

Utilizing Reproductive Tract Scoring and Managing Bull Fertility



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Reproductive Efficiency

Optimize pregnancy rates
early in the breeding season
and select/develop
replacement heifers that are
highly fertile at the lowest
cost possible, to maximize
longevity



Reproductive Efficiency

=

Management

+

Selection Pressure

+

Nutrition & Health

+

Reproductive Technologies



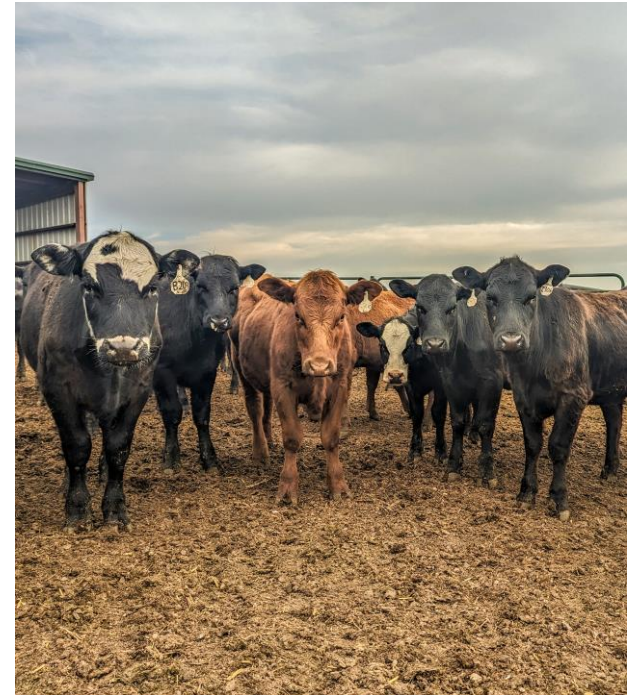
How can we evaluate reproductive efficiency?

- Maintaining records of number of females exposed (AI or bulls)
- Date when bulls were turned in and removed
- Number of calves weaned or weaned calf percentage
- Pregnancy rate (number pregnant/number exposed)
- Calving distribution
 - What proportion calved by day 21, 42, and 63

Provides insight into the success of the current reproductive management program

Criteria that heifers should meet...

- ✓ What has the pregnancy rate in your heifers been over the past few years?
- ✓ What is the calving distribution of your heifers and young cows the past few years?
- ✓ Have you selected an appropriate target weight? Do you have a nutritional management plan?
- ✓ What proportion of your heifers have a reproductive tract score of ≥ 4 ?

