K·STATE
Research and Extension

Thinking outside the shots: Managing newly weaned calves

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Kansas State University

2016 New York Beef Producers' Association Annual Meeting, Winter Conference

BEEF STOCKER

Knowledge for Life

Animal Sciences used to be Animal Husbandry

About 492,000 results (0.37 seconds)

hus·band·ry

/ˈhəzbəndrē/

noun

1. the care, cultivation, and breeding of crops and animals.
   "crop husbandry"
   synonyms: farm management, land management, farming, agriculture, agronomy; More
2. management and conservation of resources.
   synonyms: conservation, management; More

Translations, word origin, and more definitions

Primary challenges to competitiveness for the next 5 years

- Capital requirements relative to ROI
- Feed input costs
- Other input costs (fuel/labor)
- Land availability/purchase and lease price
- Labor availability


BANANAS
PINEAPPLE
BANANAS
COCONUTS
PAPAYA

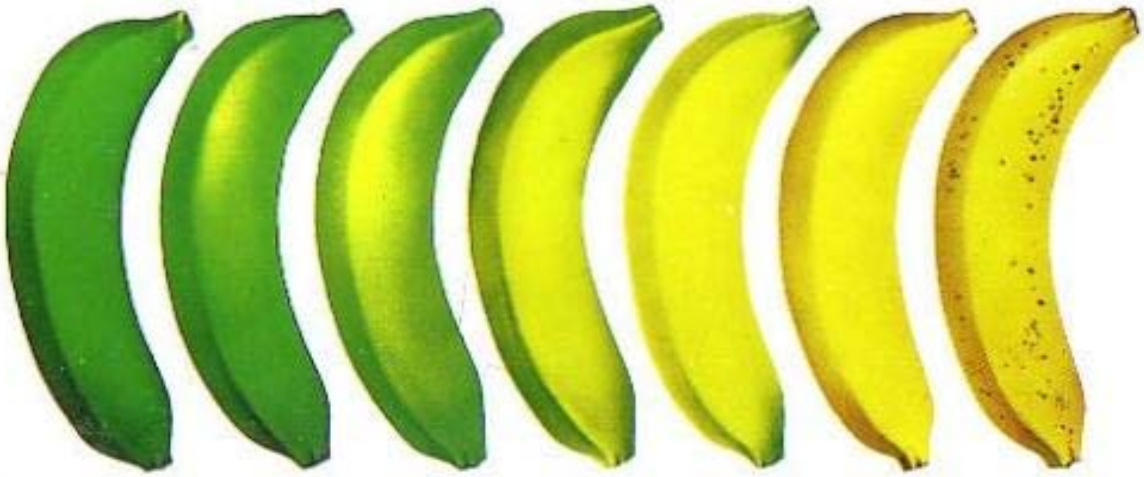
Suggested Guide for Banana Ripening

Pulp Temperatures °F

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
4 Day Schedule	ETHYLENE 64°	64°	62°	60°				
5 Day Schedule	ETHYLENE 62°	62°	62°	62°	60°			
6 Day Schedule	ETHYLENE 62°	62°	60°	60°	60°	58°		
7 Day Schedule	ETHYLENE 60°	60°	60°	60°	60°	58°	58°	
8 Day Schedule	ETHYLENE 58°	58°	58°	58°	58°	58°	58°	58°

Notes:

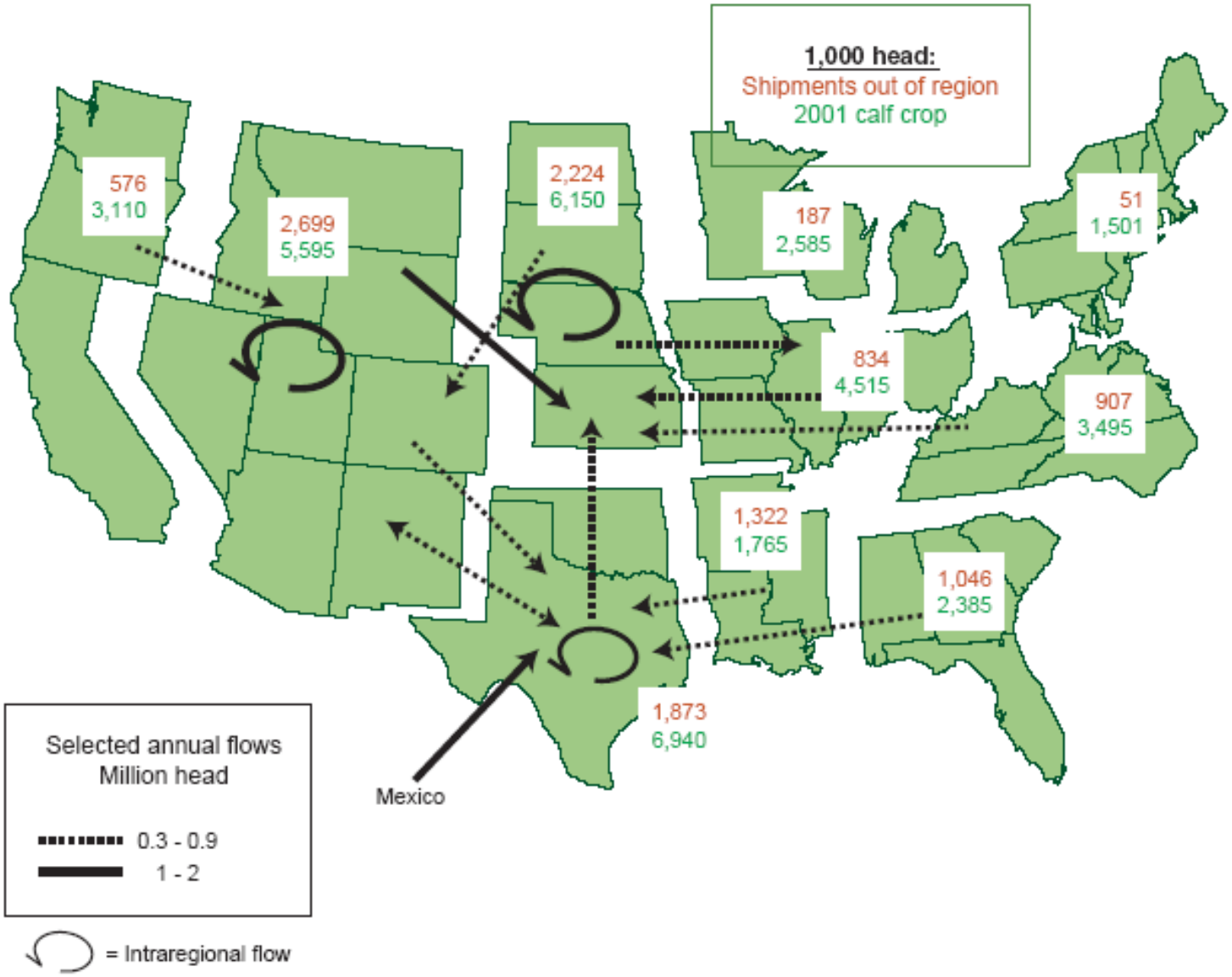
- Temperatures are °F
- Temperatures are PULP not AIR
- Proper temperature, humidity, time, air circulation, mature bananas and ethylene are required for ripening.
- Use the Super-Ripening Center® and Ethy-Gen® II to hasten ripening.
- Maintain 100-150 ppm of ethylene until color breaks.
- After 24 hour ripening initiation period, vent room for 15-20 minutes with fan on.
- For delayed shipment hold at 58°F.



