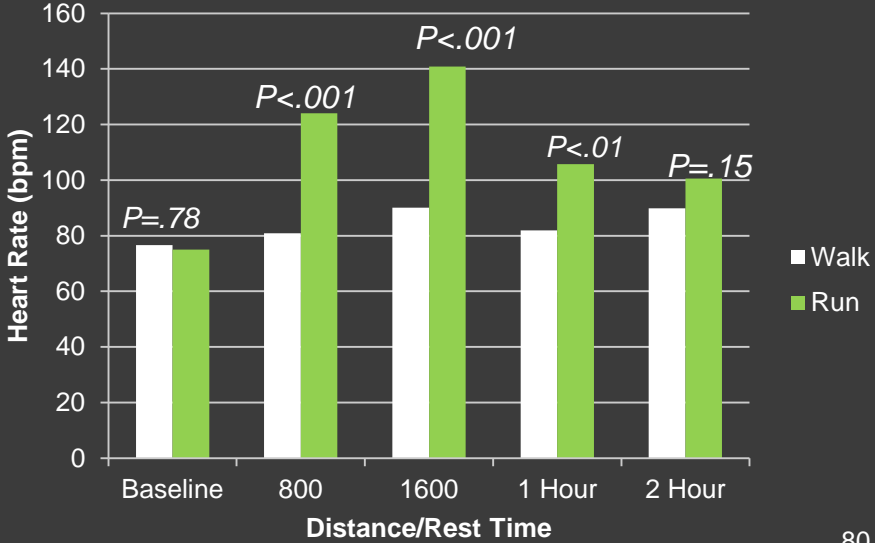
Low-stress Handling (LSH)



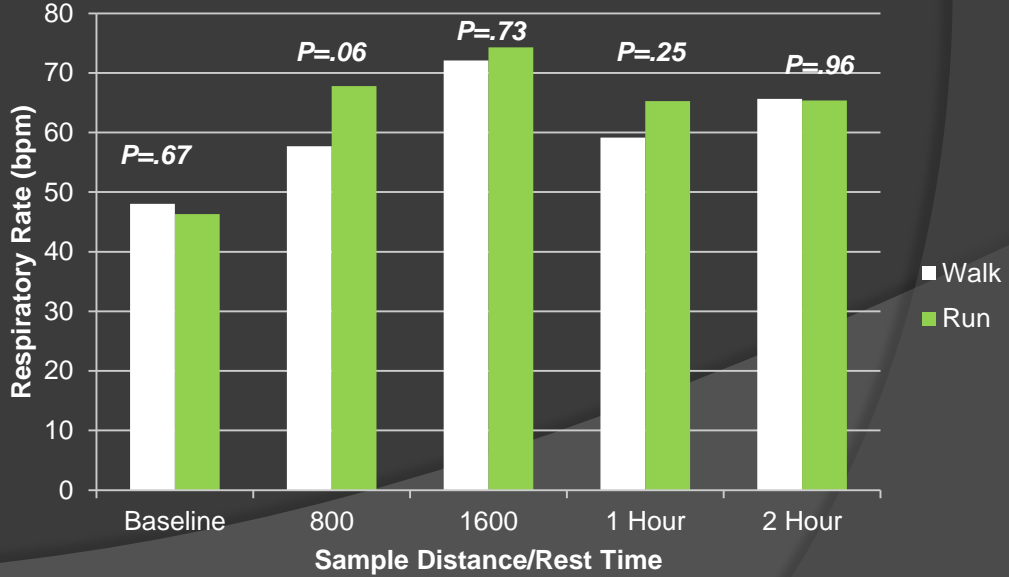
High-stress Handling (HSH)



