KSU BEEF STOCKER FIELD DAY

September 20, 2018
KSU Beef Stocker Unit

PROCEEDINGS

Beef Stocker Field Day 2018
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Table of Contents

Beef Stocker Field Day 2018
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Welcome to the 19th annual KSU Beef Stocker Field Day. We appreciate your attendance and support of this educational event. We are fortunate to have assembled an outstanding list of presenters and topics that we believe are relevant to your bottom line.

As always, if you have any questions on the program or suggestions for future topics, please let us know. Our strength in delivering relevant information lies in working closely with you, our stakeholder.

Sincerely,

Dale A. Blasi, PhD
Extension Beef Specialist
Department of Animal Sciences and Industry
College of Agriculture

THANK YOU

We would like to express a special "THANK YOU" to Merck Animal Health for their support of today's educational program and activities for the beef stocker segment. With their financial assistance, we are able to deliver the caliber of programming that today's events have in store for you. Please take a moment to stop by their display to see the line of products that they have to offer.

MERCK Animal Health

Beef Stocker Field Day 2018
September 20, 2018
KSU Beef Stocker Unit

9:30 a.m.	Registration/Coffee
10:15 a.m.	Introductions
10:30 a.m.	**The Role of Stocker Producer Expectations in Cattle Buying Decisions** *Glenn Tonsor, Ph.D., Kansas State University*
11:15 a.m.	**Producer Panel: Why Silage Fits in My Growing Diets** *Frank Harper, Sedgwick, Kansas* *Gary Burgess, Wamego, Kansas* *Gary Bacon, Minneapolis, Kansas* *Keith Bolsen, Ph.D., Emeritus Professor, Kansas State University* *Moderator: Wes Ishmael, Contributing Editor, BEEF Magazine*
12:15 p.m.	Barbecue Brisket Lunch- View Posters
1:00 p.m.	**An Update on Pain Management in Cattle** *Hans Coetzee, DVM, Kansas State University*
2:00 p.m.	**Quality Stocker Production Considerations** *Justin Sexten, Ph.D., Certified Angus Beef*
2:45 p.m.	**Break**
3:00 p.m.	**The Tech Revolution, Wall Street, Baseball and the Cattle Industry** *Dane Kuper, CEO, Performance Livestock Analytics*
3:45 p.m.	**Rethinking BRD Diagnosis** *Jason Nickell, DVM, Merck Animal Health*
4:15 p.m.	**Livestock Theft in Kansas** *Kendal Lothman, Special Agent, Office of the Kansas Attorney General*
4:45 p.m.	**Treatment Failures that are not BRD Related** *A.J. Tarpoff, DVM, Kansas State University*
5:30 p.m.	Cutting Bull's Lament 2018

Notes – Notes -- Notes

The Role of Stocker Producer Expectations in Cattle Buying Decisions

Glynn Tonsor, Ph.D.
Kansas State University

Beef Cattle Outlook & Role of Producer Expectations in Buying Decisions

Glynn T. Tonsor
Dept. of Agricultural Economics
Kansas State University
gtonsor@ksu.edu
Twitter: @TonsorGlynn

AgManager.info

Overarching Beef Industry Economic Outlook

- Supplies
  - Commercial Beef Prod. Up, Increases Moderating
    - +6.4% in 2016
    - +3.8% in 2017
    - +3.3% in 2018 (?)
    - +1.7% in 2019 (?)
    - +0.8% in 2020 (?)

- Supplies
  - Commercial Beef Production Up, Increases Moderating

- **Demand**
  - **Key to surprising prices in 2018**

- Demand Illustration: Q3.2018
  - Production +2%
  - Yearling Prices +1%
  - Calf Prices +2%

❖ *Exports are key & yet ongoing arena of uncertainty*

All-Fresh Beef Retail Demand Index

(Quarterly, Price-Index Approach, 1990=100)

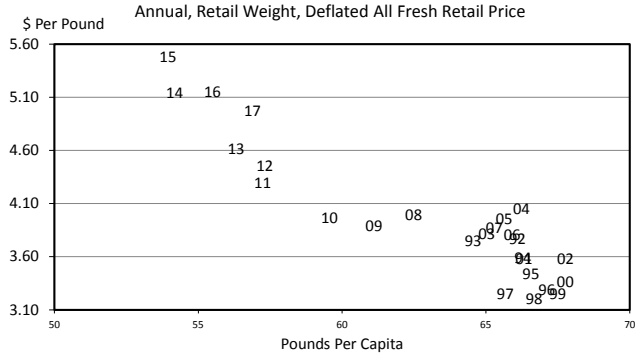
Q2.2018: +0.4%

vs. Q2.2017

http://agmanager.info/livestock-meat/meat-demand

BEEF PRICE-QUANTITY RELATIONSHIP

Annual, Retail Weight, Deflated All Fresh Retail Price



Data Source: Bureau of Economic Analysis & USDA-ERS, Compiled by LMIC

Livestock Marketing Information Center

C-P-65A
07/25/18

Demand is **NOT** Per Capita Consumption

2013 Beef Demand Determinants Study

Funded by the Beef Checkoff.

http://www.beefboard.org/evaluation/130612demanddeterminantstudy.asp

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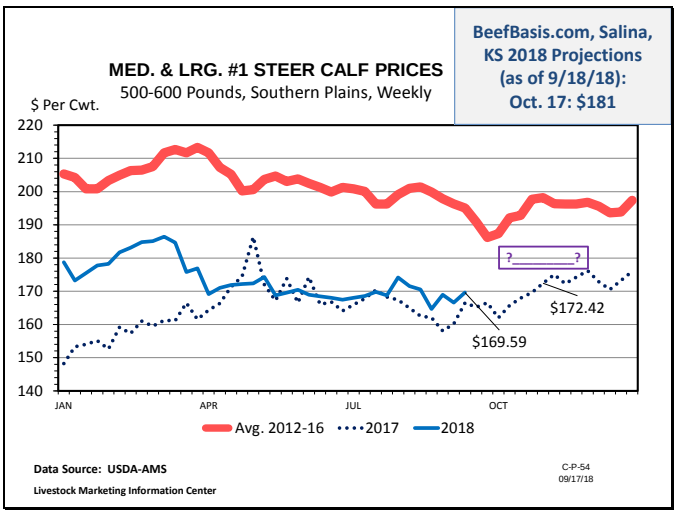
Assessing Beef Demand Determinants

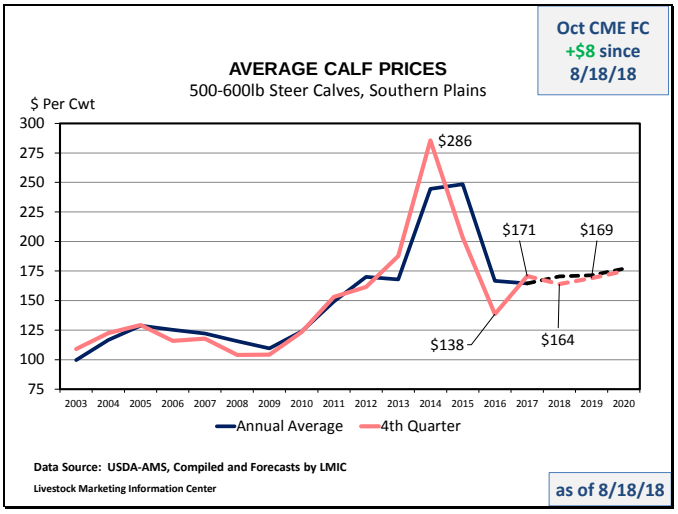
Glynn T. Tonsor, Jayson L. Lusk, and Ted C. Schroeder

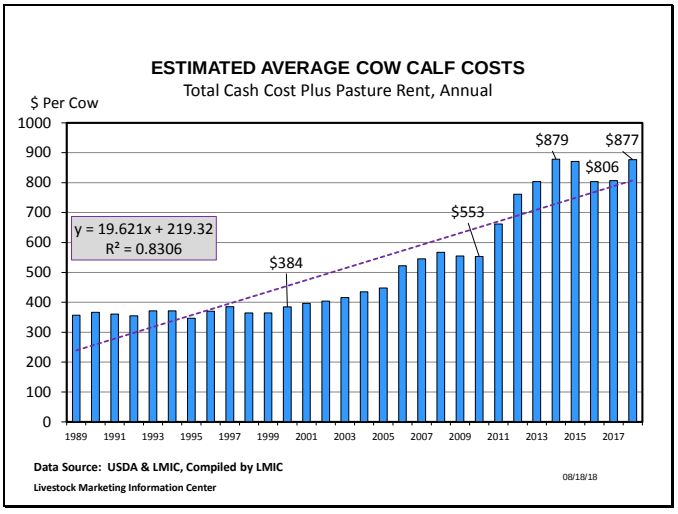
Checkoff Program Update
February 1, 2018

Presentation at 2018 Cattle Industry Convention
Phoenix, AZ

Full Project Report
https://www.beefboard.org/news/180131Tonsor-beef-demand-print.asp

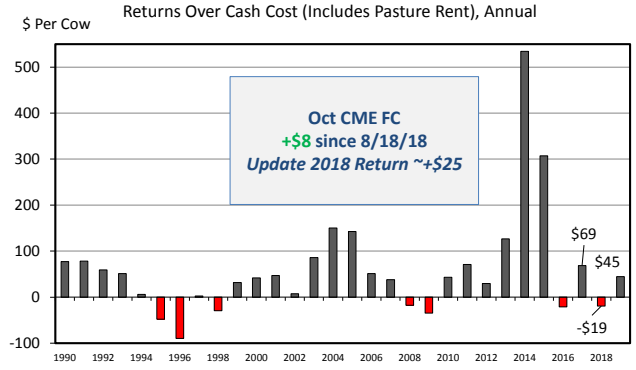

MED. & LRG. #1 STEER CALF PRICES
500-600 Pounds, Southern Plains, Weekly
$ Per Cwt.
BeefBasis.com, Salina, KS 2018 Projections (as of 9/18/18):
Oct. 17: $181
220
210
200
190
180
170
160
150
140
JAN
APR
JUL
OCT
?_____?
$172.42
$169.59
Avg. 2012-16
2017
2018
Data Source: USDA-AMS
Livestock Marketing Information Center
C-P-54
09/17/18


AVERAGE CALF PRICES
500-600lb Steer Calves, Southern Plains
$ Per Cwt
Oct CME FC +$8 since 8/18/18
300
275
250
225
200
175
150
125
100
75
$286
$171
$169
$138
$164
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Annual Average
4th Quarter
Data Source: USDA-AMS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center
as of 8/18/18


ESTIMATED AVERAGE COW CALF COSTS
Total Cash Cost Plus Pasture Rent, Annual
$ Per Cow
1000
900
800
700
600
500
400
300
200
100
0
y = 19.621x + 219.32
R² = 0.8306
$384
$553
$879
$877
$806
1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017
Data Source: USDA & LMIC, Compiled by LMIC
Livestock Marketing Information Center
08/18/18

ESTIMATED AVERAGE COW CALF RETURNS

Returns Over Cash Cost (Includes Pasture Rent), Annual



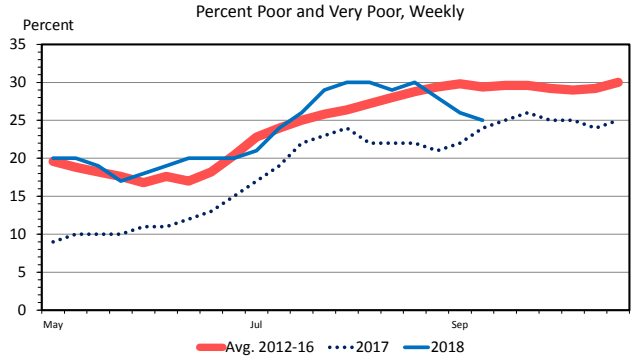
Data Source: USDA & LMIC, Compiled by LMIC

Livestock Marketing Information Center

C-P-66
08/18/18

US RANGE AND PASTURE CONDITION

Percent Poor and Very Poor, Weekly



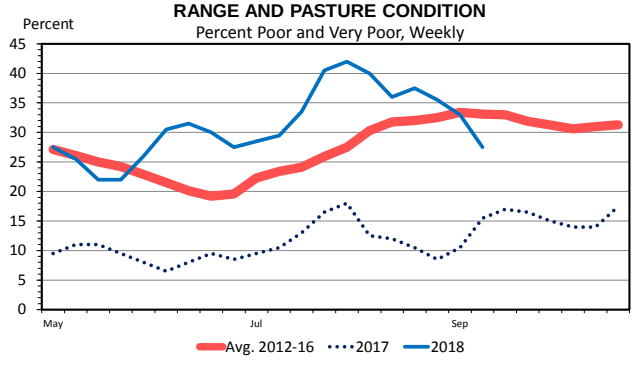
Data Source: USDA-NASS, Compiled & Analysis by LMIC

Livestock Marketing Information Center

G-NP-30
09/18/18

SOUTHERN PLAINS REGION
RANGE AND PASTURE CONDITION

Percent Poor and Very Poor, Weekly

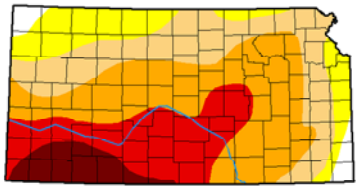


Data Source: USDA-NASS, Compiled & Analysis by LMIC

Livestock Marketing Information Center

G-NP-33
09/18/18

U.S. Drought Monitor
Kansas



April 10, 2018
(Released Thursday, Apr. 12, 2018)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.64	97.36	83.37	59.47	27.06	7.09
Last Week 04-03-2018	2.64	97.36	81.66	56.19	25.59	4.32
3 Months Ago 01-09-2018	0.00	100.00	52.43	17.23	1.50	0.00
Start of Calendar Year 01-02-2018	0.00	100.00	32.70	8.75	0.00	0.00
Start of Water Year 09-26-2017	59.89	40.11	10.08	1.35	0.00	0.00
One Year Ago 04-11-2017	49.35	50.65	8.55	0.00	0.00	0.00

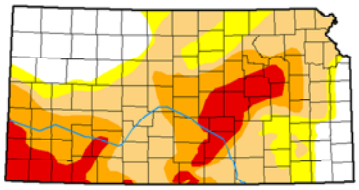
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
David Miskus
NOAA/NWS/NCEP/CPC

http://droughtmonitor.unl.edu/

U.S. Drought Monitor
Kansas



June 12, 2018
(Released Thursday, Jun. 14, 2018)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	20.40	79.60	66.48	33.63	12.65	0.00
Last Week 06-05-2018	15.19	84.81	69.40	45.96	15.86	1.42
3 Months Ago 03-13-2018	1.22	98.78	81.77	56.19	19.33	0.30
Start of Calendar Year 01-02-2018	0.00	100.00	32.70	8.75	0.00	0.00
Start of Water Year 09-26-2017	59.89	40.11	10.08	1.35	0.00	0.00
One Year Ago 06-13-2017	91.68	8.32	0.00	0.00	0.00	0.00

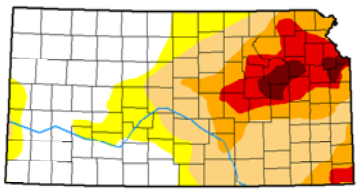
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brian Fuchs
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

U.S. Drought Monitor
Kansas



August 14, 2018
(Released Thursday, Aug. 16, 2018)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

