

TIPS & TOOLS

NORTHERN CATTLE

How do I select and manage bulls?

Selecting the right bulls for your breeding objectives and managing them effectively is key to ensuring the long-term productivity and profitability of your herd.

Producers can use these Tips & Tools to understand the importance of appropriate bull selection techniques and to implement best practice management strategies on-farm.

Selection

Selecting which bulls to buy is one of the most important decisions producers make every year – but why is it so important and what do you need to consider?

The importance of picking a performer

Genetic composition

The bull you purchase today will impact the genetic composition of your herd for the next 12–18 years.

While a bull will directly affect progeny performance for as long as he's servicing a herd (roughly four years), the herd's replacement weaner heifers that are joined to new sires can still produce progeny with performance traits of the original bull 8–10 years after his removal.

Genetic improvement

Sire selection drives genetic improvement and is approximately 10 times more important than heifer selection. For example, a bull could produce around 120–180 progeny over his time in the herd but an individual breeder cow may only produce 6–8 progeny.

A bull with the genetics required to direct the herd towards your breeding goals is often referred to as a 'herd improver'. While a 'herd improver' will increase genetic gain, a bull with inferior genetics will take your herd backwards.



MLA's pocket guide *How to shop for a high-performing sire* provides valuable insights on sire selection. To download the guide, visit genetics.mla.com.au

Key considerations

BREEDPLAN

BREEDPLAN – a modern genetic evaluation system for beef cattle – enables producers to accelerate genetic progress in their herds through the use of Estimated Breeding Values (EBVs) for a range of important production traits such as weight, carcase and fertility.

By seeking stud breeders who measure and record performance data in their herds via the BREEDPLAN database, producers can select sires that directly align with their breeding objectives. For example, if you're looking to improve female fertility, it's important to purchase bulls with EBV traits such as 'days to calving'.

For more information on using breeding values to find sires, visit mla.com.au/using-ebvs

BULLCHECK

A BULLCHECK examination provides assurance to the bull buyer that at the time of examination, the bull was reproductively sound. However, bulls will still need to be monitored for injury, disease and nutrition status, which may affect fertility after the examination.

BULLCHECK examinations are carried out by an accredited veterinarian:

- prior to sale or purchase
- annually for herd bulls – especially single sire groups and short-controlled mating systems.



Once the veterinarian has deemed a bull 'sound', they will provide an Australian Cattle Veterinarians (ACV) BULLCHECK Certificate of Approval and a summary of the tests will be provided in the bull sale catalogue (see example in Figure 1).

Figure 1: Sale catalogue summary

Bull	Age	Scrotum	Physical	Semen	Morphology	Serving
Name/number	Year/month	32cm	✓	✓	Q	NT

Key:

- ✓ All attributes for this component measured were consistent with the ACV standards.
- X Some attributes for this component measured were not consistent with ACV standards. The bull has a significant risk of reduced fertility in the short-term at least.
- Q Not all attributes for this component were consistent with ACV standards but these abnormalities may not preclude the bull's use. Retesting may be recommended.
- NT Not evaluated

Five components of BULLCHECK explained

The BULLCHECK examination involves assessment of five components of likely fertility:

1. Scrotal circumference
2. Physical
3. Semen
4. Morphology
5. Serving.

1. Scrotal circumference

Testicular size provides an indication of the sperm-producing capability of a bull. While 'big is better' to a certain extent, excessively large testicles may indicate abnormalities. Testicles should be firm and springy but not hard or too soft.

Scrotal circumference (as measured with a scrotal tape) is a highly heritable trait, with estimated breeding values available up to 400 days of age. This trait is a good indicator of puberty in young bulls, which usually occurs when the circumference is 27–30cm. Scrotal circumference is also moderately correlated with the bull's daughters' age at puberty.



Source: J. Bertram

Sale bulls must meet a minimal prescribed scrotal circumference prior to sale. This varies according to age, body weight and breed (see Table 1).

Table 1: Guidelines for minimum scrotal circumference thresholds for young bulls prior to sale (in cm)

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

Source: Veterinary bull breeding Soundness Evaluation – Australian Cattle Veterinarians, 2013

2. Physical

This entails a full physical examination of jaws, teeth, eyes, joints, hooves, limbs, prepuce, penis, internal sex organs and locomotion. Bulls must be structurally sound and free of lameness if they are to perform in a natural mating environment. However, bulls with acquired injuries may still be available for semen collection.

