Iowa Beef Center

Got Milk?

An Economic Look at Cow Size and Milk

July 13th, 2015

"Every complex problem has a simple solution, and it's usually wrong."

–Author unknown

The “Optimum” Beef Cow

- The never-ending cow size argument…
- Longevity argument…
- “The goal would be modest size cows with high reproductive rates and low input costs which produce high-value calves.”
  - Scott Greiner, VA Tech
- Pounds weaned per pound of cow…
  - Per unit of energy consumed

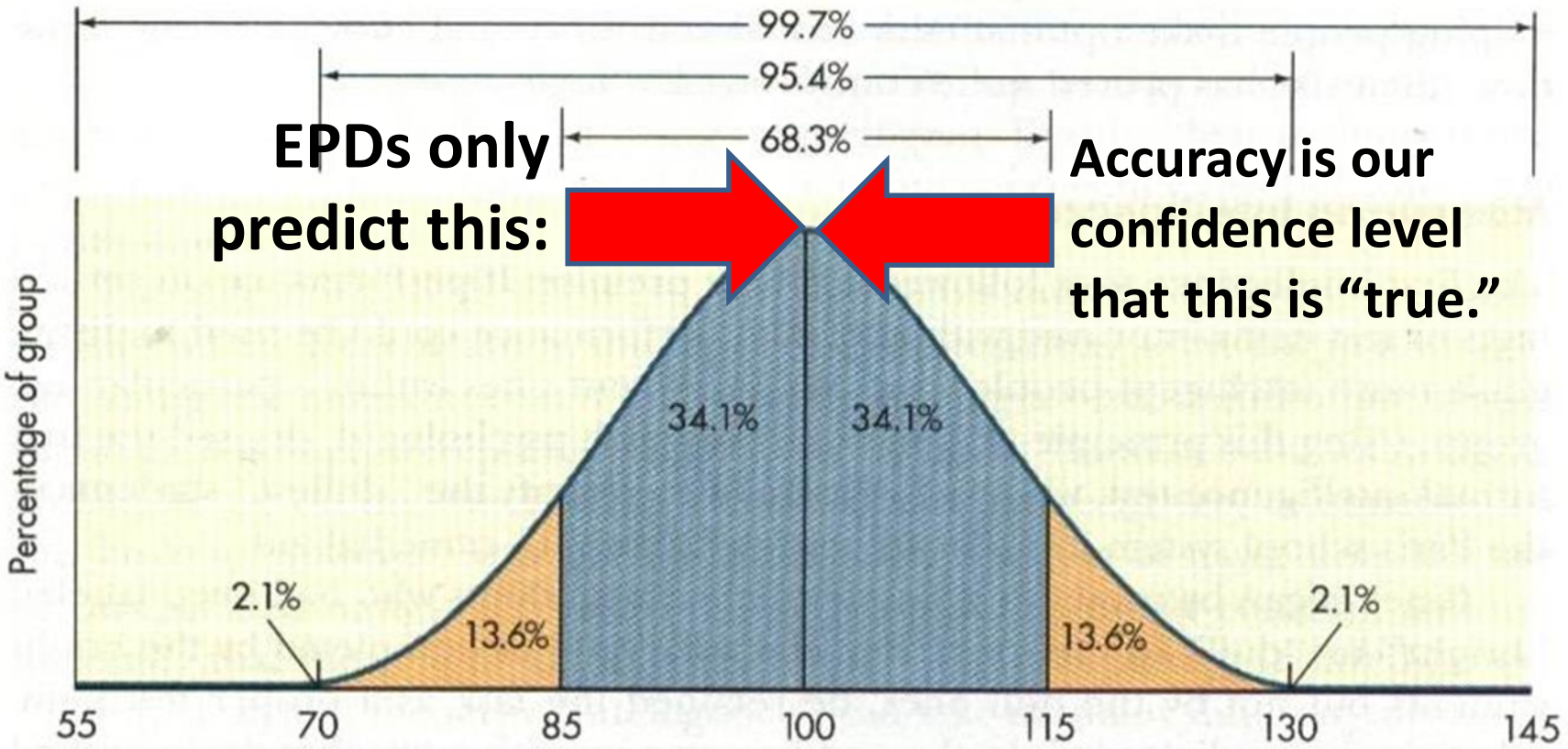
Then this is profitability…

- Return to labor?
- Return to estrus?

