Dear fellow Miniature Hereford breeder,

The **Australian Miniature Hereford Breeders Network** (AMHBN) invites you to consider joining the benefits of supporting this progressive group.

The AMHBN would like you to be aware of the fact that apart from belonging to Herefords Australia (HAL), there is no need to belong to any other group in order to breed, register or show your miniature Herefords. However you maybe interested in what the Australian Miniature Hereford Breeders Network can do for you.

AMHBN is affiliated with Herefords Australia Limited (HAL) and **conforms to international Miniature Hereford standards**; these being simply the facts that if your Hereford is registered with HAL and is under a frame score **of ONE** (at maturity, age 3) it is a Miniature Hereford.

The Australian Miniature Hereford Breeders Network is dedicated to the promotion and advancement of miniature Herefords. The network provides new breeders with access to quality stud breeding cattle and embryos and semen. We can provide polled as well as the horned variety.

By being a member of **AMHBN** you will be able to access our website and advertise animal sales, publish your results at shows (you can show your animals because they are pure bred Herefords). **Herefords Australia (HAL) is the body that registers your animals and they maintain the Hereford herd book.** AMHBN has had written confirmation from HAL that supports the views expressed in this newsletter.

A factual history of Miniature Herefords

The 'Miniature" refers to the size of a particular line of Herefords. **Miniature Herefords are NOT a different breed**. A Hereford is and always will be a Hereford, irrespective of size. Some Hereford breeders are deliberately breeding bigger and others are breeding smaller, to suit the requirements of different markets. Herefords have varied in size throughout the years depending on what the markets required at that time. A Hereford from the 1960s is very close in size to what is considered a 'miniature Hereford' these days (see the photos on the next page).

Hundreds of years ago, the Hereford breed came to be in Herefordshire, England. The cattle we refer to as Miniature Hereford cattle today are merely a product of the original Hereford cattle of the 1950's and 60's that were not bred up to the size they got to in some cycles of the intervening years. In recent years, breeders have continued in an effort to down-size Herefords.

In the USA, the name 'miniature' originated in the USA, miniature Hereford cattle have no specific designation at the American Hereford Association where they are registered. Height requirements need only be met at Miniature Hereford Breeders Association sanctioned shows, where the acceptable height for a mature Miniature Hereford bull is 47 inches (119 cm) measured at the hip and 45 inches (114 cm) for a mature female, measured at the hip. In Australia, pure bred miniature Herefords are included in the normal Hereford Australia herd book.

Breeding Stud Miniature Herefords

You must breed from animals registered **with Herefords Australia Limited (HAL)** which is the **only registering body for Herefords in Australia**. Miniature Herefords are full blood Herefords. They are simply not as tall as the normal, ordinary Hereford you usually see today.

Photos of Herefords in the 1950s and 1960s and miniature Herefords in 2009

Champion Hereford Female - Junior Division 1955
Houston Livestock Show
(Courtesy of
Cattle Raisers Museum, Fort Worth, TX.)

Miniature Hereford prize winner at the Launceston Show 2009

Champion Herefords Royal Sydney Easter Show 1961
(*Courtesy of Royal Agricultural Society of NSW Heritage Centre)*

Miniature Hereford cow and calf prize winners at the Hobart Show 2009

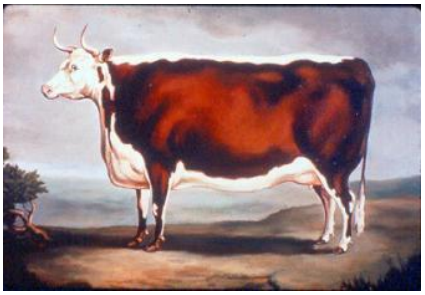
A Miniature Hereford is a Hereford

The 'Miniature" refers to the size of a particular line of Herefords. Miniature Herefords are NOT a different breed. A Hereford is and always will be a Hereford, irrespective of size. Some Hereford breeders are deliberately breeding bigger and others are breeding smaller, to suit the requirements of different markets

A Hereford is a Hereford whether it is Horned, Polled or Miniature
....and all carry the same bloodlines if you go back far enough. Herefords are

the purest breed in the world with over 250 years of heritage.

A potted history of Herefords and miniature Herefords.
Beginning in 1742 with a bull calf from the cow Silver and two cows, Pidgeon and Mottle, inherited from his father's estate, Benjamin Tomkins is credited with founding the Hereford breed. They were based in Herefordshire, England.



Silver

Herefordshire bull

Other pioneering breeders were to follow the Tomkins' lead and establish the world-wide renowned Herefordshire cattle culminating in their exportation from England to wherever grass grows. The size cycle has gone through several revolutions. Herefords in the 1700's and early 1800's in England were much larger than today. Many mature Herefords of those days weighed 1,500 kg or more. Cotmore, a winning show bull and noteworthy sire, weighed 2,000 kg when shown in 1839. Gradually, the type and conformation changed to less extreme size and weight to get more smoothness, quality and efficiency.

Cotmore

Herefords in the USA

Herefords went to the United States in 1817. Anxiety 4 is often credited as being the "Father of American Herefords" and "the bull that gave Herefords hindquarters." Today, he is the common ancestor of nearly all Hereford cattle in the USA.

Anxiety 4th

Herefords led the way in revolutionizing beef production in America, largely through the traits of doing ability and early maturity -- getting fat at an early age and producing the ideal in "baby beef."

By the late 1930's and 1940's breeders eagerly sought out the compact type of conformation -- short, low set, wide and deep-bodied cattle -- as their preferred breeding stock. By comparison, such cattle were naturally smaller. Their success in achieving such an animal with its abundance of fat and establishing that kind as the breed's "ideal" proved to eventually be a detriment.

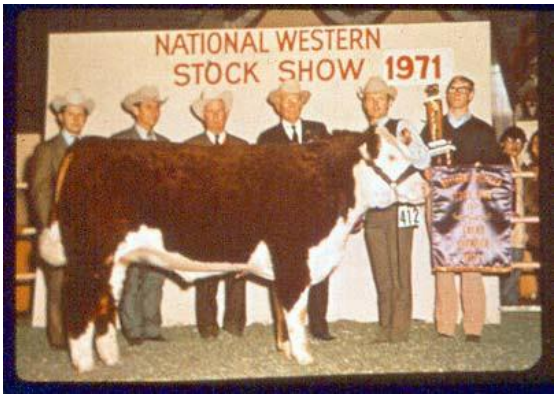
Advance Domino
Grand Champion Hereford Bull, National Western, Denver, 1940. This bull was considerably "typier" and more "extreme" than most of his contemporaries

1943. "Comprest Prince 40th", bred by Comprest Hereford Ranch, Raton, N.M. The "Comprest" bloodline was extremely small-framed and early-maturing. Along with the TO Ranch cattle, they became very popular during the 1940's and early '50's.

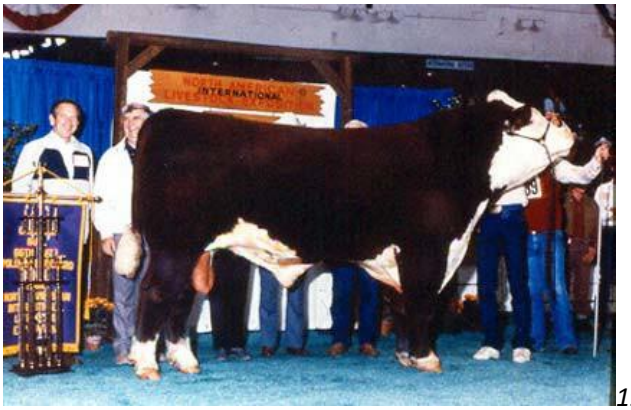
1950. "Big Spring Special." Grand Champion Steer, International, 1950.
Weighing 1025 lbs, he was very fat

1952. "Hillcrest Larry 62" as a 2-yr-old at the International. No noticeable change in skeletal size, but a lot fatter

Following World War II and well into the 1950's, the compact, fat, small type cattle continued to be favoured in the show ring, but quietly and almost unnoticed there was a change taking place in the meat-packing industry and in the basic American consumer's diet which reflected on the demand and price of the favoured kind up to that time. The commercial market for fat or beef tallow declined, plus the fact that consumers were unwilling to buy the excess fat on cuts from "over done" carcasses. The result was that beef packers paid less for the over fat cattle and suddenly there was a different type of animal preferred by the industry -- a trimmer, leaner, less fat and more red meat kind. These requirements translated to more size and a different style of conformation which, in turn, presented the breeder with a tremendous challenge in modernizing the breed. In the late 1960's Hereford followers sought out breeders and bloodlines noted for cattle of substantial size and performance.



1971. Denver Grand Champion steer. A Hereford steer that weighed 1250 lb and graded Choice with acceptable cut ability.

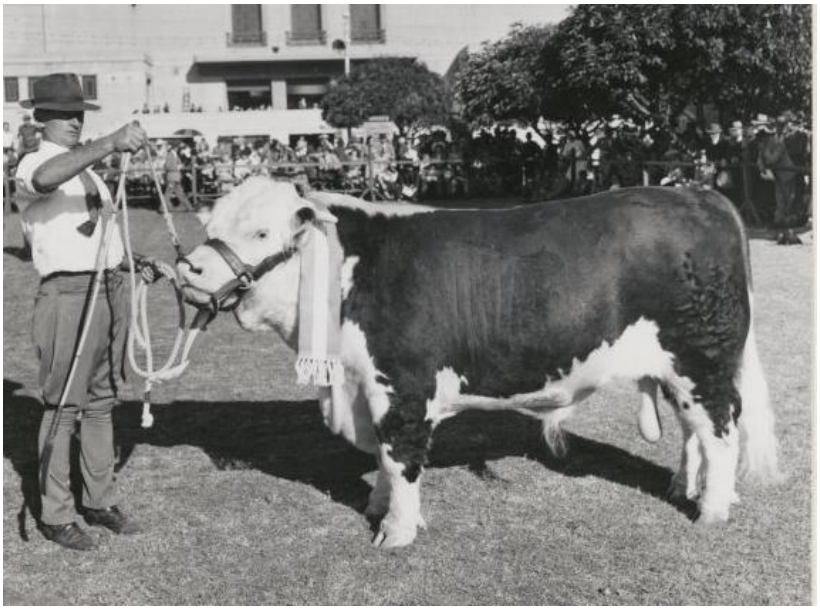


1988. "Ace Broker." Grand Champion Bull, National Polled Hereford Show (frame 10).

2001. Denver Champion Polled Hereford Female with a frame score of 6.3.

Herefords in Australia

In 1825 Herefords were exported from England to Tasmania, Australia and in 1890 the Australian Herd Book Society was founded. American Polled cattle arrived in 1920 and these became very popular, very quickly and in 1933 the Australian Poll Hereford Society was established.

