

A large, stylized illustration of a cow's head and neck, rendered in white and light green lines against a dark green background. The cow is facing right, and its long, floppy ears are prominent. The illustration is partially obscured by a semi-transparent white box containing the title text.

## **A national guide to describing and managing beef cattle in low body condition**

This national guide was developed from the MLA Welfare project, *Welfare initiatives for beef cattle in low body condition*.

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# Describing beef cattle in low body condition

This national guide provides an objective description system to assess beef cattle in low body condition, usually because of prevailing below normal nutritional conditions.

Traditional descriptions such as poor, backward and weak have not been well defined and are subjective, and their use is now discouraged.

Producers across Australia will be able to use either the new Body Condition Score (BCS) system to describe beef cattle in low body condition, or the existing National Livestock Language – Cattle system (referred to as ‘Muscle Score Fat Score’ or ‘MS FS’).

BCS and MS FS are two independent description systems, however each classification has an equivalent in the other system (see Table 1).

**Table 1: Equivalent classifications for beef cattle body condition in the National Livestock Language – Cattle (MS FS) system and the Body Condition Score (BCS) system**

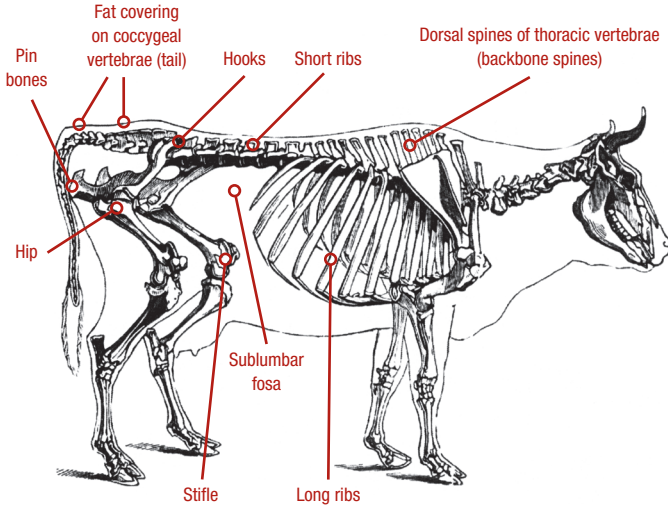
National Livestock Language – Cattle (MS-FS)		Body condition score (BCS)
Muscle score	Fat score	
E	0	0
D	0	1
B-E	1	2
A-E	2	3
A-E	3	4
A-E	4	5
A-E	5	5
A-E	6	5

*N.B. A new BCS of 0 is incorporated into the old BCS which ranged from 1 to 5.*

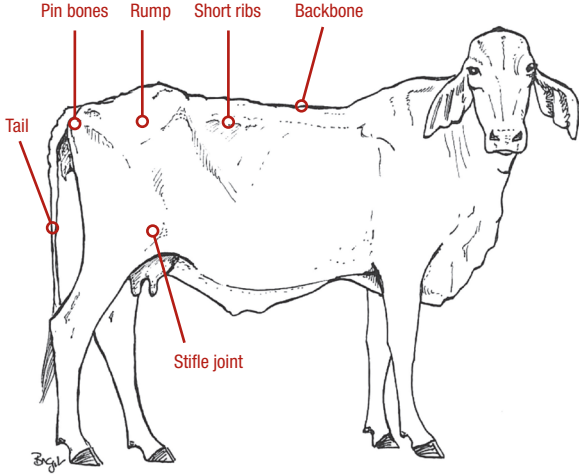
# Using physical reference sites

This guide provides clear practical guidelines to assess the status of cows in low body condition. The following sections of this guide frequently refer to the skeletal points illustrated in Figure 1.

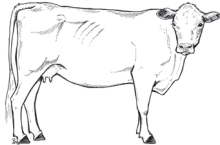


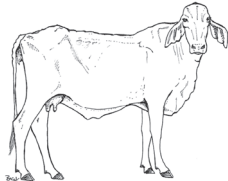
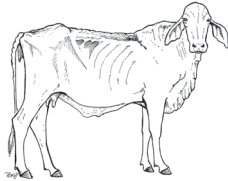
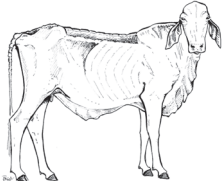
**Figure 1: Skeletal points for assessment of body condition**



**Figure 2: Location of key assessment sites**



# Assessing low body condition breeds and crossbreeds

Level of low body condition	B-E 1/BCS 2	D 0/BCS 1	E 0/BCS 0
<b><i>Bos taurus</i> or cross bred animals</b>			
<b><i>Bos indicus</i> animals</b>			
<b>Brief description</b>	<ul style="list-style-type: none"> <li>Lean but strong and healthy with evident muscle wastage</li> </ul>	<ul style="list-style-type: none"> <li>Healthy but with significant muscle wastage</li> <li>Able to recover for transport if adequately fed</li> </ul>	<ul style="list-style-type: none"> <li>Weak, with no body reserves. At risk of death from cold, wet weather or other stressors</li> <li>Recovery for transport dependent on high quality care but will be slow</li> </ul>
<b>Backbone</b>	<ul style="list-style-type: none"> <li>Easily seen</li> </ul>	<ul style="list-style-type: none"> <li>Spines of backbone identifiable</li> </ul>	<ul style="list-style-type: none"> <li>Spines of backbone individually identifiable</li> </ul>