3. Semen

Semen is often collected using an electro-ejaculator, but other techniques such as internal massage or use of an artificial vagina can be employed with training. The penis is usually examined at this stage and the colour and density of the semen is recorded. The semen should be:

- creamy in colour (not watery)
- free of pus and blood.

A drop of semen is immediately examined under a field microscope for wave motion (1–5) and individual sperm progressive motility (0–100%). On low magnification, the semen should be swirling around and very active.

On higher magnification, an assessment of the number of individual sperm that are swimming progressively forward is estimated. In the majority of cases, a bull that has a wave score of three or four and a motility score >70% will be sound reproductively.

However, semen that is watery with low wave motion and sperm motility may still be satisfactory and it may be a reflection of the quality of the ejaculate obtained on the day.

4. Morphology

A few drops of semen are placed in a vial of 10% formol saline and sent off to an accredited semen laboratory for further analysis. Using a high-powered oil immersion microscope, 100 individual sperm cells are assessed for normality.

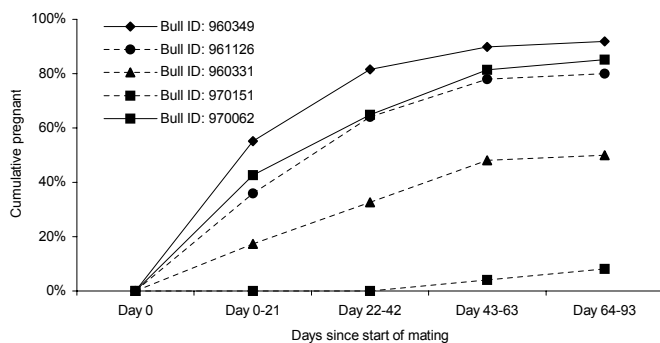
Percent normal sperm (PNS)

To calculate PNS, sperm with abnormalities are counted and a score is provided of the percentage of 'normal' sperm out of 100. Sperm abnormalities include:

- bent tails
- dislocated tails
- proximal droplets
- narrow heads
- knobbed acrosomes
- vacuoules.

A bull should have a PNS of >50% for natural service and >70% for single sire joining, semen collection and freezing. PNS has been proven to be directly linked with pregnancy rates (see Figure 2).

Figure 2: Cumulative pregnancy rates versus bulls percent normal sperm (PNS)



Key:

PNS percentages for bulls were:

- 960349: 91%
- 961126: 30%
- 960331: 23%
- 970151: 10%
- 970062: 90%

Source: *Bull selection and use in northern Australia (Holroyd et al.)*
MLA project DAQ.104

Failure of bulls to pass a morphology test may be the result of:

- immaturity
- sexual inactivity
- poor body condition
- relocation or a recent febrile condition.

A second test at least 10 weeks later is usually warranted prior to making any decisions to cull.

5. Serving

The final component of BULLCHECK assesses the bull's ability to successfully mount and achieve intromission. The test is labour-intensive and performed under strict guidelines for animal welfare. It can be performed using a cow on heat but normally requires restraint of a cow in a serving capacity crate.

Abnormalities such as spiral deviation of the penis and penile haematoma are identified in this test, as well as problems with hips and inability to mount.

If information on serving ability is not available, producers should still monitor their bulls during natural service to assess if intromission is complete.



Source: J. Bertram

Joining percentage

Another key consideration for bull selection is the number of sound bulls required to get cows/heifers in calf. This is often referred to as the 'joining percentage' and is calculated as the number of bulls put in with the herd as a percentage of the number of cows/heifers in that herd.

MLA's Bullpower: Delivery of adequate normal sperm to site of fertilisation project demonstrated that in almost all situations, a joining percentage of 2.5% is sufficient. In fact, too many bulls can lead to:

- additional mustering costs
- excessive dominance behaviour
- fighting and injuries.

However, the biggest benefit of a small bull team is purely economic, with less variable costs and the capability to run a few extra breeders at the same carrying capacity.