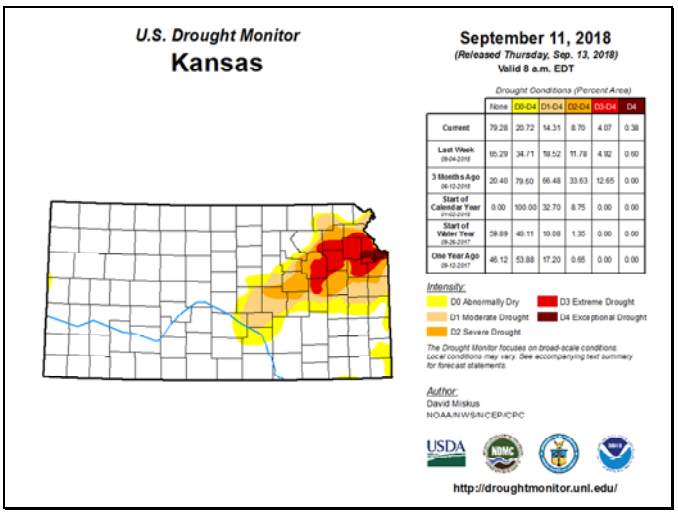
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	37.68	62.32	48.99	24.40	11.32	2.53
Last Week 08-07-2018	36.00	64.00	52.83	26.31	8.88	1.21
3 Months Ago 05-15-2018	3.02	96.98	80.15	50.32	21.75	4.60
Start of Calendar Year 01-02-2018	0.00	100.00	32.70	8.75	0.00	0.00
Start of Water Year 09-26-2017	59.89	40.11	10.08	1.35	0.00	0.00
One Year Ago 08-15-2017	63.16	36.84	13.87	0.00	0.00	0.00

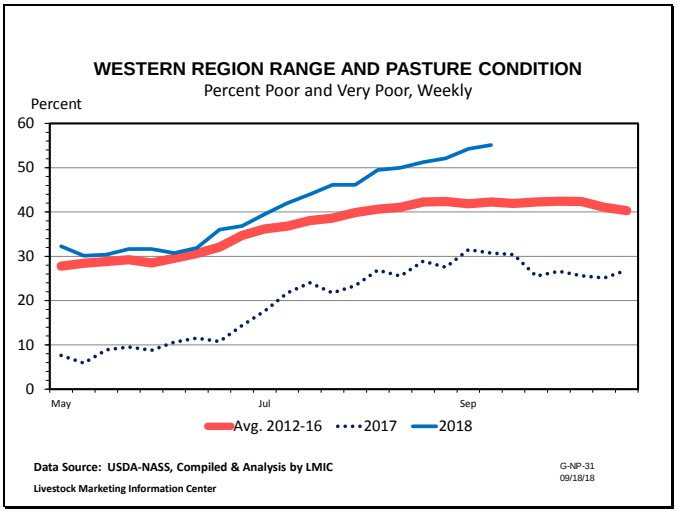
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

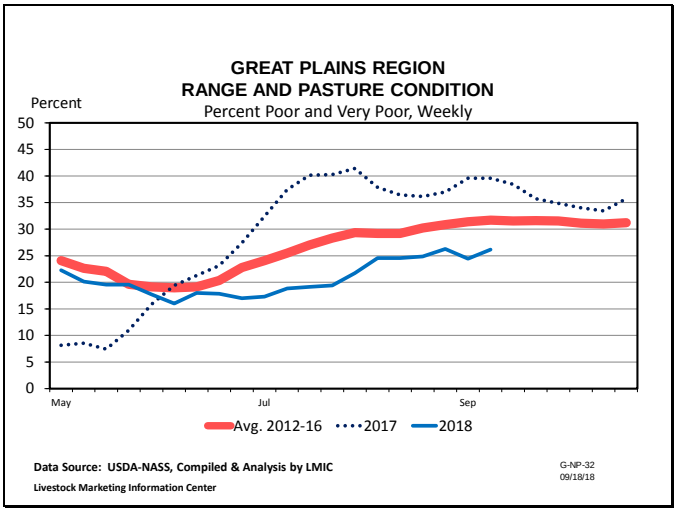
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

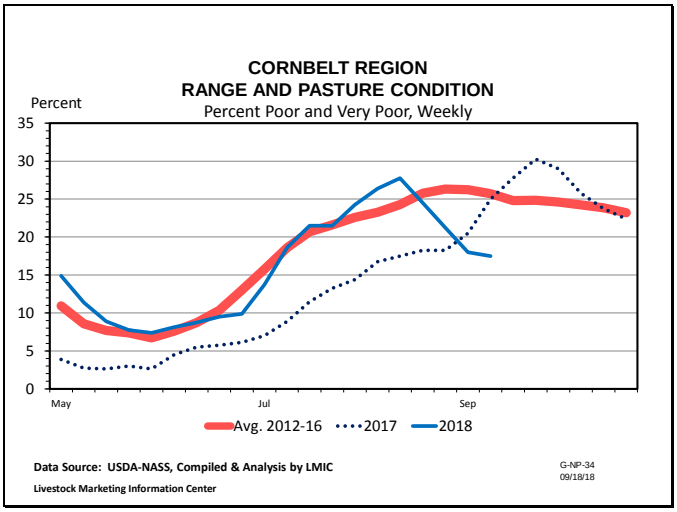
Author:
Richard Heim
NCEI/NOAA

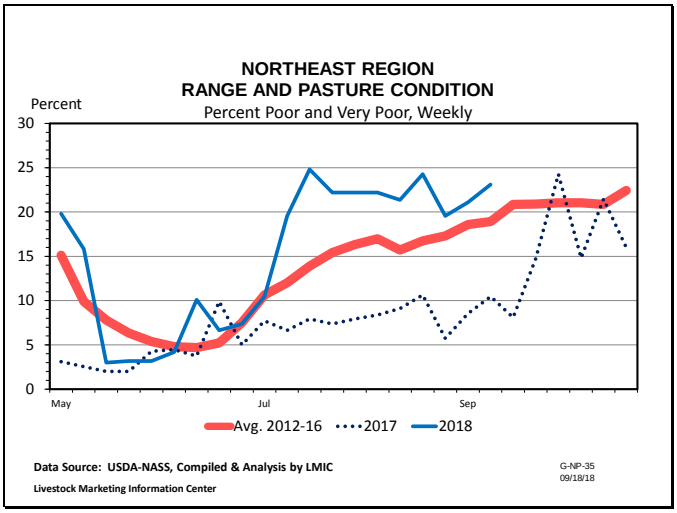
http://droughtmonitor.unl.edu/

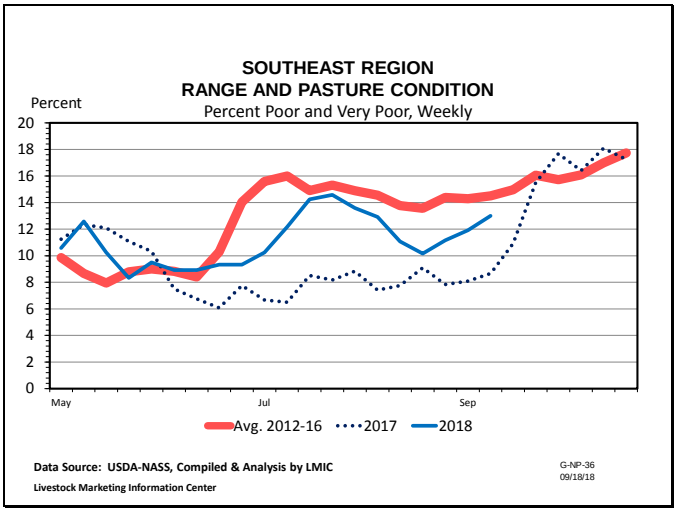

U.S. Drought Monitor
Kansas
September 11, 2018
(Released Thursday, Sep. 13, 2018)
Valid 8 a.m. EDT
Drought Conditions (Percent Area)
None D0-D4 D1-D4 D2-D4 D3-D4 D4
Current 79.28 20.72 14.31 8.70 4.07 0.38
Last Week 65.29 34.71 18.52 11.78 4.92 0.60
3 Months Ago 20.40 79.60 66.48 33.63 12.65 0.00
Start of Calendar Year 0.00 100.00 32.70 8.75 0.00 0.00
Start of Water Year 59.89 40.11 10.08 1.35 0.00 0.00
One Year Ago 46.12 53.88 17.20 0.65 0.00 0.00
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
Author:
David Miskus
NOAA/NWS/NCEP/CPC
USDA
NDMC
http://droughtmonitor.unl.edu/

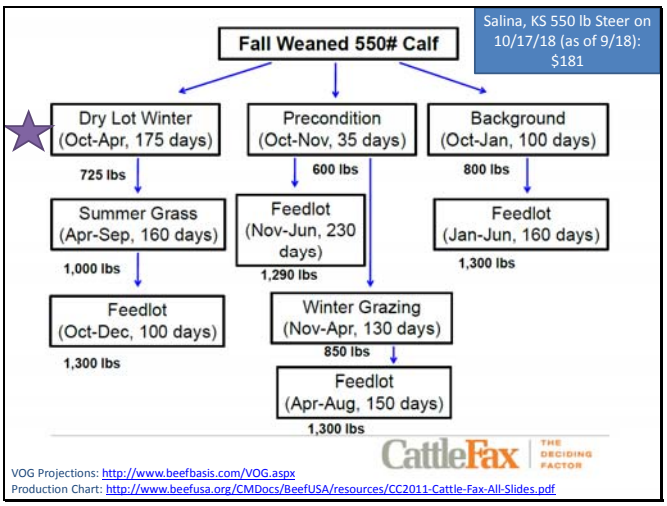

WESTERN REGION RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly
Percent
60
50
40
30
20
10
0
May
Jul
Sep
Avg. 2012-16
2017
2018
Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
G-NP-31
09/18/18


GREAT PLAINS REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly
Percent
50
45
40
35
30
25
20
15
10
5
0
May
Jul
Sep
Avg. 2012-16
2017
2018
Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
G-NP-32
09/18/18


CORNBELT REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly
Percent
35
30
25
20
15
10
5
0
May
Jul
Sep
Avg. 2012-16
2017
2018
Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
G-NP-34
09/18/18


NORTHEAST REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly
Percent
30
25
20
15
10
5
0
May
Jul
Sep
Avg. 2012-16
2017
2018
Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
G-NP-35
09/18/18


SOUTHEAST REGION
RANGE AND PASTURE CONDITION
Percent Poor and Very Poor, Weekly
Percent
20
18
16
14
12
10
8
6
4
2
0
May
Jul
Sep
Avg. 2012-16
2017
2018
Data Source: USDA-NASS, Compiled & Analysis by LMIC
Livestock Marketing Information Center
G-NP-36
09/18/18

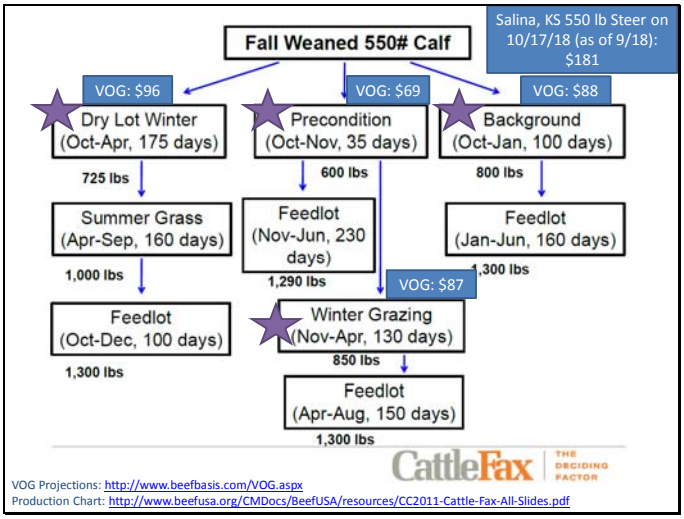


VOG Projections: http://www.beefbasis.com/VOG.aspx
Production Chart: http://www.beefusa.org/CMDocs/BeefUSA/resources/CC2011-Cattle-Fax-All-Slides.pdf

Economic Outlook Overview: Stockers

http://www.beefbasis.com/ForecastingTools/ValueofGain/tabid/1132/Default.aspx

- Salina, KS 9/18/18 Dry Lot Winter, 175 DOF Case:
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 725 lb steer on 04/10/19 ($161) {ADG 1.0}
    - VOG: $96/cwt



VOG Projections: http://www.beefbasis.com/VOG.aspx
Production Chart: http://www.beefusa.org/CMDocs/BeefUSA/resources/CC2011-Cattle-Fax-All-Slides.pdf

Economic Outlook Overview: Stockers

http://www.beefbasis.com/ForecastingTools/ValueofGain/tabid/1132/Default.aspx

- Salina, KS 9/18/18 Preconditioning, 35 DOF Case:
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 600 lb steer on 11/21/18 ($172) {ADG 1.43}
    - VOG: $69/cwt
      - *NOTE THIS DOES NOT REFLECT ANY "PRECONDITIONED" CLAIM PREMIUM*

Economic Outlook Overview: Stockers

http://www.beefbasis.com/ForecastingTools/ValueofGain/tabid/1132/Default.aspx

- Salina, KS 9/18/18 Backgrounding, 100 DOF Case:
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 800 lb steer on 01/30/19 ($152) {ADG 2.4}
    - VOG: $88/cwt

Economic Outlook Overview: Stockers

http://www.beefbasis.com/ForecastingTools/ValueofGain/tabid/1132/Default.aspx

- Salina, KS 9/18/18 Winter Grazing, 130 DOF Case:
  - Buy 600 lb steer on 11/21/18 ($172)
  - Sell 850 lb steer on 03/27/19 ($147) {ADG 2.0}
    - VOG: $87/cwt

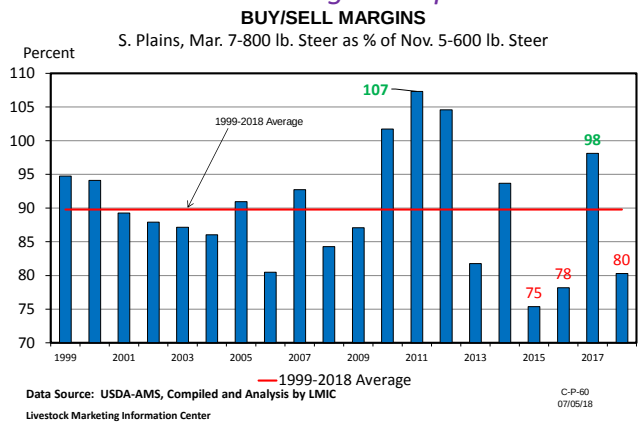
Economic Outlook Overview: Stockers

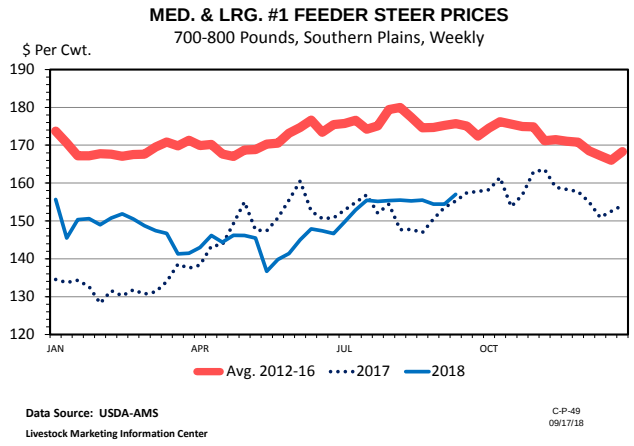
http://www.beefbasis.com/ForecastingTools/ValueofGain/tabid/1132/Default.aspx

- Salina, KS 9/18/18 Preconditioning + Winter Grazing, 165 DOF Case:
  - Buy 550 lb steer on 10/17/18 ($181)
  - Sell 850 lb steer on 03/20/19 ($147) {ADG 1.9}
    - VOG: $84/cwt

Economic Outlook Overview: Stockers

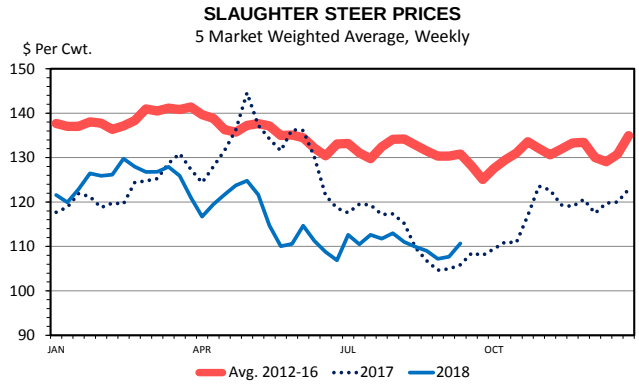
Historical Margin Perspective





Economic Outlook Overview: Feedlots

- 2017 was better than anticipated
- 2018 has been rougher
  - Q4 return prospects have improved



