MEAT & LIVESTOCK AUSTRALIA

Best practice guide

Feeder cattle preparation

Prepared by

Dr Kev F Sullivan BVSc.
Production Animal Consultation Australia
PO Box 46 Bell, Queensland, 4408
+61 499 313 115 drkevsullivan@gmail.com

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MEAT & LIVESTOCK AUSTRALIA

Meat & Livestock Australia Limited
ABN 39 081 678 364

Level 1, 40 Mount Street, North Sydney NSW 2060
Phone: 02 9463 9333 **Fax:** 02 9463 9393
mla.com.au

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Introduction

Feedlots are a major part of the beef production supply chain. In 2022, feedlots accounted for 47% of the total cattle slaughter. Cattle that are consigned to feedlots can be purchased from saleyards, direct breeder consignment (vendor bred), or from a backgrounder (vendor cattle). All these systems are prevalent in the Australian feedlot production system.

Types of feedlot operations

There are several types of feedlot operations. Most commonly, the feedlot is owned by a company that purchases cattle and feeds them for various markets. The second is a custom feeding feedlot where the feedlot is owned by a company that feeds cattle on behalf of a customer. The customer feeds cattle for a specific market and the feedlot will feed those cattle to meet that customer's market requirements. The third type of operation is owned by a cattle producer who finishes their own cattle in the feedlot for a specific market. These operations may purchase additional cattle from saleyards or other vendors to maintain capacity and ensure their contracts are filled and will often have a backgrounding phase in their production systems.

Types of markets

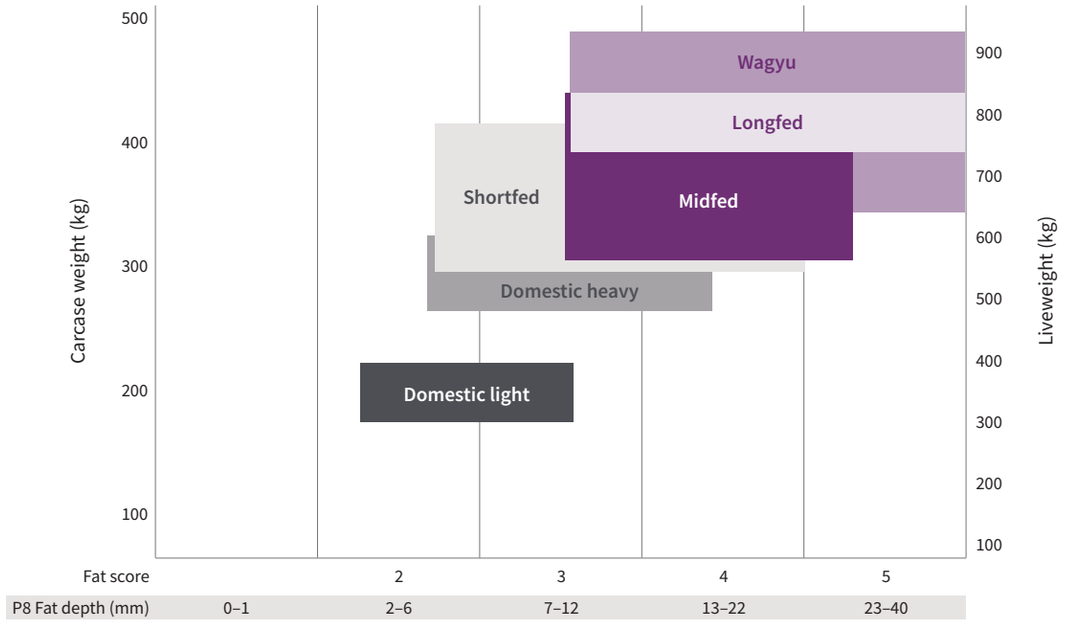
There are several markets that cattle can be fed for and each of these end point markets have specific feedlot entry specifications that must be met. The markets are listed below, and the specifications are shown in **Figure 1**.

- Domestic retail market
- Grainfed market
  - » Shortfed 100–120 days on feed
  - » Midfed 120–150 days on feed
  - » Longfed 220+ days on feed
  - » Wagyu 300+ days on feed.

The Australian feedlot production system is underpinned by the National Feedlot Accreditation Scheme (NFAS) which is a crucial part of the supply chain for marketing 'grainfed' beef globally. This quality system ensures the integrity and standards of the Australian grainfed beef industry are managed through independent audits by AUS-MEAT for the Australian Lot Feeders Association (ALFA). The system covers food safety, animal welfare, environment and production standards.

Accreditation is a pre-requisite for the marketing of beef as Grain Fed (GF), Grain Fed Young Beef (GFYG) and Grain Fed Finished (GFF).

Figure 1: Market specifications for feedlot finished cattle



AUS-MEAT Minimum standards for Grain Fed beef

Grain Fed (GF)

Cattle must have been fed in an NFAS accredited feedlot for not less than 100 days, and not less than 80 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average metabolisable energy (ME) content greater than 10 megajoules per kg of dry matter (MJ/kg DM). Cattle can only have a maximum of six permanent teeth at slaughter with a P8 fat depth of more than 7mm. Meat and fat colour requirements are in the standards.

Grain Fed Young Beef (GFYG)

Cattle must have been fed in an NFAS accredited feedlot for not less than 70 days, in the case of females not less than 60 days and for not less than 50 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average ME content greater than 10MJ/kg DM. Cattle must have no more than two permanent teeth at slaughter with a P8 fat depth of more than 5mm. Meat and fat colour are in the standards.

Grain Fed Finished (GFF)

Cattle must have been fed in an accredited feedlot for not less than 35 days, and for not less than 28 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average ME content greater than 10MJ/kg DM. Only steers and heifers are suitable.

Challenges for feedlot cattle

A feedlot can be a very challenging environment for newly arrived cattle. Cattle consigned to feedlots are confronted with a variety of different challenges and experiences. The cattle may be newly weaned, they may have moved through a saleyard system, being loaded and unloaded onto trucks several times with various standards of cattle handling. They may be co-mingled with cattle from a variety of different origins and health statuses and are sometimes transported vast distances before arriving at the feedlot.

When cattle arrive at the feedlot, they may be fatigued, dehydrated and physiologically stressed following transport and handling. Rumen and immune function may be depressed, and they may have been injured during the journey. Upon arrival, they are unloaded, processed and allocated to pens after being re-sorted and mixed with different cattle once again.

Many cattle will then be presented with unfamiliar feed in feed bunks and water in water troughs with which they may not be familiar. How cattle cope with these challenges and how they adapt to their new environment will have a major impact on how they perform.

There are several management techniques and practices that can be used to help cattle adapt to the feedlot environment. These techniques are built on good stockmanship and revolve around dissipating stress and building trust and confidence in the cattle with vehicles, machinery, the pen, bunk, water trough and caregivers.

An understanding of the major health issues encountered by cattle in feedlots has enabled the development of management strategies for the preparation of feeder cattle to improve both animal health and welfare outcomes in the feedlot and to prepare the cattle to thrive in this new and unfamiliar environment.

The main health challenges that occur in feedlots can be subdivided into four main groups.

Bovine Respiratory Disease (BRD)

BRD is the major cause of sickness in feedlots. Industry data shows that BRD can account for up to 70% of cattle treated. The percentage of cattle treated for BRD that die (Case Fatality Rate) is approximately 3.4% but can be as high at 15%.

While feedlot mortality rates in Australia are very low, respiratory disease accounts for approximately 44% of feedlot deaths. This varies from feedlot to feedlot with a range of 30–65% of deaths. Respiratory death loss is approximately 0.52% of cattle placed on feed and varies from 0.20–1.21%.

Some cattle treated for BRD never fully recover, become chronic, and need to be culled. Respiratory disease makes up 23% of all culls and is on average 0.07% of cattle placed on feed.

There are several viruses that may be involved in the BRD complex of feedlot cattle. These include Infectious Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhoea Virus (BVDV), Parainfluenza Virus (PI3), Bovine Respiratory Syncytial Virus (BRSV), Coronavirus and Adenovirus. Though IBR is the most important of these viruses, the BRD risk increases with the number of viruses that infect the animal.

