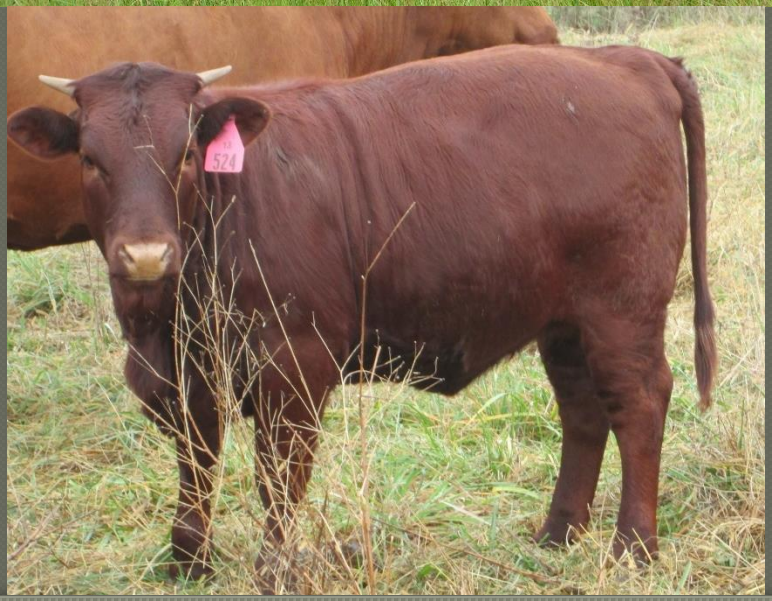
Linear Measuring the Bull & Cow For Grass & Reproductive Efficiency

An objective tool for selecting and breeding animals that are more fertile, higher meat-to-bone ratio and eat less of your grass to maintain themselves on a daily/yearly basis.

"This means something
but I can't remember what!"

Vast majority of breeds were developed to fit their environments perfectly with only Our Forefather's eyes, hands and wisdom.



Linear Measurement is a tool that enables the livestock producer to identify structural weaknesses & strengths…

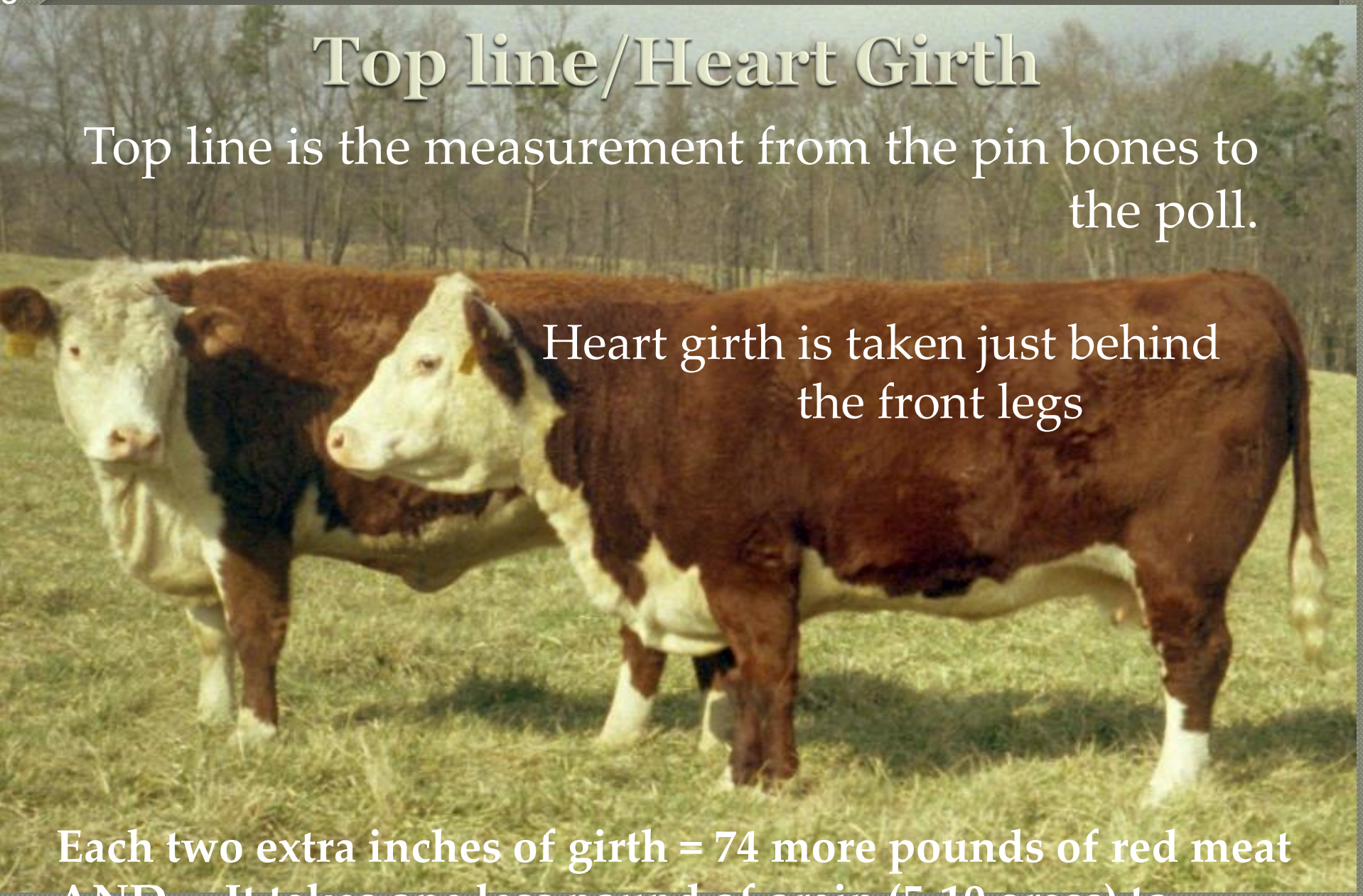
"The measuring of the skeletal system of an animal to obtain comparable figures and ratios for evaluation of the animal's growth potential and reproduction efficiencies."

(Dr. Cliff Whitmore *circa* 1978)

Top line/Heart Girth

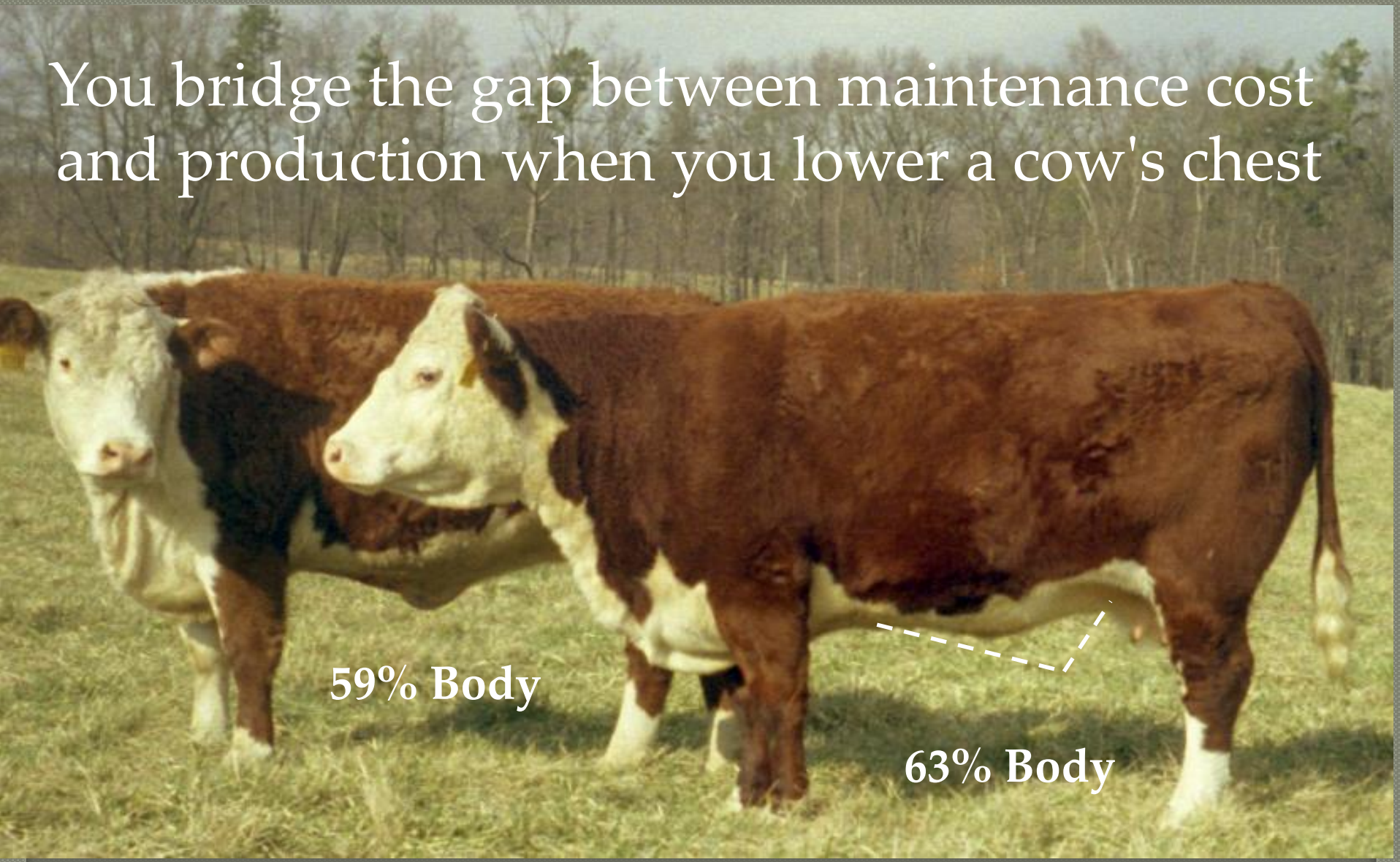
Top line is the measurement from the pin bones to the poll.

