TECH NOTE

CRITICAL MATING WEIGHTS

REPRO active

CRITICAL MATING WEIGHT

With a variety of maturity types within breeds, critical mating weight (CMW) should be determined for each individual herd.[1] Different breeds of cattle have a range of frame sizes and mature at different times – consider the difference between British breeds and the larger-framed, later maturing European breeds.[1,2]

What is 'critical mating weight' and why is it important?

CMW is the minimum weight at which heifers should be mated to achieve a high pregnancy rate when first joined. Weight is one of the most significant influences when heifers reach puberty and begin to cycle.[2]

Having some idea of CMW well in advance helps producers manage nutrition and growth to achieve high pregnancy rates.[2]

CMW should not be confused with average weight at puberty and average group weight at mating, both of which are much higher. It is important to remember an average weight for puberty means that only half the heifers in the mob will have reached puberty at this weight, so a heavier average will be required to ensure most heifers will have reached puberty well before the end of the first joining so they can conceive.

Heifers usually begin cycling at around 52% of mature body weight and can be joined at approximately 66% of their mature body weight.[1]

CRITICAL MATING WEIGHT IS DEFINED AS

The weight at the start of the joining period at which 85% or more heifers will fall pregnant in a 42-day joining period.[3]

TIP WEIGH YOUR WEANER HEIFERS AND MONITOR THEIR FEEDING REQUIREMENTS TO REACH CRITICAL MATING WEIGHTS

Growth rate targets to meet critical mating weights

Puberty is reached earlier and faster by increasing growth rate through good nutrition.[4]
Use the table below to determine the optimal growth rate required for your heifers to reach CMW.

Growth rates required between weaning and mating to reach CMW of 300 kg at 15 months of age				
Weaning weight (kg) at 8 months	200	220	240	260
Average daily growth weaning to joining (210 days, kg/day)	0.48	0.38	0.29	0.19
Growth rates required between weaning and calving to reach target weight* of 450 kg at 24 months of age				
Weaning weight (kg) at 8 months	200	220	240	260
Average daily growth weaning to calving (480 days, kg/day)	0.52	0.48	0.44	0.40

*Calving weight recommended as 80–85% mature weight (aged 4 years, condition score 3.0–3.5)

HEIFERS: FROM WEANING TO JOINING

MLA recommendations for heifers reaching CMW[4]

- Weigh heifers every 6 weeks after weaning to achieve growth targets. Use the table below as a guide to minimum weights of weaner heifers at puberty.[5]

There is no definite frame size for each breed of cattle. To determine the optimum frame size for individual situations, consider the overall economic return.[1,2]

Frame score	Weight at puberty	Mating weight at 15 months	Weight at 0–3 months pregnancy	Weight at 4–6 months pregnancy	Calving weight at 24 months	Mature weight
1	240	260	296	319	333	400
2	270	300	342	369	387	470
3	290	330	377	409	430	530
4	310	365	419	454	487	600
5	340	400	459	499	525	670

Adapted from MLA, More Beef from Pastures, Tool 5.1.[5] All weights are expressed as kilograms.

HEIFERS: FROM WEANING TO JOINING

MLA recommendations for heifers reaching CMW[4]

Heifers can occasionally join as young as 5 months of age, resulting in a calf by the time the heifer is 15 months old. Although this is possible, it is undesirable, as almost all these animals will require assistance at calving and many will require a caesarean. The most important factor is not the age of the heifer, but the weight at joining.[6]

- If adequate pasture is not available, the use of supplementary feed may be required to attain growth rates necessary to reach CMW.
- Formulate feeding strategies well in advance of joining to reach CMW.
- Practice good parasite management at weaning (an often neglected aspect) using a treatment that will be effective against the worm species in your area, and drench again 3–4 weeks prior to joining (depending on seasonal conditions, locality and production system).
- Maximise the number of heifers reaching CMW 2–3 cycles before joining.
- If deficient, supplement with selenium at weaning to improve reproductive efficiency and achieve high conception rates.
- Reproductive diseases and/or any other health issues will slow weight gain or cause weight loss resulting in lower reproductive rates and significant economic loss.[8]

TIPS

In more intensively managed systems, poor worm control can reduce cattle growth rates by at least 20%.[7]

When using an artificial insemination programme, consider using a controlled internal drug release (CIDR®) device to assist in oestrus synchronisation of your heifers.

