Limit Feeding a Single Step-up Diet as an Option to Optimize Operational Labor and Cattle Efficiency

Feeding Quality Forum

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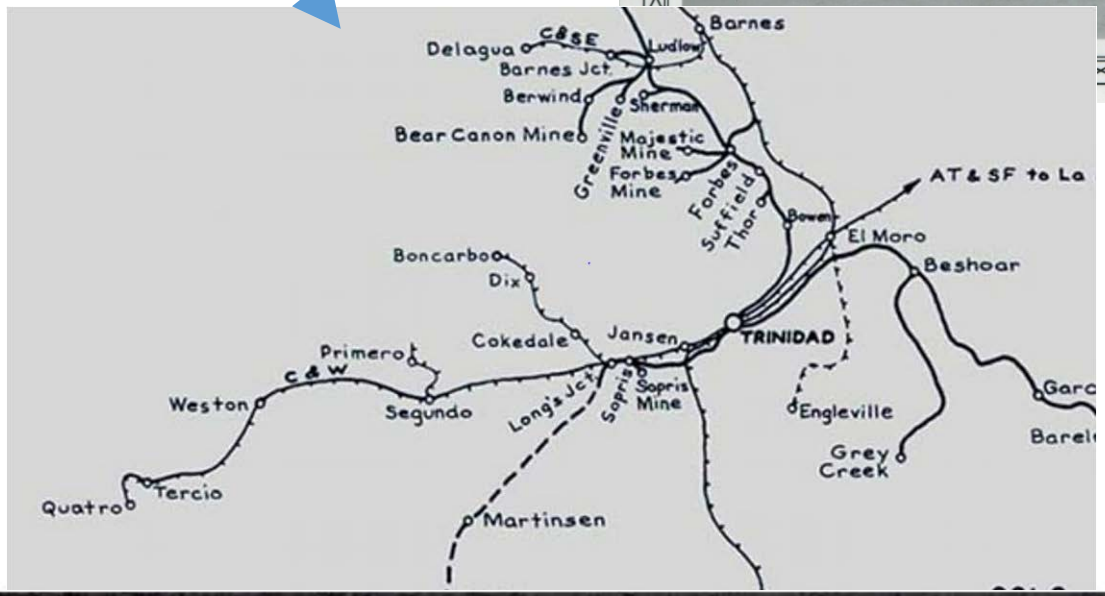

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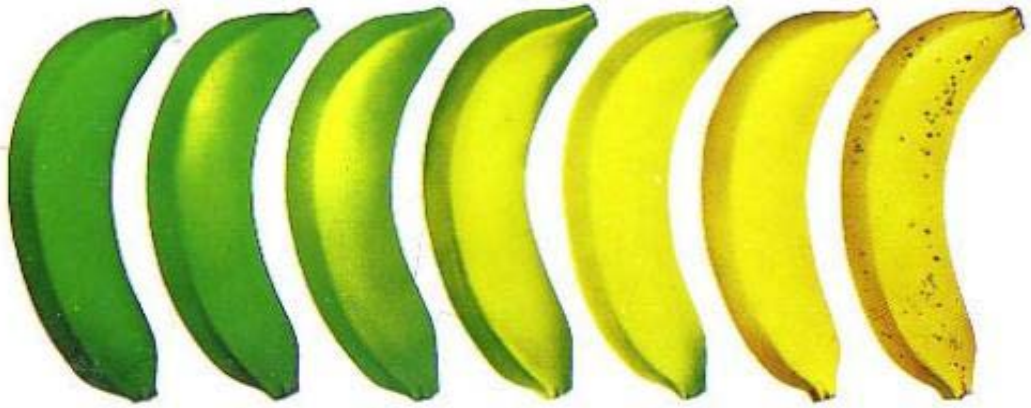
Perishability

Suggested Guide for Banana Ripening

Pulp Temperatures °F

	Day 1	2	3	4	5	6	7	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°



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

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.

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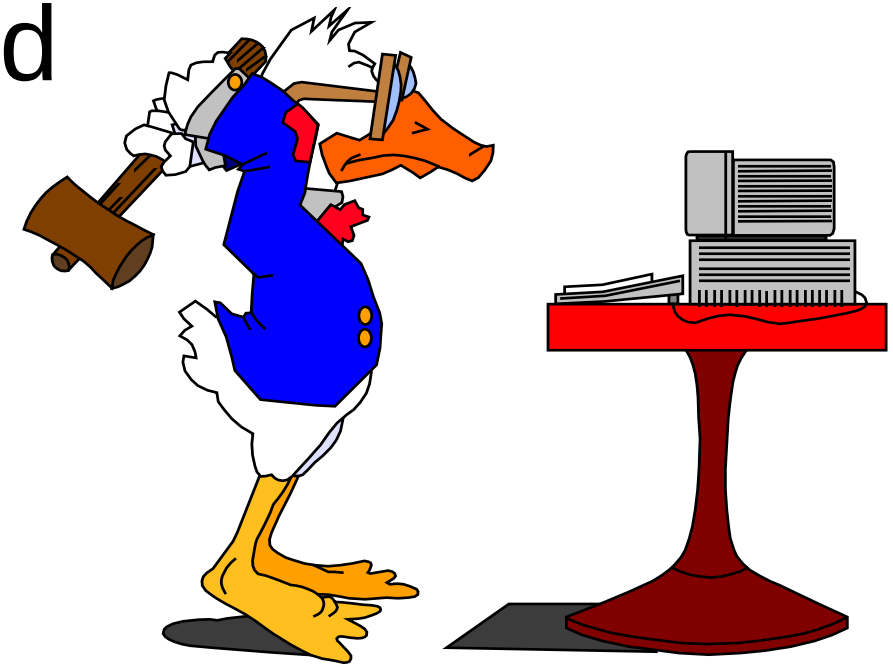
Presentation objective:
Sum of potential benefits – Limit Feeding

	Per 100 head per 90 day turn
Ration feed efficiency	?
Manure removal	?
Cattle health detection	?
Marketing window determination	?
Fuel/wagon/tractor (hrs machine)	?
Finishing phase (reduced days to full feed)	?
Total estimated dollars	$?
Per head	$?

Starting Calves on Feed

Do not Compound Stress!!!!!!!



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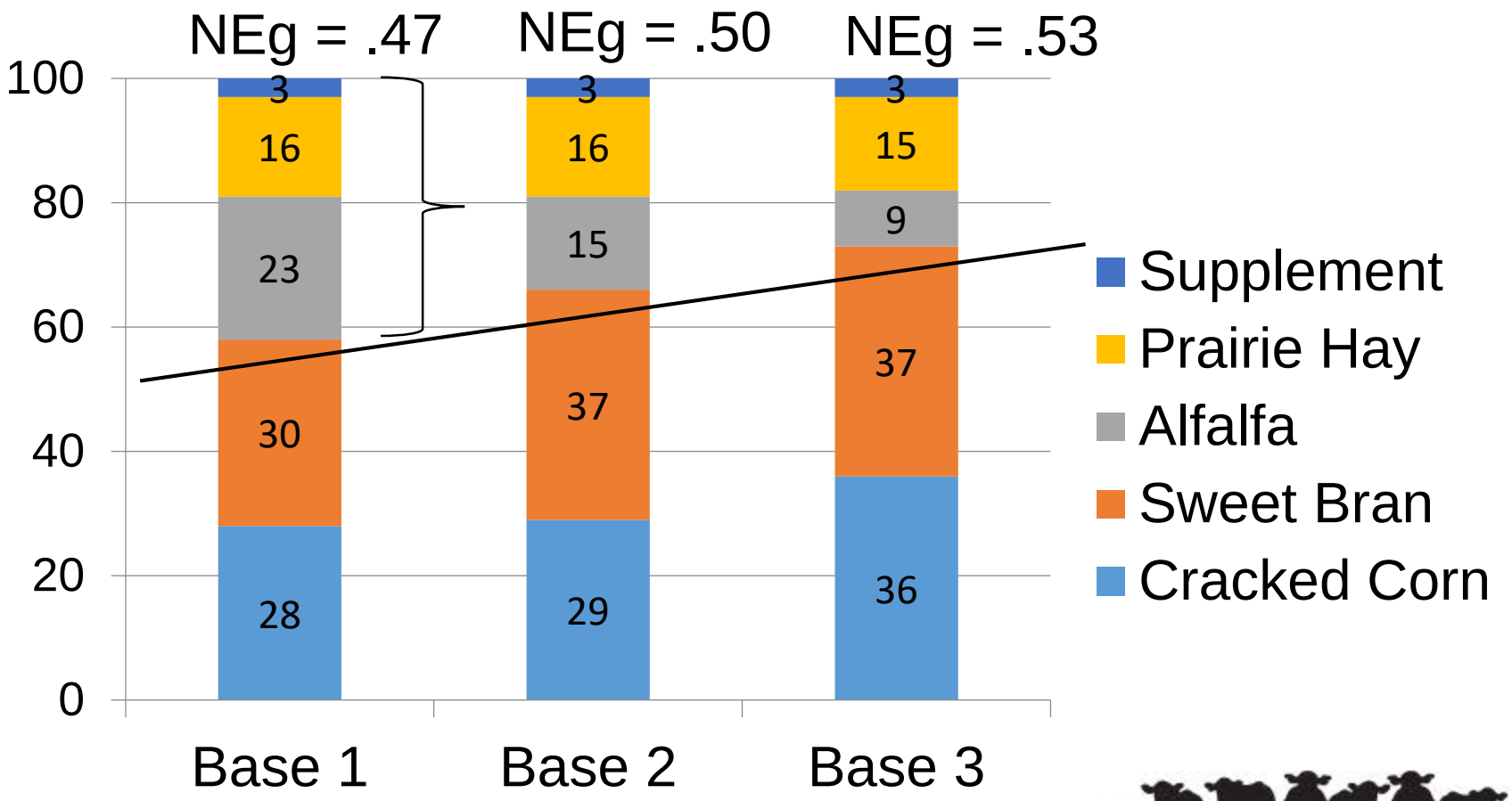
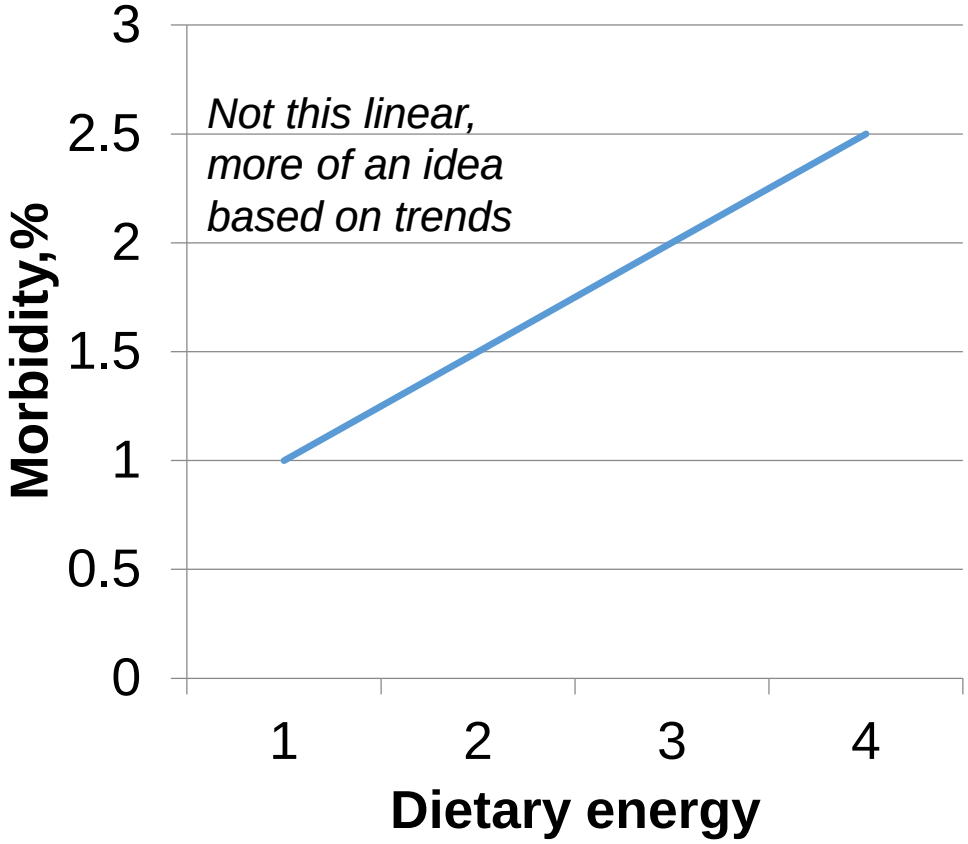
pappas