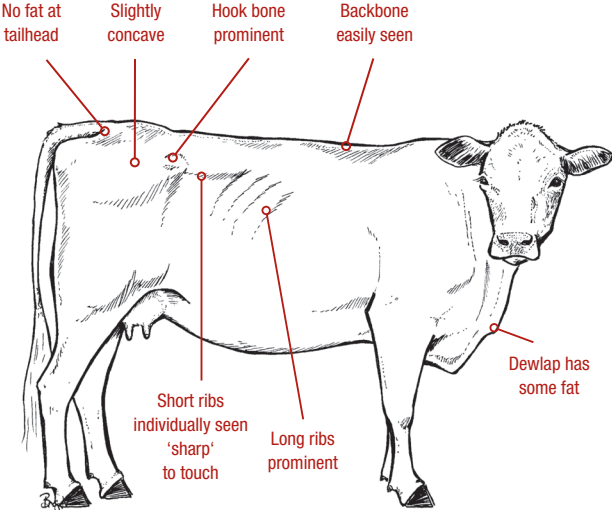
# Assessing low body condition breeds and crossbreeds

Level of low body condition	B–E 1/BCS 2	D 0/BCS 1	E 0/BCS 0
<b>Short ribs</b>	<ul style="list-style-type: none"> <li>• Visible but not individually</li> <li>• Fairly sharp to touch</li> </ul>	<ul style="list-style-type: none"> <li>• Prominent and very sharp to touch</li> </ul>	<ul style="list-style-type: none"> <li>• Very prominent and easy to see individually</li> </ul>
<b>Inside pin bones</b>	<ul style="list-style-type: none"> <li>• Slightly sunken</li> </ul>	<ul style="list-style-type: none"> <li>• Sunken</li> </ul>	<ul style="list-style-type: none"> <li>• Deeply sunken to the bone</li> </ul>
<b>Muscle wastage</b>	<ul style="list-style-type: none"> <li>• Rump muscle concave (between hooks and pins) and leg muscle is beginning to waste</li> </ul>	<ul style="list-style-type: none"> <li>• Rump muscle concave</li> <li>• Muscle wastage in loin and leg muscle evident</li> </ul>	<ul style="list-style-type: none"> <li>• Muscle wastage obvious over whole body</li> <li>• Rump and leg muscles deeply concave</li> </ul>
<b>Stifle joint</b>	<ul style="list-style-type: none"> <li>• Stifle joint not identifiable</li> </ul>	<ul style="list-style-type: none"> <li>• Stifle joint not identifiable</li> </ul>	<ul style="list-style-type: none"> <li>• Stifle joint identifiable</li> </ul>
<b>Tail bones</b>	<ul style="list-style-type: none"> <li>• Individual bones not identifiable</li> </ul>	<ul style="list-style-type: none"> <li>• Individual bones just able to be felt</li> </ul>	<ul style="list-style-type: none"> <li>• Individual bones easily felt</li> </ul>
<b>Skin</b>	<ul style="list-style-type: none"> <li>• Pliable</li> </ul>	<ul style="list-style-type: none"> <li>• Less pliable</li> </ul>	<ul style="list-style-type: none"> <li>• Tight</li> </ul>
<b>Hump (<i>Bos indicus</i>)</b>	<ul style="list-style-type: none"> <li>• Firm with no slack skin</li> </ul>	<ul style="list-style-type: none"> <li>• Slack skin over hump</li> </ul>	<ul style="list-style-type: none"> <li>• Slack skin over hump</li> </ul>
<b>Dewlap</b>	<ul style="list-style-type: none"> <li>• Has some fat</li> </ul>	<ul style="list-style-type: none"> <li>• Has no fat</li> </ul>	<ul style="list-style-type: none"> <li>• Is a skinfold</li> </ul>
<b>Appearance</b>	<ul style="list-style-type: none"> <li>• Bright, alert</li> </ul>	<ul style="list-style-type: none"> <li>• Alert</li> </ul>	<ul style="list-style-type: none"> <li>• Lacking energy and unresponsive</li> </ul>
<b>Mobility</b>	<ul style="list-style-type: none"> <li>• Normal gait</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile, able to lie down/rise with ease</li> </ul>	<ul style="list-style-type: none"> <li>• Unsteady gait, may drag hind feet or plait hind legs</li> <li>• Difficulty lying down/standing up</li> <li>• Difficult to maintain balance</li> </ul>

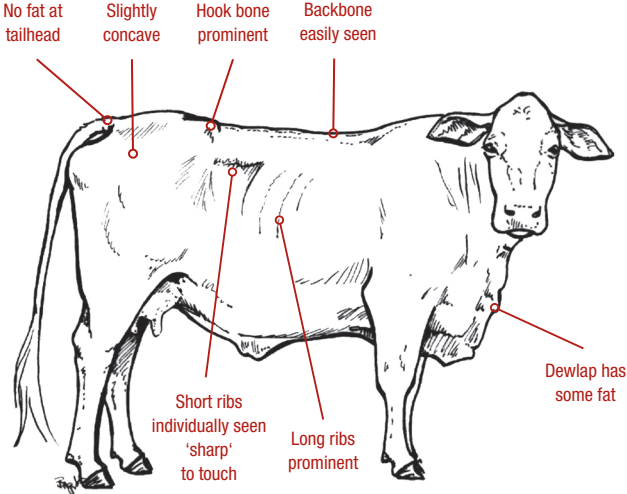
Adapted from NSW DPI (2010), *Welfare decisions for beef cows. Primefact 619, May 2010, NSW Department of Primary Industries.*

