Vendors are encouraged to carefully consider the quality of the lots they intend to enter in the sale as lesser quality lots can be difficult to market.

Vendors who fail to abide by the Terms & Conditions of Sale shall not be eligible to sell at future sales.

CONDITION OF SALE ENTRY 2026:

Bull Entry:

1. Selling of bulls will be held on Monday, the 9th of November 2026 at 9am (**unless stated otherwise**).

2. The maximum entitlement for **Bulls** will be **six (6)**. The allocation may vary based on the number of entries per breed.

3. Restrictions on accepted entries may apply. Prospective Vendor's submission of entries to the Sale does not guarantee that all or any of the entries will be accepted for inclusion in the Sale. Any entries that do not meet the high standard required for this Sale will not be accepted or catalogued for the sale. There may be an upper limit restriction applied to new or infrequent vendor drafts, depending upon entries received. The Selling Agents reserve the right to accept or refuse entries on any basis, and no correspondence will be entered into the sale. To manage overall numbers, the committee may grant increases to vendors with 100% sale clearance and average prices above the breed's per-sale average for the next sale.

4. Selling of **Registered Sires** must be registered with a breed society, or they will be catalogued and sold as commercial herd sires.

5. The minimum age & weight for a bull to enter the sale is **18 months** & **600kg**

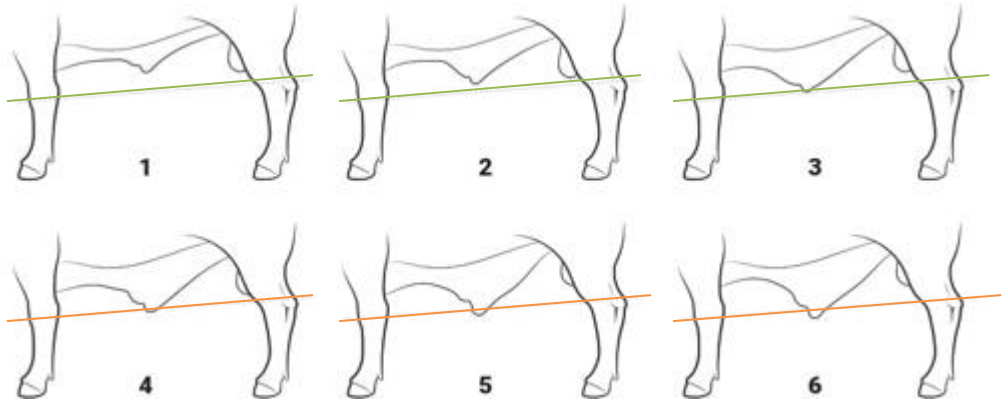
6. The maximum age for an animal to enter the sale is **30 months.**

7. All sale bulls require a Veterinary Bull Breeding Soundness Evaluation (**VBBSE**).

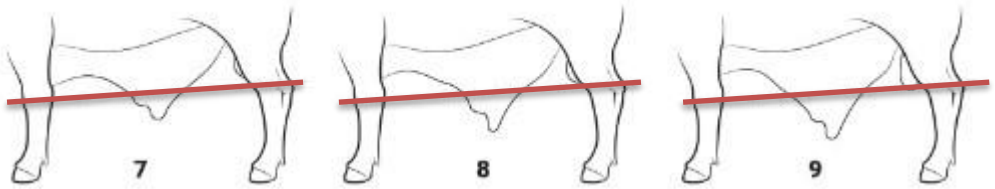
8. All used sire must be vaccinated with **Vibrovax Primary & Booster injections** and noted in the entry for comments.

9. All bulls are to be motility- and morphology-tested.
   Tick = 60% or better Motility & 70% or better Morphology
   Qualified = 30% or better Motility & 50% or better Morphology
   Morphology samples to be sent to Gener8 Reproduction Charters Towers for testing.

10. Sale bulls with **Sheath Depth** score of **1 to 6** will be accepted in the sale.



11. Sale bulls with **Sheath Depth** score of **7 to 9** will **NOT** be accepted in the sale.



12. Minimum Scrotal size (circumference, measured in cm) will be measured by the live weight (kg) of the sale bull, not age. As recommended by the Australian Cattle Veterinarians, "BULL CHECK"

Table 3. Minimum scrotal circumference by weight and breed.

	300	400	500	600	700	800	900
Angus	*27.5*	*31.0*	33.5	35.0	36.0	36.5	37.0
Murray Grey	*25.5*	*30.0*	33.0	35.0	36.5	37.0	38.0
Hereford	*25.5*	*30.0*	32.5	34.0	35.5	36.0	36.5
Shorthorn	*25.0*	*29.5*	32.0	34.0	35.0	36.0	36.5
Charolais	*23.5*	*28.0*	31.0	33.0	34.5	35.5	36.5
Limousin	*24.5*	*28.0*	30.5	32.5	33.5	34.0	34.5
Simmental	*27.0*	*31.0*	34.0	35.5	37.0	37.5	38.0
Waygu	24.5	27.5	29.5	31.0	31.5	32.0	32.0
Brangus	*25.0*	*29.0*	31.5	33.5	34.5	35.5	36.0
Belmont Red	*23.5*	*27.5*	*30.0*	32.0	33.0	34.0	34.5
Santa Gertrudis	*22.5*	*27.0*	*30.0*	32.0	34.0	35.0	35.5
Droughtmaster	*21.5*	*26.0*	*29.5*	32.0	34.0	35.5	36.5
Brahman	*21.5*	*25.5*	*28.5*	30.5	32.0	33.0	34.0

13. It is a condition of sale that vendors warrant that all bulls are to be sold as fertile and capable of natural service within 6 months of the date of the sale; The vendors shall refund to the Purchaser the purchase price paid (excluding any costs or expense of the purchaser) upon the purchaser providing to the vendor within 6 months of the sale date:-

a. A report from a licensed veterinarian certifying that, in his or her opinion:-
   i. The bull is infertile or incapable of natural service.
      1) There is no evidence that the bull has suffered any injury or illness subsequent to being sold to the Purchaser, which could affect his breeding ability

b. A Statutory Declaration from the Purchaser, warranting that in the opinion of the Purchaser, the facts stated in the veterinarian's report are true and correct.

Heifer Entry:

1. The registered heifer sale will be held on Sunday, the 8th of November 2026 at 6pm (**unless stated otherwise**).

2. The maximum entitlement for **Heifers** is **two (2)**. The allocation may vary based on the number of entries per breed.

3. All sale heifers "**MUST BE REGISTERED WITH A BREED SOCIETY"** to enter the sale. All **PTIC** heifers must have a vet Certificate.

4. All sale heifers require a Veterinary Breeding Soundness Evaluation (**VBSE**).

5. It is a condition of all sales that vendors warrant that all females catalogued and sold as unjoined are fertile to natural service within 12 months of sale.

6. If a female catalogued for sale has been flushed, the vendor must disclose this in the comments section of the catalogue

7. The vendors shall refund to the purchaser the purchase price paid (excluding any costs or expenses of the purchaser) upon the purchaser providing to the vendor within 12 months of the sale date:-

a. A report from a licensed veterinarian certifying that, in his or her opinion:-
   i. There is no evidence that the female suffered any injury or illness subsequent to being sold to the Purchaser, which could have affected her breeding ability; and
   ii. There is no evidence that the female has been subjected to embryo transfer procedures.

b. A Statutory Declaration from the Purchaser, warranting that in the opinion of the Purchaser, the facts stated in the veterinarian's report are true and correct.

Entry Condition For Both Bulls & Heifers:

1. All lots must have a veterinarian check and carcass scanning to enter the sale. Bulls (VBBSE) and Heifers (VBSE) are to be performed by a registered veterinarian with an accredited VBBSE number to enter the sale.

2. All sale animals must have a minimum (**Breed Standard Bundles 50K Genomic DNA Test**) standard bundle. Allflex TSUs can be purchased from Neogen Australasia, your local Allflex dealer or talk with **Shannon Speight from Black Box Co about GBVs options for Cross Breed DNA Testing.**
   https://neogenaustralasia.com.au/tissue-dna-collection/
   shannon@blackboxco.com.au Phone: 0411 780 931
   www.basepairgenomics.io

3. All sale animals must have a (**Pompes Status**) of bred-free with a breed society, or test-free with DNA verification.

4. All sale lots must be Pestivirus tested & be (**Pestivirus free**) to enter the sale.

5. All lots are to be (**Pre-Treated For Ticks**) to allow immediate inspection through clearing dips to tick-free areas. Tick pre-treatments must be nominated on Vendor Declaration forms. Vendors agree to pay all additional costs incurred by purchasers for feeding, handling, yard fees, extra inspections, dipping, and any additional transport arrangements. These charges are a result of delays in delivery to purchasers, caused by any of their lots found to be 'ticky' at a post-sale clearing dip inspection. **This will be paid out of the vendor's sale proceeds.**

6. All sale lots must be fully vaccinated this includes **primary & booster injections** if required. **Trivalent (Tick Fever 3 germ) vaccine, Ultravac 7in1, Longrange/Singvac (Botulism), BEF (Three Day)** & noted on the vendor Declaration.

7. **Trimming of hoofs will not be accepted in the sale**.

8. There will be "**NO SALE OF ANIMALS AFTER THE HAMMER FALLS".** All animals are to be sold in the ring or are deemed as a 'past in' sale. Vendors who sell animals after they are "**PAST IN**" at the sale will not be allowed to "**SELL**" at the Hughenden Bull Sale.

9. **Ear Tagging, Paint Branding and NLIS**:

a. All bulls & heifers shall be paint-branded with their lot numbers using well-stirred "**Blue**" for light coloured animals & "**White**" for dark coloured animals this will happen after weighing and scanning at the **Hughenden Show Grounds** yards.

b. The Sale Organising Committee shall supply numbered ear tags to vendors showing each animal lot number, and it shall be a condition of entry that vendors apply the lot number tags to each animal before entry to the Saleyards.

c. Ear tags are to be placed in the nearside ear where possible.

d. All animals must have an **NLIS** tag fitted before entry to the yards. NLIS reading will take place on arrival at the Hughenden Showgrounds.

