

Searching for Cows that are Feed Efficient

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We are in the business to produce food for a variety of customers. Will these customers dictate how you produce calves and beef?



How is it possible that consumers are technology phobic when it comes to food?





A consumer disconnect

**Myths
vs. Reality
of food
production**



What does the Consumer hear?

Ag says: “Our methods are proven safe”

Consumer says: “Your methods tamper with nature”

Ag says: “We keep food affordable”

Consumer says: “At what expense to quality?”

Ag says: “Most farms are family-run”

Consumer says: “But beholden to big processors and
the bottom line



What does the consumer hear?

Ag says: “We have the safest food supply in the world thanks to the industry”

Consumer hears: “Pesticides, antibiotics and hormones might not be safe in the long-run”



BAN
GMO

STOP
THE INSANITY
GMO

SAVE THE
BEE

I AM SO ANGRY
I MADE

DON'T WANT
GMO FOOD

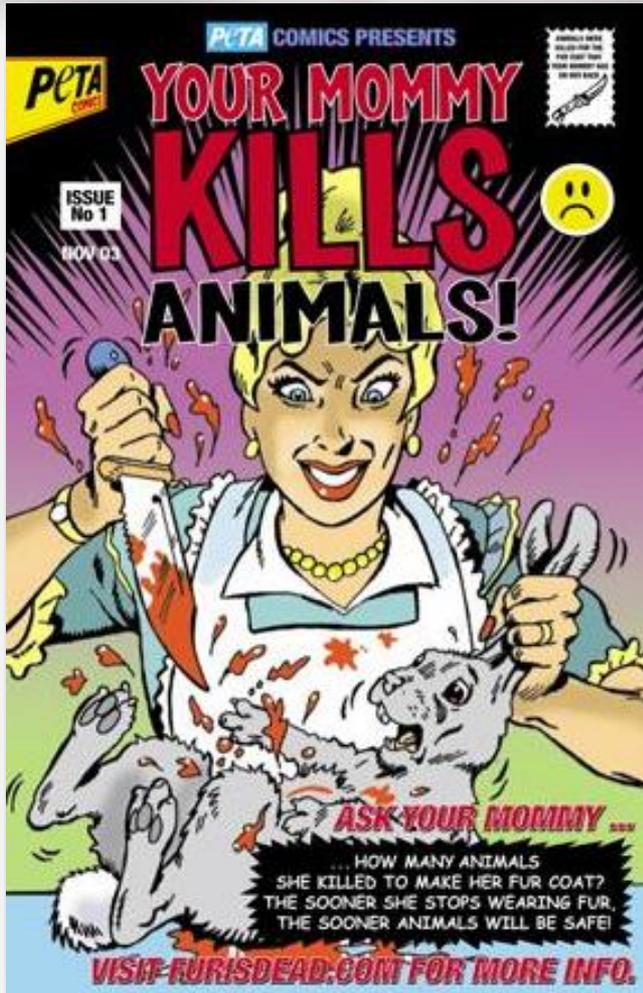
WANT FOR CRIMINALS
AGAIN HUMANITY
MONSIEUR

PRO
ORG

MENTAL OFFICE

Yoyo's
organic coffee

Detractors of Modern Agricultural Practices



I don't and would never support the 4-H. This group helps desensitize youngsters into having no emotional attachment to animals raised for food..... This is how the meat industry stays in business. If children are raised to love all animals and not try to see them as products, they would not be interested in seeing them killed.

U.S. Pet Ownership

- 81.7 million cats; 2.2/cat per HH
- 72 million dogs; 1.7/dogs per HH
- Humanization — \$38 BILLION industry
- 62% of owners keep animals indoors
- 50% of owners sleep with cats; 33% sleep with dogs
- Emergence of day cares for pets; petscanstay.com

Faux fur coat!



