



NSW DEPARTMENT OF  
PRIMARY INDUSTRIES

## **Managing drought, sixth edition 2006 - Readers' Note**

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This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

<http://www.dpi.nsw.gov.au/aboutus/resources/majorpubs/guides/managing-drought>

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NSW DEPARTMENT OF  
PRIMARY INDUSTRIES

# Section 3

## Farm management

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# Pasture sustainability and management in drought

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## INTRODUCTION

In general, pastures are quite resilient, and have valuable defence mechanisms to enhance survival through adverse periods. This ability varies with species, and so optimum pasture management during drought will depend on the pasture type and species.

## CAUSES OF STRESS ON PASTURES

It is inappropriate to single out 'dry conditions' as the single cause of stress on pastures. The following factors can also contribute to the death of plants, especially perennials:

- inappropriate grazing management;
- poor general pasture health due to previous disease or insect attack;
- soil nutritional factors;
- depth of soil and root depth.

In short, a well managed pasture that is adapted to the soil, climate and livestock system is more likely to survive drought than is a pasture that is poorly matched to the environment, is inappropriately managed, and is already under stress as drought conditions set in.

## FACTORS THAT NEED TO BE CONSIDERED

### Pasture characteristics

- In many situations, native species are more resilient than introduced species, and may survive drought conditions better.
- Paddocks will vary in their value to the livestock enterprise both during and after the drought. An assessment of a paddock's value is essential in order to make decisions in the face of deepening drought.
- Surviving pastures need a period of recovery after a drought breaks. If pastures are

compromised, they must be compensated, otherwise they may decline further, or take longer to recover, or, at worst, die.

- Many annuals are adapted for survival after droughts through high soil seed reserves, and because of favourable seed characteristics such as hard seedcoats.

## Cost and management

- Perennials are generally more expensive to replace than annuals.
- Native perennials are generally more expensive to replace than introduced species. Replacing with native perennials may be impractical in many cases, because of lack of seed and agronomic guidelines on establishment.
- Decisions on the management of pasture paddocks need to take into account the recovery period after the drought breaks.
- Pasture re-establishment costs are high, and the pasture may be out of production for a significant period.
- Additional costs often associated with drought are due to increased erosion risk because of grazing intensity and the death of pasture plants; increased weed invasion because of introduced seed; and reduced competitiveness of the pasture.

## USEFUL PASTURE MANAGEMENT STRATEGIES

### Plan to reduce the impact of drought

Sowing well-adapted pasture species and managing the pasture to enhance production and persistence is a key factor. This will improve pasture production for each millimetre of rain, and will allow pastures to carry feed further into a drought and to recover faster when the drought is over. Emphasis on well-adapted persistent perennial plants is a priority.

### Lock up the most valuable paddocks if pasture survival is threatened

As dry conditions worsen, assess each paddock for its value in terms of pasture composition, pasture condition, cost of resowing, and its ability to be a productive paddock when the drought breaks. Some (or many) paddocks will need to be locked up, while other paddocks will need to have their stocking rates reduced.

When assessing paddocks, the following benchmarks need to be considered:

- Pasture quantity. Recent research on perennial grass pastures on the Northern Tablelands indicates that the risk of pasture death greatly increases in dry conditions when the pasture is grazed below approximately 1000 kg DM/ha (kilograms of dry matter per hectare). This benchmark should possibly apply at all times, not only during dry times.
- Ground cover. Paddock lock-up is also determined by the minimum ground cover level required to prevent erosion of your environment. The appropriate ground cover level depends on the slope, the likely rainfall intensity and the soil type. Some examples of approximate minimum ground cover percentage are:
  - 70% on red soils in gently undulating country on the northern slopes of NSW;
  - 40% in the semi-arid rangelands in western NSW;
  - 85–90% on the North Coast of NSW.

### **Sacrifice paddocks**

Consider using one or more paddocks, or fencing off parts of paddocks, for use as feeding-out areas. Suitable paddocks are those:

- where the pasture is degraded and due for resowing or cropping;
- with a predominance of annual species and good soil seed reserves;
- that have suitable access for feeding operations, even after it rains, e.g. well drained;
- that are not too steep to cause excessive run-off after rain.

Avoid using pasture paddocks as feeding-out areas if the paddocks have a significant cover of perennial pasture plants, and especially if the cover consists of native perennial grass species.

## **PASTURES IN SEMI-ARID RANGELANDS**

In the semi-arid rangelands and similar low-rainfall areas in western NSW, the pasture management guidelines for encouraging a high persistence of rangelands species must be considered.

## **Management guidelines**

- Under drought conditions, desirable perennial grasses are at increasing risk if more than about 30% of growth is removed before the next growth opportunity.
- The risk of loss also increases the longer the grasses are subjected to high use levels.
- If under dry conditions the level of utilisation rises above 30%, paddocks need to be monitored closely so that timely decisions can be made on reducing stocking rates or closing up paddocks. This is particularly important where paddocks have been utilised heavily the previous year.
- Care is required to ensure that ground cover is not reduced below 40%, as soil loss by either water or wind erosion can increase rapidly when ground cover is below this level.

## **NOTE ON LIVESTOCK HEALTH DISORDERS**

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

## **FURTHER INFORMATION**

The NSW Department of Primary Industries website has a wealth of information available at

[www.dpi.nsw.gov.au/drought](http://www.dpi.nsw.gov.au/drought)

# Scrub feeding

## Note: Native Vegetation Act

Under the *Native Vegetation Act 2003*, the lopping of native vegetation for stock fodder (including the uprooting of mulga in the Western Division in areas officially declared to be drought affected), when carried out by or on behalf of the landholder, is defined as a routine agricultural management activity that is permitted under the Act.

If you have any doubts about how this applies to your situation contact your local Catchment Management Authority.

## INTRODUCTION

Edible scrub is a valuable resource that can be used as an alternative feed source for livestock in times of feed shortage. Many native trees and shrubs can provide enough energy to maintain most classes of stock when supplemented with a suitable protein source.

There are, however, a number of limitations in feeding scrub.

- At best, scrub is only equal to fair quality hay.
- Additional supplements will be required for pregnant or lactating females.
- Often sheep and cattle will lose their appetite for scrub after a couple of months, so other sources of feed must be available.
- The cost of lopping should be considered as part of the cost of feeding.
- Stock will eat some trees, but will leave others of the same species, on the same soil type.

Seek local knowledge in determining which trees and shrubs are suitable for feed in your district. Observing the scrub that stock regularly eat and trees that have a clear browse line can also aid in determining palatable species. Some species of shrub can be poisonous, especially where young leaves are fed. The seeds of Kurrajong trees have been known to poison stock.

The management of trees or shrubs is a major consideration if their long term survival is to be ensured. Trees should be only lightly pruned, removing foliage from the tree without compromising the trunk or main branches whilst

leaving some foliage intact. It is best to prune a tree only once in the season and stock should not be allowed to access the new growth. Continued lopping or heavy lopping can reduce the lifespan of the tree or kill it.

