

Protocol for frozen-thawed beef for retail sale



The following is a general protocol and advice for taking Australian frozen beef and thawing it for retail display. It is written as a general guide. Each value chain must develop their own process specifications, including product specifications, that are validated to meet customer requirements and are regularly verified.

Australian frozen beef

Australian beef is processed under strict hygienic conditions and has excellent eating quality. It has a relatively low bacterial count. While no single technique exists that can mitigate all the quality challenges caused by freezing and thawing, this protocol suggests ways that quality challenges can be minimised.

Transport and storage

Frozen beef is stored and transported at -18°C . It is best to keep frozen beef as close to this temperature as possible; increases and decreases in storage temperature should be avoided.

The 'danger zone' for damage to the structure of beef muscle during thawing is from around -6°C to 0°C . If, for some reason, frozen beef should reach these temperatures, it should be completely thawed and processed for some application other than retail, such as foodservice, or immediate cooking.

Selecting product for thawing

The quality of beef for retail display prepared from frozen will reduce the longer the beef is stored. If beef that has been frozen for a long time is being used, the colour can be expected to deteriorate more quickly than beef that has been frozen for a short time. The TVB-N of frozen beef up to 140 days after processing can be expected to be less than 8.8 mg/100g. Even up to 170–200 days after processing the TVB-N will not frequently be greater than 9.5 mg/100g.*

Older frozen beef might be more suitable for use in value added products with marinades, spices or seasonings that make colour deterioration less obvious. Value added products made from older frozen beef will still have good eating quality.

Thawing method

- **Tempering:** Optionally, frozen beef may be left in the carton and tempered over a period of several days to -8°C. This temperature is below the 'danger zone' (from around -6°C to 0°C). It will take less time to complete the thawing of this product when it is required. Product can be held at this temperature for days – weeks and should not be returned to -18°C.
- **Thawing:** The most common method of thawing is to place vacuum-packed primals on racks in a cold room at 4–6°C with good air circulation until the whole primal is greater than 0°C. Cutting the primal when parts are at a lower temperature will increase the amount of drip. Care needs to be taken not to damage the vacuum packaging as this will lead to drip from the meat contaminating surfaces in the cool room, and bacteria will more easily grow on the surface of the primal. Thawing at 4°C for 24 hours is not expected to increase the TVB-N value.*
- **Low-Temperature High-Humidity (LHT) thawing:** Another method, pioneered in China is to use fluctuating temperature and high relative humidity. This method appears to be more suitable than the method described above and seems relatively easy to implement with the assistance of refrigeration engineers.

There are some technological approaches to thawing meat (such as microwave tempering), but these are expensive and not widely available. Before using any technology, the process must be validated to be effective and result in product of the required quality.

As far as possible, beef should be thawed only when required. It is undesirable to leave thawed beef for several days before processing it for retail sale.

Packaging

Processors should consider using larger or more efficient soaker pads when preparing thawed meat for retail sale. Modified Atmosphere Packaging (MAP – at a typical 20% CO₂/80% O₂ mix) may be more suitable for thawed beef because it is likely to retain its colour for longer.

Transport and storage

Beef packed for retail should be transported and stored at between 0 and 2°C as far as possible to maximise the shelf life. It is undesirable for the temperature to fluctuate once thawed.

Quality

Colour is a property that is difficult to manage in thawed beef. Keeping the temperature of display cabinets as low as possible (that is, close to 0°C) will assist in retaining colour. Educating consumers that the product retains its eating quality even if the red colour is less intense is another approach.

The factors that cause increases in TVB-N values as frozen beef moves through these supply chains has not been studied.

Shelf life

The shelf life will be shorter than for the same product that was not frozen and thawed. Loin cuts may have a longer shelf life (based on TVB-N) than secondary cuts. Beef frozen for a longer time will have a reduced shelf life compared to beef frozen for a shorter time.

** TVB-N Testing. TVB-N values for pieces of meat from a single vacuum-pack as received from the importer may vary significantly. If you decide to use TVB-N testing to decide how frozen meat will be used for retail-ready packs, then we would advise testing several samples so that an accurate understanding of the suitability for use can be obtained.*

More information/resources

[Development of frozen and thawed beef protocols for the China retail market \(Final report\)](#)

[MLA Shelf-life Calculator for Red Meat](#)

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