Beef cattle breeding – example from the USA

Estonian breeding conference 2024

07.11.2024

Maiju Pesonen

Outline of the persentation

- **Keeping the production cycle**
  - The production environment
  - The most important trait
- **Selecting the genetics to the production environment**
  - Breeding values
  - Phenotype
  - Pedigree
- **Take home message**

- **One of the basic pillars of productively efficient beef cow production is a tight calving season**

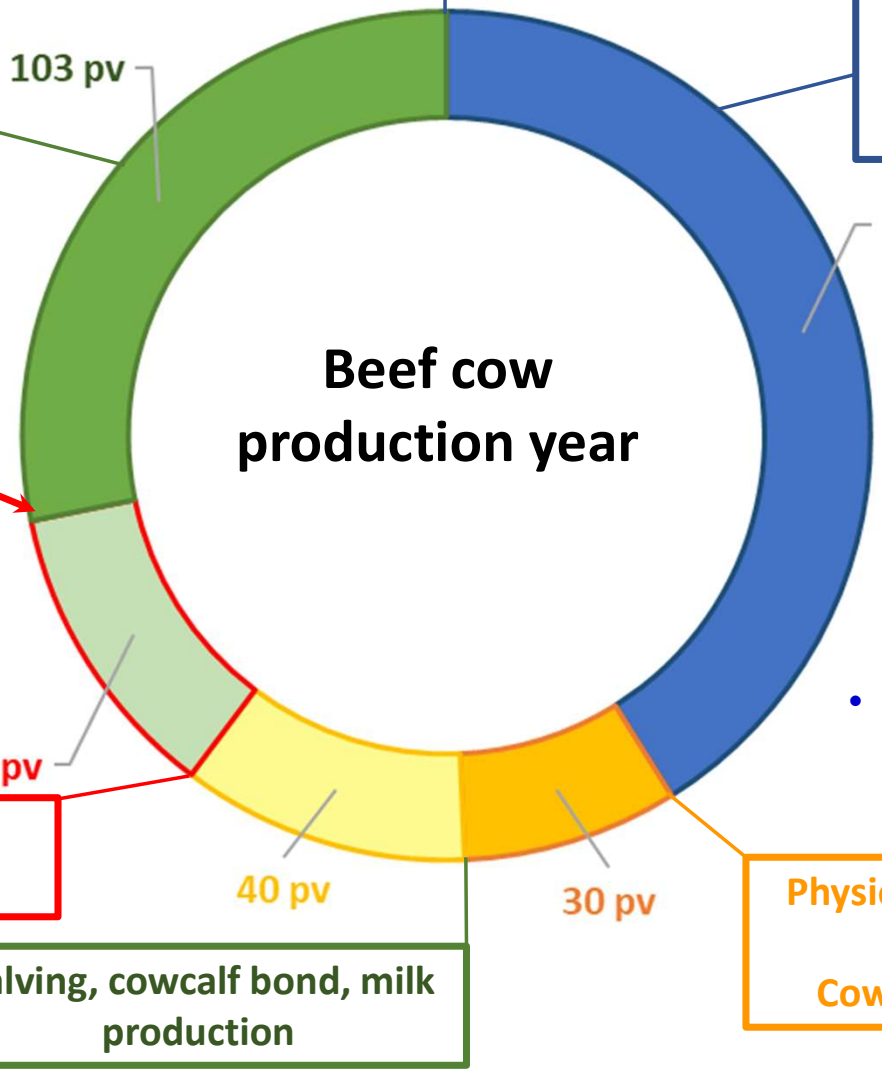
Weaning
Maintenance feeding

→

Finishing farm
Adaptability

Grazing
Grazing activity, neophobia, courage, herd function
Grazing environment

Maintenance period
Cow herd hierarchy, adaptability, function, resilience



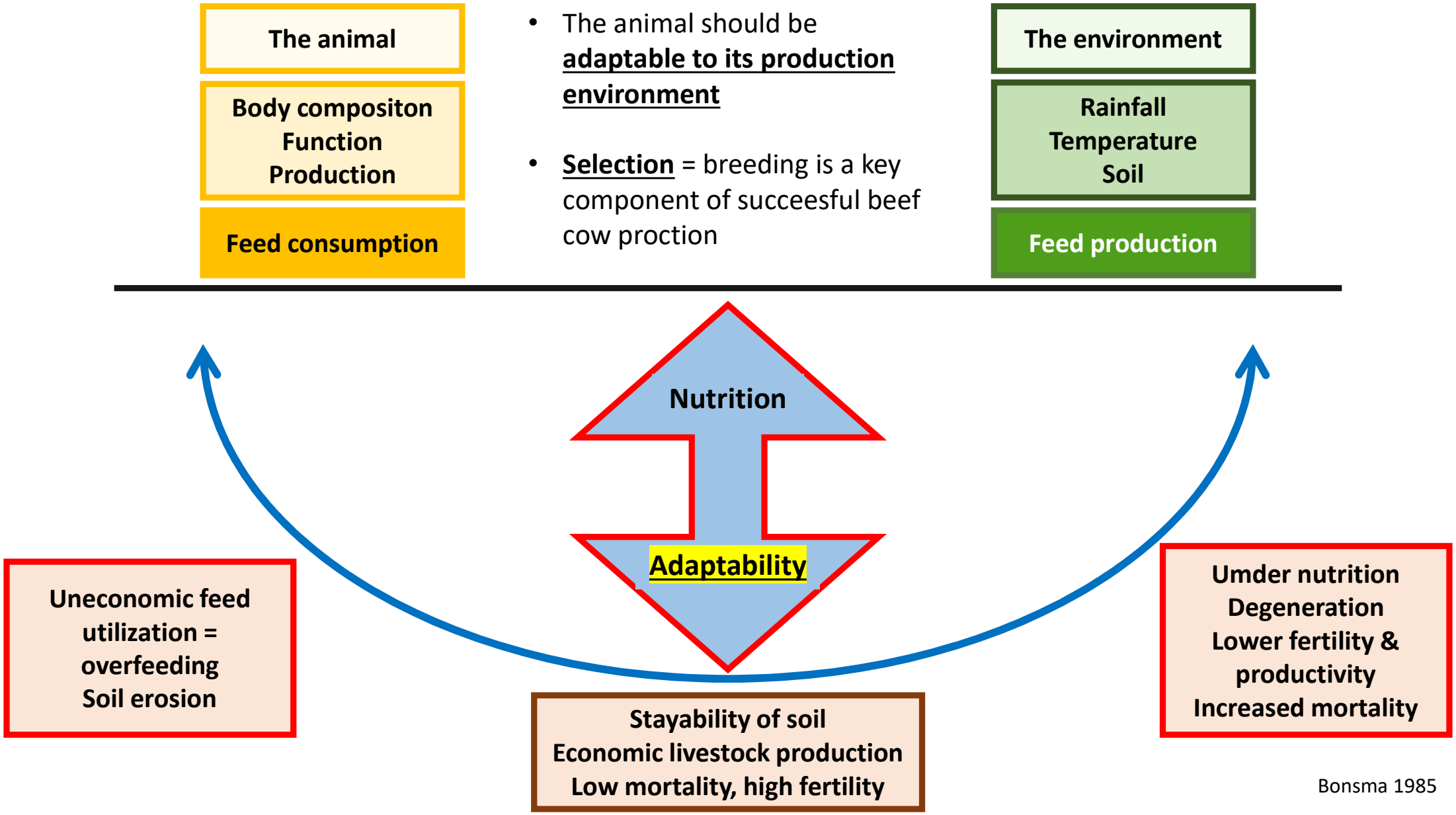
Day 83 after calving the cow must be bred to retain the 365 d calving interval