However, under the *Native Vegetation Act 2003* it will be permitted to uproot mulga in the Western Division in areas officially declared to be drought affected.

## Initial Feeding

Initially, cut small amounts of the most palatable scrub close to stock camps and watering points to allow stock to become accustomed to the sound of the chainsaw and also to eating scrub. Do this before other paddock feed is completely depleted.

As soon as stock are eating scrub and are attracted by the sound of the saw, begin feeding in areas furthest from water. The more accessible scrub is then saved for feeding when stock are weaker.

Finally, increase the amount of scrub cut to meet the full demand for fodder. The actual amount of leaf required per day depends on the class of stock and the kind of scrub being used. Experience will be the best guide for how much to feed. If no leafy material remains on the feed material a day after cutting, increase the amount cut. It is important that enough leafy material is available to discourage stock from eating twigs and branches which can cause impaction problems.

Impaction is caused by the fibrous nature of scrub and its low digestibility. Signs of impaction include failure to eat, lack of cud chewing and general abdominal discomfort often indicated by restlessness, groaning and kicking towards the belly.

Where it is difficult to persuade stock to eat scrub, a mix of two parts of molasses to one part water sprayed onto the leaves may make the scrub more palatable.

## Supplements

Fortified molasses mixes should be provided to animals consuming scrub (see 'Supplementary feeding of cattle'). Molasses helps to reduce impaction problems which may occur in the rumen of animals being fed scrub over a long period of time, while protein in the form of urea or protein meals will improve performance and intake.

Ground limestone should also be included in the molasses mix at 1.5% by weight to ensure animals are receiving adequate levels of calcium.

A lack of phosphorus and sulphur can also limit the nutritional value of some scrub; dry licks may be used to overcome these deficiencies. Phosphorus supplements can be added to fortified molasses mixes because molasses itself is a good source of sulphur.

Scrub often appears to have reasonable crude protein levels but this protein is often chemically bound in the leaves and is not available to the animal. Table 17 gives the crude protein and metabolisable energy (ME) values for various scrub feeds.

Protein can be supplemented in the form of white cottonseed or protein meals, with the addition of ground limestone. This form of supplementation, however, provides less protection from impaction than molasses mixes. If stock do show signs of impaction they need to be given unrestricted access to straight molasses in an attempt to loosen their gut contents, improve digestion and relieve the pressure in the gut.

## Water

Good quality water should always be available while feeding scrub. If troughs are used for stock water, ensure they are cleaned out regularly.

## How often to cut

Cut small amounts of scrub regularly. While it is common to cut two or three days scrub supply, daily cutting may be necessary during summer to avoid leaves drying out and reducing palatability. Cutting regularly also helps to conserve future scrub feed.

If feeding scrub daily, it is best to feed the same species each day before moving on to another species. Scrub should be cut in the late afternoon so that stock will camp after feeding and graze out in the morning. Many producers prefer to only cut scrub every second day, with grain supplements provided on the alternate days.

**Table 17. Energy and protein content of some commonly used scrub feeds**

	Dry matter (%)	ME (MJ/kg DM)		Crude Protein (% DM)	
		Average	Tested range	Average	Tested range
Belah	48	8	7.5–10.4	9	7–14
Black Wattle	45	7.5	6.2–9	9	5–13
Boonery	42	8.2	7–9	12	10.5–13
Gruie	38	9.7	8.9–10.1	12	10–14
Kurrajong	62	7.7	6.7–8.7	10	8–12
Mimosa bush	38	10.4	–	19	15–25
Myall	44	8.5	–	14.5	13–16
Mulga	77	7.5	–	8	–
Prickly Wattle	43	10	7.9–10.1	14	8–17
Rosewood	76	7.3	6.6–8.5	11	8–13
Tagasaste	27	8	5–11.4	13	5–24
Whitewood	–	8.6	–	9.9	–
Wild orange	47	9.3	9–10.1	13	12–16
Wilga	42	9.7	8.2–10.5	13	8–16

# Productivity after the drought

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While surviving the drought is obviously foremost in your mind, how you care for your natural resources during the drought will determine how productive your property will be for decades to come.

Farm management during a drought is all about making a smooth transition from drought to 'normality' and having the farm in a condition that will respond favourably to drought-breaking conditions.

## FARM PLANNING

A whole farm plan that identifies the various land types, tree lots, soil problem areas, waterways and pasture history will help to locate the most sensitive and the most forgiving areas under drought management practices. This will include identifying:

- areas to be protected from stock
- areas where stock can be fed
- areas that need additional fences or watering points
- priority areas for pest control, including unwanted grazing by native animals.

By protecting quick-recovery areas, waterways and soil structure, the farm will be in better shape when the rain falls. Maintaining groundcover wherever possible will not only protect the soil surface but will also allow more water into the soil where it will be stored for use when plants begin to grow, giving them a better chance of survival. It will also protect seeds and small seedlings which are the real investment for future recovery.

More details on pasture management are provided in the chapter 'Pasture sustainability and management'.

## SOILS

The soil resource is critical for the ongoing profitability of the farm. Heavy grazing, whether from stock or from feral or native animals, can leave the soil liable to wind or water erosion. Organic matter and finer components are lost

first, substantially reducing soil fertility and structure.

Do not leave stock in a paddock until all protection (dead and alive) is removed from the soil. Select paddocks for drought feeding that have a soil type and topography that will be less liable to erosion.

Special consideration needs to be given to areas close to watering or feeding locations. Where possible, and considering issues with weed management from feeding imported fodder, these areas should be rotated so that excessive damage does not occur in any one area. Where damage is unavoidable, a sacrificial area may minimise restoration works after the drought.

Stock tracks down slopes can provide a starting point for gully erosion. Ripping across the slope can reduce soil loss, but you must avoid creating fine soil particles.

## FARM DAMS

When the drought breaks, the initial rains will erode bare soil. Ensure that farm dams are protected so that they do not fill up with silt; if possible, maintain vegetated filter strips.

Take the opportunity of dry conditions to clean out farm dams, build silt traps above the dams and ensure that runoff is slow, well directed and conserved. Erosion after a drought can be horrific.

## WEEDS

Weeds introduced in drought feed can become an ongoing liability for a farm. The following strategies will facilitate weed management.

- Try to find out about the source of grain or fodder so that potential problems can be anticipated.
- Restrict the area over which imported grain or fodder is fed out and keep a record of the area.
- After the drought breaks, observe the area periodically for the next few years, note any new weed species and have them identified.

Weeds already present can increase in importance after a drought since they recover faster than desirable species. Observe how the pasture is recovering and decide on a management strategy if weeds show signs of dominating.