10. All sale animals must be mouthed. Mouthing guidelines are as follows: "**an animal shall not be eligible**" for sale at the Hughenden Bull Sale if:

a. In the case of an animal **19 months** and under (580 days) of age on the day of inspection, it has or has evidence of having had a permanent tooth.

b. In the case of an animal **20 to 26 months** (791 days) of age on the day of inspection, it has evidence of having had more than 2 permanent teeth.

c. In the case of an animal **27 to 30 months** (913 days) of age on the day of inspection, it has evidence of having had more than 4 permanent teeth.

d. All animals must be of sound mouth.

11. Any ¾ shares, semen or embryos collected from bull or female entries in the sale must be stated at the time of entry in the comments to be printed in the catalogue.

12. Sale applications will only be accepted if the application form is signed by the vendor acknowledging that applications have been accepted on the basis that restrictions may be imposed, and agreeing to abide by the conditions of entry and the conditions of sale at the time in place; the decisions of the organising committee and/or inspectors

13. **Substitutes**: All bulls & heifers will be sold in catalogue order. Substitution of bulls or heifers for withdrawn lots or incorrect nominations after cataloguing will not be permitted. We must be notified of any changes to the sale catalogue no later than the **1st of September 2026**. **Under no conditions will there be substitutions once the catalogue has been sent to print.**

14. Entry fees are not refundable once the catalogue has been sent to print.

15. **Any outstanding invoices from vendors for Flinders Rural, Elders Stud Stock, Hughenden Bull Sale Committee, or any out services used by vendors for the Hughenden Bull Sale will be deducted and paid out of vendor sale proceeds.**

16. Sale application for entry numbers and breed will be due Monday, the **4th of May 2026** .
17. Sale entry numbers for vendors and breeds will be determined based on the application forms received, and vendors will receive their allocation numbers for the sale by the **11th of May 2026**.

18. The sale nomination entry, along with the final numbers, is due on the **13th of July 2026.**

19. The entrance fee per head that includes all marketing will be **$220 INC GST**, plus **6%** commission on the sale price. Upset action bidding price will start at **$5000**.

20. Selling agencies will be **Cody Rogers (Flinders Rural**) & Anthony Ball **(Elders Stud Stock)**

21. All sale lots must be at the Hughenden Show Grounds no later than **3.00pm Friday the 7th of November 2026.**

Sale Cataloguing

1. All sale lot information must be submitted to the Hughenden Bull Sale Committee via email **admin@hughendenbullsale.com** no later than **5.00pm 1st of September 2026.**

2. Any changes to sale lots or withdrawals of sale lots must be submitted no later then **5.00pm 1st of September** via email.

3. Along with EBVs data we will also publish any RePro Bi GBVs data that is avaible. We will need vendors permission for this to happen, for more info please contact **Shannon Speight from Black Box Co** Phone: 0411 780 931 if you wish to catalogue this information.

Thank You.

Hughenden Bull Sale Committee.
Email: admin@hughendenbullsale.com
Sale Contacts:
Gavin Webber: 0419 274 845
Cody Rogers: 0437 689 683
Anthony Ball: 0428 275 499

BULLCHECK® Veterinary Bull Breeding Soundness Evaluation

Hughenden BULL SALE

Est 2026

STANDARDISED ASSESSMENT OF BULL FERTILITY

Veterinarians are asked to assess the fertility (or likely fertility) of bulls under several common circumstances that can be divided into two broad groups: examination of a bull after an apparent failure of fertility; and examination of a bull before it is to be used. The latter is more common, but this often puts the veterinarian in a potentially difficult position because: there may be a potential conflict of interest if the examination is being carried out for a bull seller; and the veterinarian does not want to be liable if a bull declared ok is later found to have had fertility problems. Equally, veterinarians who declare a valuable bull not to be fit for sale need to have good defensible reasons for doing so.

Thus, a veterinarian making an individual judgement about whether a particular finding, based on their own personal judgment, should preclude its use takes on a degree of risk – particularly if a client might seek an alternative opinion from a different veterinarian down the track, when things have not gone well.

The 'individual judgement risk' can be reduced significantly by having a set of standards.

A veterinarian who can make an objective assessment about whether something meets or does not meet a well described, industry accepted standard is at much less risk. This is particularly so when predicting risk, as in pre-use examinations.

This book contains a set of standards, based on evidence and collective experience, and agreed upon by experienced members of the Australian Cattle Veterinarians.

The standardized way of conducting a veterinary bull breeding soundness evaluation described in this publication is known as a BULLCHECK® examination.

A satisfactory BULLCHECK® examination is not an express guarantee of fertility, but rather an indication of the risk that a bull is likely to be "fertile" in a paddock mating situation at the time of examination and for the immediately foreseeable future, save any unforeseeable adverse events.

. THE FIVE COMPONENTS OF A BULLCHECK® EXAMINATION

The BULLCHECK® examination.

Scrotum	Physical	Semen	Morphology
•scrotal circumference in cm	•general physical examination of the bull and a specific examination of the reproductive tract	•crush side semen assessment, including sperm motility	•high magnification microscopy of preserved sperm

Each of the elements is reported in terms of risk to fertility. The scrotal circumference is reported in centimetres, with normal values being discussed in a later chapter. All other elements are reported as in

✓	Tick - All attributes assessed for this component were consistent with the ACV standards. No risk factors for reduced fertility were identified during this part of the BULLCHECK® Exam.
✗	Some attributes examined for this component were not consistent with ACV standards. This bull has a significant risk of reduced fertility in the short term at least. The client should seek advice from their cattle veterinarian, as some conditions may be temporary.
Q	Qualified - Not all attributes examined for this component were consistent with ACV standards but these abnormalities may not necessarily preclude the bull's use. A further comment will be provided. The client should seek advice from their cattle veterinarian as to the suitability of this bull for a particular purpose. Retesting may be recommended.
NT	This BULLCHECK® Exam component was not evaluated or not fully evaluated either at the owners request or as indicated.

An example of the certificate produced by Bull Reporter is below:

Report: Bull Breeding Soundness Evaluation

This evaluation is limited to an assessment and expression of opinion on the following specified matters as at the time and place of examination and should in no way be relied upon as a representation or expression of opinion as to future fertility. The opinion expressed is based on the fertility components marked as having been evaluated. If the evaluating veterinarian is prevented from undertaking a full evaluation, the opinion may not be fully informed and no liability will rest with the veterinarian as a result. This report was compiled exclusively for the use of the person to whom it is addressed. No other person or corporation has any authority to make use of or to rely upon any or all of this report. The evaluating veterinarian will not be liable for any reliance on the content of the report by a third party. This evaluation does not involve and should not be considered as a pre-purchase examination.

Summary:

To: Mr Bill Seller, , 123 Meat Street, Bulltown Vic 3456

Place of Examination: Wet Water, Victoria Date: 31/10/11

Bull ID / Brand	Age Yr:Mn / Breed	Scrotum	Physical	Crush-Side Semen	Sperm Morphology	Serving
M1199 (Tag) Running M	2: 1 Droughtmaster	42	Q	✓	✗	NT

Summary Comment: Bull has moderate posty leg - likely to develop arthtitis prematurely

Bull Identification

Birthdate-10/09/09, Ear Tag-M1199

Physical/Reproductive

Testes Tone-Medium, Scrotum-Normal, Epidiymides-Normal, Testes-Normal, Penis-Normal - Visualised, Prepuce-Normal, Seminal Vesicles-Normal, Ampullae-Normal, Prostate-Normal, Condition Score-4, Feet-Normal, Legs-Mild Sickle Hock, Gait-Normal, Leg Joints-Normal, Head-Normal, Weight-700kg, Dentition-8 Perm. Inscisors, Vet Evaluation-Qualified

Comment:Bull has moderate posty leg - likely to develop arthtitis prematurely

Crush Side Semen Evaluation

% Progressively Motile = 80, Vet Evaluation-Tick

Semen Morphology Evaluation

Semen Morphology-Fail, % Normal-60, %PC-33, %MP-4, %HT-1, %PY-0, %KA-2, %VT-4, %SA-0, Vet Evaluation-Fail

I hereby certify that I have examined the bull(s) described above in full accordance with the standards for evaluation and reporting bull breeding and soundness as published bythe Australian Cattle Veterinarians

Veterinarian: Dr B Reporter
Accredited BBSE Veterinarian
Signature: _____

I hereby certify that there has been no medical or surgical intervention of congenital abnormalities of the listed bull(s), whether genetic or not, to enable the above-mentioned standards to be met.

Owner/Agent: Mr Bill Seller
Signature: _____

3. ACV BULLCHECK® STANDARDS

The ACV Standards in this publication have been peer reviewed and agreed to by accredited BULLCHECK® Veterinarians. They are based on the most up-to-date research, and experience of these senior members of the profession.

Having a set of agreed standards means that a veterinarian can compare a bull to the standards and state whether the bull complies.

When conducting a BULLCHECK® examination, veterinarians can objectively state whether or not a bull complies with the BULLCHECK® Standards. If the bull does not comply, the veterinarian can provide an explanation of how the non-compliance may affect the risk of fertility.

BULLCHECK® examinations provide more consistency, and mean that decisions are based on collective wisdom of ACV members rather than the opinion of an individual.

All Standards in the BULLCHECK® scheme have a consistent structure:

Recording	This is where the standard is reported on the BULLCHECK® certificate. For example, items of concern from the history, general physical exam or reproductive exam are all reported under the PHYSICAL category
Requirements NT	These are requirements for the evaluation of this standard that must be met before the standard can be reported. If any of the requirements are not met, the Standard should be reported as not assessed.
Tick 	These are the requirements for a TICK. All must be met in order to report a TICK, without any findings that would result in a Q (Qualified) or Cross being present.
 Qualified	These are the findings that would prevent a TICK being reported and result in a Q (Qualified). If **any** of these findings are present, then a Q should be reported along with a specific comment as to why. A veterinarian should exercise judgment and apply a CROSS if a condition is severe.
Cross 	These are the findings that would prevent a TICK being reported and result in a CROSS being reported.

