Cow Side of Producing a 1000 lb. Feeder
Cow Size and Expenses

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Data Collected from 1990-2010 (10,073,539 cattle)

Focus on Feedlots

K-STATE Kansas State University

Kansas Feedlot Performance and Feed Cost Summary*
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January , 2010 Closeout Information

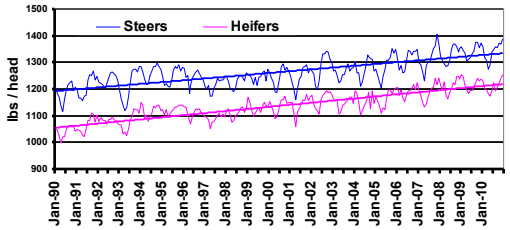
Sex	No	In Weight	Final Weight	Avg. Days on Feed	Avg. Daily Gain	Feed/Gain (Dry Basis)	% Death Loss	Avg. Cost of Gain/Cwt.	Projected Cost of Gain Current Month's Placed Cattle
Steers	22461	836	1358	144 (129 - 156)	3.59 (3.20 - 4.03)	6.35 (5.87 - 6.94)	0.94	$75.10 $68.10 - $90.95	$74.33 $68.00 - $85.00
Heifers	41885	758	1232	148 (126 - 173)	3.18 (2.84 - 3.41)	6.52 (5.98 - 7.00)	1.16	$79.07 $71.93 - $99.84	$78.33 $74.00 - $85.00

Current Feed Inventory Costs: Mid-February, 2010		Range	No. Yards
Corn	$3.67 /bu	$3.70-$4.04	8
Ground Alfalfa Hay	$120.08 /ton	$105.00 - $132.54	7

*Appreciation is expressed to these Kansas Feedyards: Brookover Ranch Feed Yard, Decatur County Feed Yard, DM&M Feed Yard, Fairleigh Feed Yard, Hoxie Feedyard, HRC Feedyard, HyPlains Feed Yard, Kearny County Feeders, Poky Feeders, Pratt Feeders, and Supreme Cattle Feeders.

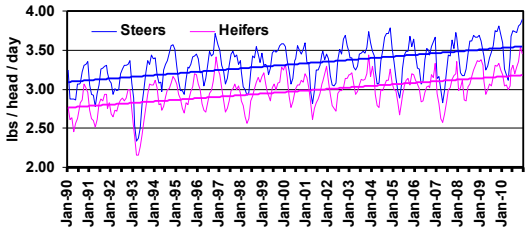
**Closeout figures are the means of individual feedyard monthly averages and include feed, yardage, processing, medication, death loss and usually sold FOB the feedlot with a 4% pencil shrink. Interest charges normally are not included.

K-State Focus on Feedlots Market Weights (1990-2010)



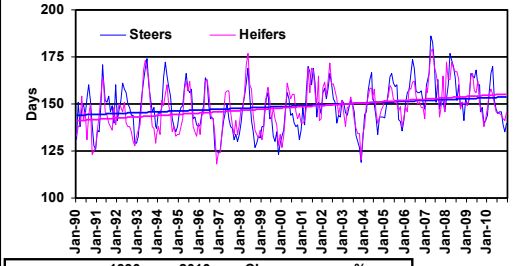
	1990	2010	Change	%
Steers, lbs	1187	1339	+ 153	12.18
Heifers, lbs	1041	1210	+ 168	16.21

K-State Focus on Feedlots Average Daily Gain (1990-2010)



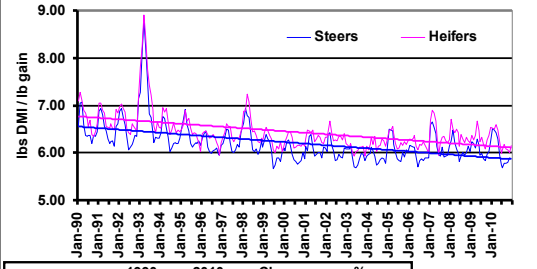
	1990	2010	Change	%
Steers, lbs/d	3.09	3.58	+ 0.48	15.76
Heifers, lbs/d	2.76	3.22	+ 0.46	16.65

K-State Focus on Feedlots Days on feed (1990-2010)



	1990	2010	Change	%
Steers,d	143.3	148.8	+ 5.6	3.89
Heifers, d	137.6	147.9	+ 10.3	7.51

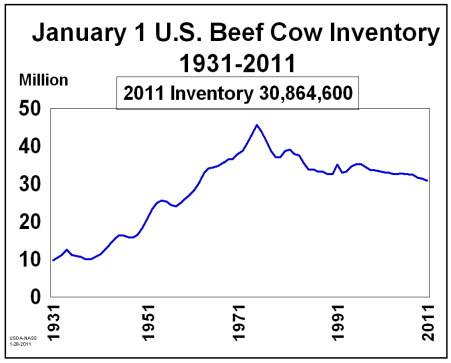
K-State Focus on Feedlots Feed Conversion (1990-2010)