Beef Stocker Unit Receiving Diets



Nutrition Paradigms

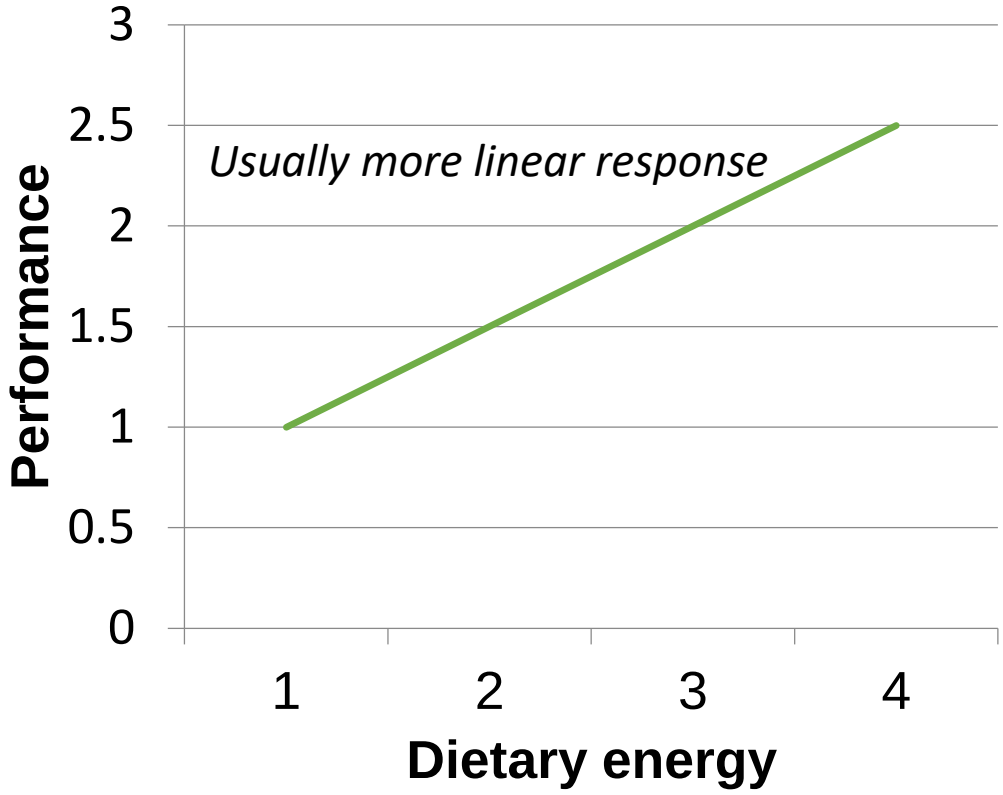


- **Possible causes**
  - Removal of roughage
  - Replacement with fermentable carbohydrate
    - Cereal grains (starch)

Increased incidence or severity of subacute and acute ruminal acidosis

Lofgreen et al., 1975 and Rivera et al., 2005

But….



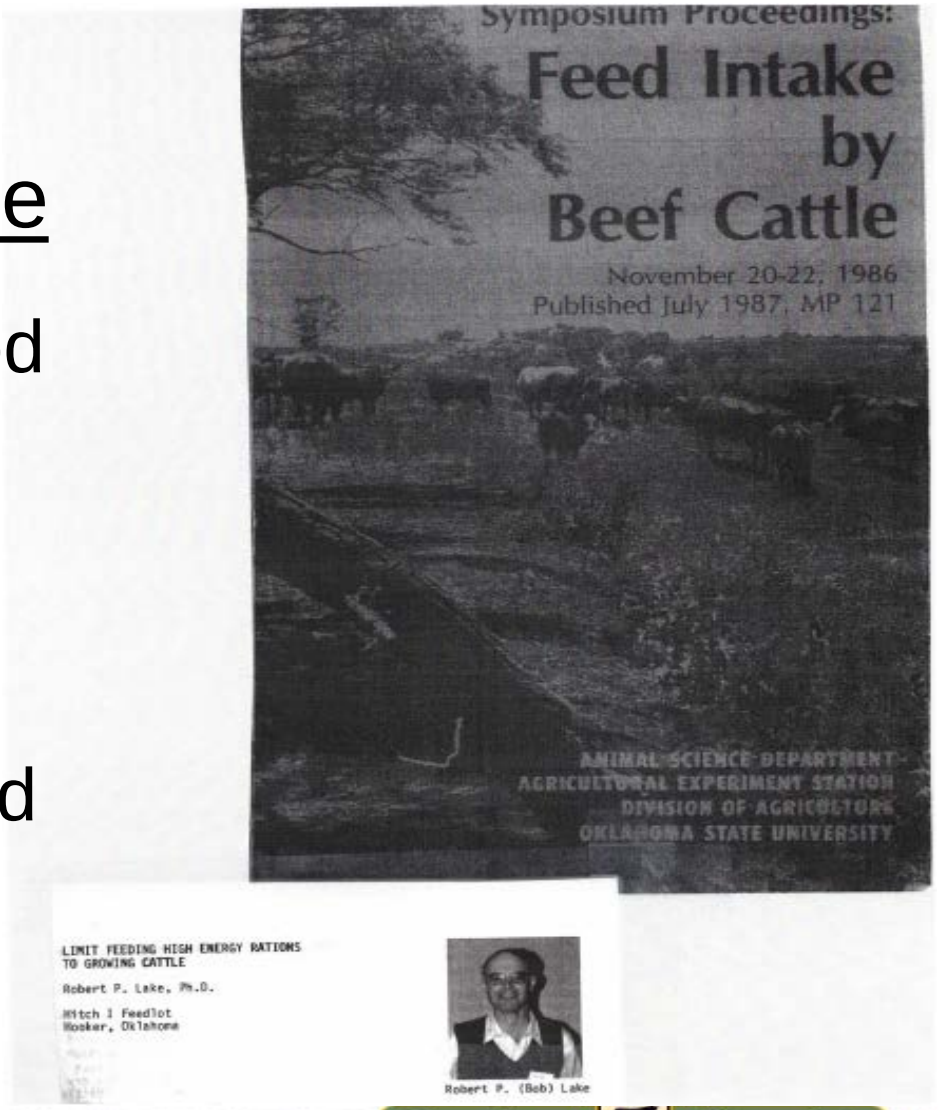
- Increased dietary energy often increases performance but with slight increases in morbidity
- Use of high-energy diets in receiving protocols is still cautioned by nutritionists

Limit Feeding:

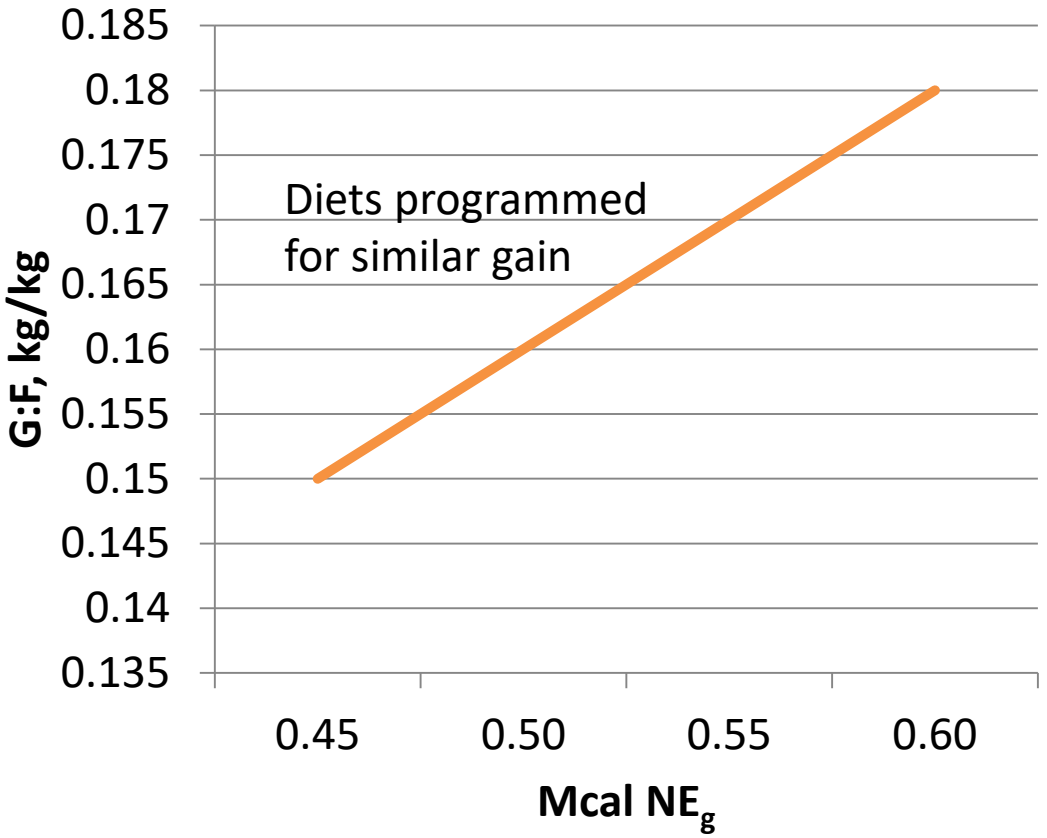
1986

Been around a long time

Definition: Feeding method in which net energy equations are used to calculate the quantities of feed required to meet the needs for maintenance and a specific rate of gain.



Limit-feeding while increasing dietary energy [ ]



Causes

Passage rate is a function of intake

↓ intake ↓ Passage rate =

Improved digestibility

Higher-energy diets are usually already more digestible based on ingredients (by-products, cereal grains etc.)

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Limit Feeding: Objectives

- Restrict (yet predict) animal daily gain
- Minimize fleshy condition
- Increase frame size
- Decrease total cost of production
- Extend the time to consider marketing options

The economic basis behind limit feeding high net energy rations to light cattle is grain (or byproducts) are cheaper per unit of energy than roughage

Advantages of Limit Fed Programs

Previous research results -

- Reduced cost of gain
- Detection of sick calves
- Flexibility in commodity trading
- Less roughage and manure handling
- Decreased feed wastage
- Less labor, equipment and feeding expense
- Marketing

Limit Feeding Management Requirements

- Adequate bunk space
- Pens that are not too large
- Weight scales
- Management
- An understanding of the Net Energy System
- Knowledge of the number of cattle currently in each pen
  - Outs, hospital pen, etc
- A sound marketing plan

The Net Energy System allows the cattle feeder to feed to a prescribed daily gain to match the frame and condition of a specific set of calves.

All night All you can eat buffet

“Vegas Baby”

VS.

