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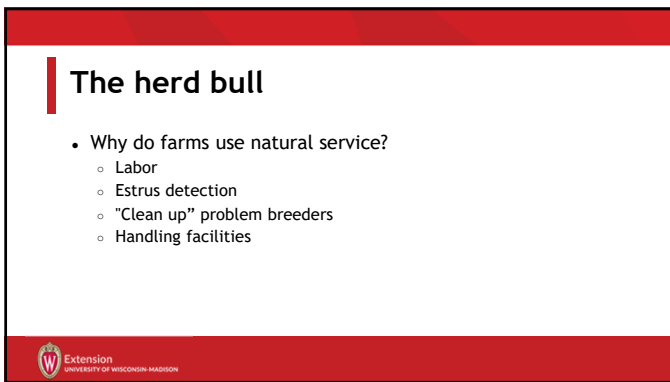
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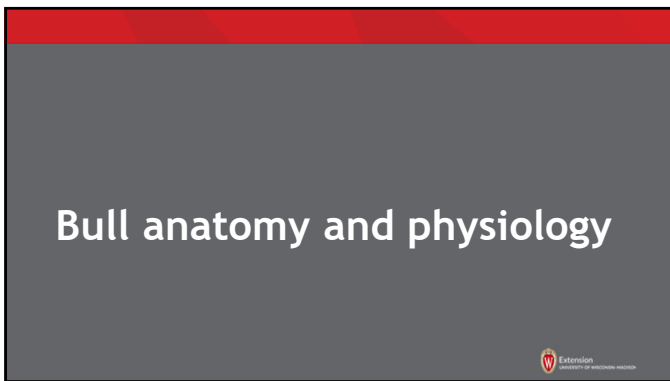
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## Male anatomy

The male reproductive system functions are to:

- Produce sperm
- Produce testosterone
- Ejaculate semen

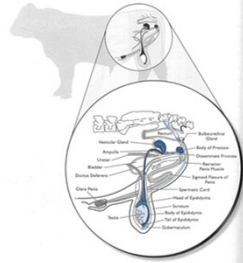


Photo source: Pathways to Pregnancy and Parturition

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## Scrotum functions

- Thermosensor
- Cooling
  - Heavily populated with sweat glands
  - Evaporative heat transfer
- Protection
  - Raises and lowers testis

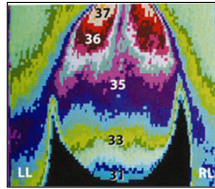


Photo source: Pathways to Pregnancy and Parturition

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## Testis

- Main reproductive organ
- Produces:
  - Sperm
  - Hormones
  - Proteins and fluids



Photo from: Pathways to Pregnancy and Parturition

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## Epididymis

- Four functions:
  - Transport of sperm cells
  - Concentration of sperm
  - Maturation of spermatozoa
  - Storage of viable sperm

Location	Spermatozoal characteristics	Image
Head	<ul style="list-style-type: none"> <li>• Not mobile</li> <li>• Not fertile</li> <li>• Proximal cytoplasmic droplet</li> </ul>	
Body	<ul style="list-style-type: none"> <li>• Some expression of motility after dilution &amp; fertility</li> <li>• Translocating cytoplasmic droplet</li> </ul>	
Tail	<ul style="list-style-type: none"> <li>• Expression of normal motility after dilution</li> <li>• Fertile potential</li> <li>• Distal droplet</li> <li>• Can bind to oocytes</li> </ul>	

Photo source: Pathways to Pregnancy and Parturition



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## Sperm transit time in epididymis

Time in specific areas of epididymis				
	Total Time	Head	Body	Tail
Days	14	2	2	10



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## Penis

- Copulatory organ
- Three parts:
  - Base: Attachment point
  - Shaft: Main portion
  - Glans: Specialized end

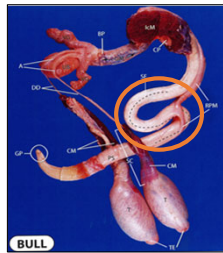


Photo from: Pathways to Pregnancy and Parturition



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## Sperm production

- Cells of the testis:
  - Leydig Cells: Produce testosterone
  - Sertoli Cells: "Governors" of development
  - Germ Cells: Become sperm



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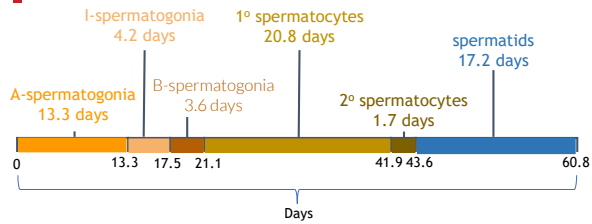
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## Sperm production



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## Breeding soundness and fertility



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## Factors affecting bull fertility

- Structural soundness: feet, legs
- Capability of reproductive organs: age of the bull
- Semen quality: health, environmental temperature
- Level of libido
- Plane of nutrition