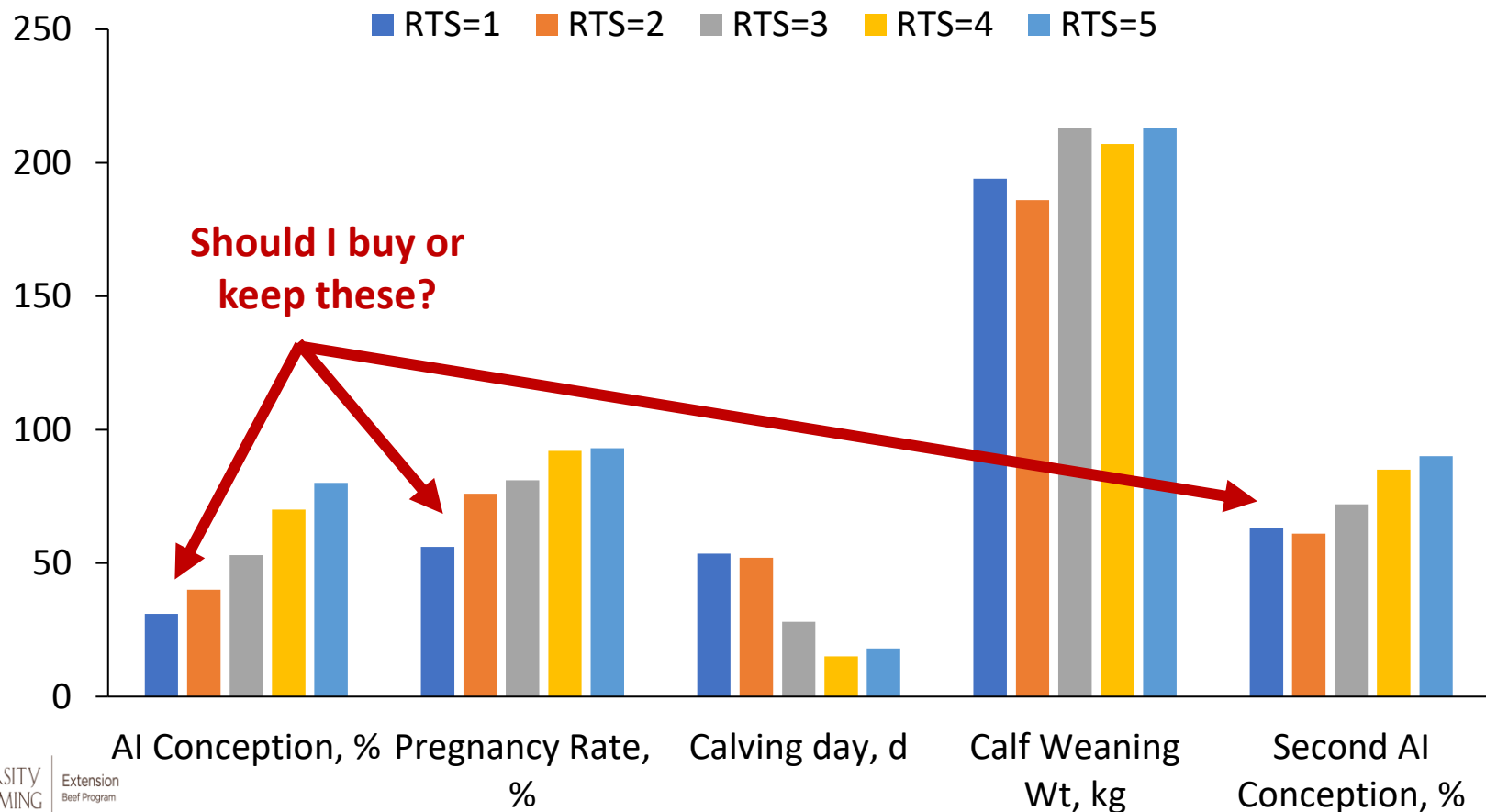


Reproductive tract score

- Reproductive tract score (RTS) accounts for:
 - Uterine horn diameter
 - Ovarian size
 - Structure present on ovary

		Ovaries			
Reproductive tract score	Uterine Horns	Length, mm	Height, mm	Width, mm	Ovarian structures
1	Immature, <20 mm in diameter, no tone	15	10	8	No palpable follicles
2	20 - 25 mm in diameter, no tone	18	12	10	8 mm follicles
3	25 - 30 mm in diameter, slight tone	22	15	10	8 -10 mm follicles
4	30 mm in diameter, good tone	30	16	12	> 10 mm follicles, CL possible
5	>30 mm in diameter, good tone	>32	20	15	>10 mm follicles, CL present

Relationship between reproductive tract score (RTS) and heifer performance



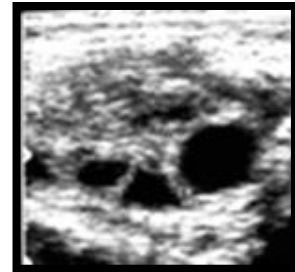
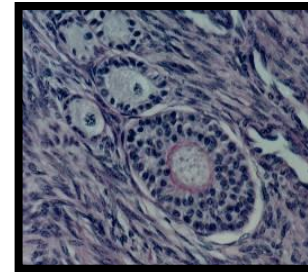
Antral Follicle Count

- Method of predicting ovarian reserve (Ireland et al., 2008)
- Determined via trans-rectal ultrasonography of the ovary
- Number of follicles growing within an estrous cycle wave is highly repeatable (Burns et al., 2005; Ireland et al., 2007)
- Follicles classified into 3 categories:
 - High ≥ 25
 - Moderate 16-24
 - Low ≤ 15