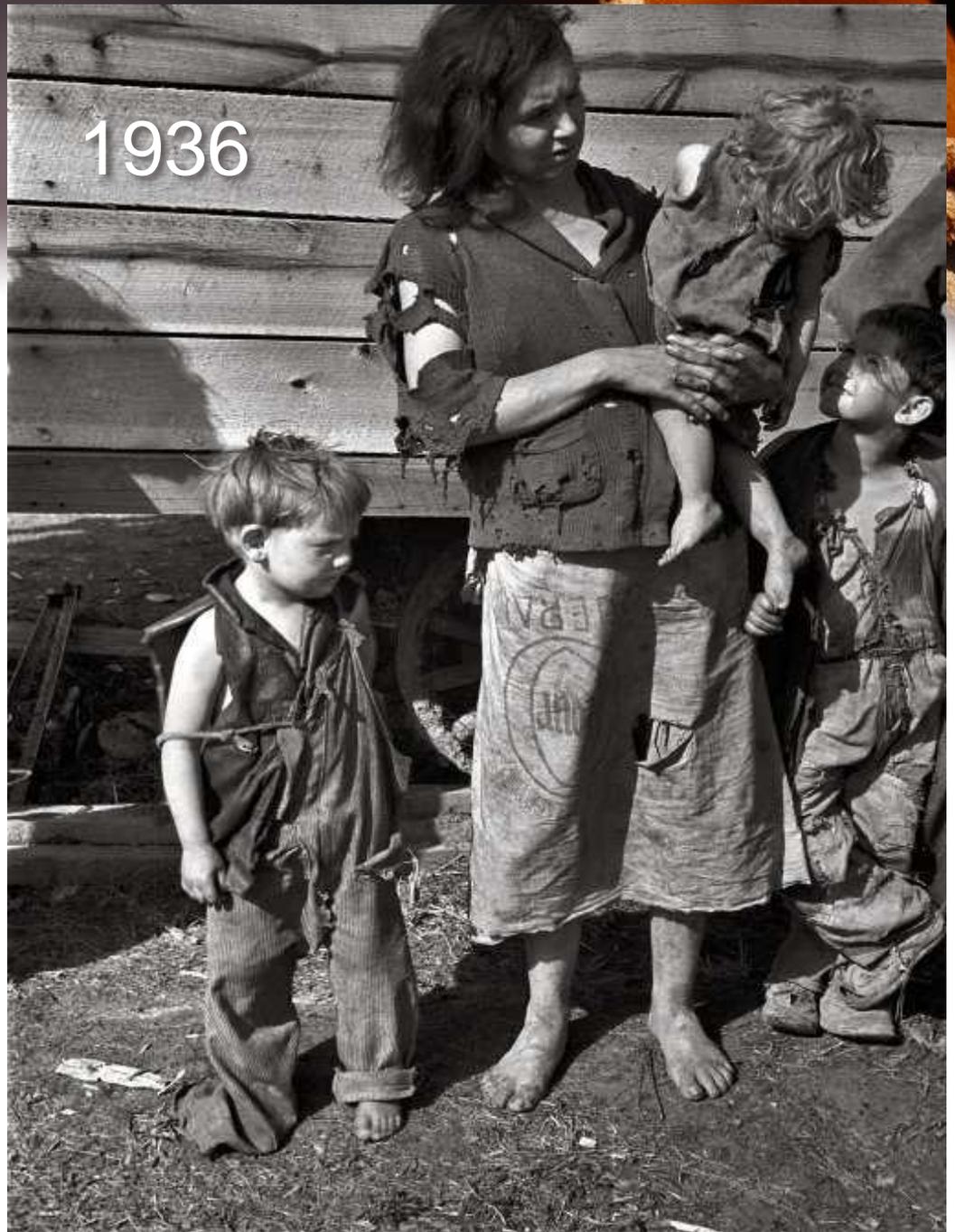


Facebook, Twitter and Texting

- **88 percent of Americans are aware of Facebook**
- **41% use Facebook**
- **Teens average 2,900 texts per month**
- **Americans texting exceed cell phone use**

“The Good Old Days?”

