

AMERICAN SHORTHORN ASSOCIATION



My moment.....











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Lake City Research Center-Grazing Research and Extension
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Michigan Land, Livestock and Livelihoods

- Improving energy use at the farm level through properly managed grazing and grass finishing
- Understand the impact of grazing systems on GHG flux
- Development of grass-finished local beef production. Opportunities for grain as well.

Food item	GHG intensity (kgCO ₂ /kg)	Cropland use (m ² /kg)	Bluewater use (m ³ /kg)	Nitrogen use (kgN/t)	Phosphorus use (kgP/t)
wheat	0.23	3.36	0.49	28.73	4.39
rice	1.18	3.51	1.07	36.64	5.20
maize	0.19	1.98	0.15	22.77	3.57
other grains	0.29	6.14	0.17	16.36	2.71
roots	0.07	0.69	0.04	3.63	0.71
legumes	0.23	11.02	0.95	0.00	0.00
soybeans	0.12	3.95	0.14	2.75	5.88
nuts & seeds	0.71	6.39	0.43	14.27	2.11
vegetables	0.06	0.49	0.09	9.55	1.67
fruits (temperate)	0.08	1.18	0.33	12.73	1.91
fruits (tropical)	0.09	0.94	0.32	10.27	1.58
fruits (starchy)	0.11	0.85	0.12	6.26	1.07
sugar crops	0.02	0.15	0.11	2.03	0.35
oil crops	0.46	5.45	0.31	31.33	5.61
palm crop	0.38	0.63	0.00	4.57	0.73
sugar	0.19	1.67	1.22	22.34	3.84
palm oil	1.85	3.10	0.00	22.33	3.57
vegetable oil	0.67	10.31	0.47	42.73	11.47
beef	32.49	4.21	0.22	27.29	5.36
lamb	33.02	6.24	0.49	27.51	4.94
pork	2.92	6.08	0.35	51.52	8.87
poultry	1.41	6.59	0.40	50.20	9.02
eggs	1.58	6.86	0.44	51.22	8.81
milk	1.22	1.34	0.08	6.32	1.58
shellfish	0.07	0.36	0.03	3.35	0.81
fish (freshwater)	0.30	1.51	0.10	16.78	3.62

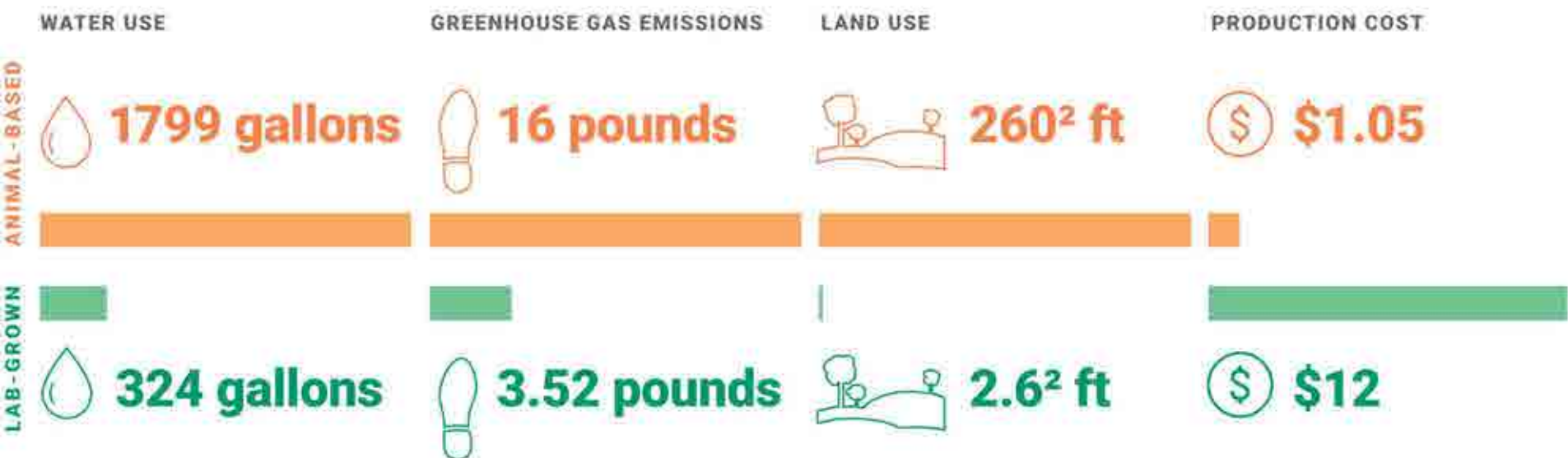
(Springman et al.,
2018)

Industry Mindsets

- McDonalds
- Tyson
- General Mills
- Exxon
- Shell
- Others?