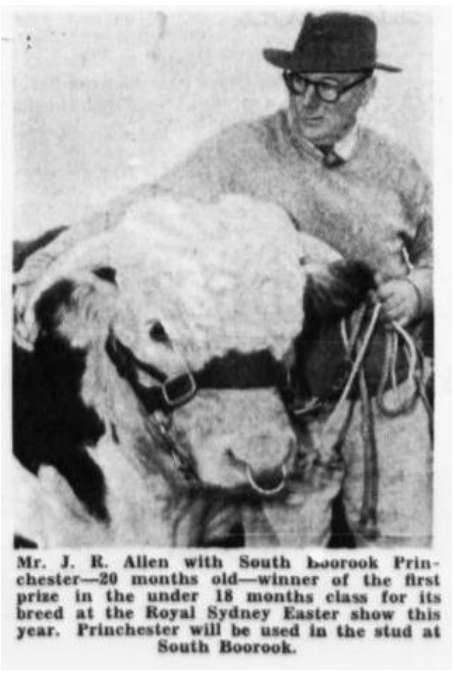


This Hereford, Windsor Byron, seen on Sydney Showground was a dual champion at the Sydney Royal Easter Show in 1949

16 The Age, Friday, September 16, 1966

LADY DELACOMBE, the wife of the Governor, ties the grand championship ribbon on South Boorook Fontaine, the award-winning Hereford bull owned by J. R. Allen, of Marlake. Mr. Fred Downie is holding the beast.

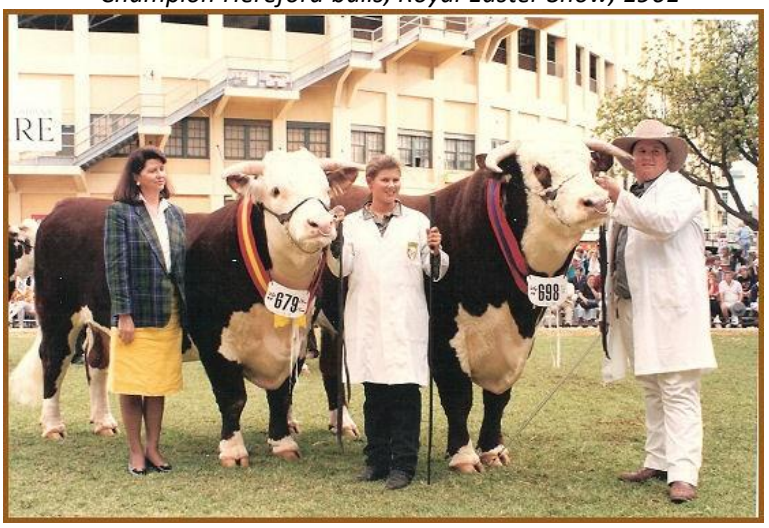
1966



Mr. J. R. Allen with South Boorook Princhester—20 months old—winner of the first prize in the under 18 months class for its breed at the Royal Sydney Easter show this year. Princhester will be used in the stud at South Boorook.

1960

Champion Hereford bulls, Royal Easter Show, 1961



SYDNEY ROYAL EASTER SHOW 1994
Anderson Pastoral Company was the "Most Successful Exhibitor"
and exhibited 5 Hereford Champions including
Reserve Senior Champion bull Inverary L'Dorado (Kirrily Johnson)
& Senior & Grand Champion & Best Exhibit Academy Columbus K37 (Richard Anderson).

Miniature Herefords emergence

Miniature Herefords today owe their existence to one stubborn family and over 35 years of careful, selective breeding. With his father having always favoured small frame Herefords, Roy R. Largent III decided to try breeding for a miniature Hereford line. Everyone else seemed to be breeding for the largest possible bovine, why not see how small the same breed could get? This idea was due in part to the rise in popularity of small acreage farms.

Several years passed as the Largents continued to develop their unique herd. The cattle were bred primarily for quality, with the agenda of developing smaller sizes through carefully selective breeding. LS MT OAK 6150 "Toughy" was born in 1996, and is considered the "King of the Largent Miniature Herefords". He gave balance and quality to the 000 sized cattle, and was used extensively at Point of Rocks for many years until his death in January of 2005.

LS Toughy

2001 National Western Stock Show - Denver, CO
Champion Miniature Hereford Bull
KAP King Henry

Miniature Herefords in Australia

There was one live shipment from the USA to Australia in 1995 and quite a few other breeders imported semen and embryos from the USA and Canada. The national herd has been slowly building ever since. Some Australian breeders have been using Australian genetics mixed with the Largent (USA) heritage to produce today's Australian Miniature Herefords and poll Miniature Herefords.

Miniature Herefords at the Launceston Royal 2009

A line up of miniature Herefords at the Launceston Royal 2009

In Summary

Hundreds of years ago, the Hereford breed came to be in Herefordshire, England. The cattle we refer to as Miniature Hereford cattle today are merely a product of the original Hereford cattle of the 1950's and 60's that were not bred up to the size they got to in some cycles of the intervening years.. In recent years, breeders have continued in an effort to down-size them. Miniature Hereford cattle have no specific designation at the American Hereford Association where they are registered. Height requirements need only be met at Miniature Hereford Breeders Association sanctioned shows, where the acceptable height for a mature Miniature Hereford bull is 47 inches (119 cm) measured at the hip and 45 inches (114 cm) for a mature female, measured at the hip. In Australia, stud miniature Herefords are included in the normal Hereford Australia herd book.

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If you require further information please visit our website at www.amhbn.com

A Hereford is a Hereford whether it is Horned, Polled or Miniature - and all carry the same bloodlines if you go back far enough.

Herefords are the purest breed in the world with over 250 years of heritage.

References:

1. Harlan Richie's Beef review https://www.msu.edu/~ritchieh/historical/cattletype.html
2. Cattle Breeds http://www.embryoplus.com/cattle_hereford.html
3. Point of Rocks Ranch http://www.minihereford.com/history.htm
4. UK Hereford Society http://www.herefordwebpages.co.uk/herdsoc.shtml
5. KP Ranch http://www.kpranch.com/history.htm
6. National Library of Australia – Picture Australia http://www.pictureaustralia.org/apps/pictureaustralia?term1=deepfields&action=PASearch&attribute1=any+field&mode=search
7. Cootharaba Herefords http://www.cootharababeefgenes.com.au/hereford%20history.html
8. National Archives of Australia http://www.naa.gov.au/
9. Galloway Family History http://www.ascot-neimenbrafords.com.au/Page_GallowayFamilyHistory.htm
10. Australian Miniature Hereford Breeders Network www.amhbn.com

Note: 304
April 2008

Department of Agriculture and Food

Farmnote

Small Landholder Series

Owning cattle on a small property

By the Small Landholder Information Service

The following Farmnote highlights the key considerations for small landholders looking at establishing their own small herd of cattle.

Many small landholders are keen to fulfil the dream of a rural lifestyle by taking the leap into livestock ownership. Running a small number of cattle is an appealing prospect for many small landholders. But while cattle can be both personally and financially rewarding, it is wise to investigate the responsibilities of ownership before taking the plunge.

Answering a few key questions will help determine whether such a purchase is a sound investment in both time and money. These preliminary investigations cover the issues of the motivation behind the purchase (for example, pasture management, financial gain or personal pleasure) whether you have the knowledge, skills, infrastructure and feed to ensure the wellbeing of your stock, and the time to care for your cattle. If, after carrying out these investigations, you want to go ahead with the purchase you need to decide on the type of cattle, where to source them and how you will transport the cattle to your landholding.

What are my motivations?

The reasons behind your decision to invest in cattle will determine the number, breed, age and gender of animals you purchase.

If, for example you simply wish to have a few cattle to control pastures on your smallholding and supply occasional meat for your family without wanting to breed additional animals, a small herd of steers of an easily-maintained beef-producing breed such as poll Hereford or Angus could suffice. If however you wanted to run and breed your own self-replacing herd of animals you may investigate a small niche breed such as Dexter or Belted Galloway.

If commercial gain is your motivation, keep in mind that this will take considerable time, money and knowledge for optimal production.

If you simply like the idea of having a few cattle to control pastures and don't want to sell or slaughter the animals for meat, alternative pasture species or a ride-on mower or slasher may be a more economical and less time-consuming option.

Figure 1: Crossbreed cattle are suitable for landholders looking for a source of homegrown beef.

Knowledge and skills

After the decision has been made that cattle are a suitable option, there are a few basic areas of knowledge and skills that are required for responsible management of your livestock.

While it can be argued that cattle are a less time consuming option than sheep, they still require you to regularly monitor feed, water supplies and general animal wellbeing, and depending on the age and **class** of stock you may need to drench, vaccinate, mark (castrate) and wean calves.

If you do not have skills in these areas you will need to develop them or employ the services of someone who has.

Take some time to research basic cattle care information on the DAFWA website www.agric.wa.gov.au where there a number of Farmnotes and some useful references.

The DAFWA Small Landholder Information Service (SLIS) runs livestock care and many other workshops (contact small_landholder@agric.wa.gov.au for more information and talk to as many people as you can who are in the industry and have "been there" before).

Infrastructure

Cattle need a well-fenced environment with adequate supplies of safe feed, water and shelter. For efficient grazing management you may need to fence off a number of smaller paddocks within the boundaries of the property to enable **rotational grazing**. This allows paddocks to be free of livestock from time to time and the pastures to recover before re-grazing. The number and size of these paddocks will be dictated by the local climate, property soil types, pasture species and the number of cattle you intend to run over a given area (**stocking rate**).

Developing a clear property plan before acquiring your stock is essential. Information on property planning is available on the small landholders website listed at the end of this Farmnote. Property planning workshops with access to professional advice are also available through the DAFWA service.

In addition to general fencing, a set of sturdy cattleyards, in which to carry out stock handling activities such as drenching, vaccinating and marking, is essential. These yards also will provide a contained area when stock arrive on the property after purchase and prepare to leave the property if they are sold. Cattleyards also provide a safe area to contain weaned calves if you decide to breed from your herd.

Your local rural outlet (for example Landmark agent) can advise you on available yards or you can contact individual yard manufacturers for more information.

Feed requirements

Establishing a quality pasture is essential to ensure your cattle remain healthy. Suitable pasture species and pasture management will vary with climate and soil type

Grazing management and **stocking rates** will depend on the season, number, size and **class** of your cattle (for example pregnant or lactating cows have a greater feed requirement than **dry cows** or steers).

As a general guide, smaller animals require less food space than larger animals. However if you are considering breeding, pregnant and lactating animals will require more food and land than dry animals.

The ability to irrigate may increase your paddocks' carrying capacity.

For more information on stocking rates download *Stocking Rate Guidelines for Rural Small Landholders* from www.agric.wa.gov.au.

In addition to determining the carrying capacity of your property during an average year, consider what will happen in dry seasons or years. Outside of the main pasture growing season, or during drought, you may need to supplementary feed your cattle. Seek advice from your local livestock officer or veterinarian before buying or supplying stock with supplementary feed to ensure you choose the most suitable feeds and quantities for your stock.

Further information on feeding livestock is available from the DAFWA website www.agric.wa.gov.au

Figure 2: A set of sturdy cattleyards is a must for routine handling operations.

Figure 3: Using the services of an experienced stock agent will ensure you get healthy stock and value for money.