Color Index No.	1	2	3	4	5	6	7
Peel Color	Green	Green – trace of yellow	More green than yellow	More yellow than green	Green tip	All yellow	Yellow – flecked with brown

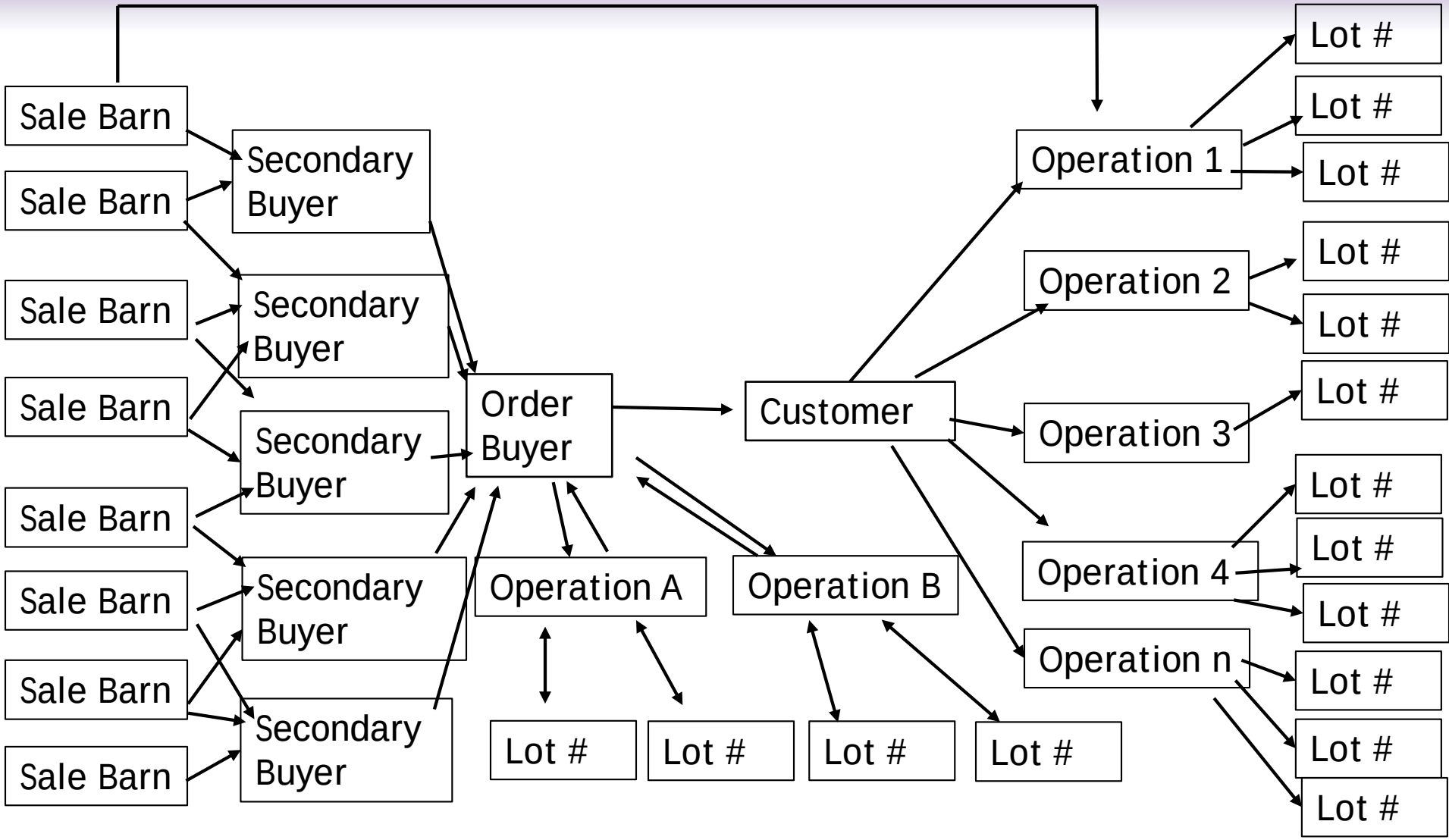
In a perfect world, upon arrival, all calves would be:

- Healthy (not stale)
- Right breed combination
- Castrated
- Dehorned
- Upper medium/large frame
- Heavy (not extreme) muscling
- Available in truck-sized lots



Source: State certificate data (generally 2001) compiled by Economic Research Service, USDA.

Direct


Sale Barn
Sale Barn
Sale Barn
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Sale Barn
Sale Barn
Secondary Buyer
Secondary Buyer
Secondary Buyer
Secondary Buyer
Secondary Buyer
Order Buyer
Operation A
Operation B
Customer
Lot #
Lot #
Lot #
Lot #
Operation 1
Operation 2
Operation 3
Operation 4
Operation n
Lot #
Lot #
Lot #
Lot #
Lot #
Lot #
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Lot #
Lot #

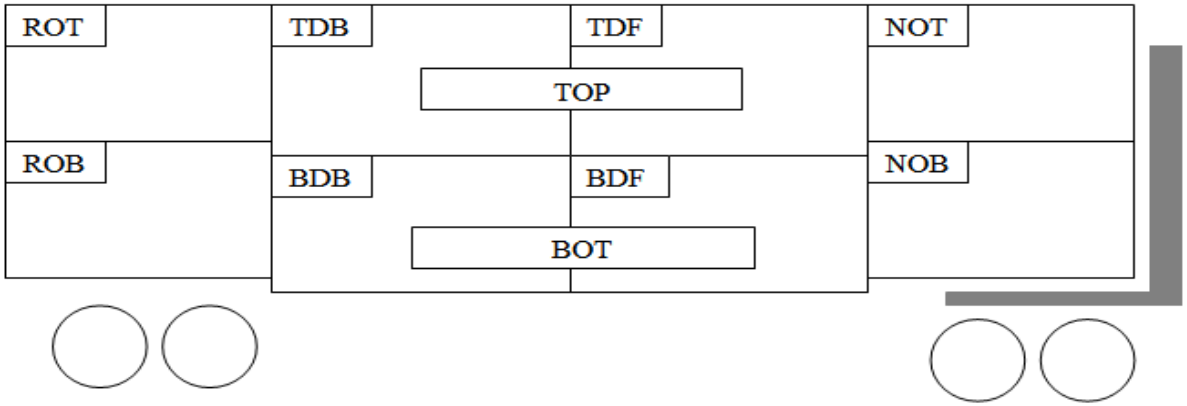
Stressors Encountered at Weaning

- Separation from dam
  - Milk deprivation
  - Change in solid feeds
  - Change in environment
    - Sale barns
    - Commingled and sorting

Stresses Encountered in Transit

- Further commingled
- Diesel fumes
- Loud noises
- Poor sanitation
- Start and stop, speeds, and turns
- Extreme weather
- Shrink (water and feed deprivation)

R^2 of beef calf wellness/ weight gain with location in a truck



- Calves in ROT section had lower gains compared to NOT, TOP and tended to be lower than BOT and NOB (P<.10)
- Cattle in the forward sections (NOT,NOB) were sig (p=.02) less likely to be treated at least once compared to cattle in the TOP and BOT.
- Calves with compartments with 15 hd or less tended to have lower odds of being treated compared to cattle in compartments with 16 – 30 head.

White et al., 2009

Arrival Management Strategies

Anatomy of a Successful weaning/receiving Program

- **Proper planning**
- Functional equipment
  - Working facilities
  - Waterers
  - Feeders
- Quality ration ingredients
- Astute management

Equipment Specs

- Throat height no more than 18”
- Calves weighing up to 600 lbs
  - 18 to 22” bunk space/head
- Free-choice hay feeders
  - 6 to 8” space/head

Hayrack Design

- Fenceline placement
- Visual feed
- Small squares

Drought and other adverse weather

Weather Extremes

Drought

- Changes forage quality and abundance – drought – protein quality, energy content, digestibility, trace minerals (Zn, Cu, Se)
- Changes water quality
- Changes cattle management practices – early weaning, out of season supplementation, preserving cow condition

Extreme Cold

- Changes calf viability – cold, wet and windy
- Changes cow's ability to mount a good immune response

Rain

- Increased flies
- Weeds and grass bloom

Weather – Effect on Immunity

- Trace minerals – impacts response to vaccines and ability of a calf to fight disease causing organisms
- Low cow body condition – lower amount and quality of colostrum
- Absorption of colostrum - cold temperatures impact calving ease and reduces colostrum intake

Weather Extremes - Outcomes

- Increased brood cow herd problems – abortions, pneumonia in cows, pinkeye
- Increased calf problems – weak calves at birth, higher scours rates, increased summer pneumonia cases, higher parasite loads
- Increased weaning problems – poor response to vaccines, increased pneumonia cases with poor response to treatments
- Yearlings and replacement heifers – reduced performance, poor reproductive performance, pinkeye