OUR MEATLESS FUTURE: COSTS AND BENEFITS

Resource Comparison of Animal-Based vs. Lab-Grown Meat



Usage, emissions, cost per pound of meat

SOURCES: CB Insights, Water Footprint Network, Business Insider, Forbes, Food Climate Research Network (FCRN), Quanta

Industry



- 30% Grass-Fed?
- 3900 Producers (up from 100 in 1998)
- 232,000 killed in 2015 (doesn't capture local)
- Direct to Consumer 50% Premiums, Branded, 25% premiums

Grass-fed Industry

- JBS Grass Run Farms
- Tyson/Cactus Feeders, Grass-Fed Beef Alliance
 - Goal of up to 20,000 head annually
- Strauss
- 1000 Hills, Seven Sons, Teton Waters, Joyce, White Oak Pastures
- Labels, Labels, Labels, Labels

Beef

I DON'T KNOW IF YOU HEAR IT ENOUGH, BUT THE END RESULT, THE BEEF, IS SOME OF THE BEST I'VE HAD IN CLOSE TO 30 YEARS IN THIS BUSINESS AND I HEAR THE SAME FROM SOME VERY TALENTED AND EXPERIENCED CHEFS. THE TASTE, TEXTURE AND FLAVOR OF YOUR WORK IS SOMETHING THAT I HOPE CONTINUES ON FOR MANY YEARS TO COME.

(I'M NOT SURE YOU HEARD, BUT A WHILE BACK ONE OF MY CUSTOMERS DID A BLIND TASTE TEST WITH MSU BEEF AND SYSCO'S CERTIFIED BLACK ANGUS PROGRAM. MSU WON!)

Production and Profitability

- Genetics
- Forage Management
- Animal Handling and Post-carcass Management

Genetics

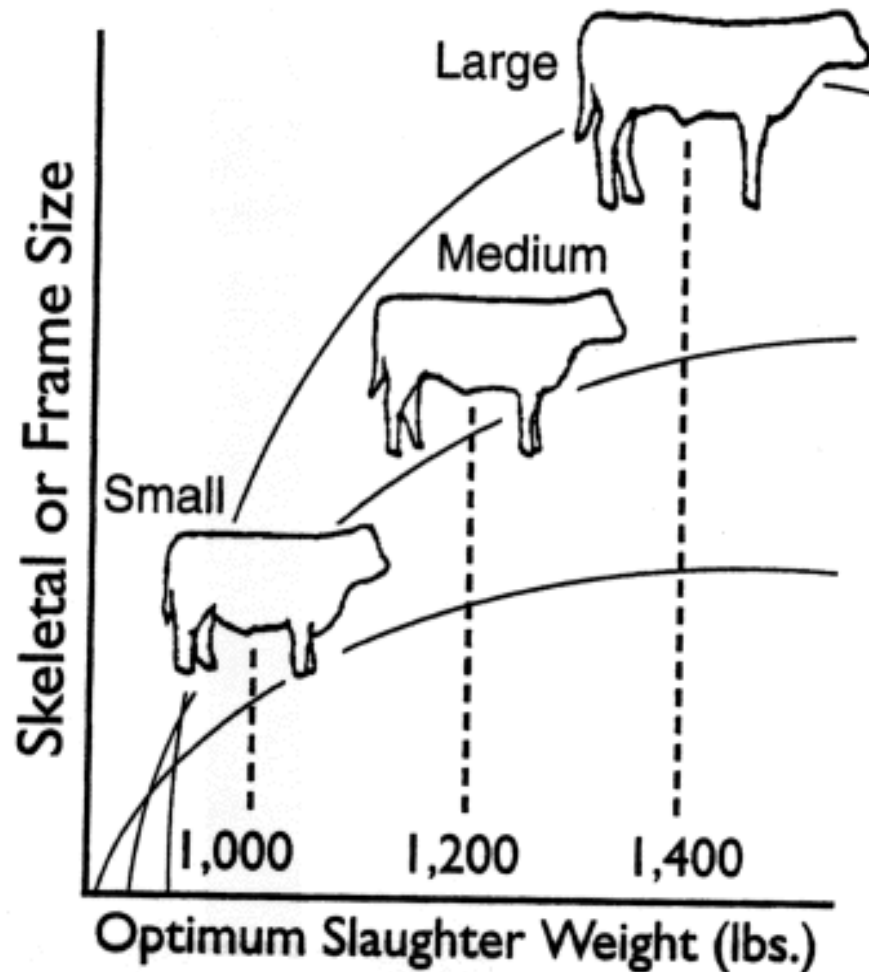
- Cattle must be adapted
 - Pressure Fertility = Carcass Quality
 - Harlan Ritchie
- Eat Grass
 - They Must be Able To Consume High Amounts of Fiber

On Average What the Cattle Look Like

- 1250 Average Weight Cows
- 1200 Average LW of steers
- 19 month Average Slaughter
- 650 Lb Carcass Weight

Relationship of Frame Size to Slaughter Weight

Typically
a steer
should
finish at
110% of
dam's BW
to Grade
choice



It takes
more
energy to
put on a lb
of fat than
a lb of
protein

Carcass Data

- Average Rib Eye Area is 11.2 inches
- The average backfat of the steers is 1 cm (.35 or so inches)
- Average quality grade is Slight 80.