Several bacteria are involved in BRD, the most prominent are *Mannheimia haemolytica (M. haemolytica)*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis*. *M. haemolytica*, *P. multocida*, *H. somni* and *Truperella pyogenes*, which reside in the upper airways of normal healthy cattle. *Fusobacterium necrophum* and *Salmonella* spp. can also be found in the lungs of cattle that die from BRD. *Bibersteinea trehalosi*, a bacterium mostly found in sheep, can cross over into cattle, and can cause BRD.

Gastrointestinal or digestive disorders

These disorders include cattle that do not eat, poor performing cattle and nutritional problems that include alkalosis, bloat and acidosis. The non-eaters and poor-doers make up between 0.5–1.2% of cattle placed on feed and is higher in *Bos Indicus* and *Bos Indicus* cross cattle.

The causes of bloat and acidosis are more complex and are the result of cattle feeding behaviour, feed production and feeding management issues. The relationship between non-eaters and alkalosis (high rumen pH) is well established. Alkalosis can be a significant problem in slow starting and poorly adapted cattle.

Lameness and musculoskeletal problems

These problems include footrot, toe abscesses, and sole abscesses as well as non-infectious conditions often due to traumatic injuries. While some traumatic injuries occur during transportation, bulling activity post arrival is one of the main causes of musculoskeletal problems. Toe and sole abscesses can often be attributed to foot injuries arising from poor cattle handling which is exacerbated in sensitive cattle.

A feedlot industry database of more than four million head showed that death loss from lameness is low, at approximately 0.13% of all cattle placed on feed and accounts for approximately 18% of feedlot deaths.

There is considerable variation between feedlots and the percentage of deaths attributed to lameness ranges from 9–35%. Lameness accounts for approximately 16% of animals treated with a range of 9–32% and is approximately 1.96% of cattle placed on feed.

Though the number of lameness cases is usually low (1.96% of cattle placed), approximately 11% of these cases do not recover adequately following treatment and need to be culled from the feedlot. This is on average 0.22% of cattle placed on feed. Lameness is a significant cause of culling and accounts for up to 70% of feedlot culls.

Lameness cases due to injury can be attributed to loading, unloading and transportation, standing on concrete in saleyard pens for long periods, poor cattle handling, slipping and falling during drafting, movement prior to loading and in saleyards.

Other more subtle infectious problems e.g. Mycoplasma and Chlamydia can also present with lameness. The main losses from lameness are losses resulting from poor performance and cattle that do not meet the intended market specifications.

Pregnancy and urinogenital conditions

Heifers that calve in the feedlot are not only costly to the feedlot operator but are also a major animal welfare concern. The severity of the problem varies greatly between feedlots and at different times of the year. The losses are not only due to calving problems and subsequent complications i.e. prolapsed uterus, retained foetal membrane (RFM), metritis and management of the calf, but also treatment costs, higher labour costs and reduced performance of the pregnant cattle whether they calve or not.

Often the feeding period must be extended in heifers that calve in the feedlot, and this may be due to withholding period compliance or to ensure that the cattle fit into market specifications.

Prolapsed prepuce

Prolapsed prepuce, where the skin around the penis drops down and becomes exposed, often leading to swelling, irritation or injury, may occur following Hormonal Growth Promotant (HGP) implant application. In some cases, during the healing process, the preputial orifice can become blocked and the steer cannot urinate. As a result of this occlusion, urine builds up in the sheath. These cases require surgical intervention. Kidney and bladder stones can also develop if there is a dietary calcium phosphorus imbalance. The stones take time to develop. This condition is most commonly seen in cattle over 100 days on feed. Sometimes the stones can block the urethra, and the steer cannot urinate. Surgical intervention is required to prevent bladder rupture and death.

Entire bulls

There are a small number of markets that will accept entire bulls. Most markets require steers which means that any bulls or stags that are received by the feedlot will require castration. Castration of bulls, either surgically or by banding, is a significant stress upon the cattle, setting them back for several weeks and increasing the risk of tetanus.

Reasons for health problems

Cattle can live anywhere. They can thrive in the winters of North America and Europe, the tropics of South-East Asia and South America, and the semi-arid areas of Australia. Why is it when they are placed in confinement in a feedlot, there can be morbidity challenges and mortalities?

There are two main causes of cattle health issues. Firstly, the immune status of the cattle determines how well they will cope with the disease challenges they will encounter during the feeding period. Secondly, the level of stress (physical, nutritional, environmental, physiological and psychological) that the cattle encounter. High levels of stress over an extended period can severely compromise the immune system of cattle and is the single most important factor in determining whether cattle get sick or remain healthy.

Factors that contribute to health problems

Age

Younger cattle generally have more health problems than older cattle, except for cull cows, but for different reasons. Freshly weaned calves that enter the feedlot suffer more stress than well weaned calves. Younger cattle have a less developed immune system and therefore have a greater risk of health problems.

Cull cows have had a lifetime of grazing, and their periods of confinement have been short, such as yarding for management and husbandry interventions. Typically, these are not positive experiences. Upon feedlot entry, some cows suffer badly from confinement anxiety, relocation anxiety and fear of humans. The manifestation of these anxieties is refusal to eat or drink properly, which in turn leads to dehydration, severe ruminal dysfunction, mostly presenting as alkalosis and depressed immune function.

Source/origin

When cattle are purchased from saleyards and moved directly into the feedlot, they experience more health problems. The nature of saleyards is that they attract cattle from many different sources, often in group sizes that vary from one or two cattle, up to large lines of several hundred cattle.

There is the opportunity for a wide variation in health status with a range of different pathogens, especially viruses being present. Some cattle may have had little exposure to these infectious agents. A lot of co-mingling and drafting occurs at saleyards. Cattle from closed herds may not have been exposed to some of the BRD pathogens. Upon arrival at the feedlot, they are exposed to a range of pathogens, some of which they have never been exposed to before. These cattle are at a higher risk of having health problems.

Cattle which have been co-mingled and backgrounded for at least 28 days prior to feedlot entry have a significantly lower risk of having severe health challenges at the feedlot.

Group size

Small group sizes and pens that have many small purchase groups in them have more health problems than large lines of cattle from the same origin. The MLA BRD initiative research from 2015, 'Epidemiology and management of Bovine Respiratory Disease in feedlot cattle', showed that if a pen has more than four purchase groups in it, the risk of BRD is increased by 3.5 times.

The effect of co-mingling has a major effect on the health of a pen. Purchase group sizes of less than 50 head have more health problems. Purchase groups of more than 100 head reduce the risk of BRD by 50%. As the purchase group size decreases, the number of purchase groups required to fill a pen will increase, increasing the co-mingling and the health risk.

Breed

British breeds have an increased risk of developing BRD compared to tropical or European breeds. The BRD initiative research showed that compared with Angus cattle, Herefords were twice as likely to develop BRD, while tropical breeds were half as likely to develop BRD than Angus cattle.

Management prior to arrival

Cattle that are yard weaned have significantly less health problems and have improved weight gains once they enter the feedlot compared with paddock weaned cattle (MLA DAN.069 Fell et.al. 1998). Well-handled cattle that have been bunk trained and have undergone basic animal handling training, adapt much faster to the feedlot environment.

Vaccination against IBR and *Mannheimia haemolytica* (MLA DAN.069 *Fell et.al*. 1998) and clostridial diseases, five in one, seven in one or eight in one vaccine is good management practice. Castration, dehorning, spaying and pregnancy testing should be done prior to arrival, ensuring an adequate recovery time before feedlot entry.

Shrinkage

From a health perspective, cattle that lose too much weight during transport have more health problems and perform poorly in the feedlot. Shrink is a loss of weight due to lack of rumen fill, excretion of urine and faeces and dehydration.

A shrinkage of more than 8% means dehydration is becoming a problem, while shrink of more than 10% indicates feed maintenance requirements have not been met. In extreme conditions, shrinkage can exceed 15%. This combined with time off feed and total transit time, can create serious problems. Recovery time from severe tissue shrink can be 10–30 days.