# B-E 1 or BCS 2 animals and clinical descriptors

(a) B-E 1 or BCS 2 *Bos taurus* breeds and cross breeds



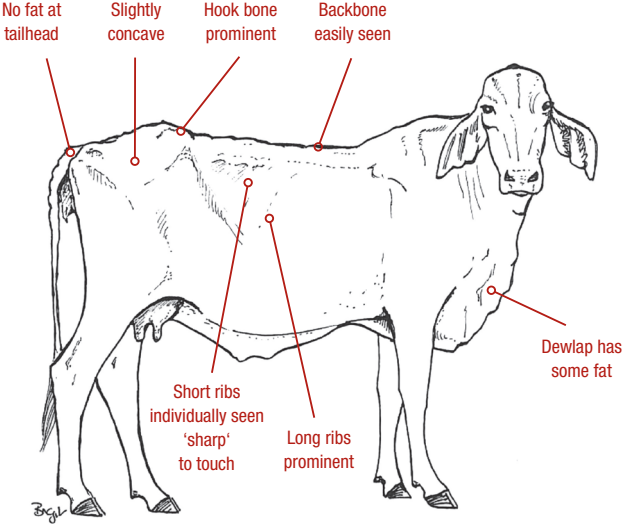
(b) B-E 1 or BCS 2 tropical composites





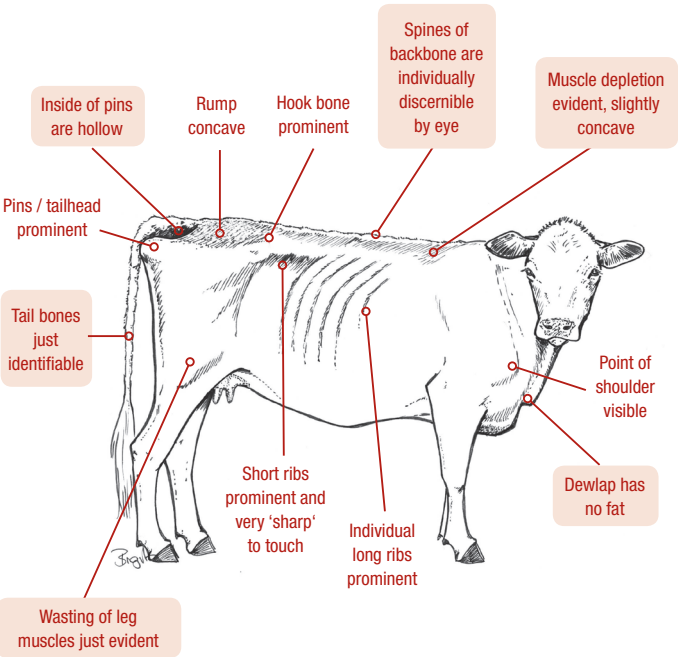
# B-E 1 or BCS 2 animals and clinical descriptors