Historical and Projected Kansas Feedlot Net Returns
(as of 9/11/18')
(http://www.agmanager.info/livestock/marketing/outlook/newsletters/FinishingReturns/default.asp)

July 18': -$84/steer

Table 1. Projected Values for Finishing Steers in Kansas Feedyards*

Closeout Mo-Yr	Net Return	FCOG**	Fed Price	Fed Futures	Fed Basis	Feeder Price	Breakeven FCOG**	Breakeven Fed Price	Breakeven Feeder Price
Aug-18	-104.20	81.98	110.81	108.63	2.18	147.01	65.79	118.33	132.98
Sep-18	-108.96	83.04	109.79	109.35	0.44	143.54	66.15	117.50	129.35
Oct-18	-31.30	83.32	114.75	114.05	0.70	137.33	77.90	116.94	133.66
Nov-18	-9.72	82.54	114.96	114.05	0.91	141.02	81.08	115.63	139.78
Dec-18	14.87	83.11	120.01	118.35	1.66	146.93	85.35	118.97	148.86
Jan-19	-38.29	83.43	120.16	118.35	1.81	152.32	77.48	122.85	147.40
Feb-19	-51.85	84.36	121.12	119.93	1.20	156.16	76.33	124.83	149.28
Mar-19	18.75	83.02	123.64	119.93	3.71	154.22	85.88	122.28	156.80
Apr-19	-63.24	83.64	116.16	112.95	3.21	150.04	73.77	120.77	141.39
May-19	-20.08	82.96	121.59	112.95	8.64	150.14	79.61	123.02	147.63

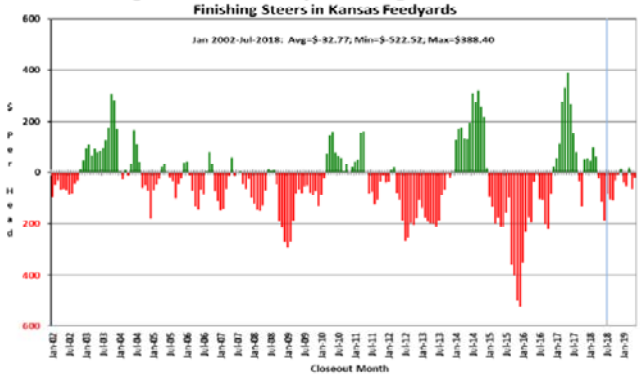
Representative Barometer for Trends in Profitability

CME LC
+$5 since 9/11/18

Historical and Projected Kansas Feedlot Net Returns (as of 9/11/18')

(http://www.agmanager.info/livestock/marketing/outlook/newsletters/FinishingReturns/default.asp)

Figure 1. Historical & Projected Average Net Returns for Finishing Steers in Kansas Feedyards



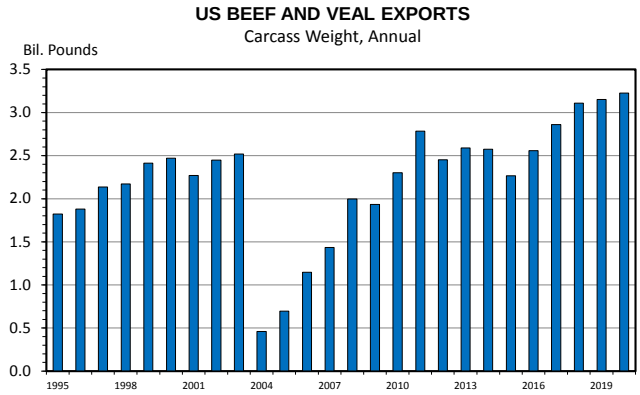
Quarterly Forecasts (LMIC: 9/17/18)

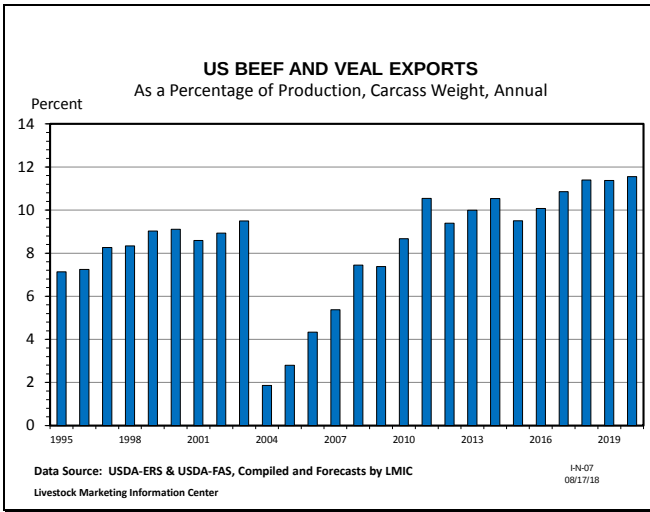
Year Quarter	Comm'l Slaughter	% Chg. from Year Ago	Average Dressed Weight	% Chg. from Year Ago	Comm'l Beef Production	% Chg. from Year Ago
2018						
I	7,877	2.1	820.8	0.5	6,465	2.6
II	8,424	4.3	798.2	0.6	6,724	4.9
III	8,395	1.7	816.8	0.1	6,857	1.8
IV	8,428	3.5	832.6	0.6	7,017	4.1
Year	33,124	2.9	817.0	0.4	27,063	3.3
2019						
I	7,892	0.2	825.7	0.6	6,517	0.8
II	8,503	0.9	807.7	1.2	6,868	2.1
III	8,540	1.7	826.6	1.2	7,059	2.9
IV	8,474	0.5	837.0	0.5	7,092	1.1
Year	33,409	0.9	824.2	0.9	27,536	1.7
2020						
I	8,059	2.1	829.6	0.5	6,686	2.6
II	8,513	0.1	812.2	0.6	6,914	0.7
III	8,489	-0.6	831.4	0.6	7,058	0.0
IV	8,447	-0.3	841.2	0.5	7,106	0.2
Year	33,508	0.3	828.6	0.5	27,763	0.8

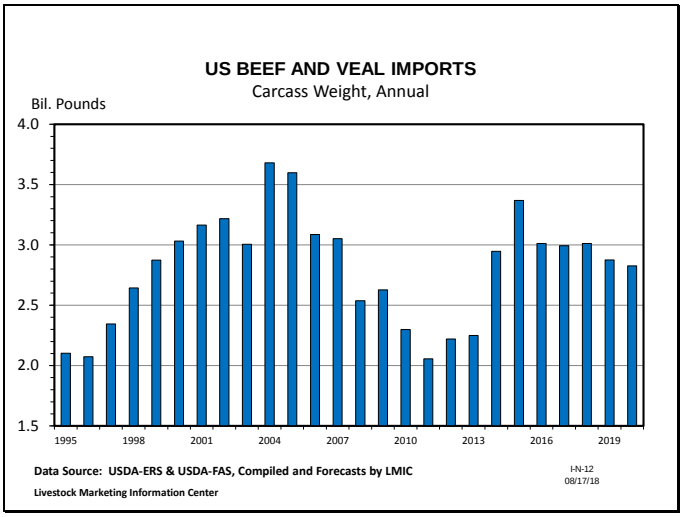
Quarterly Forecasts (LMIC: 9/17/18)

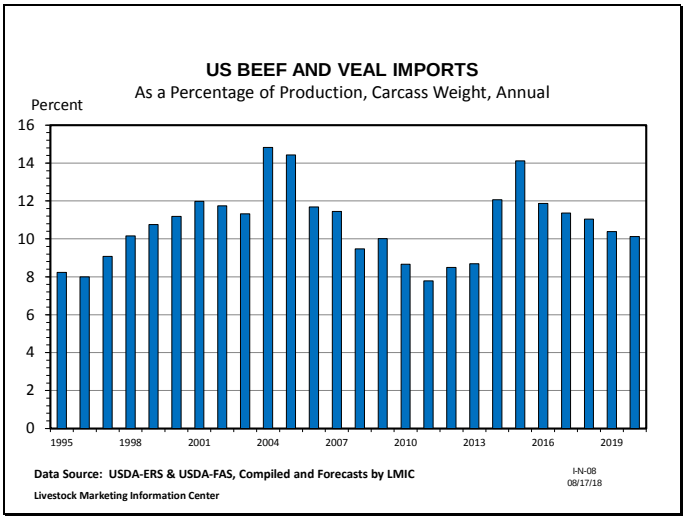
Year Quarter	Live Sltr. Steer Price 5-Mkt Avg	% Chg. from Year Ago	Feeder Steer Price Southern Plains 7-800#	5-600#
2018				
I	125.60	2.1	148.73	180.01
II	116.72	-12.1	144.52	170.11
III	111-112	-0.9	154-155	168-169
IV	115-117	-1.6	148-151	162-166
Year	117-118	-3.3	149-150	170-172
2019				
I	119-122	-4.1	147-151	168-173
II	116-120	1.1	148-153	172-178
III	108-113	-0.9	145-151	169-174
IV	113-119	0.0	145-154	165-173
Year	114-118	-1.3	147-151	169-174
2020				
I	118-125	0.8	145-155	171-180
II	116-124	1.7	147-158	174-184
III	110-119	3.6	147-159	173-185
IV	114-124	2.6	146-159	169-181
Year	117-121	2.6	149-155	173-181

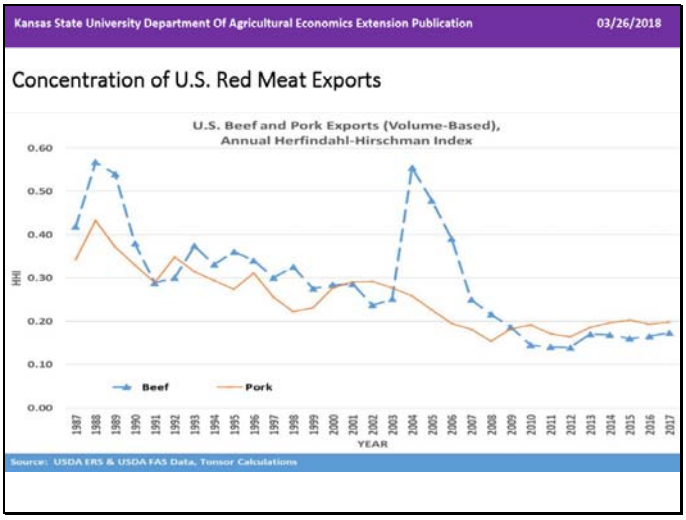
Trade Context Update



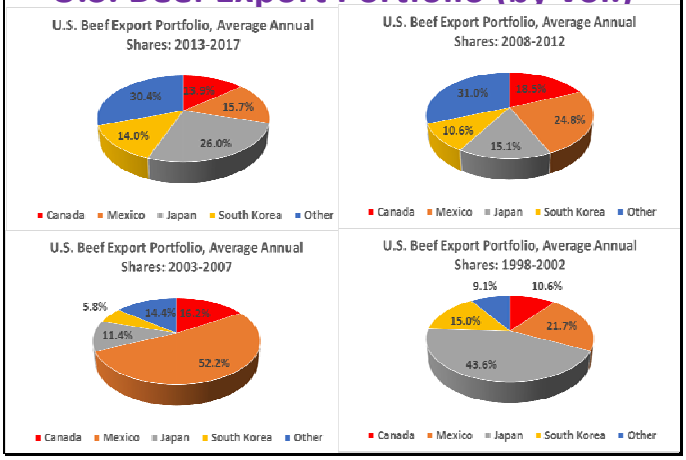



US BEEF AND VEAL IMPORTS
Carcass Weight, Annual
Bil. Pounds
4.0
3.5
3.0
2.5
2.0
1.5
1995
1998
2001
2004
2007
2010
2013
2016
2019
Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center
I-N-12
08/17/18


US BEEF AND VEAL IMPORTS
As a Percentage of Production, Carcass Weight, Annual
Percent
16
14
12
10
8
6
4
2
0
1995
1998
2001
2004
2007
2010
2013
2016
2019
Data Source: USDA-ERS & USDA-FAS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center
I-N-08
08/17/18


Kansas State University Department Of Agricultural Economics Extension Publication
03/26/2018
Concentration of U.S. Red Meat Exports
U.S. Beef and Pork Exports (Volume-Based),
Annual Herfindahl-Hirschman Index
HHI
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Beef
Pork
YEAR
Source: USDA ERS & USDA FAS Data, Tonsor Calculations

U.S. Beef Export Portfolio (by vol.)



USDA Long-Term projections

Feb. 2018 report (http://www.usda.gov/oce/commodity/projections/)

Per capita meat consumption, retail weight

Item	2016	2017	2018	2019	2020	2027
Beef	55.6	57.3	59.2	60.9	60.9	59.0
Pork	50.1	50.4	52.1	52.2	51.9	52.0
Total red meat	107.0	109.0	112.6	114.4	114.1	112.2
Broilers	89.8	91.0	91.8	91.6	92.4	92.2
Total poultry	107.6	108.8	109.6	109.2	109.9	109.3
Red meat & poultry	214.6	217.8	222.2	223.6	224.0	221.5

Note: Totals may not add due to rounding.

46

USDA Long-Term projections

Feb. 2018 report (http://www.usda.gov/oce/commodity/projections/)

2019 would be highest for beef since 2009

Per capita meat consumption, retail weight

Item	2016	2017	2018	2019	2020	2027
Beef	55.6	57.3	59.2	60.9	60.9	59.0
Pork	50.1	50.4	52.1	52.2	51.9	52.0
Total red meat	107.0	109.0	112.6	114.4	114.1	112.2
Broilers	89.8	91.0	91.8	91.6	92.4	92.2
Total poultry	107.6	108.8	109.6	109.2	109.9	109.3
Red meat & poultry	214.6	217.8	222.2	223.6	224.0	221.5

Note: Totals may not add due to rounding.

Year	Total Red Meat & Poultry
1995	205.4
2000	214.4
2005	219.7
2010	207.5
2014	200.1

47

USDA Long-Term projections

Feb. 2018 report (http://www.usda.gov/oce/commodity/projections/)

Per capita meat consumption, retail weight							
Item		2016	2017	2018	2019	2020	2027
Beef		55.6	57.3	59.2	60.9	60.9	59.0
Pork		50.1	50.4	52.1	52.2	51.9	52.0
Total red meat		107.0	109.0	112.6	114.4	114.1	112.2
Broilers		89.8	91.0	91.8	91.6	92.4	92.2
Total poultry		107.6	108.8	109.6	109.2	109.9	109.3
Red meat & poultry		214.6	217.8	222.2	223.6	224.0	221.5
Note: Totals may not add due to rounding.							

Projections INCLUDE trade dependency, PRESUME no China pork tariffs, etc.

Wrap-Up

- Broad Profitability Outlook
  - Cow-calf:
    - Converging toward Long-Term Levels
    - Situation Better than Expected, Hope Demand's Role is Recognized!
  - Stocker:
    - Margins vary widely across situations
      - Drought/feasibility impact likely substantial for many attendees
  - Feedlot:
    - 2017 offered notable equity recovery
    - Q4 2018 has improved

49

Wrap-Up

- Broad Profitability Outlook
  - Supply side factors are "well established"
  - Demand factors are key and uncertain
    - What will be beef (and meat broadly) export situation?
    - When will next U.S. recession occur?