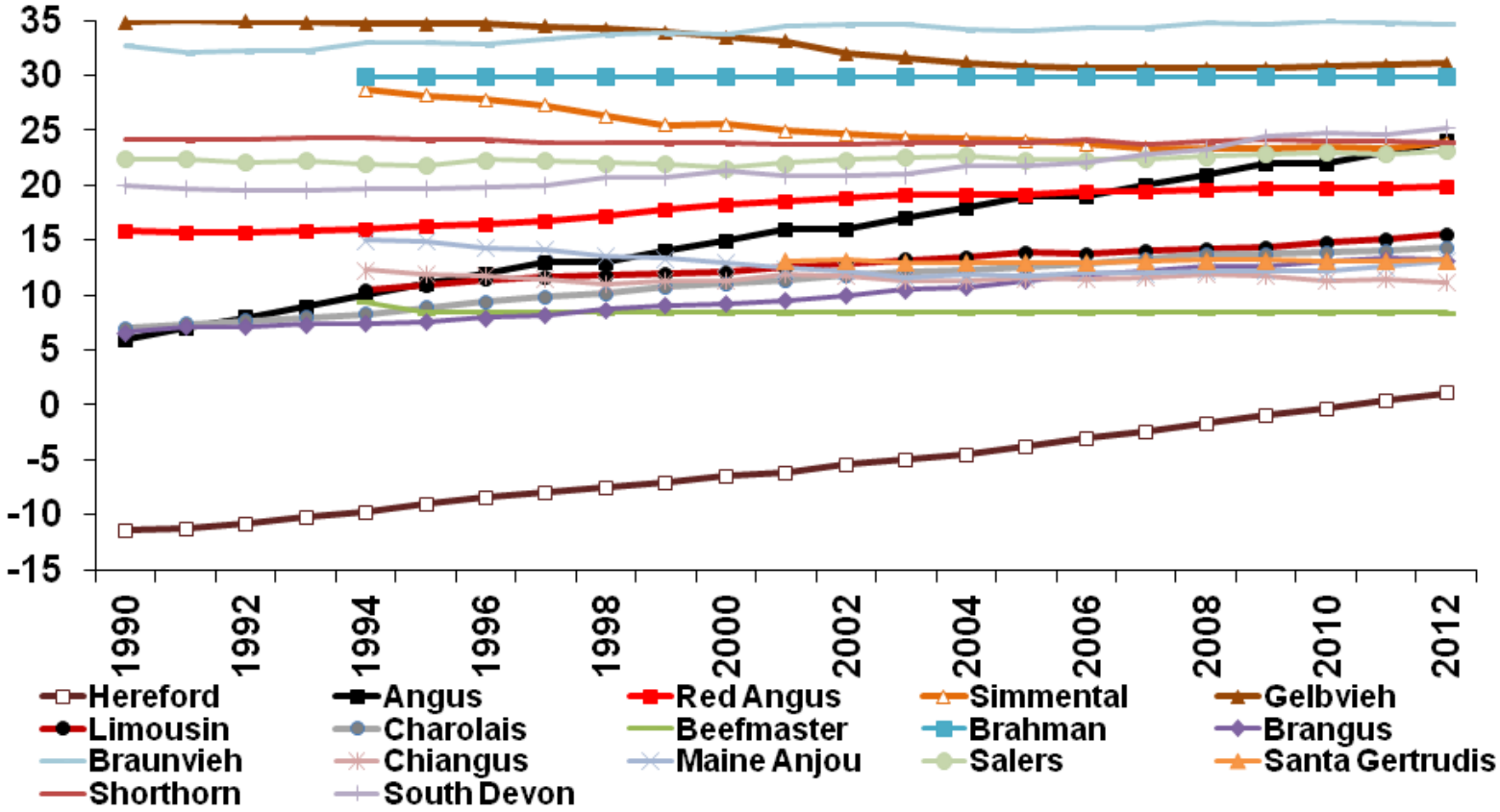
The "Optimum" Beef Cow

- What about Milk?
- What does a pound of mature size cost?
- What does a pound of Milk EPD cost?
  - *MARC-"Energy use is less effective in higher milking cows."*
- Are we ever going to truly understand cow efficiency given the grasses and management variability?
  - Is Milk EPD a part of cow efficiency research?