(c) B-E 1 or BCS 2 high grade *Bos indicus* breeds

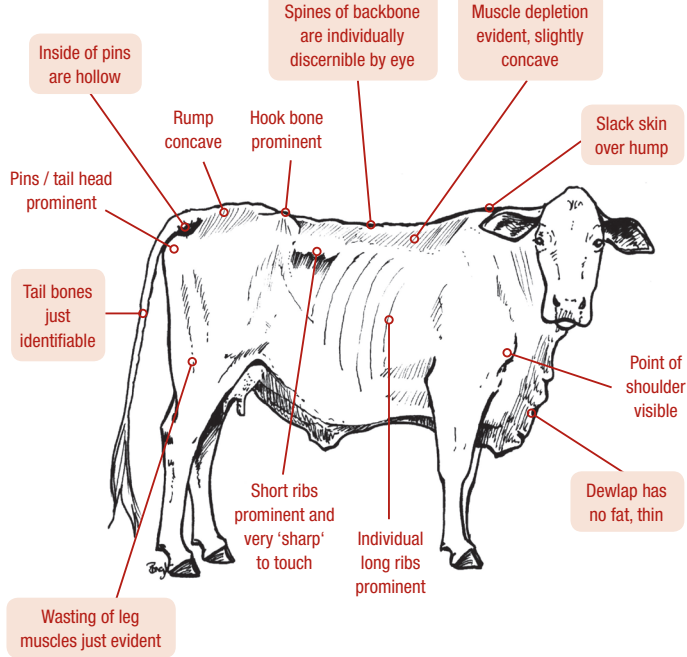


# D 0 or BCS 1 animals and clinical descriptors

(a) D 0 or BCS 1 *Bos taurus* breeds and crossbreeds

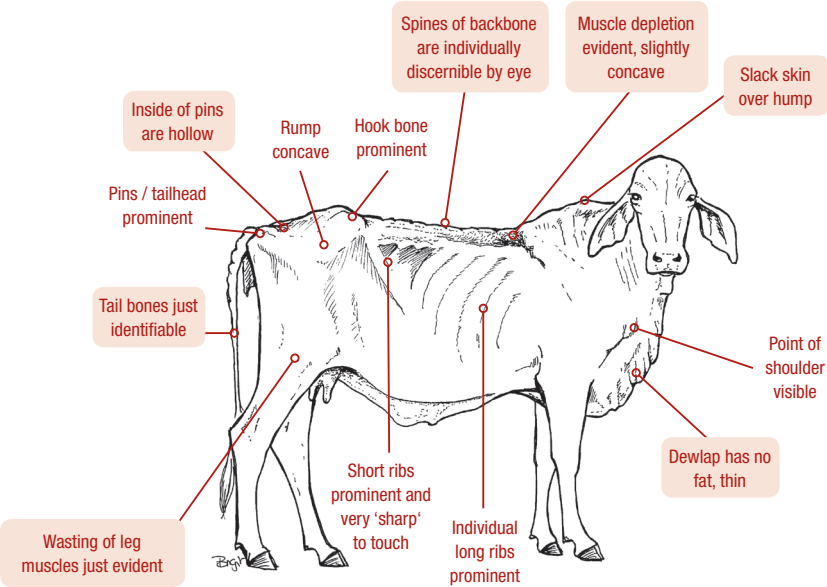


(b) D 0 or BCS 1 tropical composites



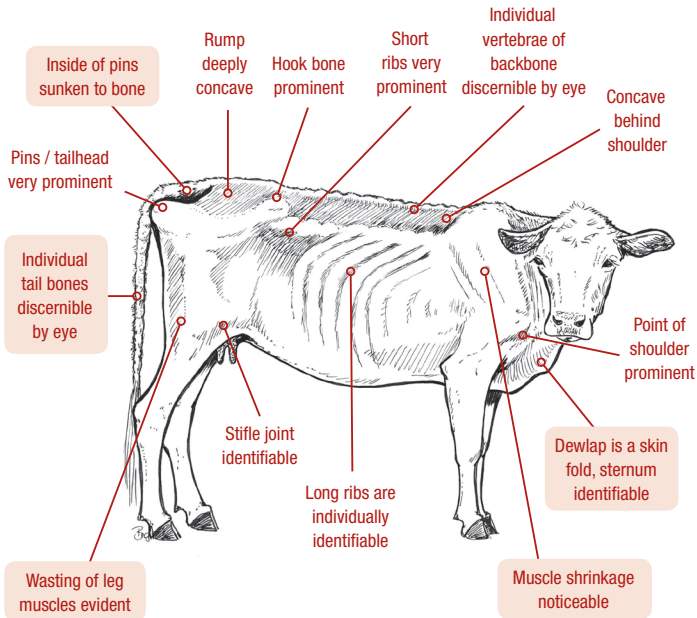
# D 0 or BCS 1 animals and clinical descriptors

(c) D 0 or BCS 1 high grade *Bos indicus* breeds

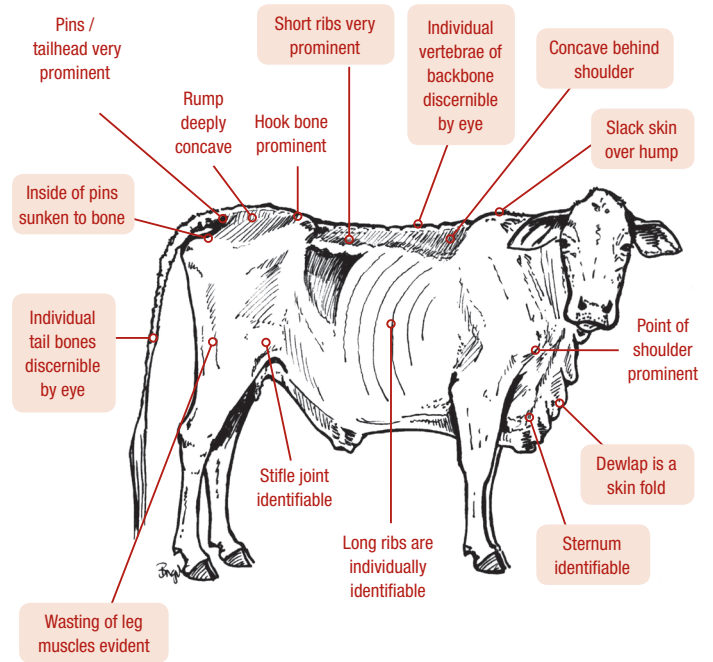


# E 0 or BCS 0 animals and clinical descriptors

(a) E 0 or BCS 0 *Bos taurus* breeds and crossbreeds

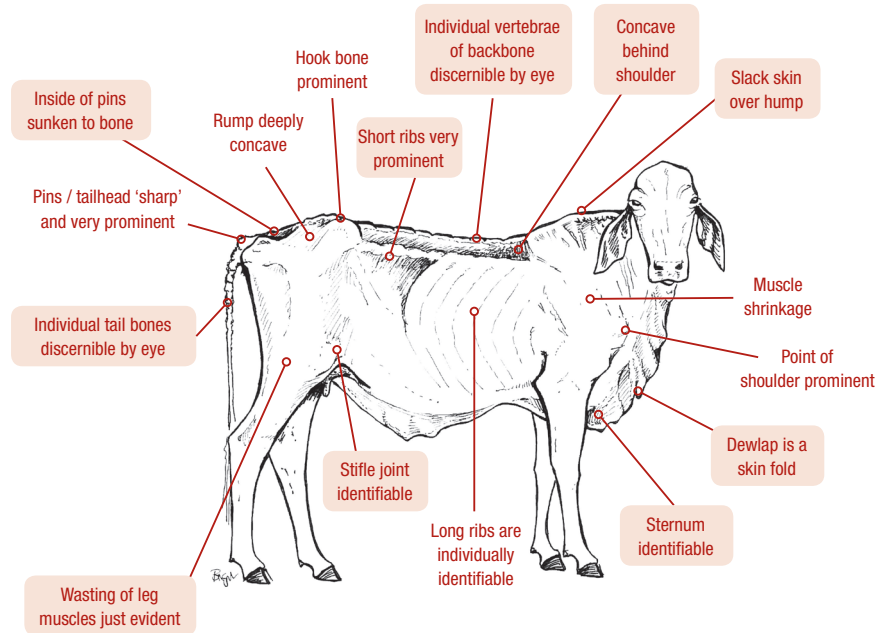


(b) E 0 or BCS 0 tropical composites



# E 0 or BCS 0 animals and clinical descriptors

(c) E 0 or BCS 0 high grade *Bos indicus* breeds



# Assessing strength in beef cattle

Animals that can perform a normal range of behaviours have sufficient strength for handling and transport.