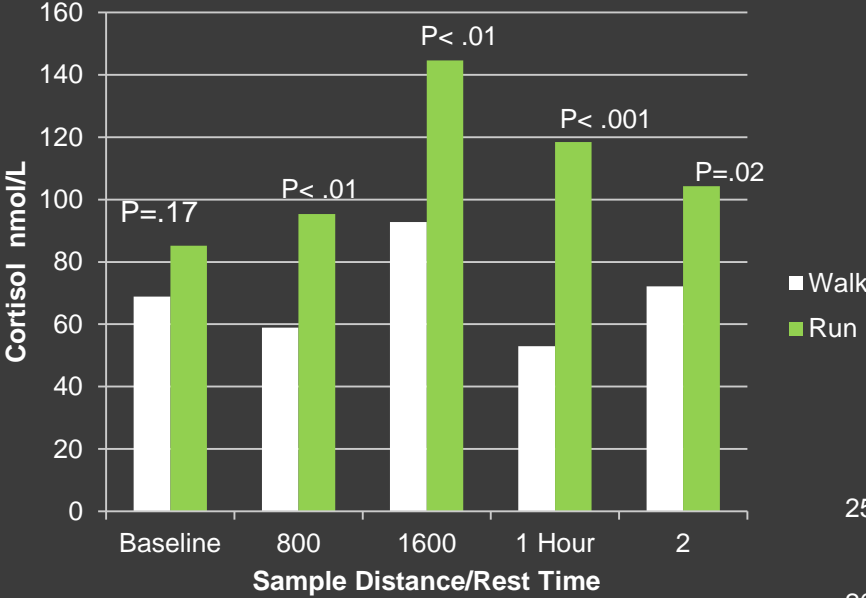
Heart Rate



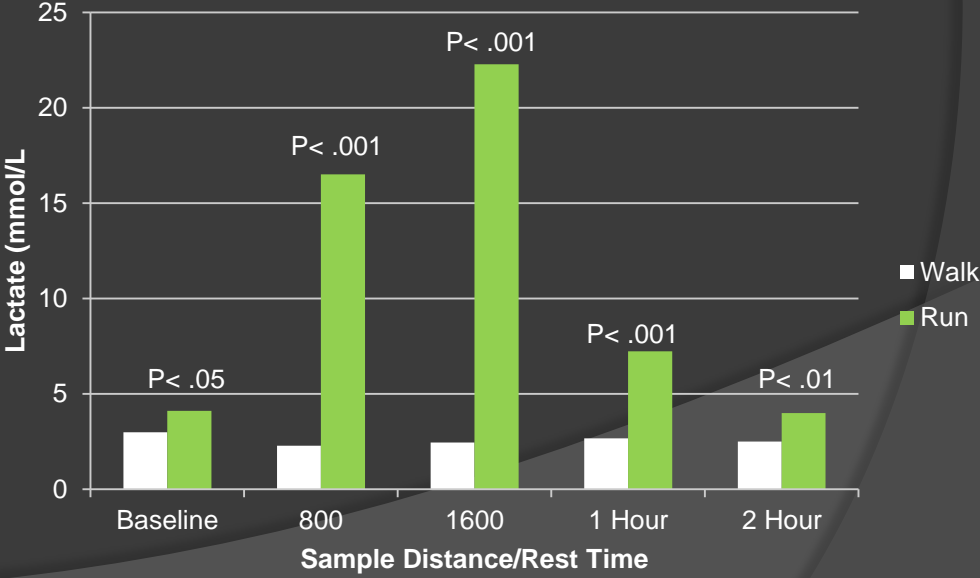
Respiration Rate



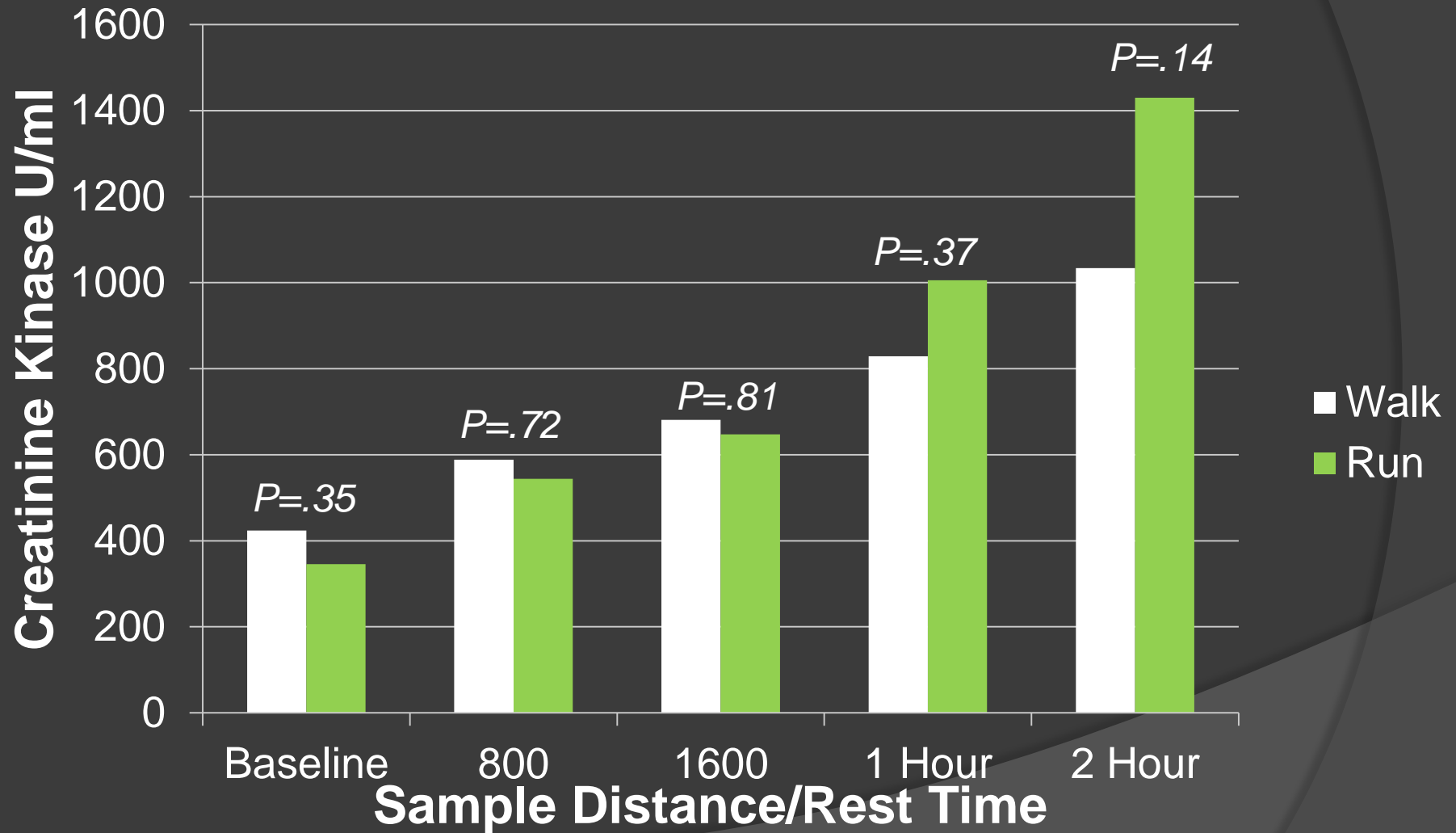
Serum Cortisol



Blood Lactate



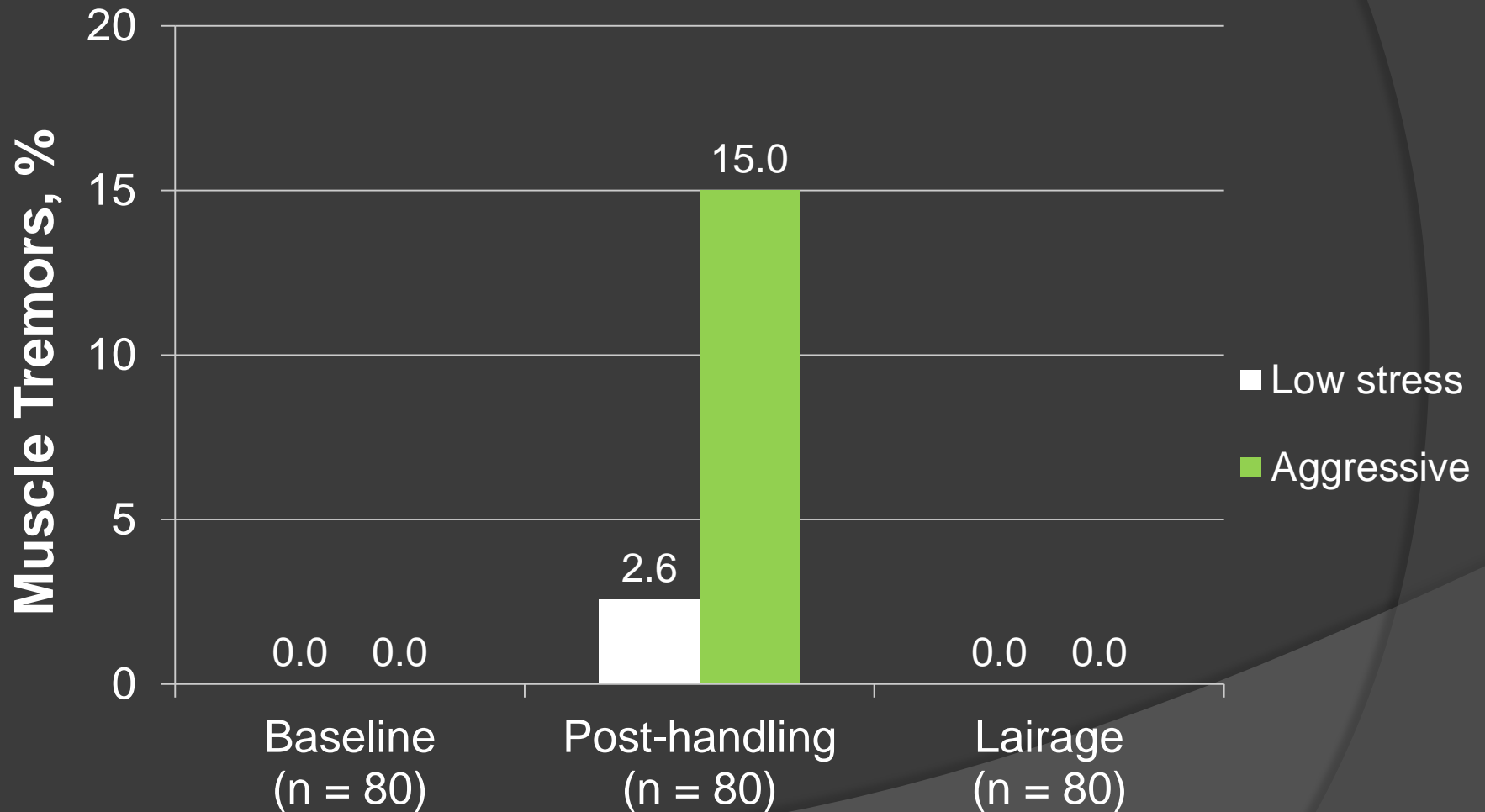
Plasma Creatinine Kinase Values



Interaction between degree of finish and cattle handling on serum biochemistry of beef cattle.

	BF GROUP	BASELINE		Post-handling		P Value
		LSH ⁸	AH ⁹	LSH	AH	Trt x Backfat
Item						
Plasma lactate (mmol/L)	THIN	2.95	4.70	2.27	18.1	P=.06
	FAT	3.00	3.63	2.63	27.3	
Blood pH	THIN	7.42	7.44	7.47	7.26	P < 0.01
	FAT	7.42	7.42	7.47	7.10	
HCO₃⁻	THIN	29.5	28.6	29.3	15.0	P < 0.01
	FAT	30.9	30.0	29.5	9.6	

Muscle Tremors



FCS: Multi-factorial syndrome

- ◎ Need for education, diagnostics, mitigation
 - Animal handling
 - Heat stress
 - Time of day at shipping
 - Distance from pen to load out
 - Out weight/finish of cattle