EPDs: The Bell Curve



Genetic Trends for Maternal Milk, lb

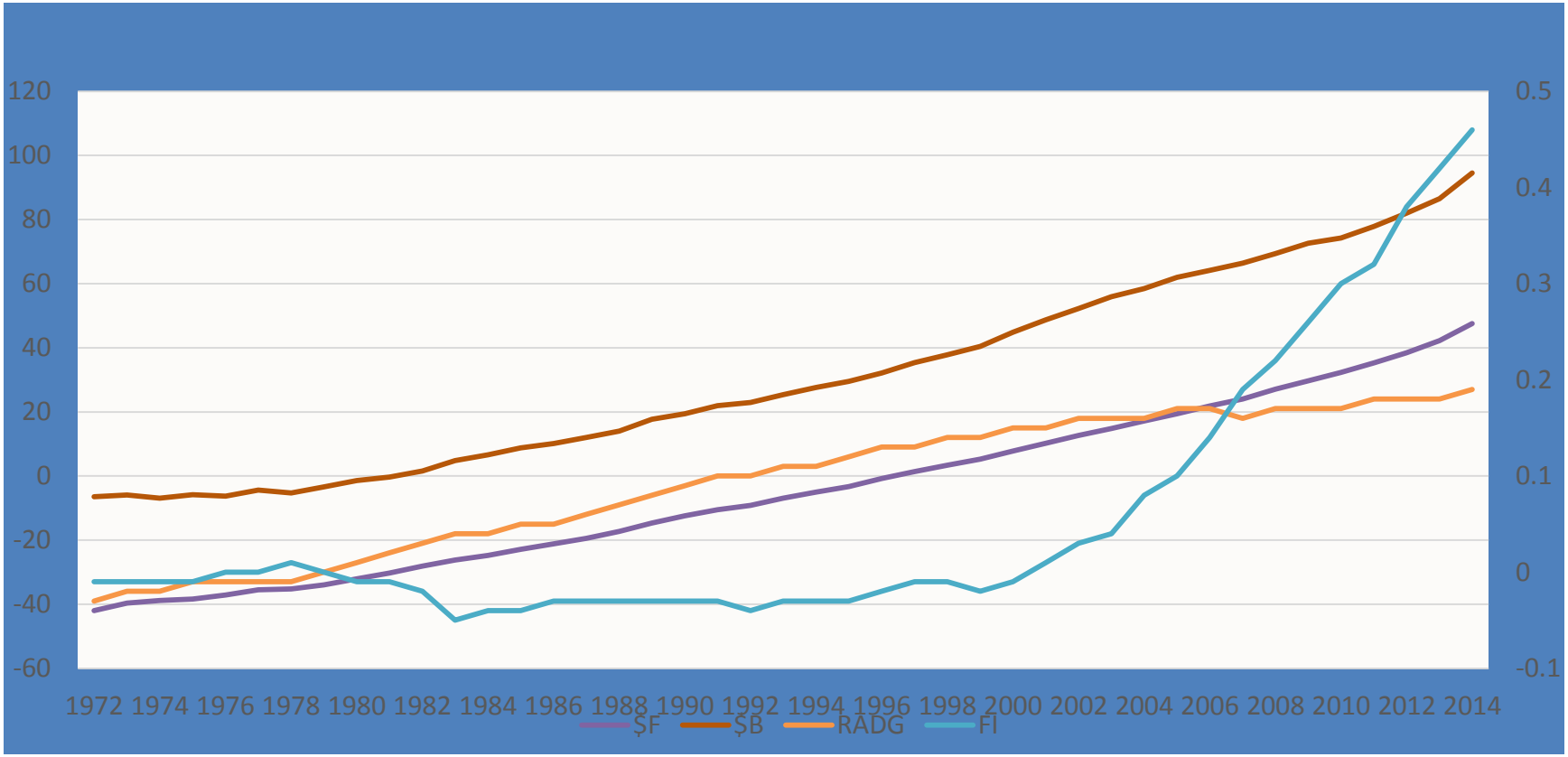


Adapted from Spring 2014 Genetic Trends from Breed Associations and 2014 AB-EPD factors

Things to think about…

- Milk EPD is the genetically unexplainable portion of Weaning Weight
  - …has very little to do with the white stuff that comes out of the udder!
  - Could we figure it differently?
  - Should BCS be part of a $Index?
- The correlation of Milk EPD to BW and WW is weak and negative (-.14 & -.16)
- Can we effectively reduce Milk via selection without negative impact on growth?

Angus Genetic Trends



Changes to $F and $B

- December 5, 2014 EPD release included:
  - Updated economic assumptions on all indexes
    - 3-year rolling average
  - Incorporation of Dry Matter Intake into $F and $B

Dry Matter Intake (DMI) EPD

- Measured in pounds of feed per day

Production									Maternal						
CED Acc	BW Acc	WW Acc	YW Acc	RADG Acc	DMI Acc	YH Acc	SC Acc	Doc Acc	HP Acc	CEM Acc	Milk Acc	MkH MkD	MW Acc	MH Acc	$EN
+6 .30	+1.6 .38	+41 .29	+78 .30	I+.16 .05	I+.47 .05	+.1 .41	I+1.34 .05	+19 .35	+10.3 .21	+9 .18	+21 .23		I+36 .05	I+.6 .05	+.05

Carcass					
CW Acc	Marb Acc	RE Acc	Fat Acc	Carc Grp Carc Pg	Usnd Grp Usnd Pg
+27 .21	+.43 .24	+.28 .28	+.032 .25		

$Values					
$W	$F	$G	$QG	$YG	$B
+29.31	+27.46	+25.80	+25.10	+.70	+77.53

Metabolic Wt VS. Live Wt

Live Weight	Metabolic Weight	Animal Unit Equivalent (% of 1,000lbs.	Equivalent Herd Size (Baseline: 100 1,000lb cows
1,000	178	100%	100
1,200	204	115%	87
1,400	229	129%	78
1,600	253	142%	70

Kleiber's Theory: Metabolic Weight = Live Weight $^{.75}$
(1932)

Maintenance Energy Requirements

Cow A

- 1,100 lbs.
- “Low” Milk potential
- Total lbs. TDN/cow/yr
  - 3,726
- Total lbs. forage/cow/yr
  - 6,774
- 396lbs. calf (36%)

Cow B

- 1,100 lbs.
- “High” Milk potential
- Total lbs. TDN/cow/yr
  - 4,159
- Total lbs. forage/cow/yr
  - 7,561
- **+787lbs. Forage/year**
  - **$75/ton = $30/yr**
  - **$200/ton = $90/yr**
- 495lbs. Calf (45%)