The behaviours and appearances described in Table 3 are normal for beef cattle. Animals that cannot easily perform these behaviours, or exhibit these appearances, should be assessed for malnutrition, disease, stress and fatigue.

Animals must meet the Australian Animal Welfare Standards and Guidelines for the Land Transport of Livestock.

**Table 3: Normal behaviours and appearances of beef cattle**

Behavioural indicators	Observations
Movement and locomotion	<ul style="list-style-type: none"><li>• Co-ordinated gait when walking</li><li>• Lies down from standing position</li><li>• Stands up from lying position</li><li>• Able to stand without muscle tremors</li><li>• Head held above a horizontal line from the point of the shoulder</li></ul>
Grooming	<ul style="list-style-type: none"><li>• Animals seen to self-lick/scratch/rub or lick others</li></ul>
Herd instinct	<ul style="list-style-type: none"><li>• Following behaviour with other cattle (not always seen in yarded cattle)</li><li>• Establishes flight zone distance when approached</li><li>• Alert and will react to potential threats</li></ul>
Inquisitive	<ul style="list-style-type: none"><li>• Approach and then consume feed and water on offer</li></ul>
Cud chewing	<ul style="list-style-type: none"><li>• Chews cud while resting</li></ul>

Physical indicators	Observations
Coat condition	<ul style="list-style-type: none"><li>• Coat shows some shine</li><li>• Coat is not rough and is not harsh to touch</li><li>• Skin is flexible with minimal skin flaking</li></ul>
Eyes	<ul style="list-style-type: none"><li>• Not sunken into the eye socket</li><li>• Are not dull visually</li><li>• Move in response to stimuli and their surroundings</li></ul>

# Assessing fatigue in beef cattle

Fatigue means extreme physical and/or mental tiredness.

Fatigue in beef cattle is not well understood, and can only be assessed by observing physical and clinical signs. Sometimes fatigue can be confused with a lack of physical strength in cattle where muscle depletion is extreme.

Fatigue is a temporary state and can be caused by a variety of stressors including long periods of standing or extreme temperatures. Reducing mobility from muscle loss is not necessarily fatigue but is due to lack of strength.

Cattle with muscle loss show fatigue-like symptoms and show them earlier than cattle not experiencing muscle loss. Grossly fat cattle also show fatigue when exposed to stressors such as periods of exertion or high temperatures.

Descriptors of fatigue are:

- open mouthed panting and salivation
- head and neck drop as muscles are deprived of energy
- muscle tremors visible in hind legs and shoulders
- unsteady gait
- no flight zone response or no avoidance behaviour
- little or no response to stimuli or surroundings
- does not remain with other cattle, particularly when lying
- no cud chewing
- bright yellow urine indicating dehydration
- breathing rate more than 40 breaths per minute.



# Managing fatigue in beef cattle

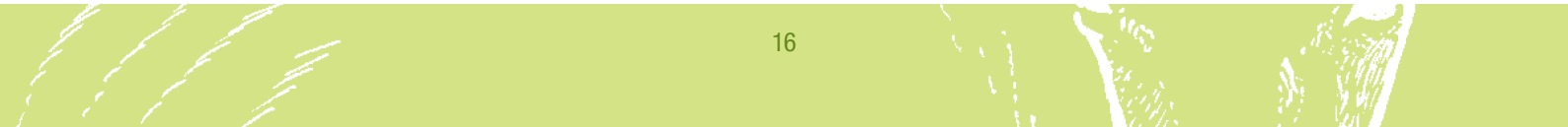
## What to do with fatigued cattle in the yards

- Do not work cattle showing symptoms of fatigue. Fatigued cattle are high transport risks.
- Allow cattle time (overnight is recommended) to recover, with access to water for rehydration and feed.
- Do not work freshly recovered cattle during the heat of the next day.
- Use low stress handling principles.
- Do not load cattle with symptoms of fatigue as they will not cope with travel and are almost certain to fall down during transport.
- Cattle still showing signs of fatigue should be fed and watered until showing signs of normal behaviour.
- Supply clean water, as cool as practically possible, and make water continually available.
- Shade should be provided.
- Cattle failing the strength assessment (see Table 3) are those most likely to show symptoms of fatigue

when exertion/exercise is given, extremes of temperature/humidity are experienced or they are on a transport journey.

## Fatigued calves

- Calves, especially those younger than three months of age or below 80kg liveweight, are susceptible to fatigue from mustering and temperature extremes. Calves younger than one month of age are the most susceptible.
- Calves have a strong instinct to follow their mother. When fatigued, calves may not keep up and may lie down from exhaustion and lose their mother.
- Take extra time and care when mustering and handling young calves to avoid fatigue.