- **A prerequiste for limited calving season is good female and male fertility**

Breeding
AI, breeding bull

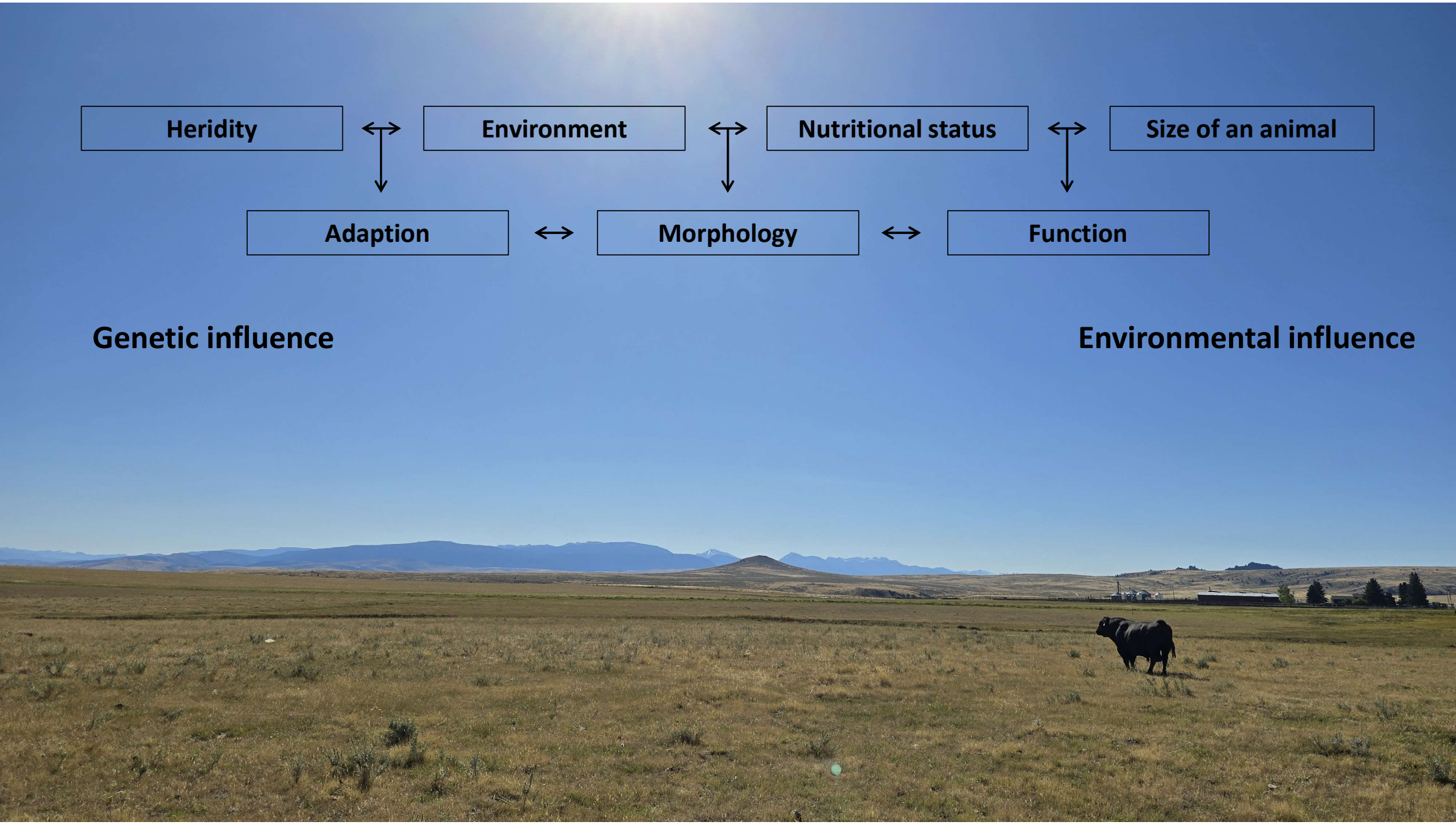
Physiological preparation for calving and milk production
Cow herd hierarchy, adaptability, function

Calving, cowcalf bond, milk production



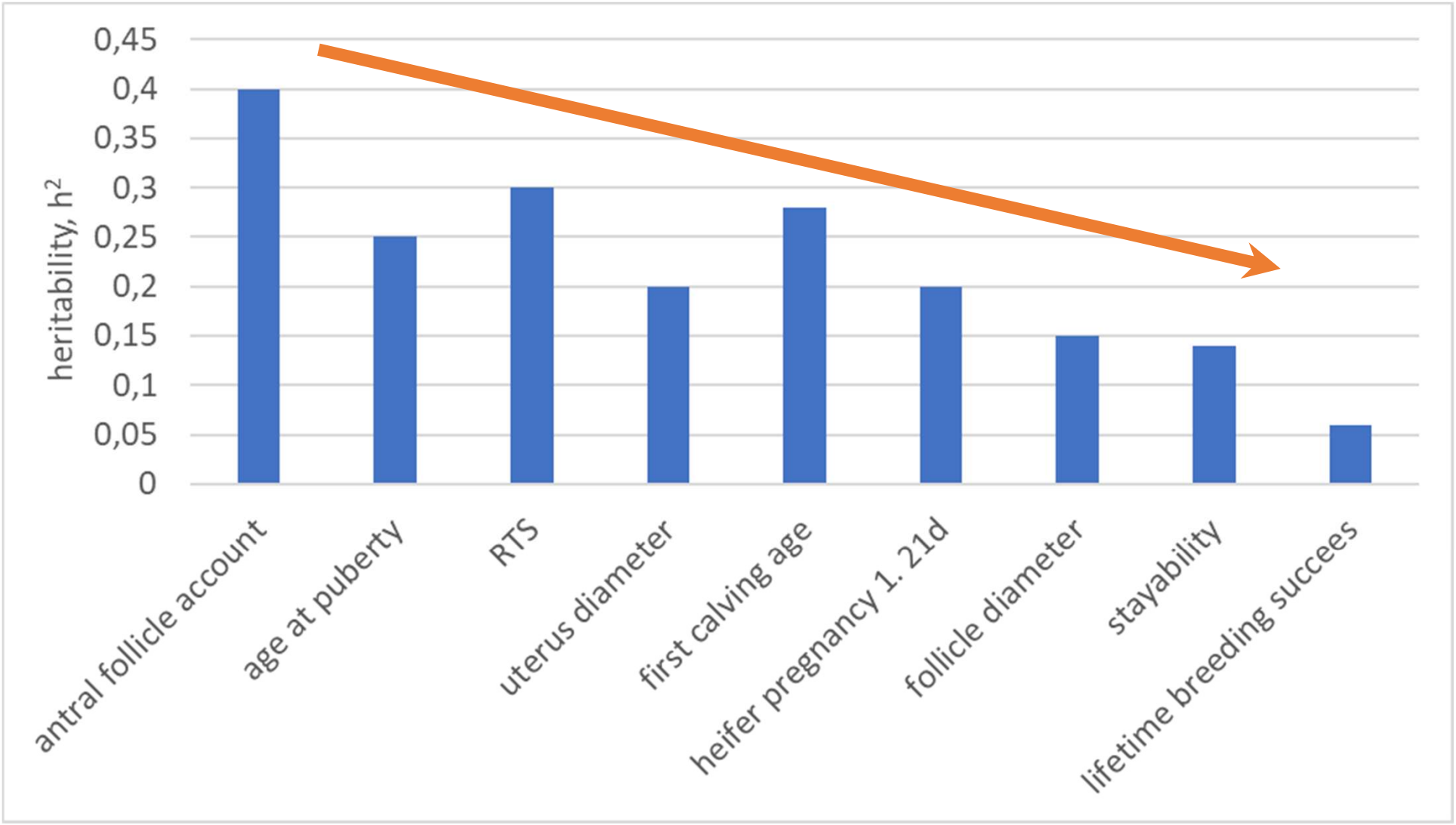
- The animal should be **adaptable to its production environment**
- **Selection** = breeding is a key component of succeesful beef cow proction