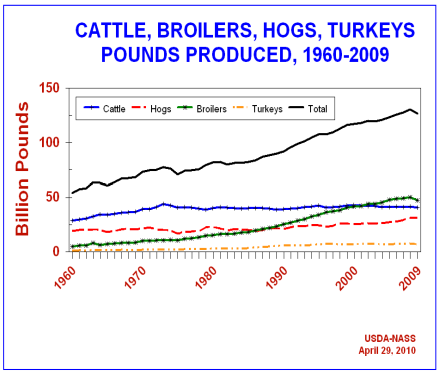


	1990	2010	Change	%
Steers, F:G	6.51	6.01	- 0.49	7.58
Heifers, F:G	6.75	6.24	- 0.51	7.54

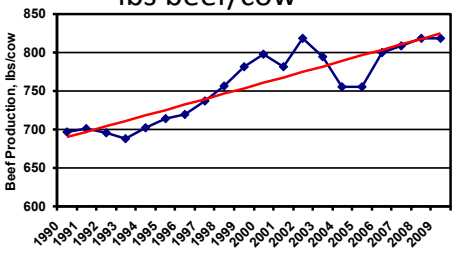
Today's Fed Cattle

- 1990 Vs. 2010
- Fed Cattle (steers and heifers):
  - 14% larger at slaughter
  - Spend 8 more days on feed
  - Gain weight 16% faster
  - 7.6% more efficient
  - 0.50 less lbs feed/lb gain





Commercial Beef Production, lbs beef/cow



	1990	2009	% Change
Beef Prod. Lbs/cow	697	819	17.5

NASS, 2009; K. C. Dhuyvetter, 2010

Relationships

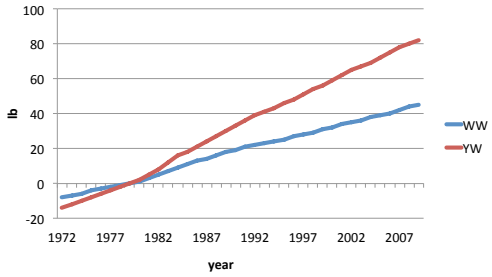
- Are cows getting bigger?
  - If so, how much?
- Does that affect their nutrient requirements?
  - If so, how much?
- Does it affect their productivity?
  - If so, is it enough to matter?
- Does it affect their ability to meet their requirements by grazing?

Are Cows getting bigger?

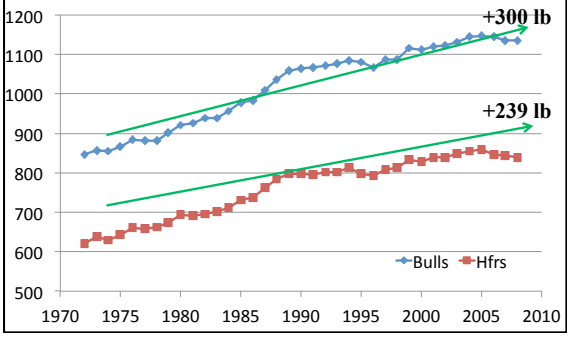
Indicators of cow size 1

- Trend in genetic predictors of growth rate and size
  - EPD
    - Weaning weight
    - Yearling weight
    - Mature weight
    - Mature height

Angus EPD Genetic Trend for Weight



Angus Yearling Weights 1972-2010 (Angus Sire Summary, 2009)



Indicators of cow size 2

- USDA ARS Germplasm Evaluation Program
  - Meat Animal Research Center, Clay Center, Nebraska
  - Direct head-to-head comparison of sire breeds
  - Allowed to express breed potential
    - No limitation on nutrient intake
  - 2009 data

Mature cow weights

Breed	5-year-old weight, lb
Hereford	1,419
Angus	1,410
Red Angus	1,409
Simmental	1,404
Gelbvieh	1,323
Limousin	1,391
Charolais	1,371

MARC cow weights

- Average cow size was 1390 lb.
- Breeds differ
- Are continental breeds still bigger than British breeds?

Indicators of cow size 3

- Common logic
  - *"Mature cow weight = weight of finished offspring"*
- *Meat Animal Research Center*
  - *Germplasm evaluation program*
  - *37,000+ cows*
  - *Mature Cow Weight correlated with hot carcass weight of progeny (0.81)*
  - *Progeny hot carcass weight = 0.599 * (mature cow weight)*

Nephawe et al., 2004

Mature Cow Weights (Focus on Feedlots)

Estimated Mature Cow Weight Based on Steer Market Weight

Year	Steer Market Wt	Steer Carcass Wt	Mature Cow Wt
1990	1186.8	735.8	1228
2010	1339.5	830.5	1386
			Difference = 158 lb.