Choosing your cattle

Having decided that you can care for cattle you now need to investigate what type of cattle will suit your needs. This will be determined by your motivations for owning cattle as already discussed.

If your cattle will be used to manage pastures and supply meat then the most economical option may be to select a general purpose purebred or crossbred beef breed, which are best found through the saleyards or direct from a local beef producer.

If you choose to run a herd of a specific breed then it would be wise to contact the relevant breed association and discuss with them your options. For the inexperienced cattle owner, the ongoing support, training opportunities and information available from breed associations can be worthwhile.

Attending agricultural field days and shows is another way of investigating individual breeds that may appeal to you and will provide an opportunity to chat with a range of breeders who can outline the benefits and challenges associated with individual breeds.

One consideration when selecting a breed is whether you buy a polled (hornless) or horned breed. For inexperienced operators, polled breeds are easier and safer to handle. If you do choose a horned breed it is advisable to employ the services of an experienced operator or veterinarian who can safely and humanely remove the developing horns of young animals.

Buying your cattle

The purchase of your cattle will be somewhat determined by the breed you have chosen. General-purpose beef breeds are easily obtained through the local saleyards or direct from a local beef producer. With the help of a local livestock agent you can ensure you will get value for money and healthy stock.

Specialist pure breeds may be best purchased directly from breeders. Breed associations should be able to put you in contact with a reputable breeder in your area where possible. If you are unsure about what constitutes a suitable healthy animal, you would be well advised do more homework before making a purchase.

Animal identification and movement

Before transferring any cattle to your ownership or care, you need to have a Property Identification Code (PIC) and current brand registration for your property. Each animal needs to be identified by earmark or brand (ear tattoo for registered stud animals) and have an electronic NLIS device (ear tag or rumen bolus). You should not take possession of cattle which do not have these identifiers. If you intend to breed cattle, you will need to purchase the appropriate tags and applicators.

Cattle across Australia are required by law to comply with the National Livestock Identification System (NLIS). This is permanent, whole-of-life identification that enables animals to be tracked from property of birth to slaughter. You need to notify the NLIS database within 48 hours of taking possession that the cattle are now located on your property. It is your responsibility as the receiver of the stock to make sure the transfer is done, however you can ask the livestock agent, a third party scanning contractor or anyone with access to the national NLIS database to do on your behalf. Scanners are available for hire from many telecentres if you would like to do it yourself. Cattle purchased from a saleyard will be transferred for you.

If you sell cattle, you will need to ensure each animal has an NLIS electronic ear tag or rumen bolus before you move them off your property. For more information, visit www.agric.wa.gov.au and search for "NLIS cattle".

Any cattle being moved off property must be accompanied by a waybill or a national vendor declaration (NVD) waybill, which can be purchased from Meat and Livestock Australia. For more information visit www.mla.com.au or freecall 1800 683 111 and select option 2.

Figure 4: Angus cow, correctly tagged and compliant with the National Livestock Identification System

Further reading

More information cattle selection and management, stocking rates and pasture management is available to be downloaded from the DAFWA website.

What does that mean?

Following are a few phrases highlighted in the above Farmnote that you may not be familiar with.

Carrying capacity — the ability of a portion of land (such as a paddock) to support grazing stock without causing deterioration of stock or degradation of land. It reflects soil type, moisture availability, plant density and so on.

Class of stock — refers to whether the animal is a calf, steer, heifer, cow or bull and wether or not they are dry, pregnant or lactating. This information is important when determining carrying capacity and stocking rates.

Dry cows — cows that are not pregnant or lactating.

Rotational grazing — the strategic movement of stock around paddocks so that feed is neither overgrazed nor undergrazed.

Stocking rate — the rate at which animals are grazed in an area, normally expressed as DSE per hectare.

Supplementary feed — feed provided to stock in addition to paddock grazing, when the paddock feed is lacking in either quality of quantity.

The above definitions are taken from *Agricultural definitions for small landholders*. This publication can be downloaded from the DAFWA website and will help you become familiar with much of the jargon used in the agricultural industry.

For your notes

082126–04/08-ID9153

ISSN 0726-934X

Department of Agriculture and Food
Farmnote
Note: 218
Replaces Farmnote 33/2004
January 2007

Handling cattle

Reviewed by Bevan Kingdon, formerly Department of Agriculture, Bunbury

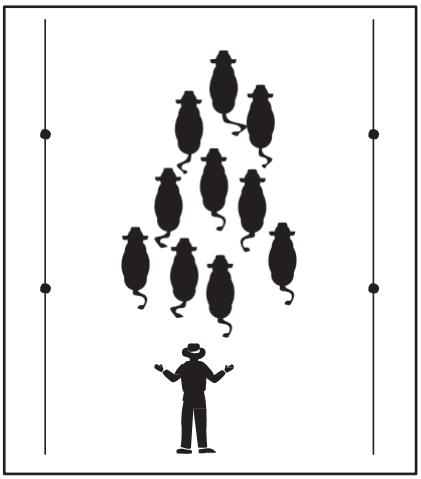

Figure 1. Moving cattle through a yard. Note the stockperson's position is not 'crowding the rear cattle which might otherwise cause them to break away.

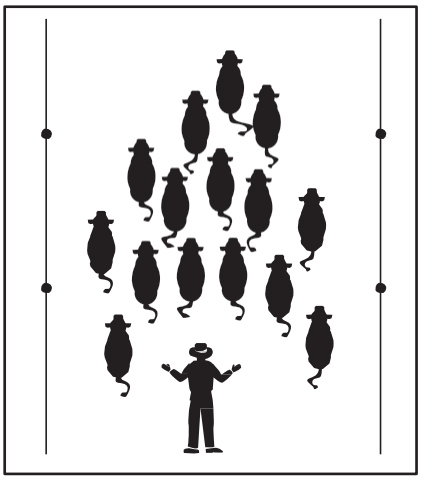

Figure 2. Stockperson is too close to the tail of the mob.

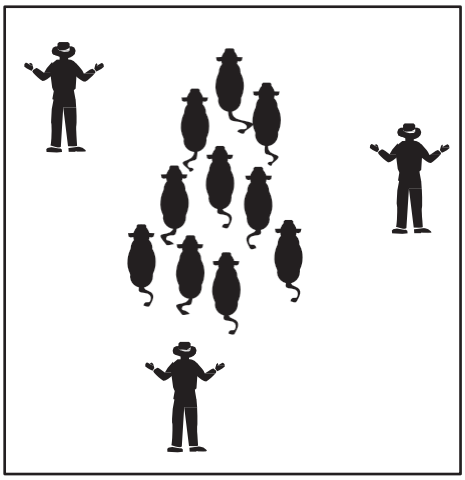

Figure 3. When handling cattle, steady and direct the lead, taking care not to overcorrect.

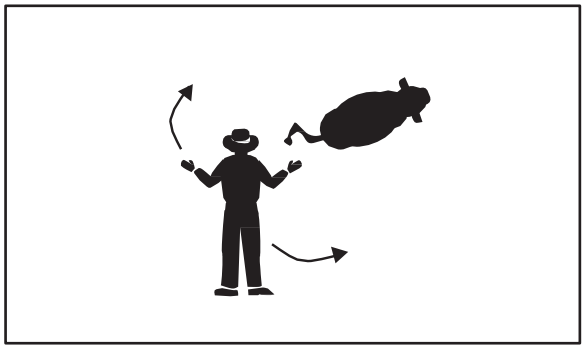

Figure 4. Stay alert when following an individual animal and take up a position behind the beast at about 30º angle to one side.

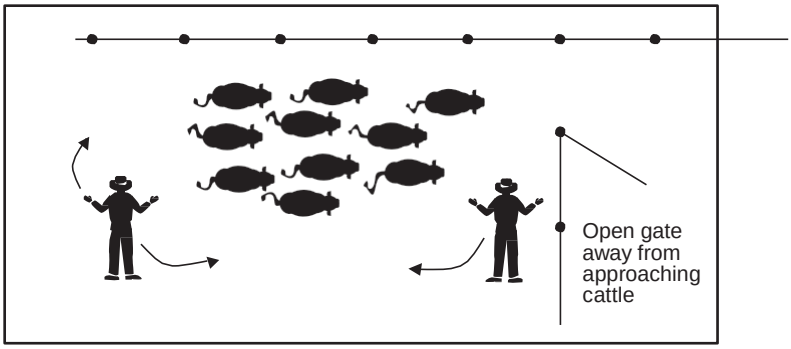

Figure 5. Guiding cattle through a gate.

With the introduction of Cattlecare and National Identification Scheme (NLIS) it is paramount that people employed to work with cattle are competent and skilful in this task to allow the cattle handled to be certified as being handled correctly. Also under Occupation Health and Safety (OHS) regulations any person involved in the handling of livestock needs to be trained and deemed as competent for their own safety and welfare.

The most important aspect of handling livestock is to recognise and understand an animal's reactions. This may often require patience and a cool head on the part of the handler, especially if the cattle are not handled very often.

An animal's "body language" will indicate how it is feeling or if it is relatively calm. Cattle can feel threatened by a handler standing too close, making sudden movements or loud noises, jamming the cattle too tightly, or isolating an individual animal in the yards. Cattle also react to a handler approaching them too rapidly in an unfamiliar way.

A good handler watches cattle, recognizes their reactions and gains their confidence by settling them down so they do not try to break away. Calm cattle will be more willing to co-operate with the handler, even if they are required to move into an area unfamiliar to them.

The success or failure in handling cattle depends on a number of factors, such as understanding animal behaviour, the animal's temperament and past training. The aim of all contact between handlers and cattle should be to achieve stock movement without stress or harm to either handler or cattle. With the emphasis on quality meat for the consumer, and profit margins requiring efficient production practices, animal facilities and handlers that cause either bruising or stress to cattle are costing the producer money.

Understanding animal behaviour

Cattle usually show the following reactions and behaviours.

- When frightened, their natural instinct is to escape.
- They are very curious – even after being frightened they will often return for another "look".
- They react favourably to good handling, kindness and particularly to feed.
- They do not like to be singled out either in yards or in the paddock. A beast breaking from the mob will run if chased. If left alone it will usually return to the mob. Cutting cattle out in the paddock, apart from forming bad habits, is mostly a fruitless exercise.
- Strange surroundings and noises frighten them.
- Sometimes bulls will do their best to prevent the herd being driven to yards, so it may be necessary to yard bulls with a few cows before trying to yard the herd.
- Cows can be very protective of young calves – handling calves in the presence of their mothers can be dangerous and requires extra awareness.

Modern handlers and facilities often take advantage of animal behaviour to make handling of livestock safer and easier, and in a lot of cases, more enjoyable.

Handling techniques that use the animal's curiosity to form a better relationship with cattle are common among cattle breeders. There are people willing to attend courses, sometimes at great expense, to learn how to use animal behaviour to achieve desired handling outcomes even with difficult animals. These methods require a lot of time and patience, but are often rewarding and may be applied in all livestock handling situations.