## HERBICIDE RESISTANCE

Fodder and grain contamination with herbicide-resistant weed seeds, mainly annual ryegrass, is the quickest means of introducing herbicide resistant weeds onto farms. Good farm hygiene and the controlled feeding of introduced fodder and grains are the best avoidance procedures. The manner of drought feeding, particularly of grain, will determine the spread on individual farms.

## FERAL AND PEST ANIMALS

During a drought, predatory animals, such as foxes and wild dogs, may increase the range of species on which they prey if their normal source of food is less available. This can increase impacts on stock and native animals. The decline in ground cover and shrubs can also increase exposure of small native animals and birds to predators. For these reasons control of predatory pest animals during a drought is desirable.

Control of pest grazing animals, such as rabbits and goats, during droughts can reduce competition for limited feed supplies for commercial stock and wildlife. Goats are a particular problem since they 'hang on' longer than other animals and can cause long-term damage to trees and shrubs.

On the other hand, drought conditions may make feral and pest animals easier to control, providing an ongoing benefit when conditions improve.

## NATIVE ANIMALS AND FLORA DURING DROUGHTS

Biodiversity underpins the functioning of the whole ecosystem and is particularly important as a component of integrated pest management.

Because agriculture is a major user of land in NSW, much of the biodiversity in NSW resides on agricultural properties. During a drought, landowners obviously focus on trying to preserve sufficient stock and resources so that their business can recover after the drought and therefore they may consider that native animals and flora are not a priority. Considering biodiversity during droughts also demonstrates to communities that we are committed to responsible stewardship of the land.

Good stewardship of the land maintains its ecological values, maintains amenity for local communities and promotes tourism opportunities. Conservation areas and areas with threatened species or communities should not be used for grazing during droughts or at other times.

Native grazing animals, such as kangaroos, contribute to total grazing pressure. If the total grazing pressure significantly exceeds feed availability, then considerable numbers of native animals may die in the latter stages of a drought. It may be in the best interests of native animals, as well as domestic stock, to adjust total grazing pressure earlier in a drought. The National Parks and Wildlife Service should be contacted for advice.

Native animals also require access to watering points, so the location of these points can influence the distribution of animals and birds. Water points that are heavily used by stock may inhibit their use by native animals; where possible, provide alternative water points.

# Animal welfare

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## BE PREPARED IN A DROUGHT

The management of livestock, stocking rates and nutrition are inextricably linked to animal health and welfare. In Australia, drought is part of the expected management cycle, and all producers should plan in advance for seasonal fluctuations and times when feed and water will run short. Ensure that plans are already in place for adjusting stocking rates and/or supplementing livestock.

The welfare of animals is always of the utmost importance, and in drought, particular attention must be paid to protecting their welfare. Tough decisions will have to be made, and producers who have drought-affected stock will need to consider the effects of any intended actions on their animals. Any decision made must be humane and reasonable.

## ACT EARLY

Delaying action may seem logical but delays usually reduce the number of choices available. Therefore, you must act early while stock are still fit and strong.

## RELIEVE ANIMAL SUFFERING

If the situation has deteriorated to the point where stock are suffering, you must immediately relieve the situation by feeding or agisting stock, or sending stock to slaughter. In desperate cases, stock may need to be humanely destroyed. It is not an option to just let nature take its course.

## SCARM MODEL CODES OF PRACTICE FOR THE WELFARE OF ANIMALS

The Primary Industries Standing Committee (PISC) supports the Primary Industries Ministerial Council of Australia and New Zealand (PIMC). PISC was previously known as SCARM (the Standing Committee on Agriculture and Resource Management) and supported the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

There are several SCARM Model Codes of Practice for the Welfare of Animals, which are key reference books containing advice on animal welfare. These Codes of Practice are essential for all people involved in livestock industries. They describe basic standards of animal care that the community accepts as reasonable. For example, the *Australian Model Code of Practice for the Welfare of Animals: The Sheep* states that:

*'Sheep being fed for survival should be observed carefully at feeding times. Weak animals may require segregation for special treatment.'*

*'Sheep should not be allowed to starve to death. Where minimal water and food requirements cannot be met, they should be agisted, sent for slaughter or humanely destroyed on the property. Drought-affected sheep are highly susceptible to stress and require careful handling:*

- i. if they are unable to rise and walk, they should be humanely destroyed on site;*
- ii. if they go down after limited exercise, they are not fit to travel and should be humanely destroyed on the property.*
- iii. if they are still able to walk, they should be agisted or sent directly to the nearest slaughtering plant. They should not be consigned through saleyards.'*

## Useful codes

- Report 29. *Australian Model Code of Practice for the Welfare of Animals: The Sheep*
- Report 32. *Australian Model Code of Practice for the Welfare of Animals: The Goat*
- Report 39. *Australian Model Code of Practice for the Welfare of Animals: Cattle*
- Report 63. *Australian Model Code of Practice for the Welfare of Animals: Land Transport of Pigs*
- Report 66. *Australian Model Code of Practice for the Welfare of Animals: The Pig* (2nd edition)
- Report 77. *Australian Model Code of Practice for the Welfare of Animals: Land Transport of Cattle*
- *Australian Model Code of Practice for the Welfare of Animals: Road Transport of Livestock*

Some of these codes are available online at:  
[www.publish.csiro.au/nid/22/sid/11.htm](http://www.publish.csiro.au/nid/22/sid/11.htm)

Some can be purchased from: CSIRO Publishing, PO Box 1139, Collingwood Vic 3066. Freecall 1800 645 051

## NSW LEGISLATION

In NSW the general law relating to animal welfare is The Prevention of Cruelty to Animals Act 1979.

This Act states that:

*'A person in charge of an animal shall not fail to provide the animal with food, drink or shelter, or any of them, which, in each case, is proper and sufficient and which it is reasonably practicable in the circumstances for the person to provide.'*

This means that the carer of an animal must provide at least maintenance feed to prevent the animal from distress and starvation, even in drought.

## FURTHER INFORMATION

Further information on animal welfare can be obtained from the RSPCA. They are listed in the phone book under 'RSPCA' and their internet address is [www.rspcansw.org.au](http://www.rspcansw.org.au)

# Preventing animal health problems during drought

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The health, nutrition and management of livestock are inextricably interrelated. As drought sets in, under-nutrition will threaten animal health unless management is changed to prevent problems occurring. In Australia, drought is part of the expected management cycle, and all producers should plan in advance what they will do when feed or water runs short. (For more information on preparing for drought, see Section 1.)

Take the hard decisions early, and reduce numbers of stock to a point where you can afford to feed them properly, so that the remaining animals will remain healthy and fertile. It is a big mistake to keep too many stock and 'half feed' them. This only leads to welfare problems, and to losses through reduced fertility, malnutrition (vitamin and mineral deficiencies etc.), metabolic disturbances (especially in pregnant stock), and eventually starvation.