VACCINATION HISTORY

Vaccination history (including dates of primary and booster vaccinations) should be recorded - particularly for:

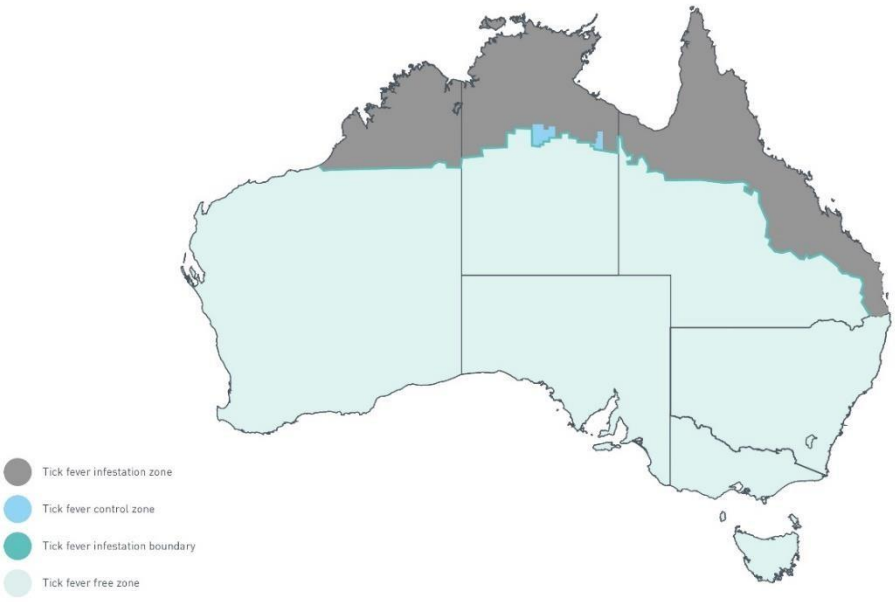
- Vibriosis
- Pestivirus
- Clostridial disease
- Leptospirosis
- Tick fever
- Bovine respiratory disease (BRD)
- Johne's disease
- Bovine ephemeral fever (BEF)

	Pestivirus	Clostridial	Leptospirosis	Vibriosis	Botulism	BEF	BRD (MH)	IBR	Tick Fever
Sale Bulls	✓	✓	✓	✓	✓		✓	✓	
Herd bulls	✓	✓	✓	✓	✓		✓	✓	

✓	Core vaccine
✓	Important diseases in certain areas and production systems
	Important in certain geographies (see maps below)

Geographies where BEF and Tick Fever vaccine may be important are described below.

Distribution of bovine ephemeral fever virus in Australia, 2007–2008 to 2019–2020.
Source: National Arbovirus Monitoring Program, Animal Health Australia
[a] Köppen climate classification

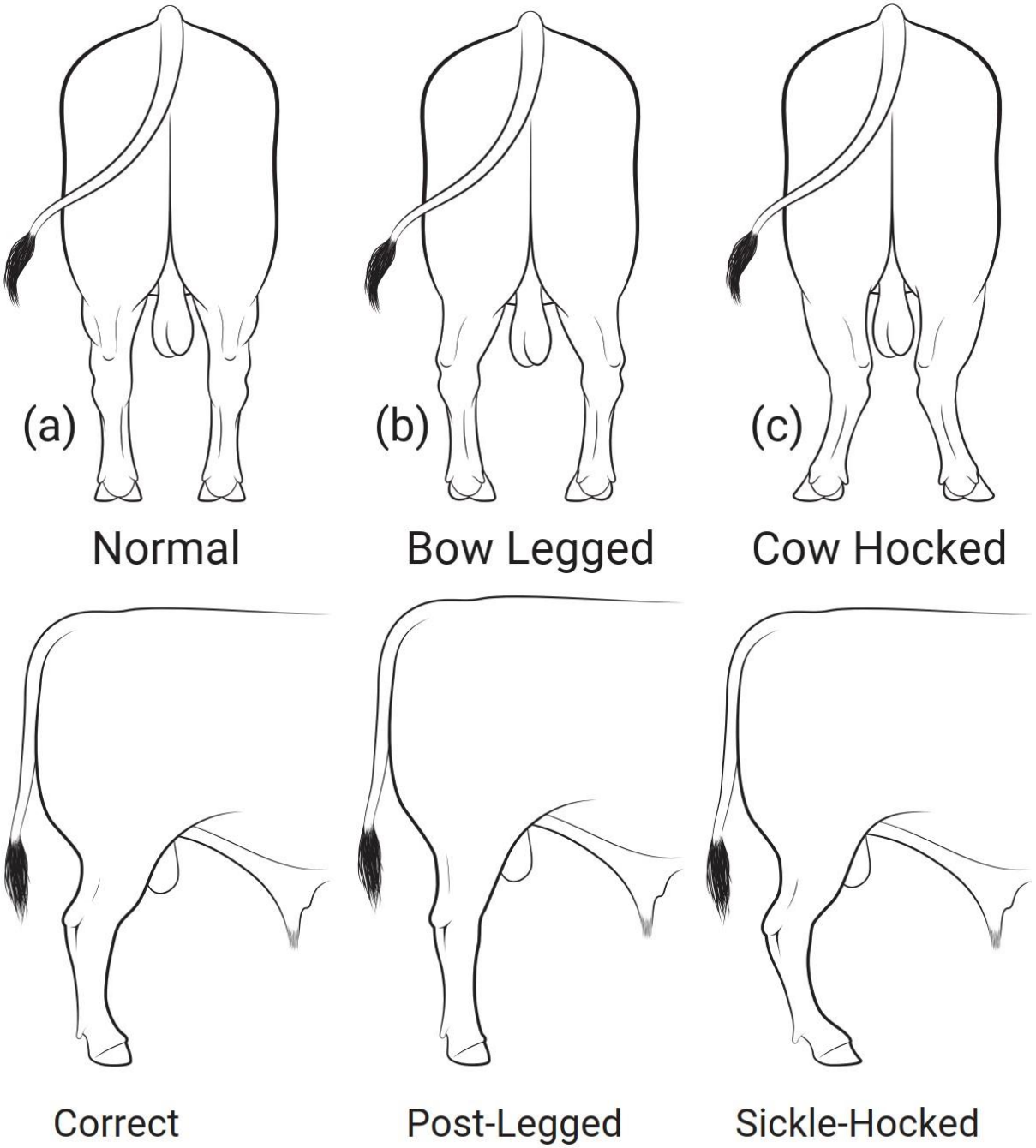


Tick fever zones as of 31 December 2020.
Source: *Animal Health in Australia Annual Report 2019–2020*, Animal Health Australia

LEG CONFORMATION

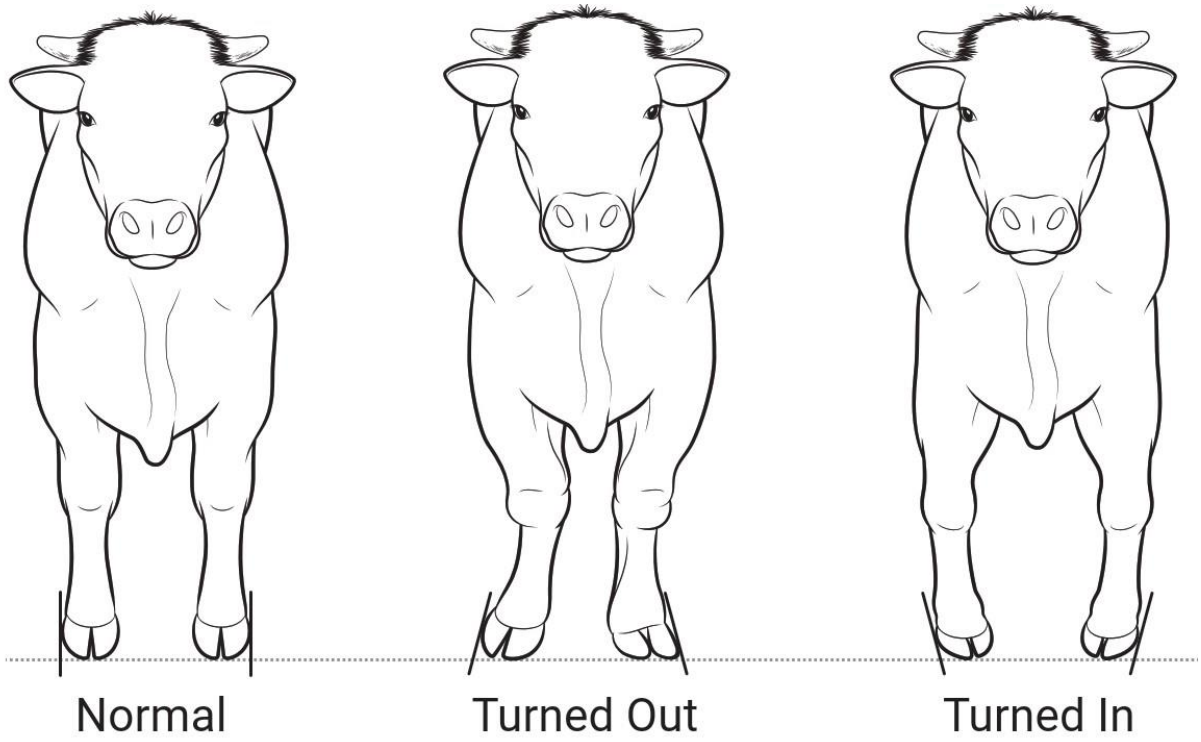
Evaluation of the musculoskeletal system and gait is a critical component of the physical evaluation.

Bull Reporter makes provision for objectivity in evaluating legs and feet. For hind leg structure a 1-5 scoring system (side and rear views) should be used.



Leg Conformation Score	Description
1	Pronounced sickle hocks
2	Moderate sickle hocks
3	Normal no sickle hocks
4	Moderate post leg
5	Pronounced post leg

Common foreleg faults include buck knees, calf knees, knock knees and bow legs. Common hind leg faults include sickle hocks, posty legs, bow legs and cow hocks. While limb conformation defects are sometimes regarded only as blemishes, in some bulls such blemishes lead to dysfunction with increasing age. Mild expression of conditions such as posty legs may resolve, especially as bulls reach maturity.