Heart girth is taken just behind the front legs



Each two extra inches of girth = 74 more pounds of red meat AND ... It takes one less pound of grain (5-10 grass) to produce each of those extra pounds *Dr. Michael McDonald*

You bridge the gap between maintenance cost and production when you lower a cow's chest



The larger the difference between girth and flank, the more productive the cow

March 26-27 2004

- Stockman Grass Farmer Conference … *Allan Nation*
- *"Right now we are picking the low hanging fruit on the grass-fed tree. Five years from now there will be 10 times as many people picking the low hanging fruit. Our intention this weekend is to give you a ladder to allow you to get to the higher fruit."*
- **Linear Measurement** is one rung of that "ladder" (*Interesting, it was not mentioned at the conference*)

December 6-8, 2007

- Sorted 1400 cows visually
- Linear measure and ultra sound "best" 275
- Rejected 50 head
- Did not worm or feed hay to 225 "keepers"

…AND…

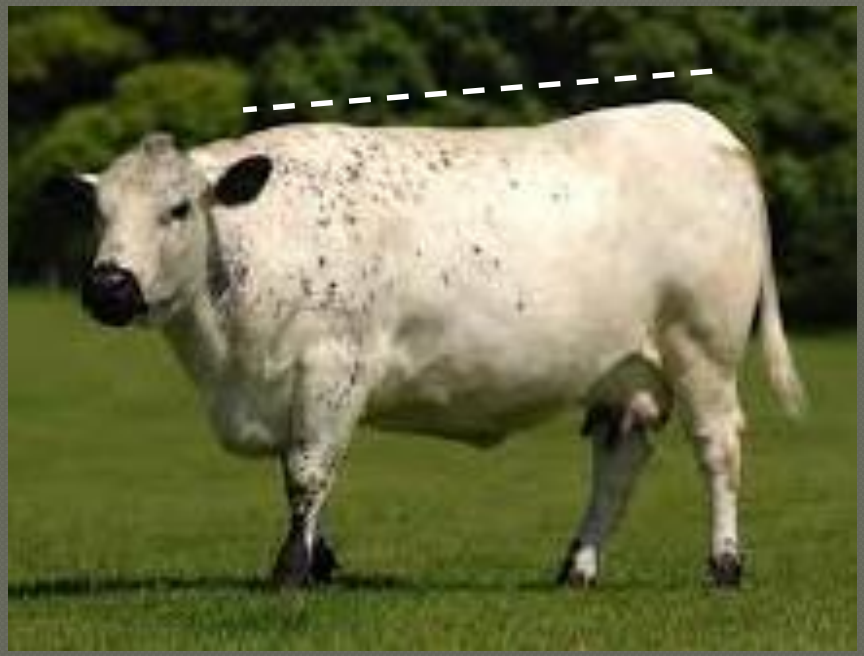
- 3 ½ months later **the rancher sold 900** of the 1175 head group
- The "right kind" ***without wormer and hay*** were thriving on his ranch in the Nebraska sand hills over the winter

Selecting cows or selective grazing

- Conventional cattle (*60 years of breeding for the feedlot*) have to graze selectively or be supplemented to be productive.
- Cattle that are selected and developed for an all forage diet do not have to graze selectively to be productive.
- MIG grazing plus cattle genetics that are made for grass (*not the feedlot*) gives us the best of both worlds.

Digestive type

RAW/KEEN CLIMATES



Respiratory type

SCORCHING/MUGGY CLIMATE

Notice the depth of chest in both examples and lack of top wedge in the dairy cow

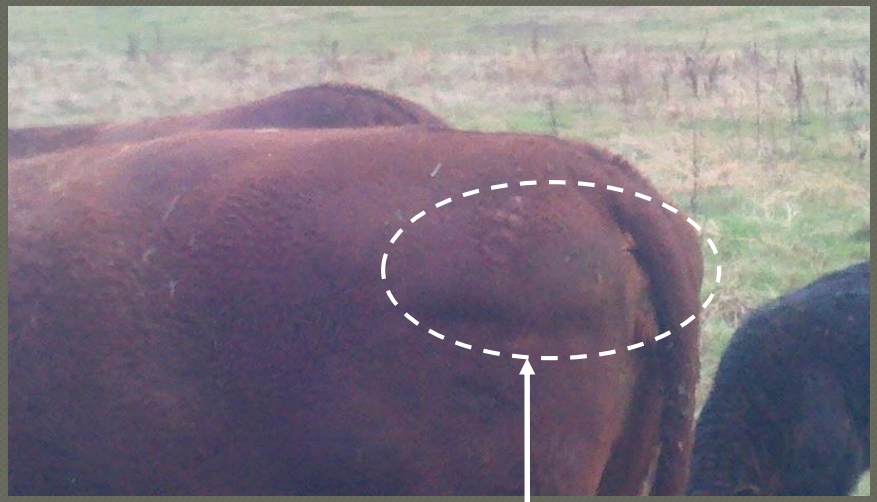
Balance is Key

Linear measuring shows body correlations, if animal is structurally correct or not.

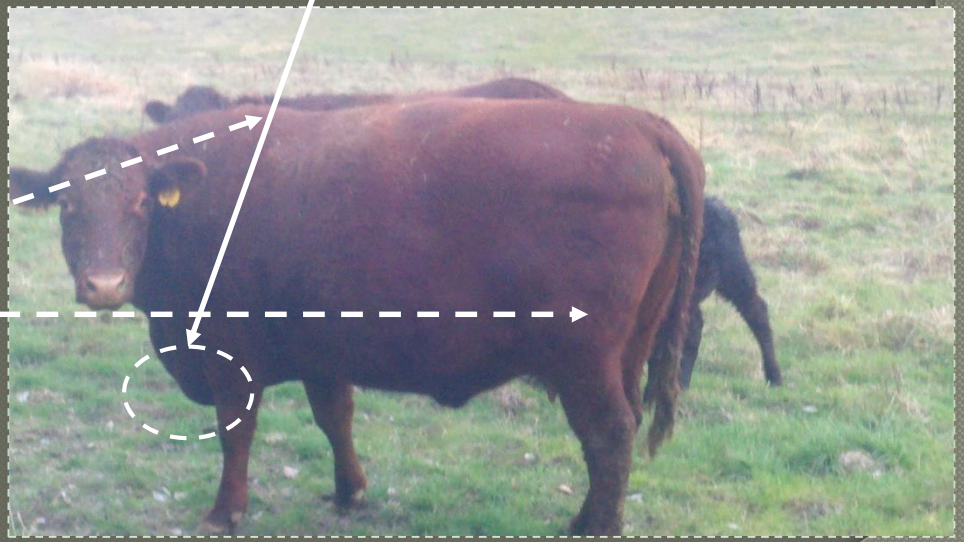
- Higher in meat volume (retail product).
- More efficient in utilizing grass/forages.
- More resistance to stress – lower in maintenance.
- More feminine or masculine – higher in fertility.
- More profitable – especially if you direct market.
- More hormone production
- Higher in reproduction

Fertility

Where bulk should be on the fertile animal



Infertility



These houses were built “up to code”

And then the wind blew

Are we breeding, selecting and nourishing animals that can withstand a “storm?”

Linear Measurement – Female

The "wedge" look

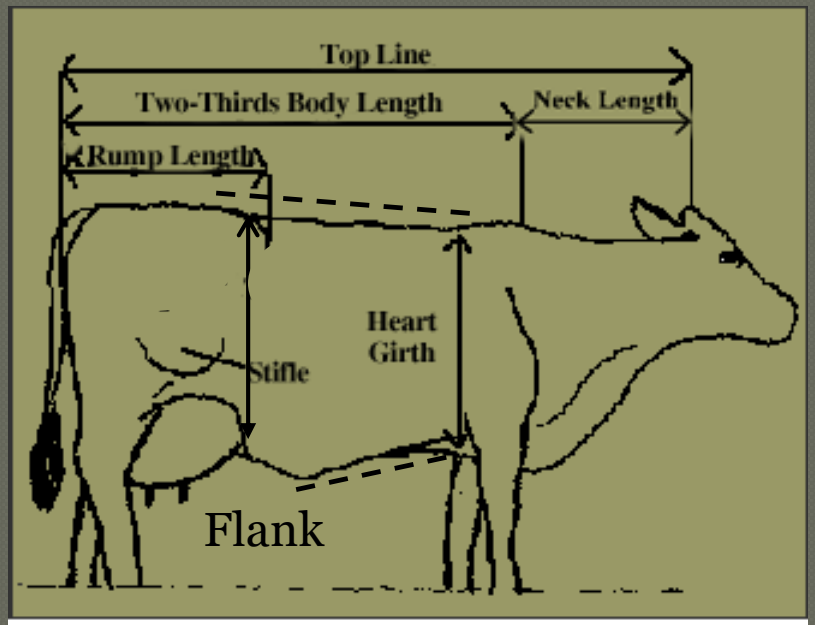


Figure 1

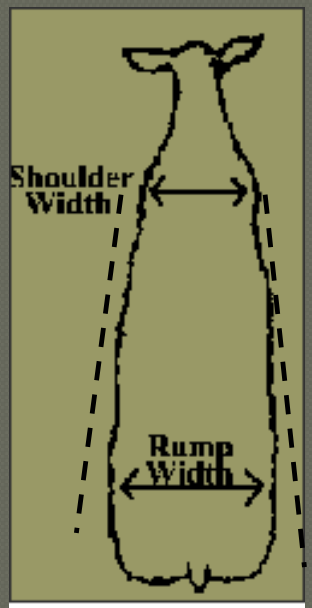


Figure 2

9 Measurements

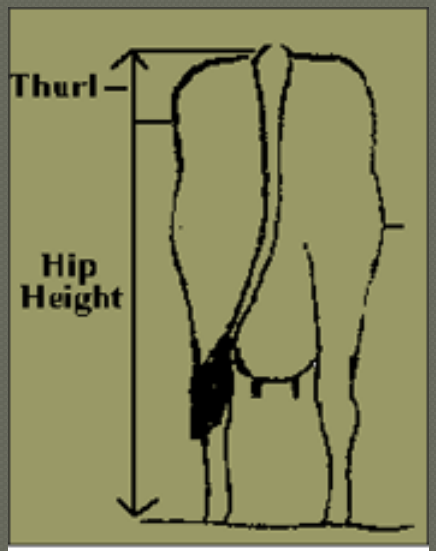
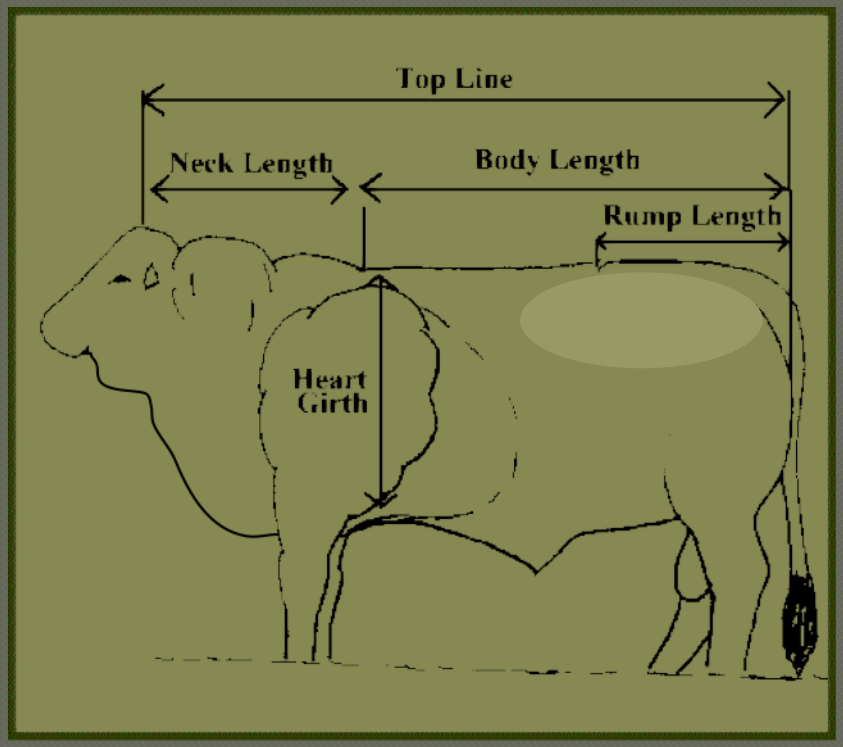