Bonsma 1985

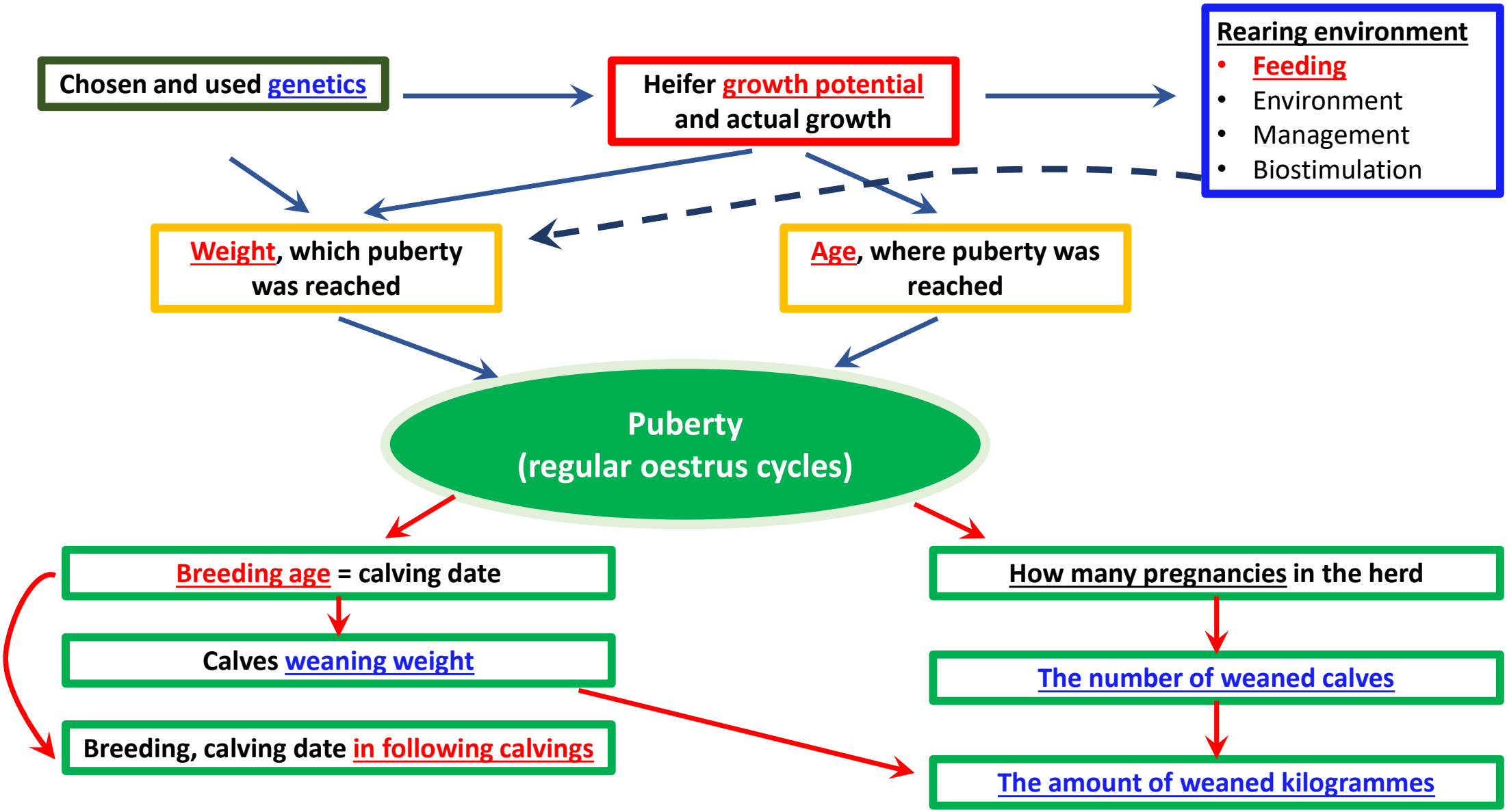

Heridity
Environment
Nutritional status
Size of an animal
Adaption
Morphology
Function
Genetic influence
Environmental influence


In beef cattle industry it is essential to have a clear idea how each environmental factor influences the animal and how we can breed better adapted animals to any environment

Heritability of early shown reproductive traits are the highest



Cushman et al. 2014


Chosen and used genetics
Heifer growth potential and actual growth
Rearing environment
• Feeding
• Environment
• Management
• Biostimulation
Weight, which puberty was reached
Age, where puberty was reached
Puberty (regular oestrus cycles)
Breeding age = calving date
Calves weaning weight
Breeding, calving date in following calvings
How many pregnancies in the herd
The number of weaned calves
The amount of weaned kilogrammes

Montana Judgement 1038 Reg: AAA +*20193391 Bull

[AMF-CAF-D2F-DDF-M1F-NHF-OHF-OSF-RDF]