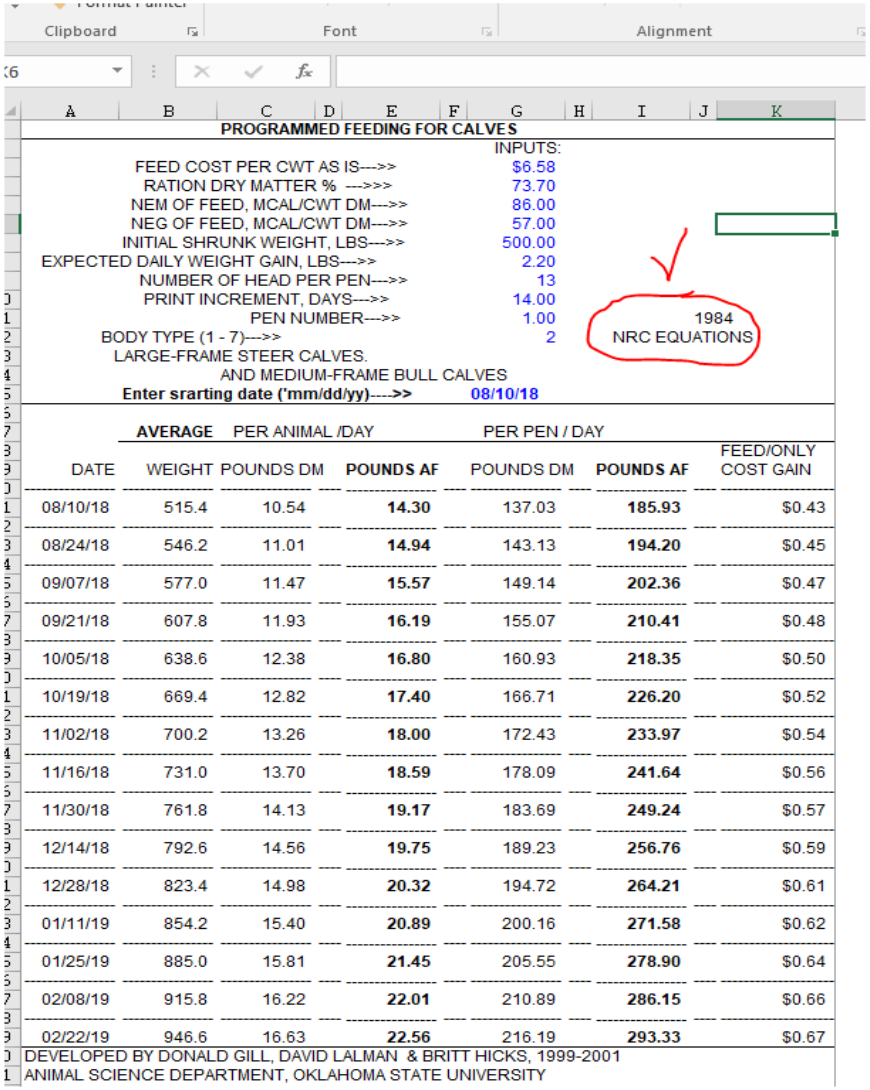
Boot camp breakfast

“Camp Pendleton”

Oklahoma State University

PROGFED2.xls

http://beefextension.com/pages/rfcalc.html



PROGRAMMED FEEDING FOR CALVES

	INPUTS:
FEED COST PER CWT AS IS--->>	$6.58
RATION DRY MATTER % --->>>	73.70
NEM OF FEED, MCAL/CWT DM--->>	86.00
NEG OF FEED, MCAL/CWT DM--->>	57.00
INITIAL SHRUNK WEIGHT, LBS--->>	500.00
EXPECTED DAILY WEIGHT GAIN, LBS--->>	2.20
NUMBER OF HEAD PER PEN--->>	13
PRINT INCREMENT, DAYS--->>	14.00
PEN NUMBER--->>	1.00
BODY TYPE (1 - 7)--->>	2

1984 NRC EQUATIONS

LARGE-FRAME STEER CALVES.
AND MEDIUM-FRAME BULL CALVES

Enter srarting date ('mm/dd/yy)---->> 08/10/18

	AVERAGE	PER ANIMAL /DAY		PER PEN / DAY		
DATE	WEIGHT	POUNDS DM	**POUNDS AF**	POUNDS DM	**POUNDS AF**	FEED/ONLY COST GAIN
08/10/18	515.4	10.54	**14.30**	137.03	**185.93**	$0.43
08/24/18	546.2	11.01	**14.94**	143.13	**194.20**	$0.45
09/07/18	577.0	11.47	**15.57**	149.14	**202.36**	$0.47
09/21/18	607.8	11.93	**16.19**	155.07	**210.41**	$0.48
10/05/18	638.6	12.38	**16.80**	160.93	**218.35**	$0.50
10/19/18	669.4	12.82	**17.40**	166.71	**226.20**	$0.52
11/02/18	700.2	13.26	**18.00**	172.43	**233.97**	$0.54
11/16/18	731.0	13.70	**18.59**	178.09	**241.64**	$0.56
11/30/18	761.8	14.13	**19.17**	183.69	**249.24**	$0.57
12/14/18	792.6	14.56	**19.75**	189.23	**256.76**	$0.59
12/28/18	823.4	14.98	**20.32**	194.72	**264.21**	$0.61
01/11/19	854.2	15.40	**20.89**	200.16	**271.58**	$0.62
01/25/19	885.0	15.81	**21.45**	205.55	**278.90**	$0.64
02/08/19	915.8	16.22	**22.01**	210.89	**286.15**	$0.66
02/22/19	946.6	16.63	**22.56**	216.19	**293.33**	$0.67

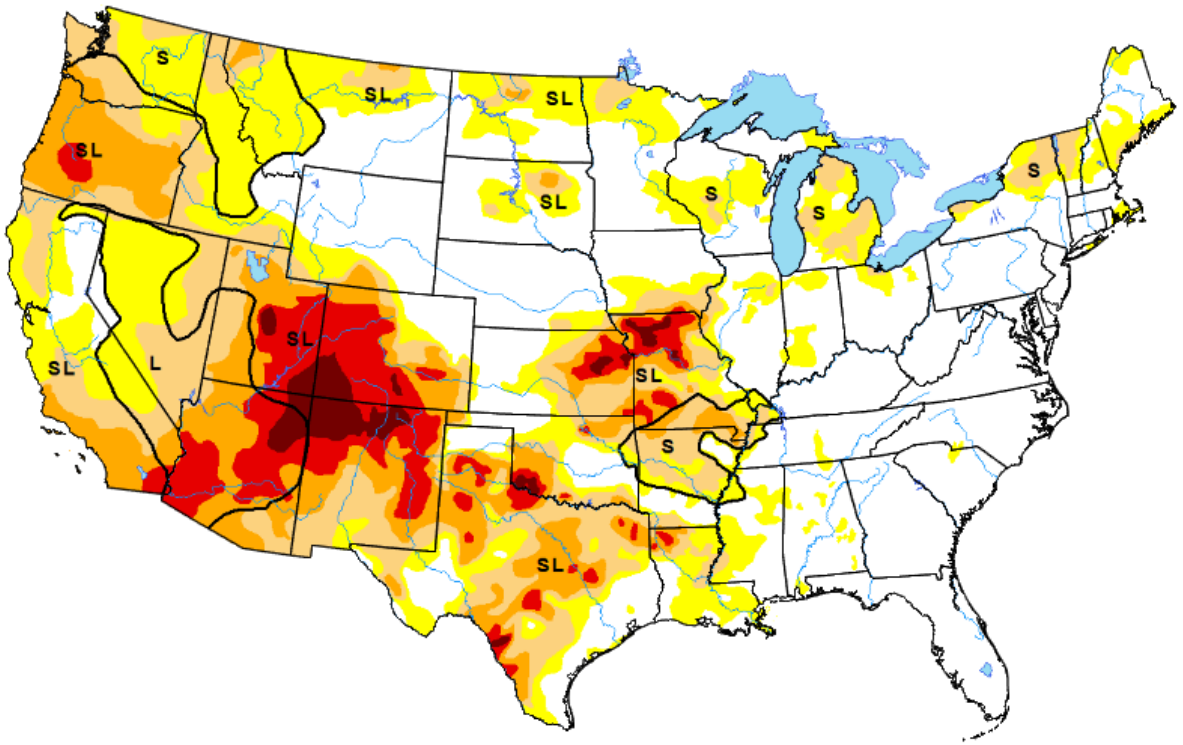
DEVELOPED BY DONALD GILL, DAVID LALMAN & BRITT HICKS, 1999-2001
ANIMAL SCIENCE DEPARTMENT, OKLAHOMA STATE UNIVERSITY

United States Drought Monitor

Current Map | Maps | Data | Drought Summary | About USDM | Current Conditions and Outlooks

Map for August 16, 2018

Data valid: August 14, 2018 | Author: Richard Heim, NOAA/NCEI



Effects of Dietary Energy Level and Intake of Corn By-Product Based Diets on Newly Received Growing Cattle: I. Performance, Health, and Digestion

Spore, T. J., S. P. Montgomery, E. C. Titgemeyer, G. A. Hanzlicek, C. I. Vahl, T. G. Nagaraja, K. T. Cavalli, W. R. Hollenbeck, R. A. Wahl, and D. A. Blasi

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Limit Feeding – Then and Now……

Then - 1986

- Cattle started slowly @ 14 days post arrival
- High Fermentable carbohydrates

Now

- 1% BW, DM basis grass hay on day of arrival
- Start "Camp Pendleton" @ 1% body weight next day and increase .25% per day up to 2.2% body weight (Day 5)
- High co-product inclusion is CRITICAL! (40% DM basis)

Then (1986)

	DM %
• Rolled corn	66.2
• Cottonseed meal	13.7
• Alfalfa pellets	8.0
• Cottonseed hulls	5.0
• Cane molasses	3.5
• Soybean meal 48	2.4
• Bovatec, Vit, Min	1.2

- NEg 58
- Crude protein 16

Now

	DM %
• Wet Coproduct	40.0
• Rolled corn	38.8
• Ground Alfalfa	6.5
• Prairie hay	6.5
• Supplement	8.2

- NEg 60
- Crude protein 17

Research Objectives

- Evaluate the effects of high-energy limit-fed diets based on corn by-products on performance of newly received growing cattle
- Analyze effects on overall health
- Examine parameters of digestion and characteristics of fermentation
- Identify dietary effects on immune function, the acute phase protein response, and stress
- Characterize the immunocompetency of healthy and morbid animals under the different dietary conditions

Material and Methods

Experiment 1. Performance and health study

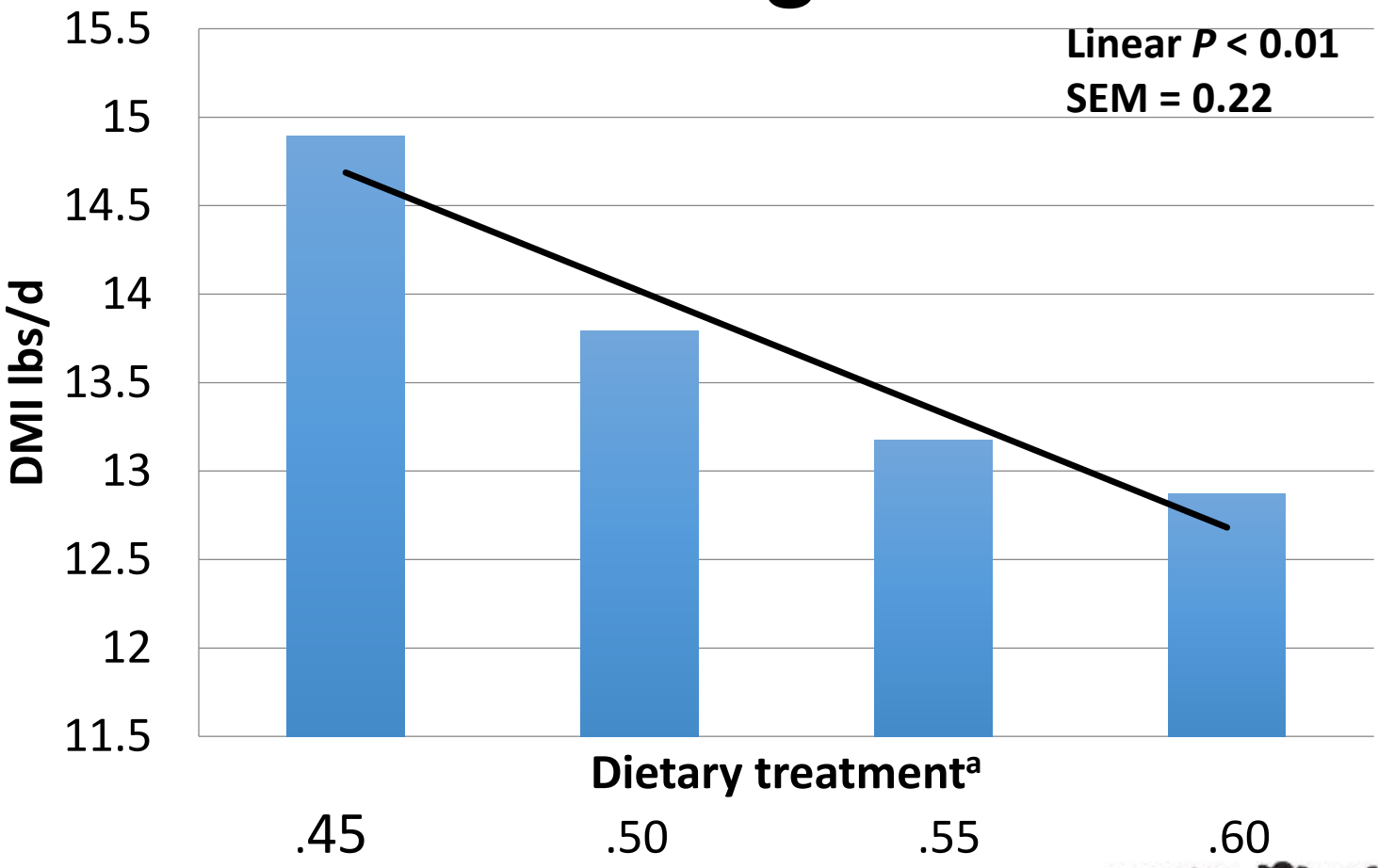
- 354 crossbred heifers (BW = 477 lbs)
- 41 d study with a 14-d gut-fill equalization period (55 d total)
- Auction markets from AL and TN, assembled by order buyer at Dickson, TN (1,086 km)
- 4 Treatments
  - 0.45 = formulated to provide 0.45 Mcal NE_g/kg DM offered to ensure ad libitum intakes
  - 0.50 = 0.50 Mcal NE_g/kg DM offered at 95% of ad libitum treatment
  - 0.55 = 0.55 Mcal NE_g/kg DM offered at 90% of ad libitum treatment
  - 0.60 = 0.60 Mcal Ne_g/kg DM offered at 85% of ad libitum treatment
- Refusals from pens offered the 0.45 Mcal treatment were removed and weighed daily to determine DMI and adjust intakes of the remaining treatments accordingly