Red Angus Cow Herd



Development Heifers



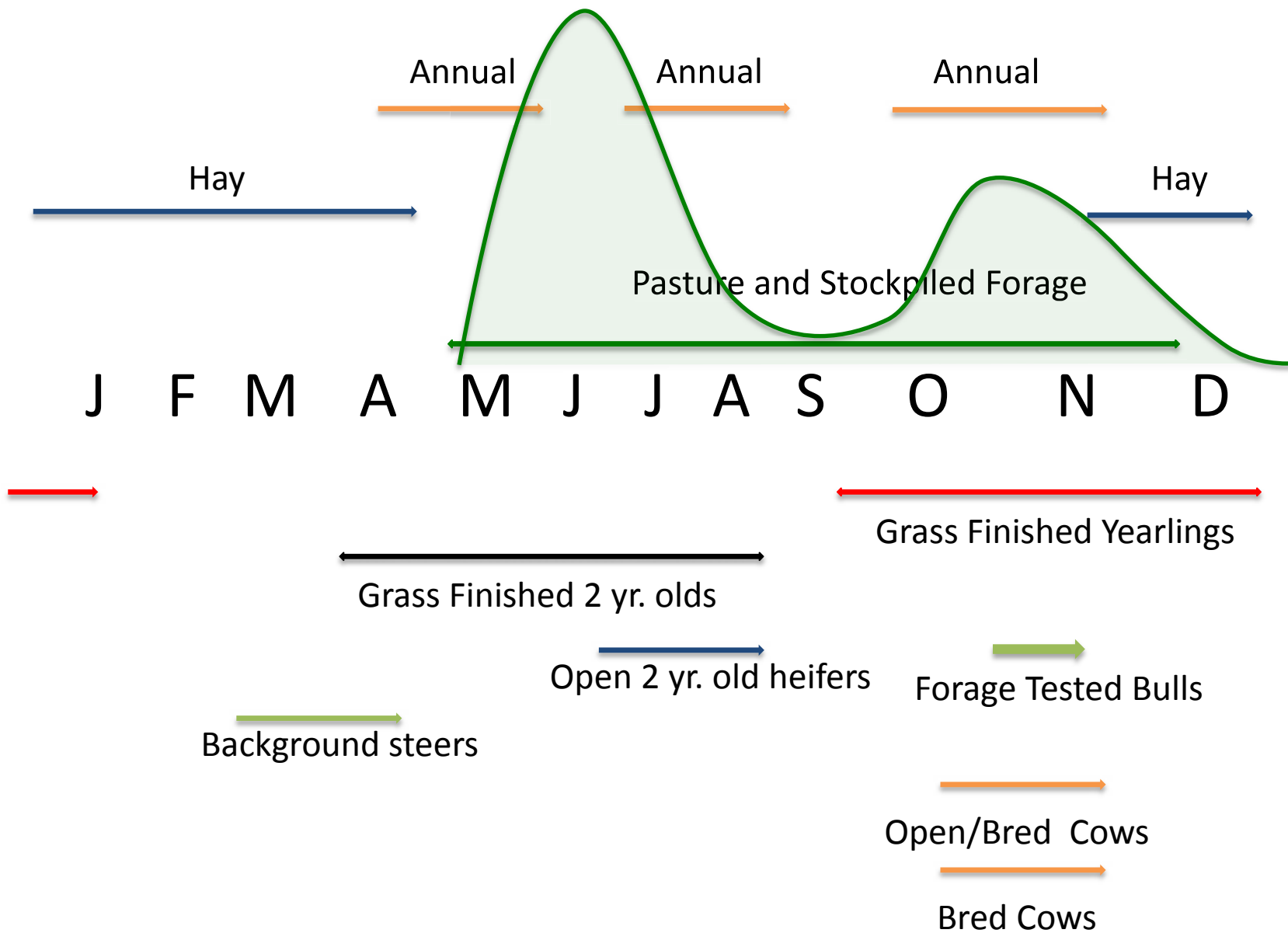




1150-1250 lb 5 yr old cows at 5.5 BCS at weaning







Life Cycle of Grass Finished Steers

- We wean in November generally around 520 lbs.
- We winter on a mixture of high quality and first cutting hay.
- When feed quality is adequate, we average 1.7/lbs a day of gain. When less than desirable this will drop down around 1.25-1.5
- Avg intake throughout the winter is around 20 lbs.

Life Cycle of Grass Finished Steers

- Steers come out of winter around 750-800 lbs
- For the lifetime of the animal we shoot for a 2.0 wda (kill wt-birth wt)/days of age
- We manage the steers in a separate group with their half sisters and a few bulls.