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## Breeding soundness exam

- Assessment of body condition and mobility
- Physical examination
  - Palpation to detect abnormalities
  - Scrotal circumference
- Examination of semen
  - Count
  - Motility
  - Morphologically



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## Breeding soundness exam

- Conducted by a veterinarian
- Recommended:
  - Yearly
  - New bulls
  - If infertility or pathogen is suspected



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## Libido

- Sex drive
- Measure serving capacity
- Social interactions - social dominance



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## Plane of nutrition

- During breeding season bulls on pasture tend to eat less
  - Use body fat
  - Lose up to 150 lbs
- Pre-breeding nutrition is essential
- Acclimate to ration if in confinement



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## Cow to bull ratio

Bull Age	Number of Cows
Yearling	15-20
2 Years Old	20-30
3+ Years Old	30-40

\* Social effects, ration, and footing may affect these numbers in confinement housing  
Source: Ontario Ministry of Agriculture and Food



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## Scrotal circumference

- Size (circumference) of testicles ~ sperm production



Photo credit: H. Schlessel

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## Scrotal circumference requirements

Minimum requirements to pass Bull Breeding Soundness Exam

Age of bull	Scrotal circumference
≤ 15 months	30 cm
15-18 months	31 cm
18-21 months	32 cm
21-24 months	33 cm
> 24 months	34 cm

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## Capability of reproductive organs

Limited testicular movement:

- Fat pads
- Scar tissue
- Small scrotum
- Soft testicles = degeneration of tissue
- Small testicles = unsatisfactory development

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## Common penile problems

- Spiral deviation: twisted instead of straight
- Persistent frenulum: tip of penis remains attached to sheath and cannot be extended
- Penile hair rings: band of hair encircles the penis



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## Semen quality

Criteria to evaluate:

- Sperm Morphology - Structure
- Sperm Motility - Progressive forward travel
- Poor semen test on bull < 15 months not reliable
  - May improve up to 4 months after puberty



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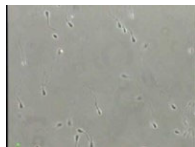
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## Semen quality



25% motility



100% motility



Video courtesy of Dr. John Parrish

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## Common abnormalities in bovine sperm

**Head Abnormalities**

**Tail Abnormalities**

Source: Pathways to Pregnancy and Parturition

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# Heat and cold stress

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## Heat stress and the bull

**Negative impacts**

- Semen quality
- Sperm development & production
- Libido

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## Effects of high testicular temperature

- Reduced sperm motility
- Reduced embryo survival
  - Implies DNA in sperm is damaged by heat



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## Heat stress and sperm production

- Damage to sperm during heat stress events don't show up for 14 - 28 days
- It takes 42 - 84 days for normal sperm production to resume



Reproductive Skills Module

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## Effects of cold weather

- Decreased sperm development and production
- Frost bite on scrotum



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**Herd bull health and worker safety**



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**Herd concerns with using a bull**

- Dominance issues when multiple bulls are used
- Difficulty with multiple females in heat
- Fertility
- Co-housed with lactating herd
- Venereal disease



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**Venereal disease**

Can cause:

- Failure to conceive
- Pregnancy loss / abortions

<b>Bacteria</b>	<b>Viruses</b>
<i>.Trichomoniasis</i>	<i>.Bovine Viral Diarrhea (BVD)</i>
<i>.Vibrio</i>	<i>.Bovine Herpes Virus</i>
<i>.Mycoplasma</i>	
<i>.Ureaplasma</i>	
<i>.Hemophilus somnus</i>	



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## Safety

- Bulls are a safety threat: use caution!
- Clearly identify pens that have bulls
- Anyone needing to enter should be warned

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## Signs of aggression

- Lowering and shaking head
- Arched back
- Side profiling
- Pawing at ground



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## What makes dairy bulls different

- Lack of socialization
- Familiarity with people
- Never play with a bull

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**Summary**

Semen production

- Spermatogenesis is affected by extreme temperatures
- Abnormal sperm motility and morphology affect fertility
- Excessive ejaculations can deplete sperm reserve and decrease fertility
- Sperm production is a long process, taking 61 days

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**Summary**

Bull performance and safety

- Sound feet and legs are essential
- Nutrition
- Age
- NEVER trust a bull

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**DAIRY WORKERS'**

TRAINING MODULE 2

**REPRODUCTIVE SKILLS**

Bulls

DAIRY WORKERS

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Presentation Developed by:  
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 Sandy Stultgen | Extension Agriculture Educator | Taylor County




# DAIRY WORKERS'

TRAINING MODULE 2

## REPRODUCTIVE SKILLS

Bulls



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# DAIRY WORKERS'

TRAINING MODULE 2

## REPRODUCTIVE SKILLS

Bulls



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# DAIRY WORKERS'

TRAINING MODULE 2

## REPRODUCTIVE SKILLS

Bulls



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