Modern facilities such as yards, paddocks and laneways take account of the animal's natural instinct in the design and construction to aid in the handling of cattle. Modern cattle yards are usually round to use cattle's instinct to mob and move in circles. This prevents them bunching up in corners, which can be a problem with square yard designs.

Paddocks are being sub-divided for improved grazing management and animals are rotated around them more often to control grazing. Laneways are often installed strategically to aid in stock movement to and from paddocks and yards.

Heritable traits

Temperament is heritable and contagious – it takes only one temperamental beast to upset the mob. It is therefore important to buy bulls of good temperament to ensure your cattle remain "well behaved" and likely to produce quality meat. Temperamental animals make handling difficult, and in some cases, dangerous. Temperamental animals are always hard to handle and will often "stir-up" the quieter cattle, so the best treatment for temperamental animals is to cull them as possible.

Training

Cattle should be taught to do what you want through animal co-operation, rather than coercion. Every time cattle are handled the activity should fit into an overall training plan.

Cattle become accustomed to the way they are mustered and worked through yards. This means you should develop the best procedure for mustering each paddock and working stock in the yards, and continue to use those methods. Repetition is especially important with poorly designed paddock layout or yard design, - if the animals follow the same pattern each time they are handled then it becomes habit for them to follow that procedure. This is also the reason bad habits should not be allowed to form.

The best time to educate cattle is at weaning. The recommended practice is to yard wean calves, especially if the weaners are destined for a feedlot, where they will be handled regularly and become used to interacting with humans.

Motor bikes and vehicles

To livestock, motor bikes are noisy and move quickly. So their reaction to an approaching motor bike is often to be alarmed and take flight.

When using a motor bike, approach the animals as quietly and at as low a speed as possible to establish a positive link between the livestock and the handler.

Livestock often do not associate a motor bike, or a vehicle, with humans and that is why they react differently when someone gets out of, or off a vehicle.

Stock can learn that a vehicle is associated with humans as long as you leave the vehicle often enough when you are near them. During training if vehicles are frequently used you should muster the stock quietly with the vehicle and then leave the vehicle to establish contact with the animals, either through feed, or physical contact.

Yard weaning

Yard weaning over a period of 7 to 14 days is by far the best way of producing manageable cattle. The only cost is time, a little good quality hay, and providing water in the yards.

A successful yard weaning system is as follows:

- Allow 4 metres per head of yard space
- Have water available in the yards at all times
- Vaccinate weaners with a 5 in 1 or 7 in 1 vaccine
- One day after weaner's have been yarded, feed about 3 kg of hay per head

- Feed twice a day, walking amongst the weaners, offering hay by hand before putting it in a rack in the yards. Gradually increase the amount of hay, but make sure the rack is emptied before the next feed. Weaners of 250 to 300 kilograms liveweight will need to eat between 5 to 6 kilograms a day to maintain weight.
- Quietly and slowly work weaners through the yards, gates and races every day or so.
- On the morning of the fifth or sixth day, depending on how quiet the weaners are, leave a gate open into a small holding paddock after feeding. Let the weaners find their own way out of the yards.
- Re-yard them in the afternoon before feeding if they have not come back into the yards to wait for feed.
- If the weaners return of their own accord the weaners can now be run in the holding paddock, preferably with a few quiet adult cattle during the day, and yarded each night and fed. Do not open the gate and let them run away – block them and make them walk away. Dogs can be used for the first time to do this, although make sure the dogs are well controlled and not too rough.
- After yarding for several nights and turning out in the paddock during the day, the weaners can be turned out into the weaning paddock, and left. Continue to feed them hay for 2 weeks, after which only continue feeding if sufficient paddock feed is not available.
- At intervals feed the weaners a small amount of hay and walk among them to maintain some contact for at least several months.

After this, inspect your weaners occasionally by mustering them into a corner or holding them in the paddock using dogs, horses, motor vehicle or a bale of hay. Make sure all cattle are standing before you move off. Do not let them run away from you. If any animals are showing excessive nervousness then consider culling these animals, especially from any breeding program, as nervousness at this time is most likely due to poor temperament.

Stock handling

Handling in the paddock

When in the paddock, approach cattle quietly and at a moderate pace, allowing them to see you coming, then gather them together in a mob before driving them to the yards.

Limit noise and don't handle them roughly or at a fast pace, especially if you are using dogs or motor bikes. Cattle should be driven at a moderate speed, a brisk walking pace, toward the gate or yard. Too fast, and the cattle will not stop long enough to see the opening. While too slow and you create a long tail on the mob, making it impossible for you to control the lead cattle.

Holding the mob

Holding cattle together in a mob requires a lot of patience and practice. If an animal breaks, hold the mob and give it a chance to return by itself. If it doesn't, dogs or one handler can bring it back only after the mob is securely held.

Cattle will not travel freely if the mob is held too tightly. Instead, they will tend to bunch up, ring around and break away in all directions.

A mob will become uncontrollable if held too loosely by handlers spread too thinly or not working as a team. When following cattle, especially in laneways, walk about 10 metres behind the mob. If a U-shaped tail to the mob forms then you are too close, and you may have animals attempting to double back and escape.

Handling individual cattle

If you are following an individual animal, always follow the animal on one side. An angle of about 30o is best, since from this angle the animal cannot see you all the time without moving its head, so it will only see you when it is moving off course.

Watch the animal's head. If it moves to the other side, then you move to that side of the animal. It gives the animal the illusion of being followed by two people, as it sees someone on both sides.

Keep within five metres of the animal so it does not have a feeling of too much freedom.

Working cattle within yards

Ensure that your yards conform to the requirements of Cattlecare, which should ensure cattle can be handled with a minimal chance of bruising.

Do not overload yards, particularly forcing yards, because cattle will pack into a corner and not see the entrance to the race. This will also present a difficult and dangerous situation for the handler. When handling cattle in stockyards there are a few points to keep in mind:

- Do not single cattle out – leave a few extra animals for company.
- Draft bulls off from the mob before starting other yard work.
- Draft off small calves from larger animals to prevent trampling by the larger cattle
- If cattle become upset, and start milling around, reduce the pressure on them. You are working too soon, too fast, too close, too tight or making too much noise.
- Work in a position where the cattle you wish to move can see you at all times
- If cattle become aggressive and agitated, especially cows with calves at foot, back off and take a break for a while to let them calm down
- If possible do not use dogs in or around the yards
- Only yard up enough animals that you can handle in a 2-hour period. If you have more cattle in the mob split them into more manageable groups
- If you require the cattle for more than a day's work then you need to put them into a holding paddock overnight, with water and supplementary feed available. Cattle kept in yards overnight with limited space per animal will tend to fight and possibly injure each other, especially animals at the bottom of the "pecking order".

Drafting cattle

Cattle are easier to draft if they are run through a race, which means they approach the drafter one at a time. Depending on the yard design the cattle could be drafted into a number of separate groups, rather than just one at a time, with gate drafting. Wild animals are difficult to handle and often move too fast for a successful gate draft. In these circumstances, for both animal and handler safety, it is best to race draft.

Raceway drafting is best done when animals are easy to identify either by their tag or individual markings on the fore end. It is important not to mix cattle of different ages when race drafting as smaller animals may be hurt by larger animals in a hurry to get through the race. Ensure cattle move through at a steady pace that allows the drafter to swing the drafting gate without hitting the following animal to prevent it escaping into the wrong group. Cattle forcing through draft gates can lead to injury of livestock and/or the handler. Remember that the drafter can only see the front end of the animal so ensure correct identification is used.

Gate or pen drafting is best when you want to only separate one group from a larger mob, or you are drafting a mob with varying size animals, such as cows and calves. Gate drafting is also best carried out with mobs of cattle that are quiet or used to being handled. Often a combination of gate and race drafting is best with large mobs of cattle of varying sizes. Make sure there are no protruding objects on gates or pens that may bruise or injure them. The gate itself should be out of the way and swung into the pen the cattle are to be drafted into (see diagram 5), or opened behind the person drafting in the gateway.

Use narrow gateways for drafting – about two metres wide. Feed the stock through one at a time, at a gentle pace. Cattle respond to calm, gentle handling. Never use electric prodders or dogs during drafting.

Cattle stop quickly when objects they can see are put in front of their heads. Polythene pipe, sticks or other pieces of pipe, though commonly used, are hard for cattle to see and can cause bruising and other physical damage. A recommended drafting stick is a piece of doweling (about one metre long by at least 18-mm diameter) with a flag attached to one end (about 200mm by 150mm). Orange or yellow flags are best. They can be seen easily by cattle and operators in all weather. Wave the flag in front of an animal you wish to stop.

When forcing cattle in a yard, and they stop, do not force the animals at the back over those at the front. The best approach is to move ahead, even if it means the back animals move back to the mob, and push the front animals forward, or see what is causing the disturbance. An animal may be down, or something has frightened the cattle, and prevented forward movement.

Good facilities, such as yards that are designed well and constructed from suitable material, can make cattle handling an easy and enjoyable task, leading to better management of livestock and improved farm efficiency. It pays to ensure you have good facilities and good handler training to achieve a product of which you can be proud.

1881-01/07-ID7396

ISSN 0726-934X

NSW DPI

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PROFITABLE & SUSTAINABLE PRIMARY INDUSTRIES www.dpi.nsw.gov.au

JUNE 2007 PRIMEFACT 419 (REPLACES AGNOTE DAI-312)

Cattle worm control – the basics

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Abbreviations used

AR: anthelmintic resistance

ML: macrocyclic lactones

BZ: benzimidazole

LEV: levamisole

IVM: ivermectin

EPI: eprinomectin

This Primefact outlines the basics of worm control for grazing beef cattle in New South Wales. The same general principles apply to dairy cattle, although the details may vary and, in addition, milk withholding periods of anthelmintics (especially flukicides) also need to be considered. The importance of various cattle worms in different climatic zones is summarised in Table 1.

A brief outline follows.

Round Worms (Nematodes)

Gastrointestinal. The small brown stomach worm *(Ostertagia ostertagi)* is the most important roundworm of cattle in temperate regions worldwide, including NSW. Other gastrointestinal worm species, however, including *Haemonchus placei*, *Cooperia* spp., *Trichostrongylus* spp., *Oesophagostomum* and *Bunostomum* (hookworm) add to the total impact on host animals.

Lungworms. Cattle can be infected with lungworms (*Dictyocaulus viviparus*), but these parasites are usually not a problem in NSW.

Flukes (Trematodes)

Liver fluke (*Fasciola hepatica*) is an important parasite of cattle in certain areas (where conditions are suitable for the intermediate host, an aquatic snail). 'Fluky' areas occur mainly in the eastern third of NSW, but also in some western irrigation areas.

Stomach fluke (such as *Paramphistomum spp*. or *Calicophoron spp.*) occasionally cause disease, mainly in coastal areas. Adult stomach flukes do little damage; most problems are caused by large numbers of migrating immature flukes in the small intestine.