There are several ways to calculate bull costs but a simple method is to consider bulls as a variable cost (Table 2) – that is, the cost of the bull per breeder cow joined (cow cost), or alternatively, the cost per weaner produced (a weaner cost).

Table 2: Calculating bull costs

Scenario	A	B	C
Joining percentage	4%	2.5%	2.5%
Bull purchase price (including transport home)	\$6,500	\$6,500	\$9,300
Bull sale price (meatworks – net of sales costs)	\$1,800	\$1,800	\$1,800
Number of years bull retained in herd	4	4	4
Weaning percentage	80%*	80%*	80%*
Bull cost per calf weaned	\$59	\$37	\$59
Bull cost per cow joined	\$47	\$29	\$47

(Mortality rates of bulls have been included as 0%)

* If the weaning percentage is not 80% but 60%, then bull cost/weaner increases to \$78 at 4% and \$49 at 2.5% respectively for scenario A and B.

In most cases, the bull cost will usually be the biggest variable cost/weaner produced and will most likely be greater than supplement costs, health costs or labour costs.

In a breeder herd of 1,000 head, the savings per year of reducing the joining percentage from 4% down to 2.5% are \$18,000 using cost per cow joined (refer to scenario A versus scenario B in Table 2).

Alternatively, the \$18,000 savings could be invested in buying bulls with superior genetics. In this case, the average price of the bull can increase from \$6,500 per bull to \$9,300 per bull (scenario C), while maintaining the same cost per weaner or per cow – both scenarios represent a win-win situation.

Management

It's one thing to select the right bulls, and another to manage them effectively to ensure they're having maximum impact within your herd. Here are the key things producers should consider for best practice bull management.

Maintaining semen quality and bull soundness

It's essential that all newly purchased bulls have undergone a BULLCHECK prior to purchase (see page 2) to ensure their semen quality is up to standard.

The semen quality of bulls that have passed their initial BULLCHECK will most likely remain satisfactory provided they are:

- maintained in good condition
- are free of disease
- have not suffered traumatic injuries.

Semen quality is related to the condition of the bull, so avoid testing bulls at the completion of a dry season when they may be in poor body condition.

Producers who are unable to implement an annual BULLCHECK still need to undertake an annual inspection of all their bulls prior to joining. In continuously mated herds (or breeding systems that use restricted joining), this should be done at the first muster.

A complete physical examination can be carried out along with physical palpation of the testes and close inspection of the sheath and penis.

If bulls exhibit the following abnormalities, culling should be considered:

- poor temperament
- prolapse of the prepuce
- swollen penis
- very hard or very soft testes
- bulls with severe lameness in their hind quarters
- bulls observed serving in the yard and fail to achieve intromission because the penis deviates to the side.

Some bulls may recover with rest or surgical intervention but this is not recommended unless the animal is extremely valuable and can be reassessed prior to returning to the breeder herd.

Annual BULLCHECKs are recommended in single sire joinings and where mating occurs over short joining periods – especially in bull breeding units. In these situations, bulls still need to be checked weekly as subsequent injuries or illness can cause mating failure.

Culling age for herd bulls

Theoretically, semen quality in a bull can remain satisfactory up to approximately seven and a half years of age. However, in practice most bulls should be culled sooner than this.

When deciding whether to cull a bull, producers should consider:

- Is the bull maximising genetic gain in my herd?
- Has lameness and mounting failure become more prevalent with this bull?
- Has the bull experienced any spiral deviations, prolapses or penis issues?
- Does the bull tend to fight with younger bulls and prevent them from performing?
- Has inbreeding become an issue in my herd?

There are no defined rules on the age to cull a bull. However, a general guide would be to cull herd bulls at six years of age and to purchase replacement bulls to start working at two years old – especially if annual BULLCHECK examinations are not performed on herd bulls and semen is not evaluated.

The policy will depend on breed, herd size and the genetic improvement program. For instance, in a small operation that puts replacement yearling heifers in with the main breeder herd, bulls would need to be turned over after only two years in the herd (to avoid inbreeding).

Disease

Vibriosis

Vibriosis is the most important disease to consider because it's a venereal disease which is common throughout Australia. If bulls aren't vaccinated, they can pick up vibriosis from an infected cow and end up spreading it to the rest of the herd.