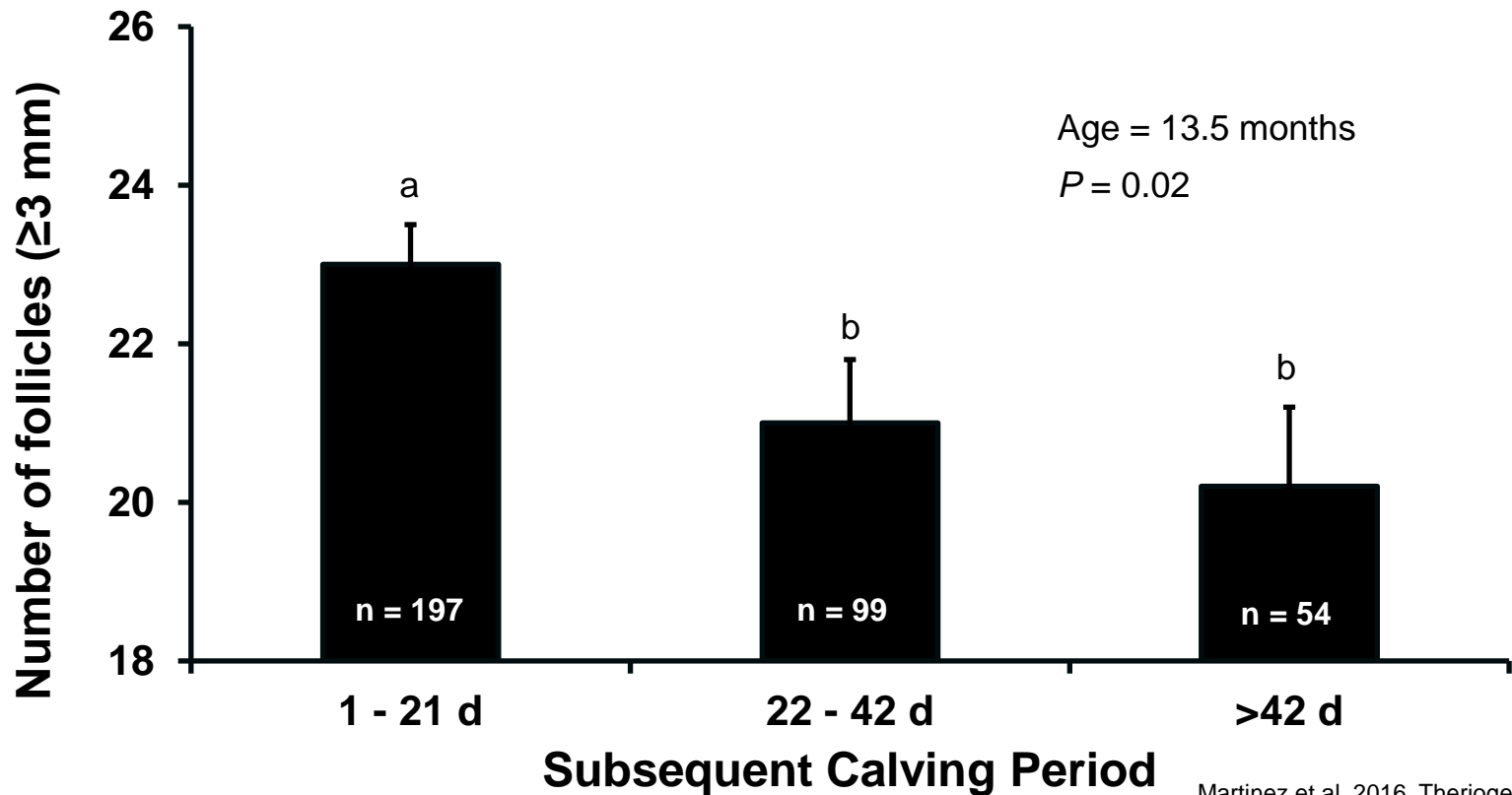


Antral Follicle Count

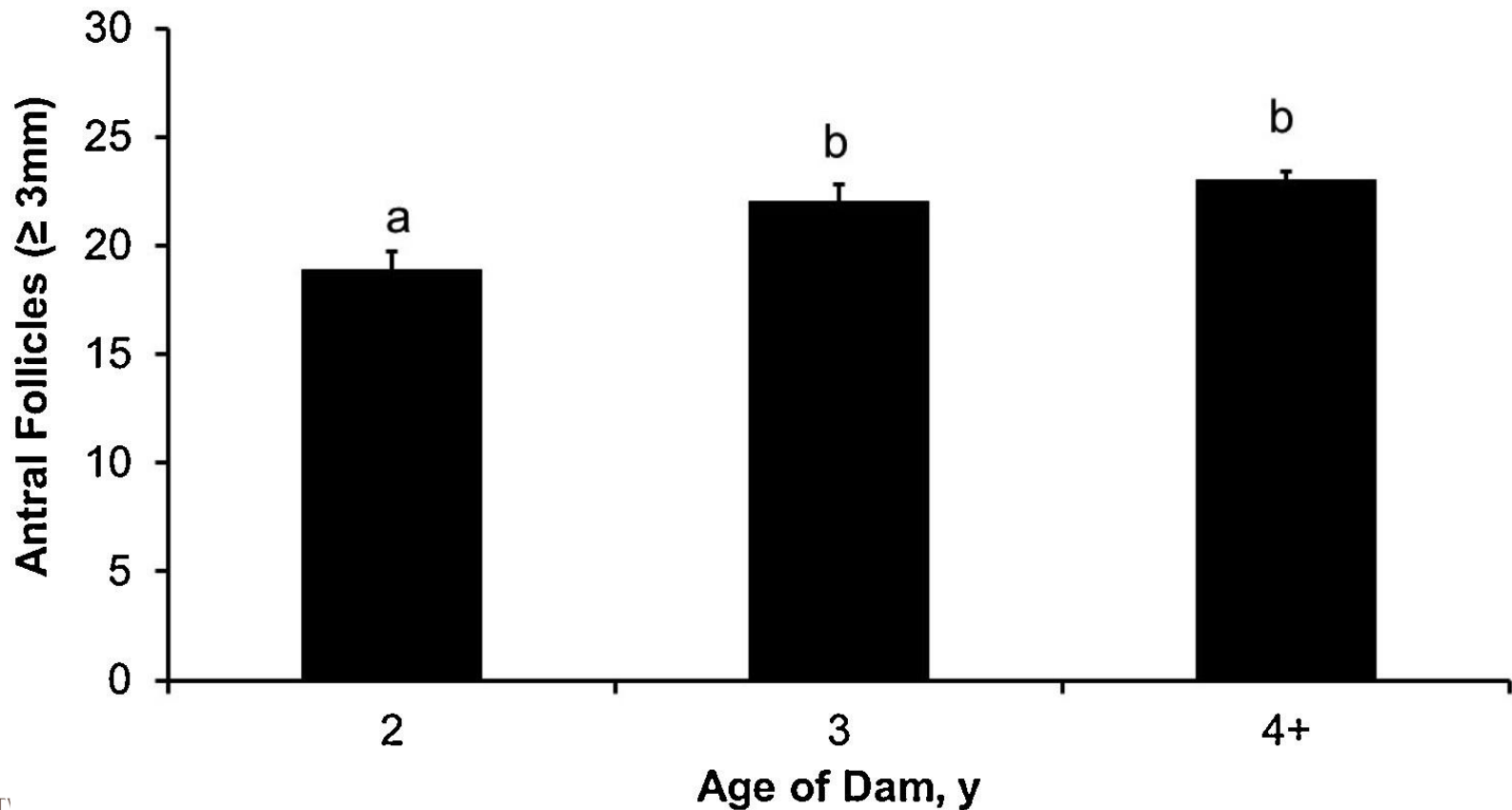
- Allow us to predict ovarian reserve (Ireland et al., 2008)
- Highly repeatable within individual (Burns et al., 2005; McNeel et al., 2017)
- High AFC heifers are more fertile (Cushman et al., 2009; Mossa et al., 2012)
- Heritability is reported to be moderate to high (Walsh et al., 2014)