Production Costs Per Head- GF 2014 - 2016	(\$) Cost/year
Calf Costs	\$ 953.75
Labor Costs	-
Hay Period	\$ 11.00
Pasture Period	\$ 38.00
Land Costs	
Pasture Rent (1 steer/1.5 ac)	\$ 105.00
Fence, Electric and Water ⁴	\$ 9.00
Feed	
Alfalfa Hay	\$ 281.80
Alfalfa Hay	\$ 64.73
Sorghum/Sudan grass	\$ 20.00
Rent Ownership	\$ 2.67
Mineral Cost	\$ 11.00
Irrigation Costs	
\$7.50/ac in	\$ 17.00
Health ⁷	\$ 6.67
Machinery	\$ 20.00
Misc/Supplies	\$ 15.00
Operating Cost	\$ 1,555.62
Interest	\$ 77.78
Death	\$ 20.69
Total Average Costs	\$ 1,654.09
Total Average Gross Income	\$ 2,069.17
Average Net Income	\$ 415.08

Table. 2. Grass Finishing Budget for 2016	
Production Costs Per Head- GF 2016	(\$) Cost/year
Calf Costs ¹	\$ 735.00
Labor Costs	-
Hay Period ²	\$ 11.00
Pasture Period ³	\$ 38.00
Land Costs	
Pasture Rent (1 steer/1.5 ac)	\$ 105.00
Fence, Electric and Water ⁴	\$ 9.00
Feed	
Alfalfa Hay ⁵	\$ 282.00
Alfalfa Hay ⁶	\$ 12.00
Mineral Cost	\$ 11.00
Health ⁷	\$ 5.00
Machinery ⁸	\$ 20.00
Misc/Supplies ⁹	\$ 15.00
Operating Cost	\$ 1,243.00
Interest ¹⁰	\$ 62.15
Death ¹¹	\$ 18.66
Total Costs 2016	\$ 1,323.81
Total Income ¹²	\$ 1,865.50
Net Income	\$ 541.70

Steers



Steers





Effects of crossing Hereford, Shorthorn and Limousin x Angus on beef parameters

	AA	HeA	ShA	LiA
Live weight, kg				
initial	148	163	165	162
final	410 ^a	456 ^b	464 ^b	477 ^c
IMF, %	3.6 ^{bc}	3.2 ^{ab}	4.5 ^d	3.0 ^a
Bck Fat thicknss, mm	8.8 ^c	7.6 ^{ab}	7.9 ^b	7.1 ^a
REA, cm ²	58.4 ^a	64.5 ^b	67.6 ^b	70.4 ^d
Cooking loss, %	26.6	25.8	25.7	26.2
WB Shear force, N	29.9 ^{ab}	28.7 ^a	28.8 ^a	30.5 ^b
pH	5.66	5.63	5.61	5.65
Color				
L*	40.2	42.1	41.6	43.2
a*	15.3	16.1	15.7	14.9
b*	12.8	12.5	12.8	11.6

n = 16

Pordomingo, A.J. , 2007. INTA Anguil Experiment Station . [La Pampa Argentina](#)

Growth and performance of Angus, Hereford, Shorthorn and Limousin steers of similar age at harvest at INTA Anguil Experiment Station, La Pampa, Argentina

	Angus	Hereford	Shorthorn	Limousin
Live weight, kg				
initial	156	160	161	179
final	422 a	450 b	460 c	498 d
<i>Backgrounding</i>				
days	178	178	178	178
ADG (backgrn), g/d	556 a	579 b	624 c	680 c
<i>Finishing</i>				
Live weight, kg	255 a	263 b	272 c	300 d
days	143	143	143	143
ADG (finish), g/d	1168 a	1308 b	1315 b	1385 c
DMI finishing, %PV	2.77 b	2.71 ab	2.66 a	2.64 a
DMI finishing, kg/d	9.4 a	9.7 b	9.7 b	10.5 c
DMI finish/ADG	8.03 b	7.39 ab	7.41 b	7.61 a
Hot carcass yield, %	57.1 b	57.2 b	58.4 c	58.9 c
Carcass, kg	241 a	257 b	269 c	293 d

n = 18

Pordomingo, A.J. , 2007. INTA Anguil Experiment Station .La Pampa Argentina

Comparisons of Angus, Hereford, Shorthorn and Limousin steers on beef parameters

	Angus	Hereford	Shorthorn	Limousin
Live weight, kg				
initial	156	160	161	179
final	422 a	450 b	460 c	498 d
IMF, %	3.4 b	3.0 b	4.7 c	2.58 a
Bck Fat thicknss, mm	7.9 c	7.1 b	8.2 c	5.3 a
REA, cm ²	56.1 a	62.3 b	68.1 b	74.7 d
Cooking loss, %	26.2	25.4	24.6	28.1
WB Shear force, N	29.4 b	29.8 b	26.2 a	31.7 b
pH	5.64	5.61	5.63	5.67
Color				
L*	40.0 b	41.1 bc	42.3 c	38.5 b
a*	15.1	15.7	15.9	15.4
b*	13.2	12.6	12.1	12.5
n = 18				