Breeding herds should be fully vaccinated against infectious reproductive diseases, such as Pestivirus, Vibriosis and Leptospirosis and external livestock introductions should be managed to minimise the risk of infection.[8]

Heifers usually begin cycling at around 52% of mature body weight. Join them at approximately 66% of their mature body weight.[1]

RIB FAT ESTIMATED BREEDING VALUE

Increasing conception rates

Genetically fatter heifers, identified by higher rib fat estimated breeding value (EBV) and rib fat depth are correlated with conception rates.[9] Having higher rib fat depth may increase conception rates by 8%.[9] Conversely, having very negative rib fat EBV may reduce conception rates at first joining.[9]

Benefits of high rib fat EBV[9]

	HIGH RIB FAT EBV	LOW RIB FAT EBV
Rib fat EBV (average)	+1.0	-1.3
Weight (kg):	360	363
Rib fat depth (mm):	4.5	3.6
Conception rate after 9 weeks of joining (%):	91.2	83.0

With all other variables being equal, higher rib fat can improve conception rates by 8%.

TIP SUFFICIENT ENERGY RESERVES

Ensure maiden heifers have sufficient energy reserves to maintain rib fat at first joining.[9]

TIP SELECTING HEIFERS

Heifer conception rates are associated with rib fat. Select heifers within a healthy range (i.e. not at either extreme).[9]

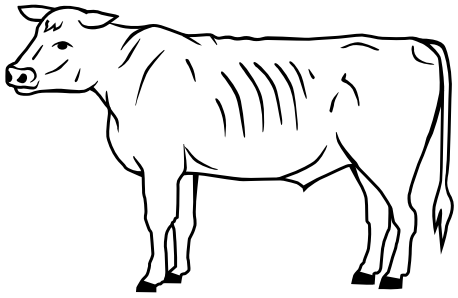
TIP BUYING BULLS

Take care when selecting bulls for purchase. Make sure they do not have a highly negative rib fat EBV.

WHAT TO EXPECT WHEN CMW IS REACHED?

With a 6-week joining period of heifers that have met the CMW, 85% pregnancy rates should be achievable. Not achieving CMW may result in >15% of your females being empty at pregnancy testing, which may impact your herd profitability, productivity, longevity and potential genetic gain.[1,4,10] When CMW is not met, critical condition scores may be difficult to achieve. This may cause decreased pregnancy rates and calving problems. Consider the possible calving issues in cattle with condition score 2 or less and condition score 5.[11]

Condition score 2:*



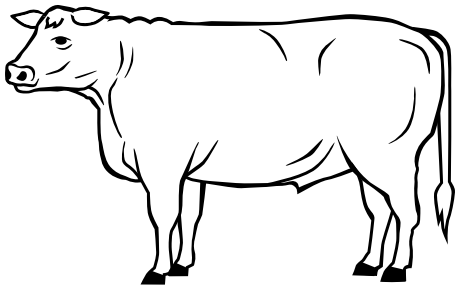
*Due to welfare conditions, a condition score of 1 is not acceptable.

Calving problems due to:[11]

- Inadequate muscle tone
- Weak labour
- Downer cow syndrome
- Foetal pelvic diameter dysproportion

vs.

Condition score 5:



Calving problems due to:[11]

- High calf birth weights may result in dystocia
- Obstruction of birth canal by fat deposits
- Poor muscle tone
- Weak labour
- Issues holding a calf
- Metabolic disease (e.g. milk fever)
- Retained foetal membranes
- Uterine inertia

MINIMUM CONDITION SCORES AT JOINING[12]

Spring calvers
Heifer: 3.0
(60–65% mature weight)
Cow: 3.0
Bull: 3.5

Autumn calvers
Heifer: 3.0–3.5
(60% mature weight)
Cow: 3.0
Bull: 3.5

Expect an average condition score to be at least 0.5 higher[12]

SUMMARY

- Nutrition is one of the key factors contributing to fertility. Optimise pasture growth to improve the condition of your herd.
- CMW is the minimum weight at which heifers should be mated to achieve an 85% pregnancy rate and varies between breeds and individual herds.[1–3]
- Ensure good parasite management is carried out. In more intensive managed systems, poor worm control can reduce cattle growth rates by at least 20%.[4,7]
- Rib fat EBV is a contributing factor to conception rates.
- Achieving CMW can increase herd profitability, productivity and longevity.[1–3]

THANK YOU

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GLOSSARY

Average weight: The sum of all the weight values in a group, divided by the number in the group.