Cross-bred beef heifers with lower numbers of follicles conceive later



Age of dam influenced the number of antral follicles detectable by ultrasonography



Goal of Beef Cow-calf Production

- To wean one healthy, heavy calf with the greatest genetic potential to perform per cow, every year

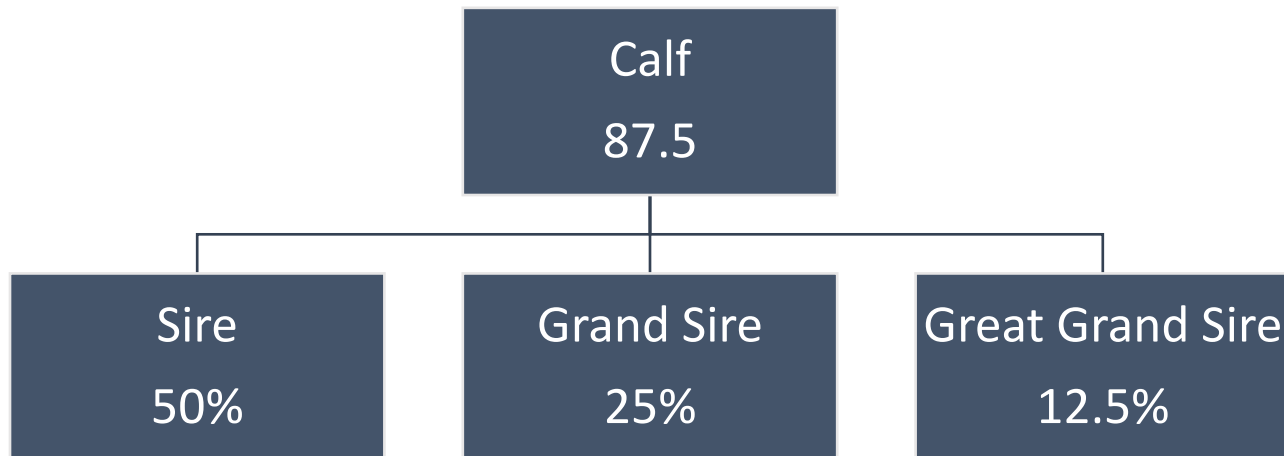


Recipe for a calf



Bull Fertility

- 87.5% of the genetic makeup of a calf crop is determined by the last 3 bulls used



Bull Fertility

- Essential Attributes of Fertility
 - Physically capable to mate
 - Capacity to produce spermatozoa/sperm
 - Functionally normal spermatozoa
- Breeding Soundness Exam - BSE