When feed supplies run short, the factors that must be corrected, in order of importance, are:

- deficiency of energy;
- deficiency of rumen-digestible protein (or alternative nitrogen and sulfur equivalent) required by rumen bacteria to produce energy and protein from low-quality feed;
- deficiency of high-quality protein required for growth, pregnancy and lactation;
- deficiency of other minerals, particularly phosphorus, calcium and magnesium;
- deficiency of vitamins associated with the lack of fresh green feed, particularly vitamins A, D and E.

Young animals and pregnant or lactating animals have much higher energy and protein requirements than do dry stock, and are therefore most susceptible to the effects of malnutrition. Aged animals are also at risk. These animals will need to be fed separately to ensure that their requirements are met.

## PREVENTATIVE HERD HEALTH PROGRAMS

Food and water of adequate quality and quantity are by far the most important ingredients in keeping an animal healthy. However, other factors will interact to affect an animal's susceptibility to disease during drought. These factors include:

- condition of different classes of stock when drought sets in;
- stage of pregnancy or lactation;
- any disease already present;
- current immunity levels to common diseases, either through vaccination or previous exposure;
- current parasite burdens, both internal (e.g. worms, fluke) and external (e.g. lice, buffalo flies, blowflies);
- crowding at feeding and watering points, which may result in infectious agents, such as viruses and bacteria, concentrating in these vicinities, thereby facilitating spread;
- congregation of potential disease carriers of other species at diminishing water sources, which may increase the risk of exposure to various diseases;
- unaccustomed close interaction and confinement with other cattle (especially strangers) and/or humans, which may impose high levels of stress on cattle, thereby reducing the ability of the immune system to protect from disease;
- the introduction of new feeds such as grain and pelleted feed, which may lead to digestive upsets if not managed with sufficient care. Digestive upsets, in turn, can predispose stock to diseases such as pulpy kidney;
- lack of green pick, which may induce cattle to eat plants that they would not normally touch, including those that are poisonous.

Because of these factors, herd health programs that are recommended even in the good times are more essential during drought. These practices include:

- 5-in-1 vaccination to prevent clostridial diseases, which are far more likely to occur in situations where there may be sudden changes in feed type, quality or quantity;

- leptospirosis vaccination (or 7-in-1 instead of 5-in-1);
- lice treatment in cooler months;
- drench for internal parasites (including fluke in fluke areas), especially young stock (if retained) and bulls.

Additional practices recommended during drought include the following.

- Give vitamin A, D and E (either in feed or as an injection) after 2–3 months on dry feed.
- If grain feeding, add 1% limestone by weight of grain to correct any possible calcium-to-phosphorus imbalance.
- Discuss the need for a coccidiosis prevention program in early-weaned calves with your veterinarian.

## WATER MANAGEMENT

The decision to hand feed cattle must take into account the quantity and quality of water available. Is the water supply good enough to assemble large numbers of cattle in one place? Will it be easier to feed near the best water supply, or improve the water supply at the most convenient feeding location? If you will soon run out of water, it may be better to sell all stock.

Beware of deteriorating water quality. If stock reduce their intake of water due to palatability problems, they will also tend to eat less, even while pasture is still adequate. Reduced water intake will also predispose stock to bladder stones.

Poor water quality is more likely to be a problem if cattle have direct access to dams. As the volume of water decreases, the dam turns into a quagmire, and weak animals may become bogged. If possible, fence off dams, and water cattle from troughs.

However, if troughs are used, try to ensure that the water is not being contaminated with dung and/or grain. Grain washed from cattle's mouths will rapidly ferment, which may contribute to digestive upsets. It can also act as a food source for bacteria (including bacteria that are potentially pathogenic to humans as well as cattle), which the cattle will then drink.

Ideally, troughs should be cleaned on a regular basis when cattle are eating grain, but obviously this may not be possible if water is in short supply. It may be advisable to set up feed troughs further away from the water supply so

that cattle will have swallowed most of the grain in their mouths before they reach the water.

## FEED MANAGEMENT

Once pasture is inadequate, cattle should be confined and fed. Confined cattle need significantly less energy for maintenance than do those that are left in the paddock to wander in search of feed. Also, the pasture should be left in a condition where it can recover quickly when the drought breaks, and not be 'flogged' completely bare.

**NOTE:** Any change in feed (especially grain) should be introduced gradually – failure to do this is probably the major cause of illness seen in drought

## RECOGNISING SICK CATTLE

When cattle are being hand fed, you are having daily contact with them. Take the time to observe the normal, so that it will be easier to recognise what is abnormal.

It is a good idea to take note of the following:

- Normal parameters:
  - respiratory rate in resting cattle, in cold and hot weather;
  - how much faster they breathe when they are put up the race;
  - how obvious or slight the normal respiratory movements are;
  - how much mucus the average animal has in its nostrils;
  - normal behaviour, head position, whether ears droop etc.
- Abnormal signs:
  - animals that stand apart, especially if depressed, ears drooped;
  - animals that don't eat;
  - fullness in flanks – bloat;
  - reluctance to move or get up when others do;
  - look for swelling of the legs, lame animals, or those standing oddly, for example leaning back, or shifting weight from one foot to another;
  - animals that seem restless or irritable, swishing the tail or kicking at the belly;
  - excess salivation, shivering, panting.

Normal adult temperature for cattle is 38°C. If you suspect that an animal is ill, take its temperature, and call a veterinarian if the temperature is abnormally high or low.

Look at the consistency of the dung, particularly while introducing grain to the ration. Pale pasty dung or diarrhoea may indicate feed problems or, in some cases, gut infections.

It is also important to detect any animals that are being bullied or not eating the ration. You may need to remove these cattle and feed them separately.

## FEED-RELATED ILLNESSES OCCURRING DURING DROUGHT

### Malnutrition and starvation

Malnutrition due to lack of energy and/or protein will be the most common disease during drought, unless you take active steps to prevent it. Animals under your control are your responsibility. It is an offence under the Prevention of Cruelty to Animals Act 1979 to fail to provide adequate feed and water. If you cannot afford to feed or agist animals, they should be sold or humanely destroyed. (See section on Animal Welfare in Drought.) Stock should not be allowed to fall below condition score 2).

If young stock start to develop pot bellies or bottle jaws, this is a sign of protein deficiency, and additional protein as well as energy will need to be provided.

### Metabolic Disease

Metabolic disease occurs when energy intake does not keep pace with energy demand.

It is important to realise that even fat cows can die if they are losing weight too rapidly. When the increasing energy demands of pregnancy are far greater than energy intake, pregnancy toxaemia develops. This is more likely to occur in fat females than thin ones, especially (but not only) in those carrying twins. Because twins are far more common in sheep, most sheep producers will be aware of this condition, but it can also occur in cows when feed is inadequate.

Pregnancy toxaemia is one form of ketosis, in which the breakdown products of fat, called ketone bodies, build up in the brain and become toxic. Such animals may have an altered temperament. They may be noticed because they don't respond normally to handling or driving. They may seem more stubborn or stupid, and

can sometimes be caught in the paddock. If not treated quickly, these animals will start to refuse feed.