Maintenance Energy Requirements

- If you had 100 high milking cows…
  - 756,100lbs. of forage annually
- If you had lower milking cows…
  - 756,100lbs. / 6774lbs. intake = **111 cows**
- **106 (396lb.) calves** **95 (495lb.) calves**
  - **41,976 @ $3.05** **47,025 @ $2.85**
  - **$128,027** **$134,021**
  - **-$5,994 (+ var. costs, depreciation, labor)**

Show me the money…

- 165,000 cow database
- 12 additional Megacalories/year (ME EPD)
  - = +3 pounds of weaning weight
- Weaning Weight WINS every year since 1975 by at least $2.50/hd
  - Corn & calves adjusted for inflation
- Bigger cows use energy more efficiently
  - 1200lb cow weighs 20% more than 1000lb cow, BUT feed requirements are only 13% more
  - Mouse vs. elephant

MARC Cycle VII Post-weaning Growth and Carcass Traits

	Mature Cow weight	ADG	Slaughter Weight	Carcass Weight
Hereford	1417 #	3.32	1322 #	803 #
Angus	1408 #	3.32	1365 #	836 #
Red Angus	1406 #	3.26	1333 #	811 #
Simmental	1401 #	3.26	1362 #	829 #
Gelbvieh	1320 #	3.12	1312 #	800 #
Limousin	1388 #	3.12	1285 #	795 #
Charolais	1368 #	3.21	1348 #	826 #

So when is Milk EPD too high???

- Environmental Challenge
  - Drought
  - Fescue Toxicity (ergot)
  - Excessive heat
  - Nutritional deficiency
  - In most cases, 3-4 of these happen at the same time
    - Pinkeye, BRD, etc.

The Fescue Belt?

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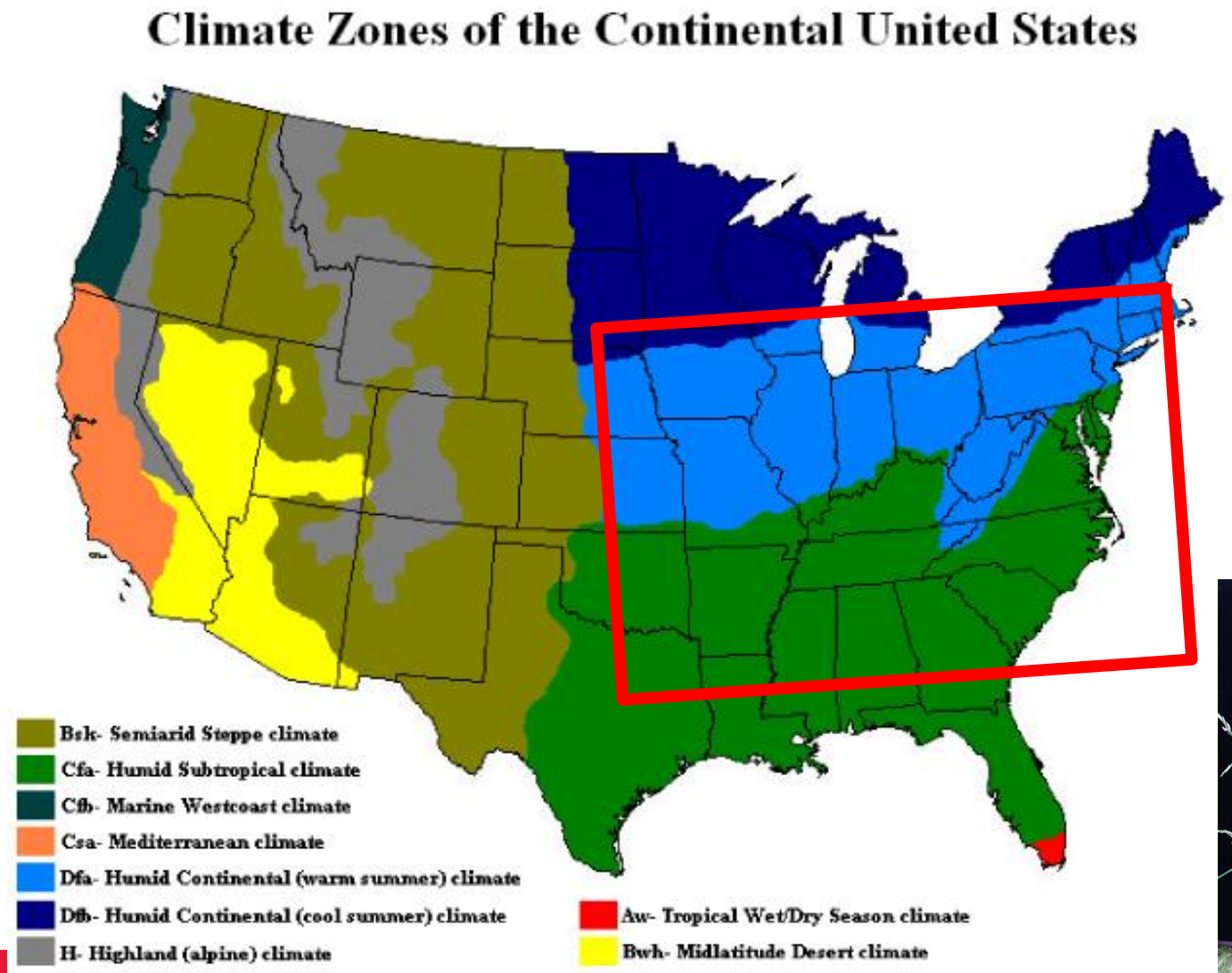