Weather Extremes - $$$$$

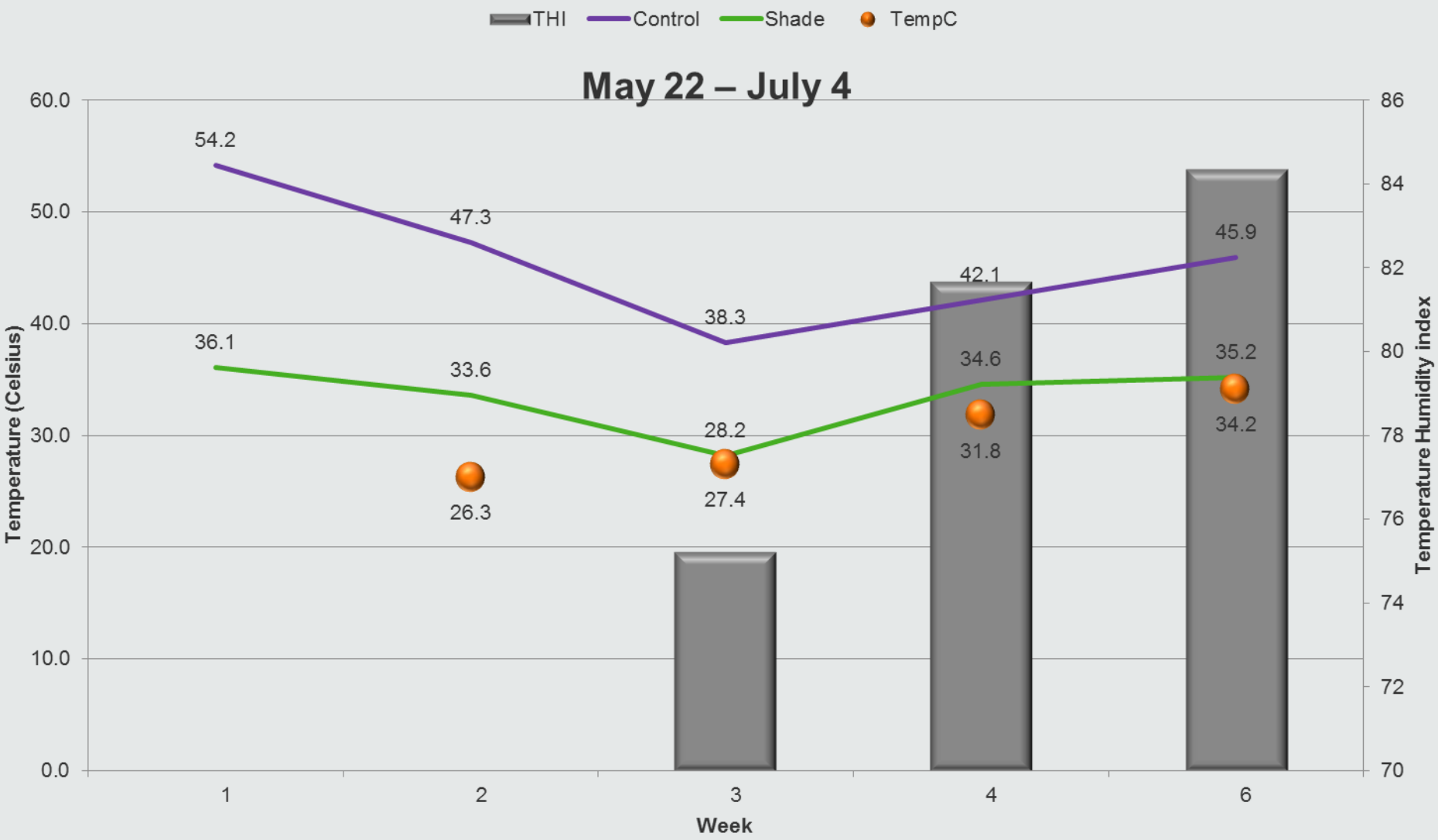
- Supplementation expenses – micro- and macro-nutrients – amount, sourcing and timing of delivery
- Commuter cattle
- Marketing changes
- Implant program revision
- Health products – choices and timing of delivery

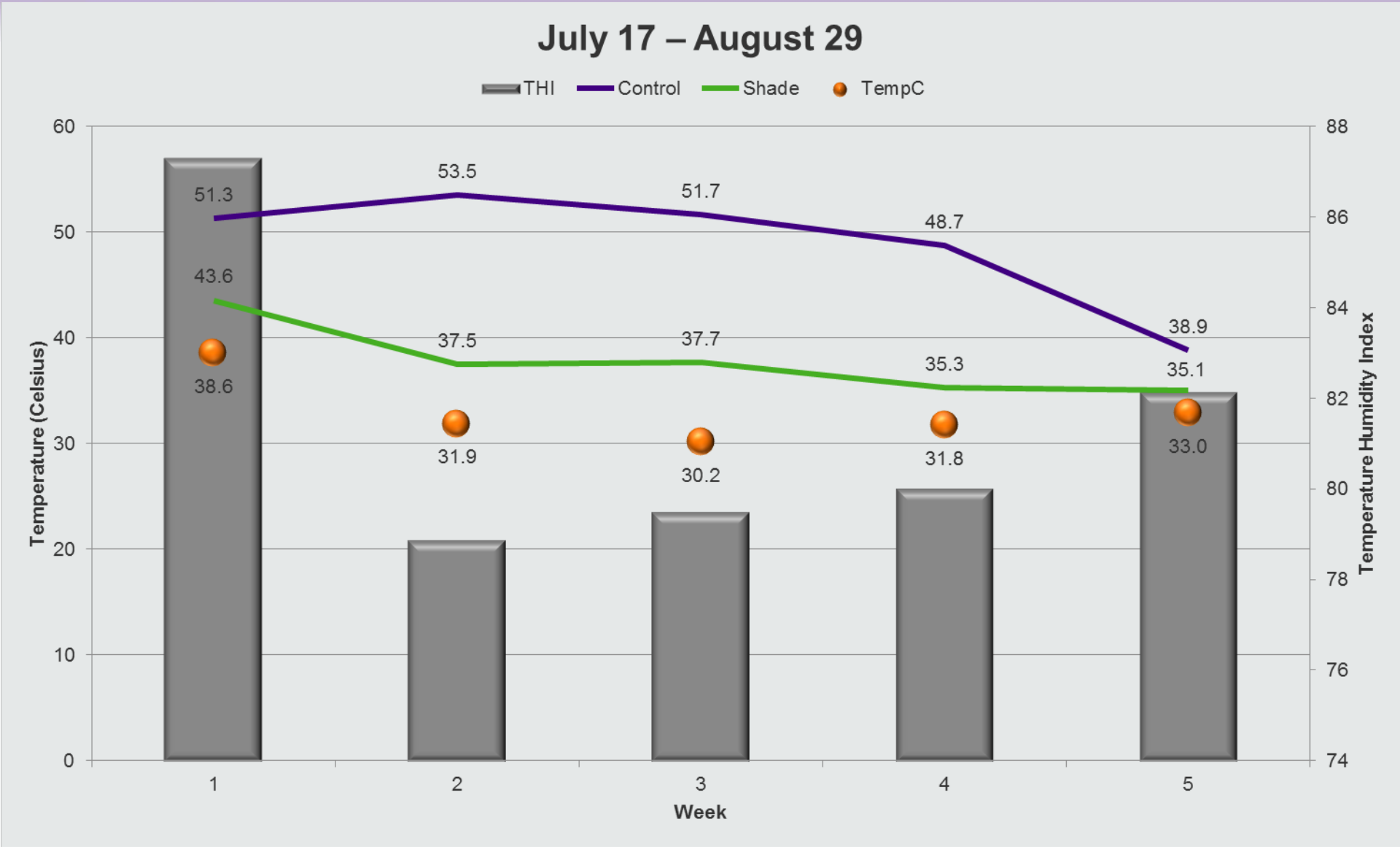
Effects of shade on performance, health, physiology, and behavior of newly-arrived, high-risk, heat-stressed beef calves