1936



The Good Old Days in Kansas

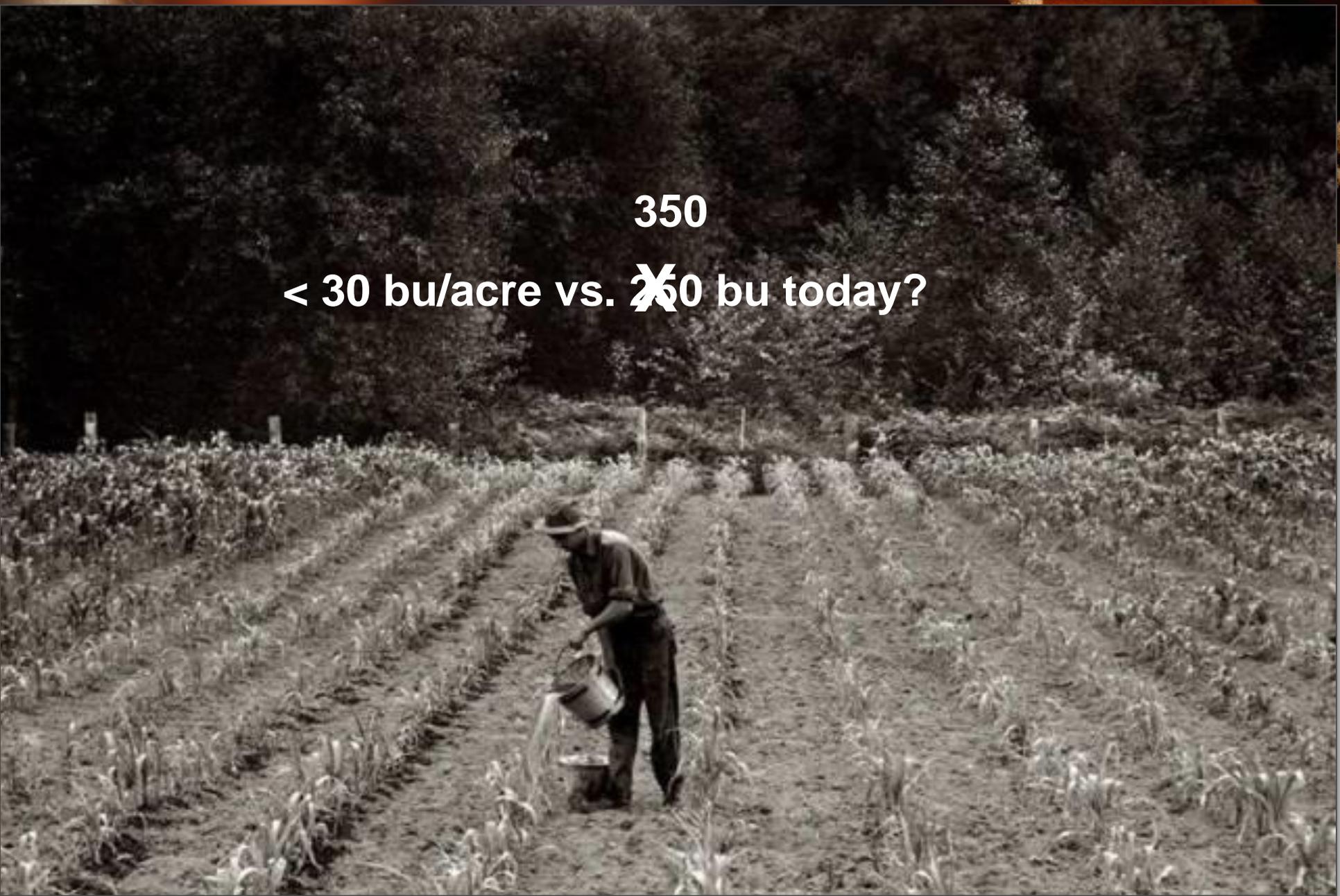


The Good Old Days?



350

< 30 bu/acre vs. ~~250~~ 350 bu today?



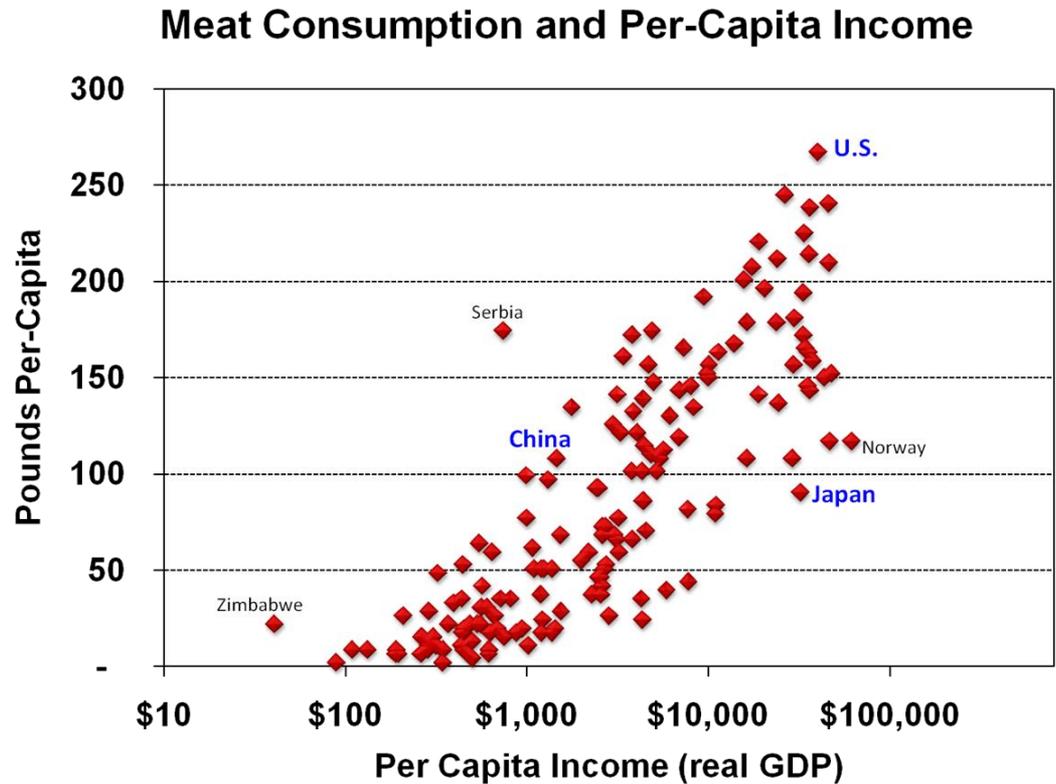


Natural Farming: Manure instead of N-fertilizer?

- Norman Borlaug, founder of the green revolution, estimates that the amount of nitrogen available naturally would only support a worldwide population of 4 billion souls.
- We would need another 5 billion cows to produce enough manure to fertilize our present crops with "natural" fertilizer. That would play havoc with global warming. (greenhouse gas?)

Correlation: Salary and Consumption

As income increases, meat consumption increases.



Source: FAO, USDA, 2003 data, includes beef, pork, and poultry

More \$\$, More Beef Consumption--

World spending on meat by income level

<u>Income level</u>	<u>Median income, USD</u>	<u>Meat, \$</u>	<u>Pct</u>
Very low	500	19	3.8%
Low	2,000	170	8.5%
Low middle	4,000	240	6.0%
Upper middle	9,925	397	4.0%
High	24,615	640	2.6%

Source: HSBC Global Research

Note: by 2050, three billion people will move from very low to Low middle, Upper middle or High

Who are “customers” for beef?

The ESTABLISHMENT

(1909-45)

- 7 million of them
- WW II
- Great Depression
- Greatest generation
- My folks
- Went from horseback to the moon



The BOOMERS (1946-64):

- Largest generation
- My generation
- Defined by: Vietnam, Woodstock, Watergate,
- Sex, drugs and rock 'n roll
- Fast cars



The Boomers (1946-1964)

- We didn't grow up
- We protested on college campuses
- We believed in free love
- Smoked dope
- Did drugs
- We still do drugs, except now it is Metamucil, Viagra, Insulin & Lipitor





The 2011 National Beef Quality Audit Showed:

1. Consumers want beef that is safe
2. Consumers want beef that is tender, juicy and flavorful
3. Consumers want to know where and how beef is produced



What do consumers want from beef?