[1]Carcass weight = market weight * 0.62
[2]Mature cow weight = carcass weight/ 0.599

K-State Focus on Feedlots; Nephawe et al., 2004

Mature Cow Weights (Federally Inspected Slaughter)

Estimated Mature Cow Weight Based on live slaughter weights (Steers and Heifers)

Year	Fed Inspected Live Wt	Steer Carcass Wt	Mature Cow Wt
1990	1140	706.8	1179
2009	1296	806.1	1346
			Difference = 167 lb.

[1]Carcass weight = market weight * 0.62
[2]Mature cow weight = carcass weight/ 0.599

NASS, 2009; Nephawe et al., 2004

Cow Size vs. Steer Carcass Weight

Mature Cow Wt	Estimated Steer Carcass Wt
1000	599
1200	719
1400	839
1600	958

Estimated Steer Carcass weight = 0.599 * Mature Cow weight

1000 lb cow = carcass that is too small!

1600 lb cow = carcass that is too big!

Nephawe et al., 2004

How big are your cows?

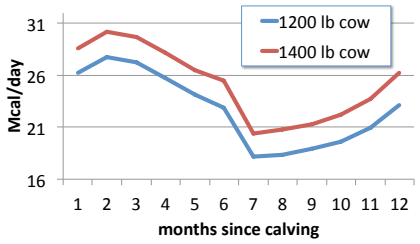
- Can you weigh them?
- Is there a subset you get weights on?

Nutrient requirements

- Increase as cow size increases
  - Not in direct proportion to weight
  - In proportion to surface area
- Requirements increase at a slower rate than weight

$$NE_m = 0.007\ BW^{0.75}$$

Effect of Cow Weight on Maintenance Energy Required

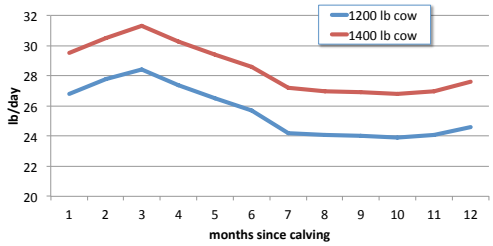


- 1400 lb cow weighs 16% more, but her requirements are only 11% more

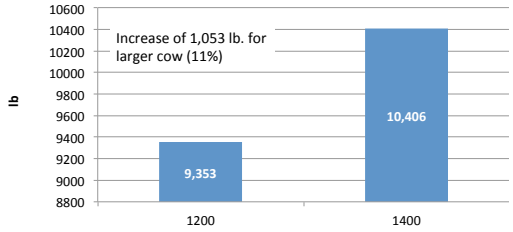
How do we get more nutrients in a cow using the same forage?

- Increased intake

Effect of Cow Weight on DM Intake



Annual DM intake per cow



Production capability

- How much more does a bigger cow have to produce to cover her higher feed bill?

Feed consumed per lb weaned

Cow wt, lb	Annual DM intake	500	550	600	650
1200	9,353	18.7	17.0	15.6	14.4
1400	10,406	20.8	18.9	17.3	16.0

1400 lb. cow needs 50 lb. more weaning weight to match "feed efficiency" of 1200 lb. cow

Is this likely?

- Angus EPD genetic trend for weaning weight
  - 26 lb increase over past 20 years

A cow's biological type determines her nutrient requirements:

What is a "biological type"?

- Group of breeds based on common characteristics
  - Size and growth rate traits
  - Maternal traits
  - Carcass traits

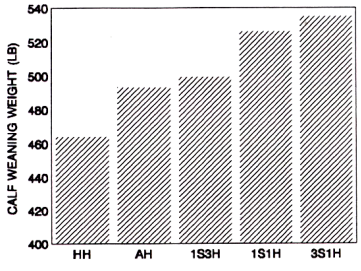
A cow's biological type determines her nutrient requirements:

- Large size or high milk production dramatically increases nutrient requirements.
  - Thus, the most important environmental characteristic to match cows to is the nutrient supply that the forage provides.
- Western range/grazing resources vary tremendously in amount of forage/level of nutrition.