Limb conformation defects may be primary or acquired. For example, a posty leg - considered by many as a major cause of hind limb disease in bulls - may become evident (usually bilaterally) at 1 to 3 years of age or it may develop as a result of degenerative arthritis of the stifle joint. Posty leg bulls generally walk short and have worn 'boxy' toes. They are predisposed to arthritis in the hips, stifle and hocks.

Bulls with 'sickle hocks' (increased angulation at the hock joint) frequently overstep, develop long overgrown claws, predisposing them to lameness.

Mild, moderate or severe degenerative joint disease will interfere with a bull's reproductive efficiency. Where there is fluid filling of the joints, especially the hock joint, but no associated lameness or pain, mild cases may be reported as Q (Qualified), but severe cases of fluid distension of the joints or any sign of lameness should be reported as X (Cross). Mild to moderate swelling of the joints, especially the radial bursa of the hock joint, appears to be a management problem in grain fed bulls and advice should be given accordingly. In herd bulls examined prior to joining, the significance of joint swelling(s) is determined by examination of the bull's age, recent clinical history, gait and serving behaviour.

FOOT CONFORMATION

Some examples of abnormal foot conditions are shown below. There are four feet, and they may present with different abnormalities. Thus, in Bull Reporter, feet are simply classified as normal or abnormal and it is expected that the examining veterinarian will describe the findings in the comment section.

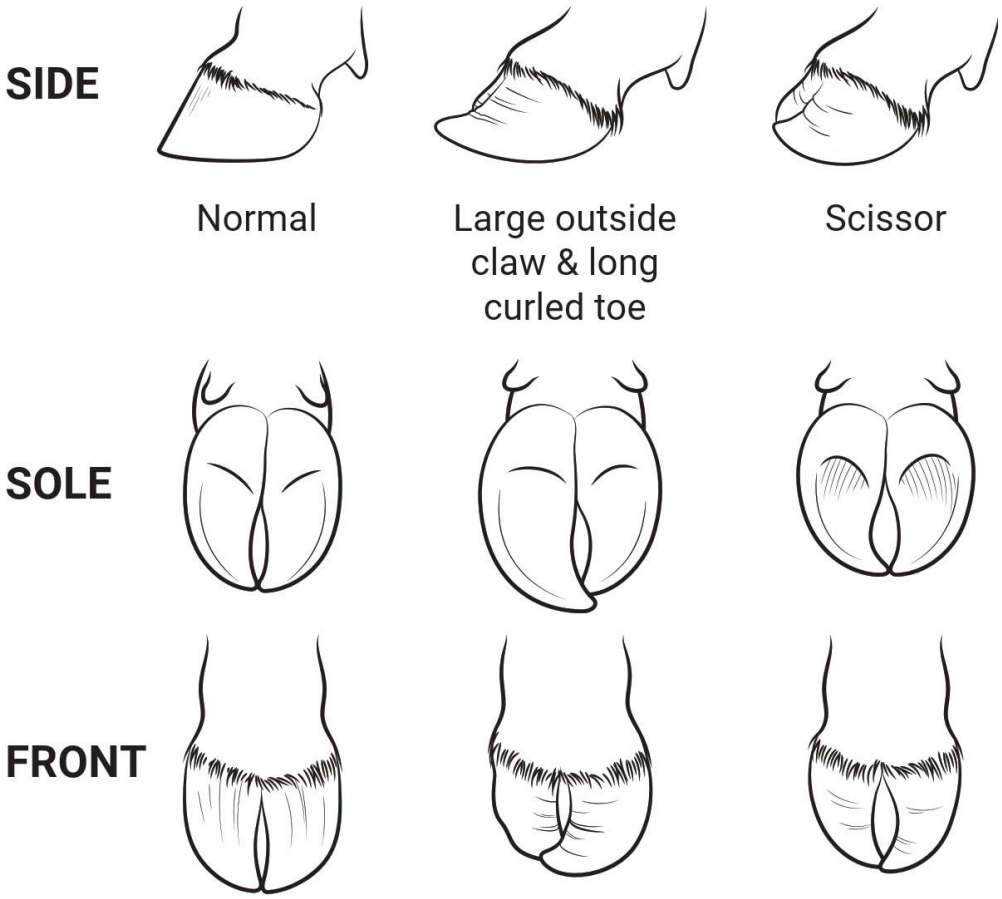
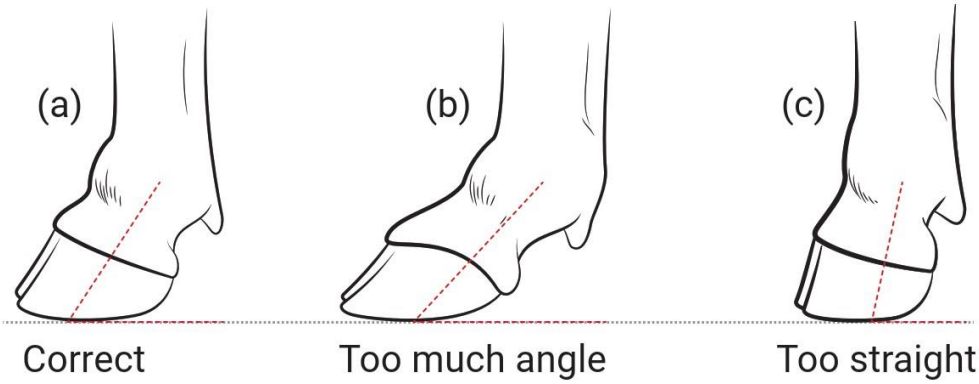


Figure 4 Front and rear feet claw structure: (a) normal (b) corkscrew curl claw (c) scissor claws (d) spread claws

Hooves should be of a normal size, with the claws of approximately equal size and symmetry. The gait of bulls with excessively straight or sloping hooves should be examined carefully. Claws worn flat across the front may provide evidence of dragging the hoof, associated with abnormal gait.

Sometimes it is not possible to assess claw conformation problems if the feet have been recently trimmed. It is suggested that a comment be made on a BULLCHECK® Exam report in cases where recent trimming might disguise poor conformation.



INTERDIGITAL FIBROMA

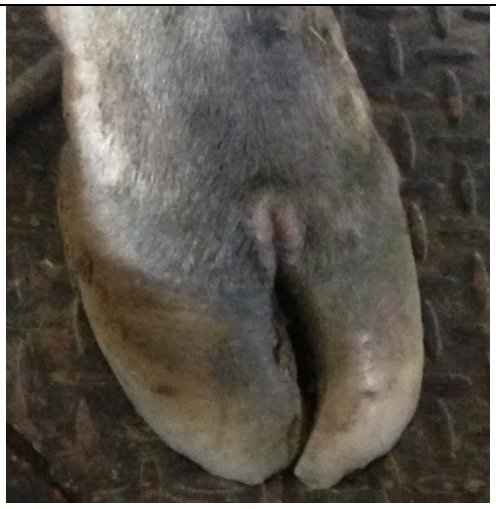
Figure 6 Severe interdigital hyperplasia – note that it is bilateral in this bull.

Interdigital fibromas with proliferative lesions (with or without evidence of acute inflammation) present a high risk of reduced fertility and are often associated with open claws. They should be reported as X (Cross). Mild keratosis without clear proliferative lesions is not considered sufficient to make a diagnosis of interdigital fibroma.

Figure 7 Bilateral moderate scissor claw, along with mild keratosis in the interdigital area.

SCISSOR CLAW

Scissor claw can be scored as:

1. Mild: some turning inwards of toes of one or more claws of the fore- and/or hindhooves.	
2. Moderate: very distinct turning inwards of toes of one or more claws of the fore- and/or hind-hooves.	
3. Severe: marked turning inwards of the toes of one or more claws of the fore- and/or hind-hooves with, in some cases, toes touching each other, and in very severe cases one toe crossed over the other.	

Mild scissor claw is unlikely to interfere with reproductive efficiency, but can be exaggerated by overfeeding of grain and soft ground. There is a risk that it could develop to a more severe form or that the bull may become lame. It should be noted in the comments as it is a heritable trait.

Overgrown, uneven claws are usually indications of poor limb structure or possible degenerative joint disease. They may also be temporary changes induced by feedlot conditions. Moderate and severe cases of cork-screw claws, grossly over-grown claws or severe cases of scissor claws are unacceptable. A comment should be recorded for all bulls with mild scissor claw. Bulls with moderate scissor claw should be reported as Q (Qualified).

CRACKS

Cracks in the hoof, either vertical or horizontal should be reported as Q (Qualified) or X (Cross- high risk).

Figure 8 A crack, possibly associated with the associated with scissor claw conformation

An assessment of Q (Qualified) or X (Cross- high risk) needs to be made by the treating veterinarian depending on the severity of the condition. At worst, such bulls will have a higher risk of lameness. It is likely that, at best, that the bull would have reduced longevity in the herd.

GAIT

On many occasions the owner having observed the animals over a longer period of time, will have noted stance and gait abnormalities, and have a good appreciation of any potential problems. Such observations should also be noted. When evaluating groups of bulls, it is recommended that gait of each bull be assessed while it is in a group of no more than 6 bulls either immediately before or after crush evaluation. As they walk, bulls should ideally be viewed from each side and behind with special attention to lameness associated with hip, hock, stifle or pastern joints. Bulls may need to be observed at the trot to be confident of detecting some gait problems.

A structurally-normal bull is one which allows all the forces of weight bearing and locomotion to be symmetrically directed along the limbs, minimising wear and tear on the bones, joints and hooves, and therefore minimising the incidence of lameness. The "tracking" of the bull's feet and the arc of the foot travel should be observed at both the walk and trot. The gait of the animal should be smooth with an even arc of the hooves, the rear hoof landing in the imprint of the front hoof and the imprint of the bearing surface of the hoof being even.