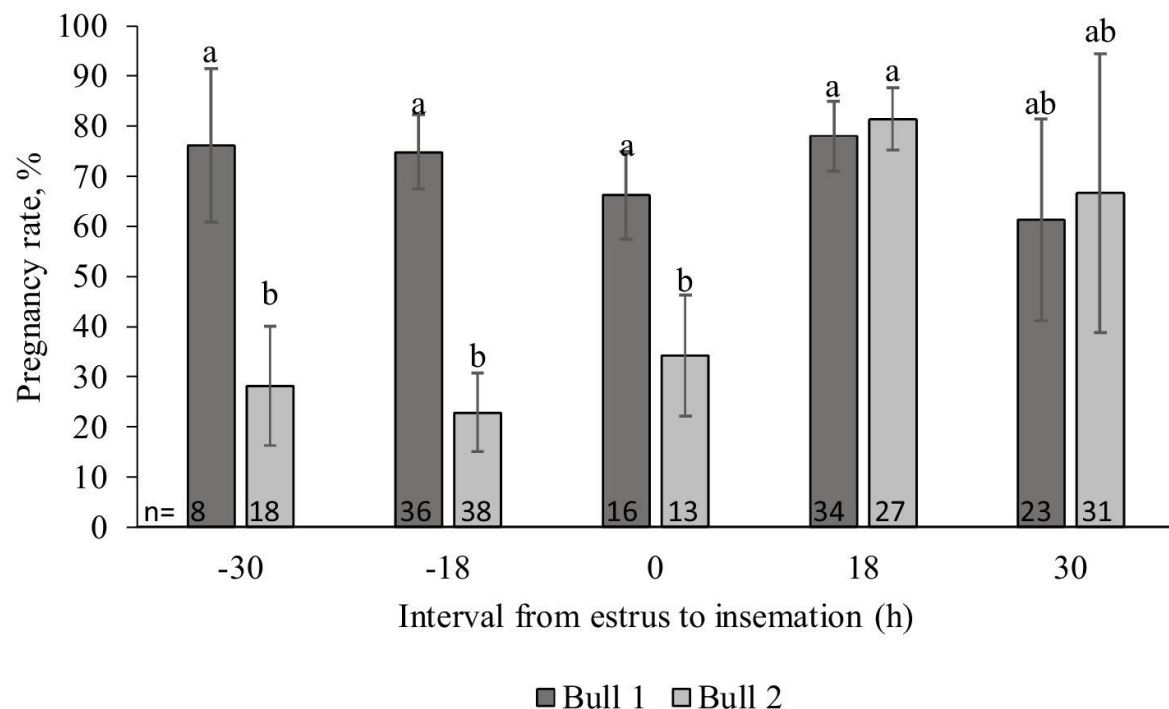
Image from All West/Select Sires

Breeding Soundness Exam

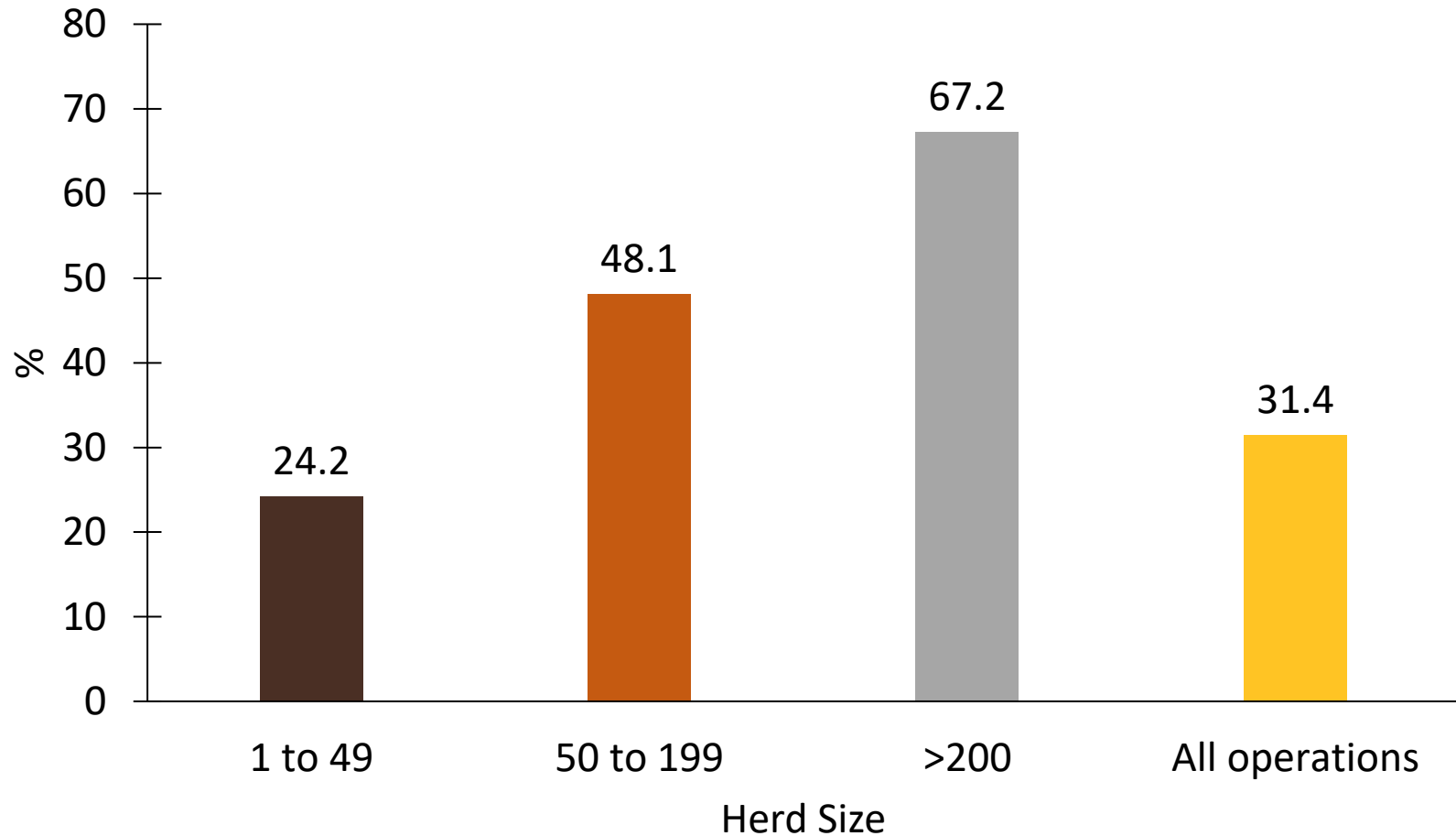
- What is the goal of a breeding soundness exam (BSE)?
 - Identify infertile bulls
 - Can identify subfertile bulls but limited based on current standards
- Pass/Fail Exam
- When do we need to perform a BSE?
 - Need to do one every year
 - 30-60 days prior to breeding season
- Bulls change from season to season
- Cheap insurance policy