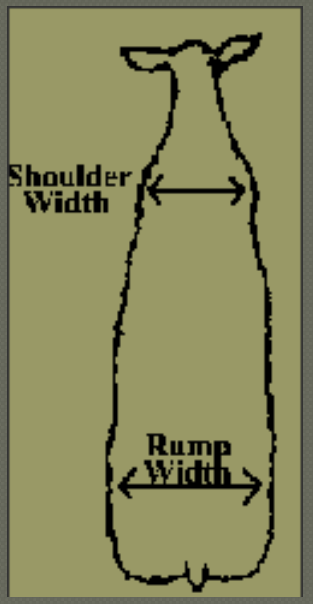
Figure 3

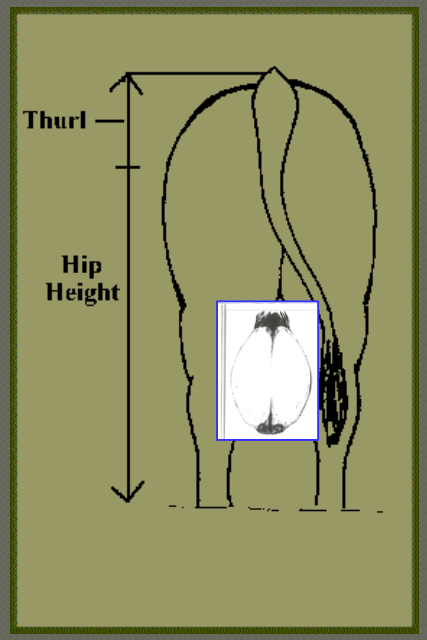
Highly fertile females

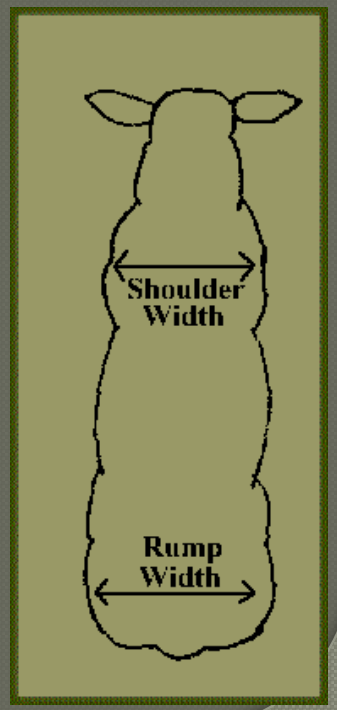
- Neck length 1/3 of total top line or slightly longer (*longer equals more milk production at the expense of input costs*)
- Rump width 2.5" to 4" wider than R/L ***
- Bones small and short on the front end due to the strength of her estrogen production
- Beyond hormones, fertility is more a function of fleshing ability than of anything else.
- Fleshing ability is more a function of low maintenance requirements than of anything else.

Linear Measurement - Male









11 Measurements

Highly fertile males:

- Shoulders equal rump length at puberty
- **Shoulders** 2" **wider** at yearling **or more**
- **Shoulders** 3" **wider** at two years **or more**
- **Shoulders** 4" **wider** at three years **or more**
- **Shoulders** 5" **wider** at 4 years on up **or more**
- Head ½ as wide as it is long
- Testosterone shuts off long bone growth in the rear end of the male first (the Buffalo look)
- Thick hide and coarse hair
- Neck 2-3" shorter that 1/3 of total top line

"If we select masculine characteristics in our females, the performance becomes immediately negative. If we select feminine characteristics in our bulls, their performance becomes immediately negative." (*Karney Redman*)

Perfect Body Conformations

- Rump length = 38-40% of body
- Length of back & rump height are same.
- Heart girth equal to top line or greater
- Neck of cow is half of body length
- Flank of cow 2-10” inches greater top line
- Large crest on the neck of bull
- Neck of bull 2-3 inches shorter 1/2 back
- Flank of bull equals top line or greater

Perfect Body Conformations

- Shoulders of cow same width as rump length… *narrower the hotter the climate*
- Rump width of cow 2.5” - 4” wider than rump length
- Bull rump width to height ratio 44% **or greater**
- Cow rump width to height ratio 40% **or greater**

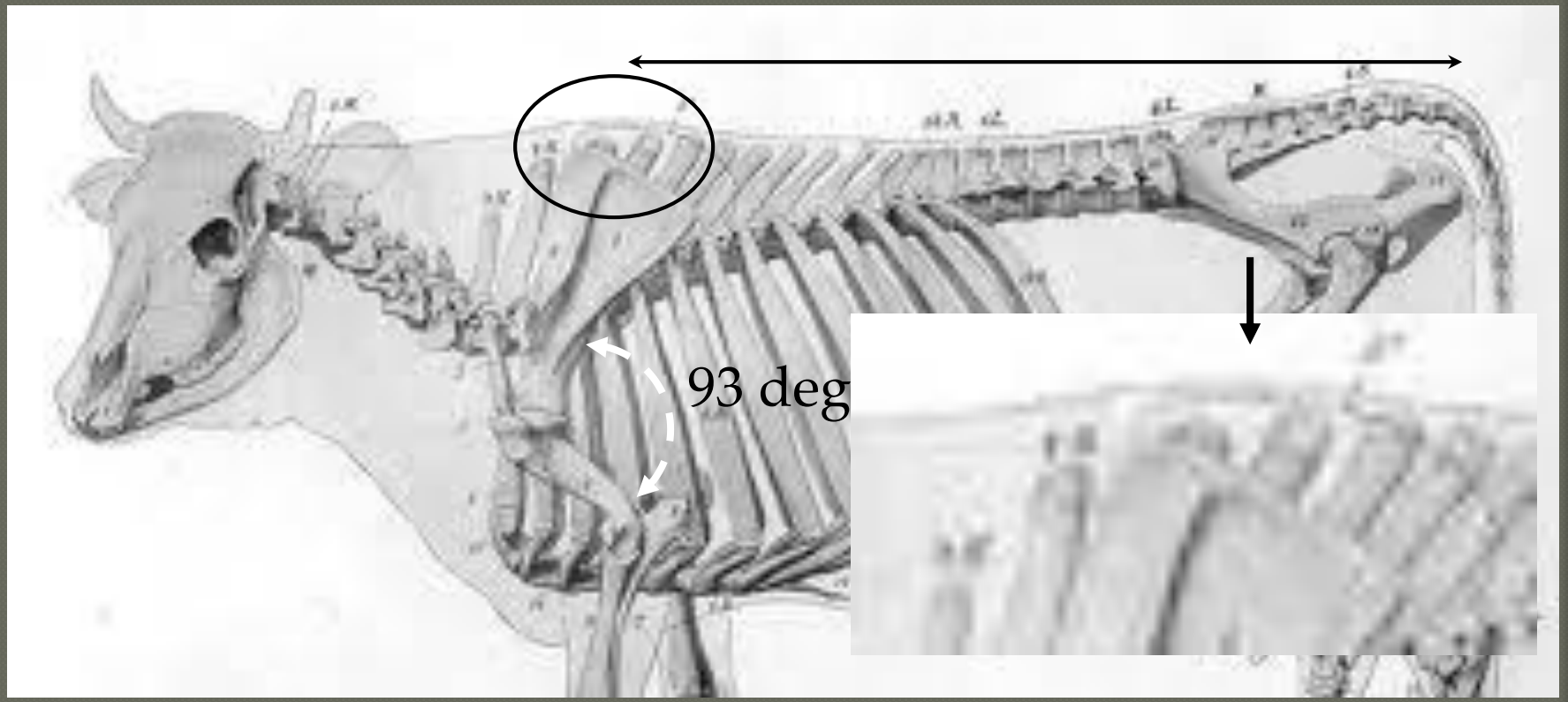
Neck length should equal ½ of body length
Rump should be 38-40% of body
DO THE MATH AT EVERY STEP

You are getting the right kind of animals the closer the 2/3 measurement equals the rump height

The cow


Video

Two thirds measurement



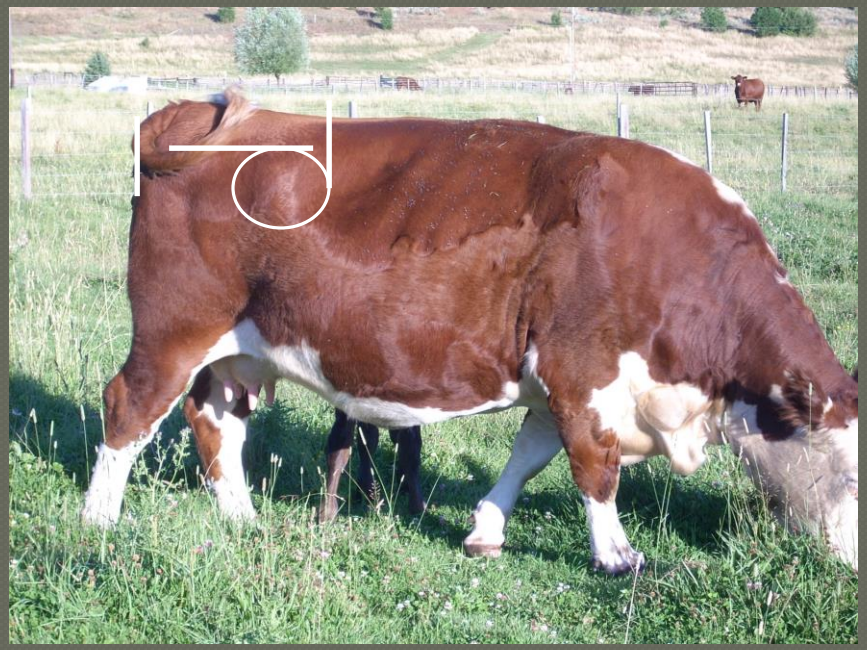
Rump Length

Why 38-40% rump length

- More meat volume on offspring
- Long and wide rumps on cows put wide shoulders on bulls
- Less than 38% R/L on bulls increases neck length in his daughter making her higher maintenance
- Calving Ease
- Higher meat-to-bone ratio
- Structural correctness for fluid movement
- **Get your calculator out and do the MATH**

We want a rump 38-40% of length
We want a rump 2.5” or wider than length

RUMP LENGTH



RUMP WIDTH 2.5” OR MORE

Birthing EPD (Expected Pulling Difficulty)