Table 1. Harmful cattle worms and their distribution (Source: Love & Hutchinson 2003, adapted from Cole 1986)

Common / significant
Summer rainfall areas of NSW
Haemonchus placei
Ostertagia ostertagi (Small brown stomach worm)
Cooperia punctata – C. pectinata (Intestinal worm), as a complex, often with *Ostertagia* and *Bunostomum phlebotomum* (Hookworm)
Oesophagostomum radiatum (Nodular worm)
Non-seasonal to winter rainfall areas
Ostertagia ostertagi
Trichostrongylus axei (Stomach hair worm)
Cooperia oncophora
Occasionally significant, mainly subclinical, or sometimes present in large numbers
Fasciola hepatica (Liver fluke)
Paramphistomum spp. (Stomach fluke)
Calicophoron calicophorum (Stomach fluke)
Strongyloides spp. (Threadworm)

Integrated parasite management (IPM)

Producers should manage worms by using 'non-chemical' as well as 'chemical' control options. 'Non-chemical' options include improved nutrition and providing 'worm-safe' pastures for young cattle. Strategies include the following.

Immunity and nutrition

Well-fed animals develop immunity faster and are better able to expel parasites and to withstand the effects of those that remain.

Young cattle are most susceptible to worms, but usually develop useful immunity by around 20–24 months. In general, cattle develop better immunity to worms than sheep and goats. Although adult cattle often require little or no drenching for roundworms (as opposed to liver fluke), some animals can become wormy. Susceptible animals may include bulls, first-calf heifers, and severely-stressed individuals.

Pasture/grazing management

Dung pats can provide shelter for worm larvae for several months, even in very dry conditions. Therefore, paddocks continually grazed by young cattle in autumn and winter can become very wormy.

It is important to prepare a number of 'worm-safe' pastures, particularly in higher-rainfall areas of NSW. This is so young, susceptible cattle can be moved every few months to paddocks with fewer worm larvae. Aim to graze weaners from early August through to summer on the least contaminated pastures available.

Begin preparing 'low-worm' pastures for spring four months ahead (i.e. in April). The table below shows different low-worm pastures.

Best	New sown pasture or crop.
	Pasture grazed by sheep for previous 4 months.
	Pasture *not* grazed by any cattle for previous 4 months.
Good	Pasture grazed by adult dry cattle or cattle older than 18 months of age.
High-risk	Pasture grazed by young cattle such as weaners.

Drenching

For the timing and frequency of drenching, see the section on 'Putting it all together'.

Roundworms

Anthelmintic treatments may be necessary to control round worms in young cattle, particularly in higher-rainfall areas (the Coast and Tablelands). In low-rainfall areas of western NSW, drenching of cattle of any age is rarely required. (If in doubt, check young cattle using a worm egg count.)

For most of NSW, regular treatment of adult cattle is not required.

Fluke

On liver fluke-affected farms, treatment of all cattle with a flukicide will be required one or more times a year, depending on the severity of the problem. The most important liver fluke treatment is usually in late autumn (April/May) when both immature and adult flukes are present. Some flukicides are only effective against adults. Consider rotating from one flukicide type to another in order to slow the development of resistance. Warning: flukicides containing triclabendazole must not be used in lactating dairy cattle.

Stomach fluke can affect cattle under certain conditions, particularly in coastal areas.

For more information on stomach and liver fluke, see the relevant Primefacts on the NSW DPI website at www.dpi.nsw.gov.au/primefacts .

Drench types

See Table 3

Drench resistance

In an earlier worldwide review of AR in cattle worms, Hutchinson (2003) states that: 'although evidence of resistance in cattle worms is only slowly coming to light and has so far been restricted to the less-pathogenic species of *T. axei* and *Cooperia,* it should be expected that resistance to MLs is likely to become established in Australia'. A more recent international review (Kaplan 2004) noted that clinical case reports basing bovine nematode resistance on treatment failures were insensitive. However, some cattle nematodes were reported to have proven resistant to BZ and ML in other parts of the world: *Haemonchus* and *Cooperia* in Argentina (Anziani et al 2004); and *Cooperia* in Europe (Coles 2002).

In New Zealand there have been reports from the early 1990s of resistance to BZs principally in *Cooperia* but also in *Ostertagia* and *Trichostrongylus* (Hosking & Watson 1991, McKenna 1996). ML resistance has been reported more recently, again principally in *Cooperia* (Vermunt et al 1996).

With growing concern over the apparent level of resistance in cattle nematodes, a major systematic survey to assess the situation in beef cattle in NZ was recently completed (reviewed by Pomeroy 2006), Based on faecal egg count reduction tests at only 7–10 days after treatment (a possible weakness in the design) it used only oral drenches

on 62 randomly selected farms in the North Island. The two types of system examined were intensive bull-beef rearing systems (hand reared bull calves or purchased as weaners 10–12 weeks old) and 'cow-calf' where calves were reared on mothers until weaning at 28–30 weeks then grown out on the same or separate finishing farms. The study was restricted to the North Island as bull-beef rearing had only recently been introduced to the South Island.

The estimated prevalence of IVM resistance in *Cooperia* was 92% and 62% for albendazole (Waghorn et al 2006). Fortunately LEV was still effective against these resistant strains of *Cooperia*. However, it is normally poorly effective against inhibited *Ostertagia*.

Ostertagia in cattle had albendazole resistance with a prevalence of 35% but only 9% of farms had IVM or LEV resistance in this species.

Risk factors for anthelmintic resistance were examined in a concurrent interview and questionnaire of farmers' opinions and practices regarding AR on these same farms (Jackson et al 2006). This revealed that the median number of treatments was five. One in four farms used anthelmintics on calves on 8–12 occasions in their first year of life (a much higher frequency than would ever be considered in Australian conditions). Most anthelmintics used for the past five years were ML or their combinations, rather than BZ, LEV or BZ/LEV combinations (Jackson et al 2006).

Why there is ML resistance in *Cooperia* but not in *Ostertagia* in mixed infections when MLs are the main drenches used is not explained. Most farmers, although aware of AR, did not perceive it to be a major problem in cattle. It was concluded that all cattle farms should now be using combinations on most occasions to achieve effective control of all parasites.

Another study (Mason and McKay 2006) investigated the efficacies of pour-on anthelmintics on five New Zealand farms with suspected resistance. The study was against field strains of parasitic nematodes in young cattle. Resistance to IVM and EPI was confirmed in *C. oncophora* on all farms. There was limited emergence of *Ostertagia* resistant to IVM, but not EPI; in other (short-tailed) *Cooperia* species there was resistance to both IVM and EPI; and in *Trichostrongylus* there was resistance to IVM, EPI and LEV used separately. It was concluded that simultaneous administration of LEV and IVM pour-on is likely to control both ML-resistant *C. oncophora* and stages of *Ostertagia* that are not controlled by LEV.

On a positive note, there have been no case reports of clinical parasitism in cattle in NZ where the effect of resistant nematodes has been quantified (Jackson et al 2006).

Australia has had only two confirmed cases of drench resistance in cattle – both involving BZ ('white') drenches. One case involved oxfendazole-resistant *Trichostrongylus axei* (stomach hair worm) in western Victorian cattle (Eagleson and Bowie 1986). The other was for oxfendazole and febantel-resistant *T axei* in the New England region of NSW (Eagleson et al. 1992).

Some factors which may increase the selection of resistant worms include:

- increased exposure of the worm population to anthelmintics (through frequent drenching);
- exposure of worms to sub-lethal doses of anthelmintics (through under-dosing);
- drenching unnecessarily in dry seasons or dry environments when there are very few worm larvae on pasture. (Note, however, that cattle worm larvae can survive for some time in the protected conditions of a dried dung pat, unlike in sheep faecal pellets).

In many areas of NSW, especially drier areas, cattle are drenched too often, particularly adult cattle. (Seek local expert advice on how much drenching is required). Also, unlike the situation in sheep, the three main broad-spectrum families – BZs, LEV and ML drenches – are still effective on the majority of cattle properties. However, many producers use just one family of drenches – rarely, if ever, rotating.

Quarantine drenching

When introducing cattle from other properties, consider 'cleaning them out' with a 'quarantine' drench, at least for roundworms, and possibly also for liver fluke.

Currently, the need for a 'quarantine' drench in cattle is somewhat less than in sheep. Anthelmintic resistance is much less common in cattle worms, so the risk of importing resistant worms is less. Also, cattle, especially adult cattle, tend to have far fewer problems with worms than sheep.

Fine tuning

In consultation with your adviser, fine-tune an integrated parasite management program to suit your property. Use WormTest (worm egg counts) to monitor your worm control program.

Cattle (especially adult cattle) can be drenched too often. WormTest can help with decisions about drenching; however, faecal worm egg counts can be an unreliable indicator of actual worm burdens in cattle – especially cattle older than 9–12 months.

In yearling or adult cattle that appear to be wormy but have low worm egg counts, consider a 'diagnostic drench', that is, drenching a small

number of cattle in the mob and monitoring the response to treatment. Clinical disease or reduced performance can sometimes be present when egg counts are very low.

Putting it all together

Table 2 (below) gives an example of a cattle worm control program. Remember that cattle in many areas of NSW will require fewer treatments than are included here.

Always read the label

Users of agricultural (or veterinary) chemical products must always read the label, and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

References and further information

See related Primefacts on the NSW Department of Primary Industries website: www.dpi.nsw.gov.au/primefacts

Anziani OS, Suarez V, Guglielmone AA, Warnke O, Grande H and Coles GC (2004). *Resistance to benzimidazole and macrocyclic lactone anthelmintics in cattle nematodes in Argentina.* Veterinary Parasitology 122: 58-59

Boray JC (1999). *Liver fluke disease in sheep and cattle*. Primefact 446, revised by Dr GW Hutchinson and Stephen Love (July 2003). NSW DPI.

Cole VG (1986). Helminth parasites of sheep and cattle. *Animal Health in Australia*, Volume 8. Australian Agricultural Health and Quarantine Service, Department of Primary Industry, Canberra, pp. 255

Coles GC. Sustainable use of anthelmintics in grazing animals. *Veterinary Record* 151:165-169.

Eagleson JS and Bowie JY (1986). Oxfendazole resistance in *Trichostrongylus axei* in cattle in Australia. *Veterinary Record* 119, 604.

Eagleson JS, Bowie JY, and Dawkins HJS (1992). Benzimidazole resistance in *Trichostrongylus axei* in Australia. *Veterinary Record* 131, 317-318.

Freeman P. *Beef cattle on the North Coast.* Rural Lands Protection Board, Casino, NSW.

Hosking BC and Watson TG (1991). Benzimidazole- resistant nematodes in cattle. *Journal of the New Zealand Institute of Agricultural*

Table 2. An example of a beef cattle worm control program (higher rainfall Tablelands area)[1].

Date	Class of stock		Management	Additional treatments	
	Young (< 20 months)	Adults		Liver fluke[3]	Stomach fluke[4]
Feb	Drench for inhibited *Ostertagia*[2].	Regular drenching may not be required.		+	
April/May	Drench at weaning.		Begin preparation of 'safe' pastures for spring[5].	+	
Early August	Drench and move to safe pasture. Move again later in spring, if possible.			+	+

1 This is a guide only. Fewer drenches may be required in many areas. Drenching may rarely be required on the Western Plains. More drenches are generally required in high-rainfall areas with productive pastures, especially if no sheep are grazed and/or grazing management is not practised.