Time off feed

Cattle that are off feed during sale and transit experience a rapid depletion in rumen bacteria and protozoa. These organisms are essential for rumen function, digestion and fermentation of feed. After an extended off-feed period, rumen function might cease altogether. Cattle arriving at the feedlot take time to return to normal rumen function even after they commence eating. This process is exacerbated by saleyard curfews. It can take up to three weeks for the rumen population to be fully re-established.

Time in transit

Long transit times have a detrimental effect on cattle. The longer the time from mustering to arrival at the feedlot, and the longer cattle are off feed, the more severe the subsequent problems are likely to be. These effects include fatigue, shrinkage, dehydration, supressed immune function, depressed rumen function and an increased risk of injury and lameness.

Strategies to reduce health and welfare risk at the feedlot and improve returns to the cattle producer

Feedlot specifications

It is important that the specifications of the cattle consigned to the feedlot are met. These specifications may vary from feedlot to feedlot, so it is essential to know what is required. Every feedlot has a grid of their own unique specifications for what is required as well as the premiums and deductions that will be applied. These include:

- age/dentition
- breed
- sex
- individual weight
- body condition (fatness)
- frame score/hip height
- skeletal structure
- pregnancy status
- castration
- vaccination status
- HGP implant status
- weaning method
- purchase group size
- National Livestock Identification Scheme (NLIS) tag is mandatory
- National Livestock Production Assurance (LPA) vendor declaration is required at feedlot arrival.

Making sure the feedlot specifications are met will maximise the returns to the producer and improve the health and welfare of the cattle in the feedlot. It also maximises market compliance once the cattle have completed their feeding period. Meeting the specifications is very important when it comes to developing a long-term relationship with a feedlot.

Yard weaning

Yard weaning is the single most important management practice a cow-calf producer can implement that will improve animal health and welfare when cattle are placed in a feedlot. Research (DAN.069 L. *Fell et.al*. NSW Agriculture, Armidale) has shown that yard weaning at high density resulted in significantly less sickness, (**Figure 2**) as well as significantly better performance, (**Figure 3**) when the study cattle were fed in a feedlot six months after weaning compared with traditionally (paddock) weaned calves.

Figure 2: Sickness (% of animals removed)

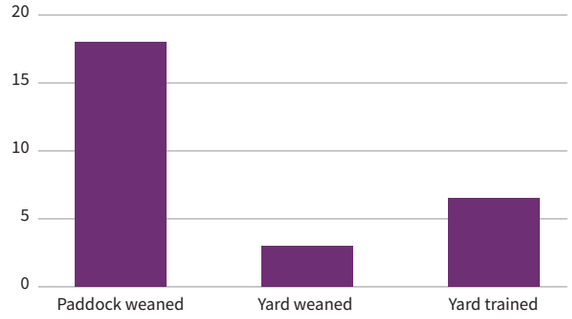
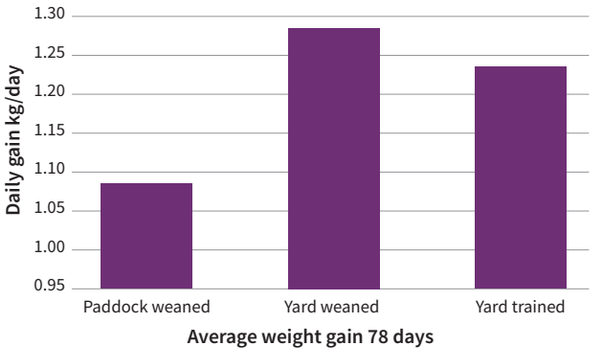


Figure 3: Feedlot average daily gain (kg/day)



The studies showed the best results were achieved by combining yard weaning with pre-feedlot vaccination for BRD. Yard-weaned, pre-vaccinated calves settled onto feed faster, grew faster and in one year of the study grew 60% faster during the first month on feed.

Figure 4: Effect of vaccination on growth rate (kg/day)

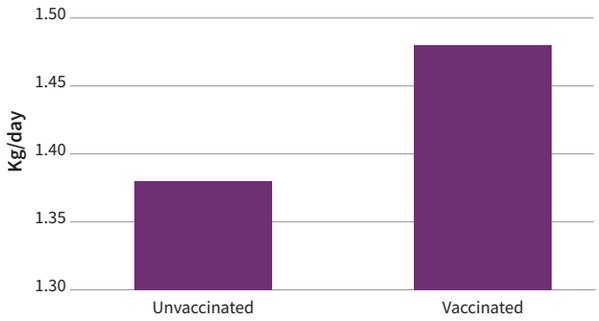
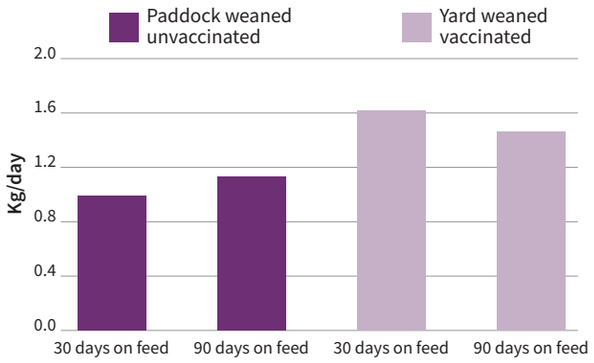


Figure 5: Effect of vaccination and weaning protocol on growth rate (kg/day)



Yard weaning is a simple process where calves are locked in secure, safe yards for 5–10 days, with a stocking density of 4m^2 per head based on a 260kg calf. They need constant access to clean water and are fed hay or silage in a feed trough or bunk. Daily feeding of a ration mix is beneficial, though not essential.

Daily human contact of 10 minutes twice a day is important. The calves should be walked through a gateway, past a handler, into another pen twice a day. Walking the calves through a race and open crush once or twice during the weaning period is helpful training.

The yard weaning process is complete when all calves are eating well, and the manure has changed and reflects what is being fed. The calves are now ready to be turned out.

The process of yard weaning ensures cattle have become:

- socialised
- accustomed to confinement
- more trusting and confident with humans
- less anxious
- bunk and water trough trained.

Yard weaning ensures that when cattle are introduced to the feedlot six months later, several of the major stressors associated with confinement are not as unfamiliar to these cattle compared to paddock weaned calves. See **Appendix 1** for more information.

Management practices

Many management practices are required as per the feedlot entry specifications and if not met, financial penalties will be incurred. These management practices improve animal welfare and reduce health risks in the feedlot.

- Ensure calves are correctly castrated and properly healed before being consigned to the feedlot.
- Dehorn calves well before feedlot entry so they are fully healed to prevent injury to themselves or other cattle during transport.
- Pregnancy test heifers before consignment and remove pregnant heifers. If an abortion program is to be used, this must be done at least one month prior to feedlot entry and all aborted cattle must be checked to ensure the program has been effective, and the heifers do not have retained calves or uterine infections. It is not acceptable to inject heifers with prostaglandin a few days before shipment to the feedlot and consider them 'empty.'
- Vaccinate calves with 5-in-1, 7-in-1, or 8-in-1 vaccine and for BRD prior to feedlot entry. See Appendix 2 for more information on vaccination protocols.
- Parasite management, both internal and external parasites. Producers in fluke areas need to pay particular attention to the management of liver fluke.

Hormonal Growth Promotants (HGP)

Some markets do not accept cattle that have been treated with HGPs; however many feedlots will accept cattle that have been previously treated with HGPs. It is important to check the feedlot specifications to see if HGP treated cattle are acceptable. If they are acceptable, then implant growing calves and backgrounded calves with a suitable implant. Implants will improve growth rates and reduce fat deposition in growing calves. This is a way to improve the profitability of the growing/backgrounding herd prior to feedlot entry.

The implant program used prior to feedlot entry must be timed so the time of activity has expired before feedlot entry. If implants are used, then it is a legal requirement that all implanted cattle receive the triangle ear punch in the right ear.