1984

- Taste
- Convenience
- Nutrition
- Variety
- Price

2009

All of the previous

PLUS

- Social causes, i.e.
- The Environment
- Sustainability
- Animal Welfare

Source: Gary Smith, Rapid City 2009



How many consumers say a ground beef burger tastes better than a ground turkey burger?

- A. 2 to 1**
- B. 5 to 1**
- C. 10 to 1**



For the Love of Beef



Overall, 69% of consumers
would order beef to
celebrate their birthday and
79% of men would do so.

eir
er

Two-thirds (74%) of men say they would order a strip steak over a chicken breast or a pork chop to make sure their date didn't think they were a wimp.



For the Love of Beef

True or False?

Six of ten women (61%) say they are less likely to think their date is a wimp if he orders a strip steak rather than chicken breast or pork chops.

Source: Foodservice Factoids,
December, 2008

Why the search for the efficient beef cow?

“Efficiency can lower costs, and/or increase returns, leading to better use of resources and increased profitability.”

(Hammett, 2009)





What do efficient cows look like?

- Cow efficiency has been described, researched, and discussed in many different forums, and has taken on numerous definitions.
- 480,000 references for “beef cow efficiency” on Google
- When I asked my Beef Management class to describe what an efficient MT cow looked like; 18 different answers
- “I’ll know her when I can see her”



What is the definition of an efficient cow?

- The ratio of pounds of calf weaned/unit of forage consumed
- Pounds of calf weaned/pounds of female exposed to a bull



Why the search for the efficient beef cow?

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(Hammett, 2009)

Breakeven Price Analysis

Economic

Annual cow cost/yr,\$

Breakeven price=

Avg. weaning wt x % calf crop

Biological



Cow size observations

- A larger cow can produce a larger calf, but her production efficiency may be suboptimal.
- In general, cows can be selected for improved efficiency in a certain environment, but they may not be as efficient in other environments
- With unlimited forage, larger cows can wean larger calves, but in limited forage environments smaller cows are more efficient
(Ferrell and Jenkins 1985).



What are some factors that affect production efficiency in the cow herd?

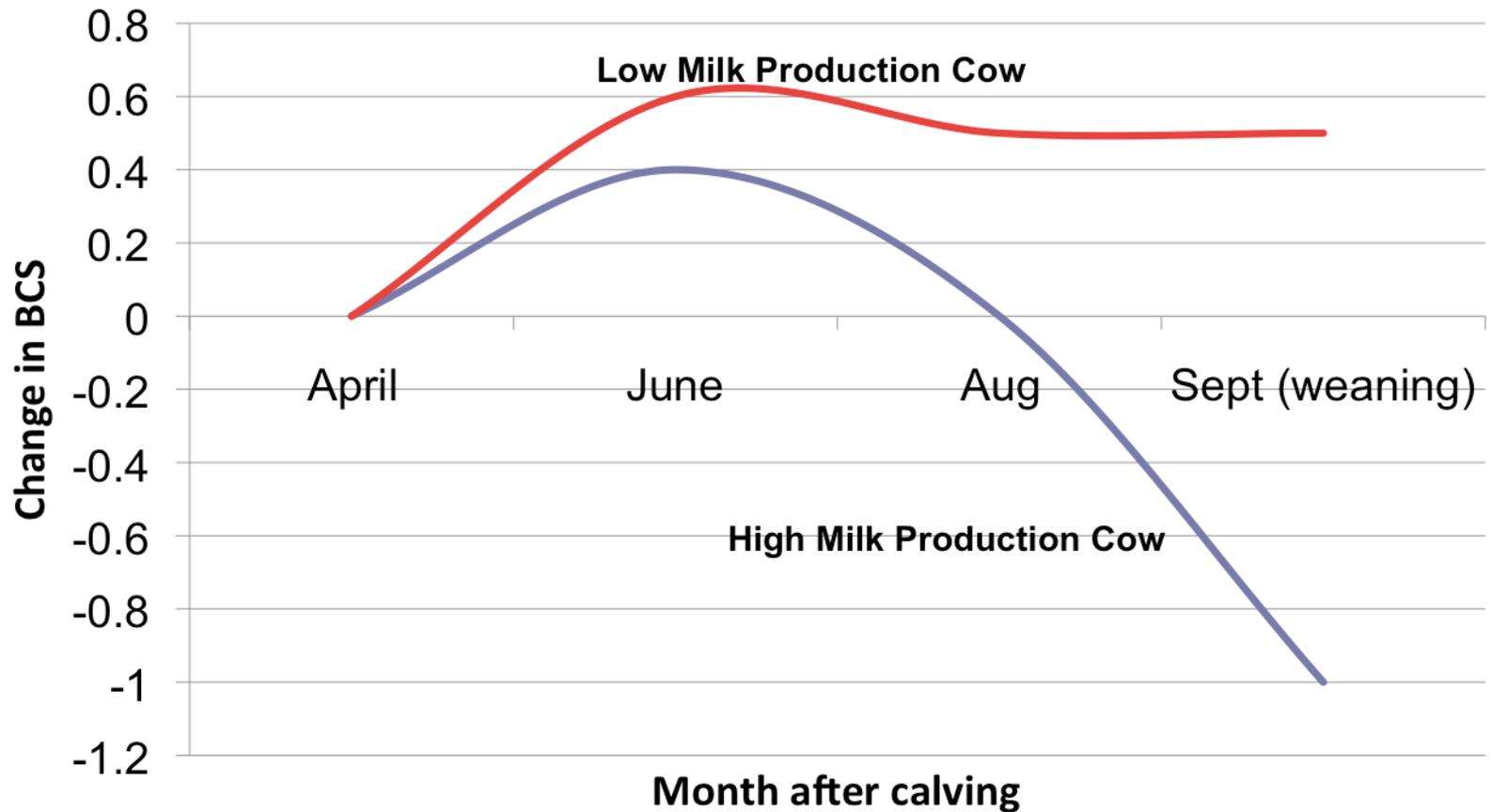
- Cow size
- Milking ability
- Reproductive performance