+1.5” R/L pulling calves +3.5” R/L probably not pulling

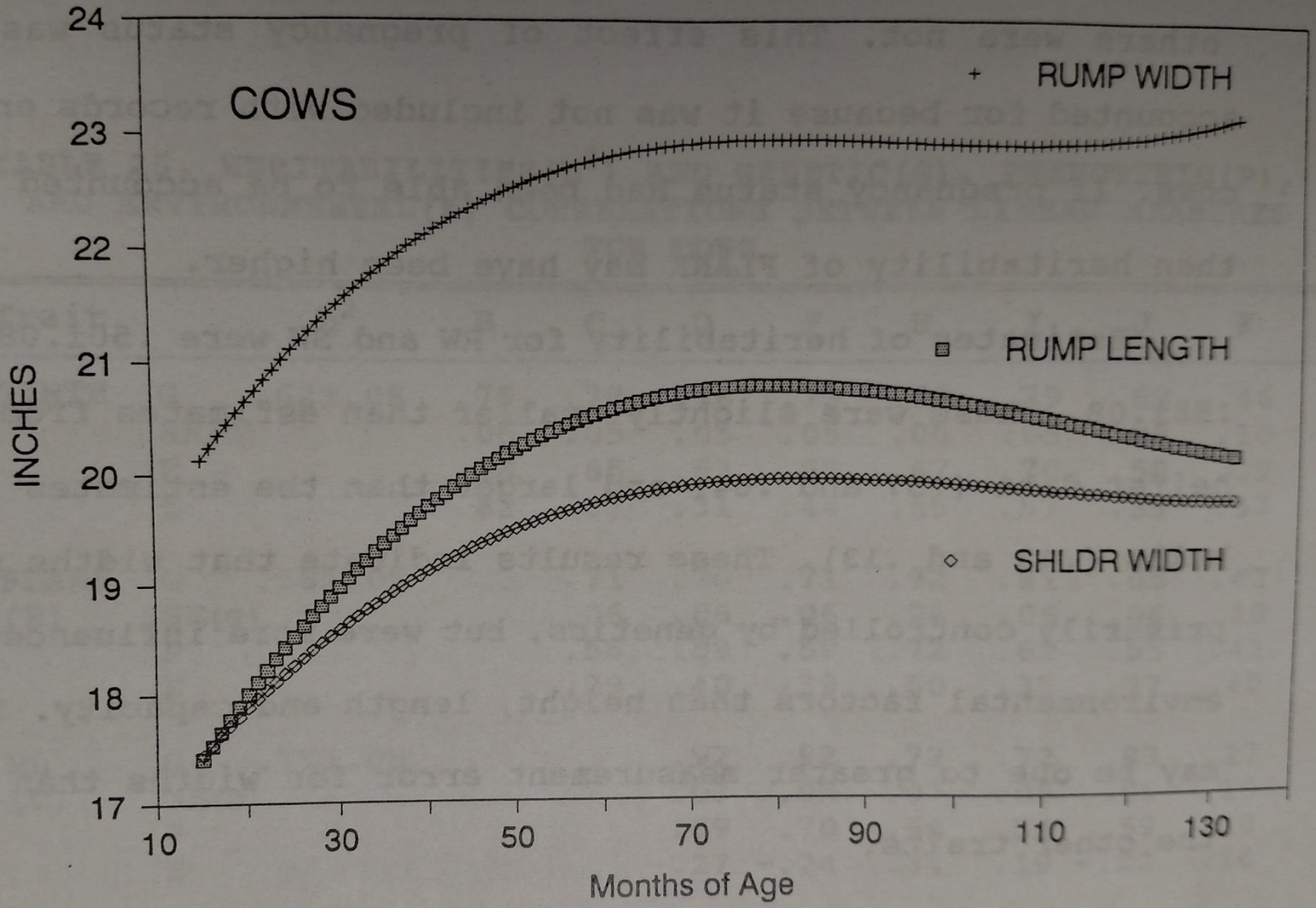
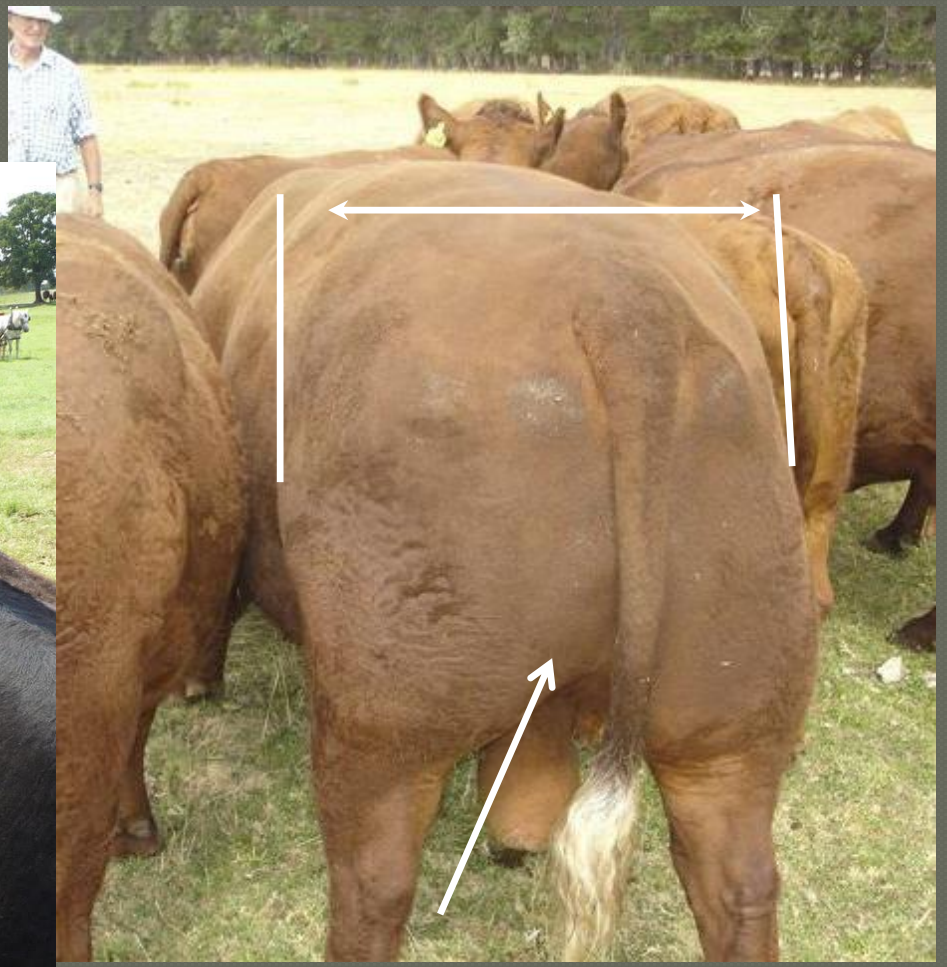


Figure 12. Regression of RL, RW and SW on AGE for cows

On a bull we want a rump width 44% or greater



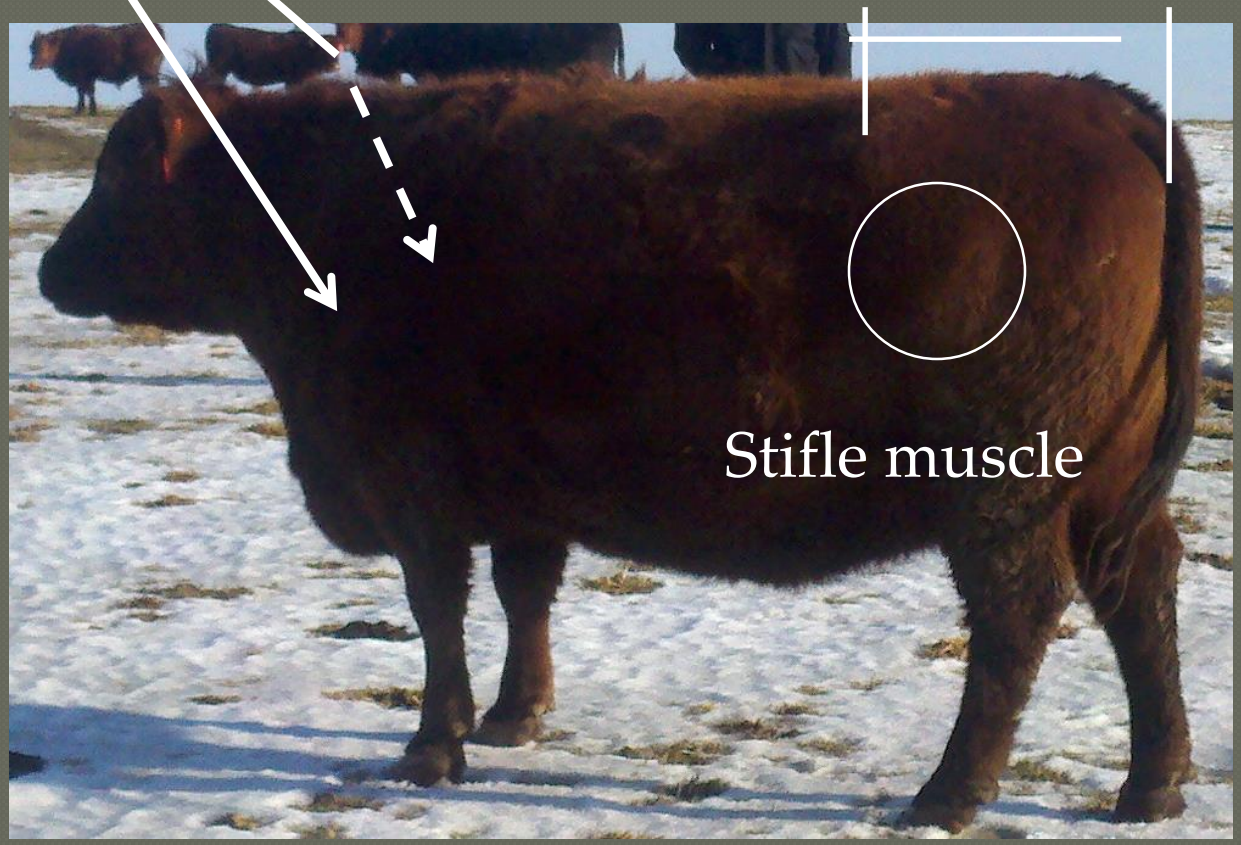
Note upside down “U”

- Shoulder width should equal rump length

The cow

Shoulders too wide equals lack of milk and lower femininity

Shoulders too narrow requires higher maintenance. If your Grass is good and the Climate is warm… Slighter cows can work well



Shoulder width 4”or more than rump length on a bull

The wider the shoulders, the shorter the gestation length

Girth equal to top line or greater

Flank 2”-10”greater we need a cow that can hold a lot of grass.

Measurement taken in front of hook bones and udder

Can be even on a bull

What makes up heart girth

- Depth of chest
- Wide shoulders (*side and top*)
- Width between front legs
- Full loin
- Knee comes out of a mass of muscle
- + 37 pounds of red meat for each additional inch…and less feed!!!