Bull Fertility

- BSE is a great tool to detect sterile or infertile bulls
- It is not a guarantee that the bull has high fertility
- It does not take into account bull libido either



Breeding Soundness Exam (BSE)



Breeding Soundness Exam (BSE)

- A uniform method of assessing a bull's likelihood of establishing pregnancy in an appropriate number of open, healthy, cycling cows or heifers in a defined breeding season.
- Includes 4 components:
 - Physical Exam
 - Scrotal circumference
 - Sperm motility
 - Sperm morphology



Breeding Soundness Exam – Why? When?

- Economically, it has shown to pay over \$17/cow return when you invest in bull BSE
 - If a bull is exposed to 30 cows.....\$510
 - Checking bulls, so they can do their job
 - Make sure nothing is wrong with them physically or with sperm production
- When should we do a BSE?
 - Individual ranch decides
 - Before purchasing the bull
 - Before the breeding season
 - After the breeding season (?)

****Keep in mind the length
of the spermatogenesis
cycle.... 61 days**

What are we evaluating?

- Physical exam
 - Eyes
 - Teeth & mouth
 - Body condition
 - Feet & legs
 - Sheath → confirmation, deformities, abscess, etc.
 - Penis → extension, deviations, persistent frenulum
 - Testes → size, symmetric
 - Internal accessory glands → Prostate, Ampulla, Seminal vesicles (vesiculitis is fairly common in bulls asymmetry or pain associated with palpation), Inguinal rings
- Sperm motility
- Sperm morphology

What are we evaluating?

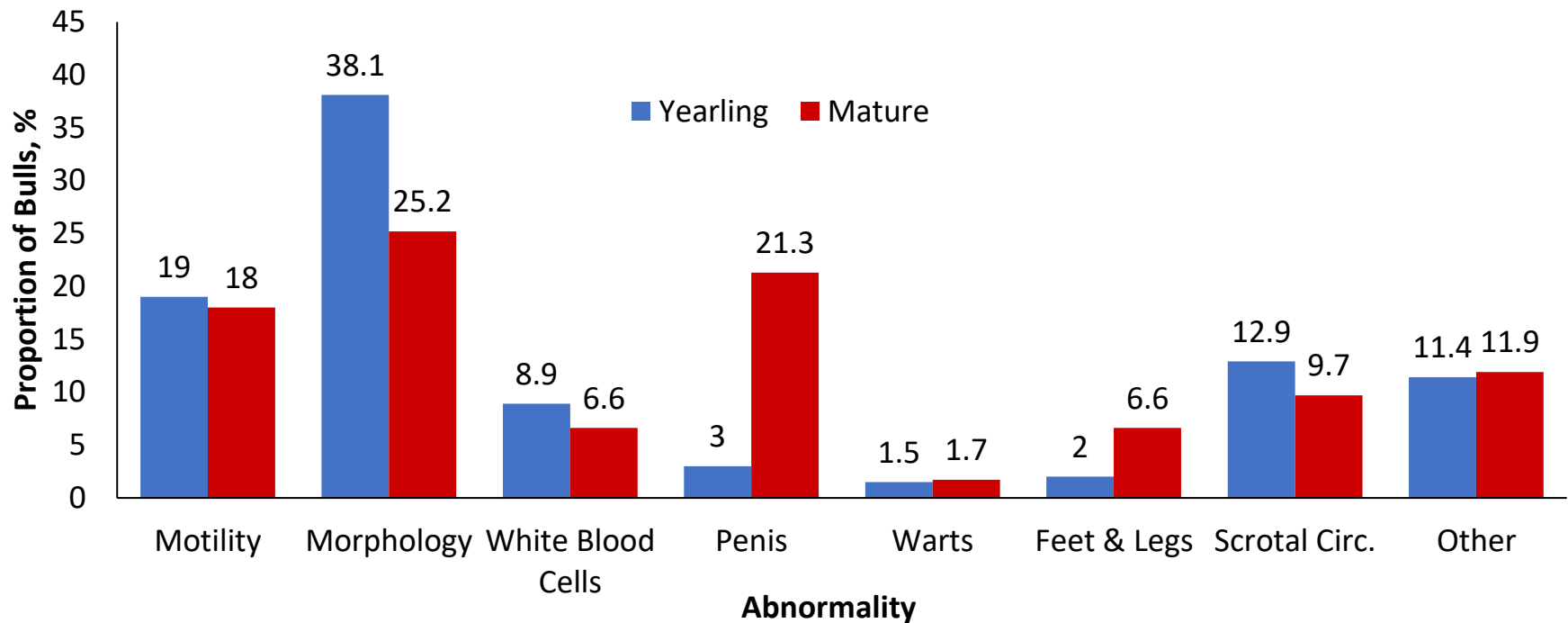
Age (months)	<15	15-18	19-21	22-24	>24
Minimum Scrotal Circumference (cm)	30	31	32	33	34