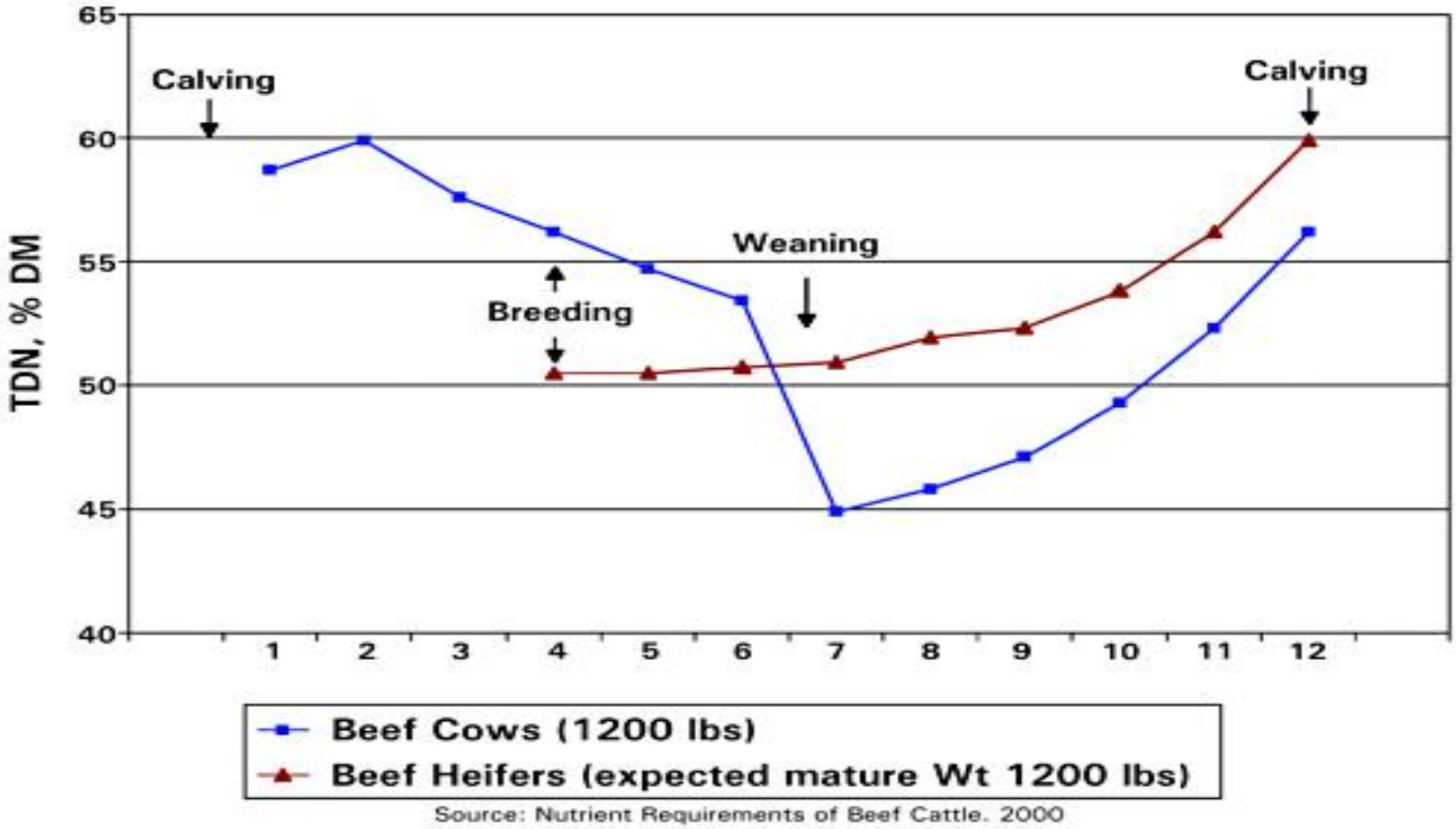
Facts about fescue

- Fat cows are better than thin
  - Fat seems to dilute the toxin effect
- Moderate/Low milk better than High milk
- Red & white hides better than black
- Creep feed can help mid- to late-summer
- Fall calving avoids nutrient demand in high toxicity
- Good “fescue” cows were gestated in a cow on fescue (bulls too!)
  - Do not move bred heifers to the fescue belt
  - The “buy local” movement
- Dilution, legumes, & management effective

Energy & CP Requirements

Item	% TDN	% CP
Mid-Gestation Req.	53	8
Late Gestation Req.	57	10
Early Lactation Req.	63	12
Hay	43 – 63	6 - 22
Corn silage	63 - 70	7 - 10
Corn stover	45 – 55	4 - 7
Wheat straw	44 – 48	< 5
Soybean straw	35 - 45	< 5

All cows are not created equal.