Objective:

To determine the effects of shade use in receiving cattle systems on:

- Heat stress abatement
- Feedlot performance
- Pen environment
- Behavior


THI
Control
Shade
TempC
May 22 – July 4
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Temperature (Celsius)
86
84
82
80
78
76
74
72
70
Temperature Humidity index
54.2
47.3
38.3
42.1
45.9
36.1
33.6
28.2
34.6
35.2
26.3
27.4
31.8
34.2
1
2
3
4
6
Week


July 17 – August 29
THI
Control
Shade
TempC
Temperature (Celsius)
Temperature Humidity Index
Week
0
10
20
30
40
50
60
74
76
78
80
82
84
86
88
1
2
3
4
5
51.3
53.5
51.7
48.7
38.9
43.6
37.5
37.7
35.3
35.1
38.6
31.9
30.2
31.8
33.0

- Use of shade during the initial 28 days of the receiving period offered limited improvements in F:G and ADG.
- Pen surface temperatures were significantly different between shaded and control pens during both trials.
- Shaded cattle spent less time drinking, eating, and walking during the 3 day observation periods, especially when THI values were greater than 82.
- Respiratory rate and panting scores were reduced greatly by the use of shade.
- Application of shade reduced body temperature when daytime heat stress climbed greater than 78 THI; however, control calves compensated more rapidly.


SILENCER

Main Points of Health Program*

- Prompt processing of new cattle
- Early detection of sick cattle
- Effective treatment of schedules and records
- Recovery pen management

* The key to a good health program is preventive medicine

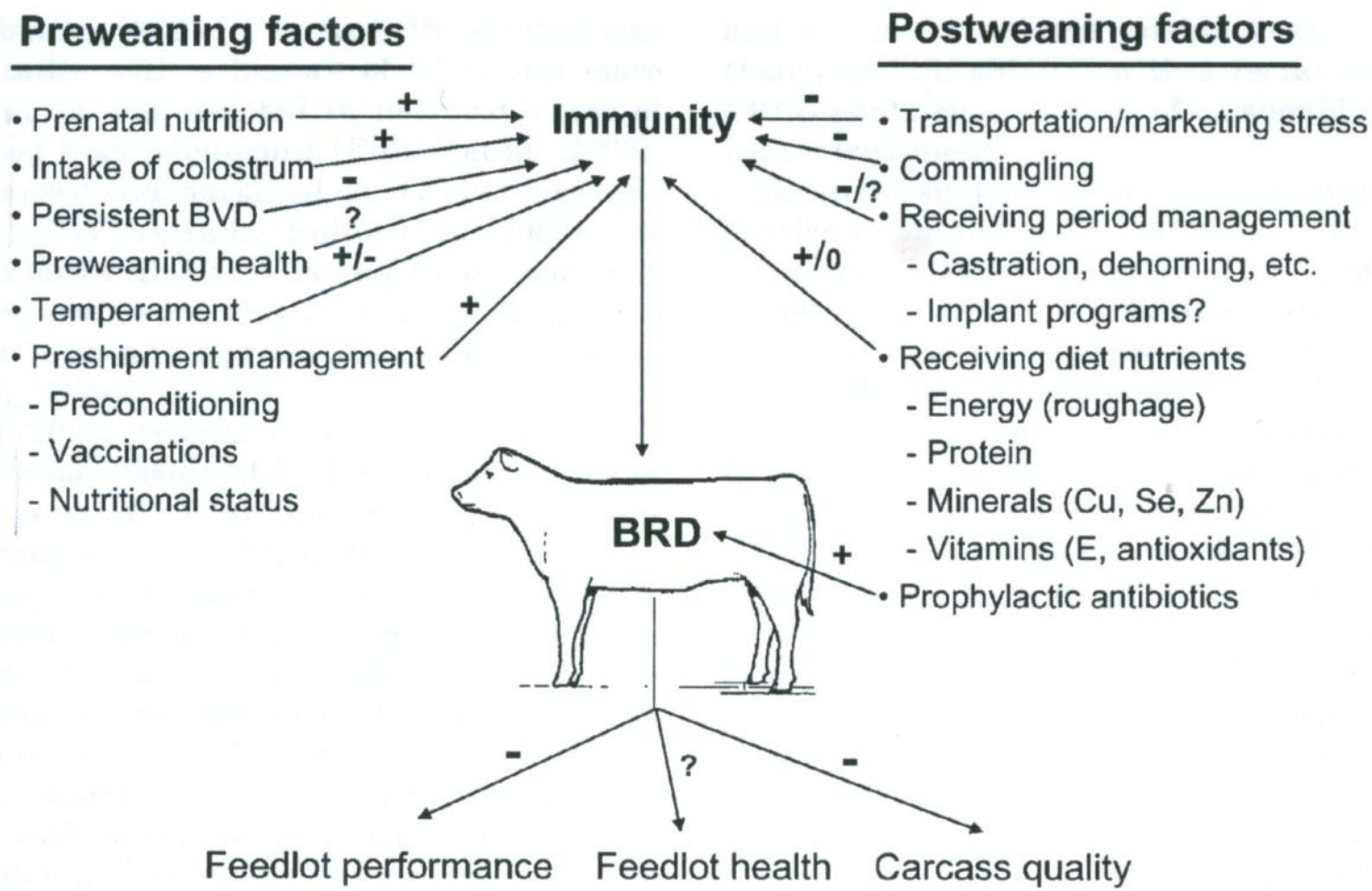
Profitable Processing

- Processing cattle morning after arrival
- Work cattle in small groups
- Vaccinate for bacterial and viral diseases
- Deworm, delouse and degrub
- Implant
- Castrate, abort, tip horns -- delay if sick
- Take temperature -- treat & I.D. sick cattle
- Keep processing and health records

Bovine Respiratory Disease Complex

- Primary infectious disease affecting cattle.
- Multifactorial nature
  - Pathogen
    - Common bacterial causes are Mannheimia haemolytica, Pasteurella multocida and Haemophilus somnus, Arcanobacterium pyogenes and Mycoplasma
    - Various viruses, especially IBRV, BVDV, BRSV and PI3 often play a significant role in BRD outbreaks
  - Environmental
  - Animal

Pre- and postweaning Factors Affecting BRD



Duff and Galyean, 2007

Health programs traditionally focus on intervention at arrival

- Vaccination – primarily viral but also Pasteurella and Histophilus and blackleg strains
- Deworming
- Fly and lice control
- Metaphylaxis – arrival use of antibiotics

The types of vaccines used can influence the inflammatory response

Endotoxin content

- Endotoxins injected into cattle can cause an animal to look sick, spike a fever and can suppress the immune response
- Frequently present in whole cell, Gram negative type vaccines (Ex: Pinkeye, Salmonella, Pasteurella, Histophilus, scours vaccines)
- Amounts vary but are generally low. The caution is the amounts can be additive if multiple vaccines are given at the same time
- Damaged or dated products can contain more endotoxin levels
- Endotoxins can be found in other types of injectables, not just vaccines

Change what's used

- Decrease sheer number of injectable products used
- Select products wisely – less irritating
- Don't stack gram negative or endotoxin prone products
- If use modified live viral vaccines in face of high level of inflammation can over compensate in response and decrease effectiveness of the vaccine (Roth, 2009)

A field study evaluating health, performance, and behavior differences in crossbred beef calves administered different vaccine-parasiticide product combinations

Published in *Vaccine* 2010; 28 : 5998-6005

Gregg A. Hanzlicek, Brad J. White, David G. Renter, Dale A. Blasi

Study Objective

- Compare health, performance, and behavior differences between two stocker-calf arrival health programs-one a minimally invasive program (MIN) and the other a more invasive program (MOR)

- Hypothesis: calves administered the minimally invasive program may outperform in health and performance and behave differently than calves administered the more invasive program.