Cows with pregnancy toxæmia or ketosis can be drenched with glucose or preferably commercial preparations containing propylene glycol, such as Ketol® or Ceton®. Even with veterinary intervention, this process is difficult to reverse, and often the animal dies or must be euthanased.

To avoid these problems, separate pregnant and lactating animals so that they can be fed more. All animals should have access to adequate roughage, especially in cold weather and if lactating. (Roughage generates more heat internally, and improves milk production.)

### Mineral deficiencies and imbalances

Mineral deficiencies may occur if producers do not ensure that they feed a balanced ration.

**Hypocalcaemia.** The most common mistake is to feed cottonseed or grain, which are high in phosphorus, without adding calcium (garden lime). The calcium:phosphorus ratio should be about 2:1. Lime at a rate of 1–2% must be added to all grain supplements, including cottonseed. If the ration is not balanced, pregnant cows may go down, primarily due to low calcium in their blood. An animal that seemed fine the previous day may be found sitting on her brisket, refusing to rise.

If these animals are suffering **only** from a calcium:phosphorus imbalance, they will often get up immediately if calcium is given into the vein. Subcutaneous injections are not often sufficient. If they are also in negative energy balance – that is, losing weight, then treatment is less likely to be successful, as the cow is likely to have other metabolic problems.

Calcium is also involved in muscle contraction, so low blood calcium may also contribute to the increased incidence of vaginal prolapses.

**Hypomagnesaemia** (low blood magnesium) is more common in cold conditions, when lush growth occurs in spring. However, it can also occur in the 'green drought' stage of a drought, after showers have resulted in the growth of short green pick, if this is the main source of feed. New growth is very high in potassium, which competes with other minerals like calcium and magnesium for absorption in the gut and hypomagnesaemia can result. In this condition cattle develop twitches or muscle tremors. They may become more excitable and aggressive, and usually die quite quickly from convulsions.

Cattle on short green pick should be supplemented with hay. Causmag at about 60 g/cow/day can be mixed into a slurry and poured over the hay, to help prevent further problems.

If possible, cattle should remain confined, and be hand fed until pasture is adequate to sustain them. They frequently burn more energy than they harvest if allowed to wander in search of short green pick.

### Reduced fertility

To maintain cow fertility, wean calves that are over 8 weeks old and feed them separately – supplementary feeding of cows so that they can produce adequate milk for feeding calves is not an efficient use of feed. If cows are dried off, it is easier to keep them in good enough condition for becoming pregnant next season. It makes no sense to feed a cow if she then fails to conceive at the next joining.

If feed supplies are limited, allow mature cows to lose some weight prior to joining, but feed them over the joining period so that they gain weight. Heifers must reach a critical mating weight of around 280 kg prior to joining, and continue to gain weight over the joining period.

Bull fertility and ability to work will be affected if bulls are allowed to slip into poor condition. Semen quality is determined approximately 2 months before use, so it is essential that bulls be in good condition well before the start of mating.

### Grain poisoning/acidosis

Eating too much grain too quickly can result in an excessive build-up of lactic acid in the rumen. Any factor that causes variation in intake (e.g. inclement weather, or palatability of feed) or changes the availability of the carbohydrate (e.g. a change in grain type, or how finely the grain is ground) may cause digestive upsets at any time, not just in the period of grain introduction. Hammer or roller mill changes are an important factor here. It is important to recognise that pellets are usually 90% grain and can also be responsible. The ration must be consistent from day to day, particularly if there is no access to other feed. To prevent these problems, it is essential for any change of feed to be introduced slowly. 'Shandy' the old batch of grain with the new, even when the two batches of grain are the same type. Additives such as sodium bentonite and virginiamycin (Eskalin®) can also be used to reduce the risk. Manufacturers sometimes change the type of grain used in pellets, so some of the old batch should be mixed with the new

batch, gradually increasing the proportion of the new feed, to reduce the chance of upsets.

Grain poisoning may be worsened if the animal is also suffering from cold stress.

Animals that are affected show obvious signs of discomfort, and are usually disinclined to move. They may kick at their belly or grind their teeth. Bloating is sometimes apparent, and scouring (light-coloured, smelly faeces) is usual. Acute cases show staggering, and appear blind and 'drunk'. Death can occur 12–72 hours after the onset of signs.

If treated early, mild cases often respond to a drench of sodium bicarbonate:

- 120 g followed by 60 g every 8–10 hours for the next day.
- One hour after the first treatment, give 0.5 L liquid paraffin or other vegetable oil.

### **Feedlot bloat**

Bloat occurs when gas accumulates in the rumen and is unable to escape. Legume roughages predispose cattle to gas formation, as do the very fine particles of shattered grain.

Drench the affected animals with at least half a cup of oil (peanut, paraffin or linseed), or use proprietary formulations of bloat oil as per the instructions provided. Call a veterinarian for severe cases – the animal may need to have a stomach tube passed, or 'tapping' of the left flank with a trocar and cannula. Chronic, persistent cases may require an anti-bloat agent to be mixed in with the feed.

Access to fibrous, stalky lower-quality roughage will help reduce bloat. Reduce the amount of legume roughage if bloat is a problem. Wetting the grain before processing can also help.

### **Clostridial diseases**

Spores of clostridial bacteria (such as those that cause pulpy kidney, blackleg and tetanus) are present in soil, and are ingested or contaminate wounds when dust is stirred up, or when animals ingest soil when grazing close to the ground. Disease is most common in young animals which are still in good condition.

Pulpy kidney usually occurs following an intestinal upset either at the sudden introduction of feed changes, usually grain, or when the drought breaks and animals are turned onto lush green pick.

Botulism can be picked up by animals if they start to chew bones because of a phosphorus and/or calcium deficiency.

All stock should be fully vaccinated with 5-in-1 vaccine to prevent all clostridial diseases.

### **Founder**

Founder is characterised by lameness, often in all four feet. Incorrect ration formulation, too much grain, or too low a protein level, can contribute. Digestive upsets result in the release of toxins which affect the circulation, especially in the feet, and there is heat and pain in the coronary band of the hoof. The animal may lean back to take the weight off the front feet, so that feet are forward of vertical. If the animal is forced to move, its gait will be shuffling and stumbling.

Mild cases often recover without treatment, provided the ration is corrected. More severe cases require urgent veterinary attention. The condition may become chronic in animals that adapt poorly to grain, and you may need to sell these individuals or feed them a much higher proportion of roughage.

### **Urea poisoning**

A maximum of 1% urea in the ration is recommended. It is possible for excess urea to be consumed when there is inadequate mixing of feed or roller drum mixes, allowing pockets to accumulate, or when rain forms pools of water with a high nitrogen content in troughs or around blocks. Blocks left out in the rain may also soften sufficiently so that they can be eaten in chunks rather than licked.