Over-stepping or under-stepping are indications of structural problems and may be associated with reduced ability to serve. Bulls that under-step often have very straight hocks (posty-leg defect) and have increased problems in completing the final ejaculatory thrust. Dragging of the hind toe(s), often in association with excessive wearing of the toes, is suggestive of arthritis affecting the hock, or stifle or hip joints or degenerative joint disease affecting the lumbosacral spine. In summary, the more common gait abnormalities encountered include:

- Under-stepping, over-stepping and abnormalities of tracking. These may be of a conformational, nutritional or heritable cause, the severity of which varies and which can compromise serving ability. Individual judgement will be needed in classification to meet satisfactory standards.
- Ataxia, usually reflecting neural tissue damage from a variety of causes and more pronounced when mounting or at the trot. Such bulls would be assessed as "Cross- high risk" for the purposes of a BULLCHECK® Exam.
- Paresis often occurs concurrently with ataxia, and is shown by a short, stilted gait often with limb dragging and stumbling. Common causes include spinal trauma and degenerative spinal changes resulting in moderate to severe impediment of serving ability with poor prognosis for full recovery. These bulls would be assessed as "Cross- high risk" for the purposes of a BULLCHECK® Exam.
- Overt lameness, caused by a wide variety of painful conditions. These may involve both hoof and leg structures and joint, pelvis and spine, and range in severity from mild to severe. These conditions will impact on serving ability and fertility and affected animals would be classed as unsound at that time. Future prognosis ranges from poor to good, depending on the type and severity of the lesion.
- Upward fixation of the patella ("stringhalt") causes a stilted, unilateral or bilateral gait and exaggerated advance of the hind leg(s). It is very likely to be heritable, as it appears to be due to anatomical aberration. The condition is more dramatically expressed when bulls are in low body condition, presumably because of reduced musculature that normally helps the animal prevent the upward fixation. Such bulls should be assessed as "Cross- high risk".

DENTITION

Whilst it is important for bull health and fertility that they have a normal bite and full set of functional teeth, dentition may also be assessed for insurance claims or for the purposes of allowing entry of bulls into some breed society sales (where dentition is used as proof of age).
Where young bulls are in satisfactory condition, the risk of poor dentition is low and the risks associated with careful assessment of the teeth may outweigh the likely benefit. When testing herd bulls older than 8 years of age, checking dentition is recommended.

Bull Reporter allows for recording of dentition using the following scale:

Dentition Score	Requirements
0	Milk teeth only
2	Two permanent incisors present
4	Four permanent incisors present
6	Six permanent incisors present
8	Eight permanent incisors present

Standard	General physical examination
Recording	This Standard is recorded as part of the HISTORY/PHYSICAL EXAM. The value for the worst affected leg or foot is recorded.
Requirements	Assessment of condition score, feet, legs, leg joints, gait and head is compulsory.
Tick	All components evaluated fall within normal limits for the age and purpose of animal.
Qualified	Any defect that is heritable or non-heritable but present in a mild form Condition score backward or fat Mild posty-leg, sickle hock, cow hock, knock knee, bow leg Any other mild leg/foot conformation defect Mild scissor claw, or other treatable foot condition Mild swelling of joints in bulls being fed grain, where gait is normal Mild corneal scarring or entropion.
Cross	An abnormality(s) was detected that is likely to significantly reduce the fertility of the bull in the short-term and/or long-term including but not limited to: Poor or fat body condition (<2 or >4.5 on a 1-5 scale) Any severe leg conformation defect Gait abnormality or overt lameness Severe foot defect Interdigital fibroma Cancer eye Entropion Lumpy jaw Dental or jaw abnormalities that may reduce the ability to eat

6. EXAMINATION OF THE REPRODUCTIVE ORGANS

Measuring scrotal circumference by a standard repeatable method can indicate the likelihood that a bull has reached puberty, and whether testicular development is within the normal range.

Scrotal circumference is:

- A good indicator of daily sperm production especially in young bulls, which is fairly constant per gram of testis
- A highly repeatable measure (with appropriate technique) and highly heritable (30-45%)
- Correlated with sperm motility and morphology. However, these are independently assessed as part of a routine BULLCHECK® Exam
- Genetically correlated with earlier age at puberty in female relatives
- Genetically correlated with earlier return to cyclicity after calving in female relatives within tropically-adapted cattle, and especially Bos indicus cattle

The terms “scrotal circumference” and “scrotal size” are both in common use in Australia. Scrotal size is the term used by some breed societies to describe the breeding value for scrotal circumference, measured in centimeters. The term scrotal circumference is preferred in the context of the BULLCHECK® Exam to avoid misinterpretation and possible ambiguity.

A ReliaBull™ tape (Figure 9) is the preferred instrument recommended by the ACV as this will increase consistency between operators compared with other means.

Figure 10 ReliaBull tapes provide greater consistency in scrotal circumference measurement than other methods https://www.reliabull.ca/

The correct tension is achieved by placing the thumb against the piston and then firmly drawing the tape in contact with the entire circumference. The reading is taken at the edge of the measurement block when approximately 2 mm of green piston is showing; appearance of red indicates excessive tension. Repeat the measurement at least once to ensure accuracy to the nearest 0.5 cm.

BEEF BREEDS - PUBERTY

In young growing bulls measurement of scrotal circumference provides a relatively accurate guide as to whether a bull has reached puberty or not. As a general guide bulls are likely to have reached puberty when they achieve a scrotal circumference of 26 to 28cm. However, although a bull may have 'technically' reached puberty it may not yet be producing at least 70% morphologically normal sperm. This is why it is particularly important to assess sperm morphology in young bulls.

Screening young bulls prior to sale presents a special case when performing a BULLCHECK® Exam. Ethical issues arising because the veterinarian is examining the bull on behalf of the seller rather than the purchaser can be overcome by having simple clear guidelines that are based on science.

Scrotal circumference depends on both weight and breed, which can present difficulties for veterinarians and producers in circumstances where accurate weights are not available. The following guidelines are based on age rather than weight, but they take weight into account because a bull would need to have satisfactory nutrition in order to achieve the recommended thresholds.

It is recommended that young sale bulls be evaluated as Q (Qualified) if their scrotal circumference is less than those in Table 2 due to the risk of not achieving puberty. Table 3 below should be consulted to determine the minimum circumference based on bodyweight.

If sperm morphology has not been used to establish that puberty has been reached, young sale bulls with a scrotal circumference of less than 30 cm (28 cm for *Bos indicus*) should be assessed as Q (Qualified) with a comment such as "Puberty not confirmed in this bull".

Table 2 Guidelines for minimum scrotal circumference thresholds for young bulls prior to sale.

Age	Brahman	Droughtmaster, Limousin, Belmont Red, Santa Gertrudis	Wagyu	Simmental Angus Murray Grey	Hereford Brangus Shorthorn
12 months	20 cm	21 cm	23 cm	24 cm	23 cm
15 months	23 cm	24 cm	25 cm	28 cm	26 cm
18 months	25 cm	27 cm	27 cm	30 cm	29 cm
21 months	27 cm	29 cm	29 cm	32 cm	31 cm
24 months	29 cm	31 cm	30 cm	34 cm	32 cm
27 months	30 cm	32 cm	31 cm	35 cm	33 cm

BEEF BREEDS – LIVEWEIGHT AND BREED

BULLCHECK® Exams can be performed on bulls of any age and breed, and it is helpful to understand what the "normal" scrotal circumference for a bull might be. This section describes our current understanding of what constitutes normal scrotal circumference in the Australian herd based on the "Bull Power" project which involved analysis of about 260,000 bulls (Holroyd et al 2005, Fordyce et al 2014).

Amongst the findings was that live weight appears to be a superior reference point than age as a measure for assessing acceptable scrotal circumference in young bulls. This is because nutrition directly affects both scrotal circumference and weight.

There is no clear point at which a scrotal circumference indicates an increased risk to fertility, but as a general principle it is recommended that if the scrotal circumference is in the bottom 5% for the bull's weight and breed, it is outside the normal range, and should be reported as a X (Cross- high risk).

BEEF BREEDS - GUIDELINES FOR NORMAL SCROTAL CIRCUMFERENCE

Bulls should be assessed on the basis of having greater than the recommended **minimum threshold** value for **scrotal circumference** that is mostly influenced by live weight and breed. Table 5 provides a guide for recommended minimum scrotal circumference and normal range by age and plane of nutrition within breed group. Interpolation may be required to use this table. Table 5 below gives a summarised version that could be used as a ready reckoner.

Table 3 shows the minimum acceptable scrotal circumference (cm) for the various breeds at given liveweights (Kg) for each breed.

Table 3. Minimum scrotal circumference by weight and breed.

	300	400	500	600	700	800	900
Angus	*27.5*	*31.0*	33.5	35.0	36.0	36.5	37.0
Murray Grey	*25.5*	*30.0*	33.0	35.0	36.5	37.0	38.0
Hereford	*25.5*	*30.0*	32.5	34.0	35.5	36.0	36.5
Shorthorn	*25.0*	*29.5*	32.0	34.0	35.0	36.0	36.5
Charolais	*23.5*	*28.0*	31.0	33.0	34.5	35.5	36.5
Limousin	*24.5*	*28.0*	30.5	32.5	33.5	34.0	34.5
Simmental	*27.0*	*31.0*	34.0	35.5	37.0	37.5	38.0
Waygu	24.5	27.5	29.5	31.0	31.5	32.0	32.0
Brangus	*25.0*	*29.0*	31.5	33.5	34.5	35.5	36.0
Belmont Red	*23.5*	*27.5*	*30.0*	32.0	33.0	34.0	34.5
Santa Gertrudis	*22.5*	*27.0*	*30.0*	32.0	34.0	35.0	35.5
Droughtmaster	*21.5*	*26.0*	*29.5*	32.0	34.0	35.5	36.5
Brahman	*21.5*	*25.5*	*28.5*	30.5	32.0	33.0	34.0

Bulls with both testes the same size but a smaller scrotal circumference than the minimum threshold indicated above, should be considered as having abnormal testicular development. If scrotal circumference is above the 90 percentile for a bull at that weight, then further investigations are indicated to ensure there are no pathological changes present for example - orchitis or testicular degeneration associated with bruising of large testes suspended in a pendulous scrotum. Crush-side semen assessment and sperm morphology will assist in diagnosis of testicular pathology.