Experimental Diets

Item	Treatment			
Ingredient	**0.45**	**0.50**	**0.55**	**0.60**
Dry rolled corn	8.57	19.08	28.50	38.82
Low energy supplement	6.43	6.92	7.50	8.18
Alfalfa hay	22.50	17.00	12.00	6.50
Prairie Hay	22.50	17.00	12.00	6.50
Wet corn gluten feed	40.00	40.00	40.00	40.00
TOTAL	100.00	100.00	100.00	100.00
Calculated Nutrient Content:				
Dry Matter, %	73.5	73.2	72.9	72.6
Protein, %	16.39	15.94	15.52	15.07
NE Main, Mcal/cwt	73.21	79.08	84.34	90.09
NE Gain, Mcal/cwt	45.28	50.40	55.01	60.06

Supplement pellet was formulated to contain (DM basis) 10% CP, 8.0% Ca, 0.24% P, 5.0% salt, 0.55% potassium, 0.25% magnesium, 1.67% fat, 8.03% ADF, and as 367 mg/kg lasalocid (Bovatec)

Dry Matter Intake decreased by design



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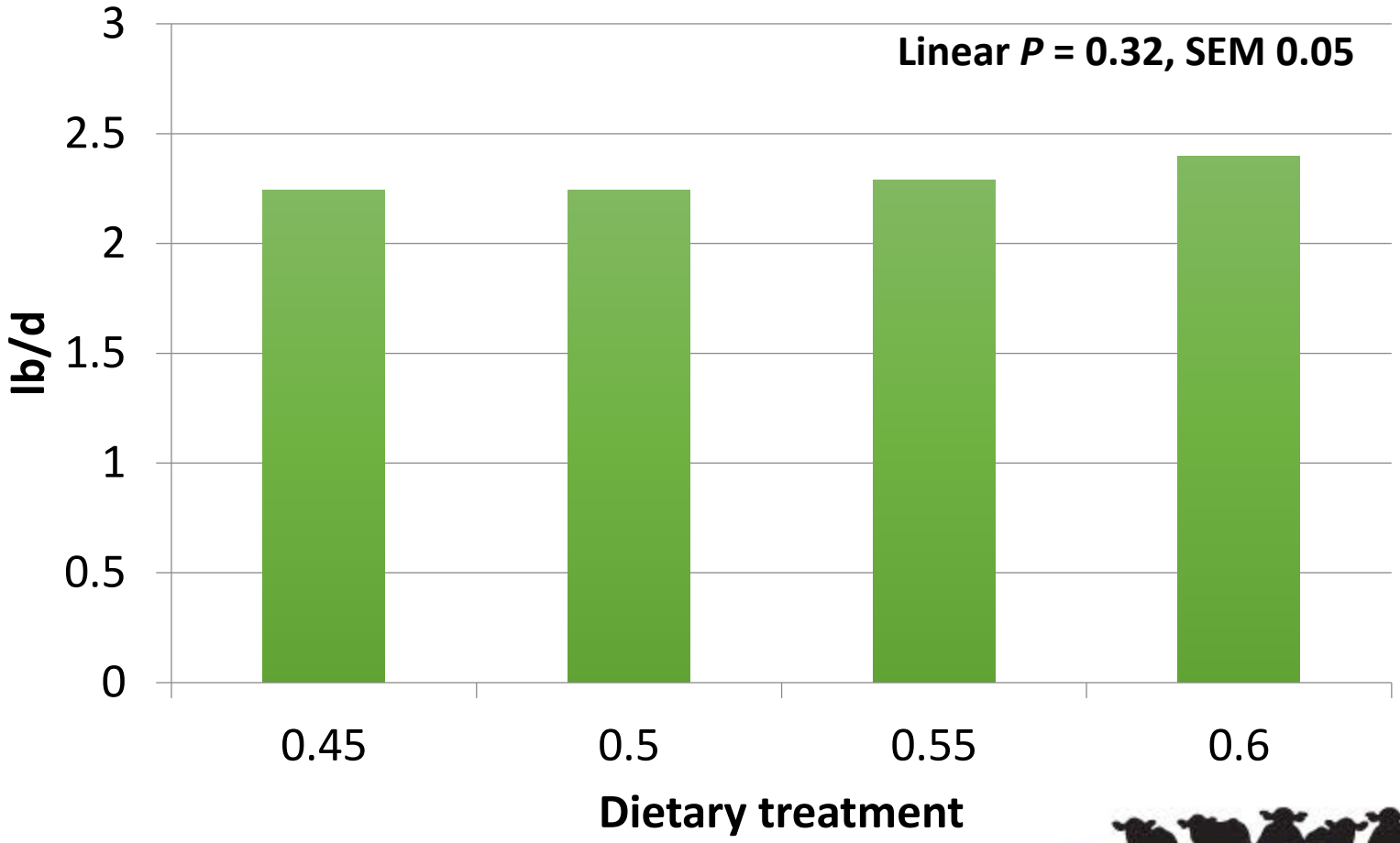
Average daily gain not affected by dietary treatment