# Body condition cattle welfare and management

National livestock language		Body condition score	Welfare	Management
Muscle	Fat			
E	0	0	<ul style="list-style-type: none"> <li>• High risk</li> <li>• Weak, with no body reserves</li> </ul>	<ul style="list-style-type: none"> <li>• At risk of death from cold, wet weather or other stressors</li> <li>• Recovery dependent on high quality care and will be slow</li> <li>• Unable to be transported without prolonged intensive management</li> </ul>
D	0	1	<ul style="list-style-type: none"> <li>• At risk</li> <li>• Significant muscle utilisation and may be weak</li> </ul>	<ul style="list-style-type: none"> <li>• Able to recover for transport with adequate care</li> <li>• High level of management required</li> <li>• Unlikely can be transported without feeding and rest</li> </ul>
B-E	1	2	<ul style="list-style-type: none"> <li>• Of concern</li> <li>• Lean but strong with evident muscle utilisation</li> </ul>	<ul style="list-style-type: none"> <li>• Management intervention required</li> <li>• May be able to be transported if strong and dependent on journey and prevailing conditions</li> </ul>
A-E	2	3	<ul style="list-style-type: none"> <li>• No concern</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum target for females at calving</li> </ul>
A-E	3	4	<ul style="list-style-type: none"> <li>• No concern</li> </ul>	<ul style="list-style-type: none"> <li>• Optimal for breeding</li> </ul>
A-E	4	5	<ul style="list-style-type: none"> <li>• No concern</li> </ul>	<ul style="list-style-type: none"> <li>• Optimal for breeding</li> </ul>
A-E	5	5	<ul style="list-style-type: none"> <li>• At risk if travelling long distances</li> </ul>	<ul style="list-style-type: none"> <li>• May be too fat for joining heifers and some cows. Can be transported if heat load is not excessive</li> </ul>
A-E	6	5	<ul style="list-style-type: none"> <li>• At risk if travelling long distances</li> </ul>	<ul style="list-style-type: none"> <li>• May be too fat for breeding. Can be transported if heat load is not excessive</li> </ul>

- Management needs to recognise an animal may have muscle strength but can still be fatigued without adequate rest.
- Management priorities include: weaning, adjusting stocking rates, energy supplementation, protein supplementation, segregation, protection from elements and rest.
- Management intervention should consider the welfare state and strength of individual animals not just the mob.
- Management intervention should only occur after careful planning to consider current and forecast seasonal and environmental conditions as well as all nutritional and relocation options.
- All management decisions should meet the guidelines contained in the publication, *Is it fit to load? A national guide the selection of animals fit to transport (2012)*.
- All management decisions involving the transport of cattle must comply with the standards contained in the publication, *Australian Standards and Guidelines for the Welfare of Animals – Land Transport of Livestock (2012)*.

# Feed requirements of low body condition cows

Where the feeding of low body condition cows is physically possible, breeding cows can be held at pre-determined liveweights to minimise welfare situations. Knowing how much to feed means that cows can be fed to maintain liveweight, muscle mass and strength.

You need to know:

- an estimate of the liveweight of your cows, disregarding the bottom 25% of any mob
- whether they are lactating
- if their calves are old enough to be weaned (i.e. older than 6 weeks of age)
- whether they are more than 8 weeks pregnant.

In pastoral areas and when cows are strong enough, if there is adequate energy in the available dry matter of grass, these cows can be supplemented with non-protein nitrogen sources such as urea so that they maintain condition. If there is not sufficient energy in the available grass, then handfeeding with both energy and protein may be the next option.

## Identify feed availability and quality

Energy is needed by animals for all bodily functions. Energy is measured in megajoules (MJ). Animal requirements are assessed as megajoules of metabolisable energy/day (MJ ME/day). Energy in feed is assessed as megajoules of metabolisable energy per kilogram of dry matter (MJ.ME/kg dry matter or simply M/D).

Use feed tables to estimate feed quality for energy, or buy feeds with a tested quality result. Feed quality is about energy first and foremost. Protein content is not the first criterion. Feeds high in energy (9M/D or more) will be high in protein (8% crude protein or more).

Manufactured feeds will come with an energy (and crude protein) test or minimum figure on the label or invoice.

Try to avoid handfeeding diets that comprise more than two or three components, unless you have mixing equipment.

Use commonly available feeds.

Drought feeding cows is expensive, reducing numbers progressively may be the best option.

# Feed requirements of low body condition cows

## Calculate feed requirements

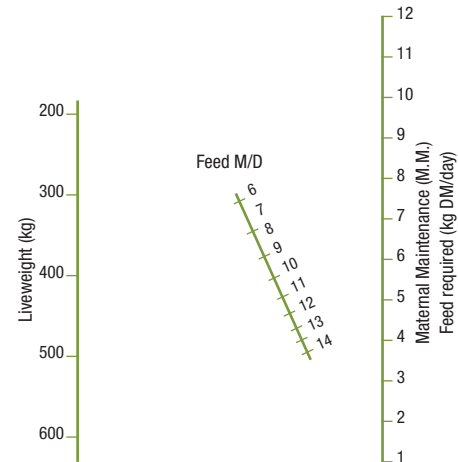
Use Figure 6 to calculate how much feed to offer per head per day.

Follow these steps:

1. Locate your estimated animal liveweight on the left-hand vertical line [liveweight (kg)].
2. Locate the feed quality [feed M/D] on the centre line.
3. Use a ruler to draw a straight line between these two points, and extend the line to the right-hand vertical line.
4. Read the value where the drawn line intersects the right-hand vertical line. This is the feed required for maternal (cow) maintenance in kg/head/day. At this feeding rate, the liveweight will be maintained.

The bottom 25% of cows should be offered slightly more feed because the calculation is for an average estimated weight. If they eat the feed on offer, their liveweight will increase. If practical, draft off and feed these animals separately until their liveweight increases.