50

BEEF Stocker Research of Note: Producer Expectations in Cattle Buying

- *Suppose in OCT a producer could buy 1 of 3 lots of calves with a planned FEB sale:*

Probability	ADG 1	ADG 2	ADG 3
20%	<1.5	<1.7	<1.9
60%	1.5-2.3	1.7-2.5	1.9-2.7
20%	>2.3	>2.5	>2.7

Journal article available online:
https://academic.oup.com/ajae/article/100/4/1120/5045159

Stocker Research of Note: Producer Expectations in Cattle Buying

- *Mean Willingness to Pay (Fall 2014):*
  - *$42/cwt more for ADG2 than ADG1*
    - *$1.77/lb for each of the additional 24 lbs*
  - *$26/cwt more for ADG3 than ADG2*
    - *$1.08/lb for each of the additional 24 lbs*
    - *Loss aversion exist:*
      - *Producers value "avoiding a bad situation" more than "improving upon a good situation."*

Stocker Research of Note: Producer Expectations in Cattle Buying

- Average experiences buying OCT calves & sell in FEB
  - Avg ADG across all lots/group over past 10 years: 1.9
  - Worst ADG across all lots/group over past 10 years: 1.2
  - Best ADG across all lots/group over past 10 years: 2.5

- *How do past experiences influence buying decisions of individual stocker operators?*

Stocker Research of Note: Producer Expectations in Cattle Buying

- If potential buyers view available cattle superior to their best personal experience:
  - Producers will NOT pay premium for higher-ADG cattle
    - ***Producers have to "see it to believe it" before they will pay-up for high-quality cattle***

Stocker Research of Note: Producer Expectations in Cattle Buying

- Implications
  - Helps explain "similar cattle" having differing prices in different markets
  - Sellers of high-performing cattle need to find markets comprised of buyers with corresponding experience

Stocker Research of Note: Producer Expectations in Cattle Buying

- Implications
  - Which came first, the chicken or the egg???
    - University trials/field days may provide this "experience" indirectly
    - Information on past performance (genetics etc.) has value in reducing risk to possible buyers & perhaps can substitute

More information available at:

This presentation will be available in PDF format at:
http://www.agmanager.info/contributors/tonsor

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57

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http://www.agmanager.info/about/contact-agmanagerinfo

Notes – Notes -- Notes

An Update on Pain Management in Cattle

Hans Coetzee, DVM
Kansas State University

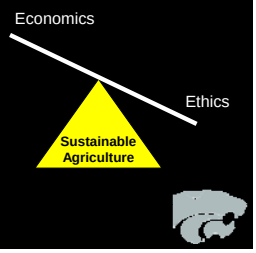
An update on pain mitigation in cattle

Hans Coetzee BVSc, PhD, DACVCP, DACAW, DECAWSEL
Professor and Head, Anatomy and Physiology
Kansas State University

What are we going to discuss today?

- Why is pain management in beef cattle important?
- What are the challenges associated with managing pain in beef cattle?
- What options are available for managing pain in cattle (and do they work)?

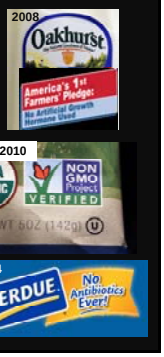
1. Why is pain management important?



How do issues (BST, GMO, AMR, Pain) factor into consumer purchasing decisions?

Economics & Ethics (Values)

Attitude Issue	Don't Care	Care
Unaware		
Aware		

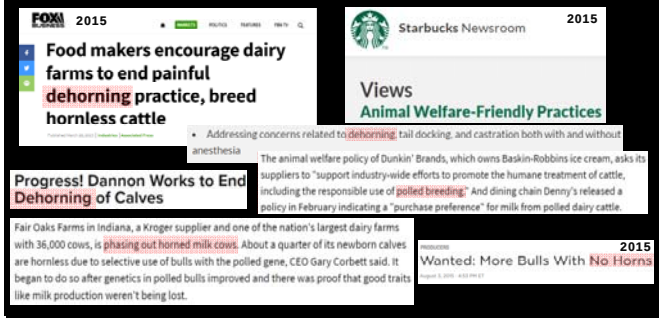


How is this relevant to pain management?

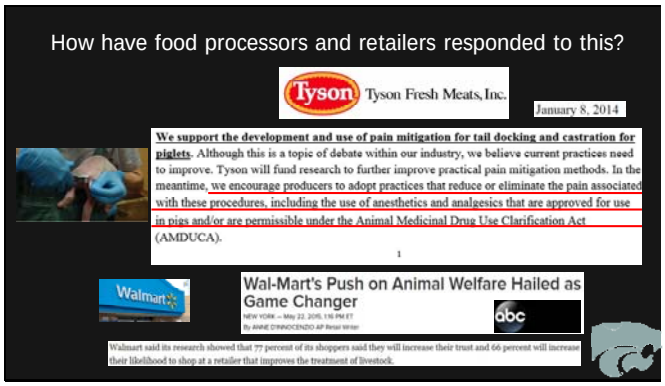
	Don't Care	Care
Unaware		
Aware		

http://www.globalanimalpartnership.org/for-retailers/consumer-support-for-animal-welfare/

How did food processors and retailers respond to this?



How have food processors and retailers responded to this?



Take Home Message

Pain management is becoming necessary component of sustainable beef production

2. Why is managing pain in livestock challenging?

1. Pain recognition is difficult in stoic species
2. Until recently, no compounds were specifically approved by FDA for analgesic use in cattle in the U.S.
   → Banamine® Transdermal is only labeled for pain associated with foot rot
   → Analgesia for dehorning and castration is still ELDU under AMDUCA
3. Time delay between drug administration and onset of activity (e.g. local anesthesia)
4. Inconvenient routes of drug administration (IV)
5. Short drug elimination half-lives necessitate frequent drug administration
6. Cost of drugs and meat/milk withhold periods

Implications of extra label drug use (ELDU) for pain management

- ELDU is permitted only by or under the supervision of a veterinarian.
- ELDU is allowed only for FDA approved animal and human drugs.
- A valid Veterinarian/Client/Patient Relationship is a prerequisite for all ELDU.
- ELDU for therapeutic purposes only (animal's health is suffering or threatened). Not drugs for production use.
- ELDU is not permitted if it results in a violative food residue, or any residue which may present a risk to public health.

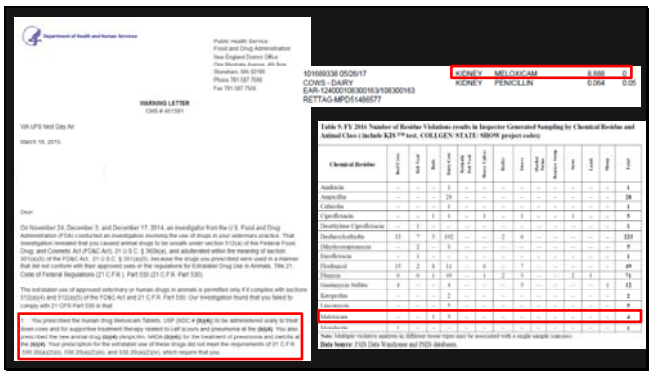
http://www.avma.org/reference/amduca/amduca1.asp

Top 10 Residue Violations

Dairy Cows (FY 2017)

Residue Name	COWS - DAIRY
Desfuroylceftiofur	179
Penicillin	95
Sulfadimethoxine	51
Flunixin	27
Ampicillin	25
Sulfamethazine	17
Gentamicin	9
Tilmicosin	6
Dihydrostreptomycin	6
Meloxicam	6

In the absence of an approval, there is a **ZERO TOLERANCE** for meloxicam residues in tissues in the USA



WARNING LETTER

10168038 05/26/17
COWS - DAIRY
EAR-1040010830016 3/108300163
RETTAG-MPD51486577

KIDNEY	MELOXICAM	0.888	0
KIDNEY	PENICILLIN	0.064	0.05

Table 9. FY 2016 Number of Residue Violations results in Inspector Generated Sampling by Chemical Residue and Animal Class (Include KIS TM test, COLLGEN/STATE/SHOW project codes)

Chemical Residue	Beef Cows	Milk Fed Veal	Veal	Dairy Cows	Nursing and Fed Veal	Dairy Calves	Bulls	Steers	Market Swine Less Than 300 lbs	Sows	Lambs	Sheep	Total
Amikacin	--	--	--	1	--	--	--	--	--	--	--	--	1
Ampicillin	--	--	--	28	--	--	--	--	--	--	--	--	28
Cefacetrile	--	--	--	1	--	--	--	--	--	--	--	--	1
Ciprofloxacin	--	--	1	1	--	1	--	1	--	1	--	--	5
Desethylene Ciprofloxacin	--	1	--	--	--	--	--	--	--	1	--	--	2
Desfuroylceftiofur	13	7	5	192	--	--	2	6	--	--	--	--	225
Dihydrostreptomycin	--	2	--	3	--	--	--	--	--	--	--	--	5
Gentamicin	--	1	--	--	--	--	--	--	--	--	--	--	1
Oxytetracycline	15	2	6	11	--	4	--	7	--	--	--	--	45
Penicillin	6	6	1	64	--	1	2	3	--	--	1	1	75
Sarafloxacin	4	--	--	6	--	--	--	7	--	--	--	1	17
Streptomycin	--	--	--	2	--	--	--	--	--	--	--	--	2
Tylosin	--	--	--	6	--	--	--	--	--	--	--	--	6
Meloxicam	--	--	1	3	--	--	--	--	--	--	--	--	4
Tulathromycin	1	--	--	1	--	--	--	--	--	--	--	--	2

Note: Multiple violative analytes in different tissue types may be associated with a single sample outcome.
Data Source: FSIS Data Warehouse and PHIS databases.

Why is there only 1 analgesic drug approval?

Until recently there were no analgesic drugs labeled for pain relief in livestock in the USA

VI. LABELING

2. Pain

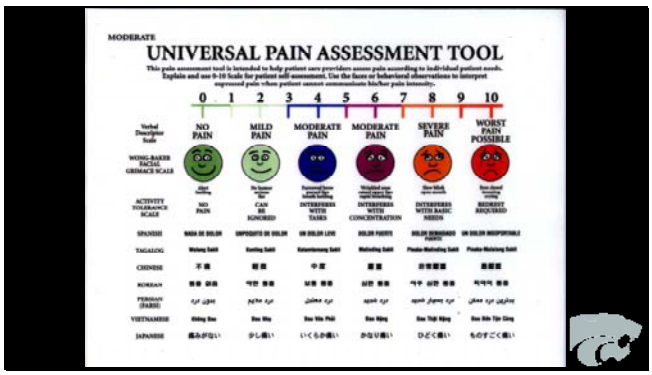
"We (FDA) recommend that this indication be based on the **control of clinical signs of pain associated with a disease**. We encourage the use of **validated methods of pain assessment** in the target species".

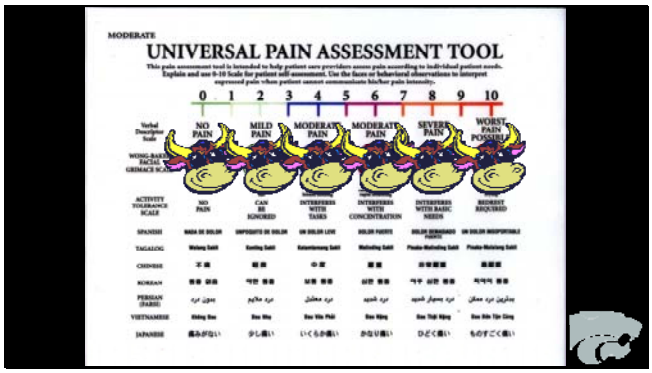
FDA Guideline No. 123
DEVELOPMENT OF TARGET ANIMAL SAFETY AND EFFECTIVENESS DATA TO SUPPORT APPROVAL OF NSAIDS FOR USE IN ANIMALS

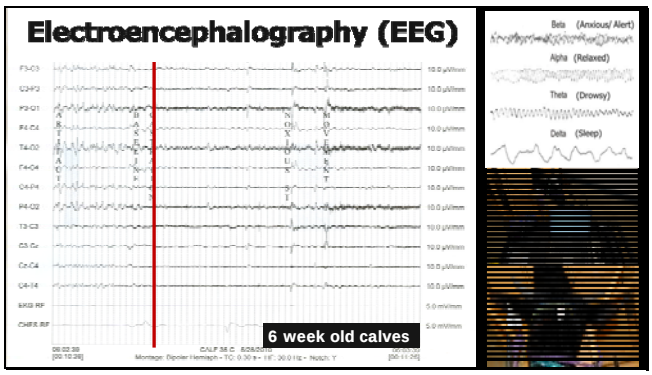
Banamine® TD approved in July 2017 for relief of footrot pain in cattle

So how do we know if it hurts?

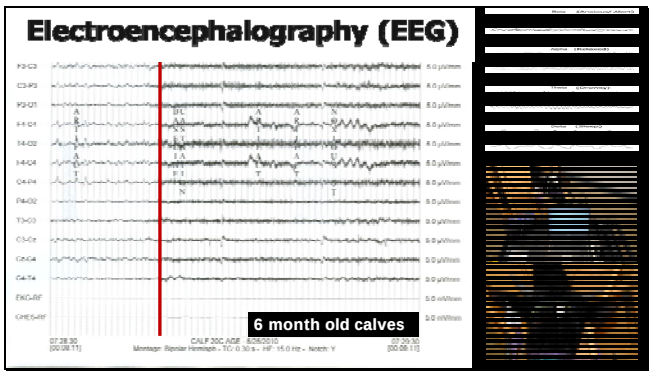
Not all of these are "validated methods of pain assessment"


MODERATE
UNIVERSAL PAIN ASSESSMENT TOOL
0 1 2 3 4 5 6 7 8 9 10
NO PAIN
MILD PAIN
MODERATE PAIN
MODERATE PAIN
SEVERE PAIN
WORST PAIN POSSIBLE


MODERATE
UNIVERSAL PAIN ASSESSMENT TOOL
0 1 2 3 4 5 6 7 8 9 10
NO PAIN
MILD PAIN
MODERATE PAIN
MODERATE PAIN
SEVERE PAIN
WORST PAIN POSSIBLE


Electroencephalography (EEG)
Beta (Anxious/ Alert)
Alpha (Relaxed)
Theta (Drowsy)
Delta (Sleep)
6 week old calves

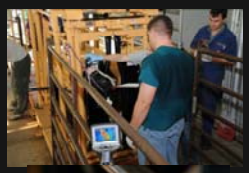
Electroencephalography (EEG)



Take Home Message

Performing painful production practices earlier in life minimizes the neuroendocrine response to a painful procedure

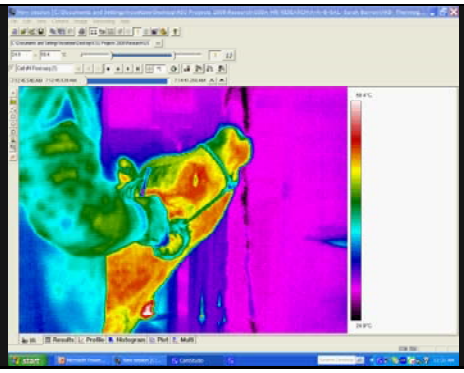
Thermography



- Detects thermographic differences associated with changes in cutaneous perfusion
- Pain causes alterations in sympathetic tone

→ Results in changes in superficial vascular blood supply.

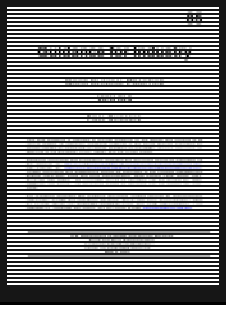
→ Gives rise to quantifiable changes in localized body temperature



Take Home Message

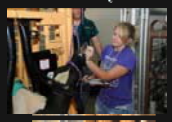
Surgical castration without pain management hurts!

Validation of Pain Assessment Tools



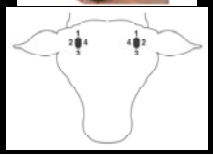
- Sensitive and specific to pain vs. stress?
- Robust and repeatable?
- Usefulness for determining clinical ***field*** effectiveness
- → Does it work in the field like it works in the lab?
- Can the study be reconstructed using the raw data?