Minimal Invasive (MIN)

- Arrival
  - 1 intranasal 4- way BRDC viral vaccine
  - 1 subcutaneous 2 cc Clostridium
  - Oral parasiticide
  - Topical parasiticide
- Revaccination (day 28)
  - 1 subcutaneous 2 cc Clostridium

More Invasive (MOR)

- Arrival
  - 1 intramuscular 4 –way BRDC viral vaccine
  - 1 subcutaneous 5 cc Clostridium
  - 1 subcutaneous parasiticide
- Revaccination (day 28)
  - 1 single antigen BRDC intramuscular vaccine
  - 1 subcutaneous 5 cc Clostridium

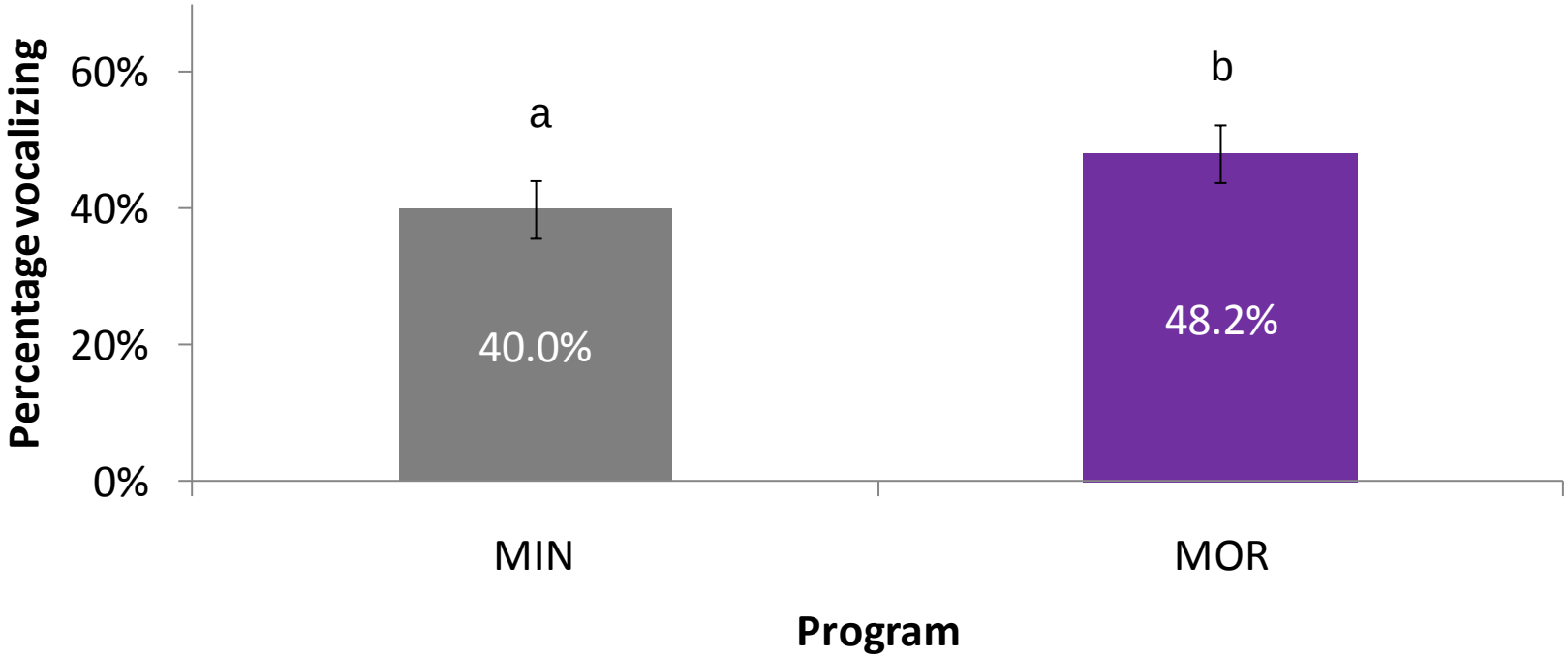
Study overview

- Kansas State Beef Stocker Unit (KBSU)
- Two replicates
  - Approx. 300 calves each
  - 3 truckloads/ replicate
- Approximately 42 days in length
- Crossbred bulls and steers
- Purchased through order-buyer
- Each truckload housed within 8 pens
  - 11-14 calves per pen

Outcomes

- Calf aversion to program administration (arrival only)
  - Vocalization
- Health-bovine respiratory disease (BRDC)
  - Morbidity
  - Mortality
  - Case-fatality
  - 1st treatment success
  - Chronicity
- Performance
  - ADG
    - Arrival to day 28
    - Day 28 to day 42
    - Arrival to day 42
  - Feed to gain
  - Feed intake (feed delivered)
- Behavior: 2 weeks after arrival and 2 weeks after revaccination (day 28)
  - Mean steps taken/24 hours
  - Percentage of time spent lying down/24 hours

Percentage Vocalizing at Initial Program Administration



Health—(BRDC)

Percentages and *p*-values for health outcomes by program			
Health Outcome	**Program**		***p*-value****
	MIN	**MOR**	
Morbidity	**59.7% (184/308)**	**47.8% (146/305)**	**0.02**
Mortality	3.5% (11/308)	1.9% (6/305)	0.25
Case Fatality	5.9% (11/184)	4.1% (6/146)	0.53
Chronic	16.8% (31/184)	11.6% (17/146)	0.24
1st Treatment success	39.1% (72/184)	35.6% (52/146)	0.58

Performance

(mortalities removed from data set)

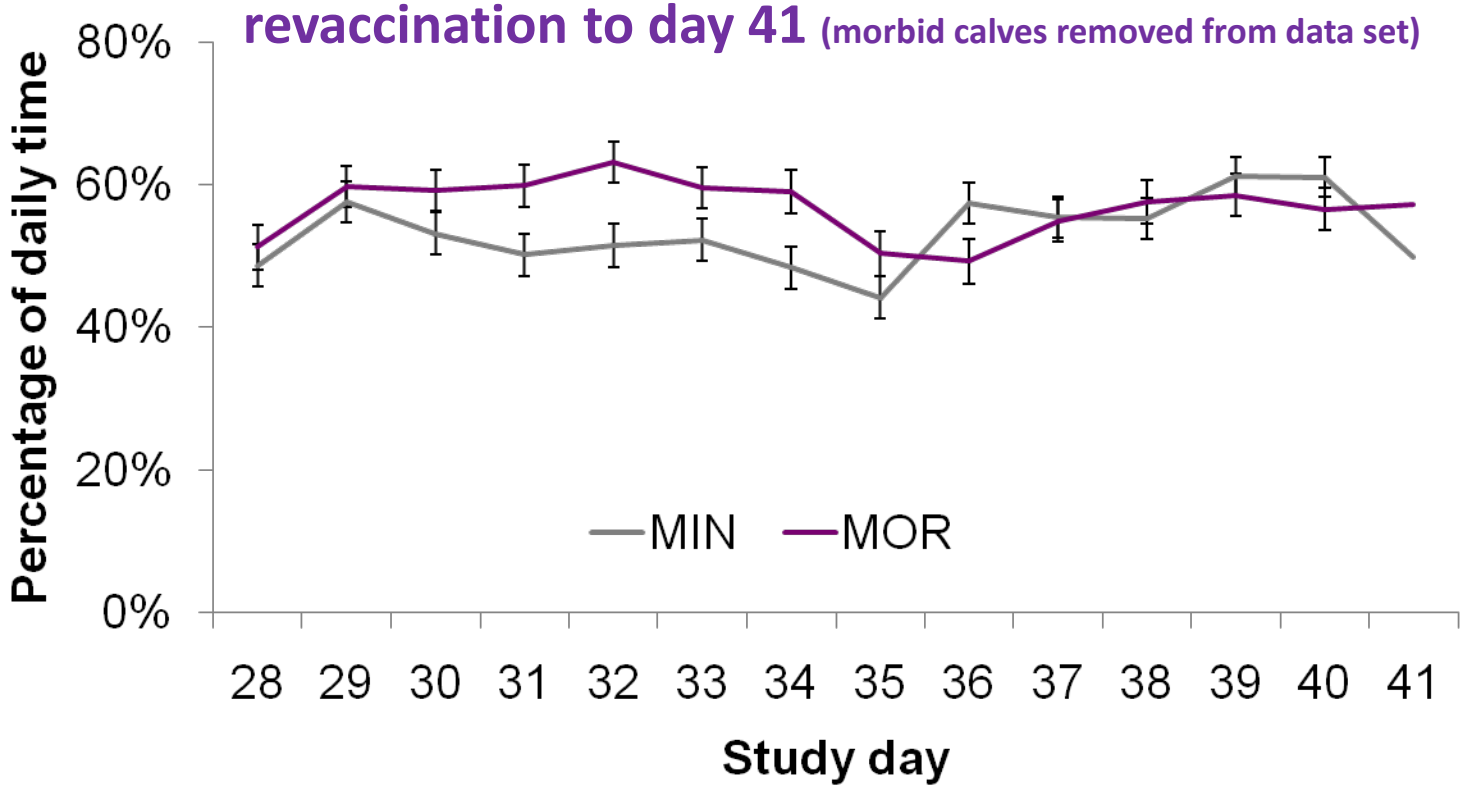
	Combined Reps		
Production parameter*	**MIN**	**MOR**	***p*-value**
ADG, (lbs) arrival to day 28	**2.74**	**2.95**	**0.04**
ADG, (lbs) day 28 to day 42	2.18	2.27	0.46
ADG, (lbs) arrival to day 42	**2.55**	**2.71**	**0.04**
Feed: gain (lbs as fed: lbs gain)	7.31	6.91	0.72
Feed intake (mean pounds/pen/day)	192.3	191.8	0.17
*Model included program as fixed and load and replicate as random effects			