Birth Date: 02/14/2021 **Tattoo:** 1038
Parentage: SNP **Genomic:** Angus GS **Genomic Prog:** 93
Parents Qualified
Breeder: 1129279 - Montana Ranch LLC, Bigfork MT
First Owner: 1129279 - Montana Ranch LLC, Bigfork MT
Owner(s): 582532 - Vision Angus, Amherst CO
1129279 - Montana Ranch LLC, Bigfork MT
1334714 - Mangell Inc, Madera CA

		S A V Rainfall 6846	Coleman Charlo 0256 **AAA #+*16879074**[RDF]
			AAA +*18578963 [RDF]
Square B Atlantis 8060		**AAA +*19405249** [RDF]	S A V Blackcap May 4136 **AAA *14739095**
		Elbanna of Conanga 1209	Connealy Consensus **AAA #*15513367**
			AAA 17029025
			Elbasta of Conanga 9703 **AAA 16449958**
		Connealy Final Product	Connealy Product 568 **AAA *15148584**
			AAA #*15848422
Mill Brae FP Joanie 3063		**AAA #17630369**	Ebonista of Conanga 471 **AAA #14220178**
		Mill Brae FA Joanie 9263	S A V Final Answer 0035 **AAA #*13592905**[RDF]
			AAA #16429762
			Mill Brae Joanie Ferd 903 **AAA +13584300**

Aiming for balance

*# Pathfinder + Embryo Transplant * Parents Qualified*

As of 11/04/2024

PRODUCTION								MATERNAL						
CED ACC % PROG	BW ACC % PROG	WW ACC % PROG	YW ACC % PROG	RADG ACC % PROG	DMI ACC % PROG	YH ACC % PROG	SC ACC % PROG	HP ACC % DAUS	CEM ACC % DAUS	MILK ACC %	MKH MKD	MW ACC % PROG	MH ACC % PROG	SEN %
+1 .43 85% 5	+3.4 .84 90% 267	+73 .74 30% 130	+120 .51 40% 19	+.26 .36 45%	+.53 .36 20%	+.2 .63 80% 13	+1.38 .58 20% 13	+13.9 .28 30%	+6 .33 70%	+25 .35 60%		+61 .42 55%	-.1 .45 85%	-15 50%

MANAGEMENT				
DOC ACC % PROG	CLAW ACC % PROG	ANGLE ACC % PROG	PAP ACC % PROG	HS ACC % PROG
+14 .56 70% 14	+.42 .44 20% 16	+.51 .44 65% 16	+1.39 .27 55%	+.07 .39 2% 4

CARCASS						ANGUS-ON-DAIRY $VALUES		$VALUES					
CW ACC %	MARB ACC %	RE ACC %	FAT ACC %	CARC GRP PROG	USND GRP PROG	$AXH %	$AXJ %	$M %	$W %	$F %	$G %	$B %	$C %
+41 .43 70%	+.65 .40 45%	+.82 .40 25%	+.056 .37 90%		5 15	+124 35%	+109 35%	+71 25%	+66 35%	+82 70%	+52 40%	+134 65%	+245 55%

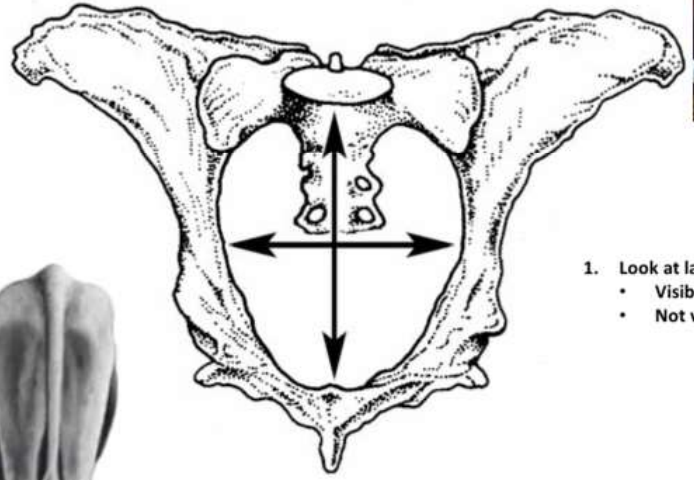
Phenotypic traits: CE, BW, WW, YW, **YH**, **SC**, **Doc**, **UScanWT**, **UIMF**, **URE**, **URibFat**, **URumpFat**

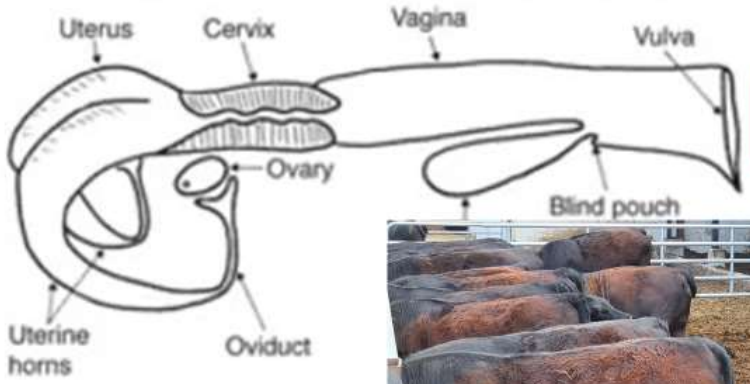
Bold Phenotypes are included in the National Cattle Evaluation.