Motility		
Gross Activity	Individual Activity	Rating
Rapid Swirling	~70%	Very good
Slower Swirling	50-69%	Good
Generalized Oscillation	30-49%	Fair
Sporadic Oscillation	<30%	Poor

Morphology
Minimum is 70% normal sperm heads

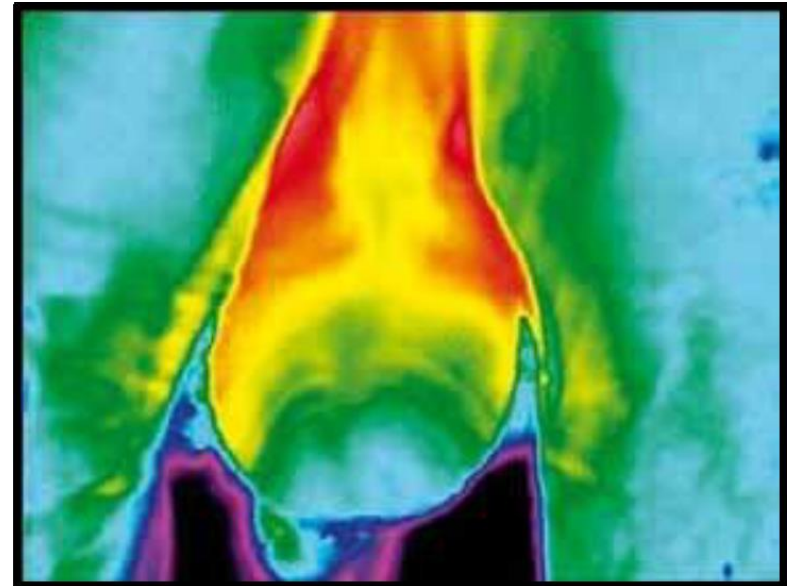
Goal for examining morphology is to determine the % and types of sperm abnormalities present in a sample and record morphology

Reasons for BSE failure in yearling and mature beef bulls



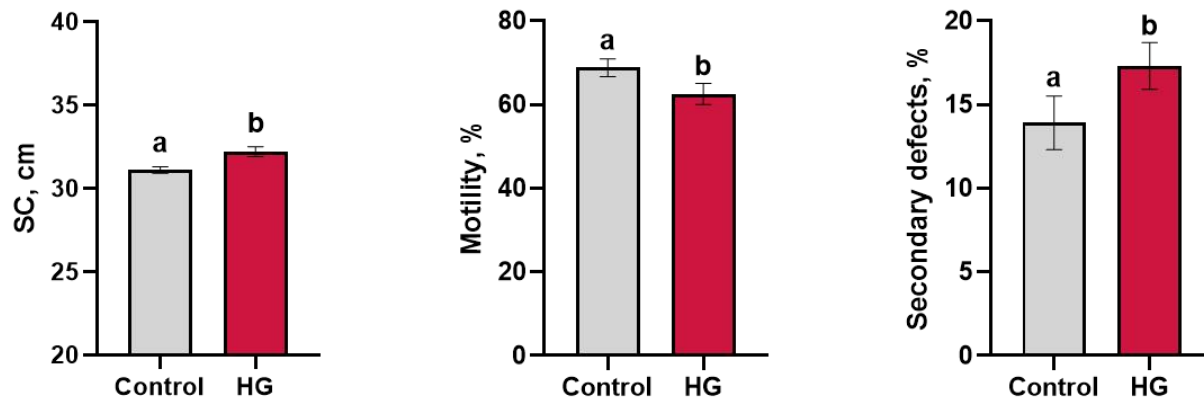
Impacts of Post-weaning Diet on Semen Quality

- High energy diets fed post-weaning influence scrotal growth and semen quality
 - ↑ scrotal circumference
 - ↓ total sperm production
 - Delay epididymal transport
 - ↓ progressive motility
 - ↑ spermatozoa morphological abnormalities
 - ↑ scrotal temperature
 - Scrotal adiposity

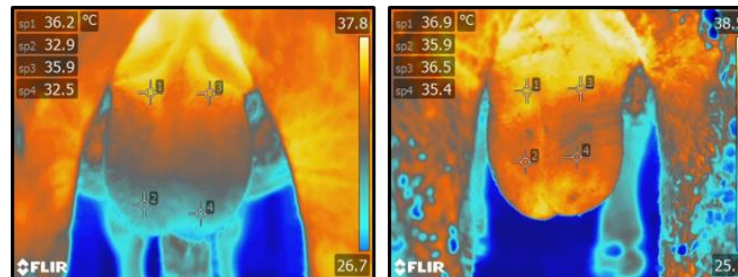


Impact of feeding young bulls a moderate-gain diet primarily comprised of forage (Control) versus a high-energy diet consisting of 80% concentrate and 20% forage (High Gain) for a period of 168 days after weaning

A



B



Coulter et al., (1997)