Severe abdominal pain, shivering, bloat and salivation may be seen 20–30 minutes after feeding the ration, or after rain if blocks have been left out in the weather. If poisoning is detected early, drench immediately with 4 L of vinegar to reduce absorption of urea. Call a vet urgently, as surgery may be necessary to empty the rumen. Further treatment could be drenching with 0.5 L water : 0.5 L vinegar : 1 kg sugar / molasses if poisoning is not severe.

Treatment is often not successful because the animal is too far gone when found. These animals should be humanely destroyed.

### **Urinary calculi (bladder stones)**

Bladder stones are usually only a problem in steers, when stones block the urethra and prevent urination. Factors that predispose stock to stone formation include the high phosphorus levels in grain, too much sodium bicarbonate

in the diet (used to help prevent acidosis), and reduced water intake due to poor water quality. Vitamin A deficiency has also been implicated as a cause of bladder stones in cattle that have been on dry feed for prolonged periods.

Signs are usually only apparent once the urethra becomes blocked. Watch cattle for straining, dribbling of blood-stained urine, kicking at the belly or twitching of the penis. If the bladder ruptures, there is temporary relief, then depression, loss of appetite, peritonitis and death. Another possibility is that the urethra may rupture at the bend near the scrotum (sigmoid flexure), in which case the underline will fill up with fluid ('water belly').

Usually, emergency slaughter is the only option. If the bladder has ruptured, the animal will be condemned.

Addition of about 1% limestone to the diet is advisable to balance the excessive phosphorus levels present in high-grain diets.

### **Vitamin A deficiency**

Vitamin A deficiency usually occurs only after animals have been without green feed for more than 6 months. In a drought situation, deficiency is unlikely in animals still in the paddock, with access to green pick from occasional showers, or if trees such as kurrajong are being lopped to feed them. Sheep are even less likely to develop a deficiency, as they can graze green pick much closer to the ground.

However, vitamin A deficiency may occur in young cattle being lot fed, especially if they were born into drought and have seen very little green feed in their lifetime. Deficiency may affect growth rates of young stock prior to other signs becoming apparent.

Vitamin A deficiency may also cause lameness, swelling of the hind legs (especially hocks), increased respiratory rate, panting, drooling, and elevated rectal temperatures. Vision may be impaired, especially in low light ('night blindness'). To check this, walk through your cattle at dusk and try to sneak up on some.

Vitamin A deficiency seems to occur more commonly in hot weather, and affected animals are more susceptible to heat stress. Vitamin A deficient cows can have abnormal calves, so it is a wise precaution to supplement cows if the decision has been made to re-breed, in spite of the drought. To prevent vitamin A deficiency, vitamin ADE injections should be given, or green chop added to the feed, after stock have had 2–3 months with no access to green feed.

### **Plant poisoning**

Hungry animals will be on the lookout for any green pick, and may consume plants, including shrubs and trees, that they would normally avoid. Poisonings are common when stock are sent on agistment and consume plants they are not familiar with. Short regrowth of many plants normally eaten (e.g. sorghum and oats) may contain levels of nitrate or cyanide that are toxic to hungry animals.

Symptoms will depend on the toxin involved. Nitrate and cyanide (prussic acid) poisoning cause acute respiratory distress and sudden death. Other poisons may cause nervous signs, staggering gait, or diarrhoea. Mouldy feed can cause digestive upsets and precipitate abortions.

Call your vet to all suspected poisonings. Do not attempt to move animals that are in severe respiratory distress, for example if you suspect nitrate or cyanide poisoning.

Check any proposed agistment paddock for any unusual plants, especially if the plants are still green. It is a wise precaution to fill animals up on hay before releasing them into a paddock of regrowth.

### **Blue-green algae**

Blooms of blue-green algae are more likely to appear in warmer months during drought, when water levels in dams or ground tanks are low, and watercourses stop flowing. Pollution from manure or fertiliser run-off will worsen the problem.

Ingestion by stock of large amounts of algal toxins can cause massive liver damage and death. Lower doses of toxin may result in jaundice and photosensitisation, the latter resulting in sunburn, particularly of the face, ears and white-haired parts of the body, so provide shade for affected animals. A vet can provide treatment that will assist the liver to recover.

Toxicity of blooms is highly variable, but tends to be worse during a rapid build-up phase, or as the algae are disintegrating. Problems may occur when algae concentrate on the shore of a dam, before the wind, if this is where stock drink. However, cattle will normally not drink affected water unless they have no alternative. If stock show any reluctance to drink, consider the possibility of this being caused by the presence of blue-green algae, and provide an alternative supply if possible. Water can be sent away for testing, but because toxicity can vary considerably from day to day, the situation

may have changed by the time you receive the results.

If a bloom is suspected, you should find an alternative supply of water for domestic, stock and irrigation use until the algae is identified. If there is no alternative for stock and irrigation use, then use water from deeper in the river or dam, or from areas not covered by scums as these may be less contaminated. It also may be possible to allow stock to drink from an area on the upwind side of the bloom if the bloom is localised.

In farm dams, aeration can help mix up the water and add oxygen. This may help control accumulations of soluble iron, ammonia and hydrogen sulfide as well as help control algal blooms. Aeration can be achieved in a number of ways. The simplest method is to cascade the water into a holding dam or tank. Alternatively, an aerating pump can be used.

Currently in NSW, only Coptrol Aquatic Algicide®, Cupricide Algicide® and Cupricide 110 Algicide® are approved for the control of blue-green algae and some other algae types. They must be used in strict accordance with their label conditions and directions. These products are registered for use in farm dams, rice paddies and irrigation conveyance systems. They must not be used in rivers, streams, creeks, wetlands, lakes or billabongs, and water treated with these products must not be allowed to spill into these water bodies.

Conditions of use further prevent their application when birds are feeding on algae or in water containing fish. As with all chemicals, read the instructions before use and wear the appropriate safety equipment. Do not treat drinking waters used by farm animals grazing on heliotrope or ragwort.

## DISEASES UNRELATED TO FEED

If animals are confined in yards or small paddocks, it is important to realise that any disease-causing organisms or parasites, which are often present in low numbers without causing problems, will become more concentrated in those areas. The risk of spread of disease or parasitism is therefore increased.

The use of troughs will minimise the pick-up of such contamination. If troughs are not used, feeding points should be changed at frequent intervals, where possible.

## Diarrhoea

Correcting the ration formulation will cure many cases of mild diarrhoea, but if the problem is more severe, causes unrelated to feed should be suspected. Various bacterial infections, including infections by coccidia, salmonella, E. coli and several others, are likely causes. These diseases will be more common in calves, but can also occur in older animals, especially if they are stressed and in poor condition.

- Salmonellosis causes a high fever and depression. It may also cause 'joint ill', and therefore lameness, in young calves. There is usually, but not always, bloody diarrhoea.
- Coccidiosis can also cause bloody diarrhoea, and animals can become quite weak and ataxic.
- With E. coli scours, the diarrhoea is pale, profuse and watery, and death is usually due to dehydration.