840—XXX—XXX—929—718

582532 03152023; 1129279 BO 11222021; 1334714 02192024

Conformation





Reproductive tract

Condition score

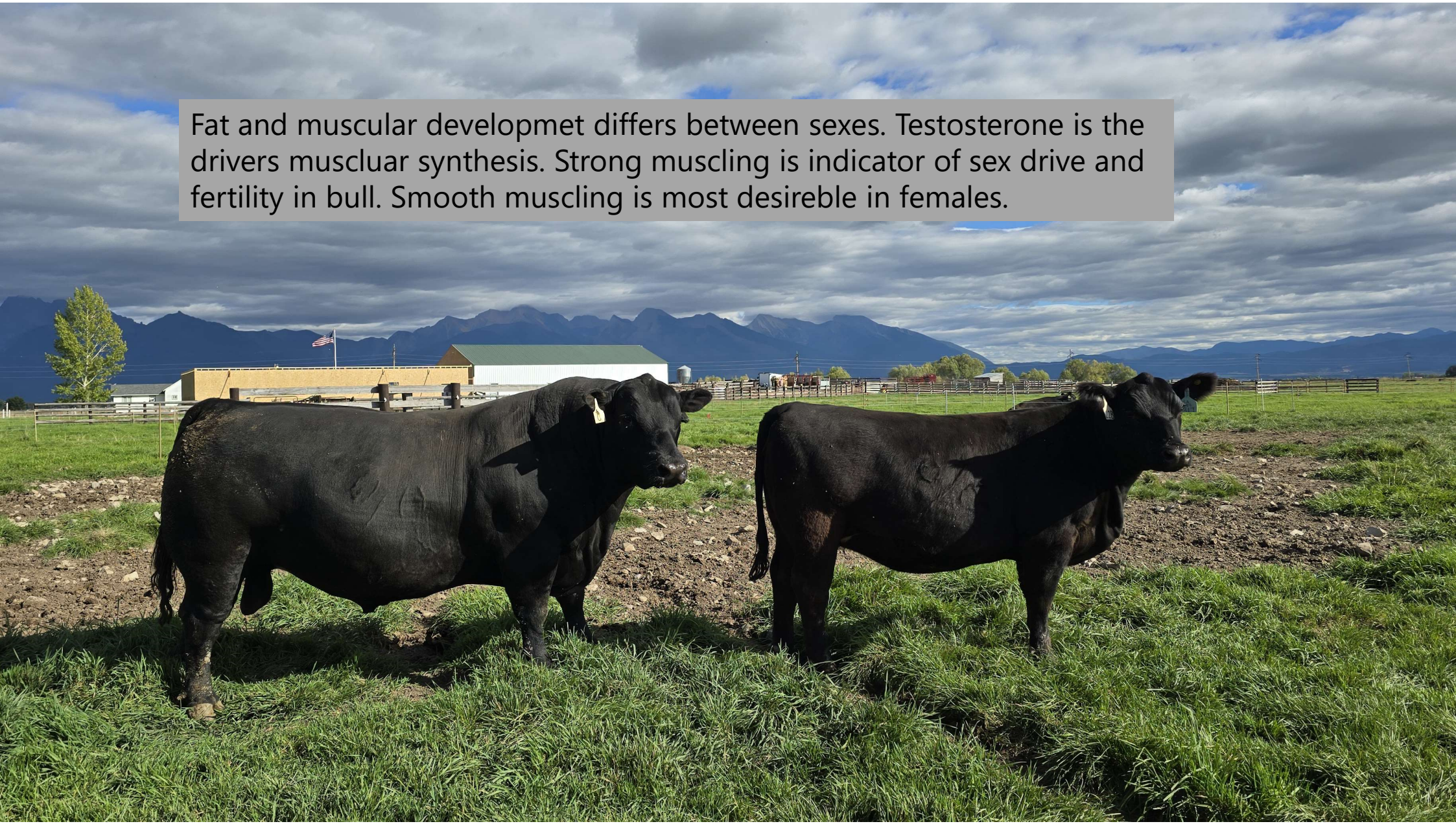
1. Look at last two ribs:
   - Visible <3
   - Not visible ≥3