Source: Nutrient Requirements of Beef Cattle. 2000

Table 13-2. Daily Energy and Protein Requirements for a 1200 lb., BCS 5, Mature Cow[a,b]

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Months Since Calving		Cow Scale Wt. BCS = 5	Expected Peak Milk (lbs/day) Low (15 lbs) NE_m[c] Mcal	CP[d] lbs	Moderate (20 lbs) NE_m Mcal	CP lbs	High (25 lbs) NE_m Mcal	CP lbs
1	April	1200	14.5	2.4	15.8	2.7	17.2	3.0
2 (peak lactation)		1200	15.3	2.6	16.9	3.0	18.6	3.4
3		1205	14.8	2.5	16.3	2.8	17.8	3.2
4		1205	14.0	2.3	15.1	2.5	16.3	2.8
5	August	1205	13.1	2.1	14.0	2.3	14.9	2.5
6		1210	12.5	1.9	13.1	2.0	13.7	2.2
7 (weaning)		1215	9.0	1.5	9.0	1.5	9.0	1.5
8		1225	9.3	1.5	9.3	1.5	9.3	1.5
9		1240	9.8	1.6	9.8	1.6	9.8	1.6
10	January	1260	10.7	1.7	10.7	1.7	10.7	1.7
11		1290	12.0	1.9	12.0	1.9	12.0	1.9
12		1340	13.9	2.2	13.9	2.2	13.9	2.2