2 The February drench for roundworms – if required – should be highly-effective and aimed at inhibited *Ostertagia* (small brown stomach worm). MLs are most effective, followed by BZs. Levamisole has limited activity against inhibited *Ostertagia*.

3 Only treat for liver fluke if its presence is confirmed on your property. Between 1–3 fluke treatments for all ages of cattle may be necessary. The most important of these is the April treatment, followed by the August treatment, then the February treatment. Consider rotating from one flukicide to another (unrelated) flukicide. Use a highly-effective flukicide at the April treatment.

4 Stomach fluke can be a problem in certain coastal areas. Seek veterinary advice. Treatment of all cattle in these localities in August to reduce pasture contamination may be appropriate.

5 Methods of producing 'safe'; or 'low-worm' pasture include cropping, hay aftermath, and grazing beforehand with sheep or adult cattle, or cattle older than 18 months.

Science 26: 53.

Hutchinson GW (2003). Cattle nematodes and resistance with particular reference to MLs. *Turning the Worm* Newsletter, Issue 11, May 2003, NSW DPI, 4-8. Retrieved 30 January 2007 from http://www.agric.nsw.gov.au/reader/ttwnews

Jackson R, Rhodes AP, Pomroy WE, Leathwick DM, West DM, Waghorn TS and Moffat JR (2006). Anthelmintic resistance and management of nematode parasites on beef cattle-rearing farms in the North Island of New Zealand. *New Zealand Veterinary Journa*l 54: 289-296.

Kaplan RM (2004). Drug resistance in nematodes of veterinary importance: a status report. *TRENDS in Parasitology* 20:477-481.

Lloyd JB, Boray J and Campbell N (2003). *Identifying liver fluke snails*. Primefact 476, NSW DPI.

Lloyd JB and Boray J (2003). *Stomach fluke (paramphistomes) in ruminants.* Primefact 452, revised by Stephen Love. NSW DPI.

Love SCJ and Hutchinson GW (2003). 'Pathology and diagnosis of internal parasites in ruminants'. *Gross Pathology of Ruminants,* Proceedings 350, 9–11 April 2003, Elizabeth Macarthur Agricultural Institute, Camden, NSW, Australia. Post-Graduate Foundation in Veterinary Science, University of Sydney, 309–338.

Mason PC and McKay CH (2006). Field studies investigating anthelmintic resistance in young cattle on five farms in New Zealand. *New Zealand Veterinary Journal* 54: 318-322.

McKenna PB (1996). Anthelmintic resistance in cattle nematodes in New Zealand. Is it increasing? *New Zealand Veterinary Journal* 44: 76.

Pomroy WE (2006). Anthelmintic resistance in New Zealand: A perspective on recent findings and options for the future. *New Zealand Veterinary Journal* 54: 265-270.

Smeal MG (1995). 'Parasites of Cattle', *Veterinary Review* No.32, The University of Sydney, Post-Graduate Foundation in Veterinary Science, pp. 358.

Spence S (2001). *Dung beetles – working for you.* Primefact 442, NSW DPI

Vermunt JJ, West DM and Pomroy WE (1996). Inefficacy of moxidectin and doramectin-resistant *Cooperia* spp. in New Zealand. *New Zealand Veterinary Journal* 44: 188-193.

Waghorn TS, Leathwick DM, Rhodes AP, Jackson R, Pomroy WE, West DM and Moffat JR (2006). Prevalence of anthelmintic resistance on 62 beef cattle farms in the North Island of New Zealand. *New Zealand Veterinary Journal* 54: 278-282.

Acknowledgements

This Primefact was drawn from a variety of sources, including research, notes and publications by:

- Dr Malcolm Smeal, formerly of NSW Agriculture, currently with 'Southern Beef Advisory', Sydney.
- Dr Paul Freeman, NSW Department of Primary Industries, formerly District Veterinarian, Casino, NSW.
- Dr Stephen Jagoe, formerly District Veterinarian, Bega (South Coast), NSW.
- Dr Roy Everett, formerly of NSW Agriculture.

Suggestions and assistance from John Seaman, Lee Cook, Belinda Walker, John Evers, Shaun Slattery, Rod Hoare, Malcolm Smeal, and John Macfarlane are also acknowledged.

ISSN 1832-6668

Replaces Agnote DAI-312

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Job number 7298

Table 3-Registered cattle drenches (anthelmintics)

Sources: Infopest, January 2007; Australian Pesticides and Veterinary Medicines Authority (www.apvma.gov.au)

Constituents	Product name	Company
Broad-spectrum roundworm drenches – benzimidazoles ('BZ', 'white') (Check label for efficacy and persistency of activity against different worm species)		
Albendazole (112.5 g/L)	Albendazole Cattle Mini-Drench	WSD
	Nuwhite CC	Captec
	Strategik Mini-Dose (Cattle)	Jurox
	Valbazen Mini-Dose Cattle	Pfizer
Fenbendazole (100 g/L)	Fenbendazole 100	WSD
	Fencare 100	Virbac
	Panacur 100	Intervet
Fenbendazole (25 g/L)	Fenbendazole	4Farmers
	Fenbendazole	WSD
	Fencare 25	Virbac
	Panacur 25	Intervet
Oxfendazole (100 g/L)	Worma Drench	Farnam
Oxfendazole (45.3 g/L)	Combat White Anthelmintic	Virbac
	Oxazole LV - Sheep, Cattle Goats	Jurox
	Oxfen LV	Virbac
	Systamex Oral	Coopers
Oxfendazole (75 g/L)	Alternate	Bomac/Elanco
	Bomatak Pour-On	Bomac
Oxfendazole (90.6 g/L)	Bomatak.C	Bomac/Pharm tech
	Oxazole - Cattle & Horses	Jurox
	Oxfen C	Virbac
	Parafend LV	Norbrook
	Systamex Concentrated Drench	Coopers
Broad-spectrum roundworm drenches – levamisole ('LEV', 'clear') (Check label for efficacy and persistency of activity against different worm species)		
Levamisole (base) (125 g/L)	Nilverm Pour-On	Coopers
Levamisole (base) (200 g/L)	Big-L Pour-On	Sykes
	Citarin Pour-On	Bayer
	Levamisole Pour-On	Virbac
	Levipor	Novartis
Levamisole as HCl (27 g/L)	Big L	Sykes
	Levamisole	4Farmers

Constituents	Product name	Company
	Levamisole	WSD
	Nilverm Oral Drench	Coopers
	Nulev	Captec
	Rycozole	Novartis
Levamisole as HCl (340 g/L)	Levamisole Gold Mixadrum Concentrate	Virbac
Levamisole as HCl (63.6 g/L)	Combat Clear (Oral Drench)	Virbac
	Levamisole Gold LV	Virbac
Levamisole as HCl (67.8 g/L)	Rycozole RV	Novartis
Levamisole as HCl (67.8 g/L)+Se as sod.selenate (1 g/L)	Rycozole RV Plus Selenium	Novartis
Levamisole as HCl (67.9 g/L)	Clear LV	Bayer
	Low Volume Levamisole	WSD
Levamisole as HCl (68 g/L)	Nilverm LV	Coopers
Levamisole HCl (32 g/L)	Levamisole Gold	Virbac
Levamisole HCl (80 g/L)	Nulev LV	Merial
Broad-spectrum roundworm drenches – macrocyclic lactones ('MLs', 'mectins') (Check label for efficacy and persistency of activity against different worm species)		
Abamectin (10 g/L)	Avomec	MSD Agvet
	Paramectin RV	Jurox
Abamectin (10 mg/ml)	Genesis Abamectin Pour-On	Ancare
	Genesis Injection Abamectin	Ancare
	Paramectin Injection	Dover
	Rycomectin - Cattle Injection	Novartis
	Vetmec - Cattle Injection	Youngs
	Virbamec Injection - Cattle	Virbac
Abamectin (10 mg/ml) + cyanocobalamin (2 mg/ml)	Genesis Injection Abamectin Plus Vit B12	Ancare
Abamectin (5 g/L)	Paramectin Pour-On	Jurox
Abamectin (5 mg/ml)	Beefmec Pour-On (Abamectin)	Virbac
	Virbamec Pour-On	Virbac
	Virbamec Pour-On Endectocide	Virbac
Doramectin (10 mg/ml)	Dectomax Injectable	Pfizer
Doramectin (5 mg/ml)	Dectomax Pour-On	Pfizer
Eprinomectin (5 mg/ml)	Ivomec Eprinex Pour-On	Merial
Fluazuron (15 g/L) + ivermectin (5 g/L)	Acatak Duostar Tick Development Inhibitor And Broad Spectrum Pour-On	Novartis
Ivermectin (10 mg/ml)	Bomectin (Injection)	Pharm Tech
	Dairymec - Pour-On	Virbac

Constituents	Product name	Company
	Ecomectin - Injection	Eco Animal Health
	Genesis Injection Ivermectin	Ancare
	Genesis Pour-On	Ancare
	Imax CD	Pharm Tech
	Ivomec Injection - Cattle	Merial
	Noromectin Injectable - Cattle	Norbrook
	Noromectin Injection - Cattle & Pigs	Norbrook
	Vetimec Injection	C-Corp
	Virbamax Pour-On	Virbac
	Virbamec LA Injection	Virbac
	Virbamec LV Pour-On	Virbac
Ivermectin (5 g/L)	Ivermectin Baymec Pour-On	Bayer
	Ivermectin Pour-On	Virbac
	Paramax Pour-On	Coopers
	Phoenectin (Ivermectin) Pour-On	Phoenix Scientific
Ivermectin (5 mg/ml)	Ausmectin Cattle Pour-On	IAH Sales
	Bovimectin	Norbrook
	Ecomectin Cattle Pour-On	Eco Animal Health
	Ivomec Pour-On - Cattle	Merial
	Noromectin Pour-On	Norbrook
	Vetimec Pour-On	C-Corp
Moxidectin (10 g/L)	Cydectin Injection - Cattle/Sheep	Fort Dodge
	Cydectin Injection for Cattle	Fort Dodge
Moxidectin (5 g/L)	Cydectin Pour-On	Fort Dodge
Broad-spectrum (roundworms) + flukicide (Check label for efficacy against different roundworms as well as various stages of fluke: adult, immature, and early immature)		
Abamectin (5 mg/ml) + triclabendazole (300 mg/ml)	Anfluke Pour-On	Ancare
	Fasimec Cattle Pour-On	Novartis
	Genesis Ultra Pour-On	Ancare
	Triclamec Cattle Pour-On	Youngs
Ivermectin (10 mg/ml) + clorsulon (100 mg/ml)	Genesis Ultra Injection	Ancare
	Ivomec Plus	Merial
	Noromectin Plus Broad-Spectrum Antiparasitic Injection for Cattle	Norbrook
	Vetmec F	Chemvet
Ivermectin (10 g/L) + clorsulon (100 g/L)	Virbamax Plus Injection	Virbac
	Virbamec Plus Injection	Virbac