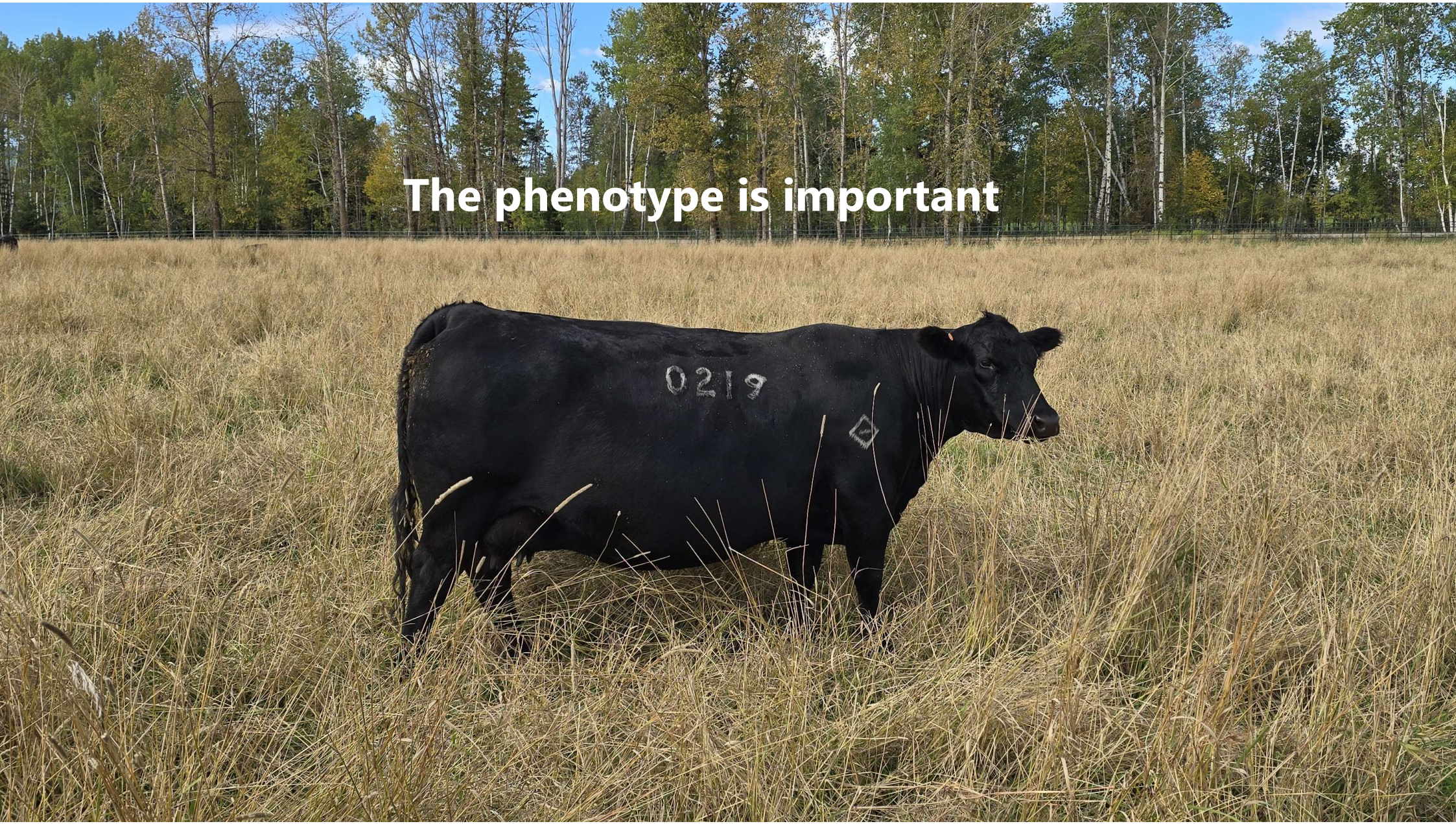
2. Spine:
   - Visible ≤ 2

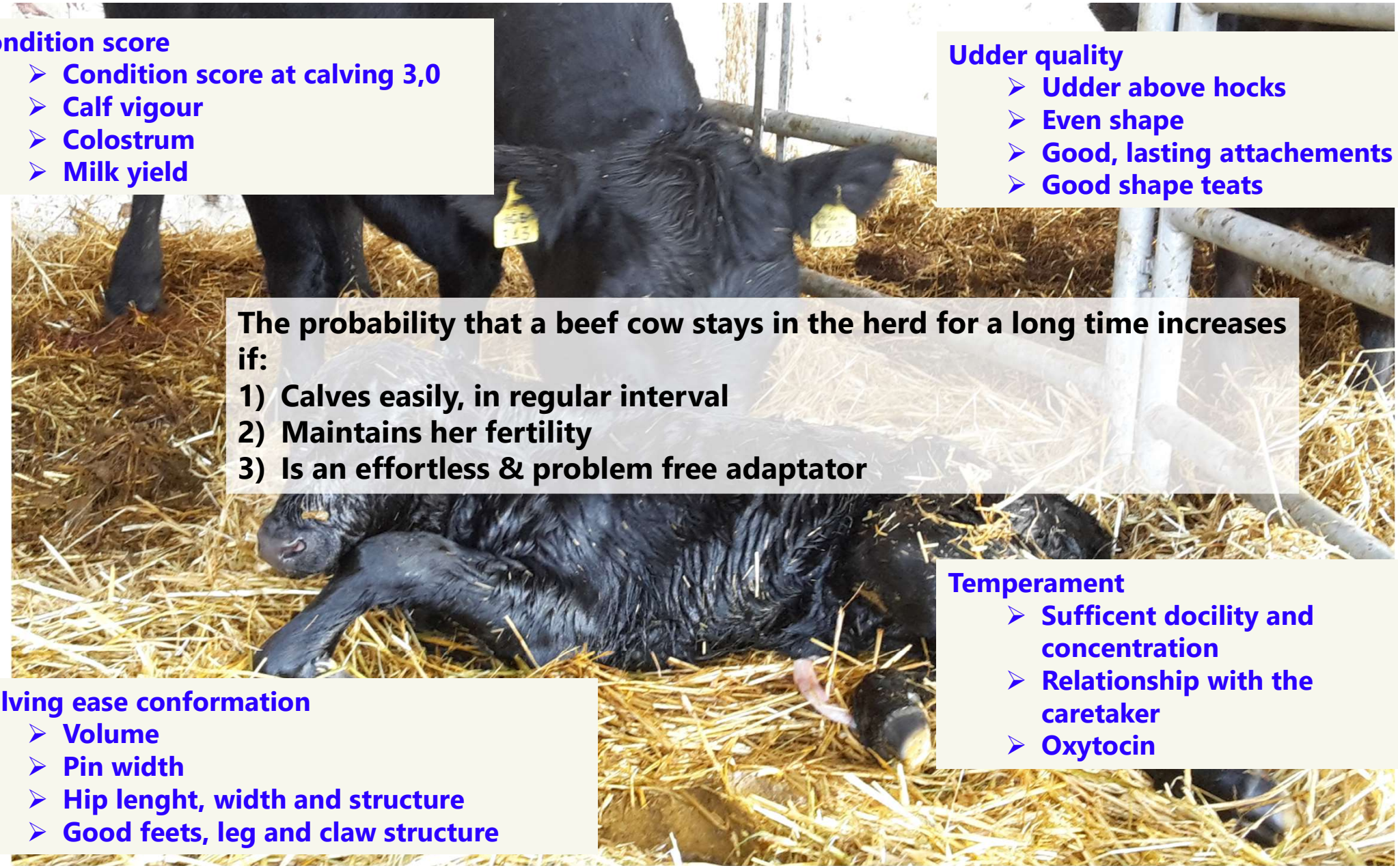
3. Shade between hooks and pins:
   - Shaloww U: 3,5
   - Strong U: 3
   - V shape: 2,5
   - Strong V: 1,5
   - Very strong V: 1

- CS 1-5
- CS 1 starved
- Cs 1,5-2 thin
- CS 2,5-3,5 production target
- CS 4-5 Obese


Don’t push the growth


Fat and muscular developmet differs between sexes. Testosterone is the drivers muscluar synthesis. Strong muscling is indicator of sex drive and fertility in bull. Smooth muscling is most desireble in females.


The phenotype is important
0219



Condition score

- Condition score at calving 3,0
- Calf vigour
- Colostrum
- Milk yield

Udder quality

- Udder above hocks
- Even shape
- Good, lasting attachements
- Good shape teats

The probability that a beef cow stays in the herd for a long time increases if:

1) Calves easily, in regular interval
2) Maintains her fertility
3) Is an effortless & problem free adaptator

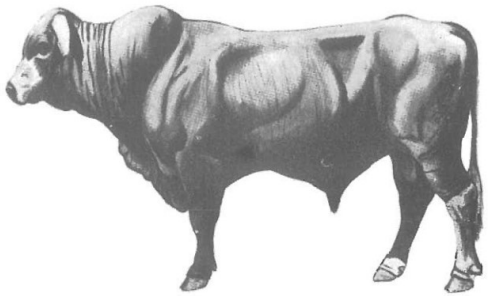
Temperament

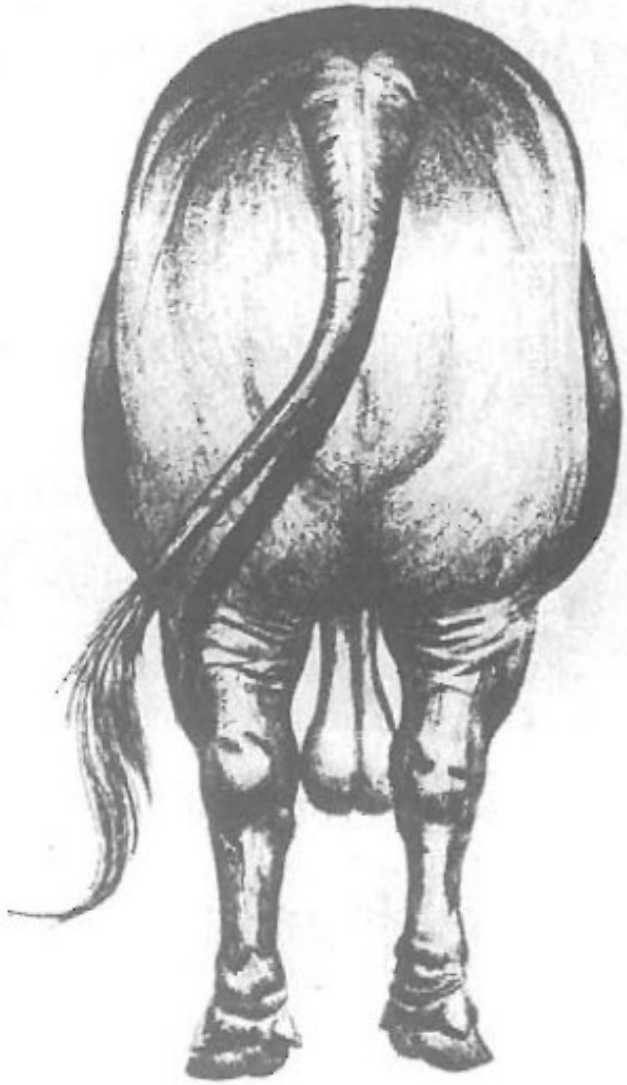
- Sufficent docility and concentration
- Relationship with the caretaker
- Oxytocin