Cattle selection

A feedlot consignment should not be seen as an opportunity to sell culls by mixing out of specification cattle into the mob. Only send cattle that meet the feedlot's specifications. Do not send cattle of poor temperament. These cattle are an animal welfare risk and are also a risk to human safety. They do not settle well into the feedlot, do not eat well or perform.

Structural soundness is important, especially if the cattle are being consigned for long feeding programs. Cattle with poor skeletal and hoof structure are more likely to become compromised when they reach heavy weights. This becomes an animal welfare issue with cattle required to be culled or in severe cases, requiring euthanasia.

Your cattle will be used to assess your worth for future consignments. Sending unsuitable cattle or out of specification cattle will affect cattle performance and your reputation as a supplier to the feedlot.

Identification and traceability

Traceability is an integral part of the beef production supply chain. Beef product needs to be able to be traced to the property of origin. It is imperative that the supplier's National Vendor Declaration (NVD) is completed correctly and in full. The NVD is a legal document and omissions or errors on the NVD will result in delays in cattle entering the feedlot and delays in payment being made to the supplier.

Growing and backgrounding cattle

Growing and backgrounding cattle is a very important part in the preparation of cattle for feedlot entry. Cattle that have been born and raised on a property enter a growing phase after weaning. These cattle are grazed on pasture until they reach feedlot entry weight.

Other producers specialise in backgrounding and growing cattle for feedlot entry. These cattle may be purchased as weaners or post weaning from saleyards or directly from breeders. Cattle may be purchased from a variety of sources and put together in a consignment.

Backgrounding is an opportunity to purchase light weight cattle and grow them out to feedlot entry weight. It is a period for growth, not a period for fattening cattle. The co-mingling that occurs during the backgrounding phase allows cattle to establish a social hierarchy and enables exposure of viruses and bacteria within the group.

The opportunity for backgrounders is to develop a system which prepares cattle well for feedlot entry. Things to consider include:

- Put groups of cattle together in feedlot pen-sized groups or multiples of feedlot pen-sized groups. If dealing with smaller group sizes, it is important that the mob size is at least the minimum purchase group size required for the feedlot.
- Sort cattle into 50kg weight ranges.
- Vaccinate cattle with vaccines required by the feedlot protocol. This will usually include 5-in-1, IBR, and *Mannheimia haemolytica* vaccines.
- Treat for internal and external parasites, paying particular attention to fluke control.
- Dehorn or tip cattle if necessary.
- Pregnancy test and manage pregnant heifers.
- Ensure any bulls are castrated.
- Acclimate and bunk train the cattle.
- Implant cattle with a suitable HGP if acceptable to the feedlot.
- Do not remix groups within four to six weeks of shipment to the feedlot.

To be most effective, backgrounding needs to be for a minimum of six weeks. Some feedlots require a minimum number of days in backgrounding, i.e. 60 days.

Nutrition during the growing phase is critical to subsequent feedlot performance. If cattle are being prepared for a high marbling market, then high growth rates during backgrounding (0.8kg/day) will increase the chance of achieving a good marbling outcome, provided the steers have suitable genetics to express marbling. If cattle are being prepared for domestic finishing and the cost of gain is important, then a lower rate of gain during backgrounding may be suitable. This data clearly shows that as backgrounding growth rates increase, the cattle will be fatter at feedlot entry, grow more slowly in the feedlot, are fatter at feedlot exit with higher intramuscular fat (marbling) and lower retail meat yield (**Table 1**).

Table 1: Adapted from Beef CRC1 – Effects of backgrounding growth on feedlot performance

Background growth (kg/day)	Feedlot entry fat (mm)	Growth in feedlot (kg/day)	Feedlot exit fat (mm)	Intramuscular fat (%)	Retail beef yield (%)
0.62	4.6	1.34	11.8	4.1	67.3
0.66	5.0	1.27	11.9	4.1	67.2
0.79	5.8	1.22	12.6	4.7	66.5

Grazing management is very important to ensure constant pasture availability and growth rate. Supplementary feeding or bunk feeding with silage can also be part of a backgrounding program. It is important the feeding is controlled so the cattle will grow at a predetermined rate and do not get overfat. It is best to work with a nutritionist to develop a suitable feeding program to best achieve the goals.

Transportation to the feedlot

Cattle that have been off feed and water for more than 12 hours have increased risk of rumen dysfunction. Before transport, ensure cattle have access to good quality hay and water.

Minimise the time cattle are held in stockyards prior to transport. Work out transport logistics with the trucking company and directly with the driver. Plan the trip so cattle will arrive at the feedlot at a suitable time where unloading can be expedited. Travel delays enroute and stoppages should only be made if necessary.

Before transportation, all cattle to be loaded must meet the **MLA Fit to load guideline**.

Good stockmanship is important to reduce injury and undue stress at loading. There is no need for dogs, yelling, whistling, chasing cattle, or using goads or electric prodders. A successful loadout is one where there is no noise or movement of the truck once the cattle are onboard and awaiting departure. The way cattle are loaded onto a truck determines how well they will travel and how they will unload.

What is important to the feedlot and what works?

As part of the development of this manual, several feedlot managers were interviewed to ascertain what they considered to be important in preparing cattle for feedlot entry. Their responses were remarkably consistent. There was some variation, though this was mainly for site-specific details. Common themes included:

- Feedlots prefer to purchase cattle direct from producers with breeding herds or backgrounders. Saleyards are only a fallback proposition to ensure the weekly procurement is met.
- Feedlots want to develop long-term, strong and lasting relationships with suppliers. All the managers emphasised the importance of investing time in building relationships and discussing requirements, as well as investing time in preparing cattle correctly.
- It is important to meet the feedlot's specifications for the cattle. All feedlots have a grid which has these requirements listed. It also itemises deductions and penalties for out of specification cattle. Below is an example of a purchasing grid (**Table 2**).
- Minimum purchase group size is typically a truck load, or a deck. The minimum purchase group size is 40 head. The bigger the purchase group size, the better.
- Yard weaned cattle.
- Pre-vaccination for IBR and *M. haemolytica* is required – some feedlots mandate which products are to be used while others are more flexible.
- Backgrounded cattle which have been co-mingled for a minimum of 42 days after the last animal has joined the mob – some have a minimum of 60 days. Some feedlots require at least 60 days ownership as per the NLIS data base.
- Cattle should be bunk trained.
- Cattle should be handled with good stockmanship.
- Heifers must be pregnancy tested and certified not in calf within one month of feedlot entry.
- Steers have been correctly castrated.
- All animals have NLIS tags.
- All NVDs correct and completed in full.

Table 2: Example of a feedlot purchasing grid

Breed		Pay weight						
		Dentition	280–199kg	300–359kg	360–480kg	481–500kg	501–520kg	<280 or >520kg
Angus premium	Steers	0	$4.55	$5.00	$5.20	$5.20	$4.80	$3.45
		2	$3.70	$4.15	$5.20	$5.20	$4.60	$3.25
		4	$3.30	$3.75	$4.60	$4.60	$4.10	$3.15
British and Euro	Steers	0	$3.95	$4.40	$4.60	$4.60	$4.20	$2.85
		2	$3.10	$3.55	$4.60	$4.60	$4.00	$2.70
		4	$2.70	$3.15	$4.00	$4.00	$3.50	$2.70
Flatback <50% *Bos Indicus*	Steers	0	$4.15	$4.60	$4.80	$4.80	$4.45	$3.20
		2	$3.20	$3.70	$4.80	$4.80	$4.20	$2.80
		4	$2.80	$3.30	$4.20	$4.20	$3.70	$2.80

Shrink	
Cattle weight at feedlot	
Distance travelled	Weighed full less
0–50km	5%
51–100km	4%
101–200km	3%
201–300km	2%
>401km	0%

Total number of head delivered	Adjustments
150+	$0.05/kg
75–150	$0.02/kg
40–75	$0.00/kg
26–39	-$0.05/kg
10–25	-$0.10/kg