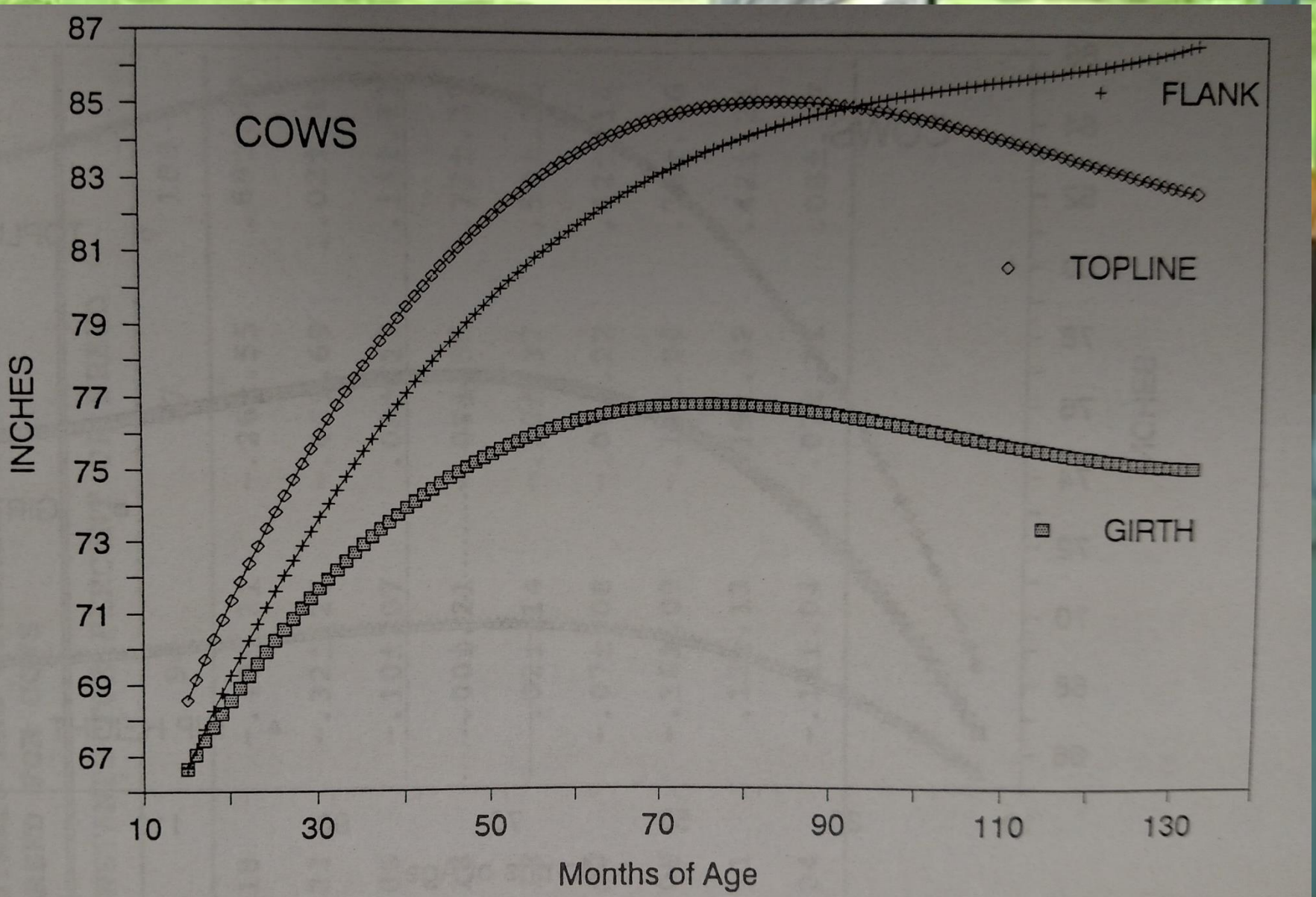


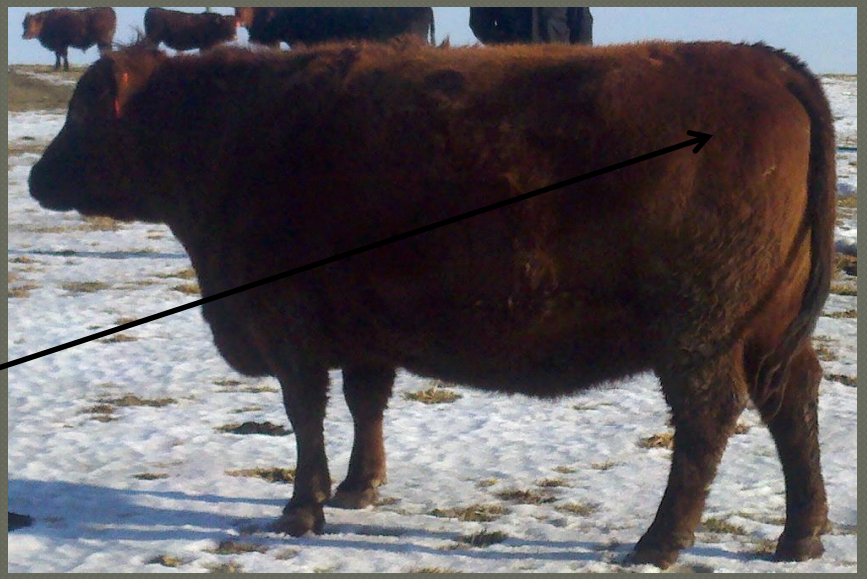
Figure 10. Regression of GIRTH, FLANK and TOPLINE on AGE for cows

100 years ago the most important trait for dairy animal selection in New Zealand was size of the rumen.