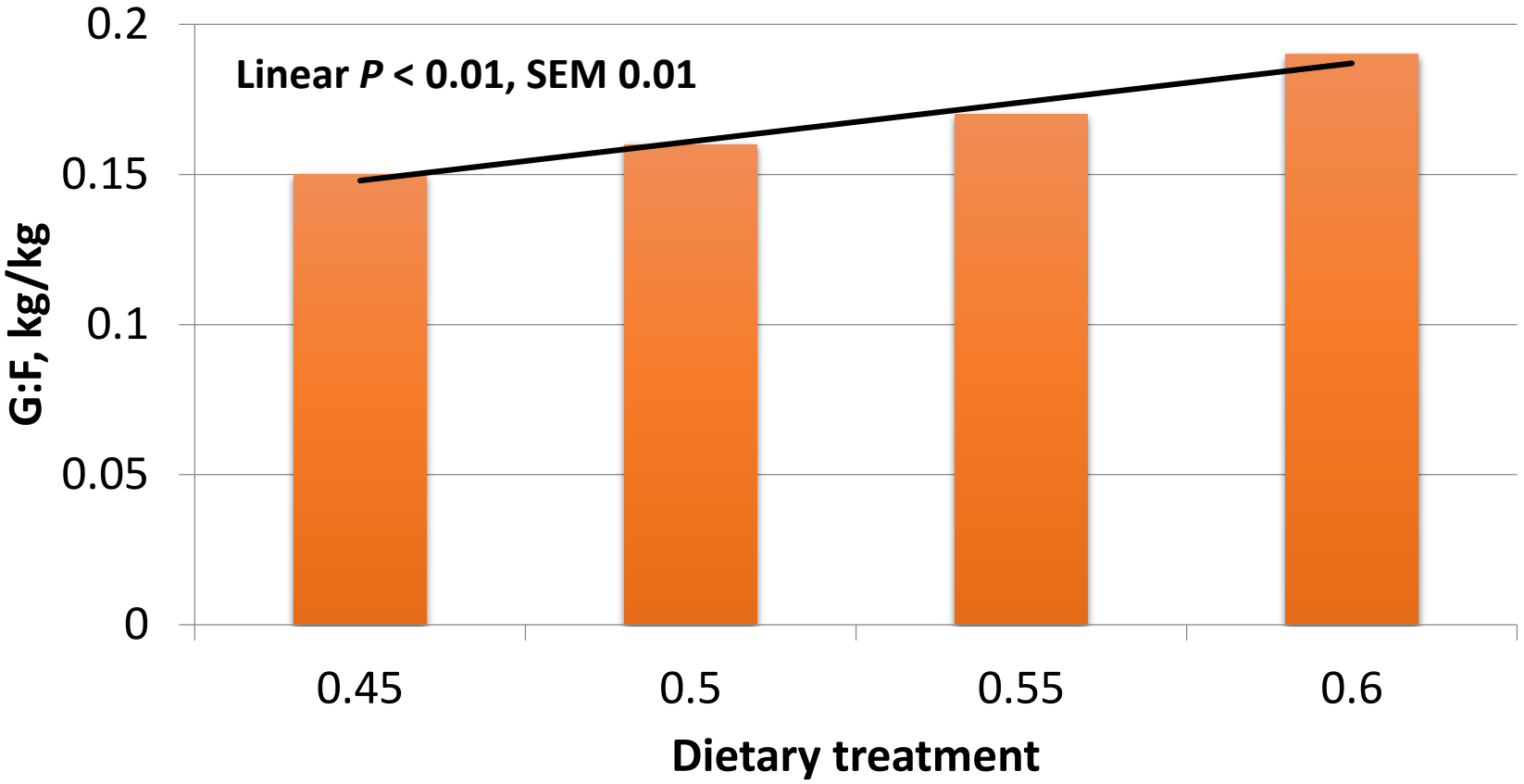


Effects of Dietary NEg and Intake

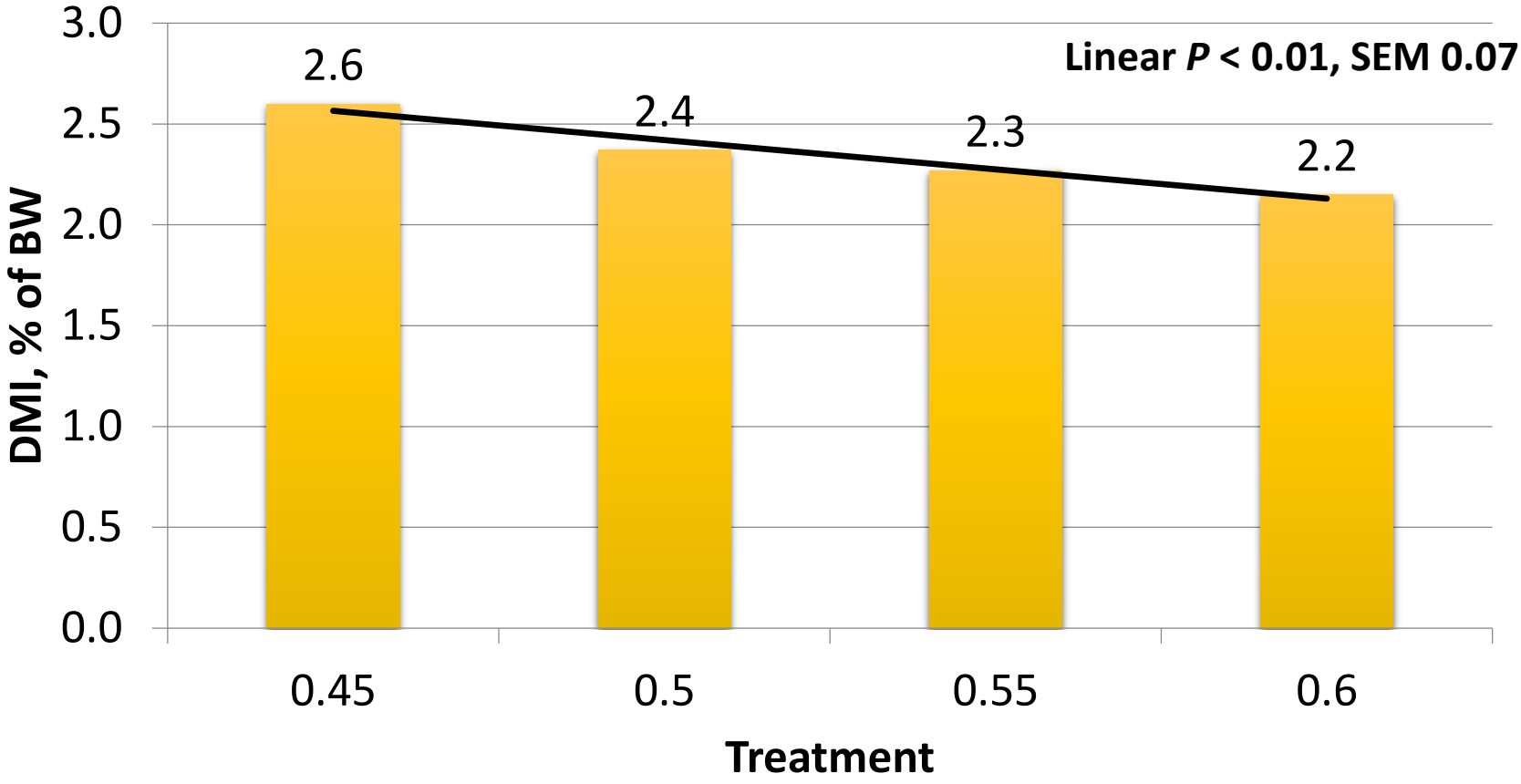
	Dietary NEg Treatment			
Item	.45	.50	.55	.60
Initial BW, lb	490	493	490	491
Avg. DMI, % BW	2.62	2.43	2.33	2.25
Final BW, lb	614	617	616	623
DMI, lb	14.51^{b}	13.51^{bc}	12.88^{c}	12.51^{c}
ADG, lb	2.26	2.25	2.29	2.40
Feed:Gain	6.48^{b}	6.12^{b}	5.65^{bc}	5.22^{c}

Spore et al. (2016).

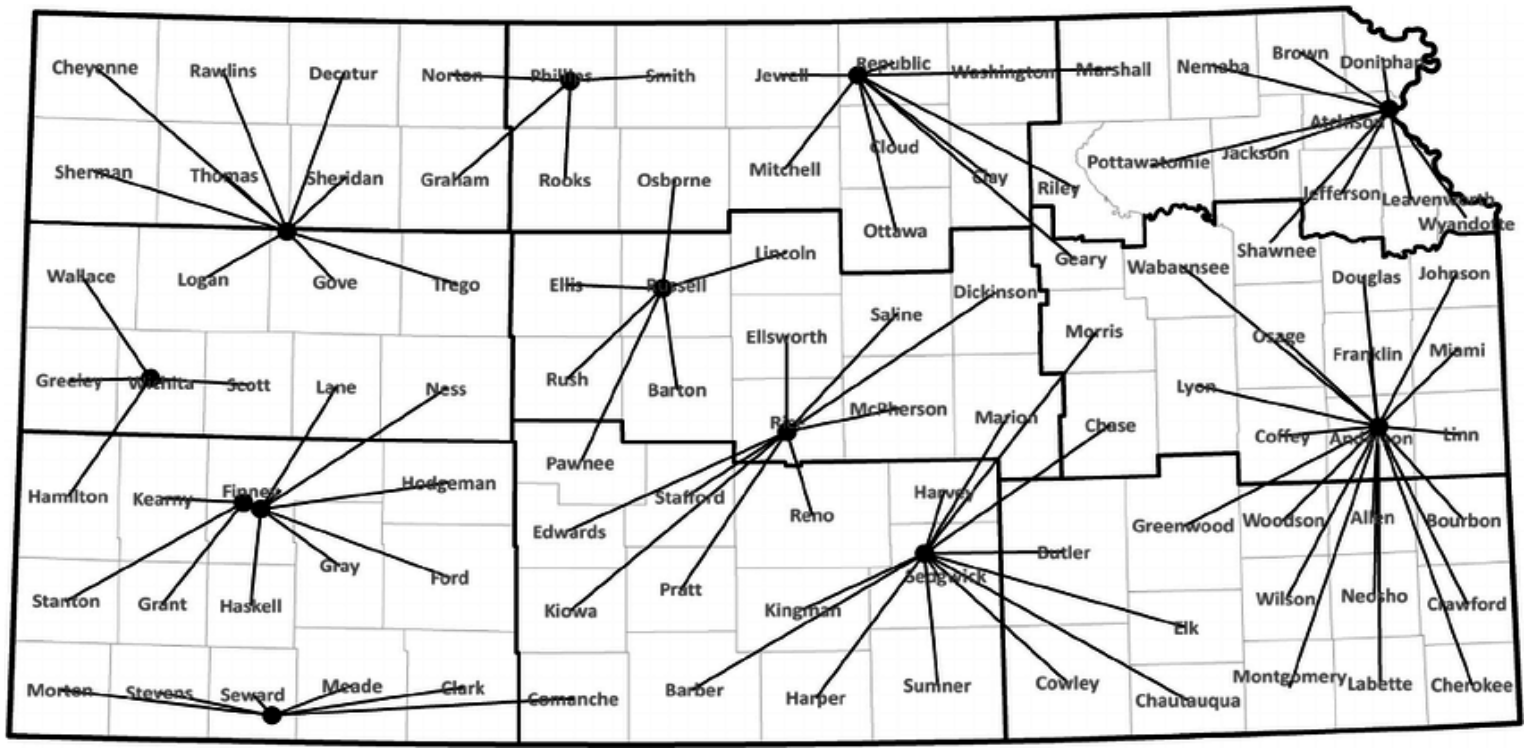
Efficiency of gain improved with increasing energy and decreasing intake



Dry Matter Intake (as % of BW) through Day 41



What about corn by-products other than Sweet Bran®?



Each dot represents an ethanol plant

Brown et al., 2014

Materials and Methods – 2nd trial

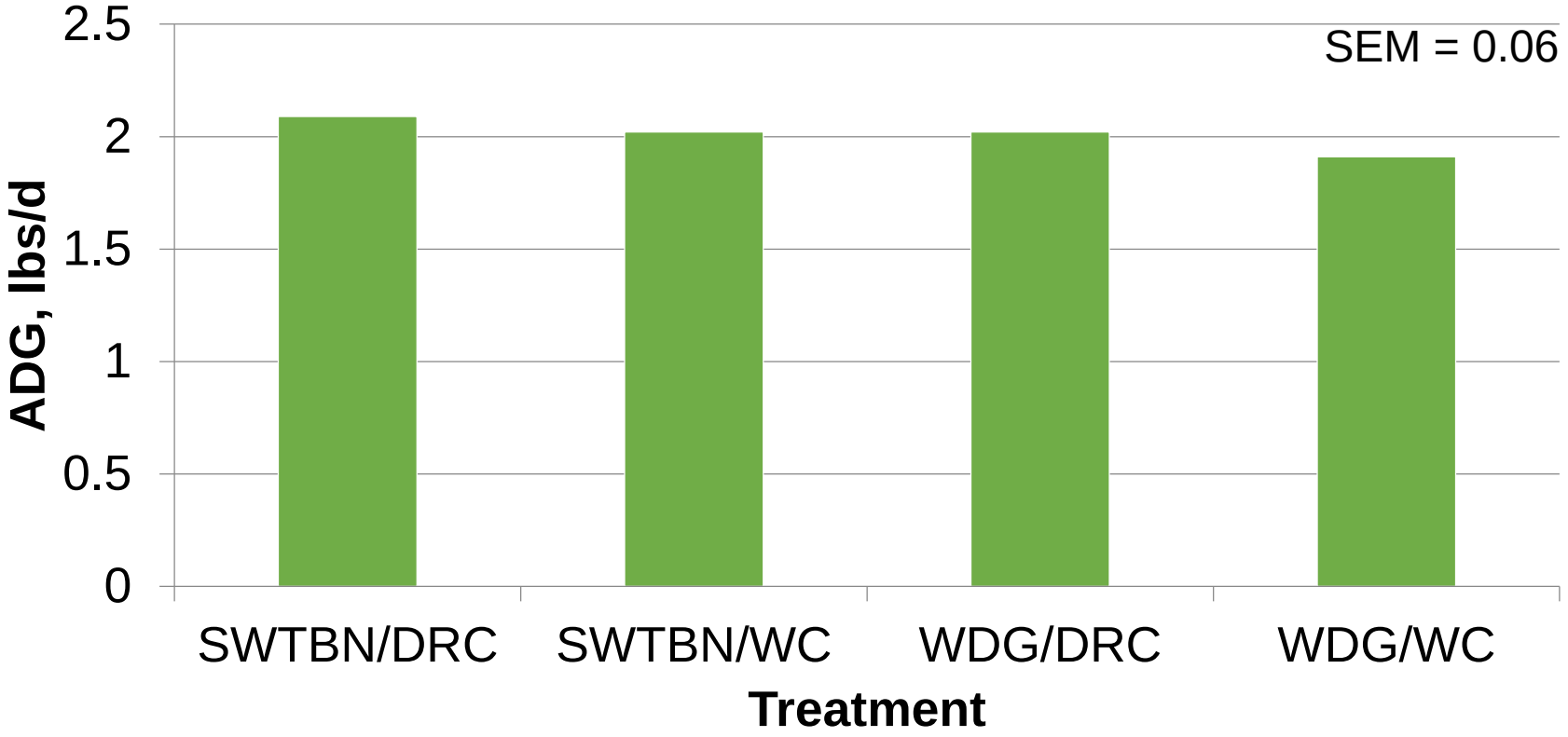
Performance and Health Study

- 70 d
- 320 crossbred steers (BW = 559 lbs) – Superior Livestock
  - Two loads from Groesbeck, TX (590 miles)
  - Two loads from Hatch, NM (886 miles)
- 2 x 2 factorial design
- Two varieties of corn by-products
  - Wet distiller's grains plus solubles
  - Sweet Bran
- Two levels of corn processing
  - Whole shelled corn
  - Dry-rolled corn
- All four diets formulated to provide 0.60 Mcal NE_g/lb DM
- 8 pens / treatment combination
- Pen weights collected weekly using pen scale and DMI adjusted accordingly