**Figure 6: Feed requirement of cattle during drought using the metabolisable energy system**



Source: Oddy VH (1983), *Feed requirements of sheep and cattle during drought using the metabolisable energy system*, Agbulletin 3, Department of Agriculture New South Wales.  
N.B. This diagram is not to scale and should only be used as a guide.

# Feed requirements of low body condition cows

## Adjust diet for pregnancy and lactation

### Step 1: Pregnancy and lactation

Determine the daily amount to be fed to pregnant and lactating cows by using the following multipliers for the maternal maintenance:

- × 1.0 if dry and empty
- × 1.2 if dry and more than 2 months pregnant
- × 1.4 if dry and 8 months pregnant
- × 1.6 if lactating.

### Step 2: Dry matter content

All feeds contain water (eg hay/grains/protein meals contain approximately 10% water, molasses contains 23% water), so calculate the amount to actually feed (called 'as fed') using the following formula:

$$\text{As fed} = \frac{\text{Amount at Step 1 (pregnancy and lactation)}}{\text{Dry matter \%}}$$

For example:

$$\text{As fed} = \frac{6\text{kg}}{0.9 (90\% \text{ DM})} = 6.7\text{kg/head/day}$$

To feed the mob, multiply the as fed value (kg/head/day) by the number of animals to be fed, and then add 10% for wastage.

# Transporting low body condition cattle

Low body condition cattle must be prepared for road transport to minimise risks to animal welfare. The amount of preparation required will be determined by the current condition of the cattle and the intended journey.

Cattle should be rested and provided with cool, clean water and dry feed until transported.

The transport company should be informed of how cattle are prepared as they are responsible for the cattle during transit. The people in charge of the cattle must meet the state or territory legal obligations of providing suitable water, food, handling facilities, yards and transport, bearing in mind the low condition of cattle to be transported.

When you talk to your transport company at the time of booking:

- describe the cattle objectively
- ask if calves will be separated from cows
- describe the pre-transport preparation

- discuss loading densities and pen size
- describe the intended journey (from/to) and the condition of loading and unloading facilities at each end of the journey
- ask if the cattle can be loaded at dusk or in the evening, to be transported in the cool of the night.

## Saleyards

Cattle assessed as E 0/BCS 0 should not be consigned to saleyards. These cattle will have welfare risks and no commercial value. There is no economic benefit from putting such cattle through a saleyard process.

Low body condition cattle must be assessed as being 'fit to load' and subject to the guideline: 'If in doubt – leave it out'.



# Transporting low body condition cattle

## Pre-transport

Cattle assessed as D 0/BCS 1 should be rested after any yard work or mustering. Ensure continual access to water and palatable hay. Cattle should be fed a diet that provides sufficient energy (at least 8MJ ME/kg DM) to start build-up of glucose blood levels for muscle strength.

If the diet is mixed, it should contain a palatable roughage of at least 8MJ ME/kg DM to help maintain rumen function. Molasses–protein meal–white, or whole, cottonseed–cereal grain mixes are also a suitable feed for this purpose, but will need an added low quality roughage of 8MJ ME/kg DM.

### TIPS

- Use the visual body description system and the strength checklist to identify cattle that may not be strong enough to travel to the intended destination
- Discuss the feed and water curfew on the cattle with the transporter and the consignee prior to loading. Continuous access to dry feed and clean, cool water until loading is preferable for the welfare of the cattle. A maximum 4 hour feed curfew is suggested.

Urea should not be considered because there will be insufficient time to safely introduce it before transport.

For cattle assessed as D 0/BCS 1, provide feed and water for at least 48 hours to build-up energy (glucose) levels, and to allow cattle to recover from dehydration and fatigue.

For cattle assessed as E 0/BCS 0, feed for 4–6 weeks before reassessing for transport. Consider if this is an economical option compared to euthanasia.



# Transporting low body condition cattle

## How much to feed

For cattle assessed as D 0/BCS 1, provide as much roughage feed as they can eat.

For cattle assessed as E 0/BCS 0, introduce feed in daily or twice daily amounts to maximise palatability and intake. Feed palatable roughage for 7 days before any other feed source is introduced.

1. Roughages (hay) allow 5–6 kg/head/day as fed  
(silage) allow 12–18 kg/head/day as fed
2. Molasses allow 3–4kg/head/day, plus roughage of at least 0.5kg/head/day

Add protein meal at 500–750g/head/day.

This will be sufficient for dry, empty breeding cows of 350–400kg liveweight.

## TIPS

- After mustering or yard work, rest cattle in holding yards or in small paddocks if practical and always with easy access to palatable water and feed.
- Work out a feeding budget.
- Non-feeders should be drafted off into a hospital paddock for specialised feeding or euthanised. Animals assessed as not 'fit to load' should continue to be fed to build-up strength or be considered for euthanasia.
- Feeding in hay/silage racks or bunkers will reduce feed wastage by 30% and help maximise feed intake. Ensure sufficient trough space to feed all animals at the same time.
- Ask for help. Seek the best available advice.

# Transporting low body condition cattle

## Pre-transport planning

Plan around the following factors in an assessment for transport:

- length of journey and road conditions (flat/hilly/rough)
- destination (saleyard, agistment, abattoir)
- time of year and seasonal climate (hot, cold, wind chill)
- assessment of cattle as 'fit to load'
- available loading and unloading facilities (eg single-deck or double-deck loading ramps)
- resting of cattle in transit, and supervision of the welfare of the cattle
- provision of feed and water during rest periods, and who is responsible for provisions and costs
- how to treat animals deemed unfit to travel after an in transit rest period.