Constituents	Product name	Company
Ivermectin (15 g/L) + triclabendazole (240 g/L)	Sovereign	Coopers
Levamisole as HCl (64 g/L) + oxyclozanide (150 g/L)	Nilzan LV	Coopers
Triclabendazole (120 g/L) + ivermectin (2 g/L)	Fasimec Cattle	Novartis
	Triclamec Cattle	Novartis
	Triclamec Cattle	Youngs
Triclabendazole (120 g/L) + oxfendazole (45.3 g/L)	Flukazole C	Virbac
Triclabendazole (120 g/L) + oxfendazole (45.3 g/L) + Se as sod.selenate (1 g/L)	Flukazole C Plus Selenium	Virbac
Flukicide (Check label for efficacy against different stages of fluke: adult, immature, and early immature)		
Nitroxynil as eglumine (340 g/L)	Trodax	Fort Dodge
Triclabendazole (100 g/L)	Fasinex 100 Oral	Novartis
	Exifluke Oral Flukicide for Sheep, Cattle and Goats	Bomac
Triclabendazole (120 g/L)	Fasicare 120	Novartis
	Fasinex 120	Novartis
	Flukare C	Virbac
	Tremacide 120	Jurox
	Tricla 120	Youngs
Triclabendazole (120 g/L) + Se as sod.selenate (1 g/L)	Flukare C with Selenium	Virbac
Triclabendazole (240 g/L)	Fasinex 240	Novartis
Triclabendazole (50 g/L)	Fasinex 50	Novartis
	Flukare S	Virbac
	Tricla 50	Youngs
Triclabendazole (50 g/L) + Se as sod.selenate (0.5 g/L)	Flukare S with Selenium	Virbac
Other (Label claim for trichlorfon: control of bot in horses and intestinal worms in cattle. Check label for details).		
Trichlorfon (800 g/kg)	Neguvon	Bayer

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DECEMBER 2006 PRIMEFACT 323 (REPLACES AGNOTE DPI-428)

Pasture assessment and livestock production

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This Primefact was compiled in part from the PROGRAZE® Manual. PROGRAZE® is owned by NSW Department of Primary Industries and Meat & Livestock Australia Limited.

Introduction

Pasture assessment involves being able to estimate the quantity and quality of available pasture. For on-farm decision making it usually involves a visual estimation; however, various more objective techniques are available such as the median quadrat technique (see Primefact 324 *Measuring herbage mass – the median quadrat technique)*, the rising and falling plate and capacitance meters, and in the future via remote sensing.

Pasture assessment can also involve estimates of botanical composition and ground cover.

Why assess pasture?

The main reasons for assessing pasture are:

- to match animals' requirements with pasture production;
- to achieve more precise supplementary feeding;
- for accurate feed planning;
- to more effectively manipulate pasture production and composition;
- to ensure ground cover is sufficient to protect soil from rainwater run-off and to encourage water infiltration into soil.

Sheep and cattle production levels are primarily determined by the daily intake of pasture and the extent to which this might vary throughout the year. While there is a range of pasture parameters that influence how close **actual** intake gets to **potential** intake, by far the most critical are:

- pasture quantity (herbage mass / plant height)
- pasture quality (digestibility)
- species composition.

Pasture quantity (herbage mass/ plant height)

Pasture quantity is usually described as **herbage mass** and is expressed in **kilograms of pasture dry matter per hectare (kg DM/ha)**. 'Herbage mass' refers to the total amount of pasture present if cut at ground level, and includes both green and dead material.

Herbage mass is expressed in terms of dry matter because water content of pasture can vary depending on the time of day and on the different stages of growth. For example, a young, leafy, rapidly growing pasture may contain 85% water (or 15% dry matter), while flowering grasses may contain 50% water and therefore 50% dry matter. Dead pasture on a hot summer's day may contain over 90% dry matter. While water is vital, it has no nutritional value. When relating herbage mass to what the animal can eat and utilise, the water component is ignored.

Assessing herbage mass

The pasture components that determine herbage mass are:

- height
- density
- water content (and therefore dry matter).

The **critical herbage mass for sheep** is in the range 400–1700 kg DM/ha, and for **cattle** 700–2900 kg DM/ha (see Pasture benchmarks below). Over these herbage mass ranges, pasture assessment skills are usually developed quickly, involving cutting pasture and weighing and drying

pasture samples (see Primefact 324 *Measuring herbage mass – the median quadrat technique*).

Of the components that determine the herbage mass of a pasture, it is the **average plant height** which has the most significant impact on how much pasture livestock will consume. Following an assessment of the average height of the green edible plants in a pasture, Table 1 can be used in conjunction with the pasture benchmarks (Table 2 and Table 3 below) as a guide to the requirements of sheep and cattle. Table 1 provides a good indication of the actual herbage mass of a dense pasture at a given average plant height.

Table 1. Average height of green plants and the 'indicative' herbage mass

Average plant height (cm)	'Indicative' herbage mass (kg green DM/ha)
1	400
2	700
4	1200
6	1600
8	2000
10	2400
12	2800
14	3200

Why is herbage mass important to livestock production?

Obviously if herbage mass drops below a certain level, sheep and cattle will be unable to consume sufficient pasture to increase or even maintain their weight. When herbage mass is low, animals must spend more time grazing to meet their nutritional requirements, since each bite of pasture harvests a smaller amount.

At the other end of the scale, there is a point at which intake will not increase even if more pasture is made available, because the animals have reached their maximum gut fill.

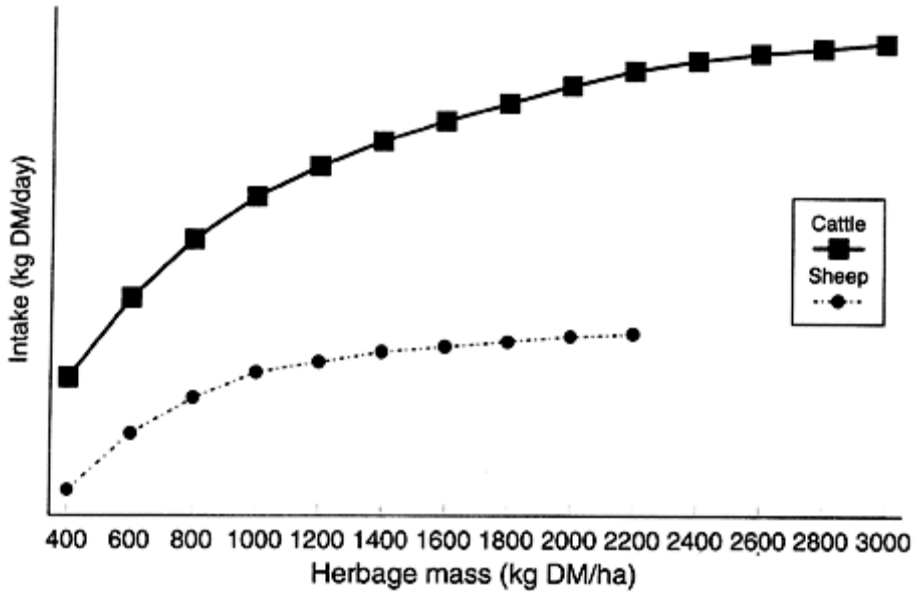
Figure 1 indicates the **general relationship between herbage mass and the daily intake** for both sheep and cattle. Using **sheep** as the example:

- As the available herbage mass increases up to 800–900 kg DM/ha, a sheep's pasture intake rises sharply.
- From that point to about 1500–1600 kg DM/ha, the intake response is not as great; however, this additional pasture is very important to stock with high nutritional requirements such as lactating ewes and crossbred lambs.
- Once herbage mass rises above 1600 kg DM/ha, only small additions to sheep performance can be expected because herbage mass should no longer be a limit to a sheep's intake.

Pasture quality

There are numerous parameters of pasture quality that can influence intake by livestock. From a practical point of view, **digestibility** and the **proportion of legume** are probably the most useful measures, even though they do not always fully explain the observed variation in intake.

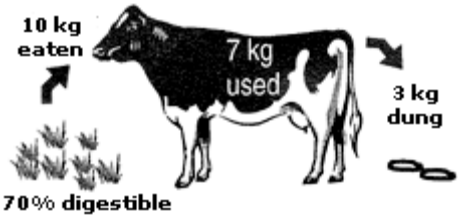
Figure 1. Correlation between herbage mass and intake for sheep and cattle



Digestibility

'Digestibility' is the most useful measure of pasture quality. It refers to the proportion of a feed an animal can use to satisfy its nutritional requirements. For example, if the digestibility of a pasture is 70%, then approximately 70% of the pasture consumed on a dry matter basis will be used by the animal for its own nutritional requirements, while 30% will eventually pass as faeces (see Figure 2).

Figure 2



Digestibility is a **useful measure of quality** for the following reasons:

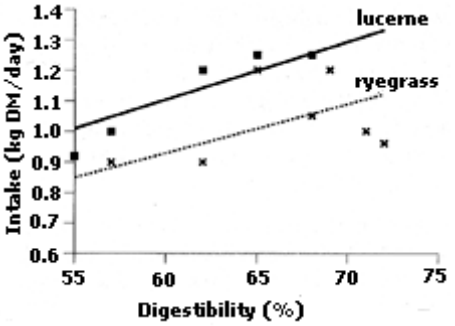
- **It is directly and positively related to the energy content of the pasture.** Energy is needed by animals for body functions. Energy in feed is assessed in megajoules of metabolisable energy per kilogram of dry matter (MJ ME/kg DM). Figure 4 shows the relationship between digestibility and the energy content of pasture.
- **It is positively related to protein content.** When digestibility is high, protein content will also be high. However, there is variation in protein content between pasture species. For example, clovers are generally higher in protein than grasses at a similar stage of growth.
- **It directly relates to the speed of digestion and therefore the movement of feed through the animal.** In general, pastures with higher levels of digestibility will be digested more rapidly, allowing for higher intake and consequently higher levels of animal production.

Species composition and the proportion of legume

'Species composition' refers to the species present, and the proportion of each of these species, in the pasture. What is important from a practical viewpoint is the **proportion of legume**.

Legumes usually have a higher digestibility than grasses at the same stage of maturity. In addition, cattle or sheep tend to consume a greater quantity of legume than grass when both the legume and grass are at the same digestibility. The graph in Figure 3 shows the relationship between digestibility and intake for grass (ryegrass) and legume (lucerne). Animals will also tend to select legume in preference to grass. Protein levels in legumes are usually superior to those in grasses, especially as the legumes approach maturity.

Figure 3



Source: Greenhalgh (1979), The management and diseases of sheep, Commonwealth Agricultural Bureau, pp. 201–12.

Parts of the plant

Leaf material has a higher digestibility than the stems. Pasture management which maintains a high proportion of leaf will provide a pasture of higher digestibility and will increase livestock performance. In addition, if leaf area is maintained on a plant, the plant will recover more quickly following grazing.