Pre vaccination	Adjustments
Bovilis MH + IBR	$20.00/hd
Bovilis MH Single Shot + Rhinogard IBR	$20.00/hd
Bovi-Shield MH One + Rhinogard IBR	$20.00/hd
Immune Ready Program	$20.00/hd

Additional deductions	
Heifer pregnancy testing (no certificate supplied)	-$15.00/hd
Heifers PTIC at feedlot	-$2.00/kg
NLIS replacement tag	-$15.00/hd
HGP treated in non-HGP program	-$0.40/kg
Pink eye/pink eye scarring	-$0.20/kg
Drafting fee (mixed steers and heifers)	-$5.00/hd
<60 days ownership as per NLIS database	-$0.60/kg
NOT NLIS lifetime traceable	-$0.05/kg
6 teeth deduction from 4 teeth price	-$1.00/kg
8 teeth deduction from 4 teeth price	-$1.50/kg

Preparation of cattle for different programs

Table 3: Summary of preparation of cattle for different programs

	Domestic trade (Supermarket)	Domestic heavy trade	Shortfed	Midfed	Longfed	Wagyu
Days on feed	Min 60 heifers Min 70 steers	80–120	100–120	120–150	200+	300–600
In weight (kg)	280–340	280–400	320–460	360–520	400–500	300–450
Out weight (kg)	300–420	400–480	570–730	550–750	670–800	600–900+
Carcase weight (kg)	180–220	280–320	300–420	300–450	380–450	350–570
Group size (head)	Min 40	Min 40	Min 40	Min 40	Min 40	Min 40
Weight spread of consignment (kg)	50	50	80	100	100	100
Sex	Steers or heifers	Steers	Steers	Steers	Steers	Steers or heifers
Breed	No restrictions	No restrictions	No restrictions	British and British X	Angus	Wagyu**
Age/Dentition	<12 months, Milk	<20 months	<30 months, 0–2	<24 months, 0–2	<20 months, 0–2	<20 months, 0–2
Body condition score (0–5)	1–2	1–2	1–2	2–3	1–2	1–3
Frame score (1–7)	3–5	3–5	>4.5	>4.5	>4.5	>4.5
HGP	Market specific*	Market specific*	Market specific*	Market specific*	No	No
Management	1,2,3,4,5	1,2,3,5	1,2,3,5	1,2,3,5	1,2,3,5	1,2,3,4,5
Vaccination	BRD and IBR	BRD and IBR	BRD and IBR	BRD and IBR	BRD and IBR	BRD and IBR
Parasite control	External and internal	External and internal	External and internal	External and internal, 6	External and internal, 6	External and internal, 6
Backgrounding	Min 42 days, 2,3	Min 42 days, 2,3	Min 42 days, 2,3	Min 42 days, 2,3	Min 42 days, 2,3	Min 42 days, 2,3,7

Note: The weight specifications in this table may vary. Check with the feedlot for requirements.
* Some markets will not accept, check with feedlot.
** Wagyu pure bred, Fullblood, minimum F1 Wagyu DNA parent verification – check with the feedlot.

Table 3: Key – Management and backgrounding section

1. Yard weaned
2. Good stockmanship training using loss stress stock handling principals
3. Bunk trained
4. Pregnancy tested empty within one month of feedlot entry. A certificate by an accredited pregnancy tester may be required. Check with your feedlot
5. Castrated and dehorned or tipped, at least one month before feedlot entry
6. In liver fluke areas: Use strategic drenching with products containing triclabendazole to target all life cycle stages
7. Growth rate from birth to feedlot entry of minimum of 0.8kg per day.

Summary and conclusion

The main health problems confronting feedlot cattle are BRD, gastro-intestinal problems and lameness.

The main reasons for health problems are poor immune status and the level of physical, physiological, environmental, nutritional and psychological stress to which the cattle are exposed.

The factors that contribute to poor feedlot health include age, source, breed, co-mingling, pre-arrival management, shrink, time off feed and transit time.

Once the factors contributing to poor health have been identified, strategies to overcome these challenges can be introduced. These include, knowing the market and the benefits of yard weaning.

Yard weaned cattle consistently start better and perform better in the first two months in the feedlot.

The importance of performing basic management procedures to reduce feedlot stress ensures that the cattle have the best chance of starting well with minimal problems.

Select cattle that are suitable and can handle the feedlot environment. These will be less likely to have health and welfare issues and perform poorly.

The benefits of feeder preparation and backgrounding when done well will result in exceptionally performing cattle at the feedlot.

The effects of transportation cannot be underestimated. The issues associated with long transit times leading to ruminal dysfunction are an important but underestimated problem.

Feedlots want to develop long-term, strong and lasting relationships with suppliers. There is an emphasis on the importance of investing time in building relationships and discussing what is required, as well as investing time in preparing the cattle correctly. To maximise returns to the producer, it is important to ensure the specifications for feedlot entry are met to maximise the positive adjustments and minimise the deductions.

Resource material for further reading

Fell L, Walker K, *et.al*. Reducing feedlot costs by *pre-boosting*: A tool to improve the health and adaptability of feedlot cattle. DAN.069. Meat Research Corporation, NSW Agriculture in conjunction with the CRC for the cattle and Beef Industry, Final report; May 1977.

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Cusack P, Mahony T. Evaluation of practices used to reduce the incidence of Bovine Respiratory Disease in Australian feedlots. Meat & Livestock Australia Limited; 2016.

Mahony TJ, Morton JM, *et.al*. The National Bovine Respiratory Disease Initiative. Presentation Brisbane; January 2010.

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Appendix 1: Yard weaning

Yard weaning is a simple process conducted after calves have been separated from their mothers and are confined in a weaner-proof yard with a water trough, hay feeder and feed bunk. The feed bunk should provide approximately 28cm of bunk space per head. Solid, opaque pen sides made from 1.2m wide rubber belting are recommended.

The yard should provide a stocking density of 4m^2/hd for weaners of approximately 180–260kg, although this space can be reduced for lighter weight calves. Ensure the yard has good drainage so that even after several days of wet weather there will only be shallow mud, no more than fetlock deep. In dry conditions, it is important to control dust levels. Providing bedding for comfort is good practice especially in wet conditions. The bedding should be spread out enough so that all calves can lie down comfortably.

Calves need to be fed every day with good quality pasture hay or silage ad libitum. To ensure the protein and energy requirements of a newly weaned calf are met and for bunk training purposes, 1kg/hd/day of a 20% weaner supplement or a protein grain mix, e.g. whole lupins and oats (40:60) is supplied fresh every day. A nutritionist can help in developing a simple diet.

Human contact is required daily with the calves being acclimated, by asking the calves to move from corner to corner around then pen and then past a handler into an adjacent pen and then back to the weaning pen every day. The time required depends on the group size and should only take 10–20 minutes per session. Do not spend too long and outsay your welcome. This occurs every day until the manure has changed and reflects the feed being fed and the calves move around the pen and through the gate past the handler without any panic. This will take between 5–10 days.

Once the initial training is complete, the calves are turned out into a larger nearby paddock and brought back into the yards overnight. Do this until the calves are happy to walk out of the pen and start grazing – it should only take a few days. The feeding program continues during this period. During this second phase, the calves are asked to walk through a handling facility on two or three occasions.

Once complete, the calves are then turned out into a paddock for grazing until they reach feedlot entry weight, approximately in 6–9 months.

Top tips for yard weaning

- Allow plenty of time to work with the weaners from day one – do not set unreasonable time restraints on yourself.
- The calves will be watching your body movement and position. Avoid sudden movement, arm waving, jumping up and down, using sticks and vocalisation.
- Be consistent in what you do.
- Initiate movement from the front of the herd, not from behind the cattle.
- Be positioned where the cattle can see you and where they can see where you want them to go simultaneously.
- The instinct of cattle is to always come back to where they came from and to follow – use these behaviours to move the herd.
- On day 1, simply try to get the cattle to move from corner to corner until they start moving as a herd and will stand side on facing the same direction. This demonstrates that they have become trusting and more confident with the handler.
- Work with the lead animal to control the pace of the herd – walk along with it to control its speed.
- Walk against the cattle to speed them up, walk with them to slow them down. Walk at a steady, consistent pace.
- Spend 10–20 minutes each day moving them as a herd through the yards, then reward them with quality hay and fresh feed in the bunk.
- On days 2–3, educate the calves to walk through gateways as described.
- On day 4, allow the calves to walk quietly through the open crush and then feed out into a holding paddock, returning that evening.