A close-up photograph of a cow's head, showing its eye and ear, with a thick, light-colored rope or lead rope visible on the right side. The background is dark and out of focus.

With Increasing Body Size--

- As mature cow size increases from 1000 to 1400 pounds,
- DM Intake, energy, and protein requirements increase 23%, 19%, and 13%, respectively for cows 90 days post-calving.

Change in BCS for Cows with High or Low Milk Production





Reproductive Efficiency

- Earlier calving cows generally wean older and heavier calves and use feed more efficiently than later calving cows (Marshall et al. 1990).
- This advantage results in higher net returns from earlier calving cows.
- Additionally, cows that maintain a shorter postpartum interval are more efficient throughout their lifetime (Davis et al. 1983b).

Summary of Beef Cow Efficiency Forum (1984)

- Cow size (weight, height, etc.) was not correlated with biological efficiency (lb calf weaned/lb DM intake per cow exposed)
- Acceptable market weight range should be a major consideration when decisions are made regarding breed size and mating systems
- Reproductive efficiency has a greater impact on cow efficiency than calf weight or feed intake
- Economic (Input) efficiency????



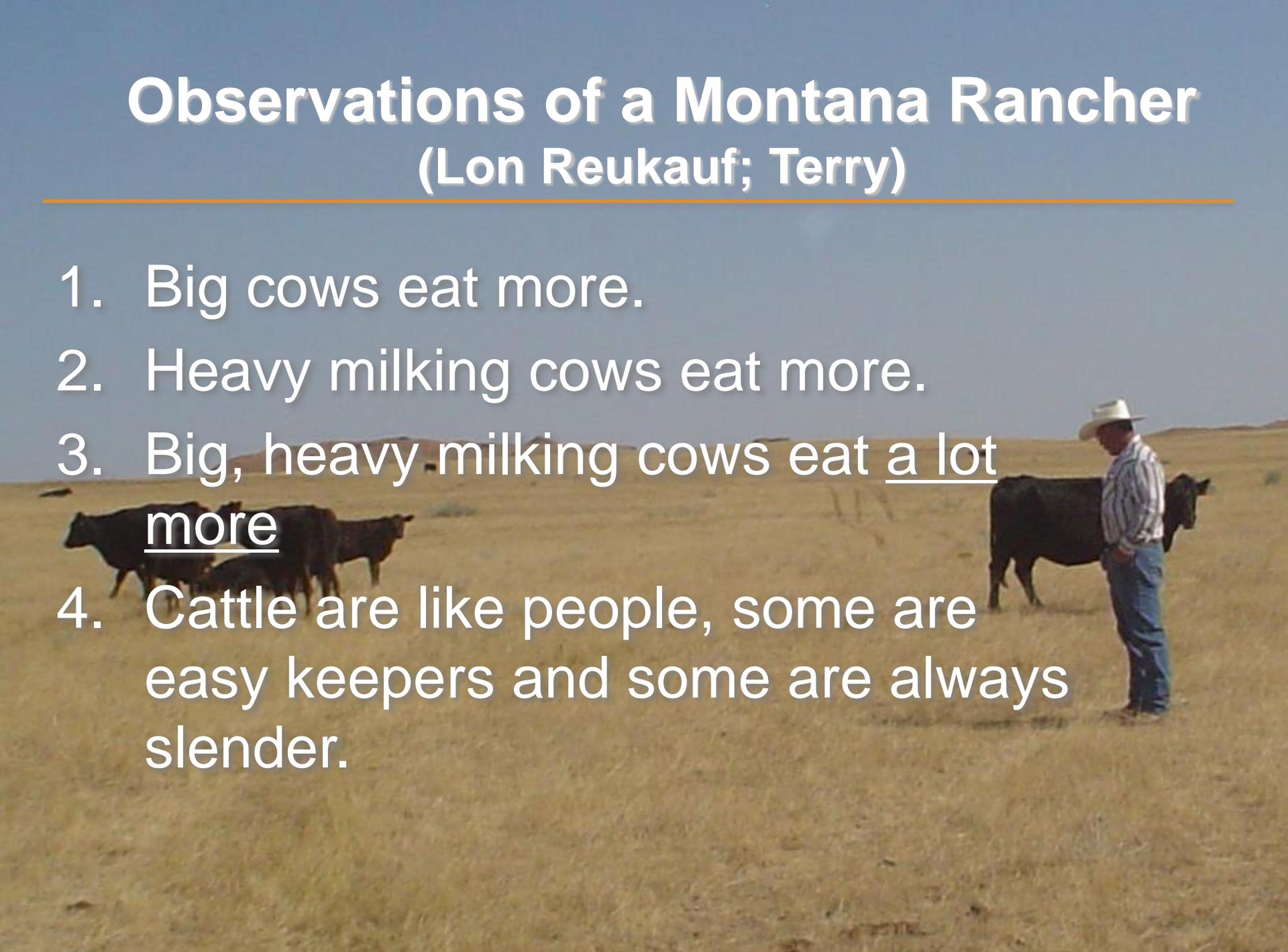
Summary of Beef Cow Efficiency Forum (1984)

- Under abundant feed supply there is a tendency for larger, heavier milking biological types to be more efficient than moderate types
- Under limited feed supply, moderate size cows and moderate milk production tend to be better adapted and more efficient than larger, heavier-milking types.