Behavior—steps taken/24 hours

(morbid calves removed from data set)

Least square mean steps taken per 24 hour by program*			
	MIN	MOR	*p*-value
Arrival (day 1-13)	2620	2449	0.07
Revaccination (day 28-42)	3584	3362	0.23
Measured by pedometer *Gender, replicate and pen random effects			

Behavior: Percentage of time lying down revaccination to day 41 (morbid calves removed from data set)



Summary

- Unique study looking at complete arrival health programs
- Neither program was particularly effective in preventing BRDC in this study
- Differences found
  - Vocalization
  - Morbidity
  - Average daily gain
  - Activity

Metaphylaxis

- Clearest benefit of all processing practices (Taylor *et al.*, 2010)
- Reduces sickness and death losses about 50% (Schumann *et al.*, 1990, Gallo *et al.*, 1995, Guthrie *et al.*, 2004, Wileman *et al.*, 2009)
- Increases performance about 0.24 lbs./day (Wileman *et al.*, 2009)
- May not reduce chronic rates (Guthrie *et al.*, 2004)
- Allows cattle to adjust to the stresses of transport, commingling, processing and diet change

However, we see far to frequently that managers get "behind" on loads of cattle. Metaphylaxis is not a "cure-all".

KSU Stocker Unit Studies – 2012 -2013

- 4 studies were conducted over an 8-month period evaluating pre-shipment management strategies compared to minimal or full processing at arrival
- Over 1,000 head of heifers from the SE were used in the studies
- Sale barn origin – avg. weight 475, assembled over a three-day period

The Theory

Shift disease intervention from an at-arrival application to its use pre-shipment, as cattle are assembled. The goal was to aid in the control of bacterial, viral and parasitic pathogen loads as cattle are prepared to move from one management type to another.

Study Design

- BVD PI calves identified prior to shipment and removed
- 45-day studies
- Standard receiving and starting rations
- Treatment for BRD could begin the day following arrival
- All deads had complete necropsy and diagnostic workup

Study Design

- Three study groups:
  1) NPP – cattle given intranasal vaccine, dewormed and an antibiotic administered 3-5 days before arrival – processed at arrival with 5-way viral + Pasteurella and blackleg vaccines and implanted
  2) NMA – no processing pre-shipment, processed at arrival with 5-way viral +Pasteurella and blackleg vaccines, dewormed, implanted and no antibiotic given
  3) ZPA - no processing pre-shipment, processed at arrival with 5-way viral +Pasteurella and blackleg vaccines, dewormed, implanted and antibiotic given

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KSU Pre-shipment Study Outcomes

		NMA Group 24 pens (309 head) No process preship- No AB			NPP Group 24 pens (310 head) Process pre ship w/ AB			ZPA Group 32 pens (412 head) No process preship; AB admin		
	P value	Mean (SE)	Lower CI	Upper CI	Mean (SE)	Lower CI	Upper CI	Mean (SE)	Lower CI	Upper CI
BRD Morbidity (%)	< 0.01	65.61[a] (5.10)	54.90	74.93	52.51[b] (5.53)	41.58	63.21	38.21[c] (5.01)	28.87	48.52
First Tx Success (%)	0.11	48.02 (3.82)	40.54	55.60	45.73 (4.13)	37.70	53.98	58.50 (4.19)	50.01	66.51
Case Fatality (%)	< 0.01	9.86[a] (2.75)	5.59	16.81	24.10[b] (5.12)	15.40	35.64	9.73[a] (2.92)	5.27	17.27
Chronic (≥ 3 Tx) (%)	< 0.01	19.65[a] (3.04)	14.30	26.39	14.45[ac] (2.51)	10.14	20.18	8.67[b] (1.64)	5.82	12.45
Overall Mortality (%)	< 0.01	7.07[ac] (1.93)	4.07	12.00	12.15[b] (2.86)	7.52	19.06	5.25[c] (1.45)	3.01	9.00

Knowledge for Life

KSU Pre-shipment Studies: "Lessons Learned"

Compared to pre-shipment processing, full processing at arrival

- Decreased sickness 27.2%
- Increased first treatment success rates 21.8%
- Decreased deads by 56.8%
- Decreased case fatality rates by 59.6%
- Decreased chronics by 39.9%

All values were significant ($p=0.01$)

Conclusion from KSU studies: Processing cattle prior to shipment has no advantage over processing at arrival


newberry

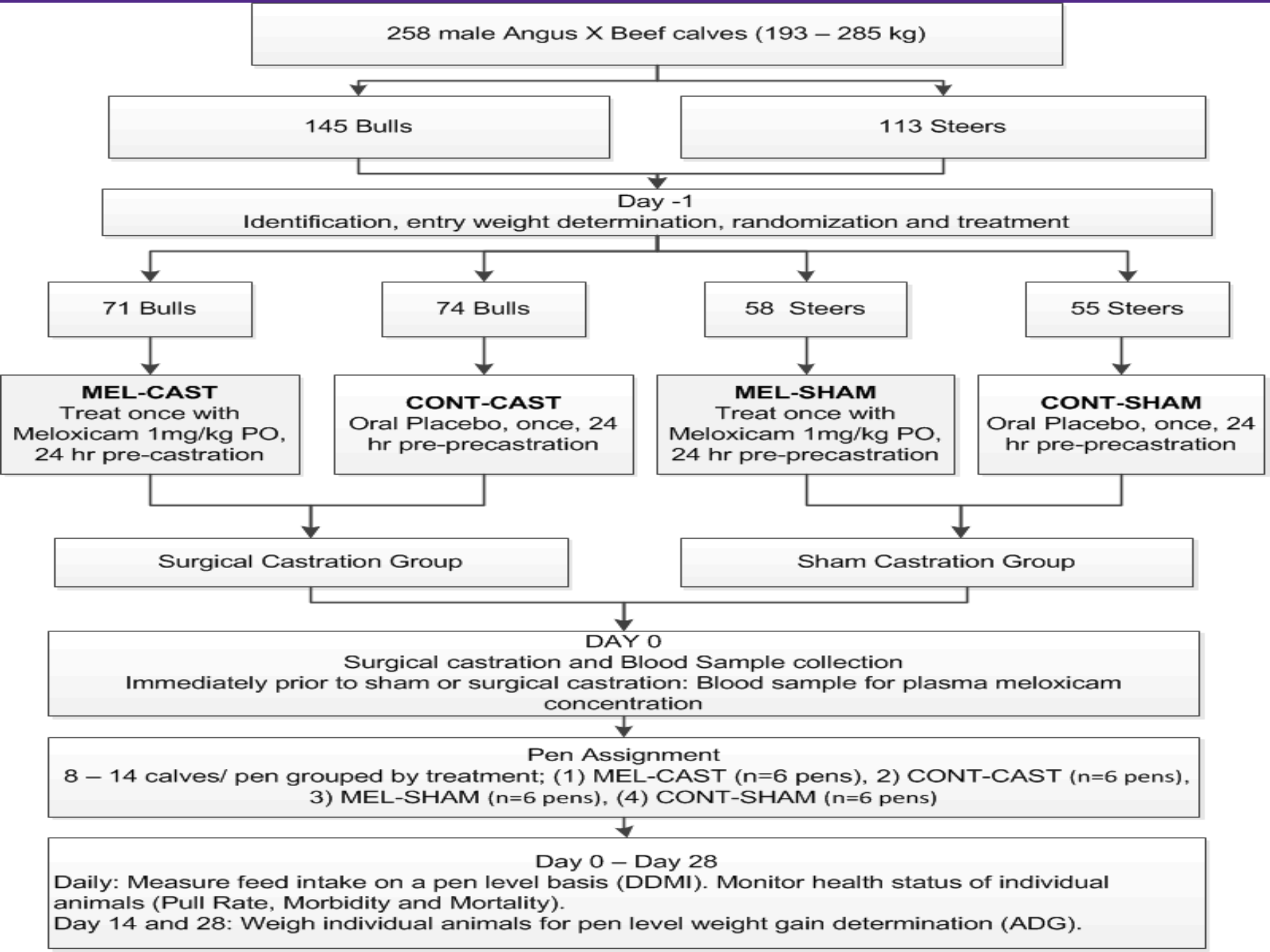
Effect of Gender Status Upon Arrival on Calf Performance*