What are potentially "validated methods of pain assessment" in livestock



- Electrodermal Activity
- Chute Exit Speed
- Growth & Performance
- Accelerometers
- Behavior & Location in a pen
- Heart Rate Determination
- Plasma Cortisol
- Plasma Substance P
- EEG
- Thermography
- Algometers (MNT) (Canada)
- Pressure mat analysis (USA)

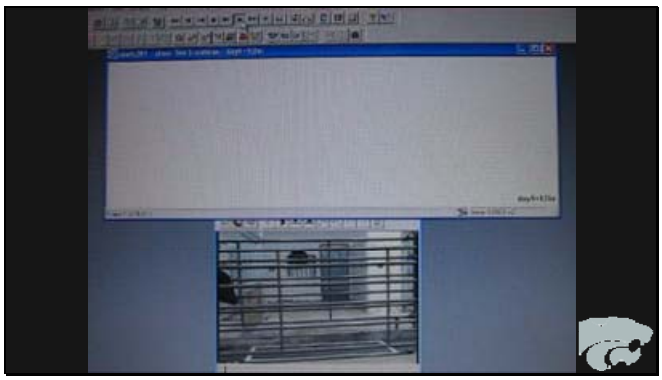
Endpoint: Algometers



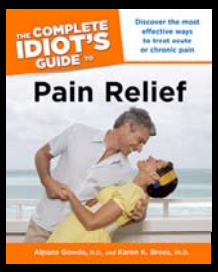
- Assess pressure tolerance at the surgical site
- Electronic measurement of force applied
- Greater the force applied, the less pain experienced
- Potentially useful for field sites

Pressure Mats

- Walkway with two sensor mats in series
- Computer software allows real-time recording of all phases of stride
  - → the duration of stride,
  - → length of stride,
  - → force throughout the stride,
  - → force distribution, and
  - → moment of inertia.
- This allows complete characterization of how much weight is being carried on each foot



3. What can we do to reduce pain? The 4 S's

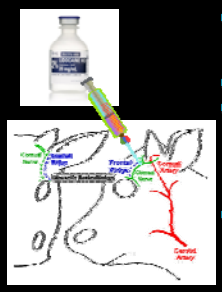


1. **Suppress (Prevent Pain)**
   - → Polled Genetics
   - → Sexed Semen
2. **Substitute (Use alternative)**
   - → Paste vs. Cautery dehorning
   - → Perform in young vs. older animal
3. **Soothe (Analgesia)**
   - → Preemptive vs. Existing Pain
4. **Supplement**
   - → Multimodal analgesia

Analgesic drug options

- Local anesthetics → Lidocaine — **Acute Incisional Pain**
- Non-steroidal Anti-inflammatory Drugs (NSAIDs) → Aspirin, → Flunixin meglumine, → Meloxicam — **Inflammatory Pain**
- Sedative analgesics → Xylazine — **Chemical Restraint**
- Dissociative Anesthetics → Ketamine — **Chemical Restraint**
- Opioids → Butorphanol — **Chemical Restraint**
- Anti-epileptics → Gabapentin — **Chronic Pain**

How do we manage acute pain? Local Anesthetics

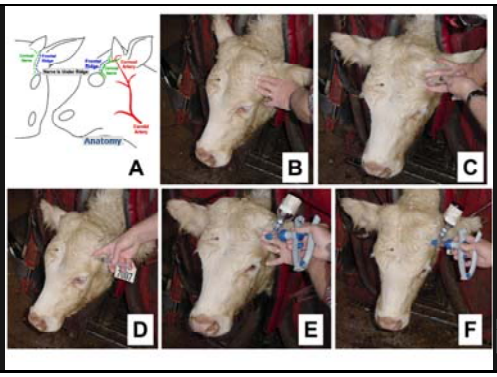


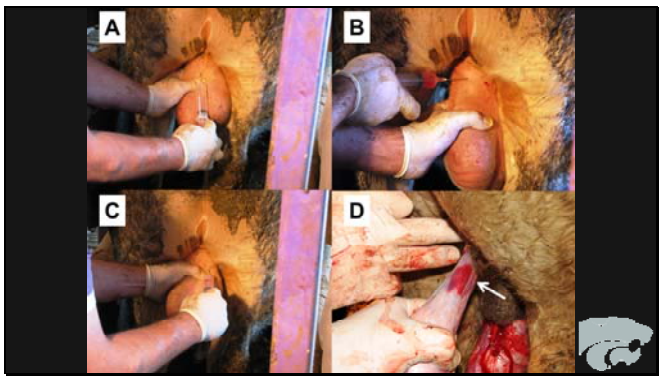
- Inhibit the transmission of nerve impulses along the nerve
- Reversible loss of sensation
- Lidocaine has a fairly rapid onset of activity (2 to 5 minutes) and an intermediate duration of action (90 minutes).
- Administer 5 – 10 mL under frontal ridge ½ way between horn and eye

Can lidocaine injection be made less painful?

1ml Bicarb to
10 ml Lidocaine

- 10: 1 ratio of 2% lidocaine with 8.4% sodium bicarbonate
- Bicarb reduces pain of lidocaine injection (McKay et al, 1987)
- Bicarb may enhance analgesia (Curatolo et al, 1998)
- Bicarb may decrease time of onset of nerve block (Sinnott et al, 2000)
- Bicarb may decrease duration of block (Sinnott et al, 2000)





Pro's and cons of local anesthesia

Pros

- Inexpensive
- Reduces procedural pain
- Reduces risk of injury to both the operator and the calf
- Reduces stress

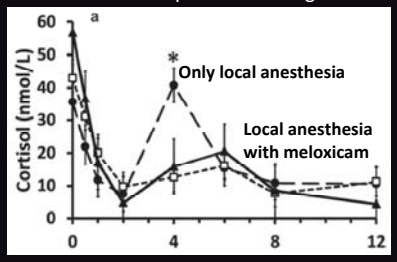
Cons

- Takes 2 – 5 minutes to take effect
- Requires some training to administer
- The effect only lasts for a few hours after which the pain returns

Take Home Message

1 mL of 8.4% sodium bicarbonate added to 10 mL lidocaine will reduce the pain of injection and may reduce the time to onset of the block

A spike in cortisol (stress hormone) occurs after local anesthesia wears off post- dehorning



Local anesthetic alone does not provide adequate analgesia

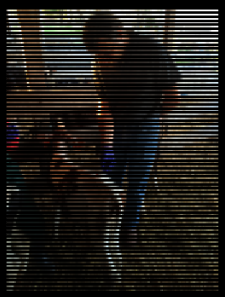
NSAIDs with bovine data available in the U.S.

Drug	Approved Species	Indications	Dose (Cattle)	T ½ in cattle	Withhold period
Flunixin meglumine (Merck®)	Cattle, horses and pigs	Antipyretic, Anti-inflammatory. BRD and mastitis **Foot rot pain**	2.2 mg/kg IV 3.3 mg/kg Topical	3-8 h Longer in topical	Meat- 4 days (IV) Meat- 8 d (topical) Milk- 36 hours (IV)
Phenylbutazone	Horses and dogs	Anti-inflammatory	4 mg/kg IV ONLY!	40 – 55 h	Not approved in cattle in the USA
Ketoprofen (Merial ®)	Horses and dogs	Anti-inflammatory	1.5 mg/kg IV, IM	0.42 h	Not approved in cattle in the USA
Aspirin	No FDA approval Horses and Cattle	Reduction of fever Relief of minor muscle aches and joint pain	50 – 100 mg/kg PO Oral F < 20%	0.5 h (IV salicylate)	No formal FDA approval Not for use in lactating cattle
Carprofen (Zoetis®)	EU approval in cattle Dogs	Adjunctive therapy of acute respiratory disease and mastitis	1.4 mg/kg bodyweight IV or SC Oral Tablets	Age Dependent <10 weeks: 49.7 hours	Not approved in cattle in the USA EU- 21 days (Meat), 0 days (Milk)
Meloxicam (Boehringer Ingelheim®)	EU and Canadian approval in cattle Dogs and cats	Adjunctive for BRD; diarrhea and acute mastitis(EU). Analgesia after disbudding (Can)	0.5 IV, SC 0.5 - 1 mg/kg PO Oral F = 100%	27 hours (Range: 19.97 – 43.29 hours)	Not approved in cattle in the USA. 15 days EU and 20 d Canada. FARAD 21 days (Meat)
Firocoxib (Merial ®)	Dogs and horses	Anti-inflammatory	0.5 mg/kg (PO) Oral F =98.4%	18.8 hours (Range: 14.2 – 25.5 hours)	Not approved in cattle in the USA or EU.

Banamine® Transdermal
(flunixin transdermal solution)

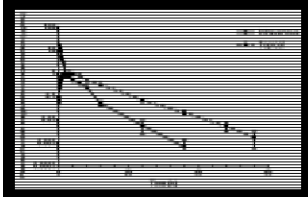
- A transdermal flunixin meglumine formulation was recently approved
- Administered topically for systemic absorption at 1 mL/ 15 kg bodyweight
- Approved for reduction of fever in BRD and pain relief for footrot in the EU, Canada and now the USA

All our studies were conducted independent of industry support



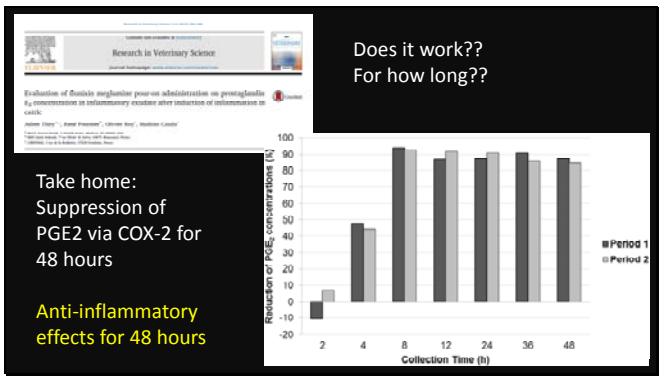
"It's so easy you can administer it with one hand tied behind you back" Dr. Mike Kleinhenz, PhD Candidate

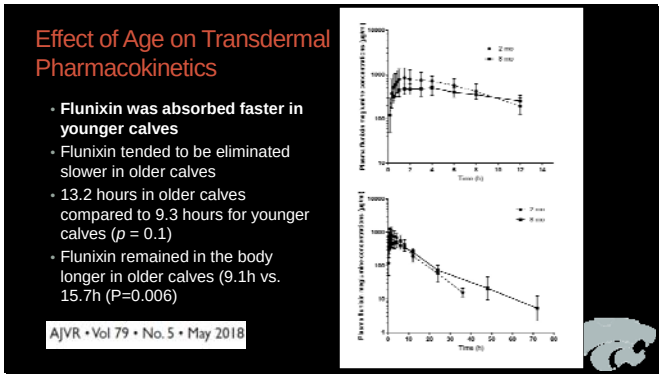
Transdermal vs. IV Pharmacokinetics

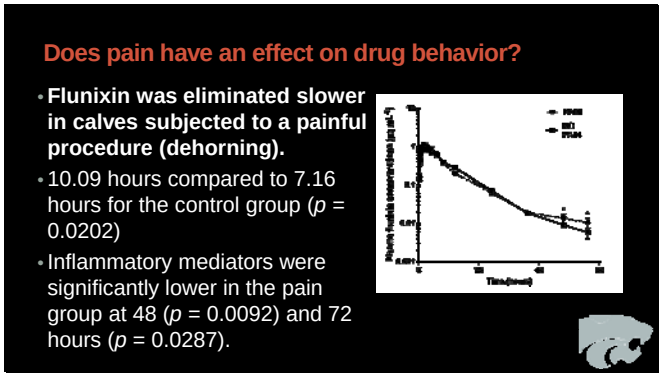


J. vet. Pharmacol. Therap. 39, 612–615. doi: 10.1111/jvp.12314.

- Time to maximum levels ↑ 2.14 h
- Maximum concentration ↓ 1.17 µg/ml
- Time for 50% drug lost ↑ 6.42 h
- Mean Residence Time ↑ 8.36 h
- Mean Absorption Time ↑ 3.82 h
- Bioavailability ↓ 48%

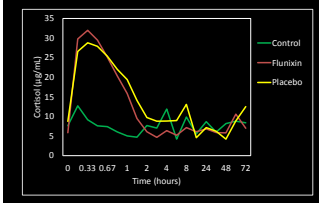

Research in Veterinary Science
Does it work??
For how long??
Take home:
Suppression of PGE2 via COX-2 for 48 hours
Anti-inflammatory effects for 48 hours
Reduction of PGE2 concentrations (%)
Collection Time (h)
Period 1
Period 2


Effect of Age on Transdermal Pharmacokinetics
Flunixin was absorbed faster in younger calves
Flunixin tended to be eliminated slower in older calves
13.2 hours in older calves compared to 9.3 hours for younger calves (p = 0.1)
Flunixin remained in the body longer in older calves (9.1h vs. 15.7h (P=0.006)
AJVR • Vol 79 • No. 5 • May 2018


Does pain have an effect on drug behavior?
Flunixin was eliminated slower in calves subjected to a painful procedure (dehorning).
10.09 hours compared to 7.16 hours for the control group (p = 0.0202)
Inflammatory mediators were significantly lower in the pain group at 48 (p = 0.0092) and 72 hours (p = 0.0287).

Flunixin Transdermal Clinical Studies

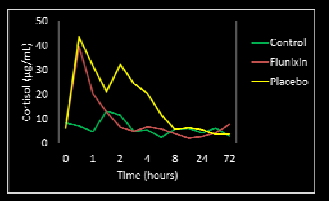
Dehorning without LA (6 week old calves)



No significant difference between flunixin-treated and control calves after dehorning without LA.

J. Anim. Sci. 2017.95:1993–2000

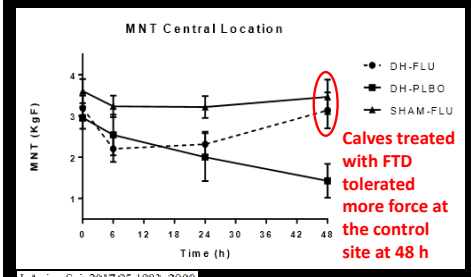
Surgical castration without LA (9 month old calves)



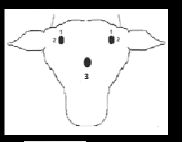
Significant reduction in cortisol between flunixin-treated and control calves after surgical castration without LA.

Livestock Science 212 (2018) 1-6

Algometer Outcomes after Dehorning without Local Anesthetic

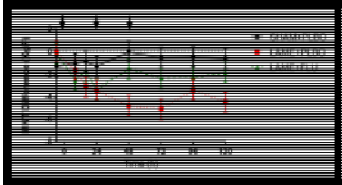


Calves treated with FTD tolerated more force at the control site at 48 h

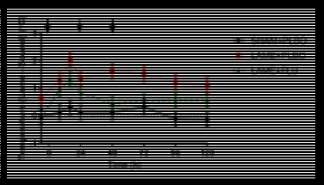


J. Anim. Sci. 2017.95:1993–2000

Impact of FTD on lameness outcomes



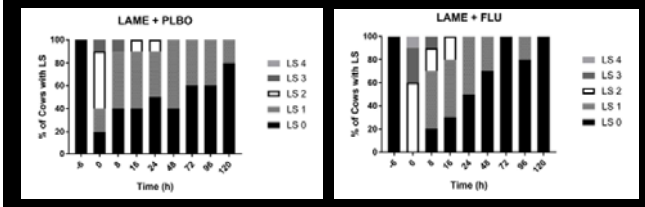
Flunixin-treated cows tolerated significantly more pressure than control cows after lameness induction



Flunixin-treated cows and significantly smaller difference in claw temperature between the lame and sound claw after lameness induction

Cows received 3 topical doses of flunixin once a day for 3 days after lameness induction with amphotericin B

Impact of FTD on lameness scores



Cows received 3 topical doses of flunixin once a day for 3 days after lameness induction with amphotericin B

A study examining Banamine Transdermal at arrival

- 384 cattle arrived from Tennessee to KSU Stocker Unit in Manhattan, KS in 4 truck loads over 10 days in October 2017
- 199 bulls and 185 steers
- Distributed by arrival weight
- 12 calves /pen (6 castrated bulls and 6 steers) over 32 pens

Banamine® Transdermal

Materials and Methods

- Pens were randomly assigned to treatments within lot as follows:

  Group 1: Calves received Zuprevo 18% (Tildipirosin, Merck Animal Health) at 4 mg/kg (1 mL/100 lb.) body weight as metaphylaxis for BRD

  Group 2: Calves received Zuprevo 18% at 4 mg/kg (1 mL/100 lb.) in combination with Banamine Transdermal at 3.33 mg flunixin/kg bodyweight (equivalent to 1 mL/15 kg bodyweight).
- Treatments were administered at the time of processing, approximately 12-24 h after arrival at the feedlot.