Pasture

Stalks

+250 BCS 3

[a]Adapted from NRC, 1996

+140

[b]Does not account for increased energy needs due to cold stress

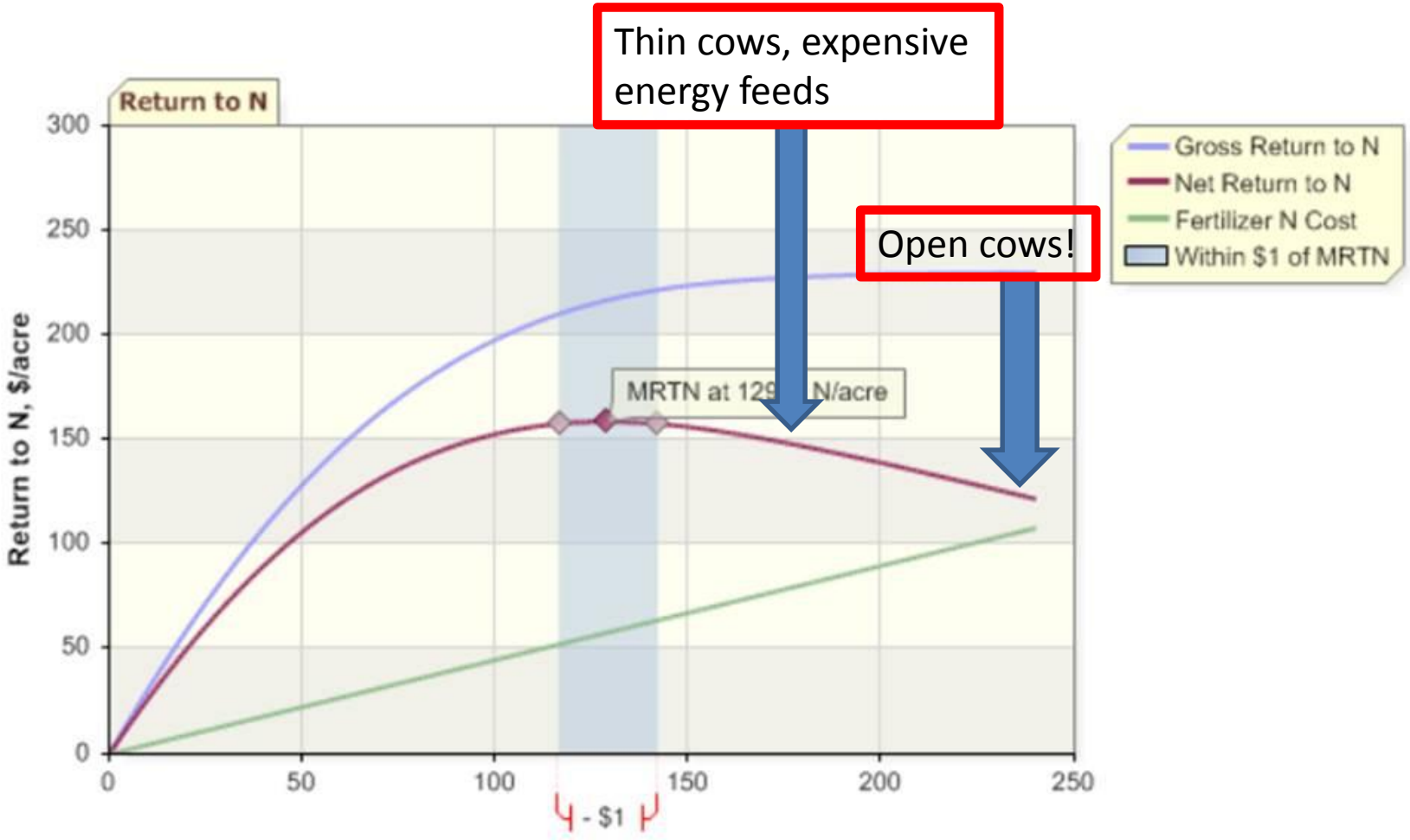
[c]Net energy for maintenance, Mcal/day

[d]Crude protein, lb/day

E Requirements: Wind Chill

Wind Chill, °F	Thin or Wet Cow		Moderate, Dry Cow	
30	0 %		0 %	
20	+30 %	~ 2.5 lb corn	+13 %	~ 1 lb corn
10	+60 %	~ 5 lb corn	+26 %	~ 2.5 lb corn
0	+90 %	~ 7.5 lb corn	+39 %	~ 4 lb corn

If Milk is the "N" of Corn…



This is where corn may be headed…

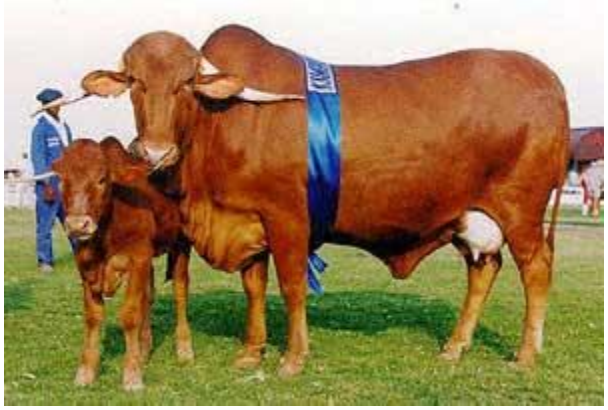
Capturing Heterosis

Heterosis – Breed "Distances"

(Picture courtesy of the USDA-Meat Animal Research Center, Clay Center, NE)

Embrace Heterosis

- Breed Complementarity
  - The more unrelated the breeds, the better
- Match your Cows to your environment, your bulls to your market.
- The potential weaknesses of one breed should be offset by the strengths of another
  - Africander X Hereford (pink eye/cancer eye)



HETEROSIS

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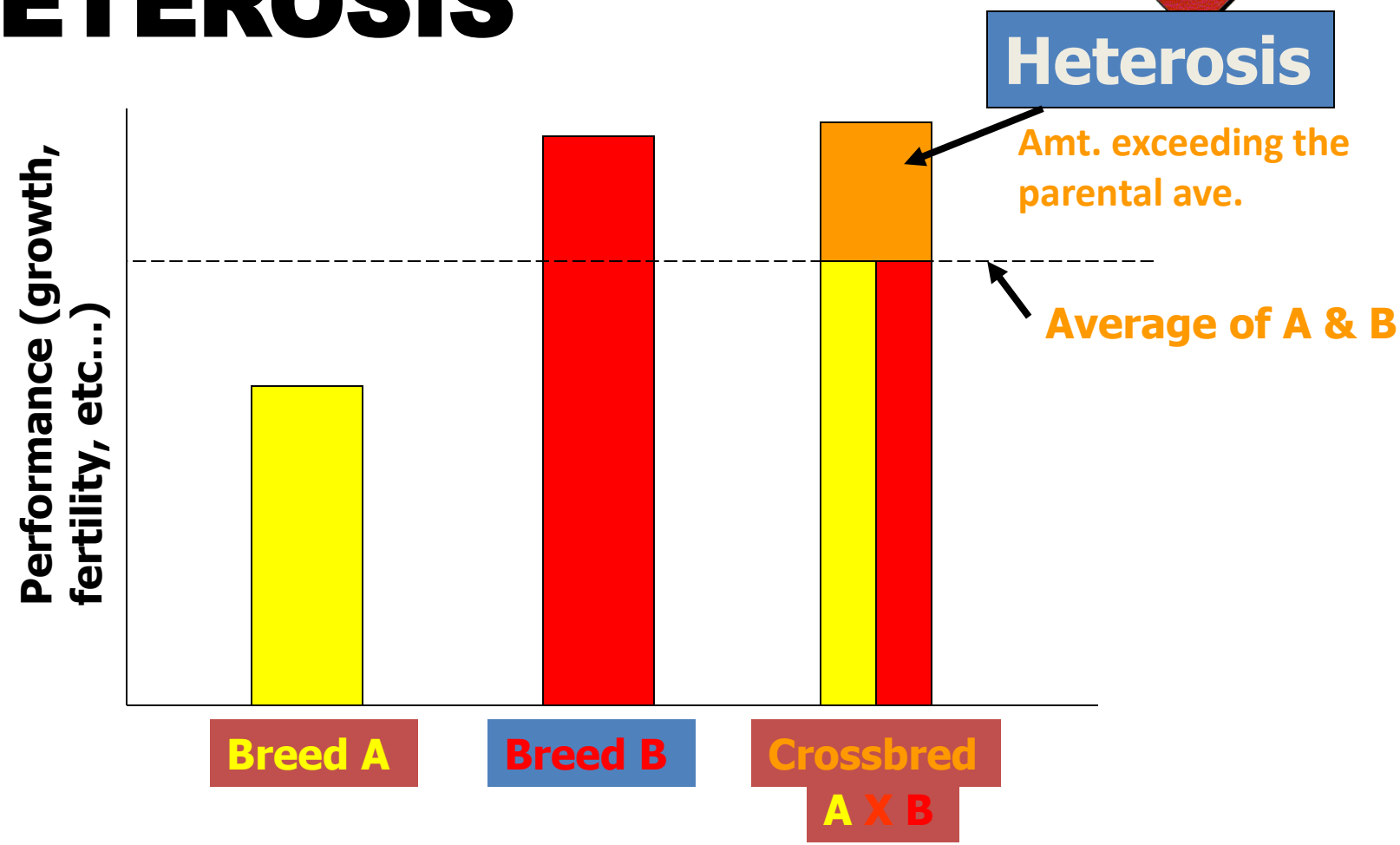