Example yard weaning program

Weaning is very stressful for calves – they experience separation anxiety and confinement anxiety for the first few days, post weaning. Until weaning, it is rare that calves will have been locked in such a confined space where the pressure is so intense. The handling techniques used in the first few days of yard weaning can dissipate the level of stress very quickly. Calves are very impressionable and learn very quickly. Educated calves complete the weaning process more quickly, which results in a more positive result in the end.

The yard weaning experience has a lasting effect on the life of the individual animal, whether it is going to a feedlot or if it is to be retained in the herd as a replacement heifer or a bull.

Day 1

When working with the weaners, start by initiating movement from the front of the herd, using the natural instincts of the lead animal. Watch for a calf that licks its lips. This is a sign that the calf understands you, is accepting pressure and will go wherever you ask it to.

Apply gentle pressure at 45° to the front of the herd by taking a step toward it to initiate movement. If the calf steps backwards, take a step back to release the pressure. The aim is to initiate voluntary motion among the group. Let the cattle decide where they want to go and go with them to control their movement.

Move the mob from corner to corner in the yard until they move as a herd.

Work with the lead calf to control the speed and adjust your distance and body position. As soon as the lead calf walks off, release the pressure and encourage the rest of the herd to follow. Walk parallel to the initiators of movement and take them to the corner, back up and release pressure to let the rest of the calves that are following come into the corner. Walking parallel with the calves will slow them down, walking against the flow will speed them up. Each time this is done the herd will become more orderly.

It is important to observe the cattle and understand what they are telling you. If the cattle have their heads up, and facing you, it means they do not trust you, they are anxious and uncomfortable. Cattle that stand side on to you or animals that are chewing and walk away from pressure calmly are trusting and comfortable with the situation.

Do not spend more than 20 minutes at each session working calves in this way. Two sessions on day one is ideal. If the calves do not appear to be working for you, ask yourself why – do not blame the cattle.

Often, you do not see the results of your positive interaction until you return for the next lesson. The calves will improve with each positive interaction.

Days 2–3

On the second and third day, introduce the calves to walking through gateways into an adjacent pen. Start by moving from corner to corner as on day one, then with the gate open, direct the calves to walk through the open gateway. Position yourself near the open gate so the calves can see you and can see where you intend them to go. Leave them in this pen until you have replenished the feed, then using the same technique, invite the animals back to their original pen. The feed is now their reward.

Day 4

Work the calves through gateways and ask them to walk through a race and crush with the crush open at their own speed. They may need a little guidance to enter the race, but once two or three have entered the race, release the pressure and let the rest follow. Depending upon the group size, this activity will be best done in groups so that the pen leading into the race is not overcrowded. Overcrowding this leadup pen will create a lot of anxiety and pressure. If the race holds 10, then just bring ten head into the leadup pen.

This is a good day to start letting the calves out into the holding paddock, by standing near the gate and having the calves walk past. Return them to the yard in the evening.

By the end of the weaning process, the cattle must display confidence and trust by being quiet and not anxious when handlers are around, walk in a straight line, stop and start when asked.

With group sizes of more than 200 head, it is advisable to use two handlers to do the training.

The length of the yard weaning process is decided by the response of the cattle. When animals stop bellowing, eat well, are willing to work for you, walk straight, and have been taught how to stop and start when asked, the process is complete and the cattle are ready to go out to pasture.

Typically, the process should take between 2–7 days.

The impact of yard weaning

The growth of yard weaned calves from weaning to feedlot entry is the same or slightly better than traditionally or paddock weaned calves.

The impact of yard weaning as described above will be manifest in the feedlot. Yard weaned calves have significantly improved growth rate (**Figure 6**) and a significant reduction in morbidity (**Figure 7**) in the feedlot compared to paddock weaned calves.

Figure 6: Feedlot daily gain

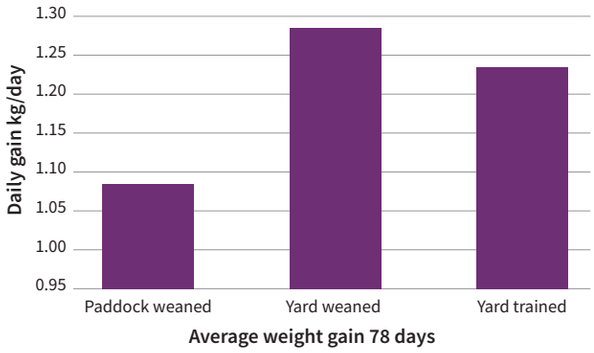
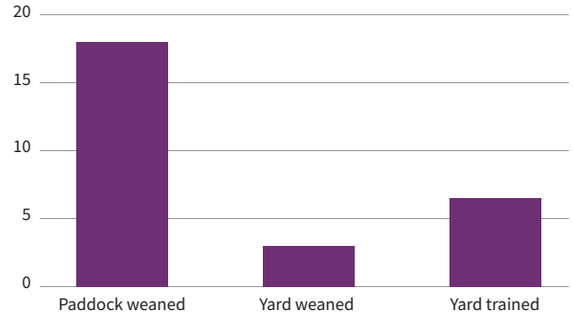


Figure 7: Sickness (% animals removed)



Yard weaning and pre-feedlot vaccination

Studies have shown the combination of yard weaning and pre-feedlot vaccination produced higher weight gains than paddock weaned, unvaccinated cattle. In the first month on feed, the yard weaned, pre-vaccinated cattle grew 60% faster than the paddock weaned, unvaccinated control group (1.62kg per day compared with 0.99kg per day) (**Figures 8** and **9**). The yard weaned groups started eating the feed bunk starter ration much sooner than the control group and other commercial cattle, most on the first day.

Figure 8: Effect of vaccination on growth rate

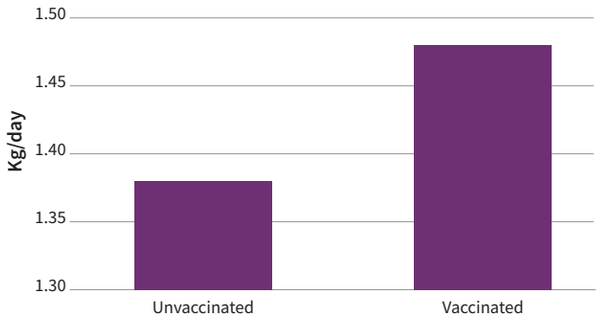
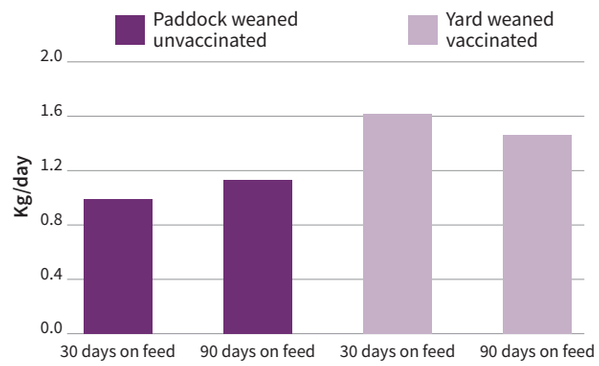


Figure 9: Effect of weaning and vaccination status on growth rate



Appendix 2: Preparation of cattle for entry into Australian feedlots – vaccination protocols

Pre-feedlot vaccination protocols in Australia primarily focus on preventing Bovine Respiratory Disease (BRD) and protecting against clostridial diseases. While specific requirements may vary between feedlots, the following standard practices are widely adopted.