Banamine® Transdermal

Outcome Variables

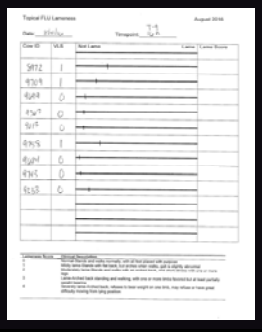
- Individual animal weights by lot and treatment were recorded on day 0, day 14 and day 63.
- **Pen Weights** were recorded weekly
- **Visual analog scale (VAS)** assessment was conducted by two trained evaluators blinded to treatment allocations

→3 calves received as steers and 3 calves received as bulls and castrated on arrival/pen.

→VAS assessments were taken every 12 hours starting 12 hours after being processed onto the study for 6 days.

Banamine Transdermal

Visual Analog Scale (VAS) Measurements



- Continuous vs. ordinal scale
- Allows for traditional statistics
- Does not confine you to only 4 scores
- Less bias
- More objective.

Banamine Transdermal

Outcome Variables

- **Accelerometers** were placed on 40 animals (10 per study lot) on the day of enrollment.
- Accelerometers were placed on the left rear legs.
- Steps, standing up and lying bouts, and motion index data was collected via accelerometers.

Banamine Transdermal

BRD Diagnosis

- Animals were observed twice daily for signs of BRD
- Rectal temperature and a clinical illness score (CIS) were recorded such that a CIS of
- 1; is a normal healthy animal,
- 2; slightly ill with mild depression or gauntess,
- 3; moderately ill demonstrating severe depression/labored breathing/nasal or ocular discharge, and
- 4; severely ill and near death showing minimal response to human approach.

Banamine® Transdermal (flunixin transdermal solution)

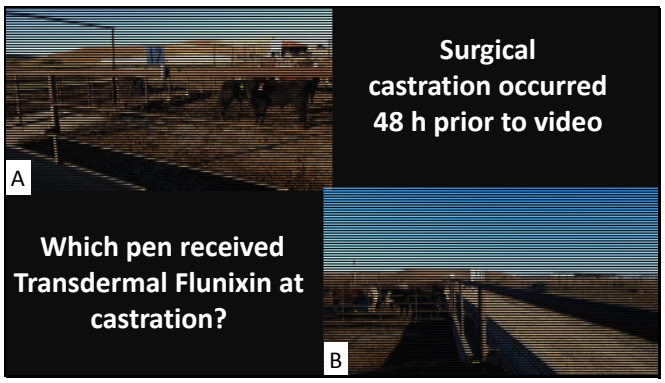
BRD Treatment

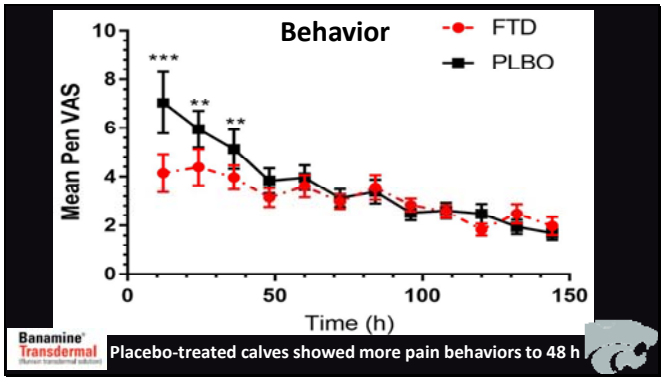
- Animals pulled from the pen with a rectal temperature ≥ 40 °C and demonstrating a CIS ≥ 2 were treated following label instructions with the following compounds:
- **1st Treatment:** Florfenicol (Nuflor, Merck Animal Health, Madison, NJ) administered at 6 ml/100 lbs BW. (3 day PTI)
- **2nd Treatment:** Enrofloxacin (Baytril 100®; Bayer Animal Health) at a dose of 5.7 mL per 100 lb BW. (3 day PTI)
- **3rd Treatment:** Oxytetracycline (300 PRO LA; Norbrook Animal Health) at 4.5 mL/ 100 lbs. at which time animals will be considered chronic and will be removed from the trial.

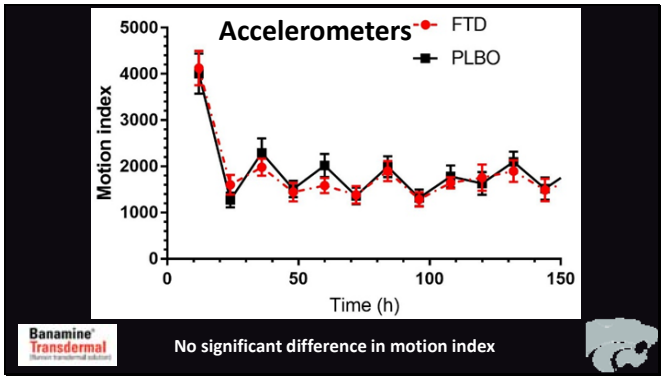
Banamine® Transdermal (flunixin transdermal solution)

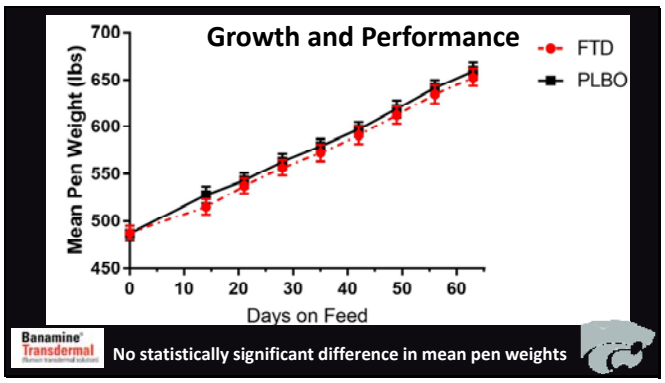
Results

Banamine® Transdermal (flunixin transdermal solution)


Surgical castration occurred 48 h prior to video
A
Which pen received Transdermal Flunixin at castration?
B


Behavior
FTD
PLBO
Mean Pen VAS
Time (h)
***
**
**
Banamine Transdermal
Placebo-treated calves showed more pain behaviors to 48 h


Accelerometers
FTD
PLBO
Motion index
Time (h)
Banamine Transdermal
No significant difference in motion index



	Lot #	Zuprevo and Banamine	Zuprevo Only	Treatment
Percentage Pulled	244	7.29%	11.45%	P = 0.85
Days to 1st Pull		17.1	14.8	
SEM		2.9	2.5	
Percentage Pulled	245	23.96%	17.71%	
Days to 1st Pull		8.4	11.2	
SEM		1.9	2.1	
Percentage Pulled	246	33.33%	30.21%	
Days to 1st Pull		14.3	12.4	
SEM		1.7	1.7	
Percentage Pulled	247	31.25%	19.79%	
Days to 1st Pull		11.1	9.6	
SEM		1.7	2	

Take Home Messages

- Topical flunixin is convenient to administer
- Topical flunixin appears to last up to 48 h after a single dose
- Topical flunixin is effective at mitigating many of the negative physiological and behavioral effects of castration, dehorning and lameness

Pro's and cons of NSAIDs

Pros

- Inexpensive
- Reduces inflammatory pain → long acting
- Reduces stress
- Reduces impact of painful procedure on animal behavior

Cons

- ELDU requires veterinary oversight
- Meat withhold periods must be observed
- Most effective when administered with local anesthesia

Final Thoughts

Scientists should recognize that, when research findings related to animal welfare are equivocal or remain unsettled, the question of how animals ought to be cared for and treated will then shift to **the realms of ethics and social values**

Dr. Stanley Curtis, *Feedstuffs* Oct. 2007

Acknowledgements

- This research was funded by USDA National Institute of Food and Agriculture: Food Research Initiative Competitive Grant no. 2008-35204-1923 and 2013-67015-21332
- Merck Animal Health for supporting the Banamine Transdermal transport work

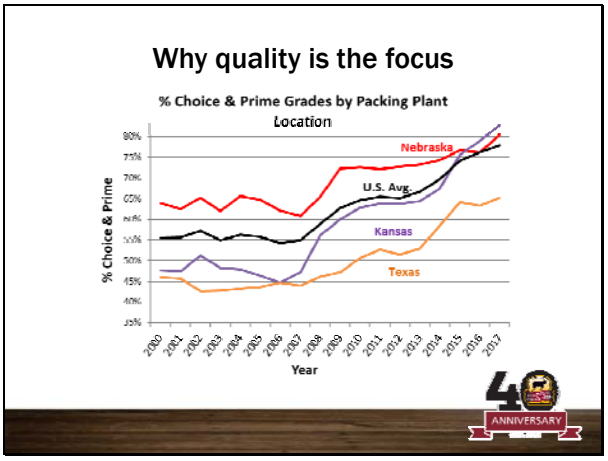
Questions?

jcoetzee@vet.k-state.edu

Notes – Notes -- Notes

Quality Stocker Production Considerations

Justin Sexten, Ph.D.
Certified Angus Beef



Why quality is the focus

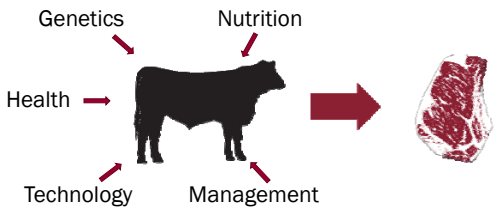
92.6%

11.2%

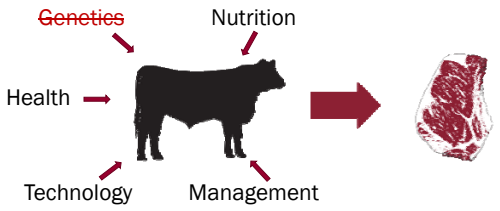
9.1%

3.5%

Factors affecting quality



Factors affecting quality – Stocker



What stocker "treatments" carryover

- Placement weight
  - Age
  - ADG
- Nutrition
- Implant protocols
- Health challenges

Galyean et al., 2011; Reuter and Beck, 2013

For each day of age at feedyard entry

- Reduced DOF by 0.3 days (R^2 = 0.52)
- Reduced feedyard gain by 0.79 lb (R^2 = 0.19)
- Marbling score decreased by 0.31 (R^2 = 0.04)
- HCW increased by 0.18 lb (R^2 = 0.02)

Reuter and Beck, 2013

For each 100 pounds gained prior to feedyard entry

- Reduced DOF by 9 days (R^2 = 0.24)
- Reduced Gain:Feed by 0.009 lb (R^2 = 0.17)
- Reduced feedyard gain by 35 lb (R^2 = 0.12)
- HCW increased by 27 lb (R^2 = 0.11)
- Marbling score was unaffected

Reuter and Beck, 2013

Nutrient source

- Forage type and grazing system influence placement weight rather than a direct impact on feedyard performance
- Meta-analysis (16 Exp) suggests carcass merit is not influenced by dietary starch level in backgrounding diets

Reuter and Beck, 2013; Lancaster et al., 2014

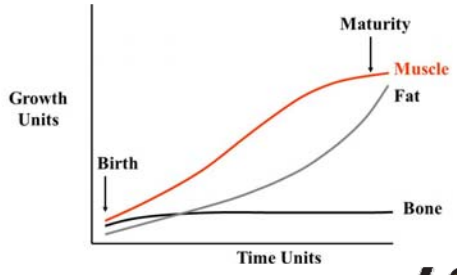
Nutrient level

Item	Mean	Min	Max
Initial BW, Lbs	450.2	409.7	612.3
Final BW, Lbs	763.7	509.9	991.2
ADG, Lbs / d	1.70	0.33	3.7
Marbling score	417	266	535

- Meta-analysis (29 Exp) suggests marbling score is not influenced by ADG during stocker phase

Krehbiel et al., 2012; Lancaster et al., 2014

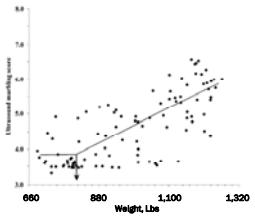
Normal bone, muscle & fat growth curves



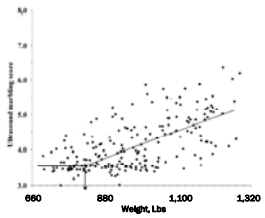
Adapted from Boggs et al., 1998

Does the "stocker period" matter?

Feedyard entry at 800 pounds



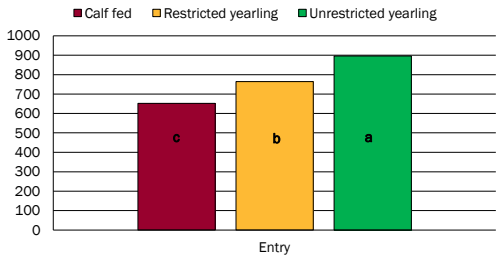
Feedyard entry at 1,000 pounds



Pasture gain 1.9 Lbs / day

Carter et al., 2002

Nutrition timing



[abc] within period means lacking common superscript differ *P* <0.05

Williamson et al., 2014

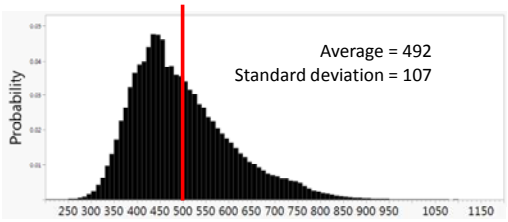
Nutrition timing

Item	Calf	Restricted	Unrestricted	*P* =
Growing ADG, Lb /d	3.6[a]	1.6[c]	2.3[b]	< 0.01
Marbling score*	604[a]	553[b]	577[ab]	< 0.01
% Choice	85.7	78.0	85.8	0.35
% Premium choice	84.9[a]	35.7[c]	55.0[b]	< 0.01

[abc] within row means lacking common superscript differ P <0.05
* Marbling scale adjusted to 400 = small, 500 = modest for consistency

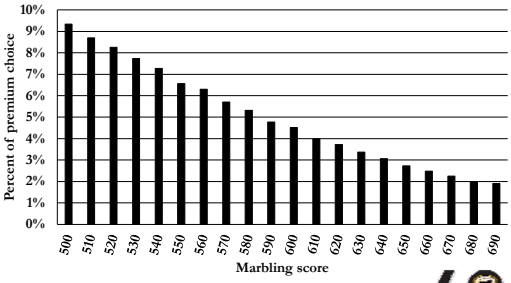
Williamson et al., 2014

How important is 40 units of marbling?