Crossbred animals tend to perform better, in certain traits, than the average of their parents. Heterosis is that amount by which performance in the crossbred exceeds the parental average.

3 Types of Heterosis

1. INDIVIDUAL HETEROSIS
   - found in X bred calves

2. MATERNAL HETEROSIS
   - 2/3 of the crossbreeding advantage

3. PATERNAL HETEROSIS
   - found in “composite” sires

MATERNAL HETEROSIS

…effects reproductive performance

- earlier puberty
- higher 1st service conception rate
- lower embryonic death loss
- faster breed back
- higher % calves weaned
- greater longevity (1.3 years)
- maternal impact on calf performance
    - more milk & improved immune response passed to calves

PATERNAL HETEROSIS

- increased mating ability, fertility, longevity

- lower cull rates

- increased SC & sperm viability

INDIVIDUAL HETEROSIS

- higher early calf growth

- more early vigor (more live calves)

Average Heterosis in Beef Cattle Traits

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Trait	% Heterosis
Calf Crop Weaned	8
Weaning Weight	13
Yearling Weight	4
Carcass Traits	3
Lifetime Productivity	**25**

HETEROSIS from Various Crossbreeding Systems

	% Max. heterosis	% inc. in calf wt. / cow exposed
Term. sire/purch. F1♀	100	23-28
Purebreds	0	0
2 breed rotation	67	16
3 breed rotation	86	20
2 breed composite	50	12
3 breed composite	63	15
Rotating F1 (AB/AD)	67	16
Rotating F1 (AB/CD)	83	19

Maximum

Unless crossing inbred lines within a breed

Still considerable heterosis

The Dollars of Heterosis

- *100 cows, 80% Weaning Rate, 575 avg. weaning weight, 10 year horizon*

- Calf Survival to Weaning (4%) = 40 hd.
- Weaning wt. (8%) = +36,800 lb.

- Weaning wt. per cow exposed (23%) = **+105,800 lb.**
  - **~ 18 calves/year @$2.00 weaning wt**
  - **~ heterosis is worth $207/cow/year**

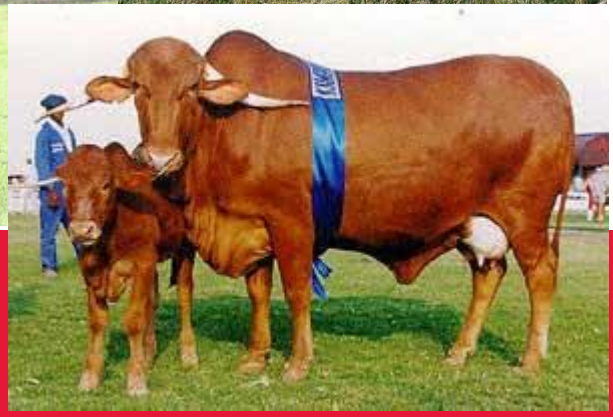
Summary

- The cow size argument is not winnable.
  - Big cows work better when feed is delivered.
  - Small cows work better when forage is scarce.
- Milk EPD may drive reproductive success/failure.
  - Genetic trend (maternal breeds) may limit our mgmt options
- Fescue toxicity can be managed.
  - Thin, open cows are a management mistake, not a product of environment.
- Cow “employee” checklists are effective.
  - What are your expectations?
  - Bull Selection may get cows “fired” or “hired!”

What do you expect out of your cows?

- Write down the top 3-5 things they MUST do to stay on the farm!!!
  - How many cows pass ALL the specs?
  - Are you buying bulls to help them succeed?
  - MILK EPD too high?
  - Mature size vs. resources
  - Docility EPD? Breed of Choice?
- Could A.I. or E.T. get you there faster?

Questions?



Patrick Wall
ISUEO Beef Field Specialist
210 N. Iowa Street
Knoxville, IA 50238
O: 641-842-2014
C: 515-450-7665
patwall@iastate.edu
www.iowabeefcenter.org