	Gender Status		P value
Item	Steer	Bull	
Number head	967	1795	
Start weight, lbs	468	464	.08
Revaccination weight, lbs	519	506	.0001
Revaccination ADG, lbs/d	1.22	.65	.0001
End weight, lbs	599	581	.0001
Receiving period ADG, lbs/d	2.23	1.95	.0001
Morbidity, %	18.72	25.07	.0001
Death loss, %	0.72	2.28	.0028

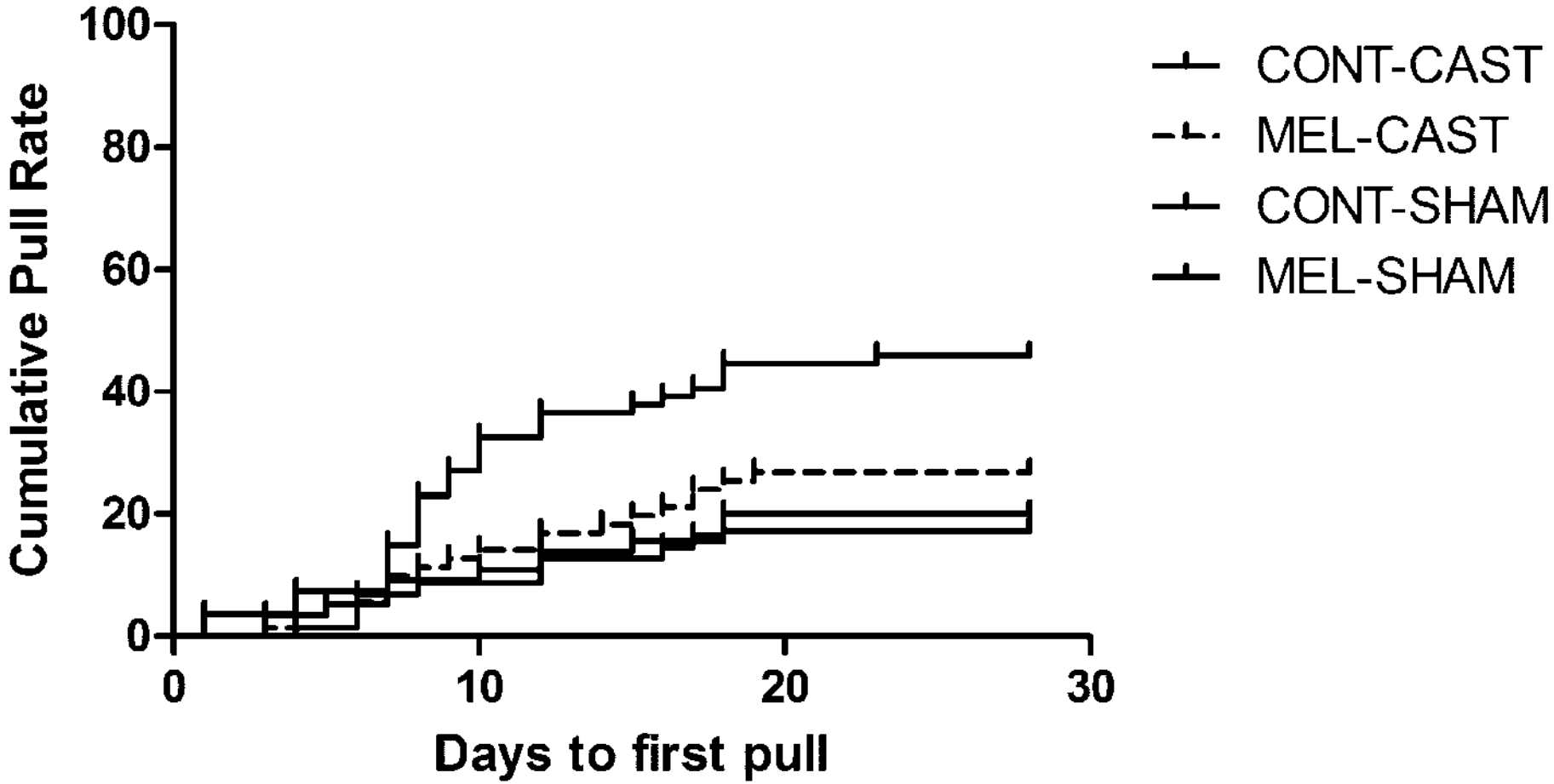
*27 truck loads of calves received at KSU Beef Stocker Unit to present

Meloxicam

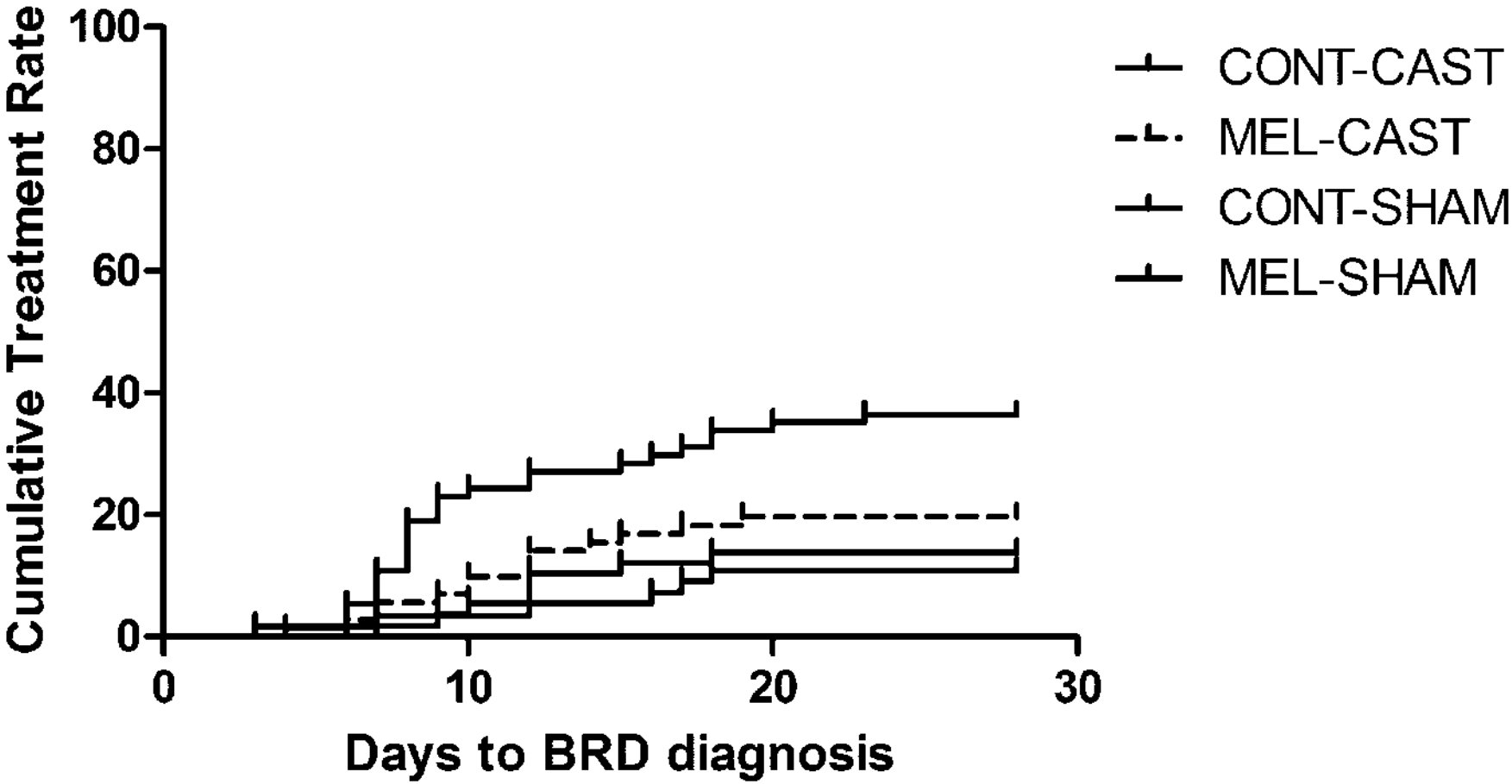
- Meloxicam tablets have 100% oral bioavailability
- Human generic tablets cost 4c/ 15mg tab or $0.20/ 100 lbs
- Oral meloxicam at 1mg/kg has a half-life of 27 hours
- EU meat withdrawal period is 15 days (0.5 mg/kg IM) and Canadian withdrawal is 20 days