## TIPS FOR IMPROVING WELFARE

- Decide how cows and calves are to be transported.
  - Ask the transport company about its practices for trucking cows with calves at foot. In the extensive pastoral industry where long distance transport is normal, calf welfare is maximised when cows and calves are not separated.
- Discuss with the driver where segregated calves will be penned on each trailer.
  - Calves younger than 1 month old need room to lie down and must be protected from wind chill.
  - Talk with the transport company about transporting young calves, as truck floors are designed for waste removal and prevention of slipping.
- Discuss with the driver the order of loading cattle onto the trailer, and note any reasons given by the driver.
- If the driver is unfamiliar with the road journey, tell them what you know about road conditions and terrain.
- Cattle assessed as D 0/BCS 1 should have access to water and dry feed until loading. A maximum 4 hour feed curfew is suggested.
- Do not use excessive force to load cattle (eg dogs, electric prodders).
- Do not jump these cattle off the transport at the end of their journey.
- Discuss pen and deck densities with the transporter when the load is booked.
- Where possible, avoid mixing horned animals with those that are polled or dehorned.
- Where possible, avoid mixing cattle belonging to different owners.



# Transporting low body condition cattle

## Suitable pre-transport feeds

Feeding drought-affected cattle to prepare them for transport aims to provide an energy source that will be easily digested to release glucose for absorption into the blood stream, to assist muscle strength.

As a product of digestion, glucose is available to the muscles within several hours of a feed being eaten. The higher the feed energy level, the higher the glucose available from digestion. However, the highest energy feeds may not be the most appropriate for pre-transport feeding of low body condition cattle.

Table 4 lists potential feed sources and use as a pre-transport feed.

A pre-transport feed is one offered to cattle to provide a planned nutritional balance (energy and protein) for a period of several days to six weeks so as to improve the body condition and strength of cattle.

A high energy feed has 9 M/D (MJ ME/kg DM) and above.

A low energy feed has 7 M/D (MJ ME/kg DM) and below.

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**Table 4: Pre-transport rating of feed for low body condition beef cattle (assessed as D 0/BCS 1 or below)**

Feed source	Nutritional factors	Rating
Silage	<ul style="list-style-type: none"> <li>• Energy value depends on basal feed ME at cutting/ensiling</li> <li>• Tropical plants peak at 60% digestibility* (range 40–60% digestibility)</li> <li>• Temperate plants peak at 70% digestibility (range 50–70% digestibility)</li> <li>• Poorly fermented silage will be less palatable</li> </ul>	★★★★ ★★★★
Molasses	<ul style="list-style-type: none"> <li>• Highly digestible energy source</li> <li>• High palatability</li> <li>• Must be fed with sufficient roughage to assist rumen function and reduce risk of toxicity</li> <li>• Feed molasses with protein meal/white, or whole, cottonseed/cereal grain. Ask your beef cattle advisor for recipe rates</li> <li>• Manufactured molasses mixtures that limit intake to 1.0–1.5kg/day for cattle will not provide sufficient energy intake. Talk to your supplier about customising the mix to increase intake to 3.0-4.0kg/head/day</li> </ul>	★★★★
Hays	<ul style="list-style-type: none"> <li>• Energy value depends on basal feed quality at cutting/baling, and whether tropical or temperate forage is being cut (see 'Silage', above)</li> <li>• Legume–grass pasture hays are ideal</li> <li>• Cereal–legume crop hays cut after flowering, and summer forage crop hays cut at 1m, are suitable</li> </ul>	★★★★
Cereal grains and palm kernel meal	<ul style="list-style-type: none"> <li>• Seek advice before adopting grain-based feeding</li> <li>• Palatability and energy values are consistent</li> <li>• Rumen needs time to be trained to consume the starch carbohydrate of grains (14–21 days). This is a major limitation for nutritionally deprived cattle</li> </ul>	★

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Feed source	Nutritional factors	Rating
Protein meals	<ul style="list-style-type: none"> <li>• The best source of energy-derived glucose</li> <li>• Energy values can vary depending on residual oil content</li> <li>• Palatable with low acidosis risks</li> <li>• Price can be high</li> <li>• Include with white, or whole, cottonseed or molasses at up to 1.0kg/head/day</li> <li>• Allow sufficient feeding space/troughs to maximise feeding opportunity</li> </ul>	★★★★
White, or whole, cottonseed	<ul style="list-style-type: none"> <li>• Energy values can vary but exceed cereal grain</li> <li>• Can be fed at 2–3kg/head/day if roughage is available. Add protein meal at a per head rate</li> <li>• Can be fed in a mix with grains or molasses at up to 2–3kg/head/day</li> <li>• Can be unpalatable when fed to cattle with no experience of eating it</li> <li>• Cattle must have rumen function to process the gossypol present in white, or whole, cottonseed</li> </ul>	★★
Grain legumes	<ul style="list-style-type: none"> <li>• Energy values are consistent and protein values vary between types</li> <li>• Acidosis risk varies between the grain legumes, but is greatest when legume grains are milled (rolled or cracked) and then fed as the sole feed</li> <li>• Best fed with cereal grains to boost diet protein content</li> </ul>	★★
Dried distillers solubles	<ul style="list-style-type: none"> <li>• Energy value consistent, but moisture content may vary, impacting on cost/kg DM</li> <li>• Palatable</li> <li>• Treat as a grain and include in a ration mix with molasses or protein meal or cereal grain</li> <li>• Seek feeding advice</li> </ul>	★

N.B. Head is assumed to be a dry, empty, cross-bred cow 350–400kg.