Stages of growth

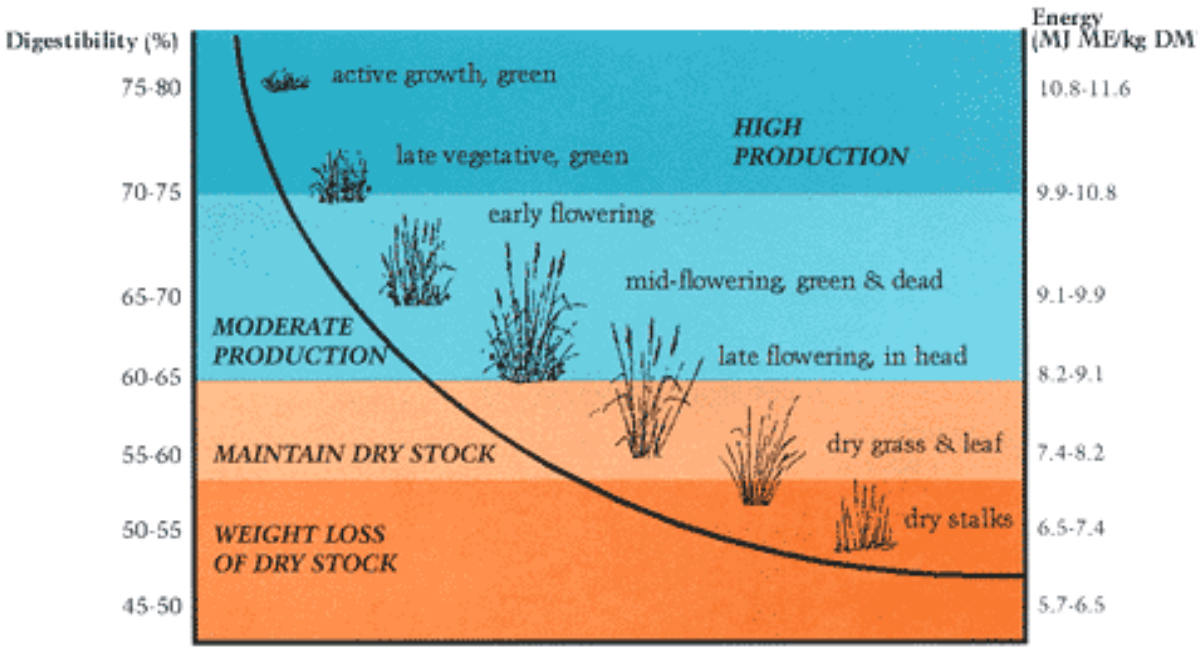
The **digestibility of a pasture plant declines as it matures** (see Figure 4). Therefore, as indicated above, where high levels of livestock performance are required, grazing management should aim to keep pastures in the growth phase for as long as possible, delaying the onset of flowering and the associated decrease in digestibility.

Species preference

Preference by livestock for one species over others in a pasture has important implications for the long-term stability of the pasture. **Highly preferred species are usually selectively grazed, and this can reduce or even eliminate these species from the pasture.** For example, the grazing pressure of continuous stocking or long periods of set stocking can reduce the presence of preferred species due to the limited opportunity for plants to recover following a stress period.

Managers should be aware of circumstances that place plant species at risk and should implement grazing procedures that ensure the long-term stability of the pasture.

Figure 4. A guide to digestibility decline as temperate pastures mature



Interaction of herbage mass and digestibility

Herbage mass and digestibility interact with each other in determining the amount of pasture that will be consumed by livestock:

- Where there is a **low herbage mass but its digestibility is high**, intake is limited because of small bite size — animals will only graze to a maximum of about 13 hours each day and under these circumstances they may not be able to eat enough to meet their nutritional requirements.
- Where there is a **high herbage mass but its digestibility is low**, intake is limited by the slow movement of feed through the animal.

Because of these interactions, there can be **trade-offs between herbage mass and digestibility** to achieve the same production outcome in livestock. The potential for trade-offs is greatest in those animals that have low nutritional requirements, for example maintaining dry stock, but there are fewer opportunities in high-demand animals.

Figure 5 indicates the trade-off between digestibility and herbage mass. Each class of animal is achieving the same production level along each line; for example, a dry sheep requires a pasture herbage mass of 4000 kg DM/ha at 55% digestibility to maintain weight, whereas at 70% digestibility, only 500 kg DM/ha is required

Note on Figure 5: Once digestibility declines below 65% for lactating stock and 55% for dry stock, then, no matter how much pasture is available, these stock are likely to experience unsatisfactory performance levels, i.e. increasing weight loss.

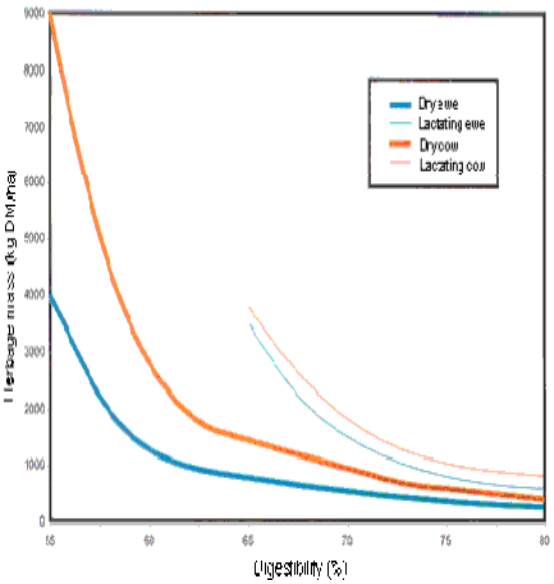


Figure 5. The trade-off between digestibility and herbage mass

Pasture benchmarks

Pasture benchmarks are an indication, a guide, of how much herbage mass is required for various classes of animals in order to gain a certain level of production.

The pasture benchmarks in Tables 2 and 3 indicate how much **green herbage mass** is required to satisfy the nutritional requirements of stock at various stages of their reproductive cycle and for growth.

Table 2. Minimum herbage mass (kg green DM/ha) to maintain satisfactory production levels in sheep

Sheep class	Pasture digestibility		
	75%	68%	60%
Dry sheep	400	600	1200
Pregnant ewes**:**			
mid	500	700	1700
last month	700	1200	ns
Lactating ewes**:**			
single	1000	1700	ns
twins	1500	ns	ns
Growing stock (% of potential growth)**:**			
30 (75 g/d)*	400	700	1700
50 (125 g/d)	600	1000	ns
70 (175 g/d)	800	1700	ns
90 (225 g/d)	1600	ns	ns

***Predicted growth rates in brackets are based on a weaned 4-month-old crossbred lamb of approximately 32 kg from a ewe with a standard reference weight of 55 kg.
ns = not suitable; that is, at these digestibilities, no matter how much pasture is available, dry or pregnant stock are unlikely to maintain weight, lactating stock are likely to experience an unacceptable level of weight loss, and growing stock will not be achieving the targeted weight gain.

Table 3. Minimum herbage mass (kg green DM/ha) to maintain satisfactory production levels in cattle

Cattle class	**Pasture digestibility**		
	75%	68%	60%
Dry cow	700	1100	2600
Pregnant cow (7–8 months, not lactating)	900	1700	ns
Lactating cow (calf 2 months)	1100	2200	ns
Growing stock (% of potential growth):			
30 (0.39 kg/d)*	600	1100	2900
50 (0.61 kg/d)	800	1600	ns
70 (0.85 kg/d)	1200	2600	ns
90 (1.12 kg/d)	2200	ns	ns

***Predicted growth rates in brackets are based on a weaned 13-month-old steer of approximately 320 kg from a cow with a standard reference weight of 500 kg.
ns = not suitable, that is, at these digestibilities, no matter how much pasture is available, dry or pregnant stock are unlikely to maintain weight, lactating stock are likely to experience an unacceptable level of weight loss, and growing stock will not be achieving the targeted weight gain.

Notes on Tables 2 and 3:

1. The benchmarks relate specifically to the nutritional requirements of livestock. At lower herbage masses, particularly those indicated for sheep, there is a risk of excessive run-off and soil erosion through lack of ground cover.
2. The predictions in Tables 2 and 3 are based on a pasture which also includes 500 kg DM/ha of dead pasture with a digestibility of 47% and a legume content of 15%.

There will be occasions when the benchmarks (Tables 2 and 3) are met and livestock still lose weight. For example, ewes can still lose weight during the peak of lactation, particularly when suckling twins, even when grazing highly digestible pastures and where herbage mass is not limiting intake.

Just because pasture is not meeting livestock nutritional requirements does not necessarily mean that supplementary feeding is necessary. Management has the option of utilising an animal's capacity to store fat reserves in the good times and to mobilise these reserves when pastures cannot fully supply their nutritional requirements. To be able to utilise this capacity, sheep and cattle must attain sufficient liveweight or fat reserves prior to seasonal declines in pasture production or before high nutritional demand periods occur, for example prior to lactation.

The **pasture benchmarks hold true regardless of stocking rate**. The stocking rate will determine how long a pasture can be maintained at any given herbage mass. If the stocking rate is such that the amount of pasture being consumed is greater than its growth, herbage mass will decline and the risk is that it will drop below a target benchmark.

If a paddock is **grazed below the target benchmark**, production is unlikely to be maintained.

- This lower production level can be accepted – it may be the appropriate management tactic or
- stock can be moved to a more suitable paddock or
- supplements can be fed.

If herbage mass falls below a critical level, the sustainability and viability of the pasture may be jeopardised. (See Primefact 325 *Pasture sustainability and management in drought* and Primefact 283 *Visually assessing pasture condition and availability in drought.)*

Managing stock based on the benchmarks should ensure that nutritional requirements are being met. **However, there will be occasions where it is not possible for the requirements to be met, or even desirable** – for example, when ewes are fat at the end of joining, it is better that they lose weight slowly during early pregnancy. Managed weight loss will occur if stock graze pasture that is below the maintenance (dry sheep) benchmark, or if stock are provided with a high herbage mass of low digestibility. The same principle applies to overfat heifers in late pregnancy.

CAUTION: Managed weight loss is acceptable only if it occurs slowly. This applies to all animals, whether or not they are pregnant. If weight loss is too fast, this can cause rapid mobilisation of fat, which can result in death.

When pasture is limiting and benchmarks are not able to maintain production levels, **supplementary feeding** may be required. The **program GrazFeed®** becomes extremely useful in determining the most appropriate supplement and the quantity that should be fed.

Producers can learn more about pasture assessment and livestock management by participating in a **PROGRAZE® course**. (Contact your local NSW Department of Primary Industries District Livestock Officer for more information.)

Further information

Refer to the following for more information on pasture assessment and availability:

- Primefact 325 *Pasture sustainability and management in drought*
- Primefact 283 *Visually assessing pasture condition and availability in drought*
- Primefact 324 *Measuring herbage mass – the median quadrat technique.*

ISSN 1832-6668

Replaces Agnote DPI-428

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Job number 7107