If the scrotum does not meet the above minimum thresholds, the scrotal circumference should still be recorded, but the Physical examination section should be recorded as X (Cross- high risk) with the appropriate comment (e.g., Scrotal circumference is not within the normal range).

Bull breeders and breed societies may impose higher thresholds where breeding objectives require increasing scrotal circumference.

The above standards do not indicate that either puberty or sexual maturity has been reached; rather, they indicate normal minimum levels of testicular development as reflected in scrotal circumference. Evaluation of sperm morphology is required to confirm attainment of puberty and sexual maturity.

EVALUATION OF THE SHEATH AND UMBILICUS DEFINITIONS

The following definitions are used in the BULLCHECK® Sheath Scoring Method:

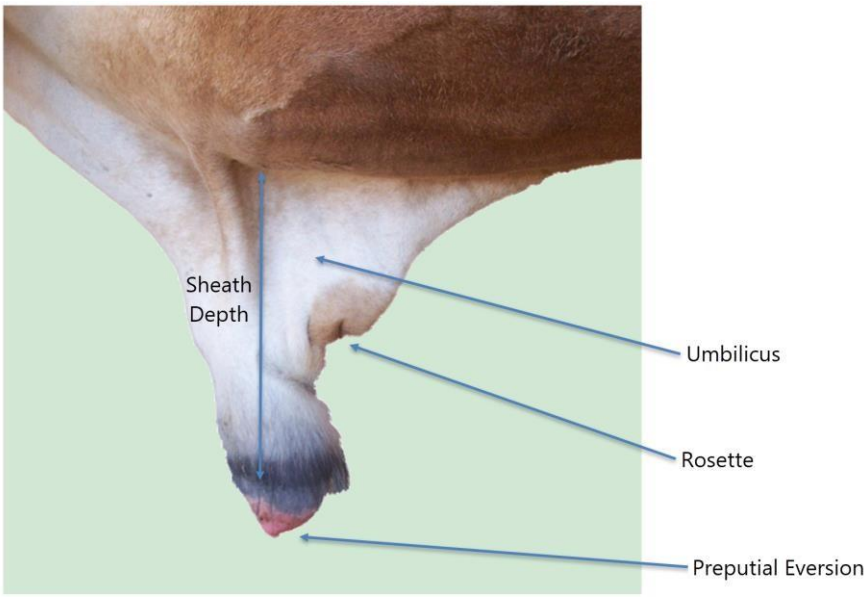


Figure 34 Illustration of sheath structures and measurements

Sheath: external hair covered appendage between the scrotum and umbilicus.

Prepuce: mucosa within the sheath

Umbilicus / Umbilical cord: remnant of the umbilical blood vessels surrounded by the skin through which it passes to the abdominal wall and the external umbilical scar or navel.

Evaluation of the prepuce is particularly important in *Bos indicus* and *Bos indicus*-derived bulls, where poor sheath structure is often associated with trauma and preputial pathology.

A REVISED SCORING SYSTEM FOR 2021

Several methods of sheath scoring have been described, based mostly on sheath depth and angle. Some confusion has existed because the ACV method of sheath scoring (1-5 scale, where 1 indicates a tight sheath) and the Breed plan method (1-9 scale, where 9 indicates a tight sheath) used scores which ran in different directions.

After some consideration, ACV has elected to introduce a new scoring scheme, developed by Michael McGowan and John Bertram which separately assess the sheath depth, umbilicus and preputial eversion to be known as the DUE Sheath Score (Depth, Umbilicus, Eversion).

This assessment should be done when the bull is standing freely in the race leading up to the crush, or in a small holding yard and by palpation during the clinical examination in the crush. It consists of visual assessment of sheath depth and conformation, conformation and size of the umbilicus and degree of preputial eversion.

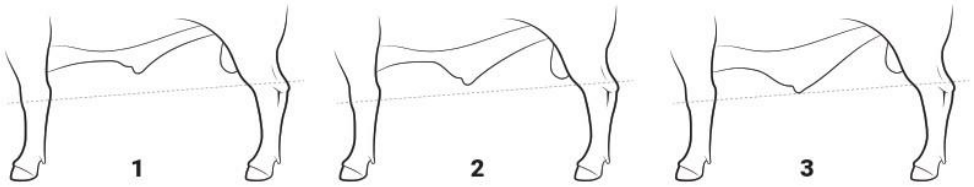
Previously used sheath scores did not take into account the latter two components of the examination which have been shown to affect mating ability, risk of preputial prolapse, and risk of umbilical hernias in progeny.

Further, it should be noted that in Brahman and tropical composite bulls both sheath score and estimated length of everted prepuce at 18 months of age are moderately heritable (heritability of 0.23 to 0.35).

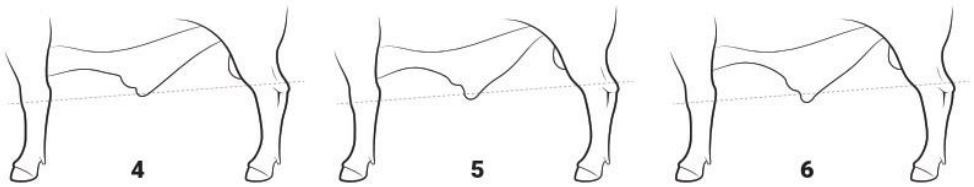
SHEATH DEPTH

The below scoring system is an adaptation of the original Breedplan and ACV scoring systems:

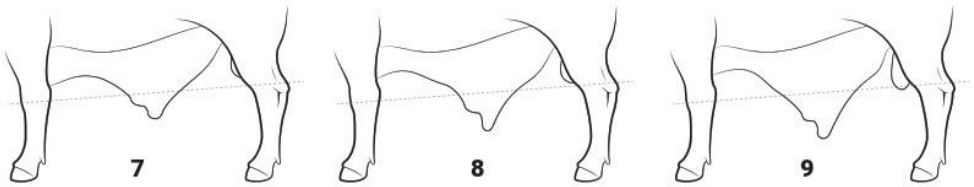
Depth
Score = 1



Depth
Score = 2



Depth
Score = 3



1 = Breedplan (reversed) score 1, 2, 3 i.e. tight to small sheaths all above the 'knee-hock' line The sheath depth (vertical distance from the abdominal wall to the preputial orifice) is estimated to be less than 15cm with sheath angle less than 30° to the horizontal. Bulls with this sheath score are considered to have good to satisfactory sheath conformation.

2 = Breedplan (reversed) score 4, 5, 6 i.e. moderate size sheaths with the preputial orifice either on or just below the 'knee-hock' line up to level of the umbilicus. The sheath depth is estimated to be 15cm to 20cm with sheath angle 30° to 45° to the horizontal. Bulls with a sheath depth of 20cm and sheath angle of 45° are considered to have questionable sheath conformation.

3 = Breedplan (reversed) score 7, 8, 9 i.e. excessively pendulous sheaths with the preputial orifice very obviously below the 'knee-hock' line. The sheath depth is estimated to be >20cm with sheath angle >45° to the horizontal. Bulls with this sheath score are considered to have unacceptable sheath conformation due to increased risk of preputial prolapse, particularly for bulls that also have a score of 3 for preputial eversion (see below).

CRUSH-SIDE SEMEN EVALUATION

STANDARDS AND GUIDELINES – CRUSH SIDE SEMEN EVCALUATION

Guidelines:

- A bull with well-developed testicles and good testicular consistency usually produces a representative semen sample. Failure to obtain a sample of satisfactory quality suggests inadequate collection technique and another collection attempt is indicated. Very few bulls have “no spermatozoa”.
- If the semen is of good concentration, and progressive motility on initial examination, and does not contain pus, a representative sample has been obtained.
- If a massaged or electro ejaculated semen sample is of low concentration but of high progressive motility this is suggestive of normal function of the reproductive organs. Scrotal circumference data provides additional information about the potential quantitative output of the testicles.
- If a sample is of low concentration and has low progressive motility then the interpretation is more difficult. Up to three further samples should be taken on the day of examination to see if progressive motility is improved. Use techniques to avoid cold shock and take care when handling the sample.
- If a sample of 30-60% progressive motility is obtained, the bull should be recorded as Q (Qualified) and a comment made that the bull may well be suitable for paddock mating but may be higher risk in single mating situations or when semen is to be frozen.
- If a sample of semen showing 30% progressive motility or more cannot be obtained then the bull should be recorded as Cross (high risk).

Standard	Crush Side Semen Evaluation
Recording	This is recorded in CRUSH SIDE SEMEN EVALUATION
Requirements	Collection and assessment of semen using: artificial vagina, electroejaculation or rectal massage. Microscopic evaluation within minutes of collection. Adequate measures to prewarm slides and glassware and maintain temperature of samples and diluents.
Tick	A sample is collected with motility > 60%
Qualified	Motility > 30% but <60% in more than one collection Evidence of mild seminal vesiculitis (presence of inflammatory cells, but no clinical signs of pain in seminal vesicles)
Cross	An abnormality(s) was detected that is likely to significantly reduce the fertility of the bull in the short-term and/or long-term including but not limited to: Three ejaculates with progressive motility consistently below 30%, Inflammatory cells present, with painful seminal vesicles.