Condition score: An assessment of an animal's condition based on an estimate or measurement of the amount of fatty tissue under the skin on certain body parts. The objective of condition scoring is to obtain a simple and reliable estimate of the body fat reserves of live cattle. The condition score provides an estimate of fat reserves that is independent of size, and is a more reliable description of condition than liveweight alone. One condition score equals between 50–80 kg live weight depending on frame size of the cattle.[14]

Controlled internal drug release (CIDR): T-shaped devices impregnated with progesterone, used in livestock for the synchronisation of oestrus. CIDRs are inserted intra-vaginally using a specialised applicator.

Critical mating weight (CMW): The weight at the start of the joining period at which 85% or more heifers will fall pregnant in a 42-day joining period. The recommended critical mating weight is approximately 66% of the mature body weight, but this varies depending on frame score and individual breed.

Cycle: The oestrous cycle comprises the recurring physiologic changes that are induced by reproductive hormones in most mammalian therian females. Cycles start after sexual maturity in females and are interrupted by anoestrous phases or pregnancies. Typically, oestrous cycles continue until death. Some animals may display bloody vaginal discharge, often mistaken for menstruation, also called a "period".

Drench: Liquid medications applied to an animal's stomach via the mouth and throat. Often used to treat internal parasites or worms in stock.

Estimated breeding value (EBV): An estimate of an animal's value as a parent for a particular production trait such as growth rate.

Frame score: A convenient way to discuss and evaluate height of cattle in units of 'frame score' based on the height over the hips at a given age.

Infectious reproductive diseases: Reproductive diseases can be infectious, caused by bacteria, viruses or protozoal parasites. They include leptospirosis, pestivirus, vibriosis and trichomoniasis.

Oestrus: In cattle, the period during which a cow or heifer is willing to receive a bull. Also known as heat or bulling.

Parasite management: Parasites are organisms that have sustained contact with another organism to the detriment of the host organism. In cattle, these parasites are often in the form of worms. It is important to find out what parasites commonly occur in your area so that you can manage them properly – see *www.wormtrax.com.au* to find the worms that count in your area.

Puberty: In beef breeds, puberty generally occurs when heifers reach about 52% of their mature body weight.

Rib fat: Also known as fat thickness or backfat, an external fat measurement taken between the 12th and 13th ribs.

Supplementary feed: Feed given to animals to supplement pasture usually to maintain or improve production. It may consist of hay, silage or concentrates.

WormTRAX™: Based on over 50,000 dung samples submitted from around Australia, WormTRAX shows the most prevalent worms in a given region and shows the drench with the longest action against the local worm types.

References: 1. McConochie J. Selecting and managing beef heifers. New South Wales, Department of Primary Industries, 2007. Primefact #626. **2.** Hamlyn-Hill F & Fordyce G. Heifer Management. Future Beef, 2012. Available from futurebeef.com.au/topics/breeding-and-genetics/heifer-and-breeder-management/. Accessed October 2013. **3.** Schatz T. Heifer management in northern beef herds. 2nd Edition 2012. Meat and Livestock Australia. **4.** More Beef from Pastures. Procedure 1: Maximise the number of live calves per female. 2013. Meat and Livestock Australia. **5.** More Beef from Pastures. Minimum liveweights of weaner heifers. 2013. Meat and Livestock Australia. **6.** Barber S. Successfully joining cattle. Published in Weekly Times 2011. Available from http://www.weeklytimesnow.com.au/ Accessed October 2013. **7.** More Beef from Pastures. Choose the appropriate management practice, corrective treatment or a combination to prevent common diseases or disorders. 2013. Meat and Livestock Australia. **8.** Reproductive diseases. 2012. Meat and Livestock Australia. **9.** Pitchford W. Selection and Management of the Maiden Heifer. 2012. Cooperative Research Council for Beef Genetic Technologies. **10.** Kroker G & Clarke L. Age of beef heifers at first mating. Victoria, Department of Primary Industries, 2000. **11.** Shaw S-E. Heifer days a hit. 2009. Department of Agriculture and Food. **12.** More Beef from Pastures. Module 6: Weaner throughput. 2013. Meat and Livestock Australia. **13.** Zoetis Inc. WormTRAX™ Check your count. Available from www.wormtrax.com.au. Accessed August 2014. **14.** Feed.FIBRE.future. Are my beef cattle at the right condition score? 2007. Dairy Australia.

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