UPREC PERFORMANCE AND CARCASS DATA

UPREC Carcass Data by Year

Year	n	Weaning Wt.	Weaning Age (d)	Age at Sale	WDA	Live wt.	Carcass Wt.	Dressing %	Bfat	Rib Eye Area	Marbling Score	# Choice	% Choice
2013	43	530	176	644	1.75	1200	660	0.57	0.21	11.50	430	7	16%
2014	34	535	183	689	1.71	1248	659	0.55	0.29	11.40	481	17	50%
2015	52	456	147	687	1.71	1251	653	0.54	0.29	11.10	499	33	63%
Average	129	503	166	673	1.72	1233	656	0.55	0.26	11.33	472	57	44%

- Cattle were marketed on average at 22 Months with an average carcass weight of 656 pounds
- Cattle average midway through the high select quality grade with 44% of the cattle grading choice

Cumulative (2013-2015) Calf Crop Carcass Data by Month of Age

Age(mo)	n	Weaning Wt.	Weaning Age (d)	Age at Sale (d)	WDA	Live wt.	Carcass Wt.	Dressing %	Bfat	Rib Eye Area	Marbling Score	# Choice	% Choice
19	20	574	178	583	1.92	1214	658	0.56	0.18	11.1	423	0	0%
20	22	550	173	617	1.88	1251	670	0.55	0.25	11.40	467	9	41%
21	29	502	168	644	1.77	1225	659	0.56	0.25	11.10	451	10	34%
22	10	473	158	672	1.74	1255	653	0.54	0.31	11.20	487	5	50%
23	20	467	161	704	1.6	1204	644	0.56	0.28	11.10	480	10	50%
24	12	426	142	731	1.58	1236	642	0.54	0.34	11.50	528	10	83%
25+	16	474	169	836	1.43	1268	663	0.54	0.30	11.80	516	13	81%
Average	129	503	166	673	1.72	1233	656	0.55	0.26	11.30	472	57	44%

- As cattle reach two years of age, they grade Choice > 80% of the time
- Little difference in carcass weight; would be different if marketed together as a group

Forages And What is needed

- 5400 lbs !
- Neutral Detergent Fiber
 - Typically 40-50%
 - Intake Should Be Around 1.25% of BW
- High % of Legumes/High Energy Forages in Sward
- Don't Slow Down!

Forages to Improve Quality

- Alfalfa based forage
- Cereal grains and Brassicas
- Highly Diverse Cover Crop
 - Establishment, sensory