If you suspect any of these diseases, call your vet promptly. Coccidiosis is usually treated with sulfonamides, and salmonellosis is treated with antibiotics. With E. coli infection, fluid replacement is the most crucial treatment, although antibiotics are often given at the same time.

The ionophore group of growth promotants (Rumensin®, Bovatec®, Posistac®) have an added benefit in that they help control coccidiosis. In feedlots, since their use has become widespread, coccidiosis has become much less common.

## Bovine respiratory disease

A variety of bacteria and viruses can contribute to respiratory disease. Problems are more likely to arise if animals from different sources are mixed, and animals are closely grouped, such as in feedlot conditions. Stress and dry dusty conditions are predisposing factors.

Symptoms of respiratory disease may vary from a mild, barely detectable illness, to animals simply found dead. Depending on the severity of the illness, there may be animals off their feed, nasal discharge, fever, depression, coughing and laboured breathing.

Call your vet promptly if any signs of respiratory disease appear. Viruses will not respond to antibiotics, but viral infections are frequently followed by secondary bacterial infections, so it is usual to treat with broad-spectrum antibiotics, such as tetracyclines, in the first instance.

## **Pinkeye (infectious keratoconjunctivitis)**

The bacterium responsible for pinkeye, *Moraxella bovis*, is spread by dust and flies, so it can be a major problem when animals are confined. Any eye damage, for example from grazing among thistles, will predispose an animal to infection.

The first sign is tears running down the face, followed by the classic inflamed pink eye. In severe cases an abscess forms in the centre of the cornea, which may burst, leading to the loss of eyeball contents.

Orbenin® eye ointment is the preferred treatment, as a single application lasts 48 hours. Patches glued over the eye will speed recovery, and will also prevent flies spreading the disease more widely.

However, if animals are not severely affected, it may be better not to treat them. Stressing the group further by putting animals through a race to treat them, which would stir up the dust and possibly spread the condition further, may only worsen the situation.

## **PARASITES IN DROUGHT**

### **Worms and fluke**

Worm infestations are more likely to cause problems in young cattle and recently calved cows. Adult cattle are normally fairly resistant to the effects of worm infestation, but stress can increase susceptibility in animals that are allowed to slip into poor condition. Usually, mixed infestations occur, but the most important is that of the small brown stomach worm (ostertagia). Bulls can be surprisingly susceptible to ostertagia infection.

Fluke can be more of a problem in dry times. Stock that congregate in damp areas which supply the last of the green pick are exposed to the snail that is the intermediate host for fluke.

Crowding around feeding sites will increase contamination, but while the weather remains dry and vegetation is lacking, egg survival is likely to be poor. Thus the importance of

parasitism is likely to be lessened if animals are confined to yards with troughs. Worms may be more of a problem when the drought breaks, or when cattle are sent away on agistment to areas that have had good rain.

Signs of worms and/or fluke include scouring, loss of appetite, anaemia and ill-thrift, with submandibular oedema ('bottle jaw') in more severe cases.

The parasites concerned should be identified if possible. In fluke areas, faecal tests are needed to differentiate between fluke and worm infestations. A specialised fluke drench must be used in the case of fluke. If worms are the cause, it is important to use a drench that is effective against the dormant larval stages of ostertagia.

### **Lice**

Cattle seem to be more susceptible to a build-up of lice if they are in poor condition, especially in cold weather. Cattle infected with lice will often scratch on sharp objects, and this can cause wounds that will make animals more susceptible to infection by clostridial bacteria. Scratching may also be a serious inconvenience, since cattle will damage equipment, especially feed and water troughs, making repairs necessary when you have more important things to do!

Consider treating hand-fed cattle for lice before a problem is apparent, especially if winter is approaching. All animals should be treated at the one time, according to the manufacturer's instructions. Note that if the preparation used does not have a sustained action, and does not kill eggs, re-treatment is necessary after about 14 days. This time interval is crucial, as it allows eggs to hatch and be killed at the immature nymph stage, before they can lay eggs themselves and continue the cycle.

## **FURTHER INFORMATION**

The NSW Department of Primary Industries website has a wealth of information available at

[www.dpi.nsw.gov.au/drought](http://www.dpi.nsw.gov.au/drought)

# Drought agistment – bovine Johne’s disease

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Movement of cattle to other properties for agistment during a drought can increase the chances of picking up Johne’s disease. Producers should be aware of these risks and take appropriate precautions to reduce them.

Herds with a status in the Cattle Market Assurance Program (CattleMAP) should discuss their agistment options with their approved veterinarians. There are specific rules and guidelines for these herds in section L3.4 of the quality assurance manual.

There is some latitude for MAP adults moving to agistment, but calves can only go to a property unstocked with cattle or goats for 12 months, or a property with the same status, without jeopardising their own status.

For cattle not in the MAP, the effects of zoning should be considered before starting agistment.

There may be issues in moving to agistment or returning from agistment, depending on the zone involved. There are two BJD zones in eastern mainland Australia:

**Protected zones** cover all of Queensland, the northern pastoral zone of South Australia, and most of NSW;

**Control zones** cover Victoria, the rest of South Australia, and parts of NSW. Maps of these zones can be found on the internet at [www.dpi.nsw.gov.au/bjd](http://www.dpi.nsw.gov.au/bjd) or contact your local Rural Lands Protection Board.

Producers are also advised to consult their approved veterinarian before moving cattle to agistment in Tasmania, which is a residual zone.

## Moving non-MAP cattle from the protected zone to the control zone /residual zone and back to the protected zone

To avoid the need to test to move back into a protected zone, the following guidelines for an exemption should be followed. Due to the unreliability of the testing, especially shortly after possible disease contact, following these guidelines will also lower the actual disease risk.

Cattle should not be agisted on infected or suspect properties. It is important to thoroughly check the status of the property you are considering.

To provide a more reliable disease assurance than testing to return home, consider the following.

- Breeding cows and bulls that are more than two years of age may be agisted on a property in the control zone and subsequently return to their home property if:
  - the property has not grazed any high risk (dairy) cattle for at least 12 months; and
  - there is no contact with other cattle or goats during the agistment.

A permit is required – contact your local Rural Lands Protection Board, who may require a statutory declaration or other evidence.

Note: If calves are born during the agistment they will need to be culled for slaughter before two years of age.

- Breeding stock under two years of age should only be agisted on a non-assessed property in the control zone and returned home without testing if:
  - no other cattle or goats have been on the land during the previous 12 months and there is no contact with cattle or goats during the agistment (a permit is required – contact your local Rural Lands Protection Board, who may require a statutory declaration or other evidence);
  - or
  - the herd on the agistment property has been check tested or is in the BC-TAS scheme, the CattleMAP, the GoatMAP or is a *Beef Only* herd (contact your district veterinarian or private veterinarian for further information).
- Steers and desexed heifers can move between zones without restriction, provided they do not contact infected or suspect stock.