Experimental Diets

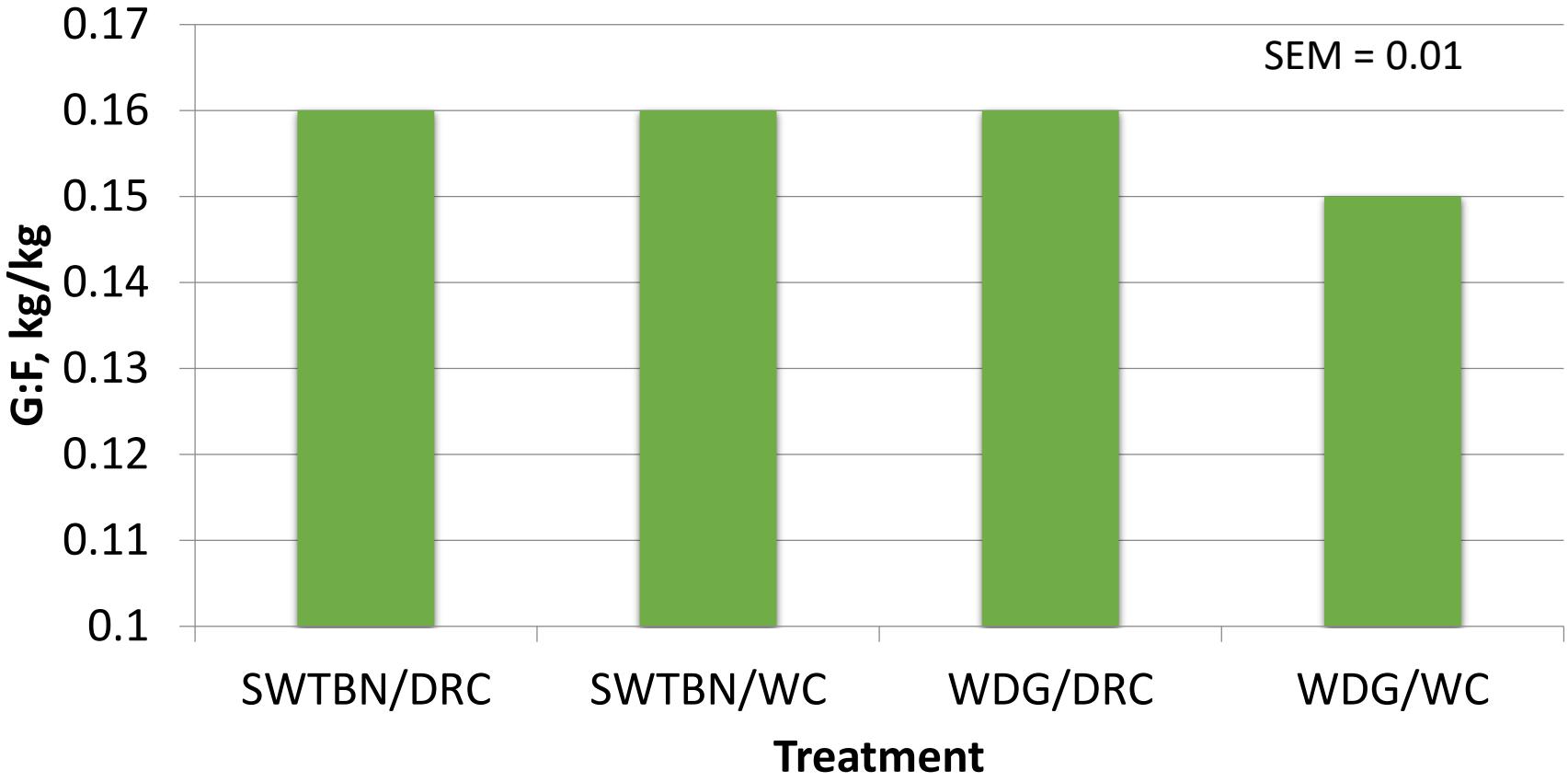
	By-product			
	WDGS		Sweet Bran	
	Corn processing			
Item	DRC	WC	DRC	WC
Ingredient, % DM				
Alfalfa	8.00	8.00	6.50	6.50
Prairie hay	8.00	8.00	6.50	6.50
Dry-rolled corn	36.50	-	39.50	-
Whole corn	-	36.50	-	39.50
WDGS	**40.00**	**40.00**	-	-
Sweet Bran	-	-	**40.00**	**40.00**
Low-energy Supp.	7.50	7.50	7.50	7.50

ADG not affected by corn processing or by-product



[a]By-product effect *P* = 0.34,
Corn processing effect *P* = 0.34, Interaction *P* = 0.93

Efficiency of gain equal between treatments

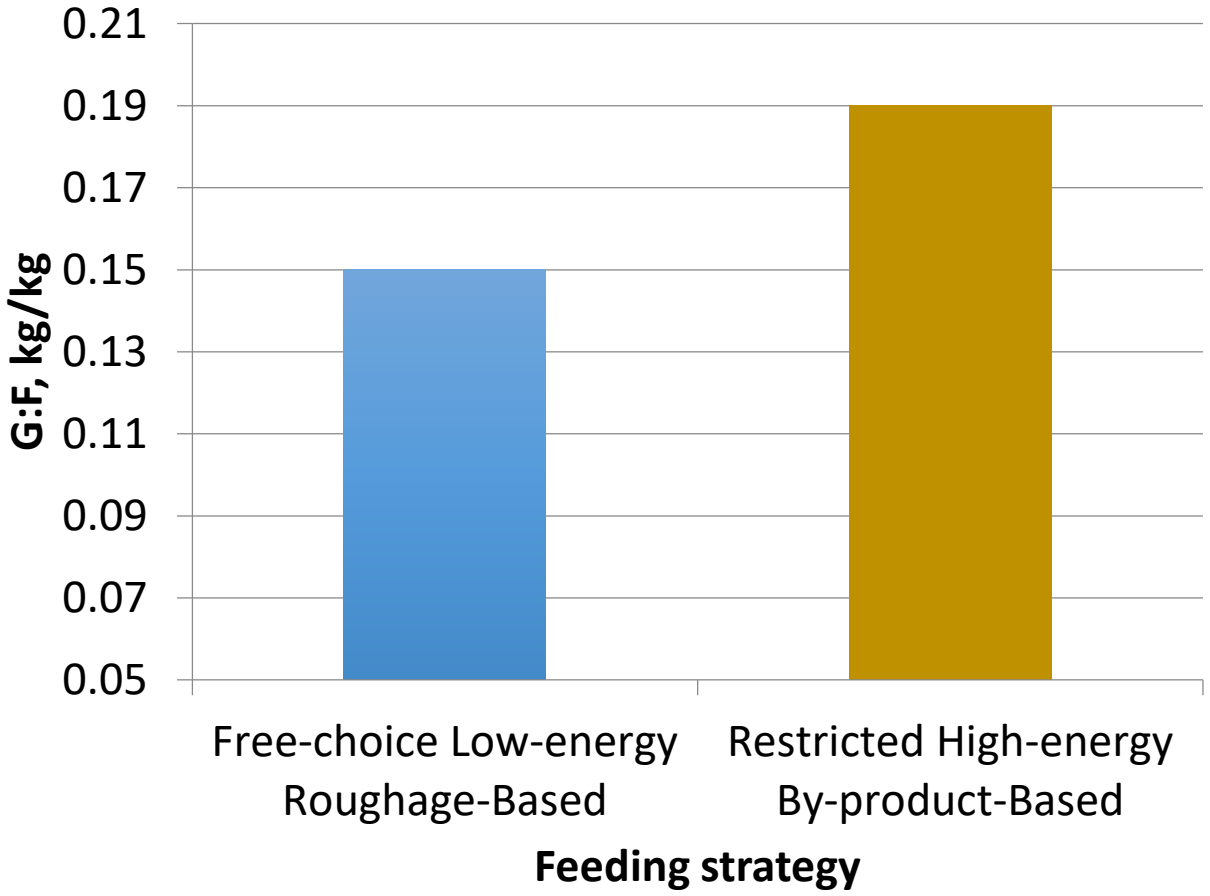


[a]By-product effect *P* = 0.46,
Corn processing effect *P* = 0.38, Interaction *P* = 0.51

Conclusions

- High-energy diets based primarily on Sweet Bran or wet distiller's grains plus solubles yield similar performance
- No affects on health
- Relatively lower overall efficiencies
  - 2% of BW could be too restricted
- Extent of corn processing does not affect performance

Research Summary – 4 trials and ongoing



27% improvement in efficiency

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How Much Feed Intake?

Feed offered, % of body weight daily[a]

Item	1.9	2.2	2.5	2.7	P –value (Linear)
Number Pens – heifers (Chinook, MT)	8	8	8	8	
Body wt, ontest	467	465	468	465	
Body wt, day 49 (shrunk)	573	582	595	600	
Daily gain, lb/day	2.16	2.39	2.59	2.76	<.01
Dry matter intake, lb/day	12.1	13.2	14.2	15.0	<.01
Feed:gain (lb/lb)	4.6	4.6	4.6	4.6	0.98
Ongoing present trial (August, 2018)	steers	2.2%	intake		
Day 70 Daily gain, lb/day (shrunk)					
Whole shelled corn		2.31			
Dry rolled corn		2.27			

[a] Diet formulated to contain 60 Mcal net energy/100 lb DM

Implications on daily ration cost (Aug 2, 2018)

	NEg concentration	
Item	.45	.60
Ration Cost/ton DM $[a]	173.90	200.51
DMI, lb	14.51	12.51
ADG, lb	2.26	2.40
Feed:Gain	6.48	5.22
Cost of gain ($ per lb)	.6107	.5284
Cost savings/100 head to gain 200 lbs in 90 days		$1,646

[a] Ingredient prices: Corn = $3.85/bushel, Supplement =$350/ton, Alfalfa hay = $175/ton, Prairie hay = $150/ton, Wet Distillers = $75/ton.

Cattle Health: Procedures

- Animals were monitored twice daily for signs of sickness following standard protocol
  - Failure to approach bunk
  - Nasal/ocular discharge
  - Overall depression
- Pulled animals were bled at the chute via tail vein
- One randomly selected, healthy appearing, pen mate was pulled from pen and bled for side-by-side comparisons

Blood Parameters Analyzed

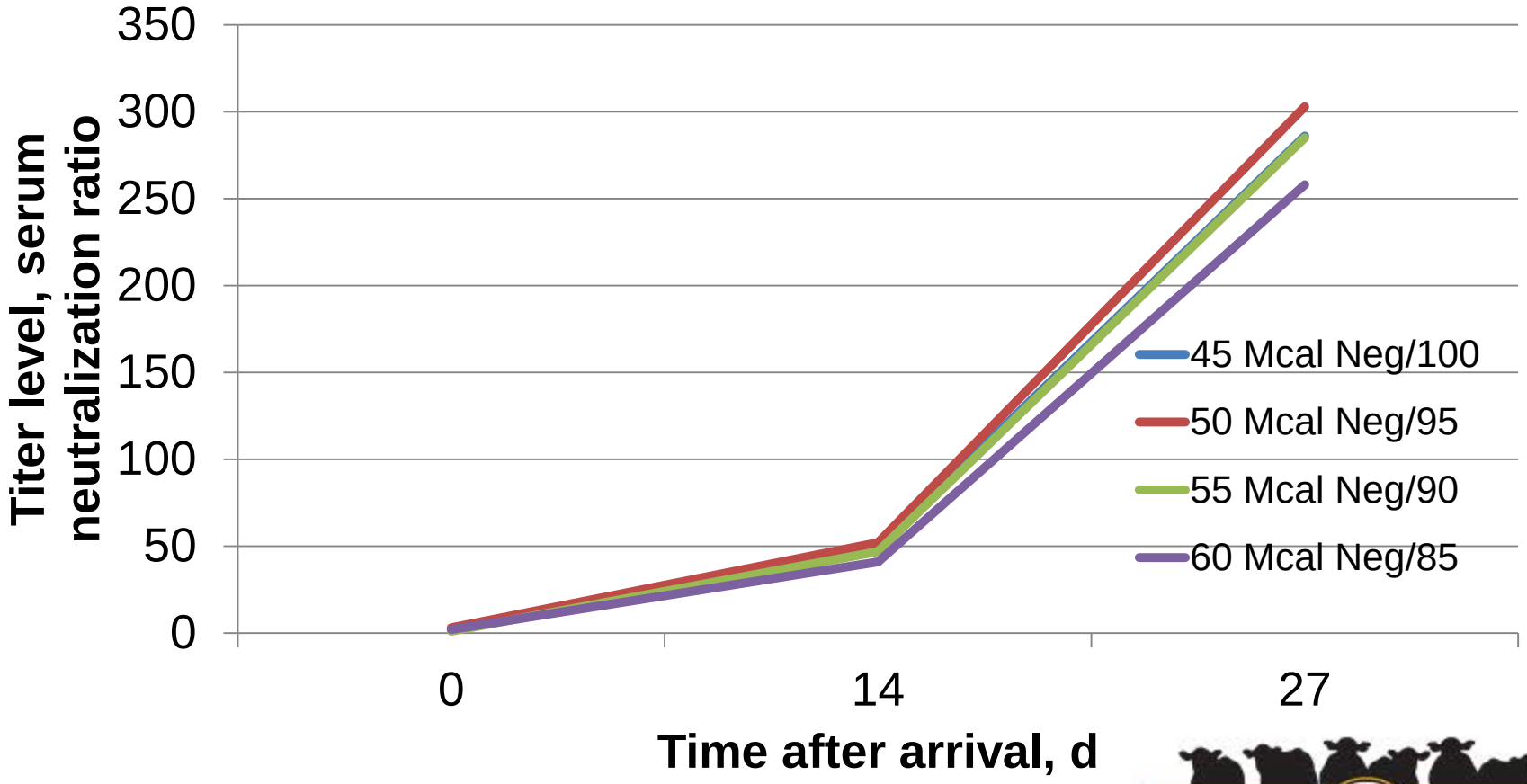
- Antibody production toward vaccines
  - Titer levels, serum neutralization test
    - BVDI
    - BVDII
    - IBR
- Indicator of inflammation
  - Haptoglobin, colorimetric assay
- All tests performed at Kansas State University Veterinary Diagnostic Laboratory