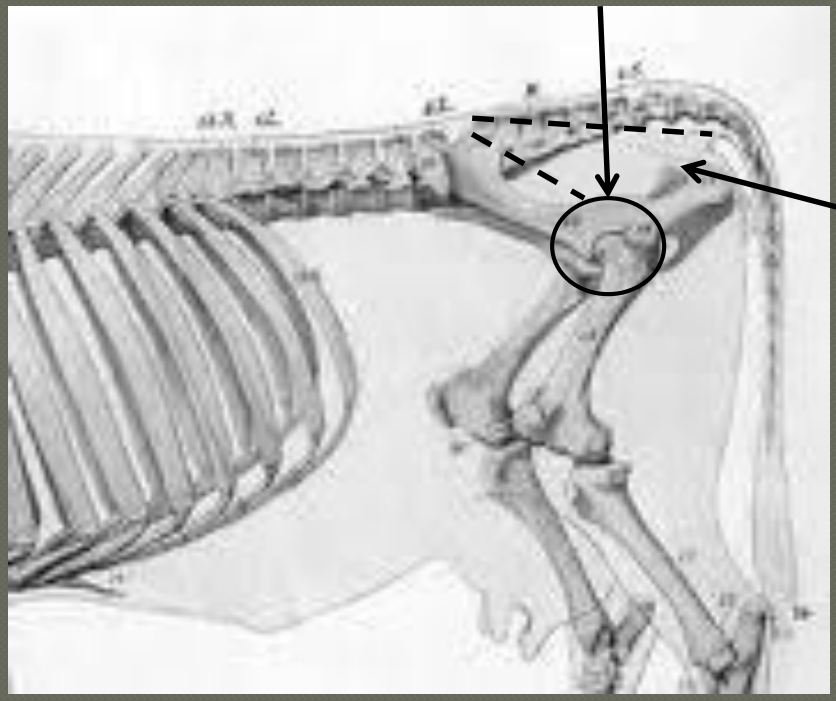
+2” to +10” on a cow

Measuring the Thurl

~MEASURE RUMP HEIGHT
~MEASURE STIFLE JOINT

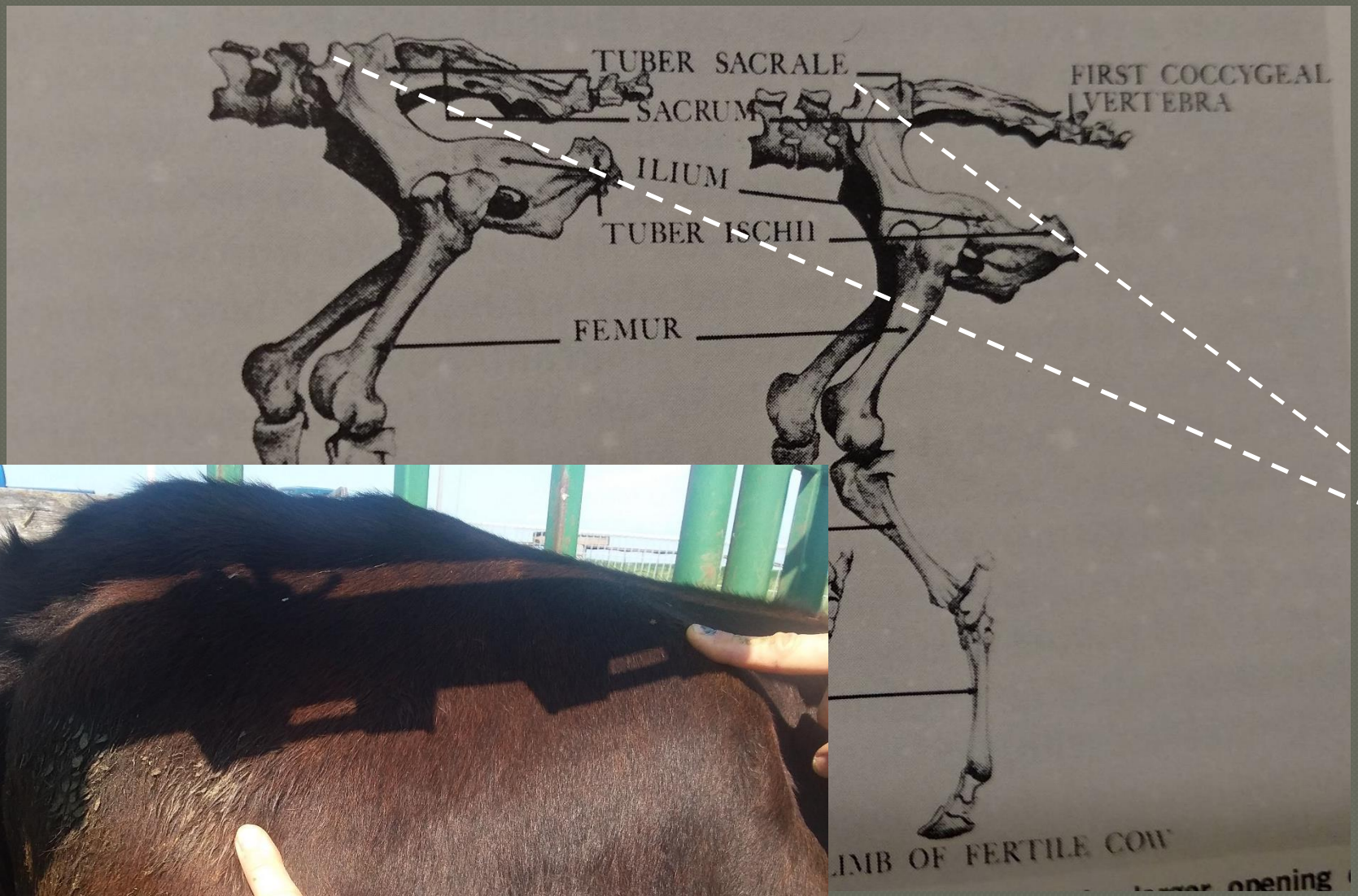


Hip joint



THIS ANGLE NEEDS TO BE 14 DEGREES OR MORE
VERY HARD TO HAVE IF THE TAIL PROCESS IS ELEVATED

Calving Ease…from the heifer side



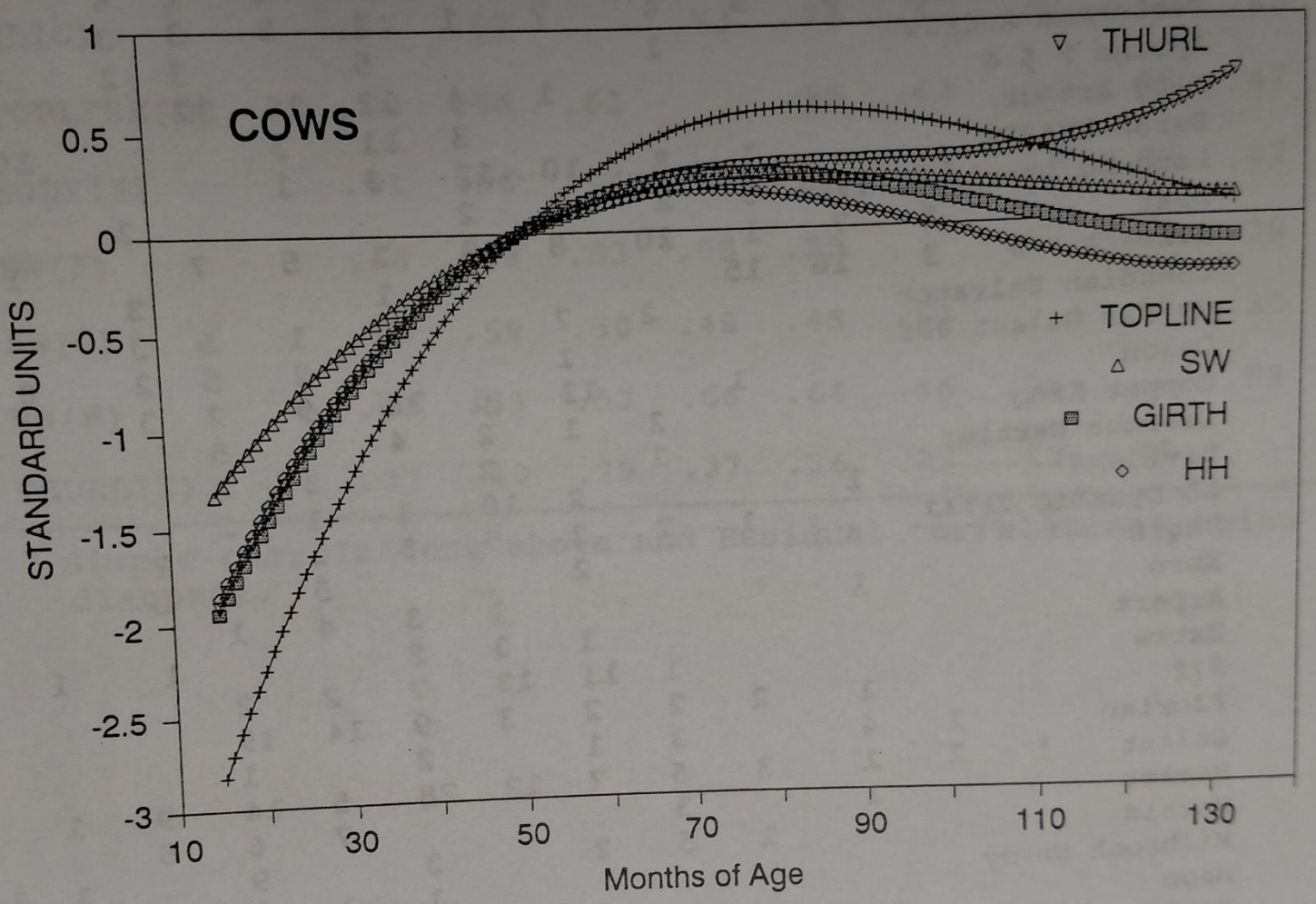
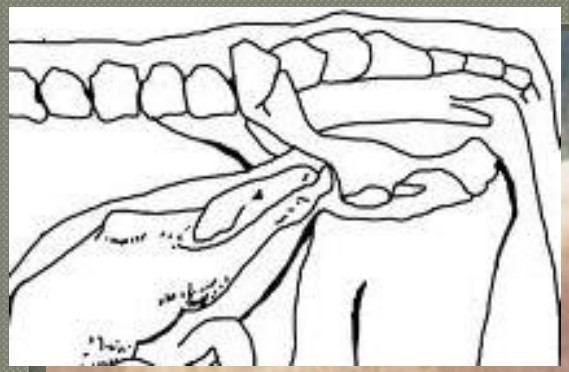
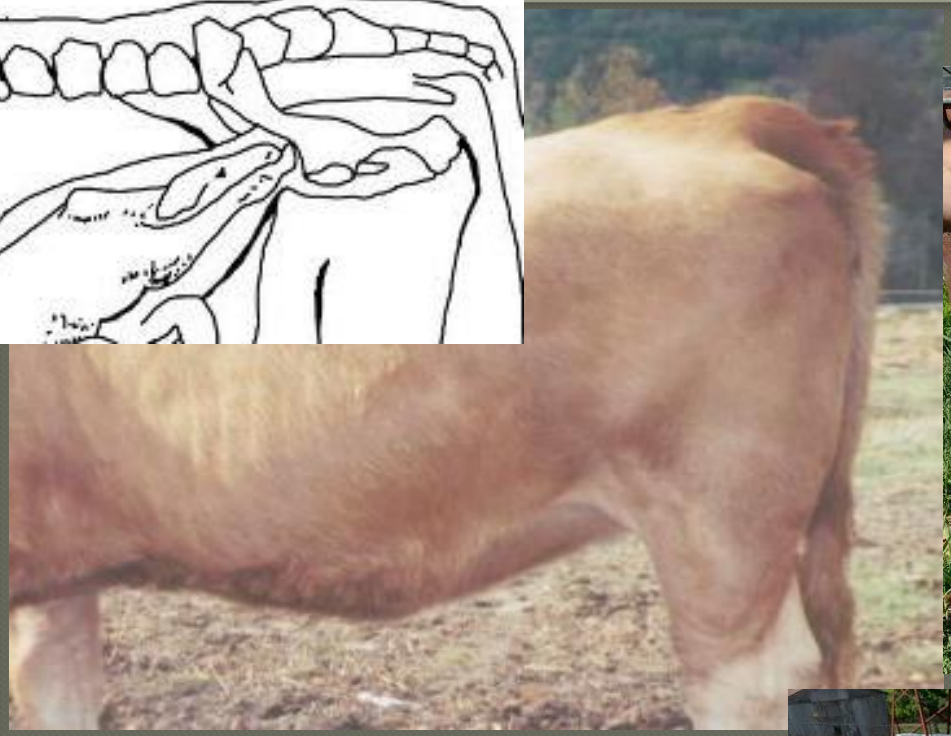
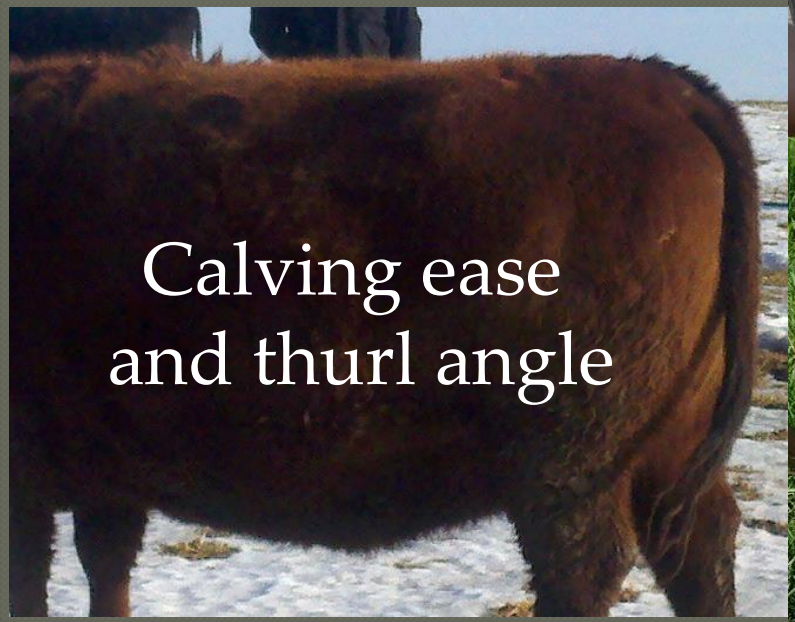


Figure 16. Regression of GIRTH, TOPLINE, SW, HH and THURL on AGE in standard measure for cows.







Calving ease and thurl angle

Rump Height

Taken at center of spine just between the hook bones

On a cow, we want her rump width to be at least 40% of rump height, and more is better. This equals femininity in the female

On a bull we want his rump width to be at least 44% of his height, and more is better.

Feedlot wants a tall animal to gain fast

Cows that are tall are not very fertile

Do we breed to put money in their pocket or in our pocket

Linear measurement score

Meat-to-bone ratios

2.0 approximately a 55% ratio = 385# = **$2310** Longest time to finish

2.5 approximately a 59% ratio = 413# = $2478

3.0 approximately a 63% ratio = 441# = $2646

3.5 approximately a 67% ratio = 469# = $2814

4.0 approximately a 71% ratio = 497# = $2982

4.5 approximately a 75% ratio = 525# = **$3150** Shortest time to finish

Assuming Grass Finished @ $6.00/pound

~~700 pound carcass

Dairy applications

- We are taking a bovine out of balance to create more milk than her offspring will consume
- Typically a longer neck, less width of rump
- Narrower shoulders
- We are giving up do-ability and volume of meat for milk production.
- The more quality we choose in the milk (butterfat and protein) and the less volume the more dual-purpose look we will get.

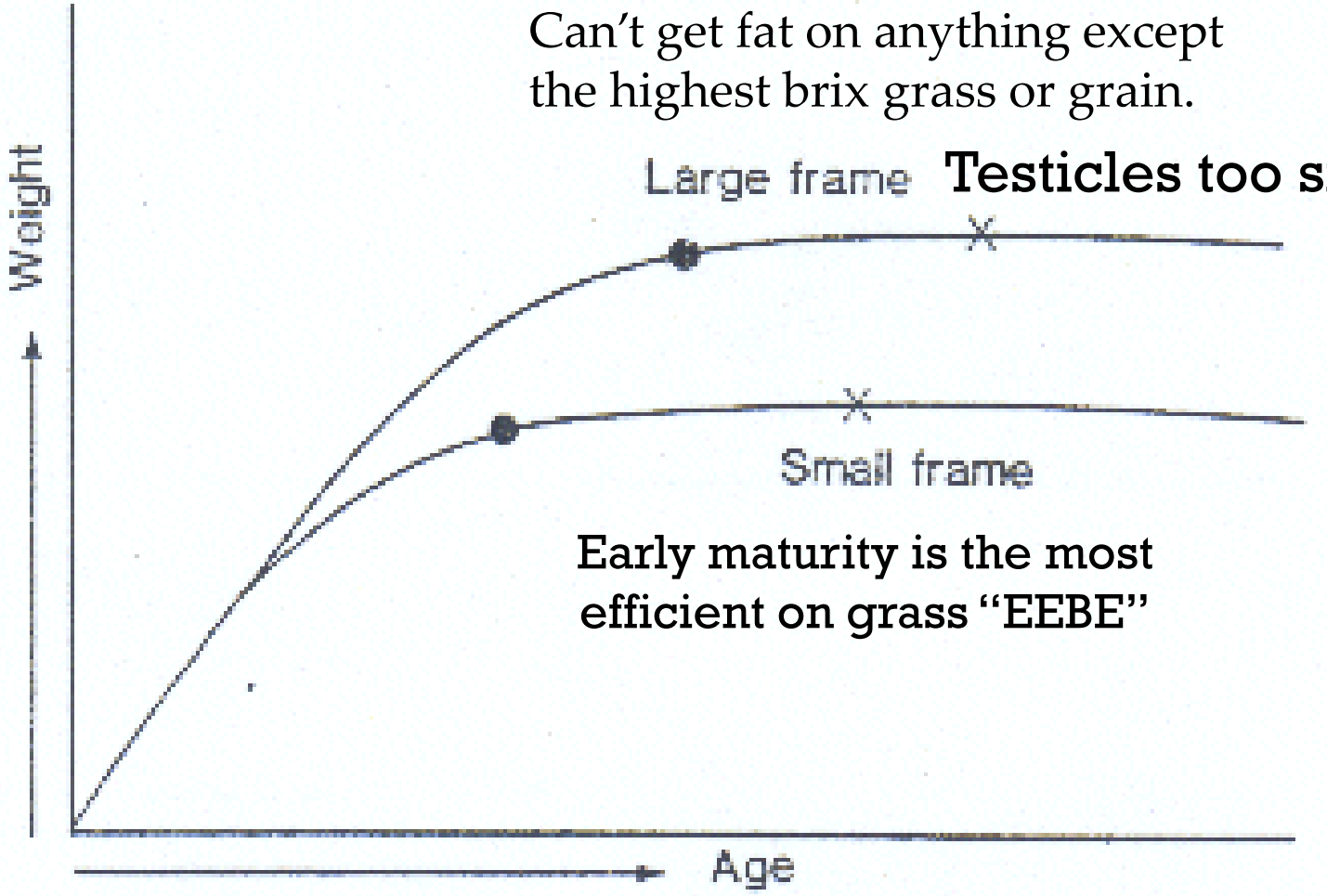
Bergman's Rule

Warm blooded species in Northern climates tend to be larger than in Southern climates

DUAL-PURPOSE

DAIRY TYPE

Comparative growth and weight gain of large and small frame cattle.