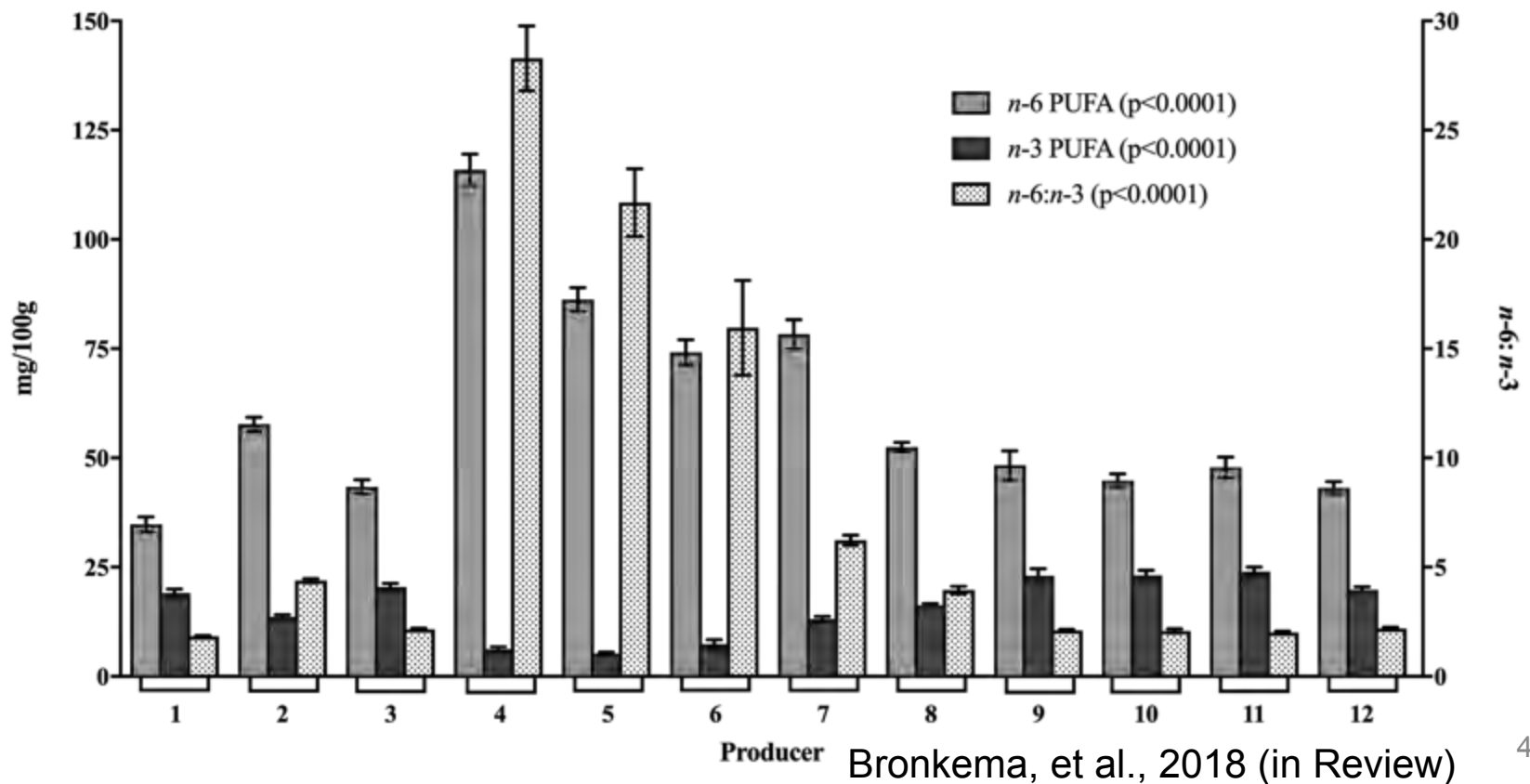


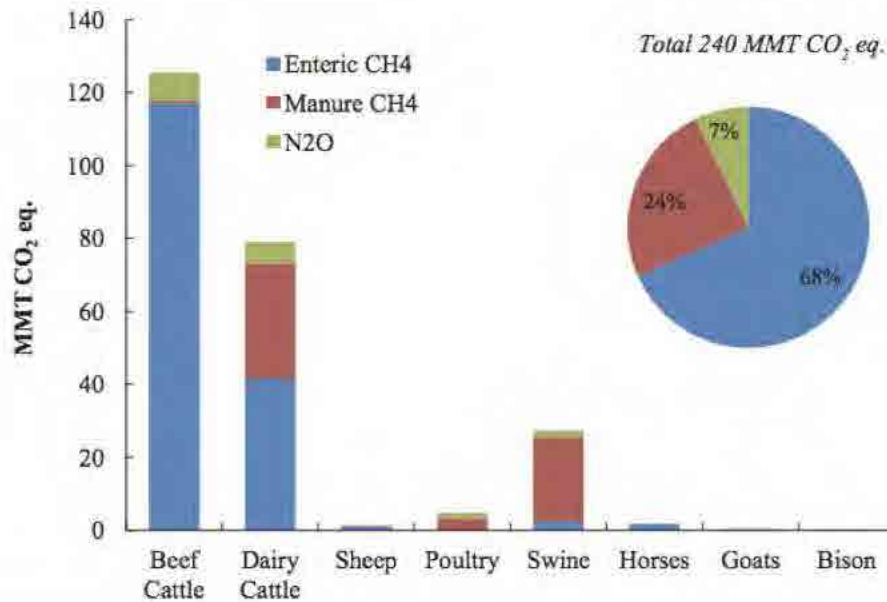




RESULTS: Fatty Acid

- Significant variation between producers for all fatty acids ($P < 0.0001$)





USDA U.S. Agriculture and Forestry Greenhouse Gas Inventory:1990-2013

Introduction

Beef cattle are a major contributor to climate change- both globally and domestically