Observations of a Montana Rancher

(Lon Reukauf; Terry)

1. Big cows eat more.
2. Heavy milking cows eat more.
3. Big, heavy milking cows eat a lot more
4. Cattle are like people, some are easy keepers and some are always slender.



A close-up photograph of a cow's hoof on the left, showing the dark, textured surface and the white, star-shaped coronary band. To the right, a thick, light-brown rope is knotted, with the knot and the rope's texture clearly visible. The background is a soft, out-of-focus gradient of light brown and white.

Factors affecting biological efficiency include cow maintenance, gestation, and lactation requirements, and reproductive performance, along with calf maintenance and growth requirements, and calf weight.

A close-up photograph of a cow's hoof on the left, showing the dark, textured surface of the hoof wall and the lighter, fibrous material of the sole. To the right, a thick, light-brown rope is knotted, with the knot and the texture of the rope fibers clearly visible. The background is a soft, out-of-focus gradient of light brown and white.

Reducing maintenance energy requirements through genetic selection in the cow herd is a long term project and requires seedstock producers to be visionary and stay on task.

Reducing energy needs in the feedlot can be implemented currently with already characterized genetic information (carcass EPDs) and breed complementarity.

A close-up photograph of a cow's head, showing its eye and part of its ear, with a thick, light-colored rope tied in a knot in the foreground. The background is dark and out of focus.

Most breeding programs have focused on improving economically relevant output traits such as growth, carcass quality and fertility to enhance the economic viability of beef production systems.



Is your cow herd efficient?

“My weaning weights this year averaged 648 pounds, and 20 years ago they probably wouldn’t have been even 550”

[editorial]

Is this producer more efficient or is he more profitable?

He answered: “Well that’s more pounds and we still sell calves by the pound”

[editorial]

Weight alone can’t measure efficiency because there is no accounting for input costs

Even average weight is not a complete measure of output. How many calves do you have to sell in the fall?

Where does reproduction, survival and production fit in measuring efficiency?

Are there differences in appetite among different breeds?

Ranking by breed of cattle

Angus

Charolais

Red Poll

Hereford

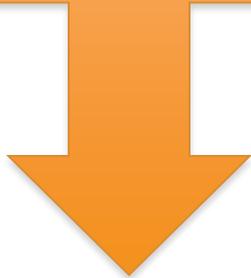
Gelbvieh

Braunvieh

Simmental

Limousin

Largest
to
Smallest
Appetite





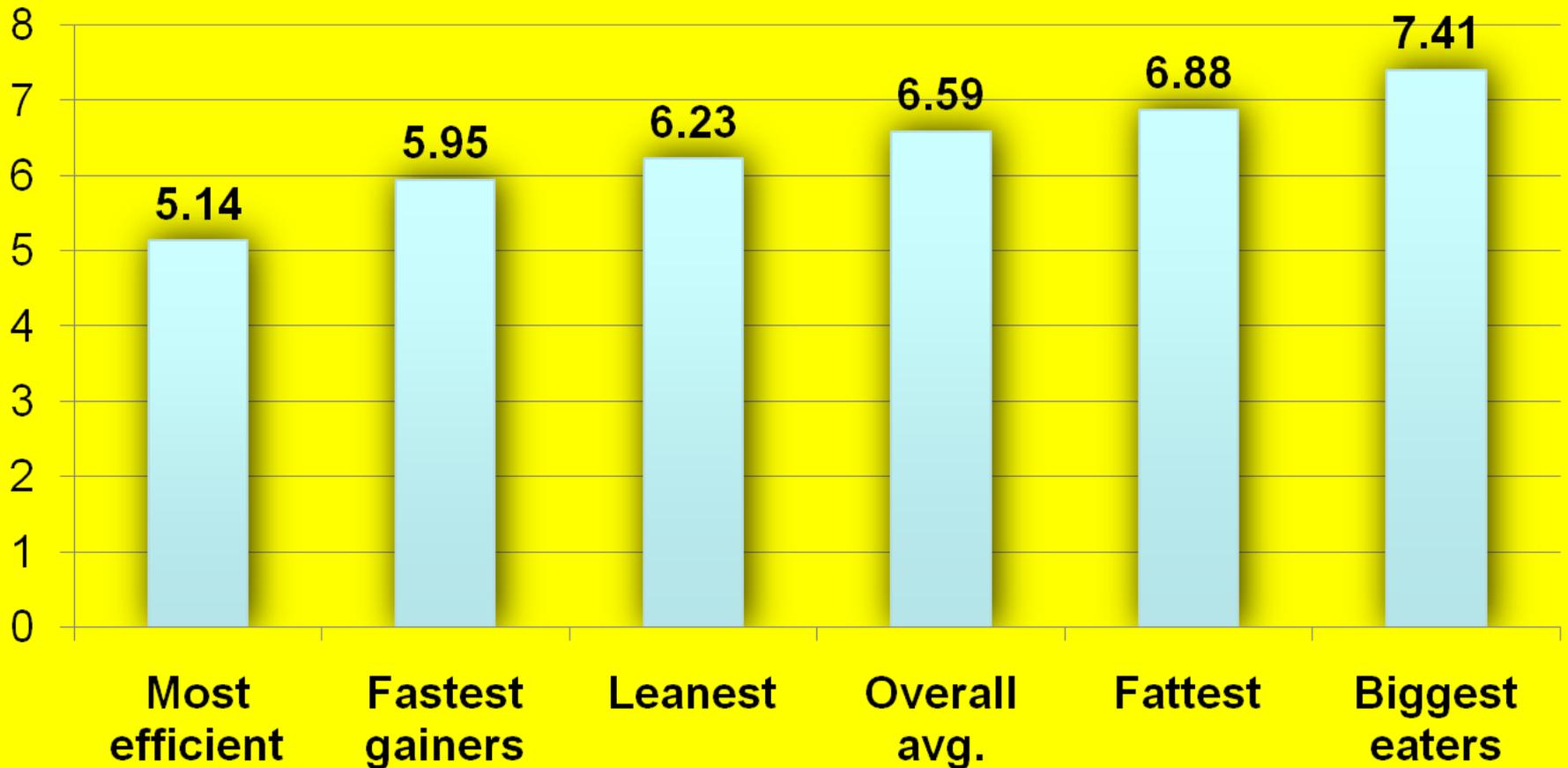
Generally absent from current breeding programs in the U.S. are avenues for exploiting genetic variation in feed efficiency, even though reductions in feed inputs would substantially improve profitability