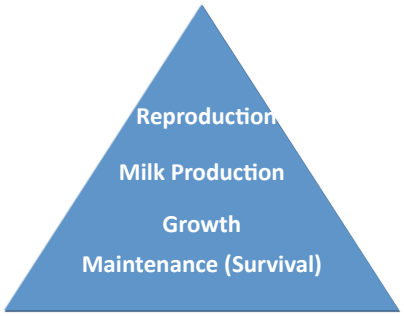
Matching biological types to forage resources

- Extremes in biological type seldom fit, intermediate types are usually most efficient
- Study conducted in northern Montana – 5 breed combinations (Kress, 1993):
  1. Straightbred Herefords
  2. Angus X Hereford
  3. ¼ Simmental X ¾ Hereford
  4. ½ Simmental X ½ Hereford
  5. ¾ Simmental X ¼ Hereford

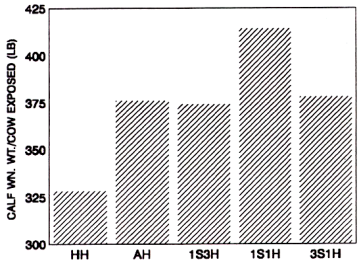
Weaning Weight



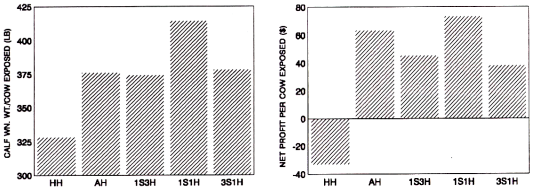
Biological Priorities of Beef Cows



Weaning Weight per Cow Exposed

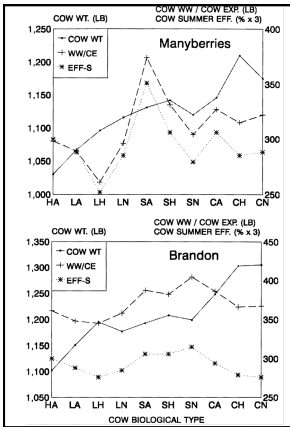


WW/CE Compared to Profitability



Matching biological types to forage resources

- Scarce or abundant resources move the best biological type toward the extremes, but not to the limit
- Study conducted at 2 locations in Canada
  - Manyberries, Alberta: semiarid rangeland
  - Brandon, Manitoba: humid, high-production pastures



Breed Legend	
HA	Hereford x Angus
LA	Limousin x Angus
LH	Limousin x Hereford
LN	Limousin x Shorthorn
SA	Simmental x Angus
SH	Simmental x Hereford
SN	Simmental x Shorthorn
CA	Charolais x Angus
CH	Charolais x Hereford
CN	Charolais x Shorthorn

Additional Comments

- Risk: Difference in WW/CE between biological types is greater in poorer forage conditions
  - Making a mistake in choosing biological type will have greater consequences in poorer forage conditions

Table 1. Matching Biological Type of Cow Herd to Feed Resources

Mature Size	Milk Level	Availability of Cheap Feed for Cow Herd: High	Medium	Low
H	H	6[1]	3 (avoid)	1 (avoid)
H	M	7[1]	4 (avoid)	2 (avoid)
H	L	8[3]	5 (risky)	3 (avoid)
M	H	7[2]	5 (risky)	3 (avoid)
M	M	8[2]	6[1]	4 (risky)
M	L	9[3]	7[1,3]	5 (risky)
L	H	9[2]	7[2]	4 (risky)
L	M	10[2]	8[2]	5 (risky)
L	L	11[3]	9[3]	6[1]

[1]Values of 6 (or higher values) match biological type to feed resources for all purpose herds
[2]Good for terminal sire breeding system when selling weanling calves
[3]Possible for terminal sire breeding system when retaining calves to slaughter and cost of post weaning feed is cheap

Stocking Rate

- Animal unit equivalents
  - 1000 lb cow = 1.0 AU
  - 1200 lb cow = 1.15 AU
  - 1400 lb cow = 1.3 AU

Stocking Rate Examples

Cow Wt	AUE	Acres for 8 mo. Grazing season
1000	1.0	20
1200	1.15	23
1400	1.3	26

Stocking Rate Examples

Cow Wt	AUE	Acres for 8 mo. Grazing season	Cows per 640 acres
1000	1.0	20	32
1200	1.15	23	28
1400	1.3	26	25

Conclusions

- Cows have gotten bigger
  - 200 lb increase over 2 decades
  - Genetic selection for growth has played a role
- Bigger cows need more feed to meet nutrient requirements
  - They may not fit limited range resources
- Bigger cows need to wean bigger calves to pay their feed bill
- Improved management is needed to match calf weaning weight to cow size

Going Forward: Selection and Management

- New generation of selection tools:
  - Angus- Cow Energy Value EPD ($EN)
  - Red Angus- Maintenance Energy EPD
- Management
  - Beware of increasing stocking rate
  - Weigh and body condition score cows

You can't manage what you don't measure!

What else does this mean?

- Other management to alter nutrient supply:demand
  - Grazing management
  - Range improvements
  - Strategic supplementation
  - Adjust calving and weaning dates
- Manage cow size
  - Cull big cows
  - Replacement heifer development/nutrition