Effects of Dietary Energy on Health

Item	Diet[1]				SEM	*P* - Value
	0.45	0.50	0.55	0.60		
Morbidity, %						
Treated once	11.2	12.6	12.3	12.6	4.6	0.99
Treated twice	3.6	4.8	2.8	4.8	2.9	0.86
Chronic	2.6	3.7	1.8	2.7	2.5	0.86
Mortality, %	4.2	4.4	2.1	4.3	2.1	0.83

[1]Mcal NE_g/lb DM.

Dietary Treatment did not Affect Antibody Response to Vaccine-BVD I



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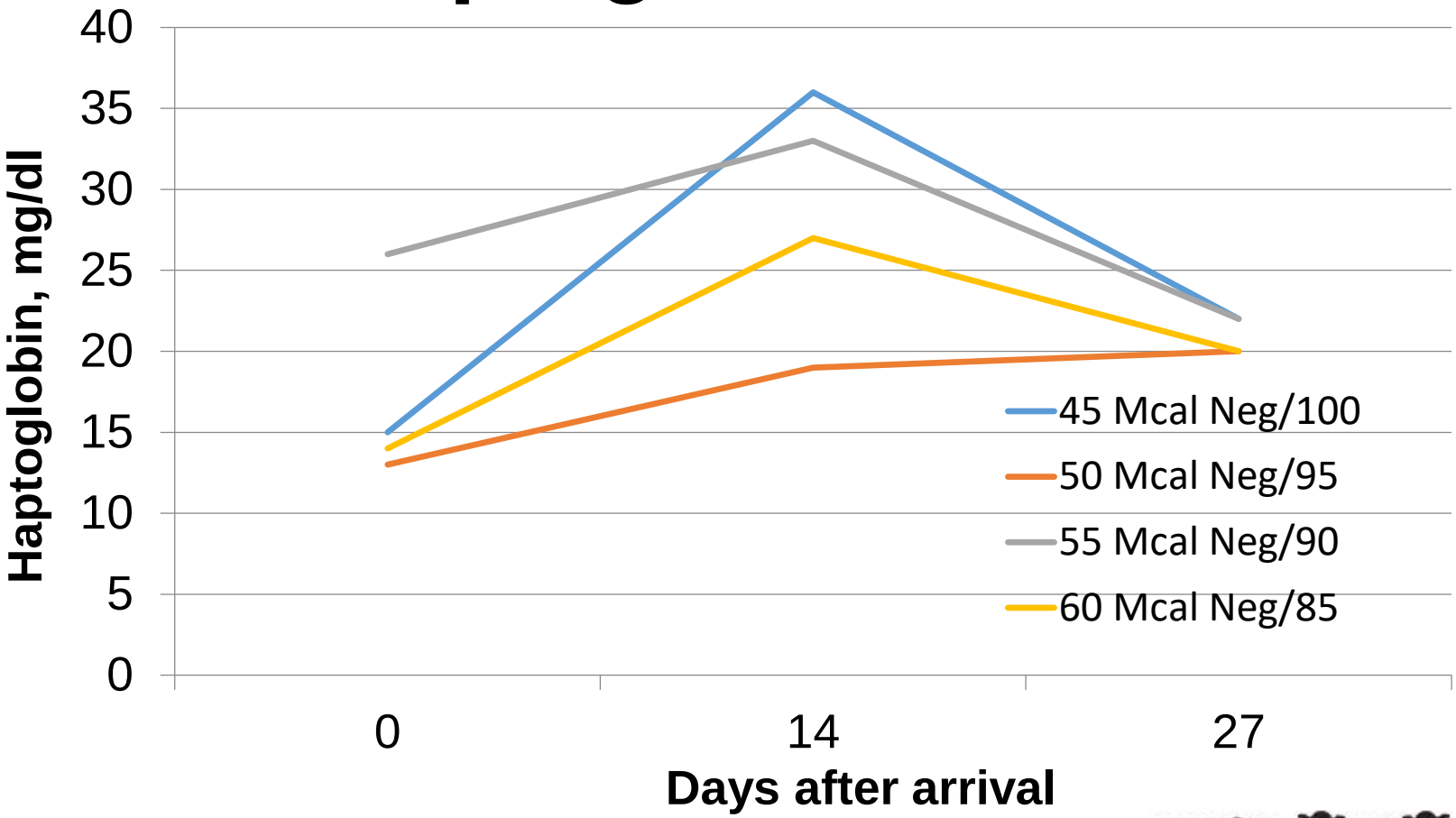
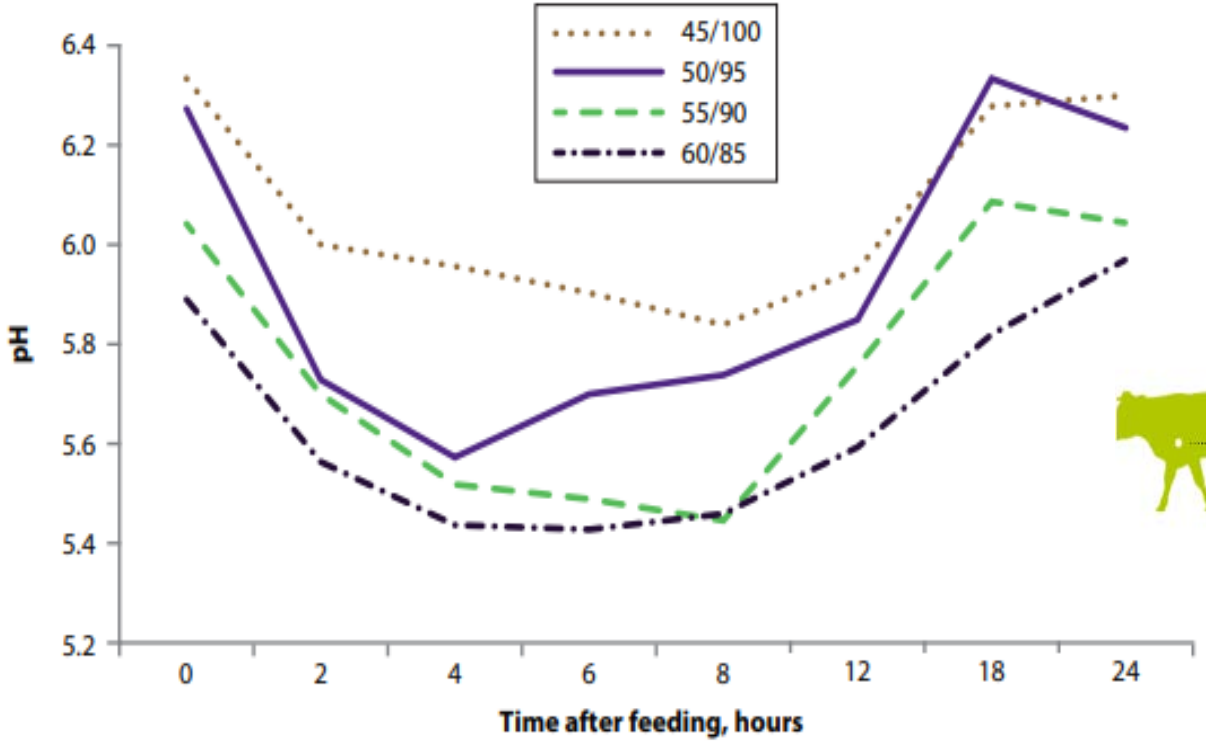
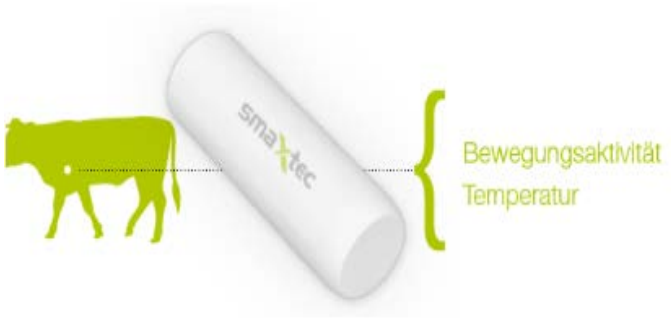
Dietary Treatment did not Affect Haptoglobin Levels



Ruminal pH measured continuously over 24 hours after feeding using indwelling pH monitoring bolus





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Effects of Energy Level on Ruminal pH

	Diet[2]					P-value		
Item	0.45	0.50	0.55	0.60	SEM[3]	Linear	Quadratic	Cubic
Number of observations	6	6	5	6				
Ruminal pH								
Average[4]	5.17	5.05	4.82	4.72	0.21	<0.01	0.92	0.62
Minimum[5]	4.69	4.55	4.21	4.31	0.21	<0.01	0.22	0.18
Maximum[6]	5.58	5.61	5.56	5.38	0.20	0.13	0.28	0.93
Time below 5.5, min[7]	542	622	789	764	133	<0.01	0.41	0.35

[1]Ruminal pH continuously measured every 10 min using indwelling ruminal bolus (SmaxTec®, Graz, Austria.
[2] Diets formulated to supply 0.45, 0.50, 0.55, or 0.60 Mcal NE_g/kg DM.
[3]Largest value among treatments is reported.
[4]Average pH during last 2 days of period for each animal.
[5]Average minimum pH over last two days of each period for each animal.
[6]Average maximum pH over last two days of each period for each animal.
[7]Average number of minutes ruminal pH measured below 5.5.