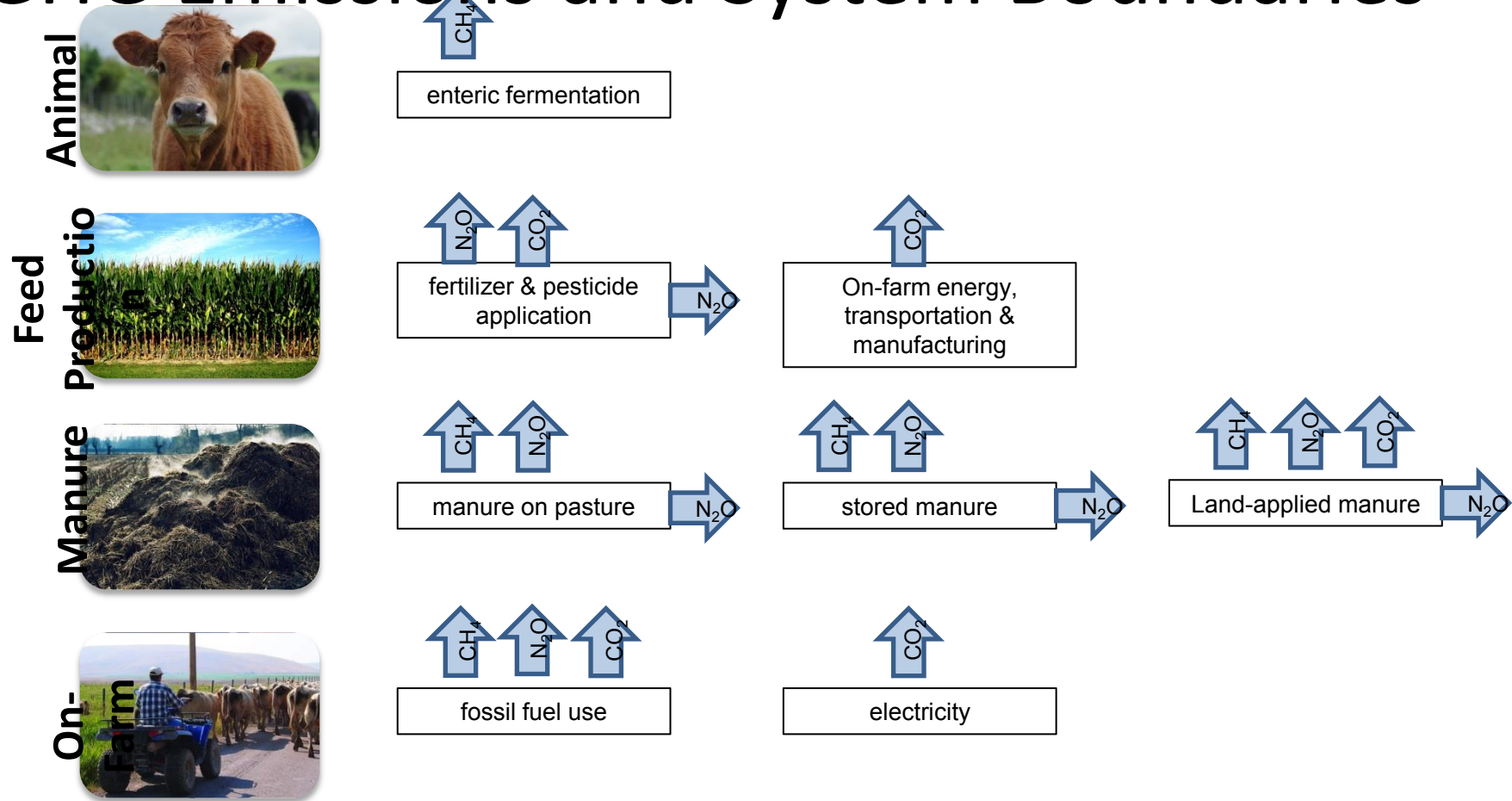
- Livestock represent 66% of all agricultural emissions (USDA, 2016)
- Of this, beef cattle contribute the most, primarily because of enteric CH₄ production (USDA, 2016)

Paige Stanley

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Stanley, et al., 20

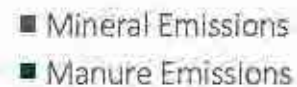
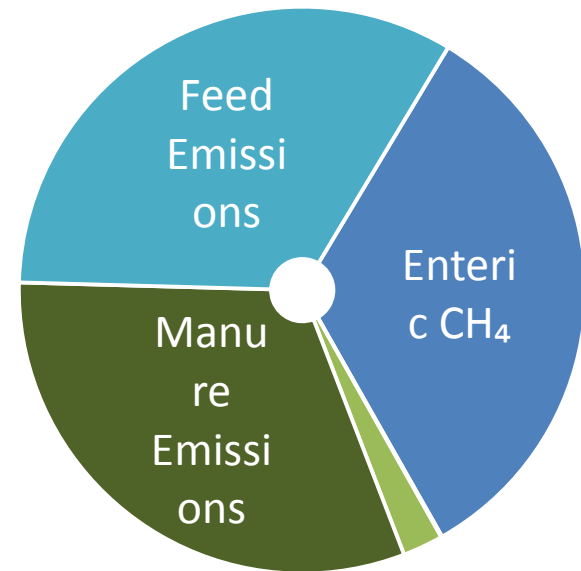
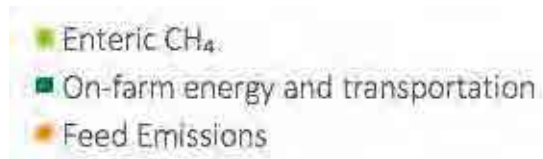
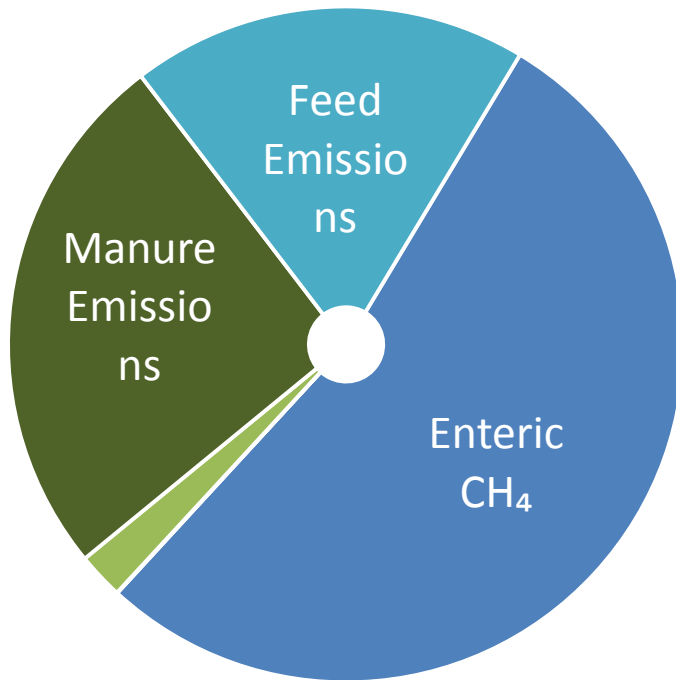
GHG Emissions and System Boundaries