BRD protocols

BRD is the leading cause of sickness and mortality in Australian feedlots. Pre-vaccination on the farm prior to feedlot entry allows the cattle to develop immunity to the target pathogens in a low-stress environment before exposure. The target pathogens are primarily *Mannheimia haemolytica* (MH) and Infectious Bovine Rhinotracheitis (IBR).

Timing

Vaccination can occur anytime from 14–180 days prior to feedlot entry. The best time to vaccinate is prior to weaning, preferably two months prior. At marking/branding is a good and convenient time. Protocols often involve an initial on farm vaccination followed by a booster at feedlot entry.

Products and product combinations that are available:

- Bovilis MH + IBR (subcutaneous)
- Bovilis MH single shot (subcutaneous) + Rhinogard IBR (intranasal)
- Bovi-shield MH one (subcutaneous) + Rhinogard IBR (intranasal).

Clostridial disease protocols

Clostridial disease cause sudden death in cattle. These diseases include Blackleg, Tetanus, Enterotoxaemia, Malignant Oedema and Black's Disease. The main clostridial disease seen in feedlot cattle in enterotoxemia, though the other clostridial diseases can occur.

Vaccine types are 5-in-1, 7-in-1 and 8-in-1. 7-in-1 adds Leptospirosis protection, while 8-in-1 adds an extra clostridial organisms. The initial course is two vaccinations four to six weeks apart.

Other vaccinations

There are other vaccinations which may be considered in certain circumstances even though they are not usually part of feedlot pre-vaccination programs. These include Botulism which is highly recommended for herds in northern Australia or where there is nutritional risk, Pink-eye vaccination (Piliguard) which may be considered in herd which are selling into feedlots which have deductions for cattle which have pink eye lesions at feedlot entry, and Pestivirus (BVDV) vaccine (Pestigard) which protects against the immunosuppression that this virus can cause predisposing cattle to BRD. Pestivirus vaccination should be considered in calves that are destined for feedlots which are derived from cow herds that vaccinate for Pestivirus.

Example programs

Breeding operations producing feeder cattle for feedlots

Branding:

- 5-in-1, 7-in-1 or 8-in-1
- BRD vaccination
- Piliguard (Pink eye issues where Moraxella bovis has been identified as the causative pathogen).

Note: Efficacy of pink eye vaccine is variable, and efficacy is dependent on the bacterial strain causing the infection. Other organisms, not in the vaccine, as well as the severity of environmental factors like dust, UV light, flies and tall grass, can overwhelm the immunity provided by vaccination alone.

Weaning:

- 5-in-1, 7-in-1 or 8-in-1
- BRD vaccination.

For backgrounding operations 42 days to 120 days before feedlot entry

- 5-in-1, 7-in-1 or 8-in-1
- BRD vaccination.

Minimum requirements 5-in-1, 7-in-1 or 8-in-1, and BRD vaccination a minimum of 14 days before feedlot entry.

Dosage and administration

5-in-1	
Timing:	Initial dose at six to eight weeks of age. Branding or marking is a convenient time, followed by a second dose four to six weeks later.
Dose:	Rate depends on the brand and will be either 2mL (Ultravac 5-in-1) or 4mL (Tasvax 5-in-1)
Route:	Subcutaneous under the skin, high on the neck behind the ear.
Withholding period:	Nil.
7-in-1	
Timing:	Initial dose at four to six weeks of age. Branding or marking is a convenient time, followed by a second dose four to six weeks later.
Dose:	Rate depends on the brand and will be either 2.5mL (Ultravac 7-in-1) or 4mL (Websters Clepto 7-in-1).
Route:	Subcutaneous under the skin, high on the neck behind the ear.
Withholding period:	Nil.
8-in-1	
Timing:	Initial dose as early as two weeks of age. Branding or marking is a convenient time, followed by a second dose four to six weeks later.
Dose:	5mL (Tasvax 8-in-1).
Route:	Subcutaneous under the skin, high on the neck behind the ear.
Withholding period:	Nil.
Bovilis MH + IBR	
Timing:	Initial dose at more than six weeks of age. Branding or marking is a convenient time, followed by a second dose 14–180 days later. For weaning protection dose a minimum of 14 days before weaning.
Dose:	2mL.
Route:	Subcutaneous under the skin, high on the neck behind the ear.
Withholding period:	Nil.
Bovilis MH Single Shot RTU	
Timing:	Vaccinate 7–14 days prior to a stressful event e.g. weaning, transportation to the feedlot. Protection remains high for at least 180 days.
Dose:	2mL.
Route:	Subcutaneous under the skin, on the side of the neck.
Withholding period:	Nil.
Rhinogard IBR	
Timing:	Vaccine can be administered to any calf over two weeks of age. Branding or weaning is a convenient time.
Dose:	Single 2mL dose.
Route:	Intranasal spray into one nostril.
Withholding period:	Nil.

Bovi-shield MH One	
Timing:	For cattle over five months of age, a single dose will give immunity for 120 days. For young stock two weeks to three months of age, a booster MH vaccination is required three to four months later.
Dose:	2mL dose.
Route:	Subcutaneous or intramuscular high on the neck.
Withholding period:	Nil.
Piliguard	
Timing:	Vaccinate three to six weeks prior to the expected start of the pinkeye season or four weeks before hot dusty conditions e.g. yard weaning. Can be given to healthy calves from two weeks of age.
Dose:	A single 2mL dose.
Route:	Subcutaneous or intramuscular.
Withholding period:	Nil.
Pestigard	
Timing:	Calves can be vaccinated from three months of age. They should receive two doses, the second dose can be from four weeks to up to six months apart, followed by a third dose two to three weeks prior to joining in breeding heifers. Steers retained for more than 12 months follow the heifer vaccination schedule.
Dose:	A single 2mL dose.
Route:	Subcutaneous or intramuscular.
Withholding period:	Nil.
Botulism	
There are three types of Botulism vaccines available each with a different vaccination interval: 1. A conventional vaccine requiring a two-dose vaccination program with annual booster 2. A single dose vaccine providing one year of protection with an annual booster 3. A single dose vaccine providing three years of protection with a booster in three years.	
Timing:	Calves can be vaccinated from four weeks of age. Weaning is often a convenient time to vaccinate. ■ Multi dose program requires two doses four to six weeks apart with annual boosters. ■ Single dose – one year. One dose annually. ■ Long term – three years. One dose every three years.
Dose:	Dosage varies with the product. 2.5mL for Ultravac Botulinum and Longrange Botulinum one year vaccine, and a 2mL dose for Singvac three year Botulinum vaccine.
Route:	Subcutaneous high on the neck below the ear.
Withholding period:	Nil.

Immune Ready Program

The Immune Ready Program is an industry vaccination and biosecurity program which is designed to standardise cattle health status across the supply chain. The program categorises vaccines to help producers manage disease risks based on production systems and geographic location.

It includes core vaccines which are necessary for all cattle to comply with the program.

There are risk-based vaccines which are important for specific production systems (feedlots and breeding) or geographic regions (northern and southern production systems).

The system is underpinned by the National Cattle Health Declaration (NCHD), a legally binding document that verifies the animals' vaccination history.

Vaccination technique

Vaccination plays a very important role in the preparation of cattle that are destined for the feedlot. Sometimes animals that have been vaccinated can still have poor health outcomes. What is the cause of this apparent vaccination failure?

It is not simply about vaccinating calves, but 'how' it is done that is important and how that impacts on health outcomes later in life. For a vaccination program to be efficacious, the vaccine itself must be efficacious, the animal must have a functioning immune system, and the vaccine must be administered correctly. Both animal and product factors must be considered.