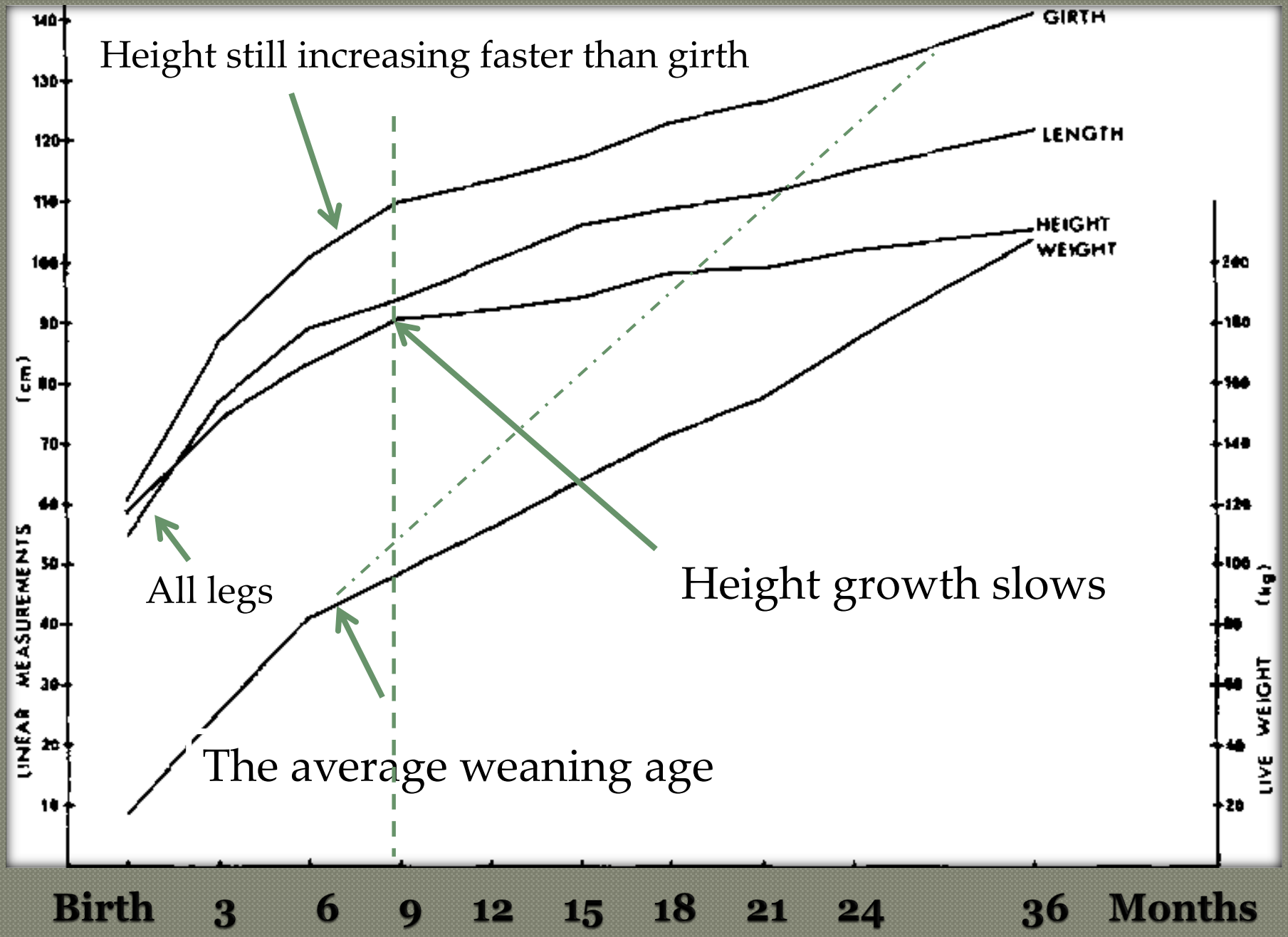


Can't get fat on anything except the highest brix grass or grain.

Testicles too small

Early maturity is the most efficient on grass "EEBE"

Sex hormones limit frame size
Taller animals are less fertile
Than shorter animals "EEBE"


Height still increasing faster than girth
GIRTH
LENGTH
HEIGHT
WEIGHT
All legs
Height growth slows
The average weaning age
LINEAR MEASUREMENTS (cm)
LIVE WEIGHT (kg)
Birth
3
6
9
12
15
18
21
24
36
Months

Differences for a bull

Wider shoulders +4”
Wider rump 44%
Adjusted neck length minus 2” -3”=
wide rumps on daughters
Scrotal measurements

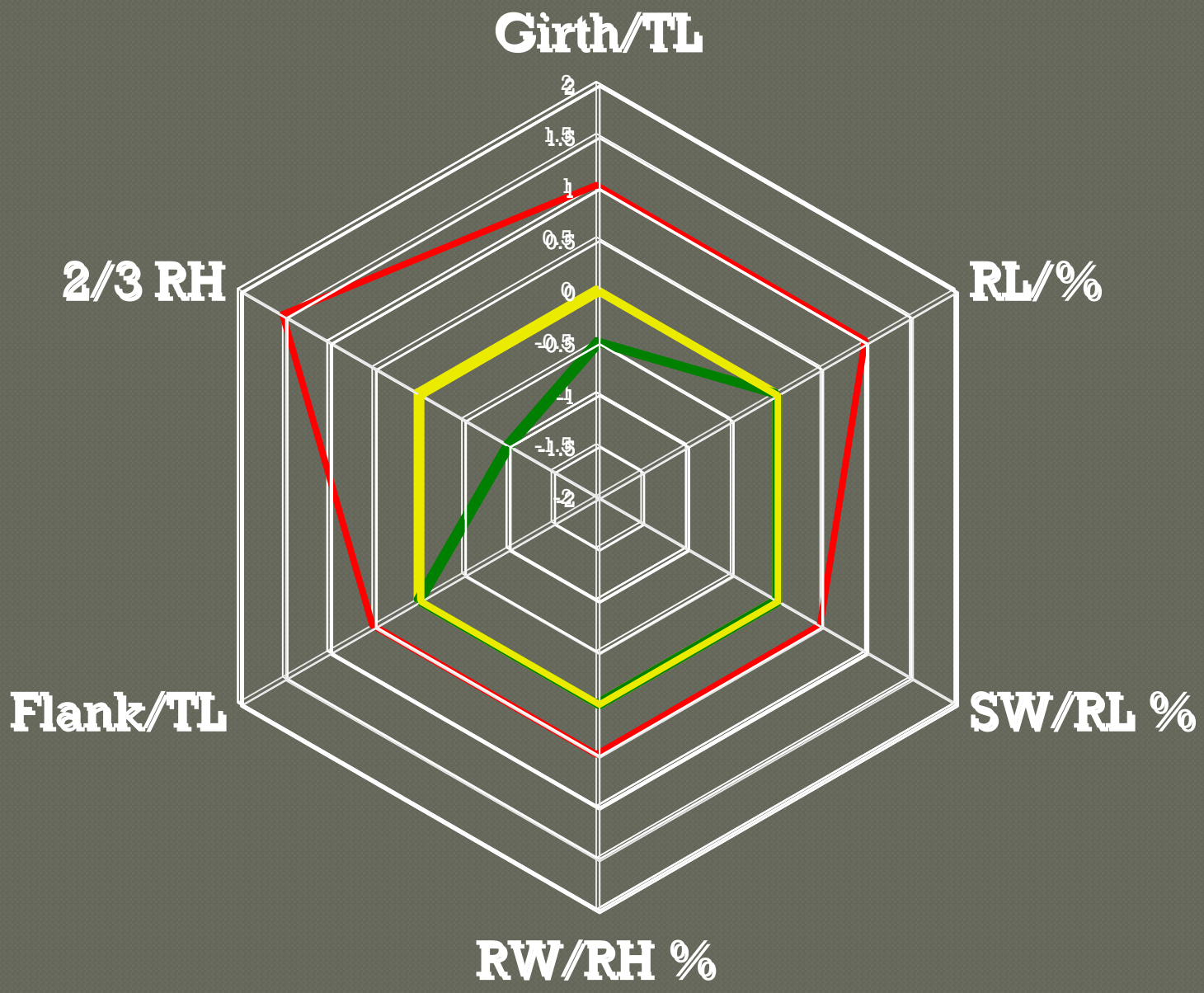
Dimensional Scrotal Measurements

Classification	Length (inches)	Circumference (cm)	Sperm Count per cc (range) x10⁶	Approx. % Live	Approx. % Conception
Age: 7 1/2-9 months					
Optimal	5, 5 1/2	28, 29	N/A	N/A	N/A
Tolerable	4 1/2	26, 26 1/2, 27, 27 1/2	"	"	"
Objectionable	4	24 1/2, 25, 25 1/2	"	"	"
Undesirable	3 1/2	23, 24	"	"	"
Unacceptable	3	20-22	"	"	"
Age: 12-16 months					
Optimal	6, 6 1/2, 7	38, 39, 40	980-1379	75-90	80-90
Tolerable	5 1/2	36, 37	672-1076	65-70	70-75
Objectionable	5	35	527-707	55-60	60-65
Undesirable	4 1/2	34	362-538	50-55	45-55
Unacceptabe	4	30-33	40-372	10-45	5-40
Age: 16-24 months					
Optimal	7, 7 1/2, 8, 8 1/2	40, 41, 42, 43, 44	1093-1790	75-90	80-90
Tolerable	6 1/2	37, 38, 39	1043-1592	65-70	70-75
Objectionable	6	36	796-1541	55-60	60-65
Undesirable	5 1/2	35	381-1093	50-55	45-55
Unacceptable	4 1/2, 5	30-34	309-783	10-45	5-40
Age: 24-36 months					
Optimal	7, 7 1/2, 8, 8 1/2	43, 44, 45, 45 1/2	1379-1853	75-90	80-90
Tolerable	6 1/2	39, 40, 41, 42	920-1469	65-70	70-75
Objectionable	6	37, 38	732-1181	55-60	60-65
Undesirable	5 1/2	35, 36	517-1011	50-55	45-55
Unacceptable	4 1/2, 5	30-34	68-548	10-45	5-40
Age: 36-48 months					
Optimal	7, 7 1/2, 8, 8 1/2	43, 44, 45, 46	1218-1990	75-90	80-90
Tolerable	6 1/2	40, 41, 42	965-1790	65-70	70-75