If the bull wasn't vaccinated at the time of sale, it's recommended to vaccinate prior to joining. The vaccine does leave a lump on the side of the neck but this is good confirmation the bull has been vaccinated.



A lump on the side of the neck is usually indicative that the animal has been vaccinated. Source: G. Niethé

Pestivirus

Pestivirus can cause problems if a persistently infected bull is introduced to a naïve herd of breeders, as it will continuously shed the virus and cause infertility and early embryonic loss in cows.

Most persistently infected animals are 'poor doers' and usually die prior to reaching adulthood, while others appear quite normal. Ensure newly purchased bulls have been vaccinated against pestivirus, or that they've had a negative 'ear notch' test and are not a persistently infected animal.

Leptospirosis

Leptospirosis is not a disease that causes clinical signs in bulls but it can cause serious health problems in humans. Bulls can be asymptomatic carriers of the organism and it's recommended bulls be immunised when the rest of the breeder herd is being vaccinated.

Tick fever vaccine

Bulls purchased from studs in the tick-free regions of Australia must be vaccinated prior to purchase. Vaccination should preferably occur about four weeks prior to transportation, as vaccine reactions can occur. If this is not possible, it's highly recommended to vaccinate bulls with three-germ vaccine as soon as possible after arrival. Vaccinated bulls should be monitored for at least two weeks post-vaccination for vaccine reactions.

Bovine ephemeral fever

If bulls originate from regions free of bovine ephemeral fever, it's recommended to vaccinate animals that will be destined for endemic areas. The disease is spread by biting midges after floods and periods of heavy rain – usually January through to May.

The symptoms are less severe in young cattle but infected bulls may be rendered temporarily infertile for 10 weeks. Bovine ephemeral fever may even cause death if heavier, older animals are lying down for any length of time.

Relocation effects

Takeaways from the Bullpower project

MLA's Bullpower project conducted observational studies on the relocation effects on bull reproductive traits. The key findings from this project were:

- The average age and range of puberty in Brahman and composite bulls was 17.4 (13.5–24) months and 15.4 (12.5–18.5) months respectively.
- At 14 months of age, 12% to 18% of *Bos indicus* bulls produced semen with at least 50% normal sperm, while in composites it was 59% to 89%.
- Supplementing yearling bulls with moderate levels of concentrates had a variable effect on scrotal circumference but there was no effect on semen quality or sperm morphology.
- With concentrate feeding there is a risk of lameness from acidosis; flight speeds increased and the advantages in live weight and scrotal circumference were almost eroded 12 months later.
- Where bulls are relocated from studs with high quality feed on offer or from studs where additional pre-sale feeding is used to present better finished bulls for sale, it's recommended to purchase these bulls 3–12 months prior to their intended mating dates.
- Temperament should also be considered when selecting bulls.



Grainfed bulls will often be in very good condition and exhibit very soft loose faeces. These animals will take time to adjust to poorer quality pastures. Source: G. Niethé

Creating a bull selection and management plan

Here are eight tips that will help producers maximise genetic gain and offer significant cost savings for breeding enterprises.

1. Use BREEDPLAN to help ensure that you buy a 'herd improver' to maximise genetic improvement.
2. Purchase bulls at least three months prior to intended use and ensure their breeding values are aligned to your breeding objectives.
3. Always insist on a BULLCHECK certificate when purchasing a bull.
4. Aim for a joining percentage of 2.5%, which should be sufficient in most circumstances (if the bull is in good condition).
5. Do a risk assessment for diseases in your region and ensure all bulls are vaccinated against vibriosis.
6. If single sire joining, perform a visual inspection on herd bulls every year and conduct an annual BULLCHECK.
7. If using a short joining period or stud producer, monitor bulls over the mating period.
8. Avoid retaining bulls too long – cull at six years of age and inspect bulls annually.



More information

You can download the full Tips & Tools suite at: mla.com.au/repro-performance, including:

- *What females should I sell?*
- *What joining system should I use?*
- *How do I manage heifers pre-joining to improve reproductive performance?*
- *Calf loss – do I have a problem?*
- *What causes calf loss?*
- *How do I select and manage bulls?*

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