Effects of Energy Level on Nutrient Digestibility

	Diet[1]					P-value		
Item	0.45	0.50	0.55	0.60	SEM[2]	Linear	Quadratic	Cubic
Number of observations	6	6	5	6				
Apparent total tract digestibility, %								
DM	62.4	63.6	65.8	70.8	2.0	<0.01	0.32	0.85
OM	64.9	66.0	68.0	72.4	2.0	0.01	0.38	0.86
NDF	58.0	57.0	57.2	56.0	3.0	0.69	0.97	0.85
ADF	55.0	53.2	55.0	53.7	3.0	0.88	0.94	0.66

Strate Construction
Kinsley, KS

“J Bunk” Pappas
Garden City, KS

Bunk Management – When Limit Feeding

- Adequate bunk space - NECESSARY !!!!
- Empty bunks and hungry aggressive cattle waiting for feed can be nerve wracking
- Bunks will be licked slick within 4 hours post feeding and will be slick for the next 20 hr

Pre – Feeding @ 7:40 am

https://youtu.be/s-09NfGDNbk

Feeding – 8:09 am

https://youtu.be/ukNyJeMvXr4

Feeding Quality FORUM 2018

Feed Waste

- Wind losses
- Fluffy ration – cattle tossing

14.51 lbs DM intake x 5% waste (estimated) = .73 lbs

.73 lbs x 8.70 cents/lb DM ($173.90/ton) = 6.4 cents/hd/day

- Nutrient Management Plan issues
- No till
  - Weed load
  - Soil compaction

Feeding Quality
FORUM
2018

105 head of calves, 90 days

Intake and Digestibility Study

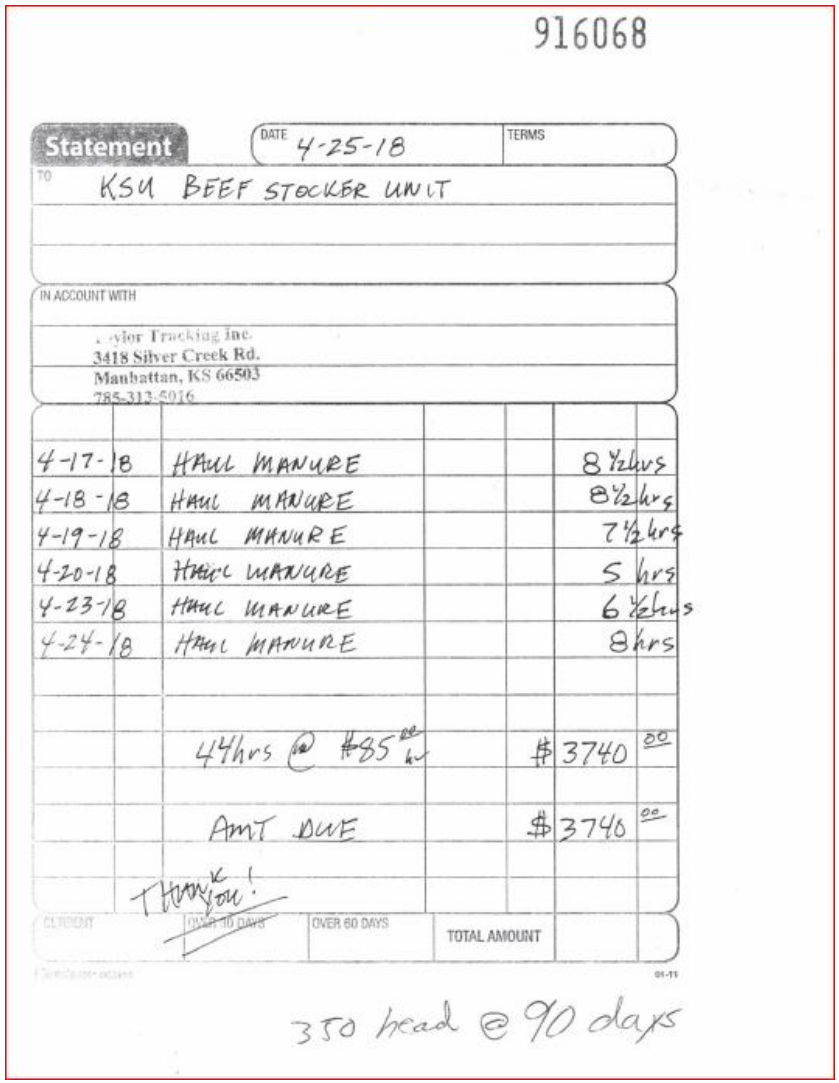
Item	45	60
Dry Matter Intake, lbs	20.20	14.81
OMI,kg	18.70	14.04
NDFI,kg	7.96	3.81
ADFI,kg	4.11	1.58
DM digestibility	0.62	0.71
OM digestibility	0.65	0.73
NDF digestibility	0.58	0.56
ADF digestibility	0.55	0.54
Fecal DM output, lbs	**7.52**	**4.34**

58% reduction in manure output

Feeding Quality FORUM 2018

Feeding Quality
FORUM
2018

Full Fed – Ad Lib Diets



916068

Statement

DATE 4-25-18 TERMS

TO KSU BEEF STOCKER UNIT

IN ACCOUNT WITH

Taylor Trucking Inc.
3418 Silver Creek Rd.
Manhattan, KS 66503
785-313-5016

4-17-18	HAUL MANURE			8 ½ hrs
4-18-18	HAUL MANURE			8 ½ hrs
4-19-18	HAUL MANURE			7 ½ hrs
4-20-18	HAUL MANURE			5 hrs
4-23-18	HAUL MANURE			6 ½ hrs
4-24-18	HAUL MANURE			8 hrs
	44 hrs @ $85.00 hr		$	3740 00
	AMT DUE		$	3740 00

Thank you!

CURRENT | OVER 30 DAYS | OVER 60 DAYS | TOTAL AMOUNT

350 head @ 90 days

350 head x 90 days= 31,500 pen days

Full Fed:

$3,740.00 / 31,500 pen days = 11.87 cents/hd/day

Limit Fed: (less 58%)

$2,169.20 / 31,500 pen days = 6.89 cents/hd/day

Savings:

$1,571.00 or 4.99 cents/hd/day

Feeding Quality FORUM 2018

Feeding Logistics and Efficiency

Feeding Quality FORUM 2018

Feeding logistics/efficiency

- Length of time to feed
- Number of loads to deliver

Less feed needs to be mixed and hauled

Calculating Value of Gain

Estimated Cost

400 lb (purchase wt)

$1.60/lb (current price)

$640.00 paid

Estimated Gain

800 lb (sale wt)

400 lb (purchase wt)

400 lb (gain)

400 lb / 182 days = 2.20 lb/day

Estimated Sale Value

800 lb (sale wt)

$1.55/lb (sale price)

projected sale value

Breakeven Price on Gain

$1,240 (projected sale value)

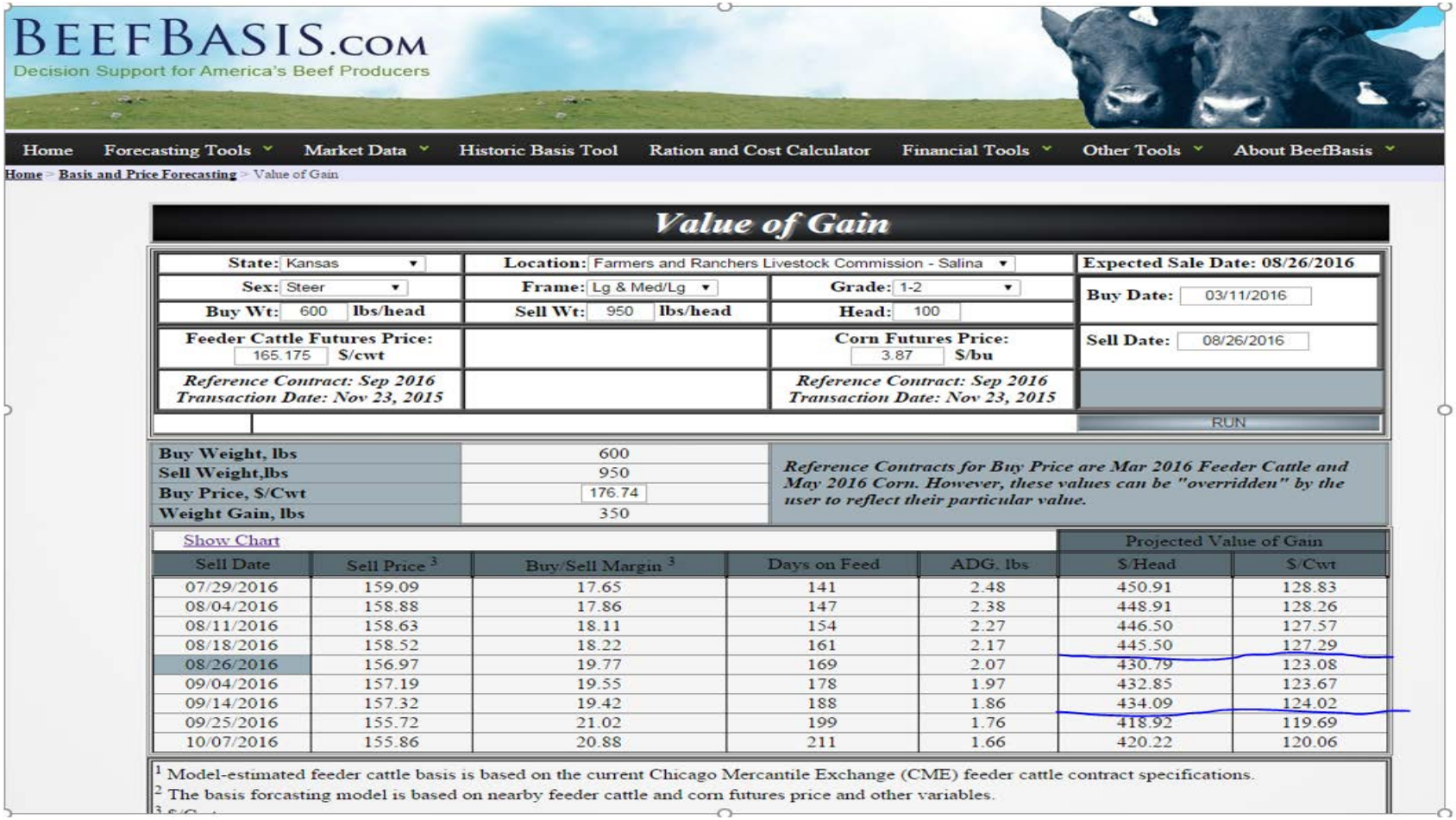
$ 640 (purchase price)

$600

$600.00 / 400 lb gain= $150.00/cwt

Cattle Current – August 7

Marketing



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Home > Basis and Price Forecasting > Value of Gain

Value of Gain

State: Kansas	Location: Farmers and Ranchers Livestock Commission - Salina		Expected Sale Date: 08/26/2016
Sex: Steer	Frame: Lg & Med/Lg	Grade: 1-2	Buy Date: 03/11/2016
Buy Wt: 600 lbs/head	Sell Wt: 950 lbs/head	Head: 100	
Feeder Cattle Futures Price: 165.175 $/cwt		Corn Futures Price: 3.87 $/bu	Sell Date: 08/26/2016
Reference Contract: Sep 2016 Transaction Date: Nov 23, 2015		*Reference Contract: Sep 2016 Transaction Date: Nov 23, 2015*	

RUN

Buy Weight, lbs	600
Sell Weight,lbs	950
Buy Price, $/Cwt	176.74
Weight Gain, lbs	350

Reference Contracts for Buy Price are Mar 2016 Feeder Cattle and May 2016 Corn. However, these values can be "overridden" by the user to reflect their particular value.

Show Chart

Sell Date	Sell Price [3]	Buy/Sell Margin [3]	Days on Feed	ADG, lbs	Projected Value of Gain $/Head	Projected Value of Gain $/Cwt
07/29/2016	159.09	17.65	141	2.48	450.91	128.83
08/04/2016	158.88	17.86	147	2.38	448.91	128.26
08/11/2016	158.63	18.11	154	2.27	446.50	127.57
08/18/2016	158.52	18.22	161	2.17	445.50	127.29
08/26/2016	156.97	19.77	169	2.07	430.79	123.08
09/04/2016	157.19	19.55	178	1.97	432.85	123.67
09/14/2016	157.32	19.42	188	1.86	434.09	124.02
09/25/2016	155.72	21.02	199	1.76	418.92	119.69
10/07/2016	155.86	20.88	211	1.66	420.22	120.06

[1] Model-estimated feeder cattle basis is based on the current Chicago Mercantile Exchange (CME) feeder cattle contract specifications.
[2] The basis forcasting model is based on nearby feeder cattle and corn futures price and other variables.
[3] $/Cwt

Feeding Quality FORUM 2018

Sum of potential benefits – Limit Feeding

	Per 100 head per 90 day turn
Ration feed efficiency	$1,646
Manure removal	$499
Cattle health detection	++++
Marketing window determination	+
Fuel/wagon/tractor (hrs machine)	+
Finishing phase (reduced days to full feed)	+
Total estimated dollars	$ 2,145.00
Per head	$ 21.45
Labor savings (est. 2 hours/day @ $15/hour)	$2,700.00

Questions ?

Feeding Quality FORUM 2018

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BEEF STOCKER

Feeding Quality FORUM
2018