Necessary measurements for an optimal bull

Scrotal shape is related to

- Udder shape
- 4 good quarters … or something else
- Tilted udders
- Saggy, droopy, pendulous udders
- Teat size and shape

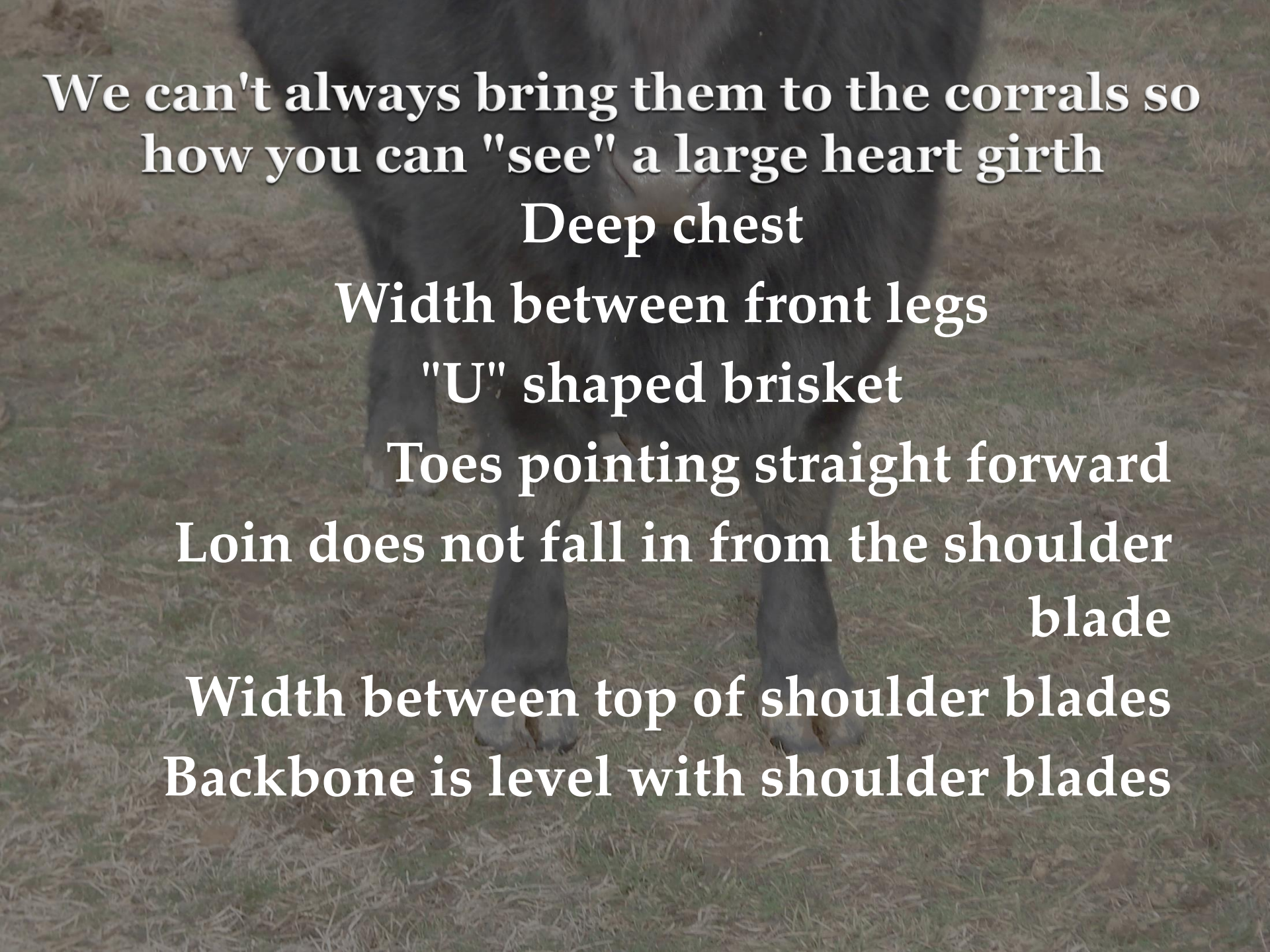

Girth/TL
RL/%
SW/RL %
RW/RH %
Flank/TL
2/3 RH
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2

Wide shoulders & Deep Heart Girth (bull & cow) are necessary for:

- Vigor (*Secretariat*)
- Adaptability
- Forage efficiency
- Meat volume
- Hormone production
- Reproduction
- Paternal requirements
- Maternal benefits

How to “see” correctness in the animal

- Deep chest in a bull shows elevated testosterone, and meat production.
- If the shoulders are too narrow the toes will be pointed out. Really masculine bulls will toe-in just a bit!!!
- If the hips are too narrow, the cow will be “cow hocked”
- “U” shaped brisket~ Inverted “U” above hocks
- A one inch difference in the top line/heart girth either adds or takes away 37 pounds of red meat in the animal.
- Wide mouth and pins


We can't always bring them to the corrals so how you can "see" a large heart girth
Deep chest
Width between front legs
"U" shaped brisket
Toes pointing straight forward
Loin does not fall in from the shoulder blade
Width between top of shoulder blades
Backbone is level with shoulder blades

How to train your eye to SEE a good shape

- Once you get a group of animals measured
- Put the numbers into the spread sheet
- Write down the animals ID number according to highest ranking
- Sort the animals into three even groups
  - Highest score
  - Middle scores
  - Lowest scores

  STUDY those three pens of animals

Other traits

- Bones should be short and fine from the knee down indicating estrogen production, tender beef and higher butterfat
- Early cycling indicates larger ovaries, shorter gestations, heavier milk flow, and heavy tear gland flow (*glandular function*)
- Hide should be supple with early shedding and fine, silky, uniform hair
- Adrenal hair whorl forward

Traits continued

- Correct/large escutcheon with extra teats on back of udder
- Smooth, shinny hooves = **mineral sufficiency**
- Rings on hooves = mineral/stress challenges
- We want them up on their toes rather than walking on their dewclaws
- Cattle with poor foot and leg structure won't last. They have to be structurally correct.
- We also want a cow to be wide in the pelvis (*width of muzzle equals width of pins equals wide pelvis*)

Conclusion

- Bull represents Masculinity
  - Wide shoulders, deep chest broad rugged head = Pregnancies, volume of meat, masculine male offspring and feminine female offspring

Cow represents Femininity

  - Wide rump with shoulders same width as rump length deep chest & feminine head = Pregnancies, calving ease and volume of meat

December 6-8, 2007

- Sorted 1400 cows
- Linear measure and ultra sound "best" 275
- Rejected 50 head
- Did not worm or feed hay to 225 "keepers"

…AND…

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- The "right kind" ***without wormer and hay*** were thriving on his ranch in the Nebraska sand hills over the winter

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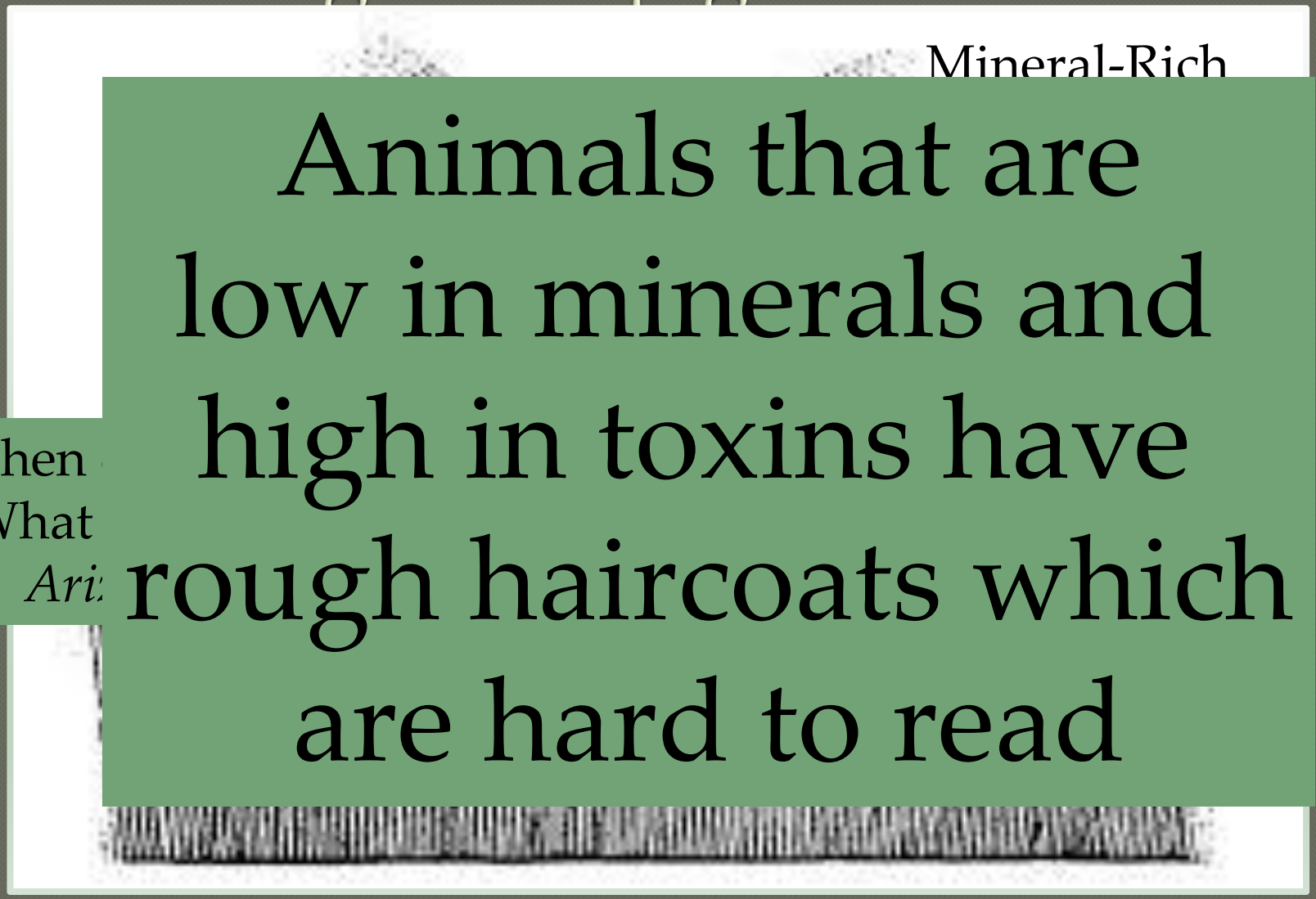
Assuming Grass Finished @ $6.00/pound

~~700 pound carcass

Waddington's Epigenetic Landscape



Animals that are low in minerals and high in toxins have rough haircoats which are hard to read

Poor -------- Genetic expression -------- Best

Tailor Made Cattle:

Have enquiring mind…Will Travel

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