258 male Angus X Beef calves (193 – 285 kg)
145 Bulls
113 Steers
Day -1
Identification, entry weight determination, randomization and treatment
71 Bulls
74 Bulls
58 Steers
55 Steers
MEL-CAST
Treat once with Meloxicam 1mg/kg PO, 24 hr pre-castration
CONT-CAST
Oral Placebo, once, 24 hr pre-precastration
MEL-SHAM
Treat once with Meloxicam 1mg/kg PO, 24 hr pre-precastration
CONT-SHAM
Oral Placebo, once, 24 hr pre-precastration
Surgical Castration Group
Sham Castration Group
DAY 0
Surgical castration and Blood Sample collection
Immediately prior to sham or surgical castration: Blood sample for plasma meloxicam concentration
Pen Assignment
8 – 14 calves/ pen grouped by treatment; (1) MEL-CAST (n=6 pens), 2) CONT-CAST (n=6 pens), 3) MEL-SHAM (n=6 pens), (4) CONT-SHAM (n=6 pens)
Day 0 – Day 28
Daily: Measure feed intake on a pen level basis (DDMI). Monitor health status of individual animals (Pull Rate, Morbidity and Mortality).
Day 14 and 28: Weigh individual animals for pen level weight gain determination (ADG).

Overall Pull Rate



Cumulative BRD Treatment Rate



Refrigerators

- University of Nevada
  - 20 ranches, 4 feed stores
  - 25% of the refrigerators failed to maintain vaccines in the safe zone (35 to 45 deg. F)
- University of Arkansas
  - 180 refrigerators tested
    - 45 were only at proper temp range 5% of the time.
    - 76% were unacceptable for storing animal health products.
    - 23% < 5yrs, 34% 6 – 10 years, 22% 11 – 15 years and 21% >15 years of age.

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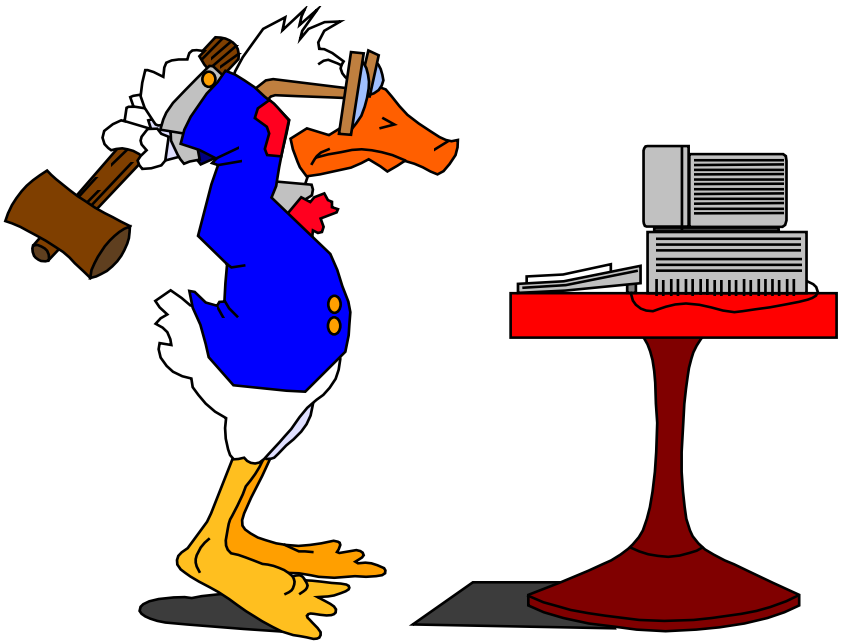
Keep Tabs on the Lot Numbers!

Incoming Date	Lots	% 1st pulls, respiratory	Comments	BRD vaccine
Mar-06	102-104	4.2		Merial
May-06	105-107	10.3		Merial
Oct-06	108-110	0.71		Merial
Feb-07	111-113	1.2	Study longer than 45 days; Limit intake study	Merial
Jun-07	115-117	40.4	Vaccine found to be bad	Jencine 4
Aug-07	118-120	51.5	Vaccine found to be bad	Jencine 4
Nov-07	121-123	28.8		Pfizer
Mar-08	124-126	19.2		Pfizer
May-08	128-130	39.6	Study longer than 45 days	Pfizer
Aug-08	131-133	59.9	vaccine study	Pfizer/Schering
Oct-08	134-136	47.6	vaccine study	Pfizer/Schering
Mar-09	137-139	10.9	500 lbs heavier arrival wt	Pfizer
Jun-09	141-143	1.5	600 lb arrival wt/local cattle	Pfizer
Oct-09	145-147	31.2	450 lb heifers	Fort Dodge


NDC 0061-9045-04
For Animal Use Only
Para Uso Animal Unicamente
125 Doses
250 mL
Clostridium Chauvoei-
Septicum-Haemolyticum-
Novyi-Sordellii-Tetani-
Perfringens Types
C & D Bacterin-Toxoid
Cavalry™ 9
Schering-Plough Animal Health
NDC 0061-9045-01
For Animal Use Only
Para Uso Animal Unicamente
10 Doses
20 mL
Clostridium Chauvoei-
Septicum-Haemolyticum-
Novyi-Sordellii-Tetani-
Perfringens Types
C & D Bacterin-Toxoid
Cavalry™ 9
Schering-Plough Animal Health

Receiving Ration Philosophy

- Do not Compound Stress!!!!!!!



Receiving Ration Management

- Quality feed ingredients
- Clean bunks/stale feed removed
- Clean waterers
- Feed analysis - critical
- Formulated nutritionally balanced diets
- Standardized, thorough mixing
- Timed, uniform delivery

Cross-Section of a Successful Starter Ration

- Palatable
- High (rumen friendly) energy and protein
- Fortified with minerals and vitamins
  - Chelates vs inorganic ??
- Expense may vary depending upon situation
- Avoid least cost formulations

Feedstuffs to Avoid Initially Upon Arrival/Weaning

- Finely ground grain (sorghum or corn)
  - Excessive fines - sub-clinical acidosis
- Silage or other fermented feeds
  - Possible depressed intake

Questions ?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