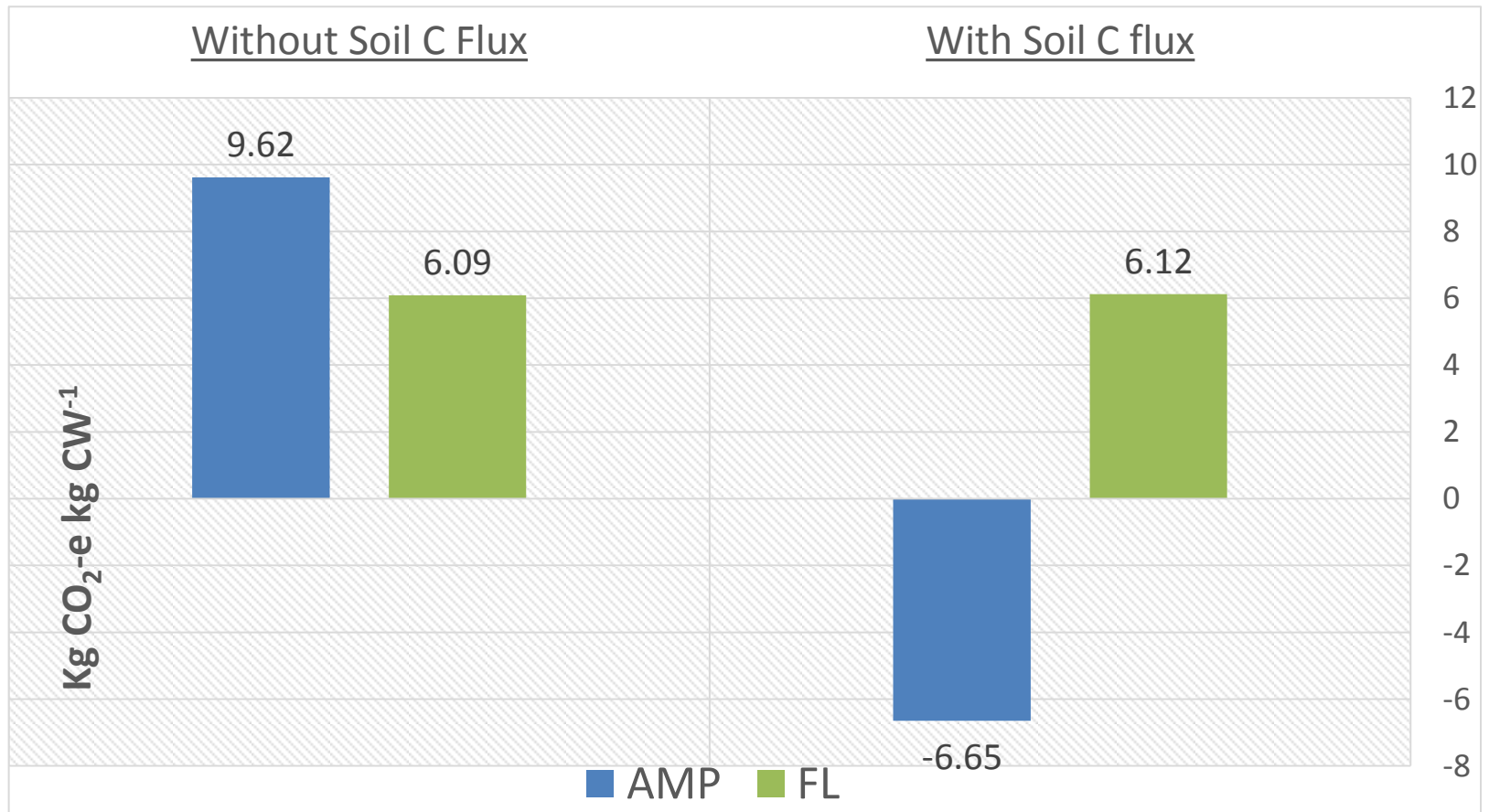
Results: GHG Emissions

AMP Grazing: 9.62 kg CO₂-e kg CW⁻¹

Feedlot: 6.09 kg CO₂-e kg CW⁻¹



Results: Net GHG Flux



Conclusions

- The beef industry is continuing towards addressing its environmental challenges
- Grass-finished beef is a growing component of this industry. It can yield environmental benefits in proper environments
- Shorthorn genetics can proficiently convert grass to marbling