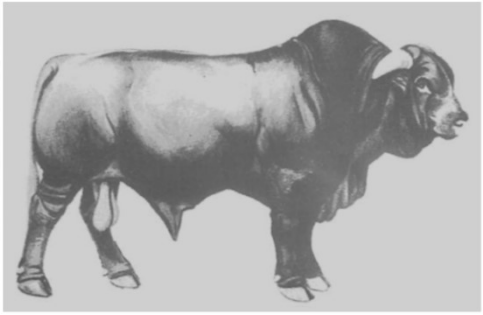
Calving ease conformation

- Volume
- Pin width
- Hip lenght, width and structure
- Good feets, leg and claw structure

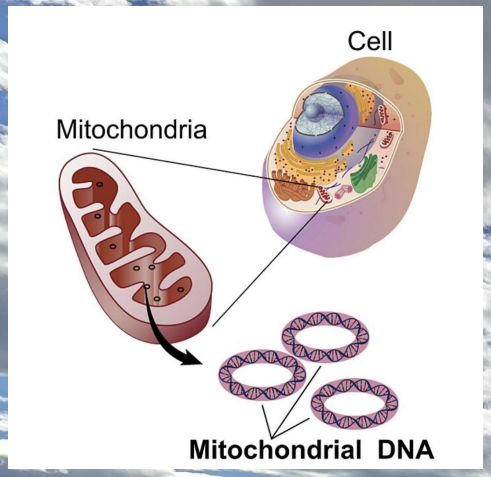

Know what you bring and use in your herd







Bonsma 1985



- Nuclear DNA carries the genetic information for the development and function of each organism
- 3 generations back in the pedigree DNA is inherited from 7 sires and 7 dams

- Mitocondrial DNA (mDNA) is inherited only from the mother

- Is the prepotency of certain important function traits in beef cow production inherited by mDNA?

Montana Judgement 1038 Reg: AAA +*20193391 Bull

[AMF-CAF-D2F-DDF-M1F-NHF-OHF-OSF-RDF]

Birth Date: 02/14/2021 **Tattoo:** 1038
Parentage: SNP **Genomic:** Angus GS **Genomic Prog:** 93
Parents Qualified
Breeder: 1129279 - Montana Ranch LLC, Bigfork MT
First Owner: 1129279 - Montana Ranch LLC, Bigfork MT
Owner(s): 582532 - Vision Angus, Amherst CO
1129279 - Montana Ranch LLC, Bigfork MT
1334714 - Mangell Inc, Madera CA

	S A V Rainfall 6846	Coleman Charlo 0256	AAA #+*16879074[RDF]
		AAA +*18578963 [RDF]	
Square B Atlantis 8060	AAA +*19405249 [RDF]	S A V Blackcap May 4136	AAA *14739095
	Elbanna of Conanga 1209	Connealy Consensus	AAA #*15513367
		AAA 17029025	
		Elbasta of Conanga 9703	AAA 16449958
	Connealy Final Product	Connealy Product 568	AAA *15148584
		AAA #*15848422	
Mill Brae FP Joanie 3063	AAA #17630369	Ebonista of Conanga 471	AAA #14220178
	Mill Brae FA Joanie 9263	S A V Final Answer 0035	AAA #*13592905[RDF]
		AAA #16429762	
		Mill Brae Joanie Ferd 903	AAA +13584300

Mill Brae Benchmark 9016 Reg: AAA +*19503604 Bull

[AMF-CAF-D2F-DDF-M1F-NHF-OHF-OSF-RDF]

Birth Date: 02/05/2019 **Tattoo:** 9016
Parentage: SNP **Genomic:** Angus GS **Genomic Prog:** 860
Parents Qualified
Breeder: 827769 - Mill Brae Ranch LLC, Maple Hill KS
First Owner: 827769 - Mill Brae Ranch LLC, Maple Hill KS
Owner(s): 493689 - Schaffs Angus Valley, Saint Anthony ND
827769 - Mill Brae Ranch LLC, Maple Hill KS
1129279 - Montana Ranch LLC, Bigfork MT

	Connealy Confidence 0100	Connealy Tobin	AAA 15497354
		AAA #*16761479	
Connealy Confidence Plus	AAA #*17585576 [RDF]	Becka Gala of Conanga 8281	AAA 16204725
	Elbanna of Conanga 1209	Connealy Consensus	AAA #*15513367
		AAA 17029025	
		Elbasta of Conanga 9703	AAA 16449958
	Connealy Final Product	Connealy Product 568	AAA *15148584
		AAA #*15848422	
Mill Brae FP Joanie 3063	AAA #17630369	Ebonista of Conanga 471	AAA #14220178
	Mill Brae FA Joanie 9263	S A V Final Answer 0035	AAA #*13592905[RDF]
		AAA #16429762	
		Mill Brae Joanie Ferd 903	AAA +13584300

Coleman Resolve 7219 Reg: AAA +*19102305 Bull

[AMF-CAF-D2F-DDF-M1F-NHF-OHF-OSF-RDF]

Birth Date: 06/27/2017 **Tattoo:** 7219
Parentage: SNP **Genomic:** Angus GS **Genomic Prog:** 67
Parents Qualified
Breeder: 103888 - Coleman Angus, Charlo MT
First Owner: 103888 - Coleman Angus, Charlo MT
Owner(s): 103888 - Coleman Angus, Charlo MT
443449 - Pine Coulee Angus Ranch, Absarokee MT
1278488 - Sandford Ranches LLC, Greenwood TX

	Rito 707 of Ideal 3407 7075	R R Rito 707	AAA #5770651[RDF]
		AAA +13066860 [RDF]	
S A V Renown 3439	AAA #+*17633839 [RDF]	Ideal 3407 of 1418 076	AAA 12001645
	S A V Blackcap May 4136	S A V 8180 Traveler 004	AAA #13512009[RDF]
		AAA *14739095	
		S A V May 2397	AAA #+14140872
	Connealy Onward	Connealy Lead On	AAA #13447282
		AAA #*14216491	
Coleman Donna 714	AAA +*15706882	Altune of Conanga 6104	AAA 13169198
	Coleman Donna 386	Basin Rainmaker 654X	AAA #11115794
		AAA +*14800153	
		KMK Donna J311	AAA +13642847