GrowSafe System to Measure Individual Animal Feed Efficiency



Ranking of MT Steers by F/G ratio

F/G ratio



Ranking of Profitability for Bair Steers



Comparison of steers with divergent RFI



Performance data during an 77-day growing trial:

538 lb	Initial body weight	535 lb
2.11 lb/d	ADG	2.16 lb/d
1502 lb	Expected feed intake	1509 lb
1717 lb	Actual feed intake	1232 lb
+215 lb	Residual feed intake	-277 lb

*The more efficient steer (**negative RFI**) gained the same, but ate 485 lbs less feed than the less efficient steer (**positive RFI**)*

Bull Testing at Midland Bull Test: Columbus, MT



Leo McDonald: Owner of Midland Bull Test





Searching for the Ultimate Cow: The Economic Value of Residual Feed Intake at Midland Bull Sale

- Organizers of bull sales provide sale catalogs that advertise bull performance measures and genetic characteristics.
- Performance measures that are provided include: birth weight, weaning weight, age and more recently residual feed intake (RFI)
- The objective of this research was to quantify purchase price of bulls as related to performance and especially RFI



Effects Genetic Selection

- Genetic selection has resulted in increased growth and carcass traits.
- The focus has significantly increased mature cow and fed cattle body weight
- But these changes have resulted in greater feed consumption and feed costs.
- How can we select cattle with lower feed intake without negatively affecting weaning weights, carcass quality and reproduction?



As a potential bull buyer, what information is important to you?

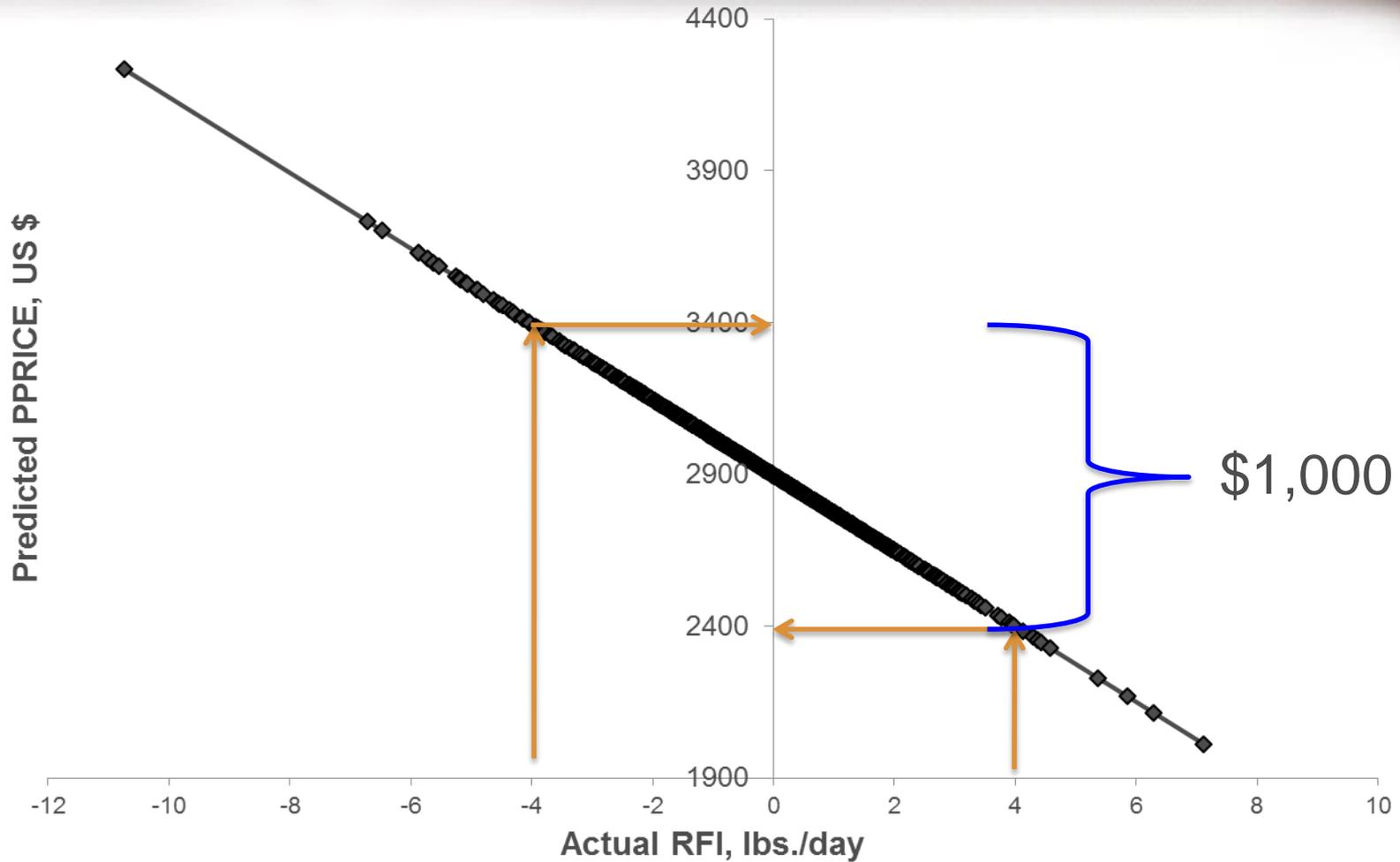
- Birth Weight Actual
- EPD's for Birth Weight
- Weaning Weight
- Yearling Weight
- Carcass Traits
- Milk
- Other??