 - Pen weights/crushing
 - Trucking
 - Time standing at plant
 - Nutrition day before shipping

Are Pre-harvest Stressors Additive?

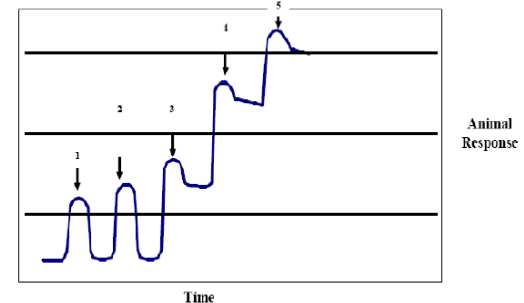


Figure 1. Adapted from Broom and Johnson (1993); Responses to a series of stimuli which, individually have moderate effects but which can be lethal in combination. 1 = Movement from home pen along alley way, 2 = Electric prod use 3 = Loading 4 = Transport 5 = Unloading.

Broom, D. M., and K. G. Johnson. 1993. Pages 87-110 in *Stress and animal welfare*. Chapman and Hall, Oxford, UK.
Hill, J., N. Berry, and A. K. Johnson. 2007. Fact sheet: handling and loadout of the finisher pig. Pork Information Gateway, Ames, IA.

Handling of finished cattle

- ⦿ Gathering in the home pen
- ⦿ Moving cattle in the yard
- ⦿ Pen weighing finished cattle
- ⦿ Holding pen management of finished cattle
- ⦿ Staging finished cattle close to shipping facilities



Loading and transporting finished cattle

- Loading facilities
- Handling cattle in a tub or bud box
- Proper trailers for finished cattle
- Transporting finished cattle
 - Driver education



Cattle handling and comfort at packing plants

- ⦿ Time spent on truck waiting for unloading dock
- ⦿ Lairage and cattle comfort
 - Shade, water cooling
 - Cattle density in a pen
 - Pen surface management
 - Time spent in lairage pen



Conclusions

- ⦿ Larger cattle are a different beast
- ⦿ Bruising
 - Trailer types
 - Facilities
- ⦿ Multi-factorial stressors culminating in FCS
 - Heat, size of cattle and handling

Thank you!!!

- PAC Partners

- KSU CVM

- Chris Reinhardt
- Steve Bartle
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- Mike Siemens
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- Merck Animal Health