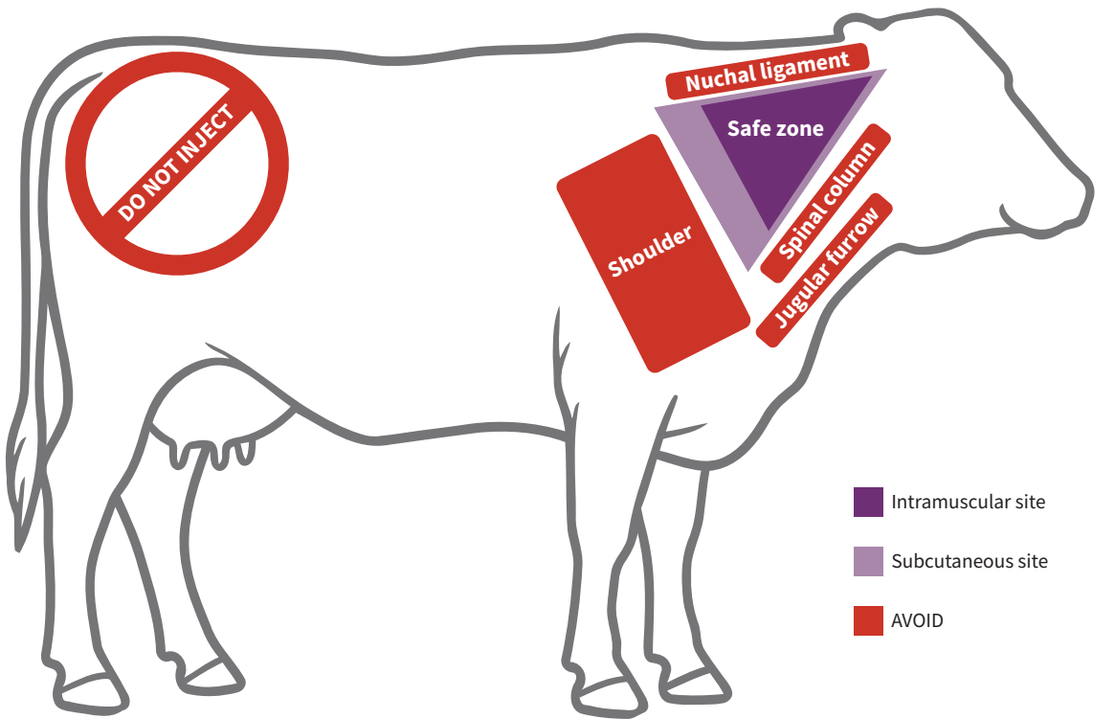
- Animal factors – poorly handled, stressed, dehydrated cattle and cattle with poor rumen function will have depressed immune function. A depressed immune system impairs the calf's ability to respond to the vaccine.
- Product factors – correct storage and handling of a vaccine is essential for the vaccine to be effective. Storage and handling conditions are documented on the vaccine label.
- Correct administration – the correct vaccine, at the correct time, using the correct needle, at the correct dose rate, at the correct site, and by the correct route into an immunocompetent animal is necessary for a vaccine to be effective.

Injection techniques – Key recommendations

Restraint

Ensure cattle are safely restrained, allowing easy access to the neck and preventing unnecessary movement by the animal. Improperly restrained cattle are at a higher risk for tissue trauma, needle breaks, improper injection technique and incorrect injection location.

Figure 10: Vaccination zones



Routes of administration

Subcutaneous (under the skin): Most vaccines used in cattle are administered by the subcutaneous route. Subcutaneous injections are placed just under the skin in the safe injection zone (**Figure 10**). The needle should be inserted at a 45° angle to the animal. The bevel of the needle should be parallel with the skin (**Figure 11**). To inject, lift a fold of loose skin with your free hand and inject into the space created by the tented skin. Ensure the needle does not pass through the skin fold (**Figure 12**).

Intramuscular (into the muscle): All intramuscular injections should be given in the neck in the safe injection zone (**Figure 10**). The needle should enter at 90 degrees, or perpendicular to the animal into the muscle tissue.

Figure 11: Needle angle for vaccination

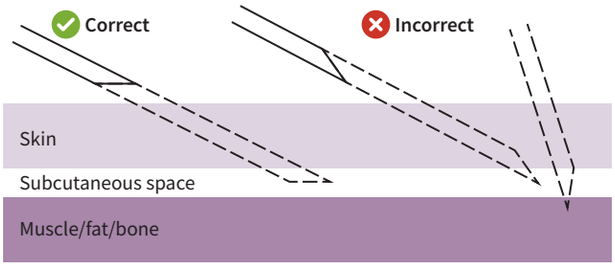


Figure 12: Correct vaccination procedure

Needle size

It is important to choose an appropriate needle size to ensure the product is delivered with minimal tissue damage, based on the size of the animal. Choose the smallest gauge needle that can effectively deliver the medication.

Table 4: Needle selection guide

Cattle class	Route of injection	Needle gauge	Needle length
Less than 250kg	Intramuscular	18–20	1 inch (25mm)
	Subcutaneous	18–20	½ inch (12mm)
Over 250kg	Intramuscular	16–18	1–1½ inch (25–37mm)
	Subcutaneous	16–18	½–3/4 inch (12–18mm)

Hygiene

Use specialised detectable stainless steel needles – this makes them easier to find if a break occurs.

Keep equipment clean and in good working order to prevent tissue trauma and abscesses. Inject through a clean area of the hide, being careful not to drag bacteria and debris into the tissue which could create conditions for abscess formation.

Burred, bent and blunt needles increase the risk of tissue damage and abscess formation. Use quality needles that should be replaced whenever damage is evident. Needles should be changed after every 15–20 injections. When giving multiple injections, injection sites should be 10cm apart or on opposite sides of the neck. Do not inject through mud or manure.

Protect vaccines from heat and direct sunlight. Always keep vaccines between 2–8°C. Use insulated pouches and eskies with ice packs to store vaccines when working in yards.

Handling and equipment

Check and calibrate automatic vaccinator guns before use to ensure accurate dosing.

Proper syringe cleaning is essential to maintain hygiene and prevent cross-contamination. If possible, designate specific syringes for each product and use only with that product.

Syringes should not be cleaned with soaps, disinfectants, or antibacterial agents, as they may affect the efficacy of vaccines.

The following procedures are recommended:

- **Pre-rinse**: Immediately after use, rinse the syringe with warm water to remove any leftover substances.
- **Disassemble syringe:** Separate the barrel, plunger and needle (if reusable). Wash with hot water. Clean all parts using hot water and a brush.
- **Dry:** Hang the syringe upside down or place it on a clean towel, ensuring it is fully dry before reassembling.
- **Store:** To prevent contamination, store syringes in a clean, dry place that is separate from medications or feed.

Record keeping

Record the vaccine type, batch number, date and injection site for every treatment to monitor for adverse reactions.

Broken needles

Broken needles in cattle are a serious food safely and animal welfare concern. If a needle breaks it must be addressed immediately as they can migrate through the body causing infection, pain, or damage to internal structures.

If a needle migrates and cannot be found, the animal must be identified to ensure that it does not enter the food chain.

Protocol to manage a broken needle incident

Immediate action – Attempt to locate the needle, especially if it is close to the skin surface and try to remove it. If the needle cannot be easily removed, clearly mark the animal, record its details and mark the area where the needle is, then contact a veterinarian for surgical removal.

Long-term management if the needle cannot be found – If the broken needle cannot be removed, it must be considered to be a permanent risk. Ensure the animal is not slaughtered for human consumption.

The animal should be euthanised and correctly disposed of at the end of its productive life.

Disposal of used needles

In Australia used needles are classed as clinical waste (sharps) and must be disposed of according to strict safety and environmental standards to prevent injury and disease transmission.

Used needles must be placed into a dedicated sharps container that is puncture proof and meets Australian standards. Before disposal, the container must be sealed and disposed of appropriately.

Sharps must never be placed in rubbish bins or recycling bins. Many local councils provide collection points. Some pharmacies and medical centres participate in disposal programs and may accept sealed sharps containers.

There are commercial waste services that provide professional medical waste collection for agricultural operations. High-temperature incineration is the preferred method of disposal and is standard practice for authorised disposal facilities

Notes

Meat & Livestock Australia Limited

ABN 39 081 678 364

Level 1, 40 Mount Street
North Sydney NSW 2060

PO Box 1961
North Sydney NSW 2059

Phone: 02 9463 9333
Fax: 02 9463 9393

mla.com.au