Ranking of Bull Traits

Buyers valued the following traits (2008-09)

Bull Trait	Ranking
Birth to Yearling Gain EPD	1
Birth Weight EPD	2
Age of bull	3
RFI	3
Rib-Eye Area EPD	3

Buyers Paid More for Bulls with a Lower RFI





Accelerate Herd Improvement with Beef Genomics



What about predicting RFI???

- Selection for bulls/cows that have a lower residual feed intake (RFI) does have the potential to reduce feed costs on the ranch
- A DNA test using hair, blood, semen, ear notch has been developed to predict both ADG and RFI on steers. The following is an example of the output----

Using Genomics to Rank Herd Sires in an Index (from Geneseek)

Bull	RFI	ADG	Marbling
1	4	7	3
2	3	6	5
3	5	8	3
4	6	7	7

The lower
the better

The higher
the better

The higher
the better

Is it possible to select cows that eat less but produce normally?





Effect of RFI on Productivity of Cows Prior to Calving

Cow Residual Feed Intake, RFI

Item	Low	Medium	High	P=
No cows	36	42	35	
RFI	-4.0^a	-.02^b	3.9^c	.001
DM intake, lb	22.1^a	25.5^b	30.8^c	.001
Daily gain, lb	1.3^a	1.2^b	1.3^a	.05
Feed:gain	21.3	23.2	27.6	.54

Comparison of Bair Cows Selected for High or Low Feed Intake (Nichols et al.)

Item	Low RFI	High RFI	Difference
No. cows	10	12	
Body weight, lbs	1291	1319	+ 28 lbs
Daily gain, lbs	2.21	2.11	-.10 lb
Hay Intake, lbs	19.2	26.9	8 lbs (40%)
Hay:Gain ratio	8.7	12.7	+4 lbs

8 lbs of hay x 100 days of winter feeding x \$70/ton = \$32/cow more hay costs (\$32/cow x 300 cows = \$9,600 more in hay costs or an additional 137 tons of hay needed)

Is the Intake Response Repeatable?

Item	<u>2008 1st Calf</u>	
	Low RFI	High RFI
Weight, lb	1080	1086
DM Intake	19.5	31.6
Gain, lb/day	1.89	1.87
Feed: Gain	10.3	16.9



**Did RFI of the Heifer Influence
Birth Weight of the Calf?**

Effect of Cow RFI Differences on Calf Productivity

Cow Residual Feed Intake, RFI

Item	<i>Low</i>	<i>Medium</i>	<i>High</i>	P=
Cow weight at birth, lb	1063	1026	1056	NS
Calf birth weight, lb	83	85	84	NS
Calf ADG	2.02	2.11	2.10	NS
Calf weaning wt, lb	514	532	519	NS
Efficiency (calf/cow wt)	48	52	50	NS



What about the Calves?

- There were no differences ($P > 0.05$) in birth or weaning weights for calves that came from high or low RFI cows.
- There were no differences ($P > .05$) in high or low RFI cows cycling at the beginning of the breeding season.



The ideal cow for both biological and economic efficiency

- would be modest size cows with high reproductive rates and low input costs which produce high-value calves.
- Summary statement for 480,000 references? (I'll know her when I see her")



In my opinion, are there efficient cows?

Yes, but the answer depends on what the rancher is managing for, the environment that the cow herd is exposed to and what the customer is willing to purchase.

Thanks for Allowing Me to Make this
Presentation---- JP