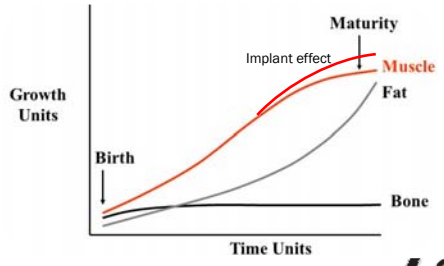
Marbling score, 400 = Small 00, 500 = Modest 00

Premium choice marbling distribution



National Beef Quality Audit 2017

Normal bone, muscle & fat growth curves



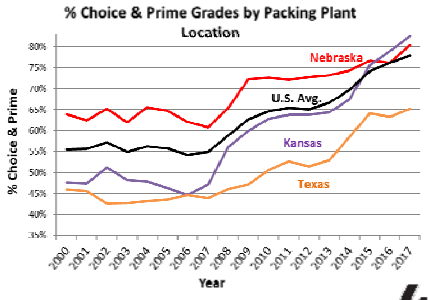
Adapted from Boggs et al., 1998

Implant timing

Item	Feedyard	Stocker	*P* =
ADG, lb / day	2.35	2.64	< 0.01
HCW, Lbs	720	718	0.92
Back fat, inches	0.59	0.55	0.20
Marbling score	490	466	0.06
% Choice	86.1	80.3	0.25
% Premium choice	60.8	56.3	0.44

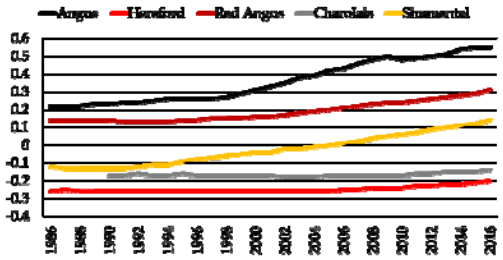
Williamson et al., 2014

Premise for changing implant programs



Premise for changing implant programs

Marbling EPD on Angus base



Kuehn and Thallman, 2018

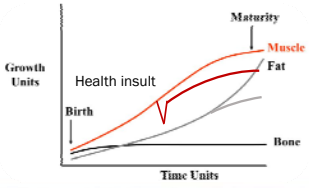
Considerations for increased implant duration or level

- Period length is key
  - Long term implants used in short term did not increase performance
- In calf-feds increasing implant potency earlier in the feeding period did not improve ADG and depressed quality grade

Farney and Corrigan 2018; Hilscher et al., 2016; Oney et al., 2018

Health

- Single largest challenge to individual
  - Performance
  - Carcass merit
- Metaphalaxis
  - Production challenge
  - Consumer view



Consumer opposition to antibiotic use *Treatment*

- Production benefit
  - Daily monitoring
  - Early diagnosis
- Animal welfare

Consumer opposition to antibiotic use *Prevention*

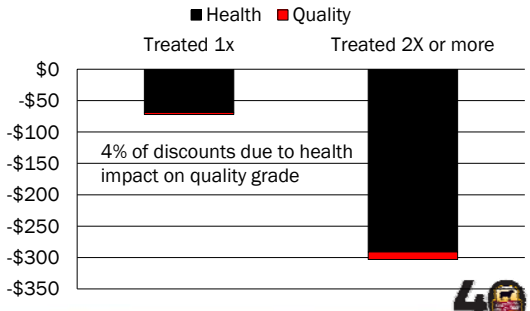
- Production benefit
  - Improved ADG and efficiency
  - Improved digestive health
- Environmental benefit
  - Greenhouse grass reduction
  - Efficient resource use

Consumer opposition to antibiotic use *Prevention*

Item	No Metaphylaxis	Metaphylaxis	*P* =
All in ADG, lbs / d	3.2	3.4	< 0.01
BRD morbidity, %	14.3	3.9	0.02
BRD mortality, %	3.1	1.2	0.03
Marbling score	394	395	0.92
% Choice and Prime	47.2	47.1	0.74

Adapted from Tennant et al., 2014

Discount source per head compared to healthy cattle



Over 80,000 head summary from the Iowa Tri-County Steer Carcass Futurity

Opportunities to reduce antibiotic use

- Minimize transit stress
- Evaluate arrival procedures
- Optimize nutrition
- Consider alternatives

Notes – Notes -- Notes

The Tech Revolution, Wall Street, Baseball and the Cattle Industry

Dane Kuper, CEO
Performance Livestock Analytics

World Population Clock

7.6 Billion People

http://www.worldometers.info/world-population/

CURRENT MARKET SITUATION

Volatile Market

Low Margins

Capital Intense

PERFORMANCE LIVESTOCK ANALYTICS

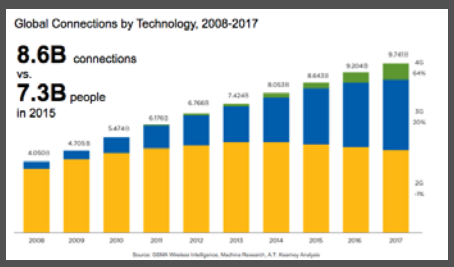
Dane Kuper
CEO

SMART TOILET

97%

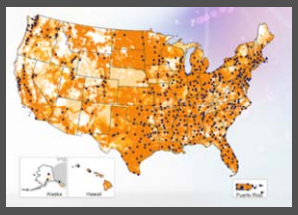
Use smart devise while on the porcelain throne

More Connected Mobile Devices Than People



Connectivity is Expanding

2004



2010

WHY ARE WE NOW ENTERING INTO THE DATA REVOLUTION?

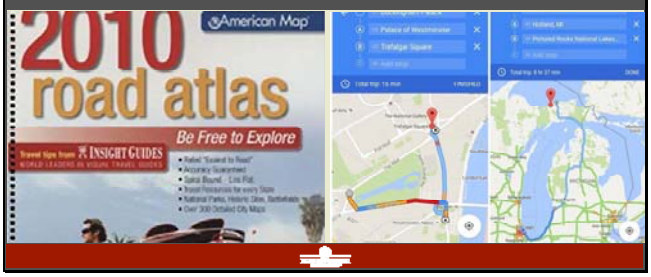
FASTER COMMUNICATION

COST OF DATA STORAGE DOWN 98% IN THE LAST 10 YEARS

SHOEBOX STORAGE

ACCESS TO INFORMATION FROM ANYWHERE AT ANYTIME

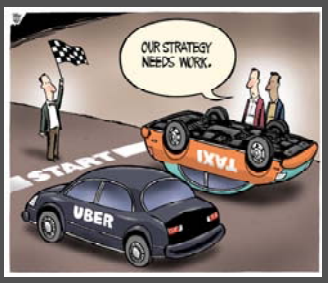
POWER OF REAL-TIME DATA



BETTERING THE BOTTOMLINE IN OTHER INDUSTRIES

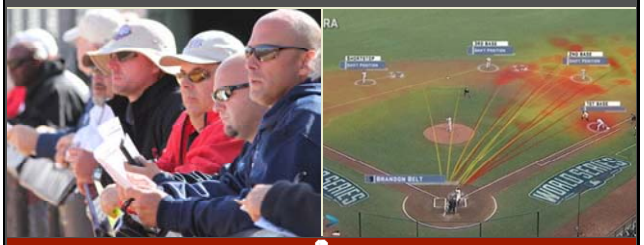
Uber vs Taxi

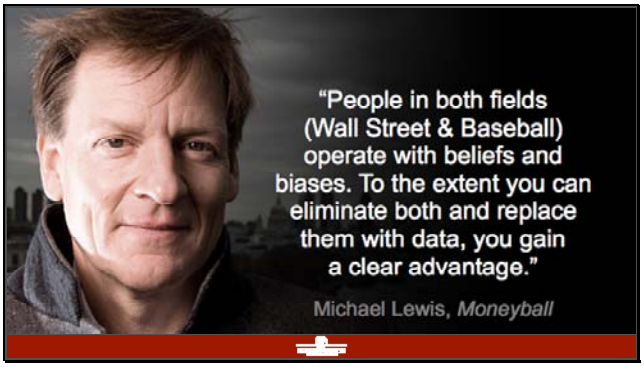
UBER



GOOGLE ADS: TARGETED ADS

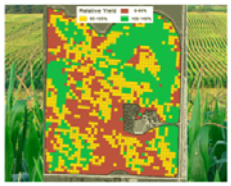
MAJOR LEAGUE BASEBALL





The Analog World is Getting Digitized

Digital Data is a Representation About a Real World Condition



CURRENT MARKET SITUATION

Volatile Market

Low Margins

Capital Intense

"Just 10% of trading is regular stock picking, JPMorgan estimates"

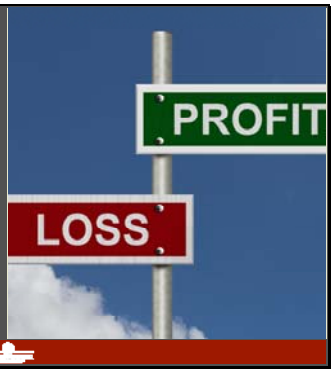
- CNBC

NET INCOME VARIATION

75%

Due to market variation

Dr. Lee Schulz, Iowa State University



How can we use data and technology to become more competitive?

BUY CATTLE BASED ON DATA, NOT YOUR GRANDPA'S BIAS

- Data can tell us how a particular ranches cattle has preformed
- Data can tell us our true cost of gain on steers vs heifers
- Data can tell us when is the optimum time to buy 500lb vs 850lbs
- Data can tell us we can bid more or that a bid is not worth the cattle on sale

Know your history

BE ALERTED WHEN TO PULL THE TRIGGER

- Should I take my cattle to 1450 or sell them at 1300lbs?
- When will my implant run out? Is there an ROI to do so?
- Do the markets allow me to lock a profit on this group?
- How do the markets work for these cattle in the auction ring?

Real-Time Information

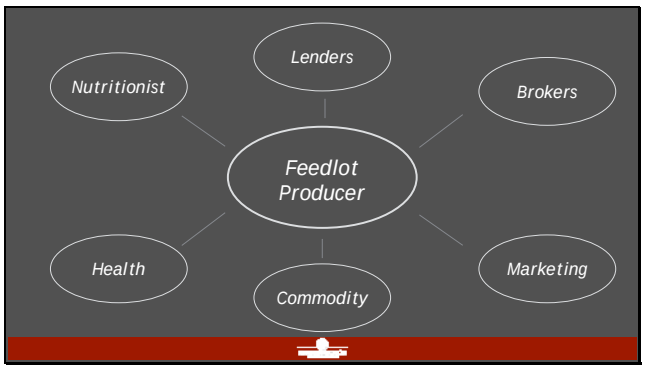
BRING THE EXPERTS IN TO HELP

- Equip your nutritionist with the tools necessary to provide educated recommendations
- Alert your vet when health issues arise
- Be better prepared with your lender
- Spend more time what you love to do, and empower your advisors to better help

Connecting to Advisors

WE SHOULD NEVER ALLOW A NUTRITIONIST TO ASK US…

"How are the cattle doing?"



KNOW YOUR HISTORY

REAL-TIME ACCESS

CONNECTING TO ADVISERS

PERFORMANCE
LIVESTOCK ANALYTICS

Dane Kuper
CEO
dane@cattlekrush.com

ARGENTINA

Economic Crisis
38 Pesos to $1 USD
41% Inflation Rate
60% Interest Rate
Feedyards are not full
Most beef consumed per capita
90% beef consumed locally
12 million slaughter per year

BRAZIL

4 Million on feed (3-5% in Feedlots)

160 million beef cattle

Slaughter 40 million head per year

$1.10 lb CARCASS

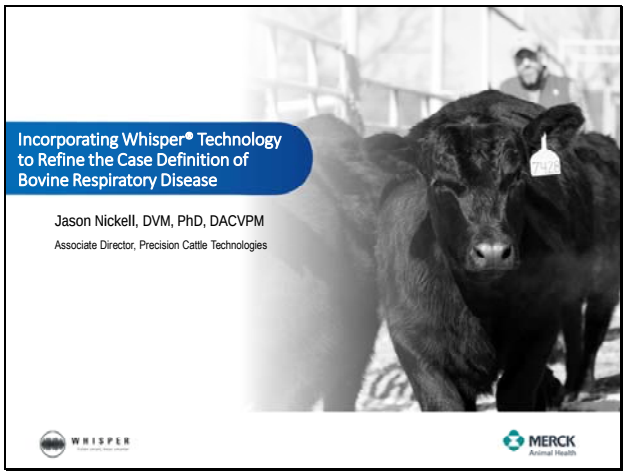
3 year old Nehlor bulls

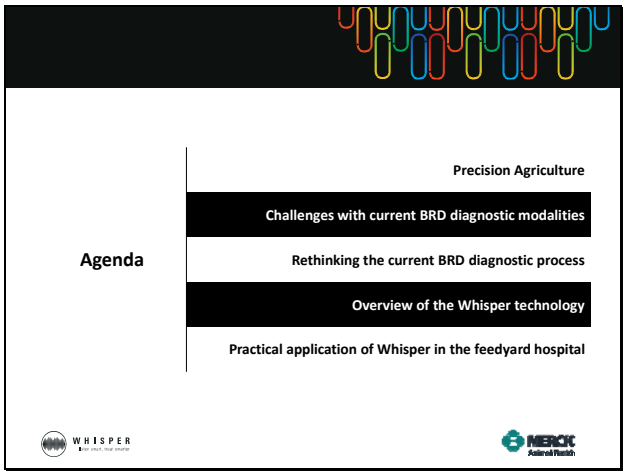
"Brazillian Trump" Running for President

Notes – Notes -- Notes

Rethinking BRD Diagnosis

Jason Nickell, DVM
Merck Animal Health





Our Current Mission

Develop solutions to help our customers assess risk, detect diseases early and make treatment decisions through predictive analytics, leading to improved productivity and validated appropriate antibiotic usage

WHISPER

MERCK Animal Health

WHISPER

MERCK Animal Health

Today, our customers are impacted by growing trends

Judicious Antibiotic Use
Tools to address increasing consumer concerns with the use of antibiotics

Labor
Alternatives to address lack of skilled and consistent labor resources

Health Outcome Insights
"Big data" and analytics to improve health outcomes and herd efficiency

Reduce Economic Impact / Improve Performance
Solutions to minimize economic losses due to disease, optimize performance

WHISPER

6

MERCK Animal Health

Precision Agriculture

The row crop example

- Farming management concept based on observing, measuring and responding to inter and intra-field variability in crops.
- High-level of variability within a field
  - Soil type
  - Fertilizer and water needs
  - Yield predictability

Precision Agriculture

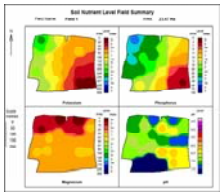
The row crop example

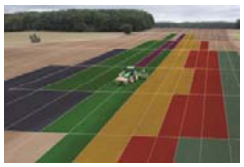
- Variable rate application
  - Water
  - Seed
  - Fertilizer

↓

Maximize yield

Reduce input costs



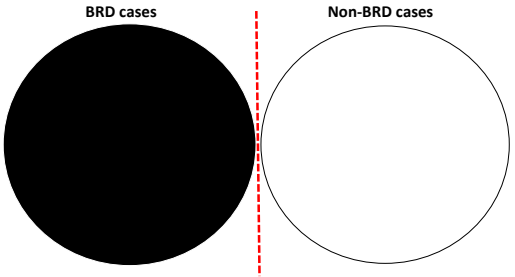


Challenges with current BRD diagnostic modalities

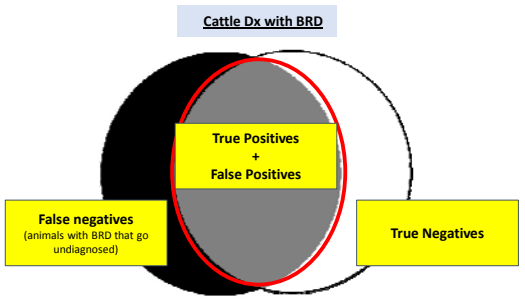
Caregiver

Trust = willingness to convey weakness

Challenges with current BRD diagnostic modalities



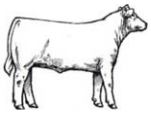
Challenges with current BRD diagnostic modalities



Rethinking the current BRD diagnostic process

BRD Diagnosis = **BRD Detection** + **BRD Confirmation**

Rethinking the current BRD diagnostic process



Onset of clinical signs….elevated body temperature for 12-136 hours (Timsit et al 2011)

Questions
1. **Are all calves that meet a BRD diagnosis at the same stage of disease?**
2. **Is rectal temperature, by itself, specific to BRD?**

Rethinking the current BRD diagnostic process

Automated stethoscope technology owned by Merck Animal Health

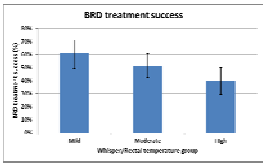
Sounds coming from chest are collected, evaluated, recorded and stored in a digital sound file

Generates a score that reflects the severity of BRD of the animal in the chute

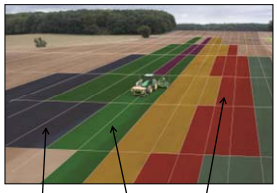
Whisper-hospital: Research summary

- 5 studies performed in the last year
- What have we learned?
  - Lung health estimate
  - Prediction of death
  - Whisper + rectal temperature

1. Mild BRD
   - WS=1, RT<104
2. Moderate BRD
   - WS=1, RT≥104 & WS≥2, RT<104
3. Severe BRD
   - WS≥2, RT≥104



Whisper-hospital: Research summary



198 lb N | 172 lb N | 191 lb N

Mild BRD (non-Abx trt)? | Moderate BRD (Abx trt only?) | Moderate BRD (Abx trt only?) | Severe BRD (Abx + ancillary trt?)