The Breeding Season and Bull Plane of Nutrition

- Variation in bull workload
 - Ranged from 4 to 80 females per bull (Dahlen and Stoltenow, 2015)
- Weight loss during the breeding season
 - Can be from 100 to 400 lbs(Boyles et al., 2011; Walker et al., 2009; Hersom and Thrift, 2008)
- Weight gain before next breeding season
 - Must regain BW in preparation for subsequent breeding season (Barth, 2013)

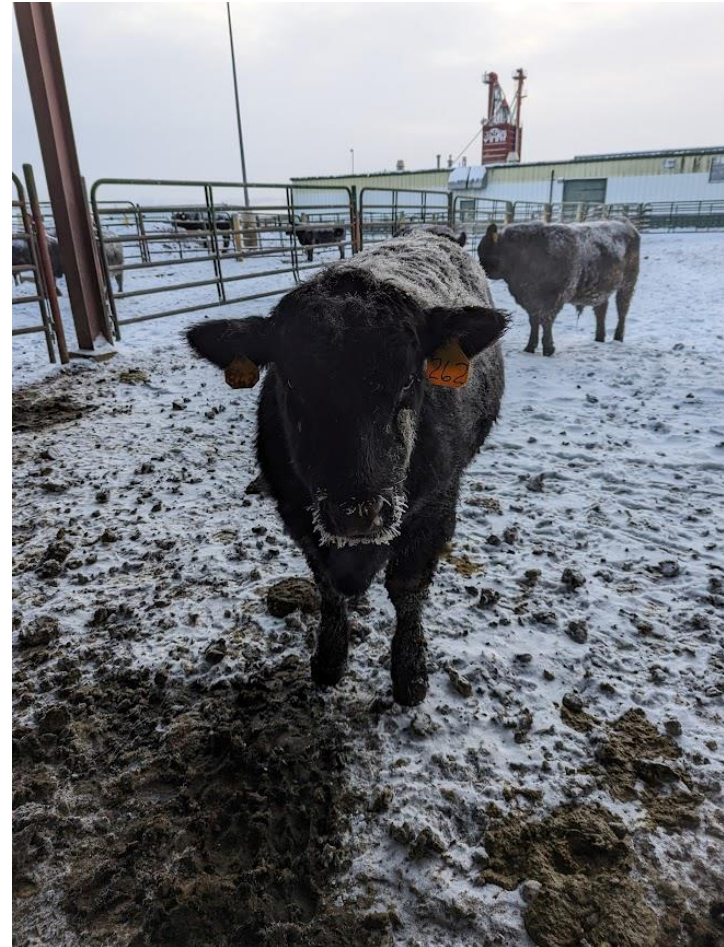
Bull Management During the Off Season

- Plane of nutrition impacts mature bull fertility
- Bulls should be maintained at a BCS of 5 or 6
- Good mineral program
 - Selenium critical for normal spermatogenesis
 - Zinc plays role in male fertility
 - Critical for sperm-cell plasma membrane integrity, tail morphology and thus motility

Bull Management During Winter

Where do bulls go over winter?

- A. Bull pasture
- B. Dry lot
- C. Stay out with the cows
- D. Crop residue
- E. Other



Cold Weather Impacts on Fertility

- Low temperatures and windy conditions can easily increase feed requirements 25 to 30 percent above normal maintenance requirements
 - Lack of wind protection and/or bedding will increase the chance of frost damage to the scrotum and testicles
- Cold weather and wind chill can result in bull infertility
 - Tissue Damage
- Can cause blisters and scabs from frostbite
- Frostbite will appear as discoloration, a scab, and/or sloughing of the lower scrotal portion
 - Spermatogenesis takes 61 days
- Reevaluate bulls with BSE 45

Effect of severity of frostbite on semen quality in bulls

Soundness Score	Severity of Frostbite		
	Mild	Moderate	Severe
Satisfactory (%)	89.5	48	2.1
Questionable (%)	9.5	25.3	9.2
Unsatisfactory (%)	1	26.7	88.7

Take Home Message...

- Nutritional management of bulls is critical → consider the genetic contribution of bulls to your cowherd - his fertility is important
- Over-conditioning can have detrimental effects on semen quality
- Consider performing a BSE 30-60 days before the breeding season to identify subfertile bulls

University of Wyoming High Altitude Bull Test and Sale

1. Evaluate potential sires on their ability to serve producers at high altitude
 2. Increase applied production agriculture experience available for students
 3. Engage producers in research and education related to brisket disease and bull development
- Second annual test currently underway (November 2023 – March 2024)
 - 79 bulls (Angus, Charolais, Red Angus, Hereford, Simmental, Shorthorn)
 - 45-day screening period, 70-day feed efficiency test, PAP testing, carcass ultrasound, breeding soundness exam
 - Creation of marketing materials – flyers, sale catalog, videos, etc.
 - Fall and Spring undergraduate course
 - 16 students currently enrolled
 - Extension field day and sale on March 9th
 - Online/live sale

University of Wyoming Brisket Disease Survey

- Anonymous survey for cow/calf and feedlot producers on characterization of brisket disease and risk factors
- <https://bit.ly/brisket-disease-survey>



Thanks!!



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Beef Extension Website
coming soon!!!