MORPHOLOGICAL EVALUATION OF SPERM

STANDARDS AND GUIDELINES – SPERM MORPHOLOGY

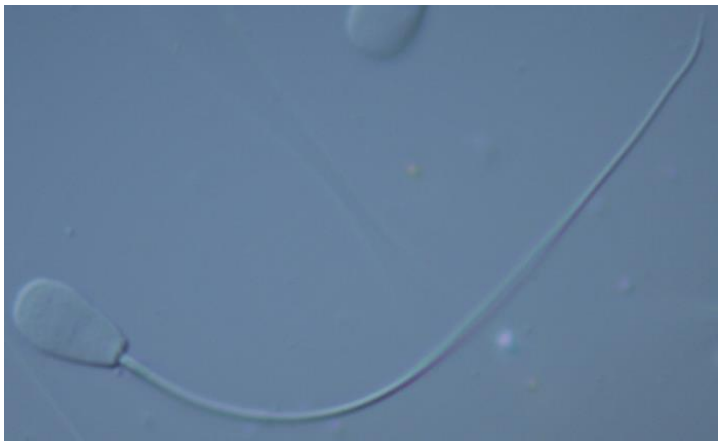
The assessment of sperm morphology is strongly recommended for every bull examination. Sperm morphology assessment is necessary if sperm motility assessment is

Standard	Sperm Morphology
Recording	This is recorded under SPERM MORPHOLOGY
Requirements	Assessment of sperm using Differential-Interference Contrast (DIC) microscopy at 1000x magnification. Count 100 sperm (or 200 if Percent Normal Sperm at 100 count is marginal - between 62 and 78). Distal droplets >30% to be noted in comments.
Tick	>= 70% normal sperm
Qualified	>= 50% normal sperm <30% of any type of defect <20% of individual defects for proximal droplets, pyriform heads or vacuoles
Cross	<50% normal sperm OR >30% of any type of defect OR >20% of individual defects for proximal droplets, pyriform heads or vacuoles

COMMON FINDINGS AND INTERPRETATIONS .

Category	Defects	Notes
Normal Sperm	Normal sperm, and those with distal cytoplasmic droplets, abaxial tails, bent midpieces, segmental aplasia, slightly pyriform heads, narrow heads	These defects do not appear to affect fertility at low numbers – but high numbers of any one defect may be a cause for concern.
Proximal Cytoplasmic droplets (PC)	Proximal droplets	Significance can depend on the presence of other abnormalities. Sperm can't bind to oocytes. Epididymal dysfunction or immaturity. Non-compensable if >20%.
Mid-piece defects (MP)	Distal midpiece reflex, Dag defect, stump tails, multiple (accessory) tails	Generally considered compensable defects as sperm can't reach egg.
Head and Tail defects (HT)	Detached/loose/decapitated heads, reflex tails / bent principal pieces, coiled tails / bent principle piece	Generally considered compensable defects as sperm can't reach egg.
Pyriform heads (PY)	Pyriform heads	Often occur along with other abnormalities in the same and different sperm, indicating oxidative damage during spermiogenesis has occurred within 2-4 weeks prior to testing. Generally considered non-compensable.
Knobbed Acrosomes (KA)	Knobbed acrosomes	May be genetic in origin when high levels (>20%) present along with other abnormalities. Sperm showing the defect are likely compensable because they can't reach the egg, but there is evidence that some sub-types may be non-compensable.
Vacuoles / Teratoids (VT)	Small apical vacuoles, large confluent vacuoles, diadem defects, rolled heads, teratoid heads	Some of these are due to oxidative damage, some are potentially heritable. Considered non-compensable.
Swollen Acrosomes	Swollen acrosomes, ruffled / incomplete acrosomes	Aged sperm – especially "rusty loads". Generally considered compensable.

9.3.1. NORMAL SPERM



The ACV standardised system of analysis of the spermiogram dictates that sperm with morphological defects which do not impact fertility are included in the count of normal sperm. These include distal cytoplasmic droplets, abaxial tails, bent midpieces, segmental aplasia, slightly pyriform heads and narrow heads.

Figure 43 Normal sperm

9.3.1.1. DISTAL CYTOPLASMIC DROPLETS

Most developing sperm at the cauda epididymis have a cytoplasmic droplet at the distal- midpiece position. Phospholipid Binding Protein is produced by bovine vesicular glands and has been demonstrated to bind to sperm membrane removing distal droplets. Consequently, when sperm are mixed with seminal fluid, the droplets are shed from the distal midpiece.

Distal droplets are usually present in less than 3% of bull sperm and are reported under the normal sperm count in Bull Reporter. Distal droplets are considered compensable. However, if present in high proportions >30% they should be noted in the comments and retesting of the bull and the potential unsuitability of the sample for freezing should be considered.

Figure 44 Distal cytoplasmic droplet

9.3.1.2. ABAXIAL TAILS

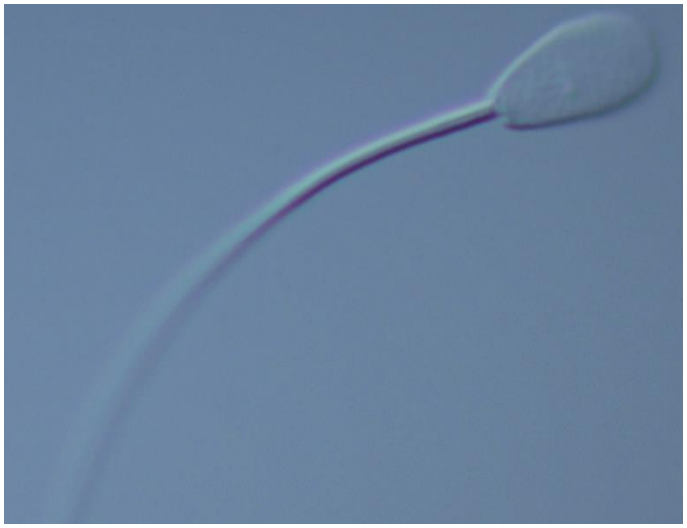


Figure 45 Abaxial tail

Abaxial tail implantation is only an abnormality of bull sperm when it is accompanied by an accessory tail. It occurs in the neck region and involving the eccentric positioning of the centriolar complex relative to the head base. Abaxial tail attachment is not considered abnormal in the stallion, boar or dog.

9.3.2. PROXIMAL CYTOPLASMIC DROPLETS

A high percentage of sperm with proximal droplets is associated with abnormal epididymal function, spermiogenesis or sperm maturation. Bulls can recover from elevated levels of proximal droplets within a matter of weeks, although the prognosis may depend upon other types of abnormalities associated with the proximal droplets.

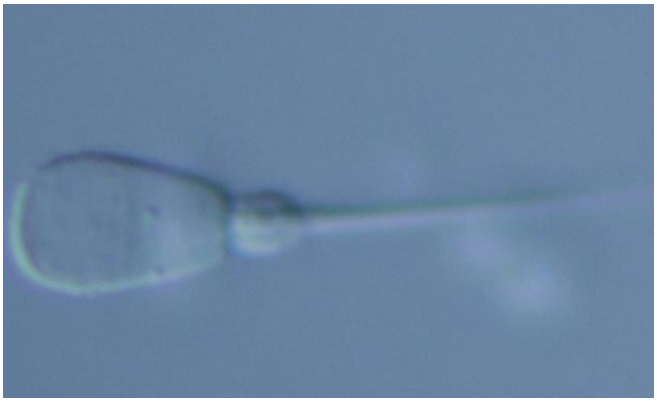


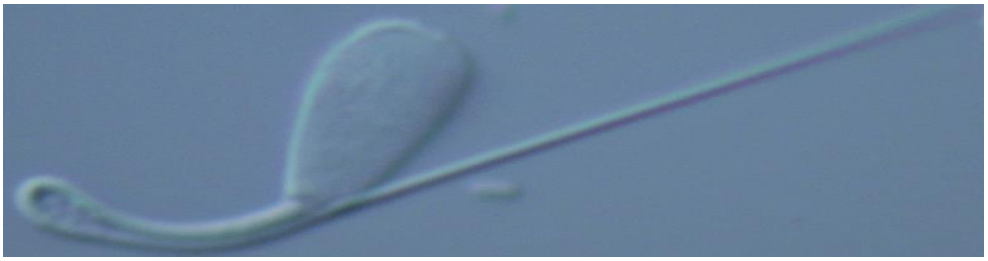
Figure 46 Proximal cytoplasmic droplet

Peripubertal bulls often have elevated numbers of sperm with proximal droplets, these normally reduce by the time a bull is 13 to 14 months. however, cases of proximal droplets can persist well after puberty and sexual immaturity is not their only cause.

9.3.3. MID-PIECE DEFECTS (MP)

Mid-piece defects are the most common semen defects in beef bulls. They are generally considered to be compensable traits, as sperm with midpiece problems usually cannot reach the fertilization site.

DISTAL MIDPIECE DEFECTS (DMR)

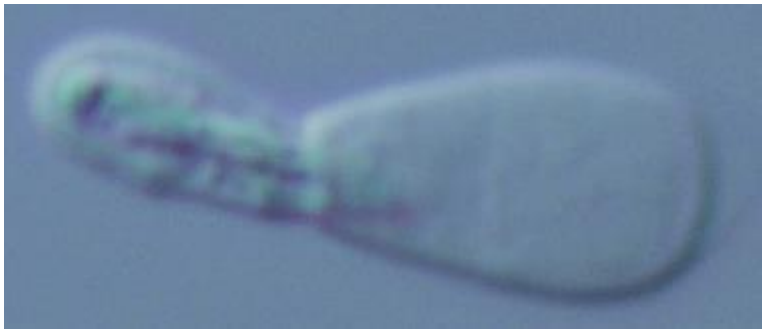


The distal midpiece reflex (DMR) is one of the most common defects encountered in bull sperm. It is differentiated from the bent tail defect by the fact that part of the midpiece is included in the bend usually trapping a cytoplasmic droplet. The affected sperm are often swimming backwards or in tight circles on motility assessment.

DMRs are due to disturbances in the cauda epididymis. Post stress, DMRs can increase rapidly within a week then regress if the stress was mild or short lived. If prolonged or severe stress the DMRs may persist.

DMRs can also be caused by problems collection and handling (e.g. cold shock, hypo-osmolality), however, these DMRs will not have the retained droplet.

DAG / DAG LIKE / TIGHTLY COILED MIDPIECE DEFECT

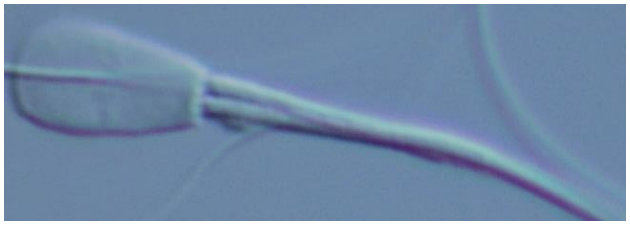


Named after the Jersey bull in which it was first identified (not because they look like a dag), this defect is characterised by strong folding, coiling and fracture of the distal part of the sperm midpiece (with or without a retained distal cytoplasmic droplet). True Dag defects generally occur at very gigh levels. Similar ("Daglike") defects occur at lower levels.