Can we modify our BRD treatment regimens to reflect differences in BRD severity?

WHISPER | MERCK Animal Health

How is Whisper used in the field?

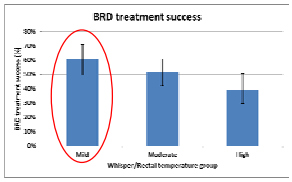
Disclaimer: This is completely anecdotal data provided to MAH by our existing Whisper customers

WHISPER | MERCK Animal Health

How is Whisper used in the field?

Application #1

- Reduction of BRD treatment costs
- Cattle observed with signs of mild BRD
  - Whisper score = 1
  - Rectal temperature < 104
- Treat with oxytetracycline or with nothing
  - Oxytetracycline: LA 200, Bio-Mycin 200, etc…



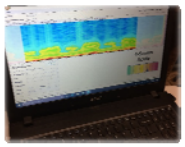
No **perceived** loss in performance compared to more expensive/potent antibiotics

WHISPER | MERCK Animal Health

How is Whisper used in the field?

Application #2

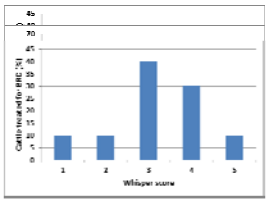
- Training of pen-riders
- Identify early signs of clinical disease
  - Calves receive treatment earlier in the disease process
- Perceived improvement in overall calf health



How is Whisper used in the field?

Application #3

- Use the Whisper score distribution as a tool to assist in managing various aspects of the production system



Thank you!

Notes – Notes -- Notes

Livestock Theft in Kansas

Kendal Lothman, Special Agent
Office of the Kansas Attorney General

Kansas Attorney General
Derek Schmidt

K-State Beef Stocker 2018 Field Day

September 20th, 2018

Kendal Lothman

- Special Agent
- Assigned to Livestock and Brand Investigation Unit
- Great Bend, KS

Livestock and Brand Investigation Unit

KANSAS ATTORNEY GENERAL
Derek Schmidt

- Created June 2014
- Joint coordination between Kansas Attorney General's Office Kansas Department of Agriculture
- Unit up and running November 2014

Livestock and Brand Investigation Unit

KANSAS ATTORNEY GENERAL
Derek Schmidt

Our Main Mission

Assist Local Agencies with livestock investigations

- Felony livestock theft
- Felony livestock pharmaceutical theft
- Brand violations

Assist KS Department of Agriculture with animal health emergencies

How We Get Involved

- At the request of local agency
- At the request of state or federal agency

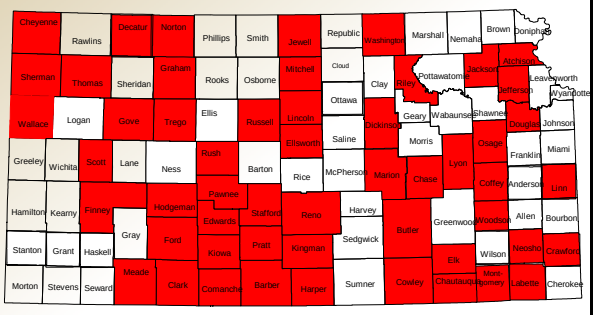
Case Load

- Have opened 113 cases in the last three and a half years

- 53 Counties
- Assisted 6 States
  - Kansas
  - Nebraska
  - Missouri
  - Oklahoma
  - Texas
  - Colorado

Average about 27 new cases each year

Livestock Investigations



Case Trends

- Thefts stay consistent whether markets up or down
- Increase in cases at the end of grazing season

Livestock in Kansas

- 2017 cattle inventory 6.4 million head
- Kansas ranked third in the nation
- Cattle VS Human 6.4 to 2.9
- Western Kansas has a large number of confined cattle (about 48% of inventory)
- East side has more cow calf operations
- Multi billion dollar industry

Identifying Cattle

- Branding
- Ear tags
- Tattoo
- DNA
- Unique markings

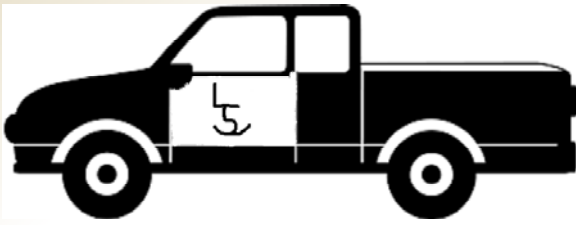
Branding

- Best way to identify livestock
- Can be seen from a distance
- Is hard to alter
- Cannot be removed
- Permanent return address
- Even if it is previous owners, brand can be used to ID the livestock.
- Rarely get cattle stolen that have freeze brand

Branding

Branding

Branding



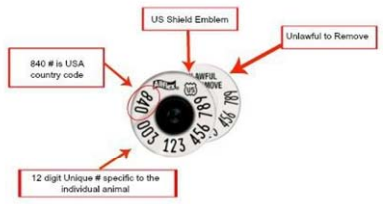
Ear Tags

- Ranch tags are great when sorting from neighbors but are easily removed
- Official ID tags can be used to track
- If your cattle have official ID tags keep records

Ear Tags

Ear Tags

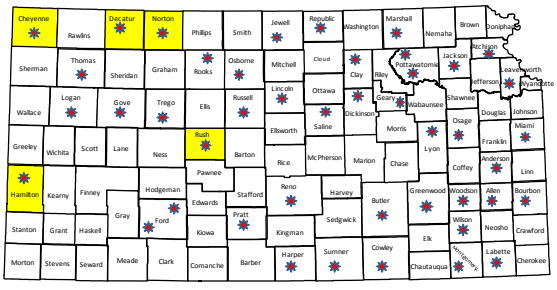
Ear Tags



Livestock Markets

- Kansas has 43 livestock markets across the state
- Only 5 of those markets do brand inspections
- Those markets choose to check brands due to proximity to Colorado and West Nebraska that require brand inspection
- KDA Animal Health Division has 6 contract brand inspectors that work at those markets. They will occasionally do country cattle or horses that are moving directly to a brand state

Kansas Livestock Markets



Livestock Markets

- Livestock markets are an important key in detecting and catching the outlaws that steal livestock

Livestock Theft

- Is a property crime
- Often resembles other property crimes
- Suspect may be the same
- Often leads back to drugs
- Rural locations
- Easy access, pens available
- Bait cattle

Livestock Theft

- Crime of opportunity
- Late at night or early morning
- Cattle at public market the next morning
- Only property crime that the suspect will get fair market value for stolen goods
- Cattle move quickly once at market
- At some point cattle will be gone permanently
- Time is of the essence

Outlaws

- Steal because they're lazy
- Take the path of least resistance
- What makes them the most money
- Scout out their targets / Do their home work
- Not worried about being efficient
- May have cattle experience / may not
  - Borrow /steal trailer and pickup
- Need money to support habits
  - Drugs / Rodeo / Gambling

Crime Scene

- **Tire tracks**
  - Dually or single axle pickup
  - Dual or single axle trailer
- **Shoe prints**
  - Number of persons
- **Other prints**
  - Horse tracks / 4 wheeler tracks / dog tracks
- **Foreign objects that don't belong**
  - Cigarette butts
  - Water bottles, beer cans
  - Receipts
  - Blood

Crime Scene

- **Baiting Material**
  - Cow Cake / Alfalfa
- **Distance from trailer tires to loading point**
  - Size of the trailer
- **Positioning of trailer to chute or alleyway**
  - Type of door on trailer
- **Contact points of trailer with fence**
  - Paint transfer

KDA Missing /Stolen Livestock Report

- Distributed upon report of missing livestock
- Goes to markets, LEO , surrounding states
- Best way to get out information fast
- agriculture.ks.gov/missing livestock
- Instructions / forms / contact information
- List of missing livestock

Common factors

- Target 300-600lbs 10 head
- Baby calves 1-2 head
- Cows 5-6 head
- Bait cattle
- Stolen livestock taken to a market
- Will take what is accessible

Prevention of Livestock Theft

- Brand your cattle
- Lock your gates / deter access to property
- Check your cattle often
- Count your cattle weekly
- Keep records
- Pay attention to what your cattle are telling you
  - Spooky /bawling /dry cows / coming to truck
- Trail cameras good way to monitor rural property

Prevention of Livestock Theft

- Talk with neighbors
- If you see something suspicious report it
- If you think your cattle have been stolen, report immediately to law enforcement
- Preserve crime scene
- Timely reporting is essential to a successful investigation

Contract care

- Do your home work
- Get references
- ID cattle before delivery
- Hold the caretaker accountable
- Require reports on head count, deads, doctored cattle monthly
- Go inspect livestock / facilities / pastures

Confined Cattle

Confined Cattle

- Head count / In and out
- Death rate / type of cattle
- Track medicine use
- Pay attention to feed consumption
- Checks and balances
- Outlaw is usually a employee

Contact Information

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Special Agent

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Notes – Notes -- Notes

Treatment Failures that are not BRD Related

A.J. Tarpoff, DVM
Kansas State University

KSU Beef Stocker Field Day

Treatment Failure. Was it really BRD?

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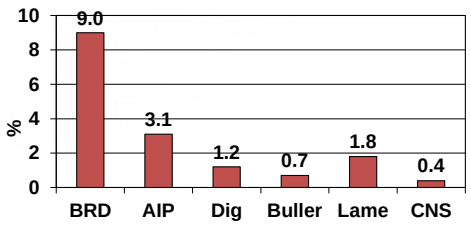
Knowledge for Life

2011 Feedlot NAHMS Data

Percent of Placements Affected by Disease Type



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Early Treatment=Success

- Do we have the right diagnosis?????
- Cattle are prey species
- Don't show us all their symptoms
- Dopey looking calves?
  - BRD
  - Or is it something else?

Other Considerations

- Lameness
- Digestive issues

Lameness Estimates

- 16% of all treatments
- 5% of deaths
- 70% of railer slaughter

Griffen et al. 1993

Lameness

- May be the biggest opportunity for improvement in the industry
- Significant losses
- Has been identified as a major point of focus, and as a welfare concern in all livestock industries
  - Beef- Fatigue cattle syndrome
  - Dairy
  - Swine
  - Poultry

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Where is the lameness?

- Most studies agree
  - 70% or more of lameness stems from the foot!

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Toe tip necrosis/toe abcesses

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What causes toe abscesses?

- Predisposing factors include cattle temperament, handling, softening of the hoof due to moisture
  - Cattle fight to get to the middle of the group when threatened (or sorted)
  - The powerful hind legs are used to push as the cattle mill about
  - The toes of the feet (especially the rear feet) may be ground down enough for infection to set in
  - Standing long periods of time on concrete?

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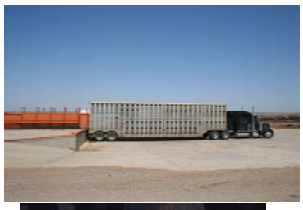
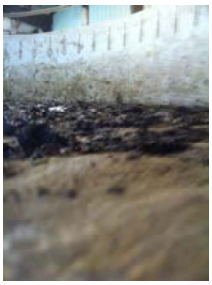
Causes





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Diagnosing toe abscesses

- Can you tell the difference between a lower and an upper leg lameness?
  - Again, often hard to tell.
  - Walk to protect the toe
  - Does not always appear the same as other types of lameness
- Use hoof-testers to find the affected toe
- You may be able to pare down to the abscess with a hoof knife
- Most of the time you will need to take the tip of the toe off with hoof nippers to allow drainage

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IDENTIFYING THE PROBLEM

- Pick Up The Foot
- Wash It
- Examine To Determine Cause of Lameness

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TOE ABSCESS

TREATMENT

- Tip Toe To Drain Abscess And Relieve Pressure
- *DO NOT TRIM ENOUGH TO CAUSE BLEEDING*
- May require extended therapy

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TOE ABSCESS
PREVENTION

- Quiet/Calm Cattle Handling
- Provide Nonabrasive Footing In Alleys And Working Areas

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Septic Arthritis

- May occur **after** initial respiratory disease
  - **Histophilus somni**
  - **Mycoplasma bovis**
- Routinely see lameness ~ 1 week + following treatment for BRD
  - Not Footrot!!

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Treatment

- Remember, Mycoplasma does not have a cell wall
  - Penicillin and Ceftiofur are a poor choice
- Recovery takes extended periods of time
  - Bacteria gone, but inflammation remains

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"Footrot"

- AKA
  - Infectious pododermatitis
  - Interdigital necrobacillosis
  - Interdigital phlegmon
- Not necessarily any animal carrying a leg

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Footrot

- Fusobacterium necrophorum
- Begins with a skin abrasion
- Swelling surrounding the food
- Noticeable lameness
- SMELL!!!

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Treatment

- Many labelled options
- Time of treatment critical in recovery
- Clubfoots seldom recover

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Digestive Diseases

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Coccidiosis

- Protozoal disease
- Primarily *Eimeria bovis* or *E. zuernii*
- Infection is present at some level in ≈100% of all cattle and/or their environment
- **Fecal/oral transmission**

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Coccidiosis

- Most frequently seen between 1 month and 2 years of age — immunity gradually develops
- Incidence increased by stress or concurrent disease
  - Winter
  - Freshly weaned
  - Newly arrived stockers and feeders
  - Worms
  - BRD

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Coccidiosis

- Bloody diarrhea — bright red blood

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Prevention and Control

- Sanitation
- Reduce stress
- Treat before times of stress
  - Preventatives/Treatments:
    - Amprolium
    - Sulfas
    - Decoquinate
    - Monensin
    - Lasalocid

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Acidosis

- Rapid grain consumption results in increased lactic acid production in the rumen
  - Lowers pH and acidifies the blood
  - Causes dehydration

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Acidosis

- Over consumption
- Caused when animals are moved too rapidly to high concentrate, low roughage diet
- Ration is misformulated
- Cattle are misfed
- Rumen pH <5.0 for extended period

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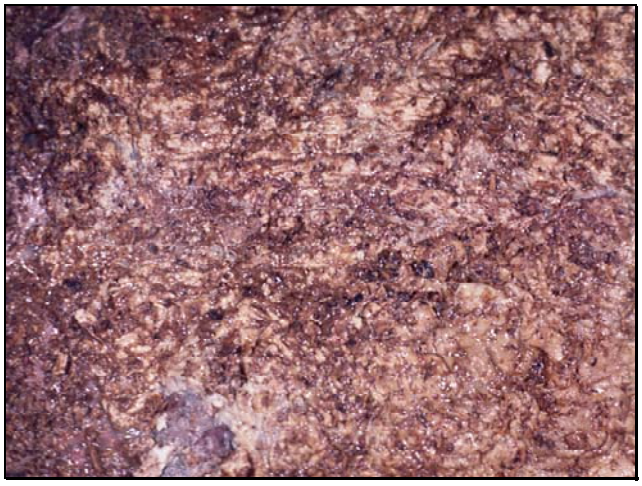

Acidosis

Progression:

- Depressed, slight foam around mouth
- Drunk staggers
- Bloated
- Projectile diarrhea
- Down
- Comatose
- Death

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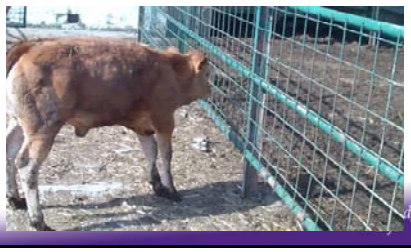
Sequela of acidosis

- Poorer performance
- **Liver abscesses**
- **Founder**



Metritis

- Aborted heifers
- Infection of the uterus
  - Depression
  - Fever
  - Off feed

Notes – Notes -- Notes