Sitz Resilient 10208 Reg: AAA *19057457 Bull

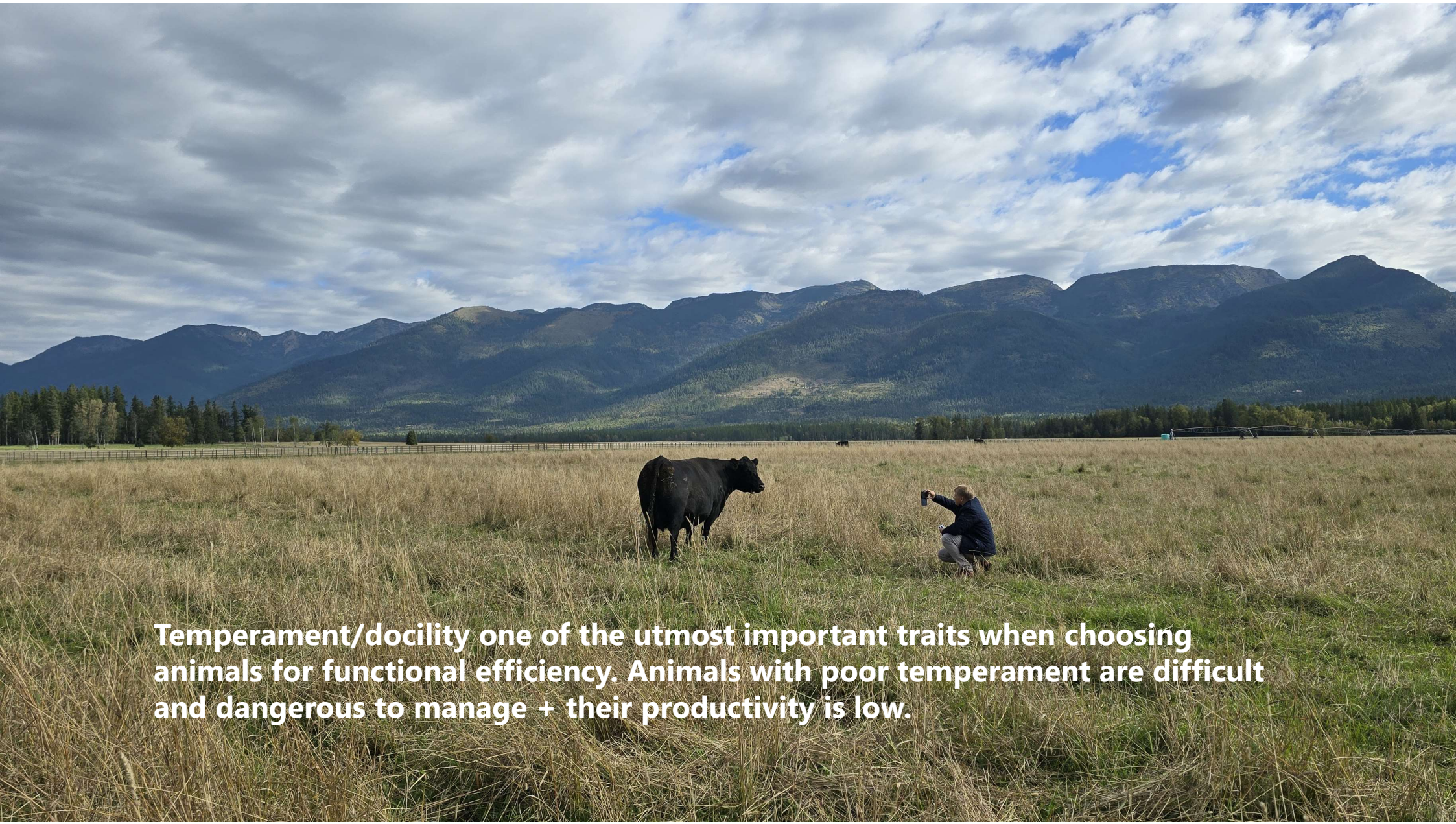
[AMF-CAF-D2F-DDF-M1F-NHF-OHF-OSF-RDF]

Birth Date: 02/15/2018 **Tattoo:** 10208
Parentage: SNP **Genomic:** Angus GS **Genomic Prog:** 7954
Parents Qualified
Breeder: 517050 - Sitz Angus Farm, Harrison MT
First Owner: 517050 - Sitz Angus Farm, Harrison MT
Owner(s): 25508 - Bar J V Angus Ranch, Fairview MT
277427 - Dan E Ingalls, Casper WY
346411 - Lunds B Bar Angus, Wibaux MT

	Mohnen Substantial 272	Benfield Substance 8506	AAA #*16207085
		AAA #*17292558	
Sitz Stellar 726D	AAA #*18397542	Mohnen Glyn Mawr Elba 1758	AAA 16396059
	SITZ Pride 200B	Connealy Final Product	AAA #*15848422
		AAA *17776820	
		Sitz Pride 308Y	AAA #+*17050218
	Sitz Top Game 561X	GDAR Game Day 449	AAA #+14691231[RDF]
		AAA #*16559105	
Sitz Miss Burgess 1856	AAA *18395931	Sitz Pride 88T	AAA #15636920
	Sitz Miss Burgess 4381	Sitz Rainmaker 10899	AAA 16266466
		AAA 16934054	
		Sitz Miss Burgess 1609	AAA 13263870

- **Consistent type**

- **Predictable outcome**



Temperament/docility one of the utmost important traits when choosing animals for functional efficiency. Animals with poor temperament are difficult and dangerous to manage + their productivity is low.

Evaluate regularly, cull strictly

At weaning, 6 months

- Poor growth, age, size (eliminate extremes)
- Poor structure (individual, dam, breeding line)
- Poor temperament
- Does not fit in the group (mobbed individual)
- Problems in the breeding line (morbidity, ectoparasites ect.)
- It is advisable to keep 30-40 % more than needed in this age group

Before breeding, 12-15 months

- Poor growth, has not reached the target growth
- Delayed puberty
- Structure problems (pelvis structure!)
- Poor temperament
- Does not fit in the group (mobbed individual)
- Problem behaviour

After pregnancy testing, >15-19 months

- Open, or late pregnancy
- Structure problems (pelvis structure!)
- Poor temperament
- Does not fit in the group (mobbed individual)
- Problem behaviour
- Does not reach calving weight
- Does not keep the CS

- Be critical on what and when you will want to calve
- The aim should on a short calving period
- The target should be a even group of calving animals and even group of calves

Take home message

- Aim for a **short breeding season** = results in short calving season = 43 days
  - Use both AI and breeding bull for all cows
- Aim for **functional animals**
  - Good structure
  - Good movement
- **Choose animals which suit your production environment**
  - Guard fertility
- **Don't buy your breeding bulls with out seeing the bull and it's dam**
- Breeding values should be seen as **tools** on which animal performance level is evaluated in different traits
  - Keep the balance
  - Remember that the genotyped information is not sufficient = **measured traits**
  - **Everything cannot be seen in the numbers**
- **The most important functional traits (eg. mothering ability) are very challenging to create a breeding value**
  - At the moment even **fertility** is not evaluated in most breeding value schemes
  - Remember the **antagonisms**
  - **The most functional animals** can be mainly selected by **the breeders' own knowledge** of the herd
  - Remember the **pedigree**
- **Every herd should have a breeding plan**
  - Follow the plan, **cull strictly**
  - The cows and bulls should be working for you = no free rides


Thank You!