TAIL STUMP AND SHORT TAIL DEFECT

The tail stump defect is uncommon but reported in multiple breeds of cattle. Sperm affected have a short tail stump or rudimentary tail with the stump often obscured by a retained proximal droplet. Most sperm are dead and immotile and >60% of sperm are affected. Affected bulls are usually completely sterile and not expected to recover.

ACCESSORY TAILS/ DOUBLE TAILS



The presence of accessory tails along with abaxial tails is considered a mid-piece defect. As seen above, abaxial tails on their own can be considered as normal sperm.

HEAD AND TAIL DEFECTS

Head and tail defects are generally considered to be compensable traits, as sperm with tail problems usually cannot reach the fertilization site.

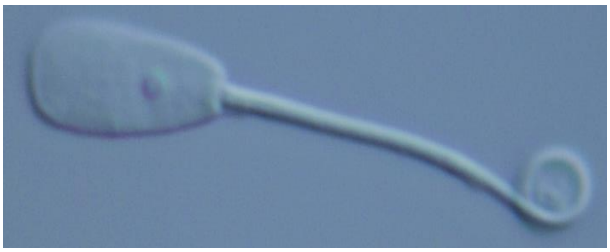
DETACHED HEADS/ LOOSE HEADS/ DECAPITATED HEADS

Large numbers of detached normal heads can occur in association with abnormal accumulation of sperm in cauda epididymis. Peristalsis continuously moves sperm from the cauda epididymis into the urethra to ensure fresh sperm in ejaculation. Failure of this process can result in a buildup of sperm or “rusty load”.

REFLEX TAILS/ BENT PRINCIPAL PIECES

Sperm with a reflex distal to the midpiece annulus, usually with a cytoplasmic droplet in the loop originate under the same circumstances as DMRs. Hypotonic shock may cause as similar type of bend without a trapped droplet.

COILED TAILS/ COILED PRINCIPAL PIECES



Coiled tails are characterised by a tight coiling of the principal piece around a cytoplasmic droplet at various locations along the length of the tail. There appears to be a hereditary predisposition that some bulls are more prone to develop coiled tails secondary to season, stress, thermoregulation and/or oxidative stress. Coiled tails are often noticed with dag like defects in Bos-indicus and Bos indicus cross breeds by Australian morphologists.

KNOBBED ACROSOMES (KA)

A number of acrosomal anomalies have been reported in bull sperm. The knobbed acrosome defect can be identified as an apical swelling that may protrude from, or fold over, the head and appears most often as a flattening or indention of the apex. Elevated levels of KAs in bull semen can linked with either genetic or environmental factors. With the latter, the elevated levels are usually seen in concert with other signs of spermatogenic dysfunction. A genetic cause is suspected when relatively high proportions (>20%) of sperm exhibit the KA defect in the absence of frequent numbers of other sperm abnormalities. Current evidence is that some sub-types of KA may be non-compensable but more work is needed in this area.

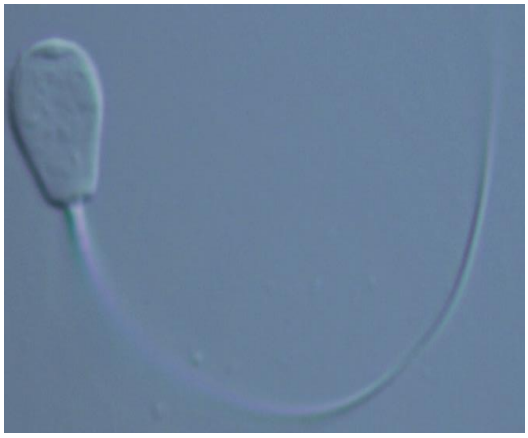
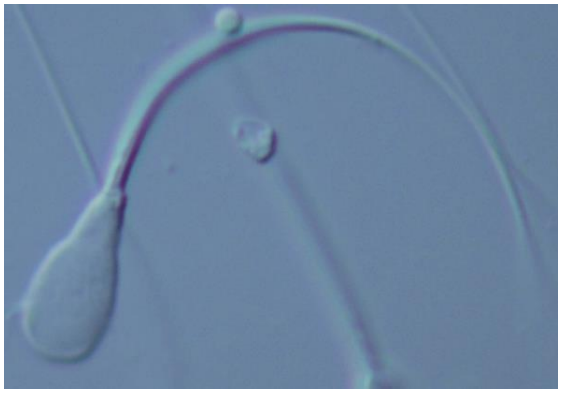


Figure 54 Knobbed acrosome

PYRIFORM HEADS

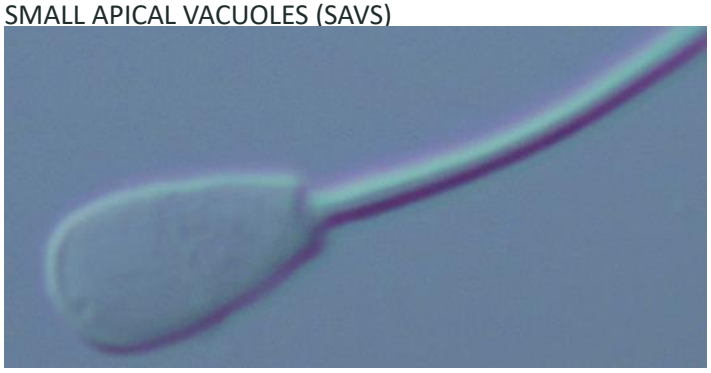


Pyriform, or pear-shaped heads, are a fairly common abnormality, usually observed with other head abnormalities such as diadem and proximal cytoplasmic droplet defects. It is not uncommon to encounter elevated levels of pyriform sperm heads in young bulls which have been over conditioned. Although such sperm are often impeded from reaching the fertilization site and zona pellucida they are generally regarded as non-compensable defects due to their potential to cause post-fertilization problems.

VACUOLES

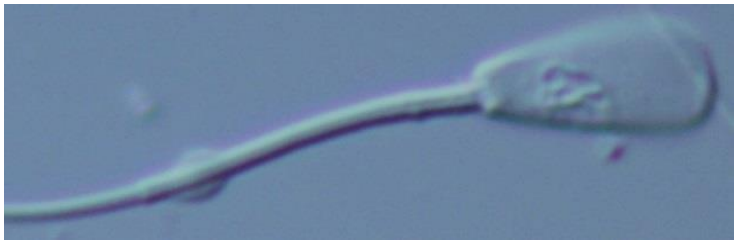
Age, heat and stress are often associated with the formation of vacuole defects. Hereditary breed predispositions have been demonstrated for some breeds.

SMALL APICAL VACUOLES (SAVS)



The occurrence of small single or double vacuoles in the apex of the sperm head. The importance of this type of vacuole on fertility is unresolved.

LARGE CONFLUENT VACUOLES

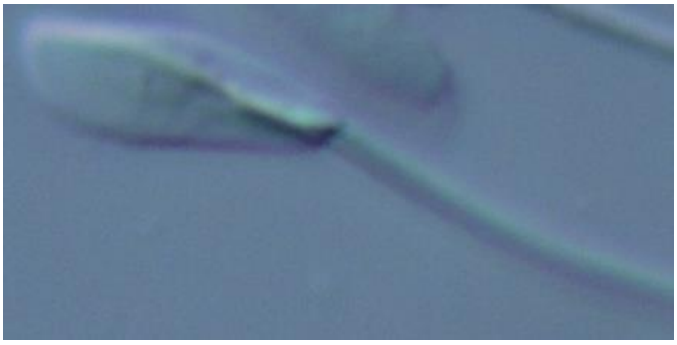


Very large vacuoles may occur in large numbers with or without diadems and SAVs. These have been associated with infertility.

DIADEM DEFECT (CRATER)

Subtle vacuoles or craters, often seen in the equatorial region of the sperm nucleus, represent oxidative damage which occurs during the differentiation phase (spermiogenesis), resulting in abnormal chromatin condensation and binding. Such sperm may achieve fertilization. However, due to DNA/chromatin damage they can cause subsequent problems such as early embryonic death, early pregnancy loss, and possibly abortion and poor viability neonates. They are classified as non-compensable defects. Environmental (temperature-related) effects on spermatogenesis have shown to be one cause of diadems as the appearance of this sperm abnormality follows within days of the administration of dexamethasone or the application of scrotal insulation. The problem may resolve with time, treatment and/or environmental change although some bulls are more susceptible possibly due to impaired thermoregulatory mechanisms of their testes.

ROLLED HEAD- NUCLEAR CREST- GIANT HEAD SYNDROME



This abnormality is also included under the vacuole/teratoid category as it is uncommon. It is thought to be an inherited condition. The prognosis for recovery is very poor. The number tolerated in the ejaculate is at 20% because of the ability to penetrate the zona pellucida but the inability to produce a viable embryo. Reports upon its effect, when present at 20-30% of the ejaculate, on conception rates vary between 2774%.

MICROCEPHALIC AND MACROCEPHALIC HEADS

Small (microcephalic) and giant (macrocephalic) heads are categorized as compensatory defects. The variation in size of the sperm head may be due to an excess or deficiency of nuclear chromatin. They are commonly found in very small numbers in the ejaculates of bulls of normal fertility. These defects can be observed with a myriad of other defects (pyriform, vacuoles, etc.) Following a disturbance in spermatogenesis, but still rarely exceed 5–7% of the ejaculate.

TERATOID HEADS

The term teratoid means significant malformation, in this case of the sperm head region. If a significant number of sperm are so affected, then this usually reflects a severe spermatogenic insult. The defect is regarded as non-compensable.

SWOLLEN ACROSOMES

In general, the term swollen acrosomes refers to an evident ballooning of the acrosomal membrane(s), which is a common occurrence in ageing sperm - for example in the “rusty load” syndrome or where samples are not added to fixative in a timely manner. However, ruffled and incomplete acrosomes have been reported in sub fertile bulls.