## Moving non-MAP cattle from the control zone to the protected zone for agistment and back

- Breeding stock under two years of age may be agisted on a property in the protected zone if:
  - there is no contact with other cattle or goats during agistment; and
  - the cattle return to the control zone or are sent to an approved feedlot or are slaughtered before they are two years old.

Note: If the cattle end up being older than two years of age when they depart, the agistment property may have to be spelled

from susceptible cattle and goats for 12 months. This may not be satisfactory to the owner of the land.

A permit is required – contact your local Rural Lands Protection Board.

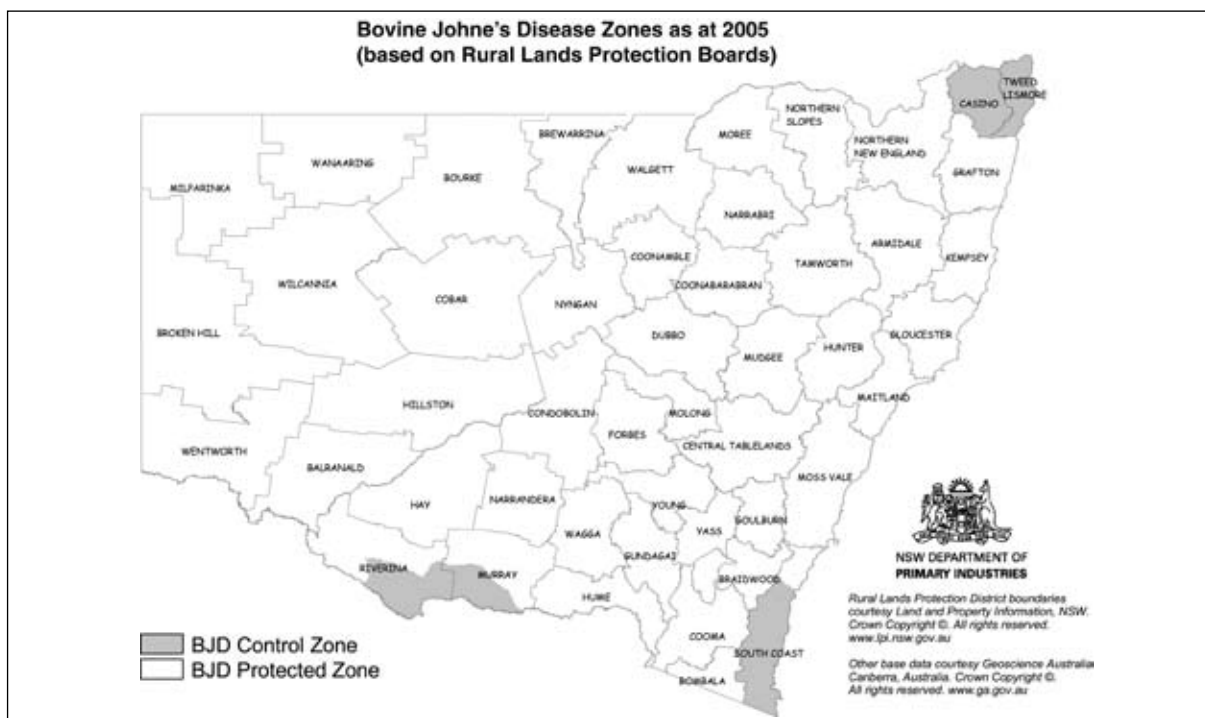
- Breeding stock over two years of age may only be agisted on a property in the protected zone if:
  - the herd of origin has been check tested, is in the BC-TAS scheme, meets the *Beef Only* criteria or is in the CattleMAP (contact your district veterinarian or private veterinarian for further information); or
  - there is no contact with other cattle or goats during the agistment and the land is spelled of susceptible cattle or goats for 12 months after the agistment finishes.

A permit is required – contact your local Rural Lands Protection Board. Cattle moving as *Beef Only* must be accompanied by a signed National Animal Health Statement for Johne's Disease Status of beef cattle.

- Steers and desexed heifers can move between zones without restriction, provided they do not contact infected or suspect stock.

## Precautions

1. If your cattle are in the CattleMAP, consult your approved veterinarian before moving or introducing any stock.
2. Avoid agisting your cattle on a property with lower BJD status than your own herd. If your cattle contact any stock with a lower BJD status, they may jeopardise their status, and also the status of your home property if the cattle are returned to it.
3. Before committing yourself, inspect the agistment property if possible and ask about its grazing history and BJD status.
4. Use direct transportation if possible but be aware of welfare issues. Unloading the stock en route increases the risk of exposure to contaminated land.
5. If you are agisting other producers' stock on your land, ask for a written declaration of BJD status and ensure that you have the capacity to maintain both their status and that of your own herd.
6. Plan well ahead to give enough time to seek advice, ask relevant questions, obtain declarations or permits if required, or arrange check testing if required.



# Sheep health

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There are a number of conditions which occur more commonly when drought-feeding, especially when sheep are congregated on small areas for feeding. Some of these conditions are discussed together with recommendations regarding prevention and control. The oral route is important in the transmission of some sheep diseases. Examples include salmonellosis, worms, coccidiosis, and Johnes disease. The risk of spread of such diseases can be minimised by avoiding faecal contamination of feed and by regularly changing the areas in a paddock where sheep are fed.

## AFFECTING ALL AGES

### Grain poisoning

**Cause:** Grains are highly fermentable carbohydrate-rich foods. Following ingestion of excessive quantities there is a sudden change in the microbe population in the rumen, leading to the formation of large amounts of lactic acid which causes this condition. See Agfact A0.9.53 *Grain poisoning of cattle and sheep*.

In practice, the condition commonly occurs:

- when sheep are first given access to grain;
- when there is a sudden increase in the amount of grain being fed;
- when too much grain is fed allowing excessive consumption;
- when there is a change in the type of grain or concentrate being fed or even the same grain type but from differing sources.

**Clinical signs:** Vary from mild to acute, depending on amount of grain and previous experience with grain. In milder cases, sheep are depressed, anorexic (do not feed) and ataxic (unstable on feet). In severe cases there is scouring, abdominal pain, acute lameness with heat and pain around coronet (laminitis), apparent blindness, recumbency and death.

**Treatment:** Based on neutralising the excessive ruminal lactic acid. Treat with 60 g Causmag (magnesium oxide) or 15 g sodium bicarbonate in 1 litre of water as a drench for each sheep. Affected sheep should be given roughage such as hay until recovered. Drafting off the affected cases may be practical in large mobs with small numbers affected. Valuable stock should receive veterinary attention.

**Control and prevention:** Follow guides for introducing sheep to grain (see Table 15 in 'Full hand feeding of sheep – feeding management'). The first day of a feeding program should be

considered to have commenced when sheep start to eat the grain when fed. Do not allow build-up of grain in the paddock.

When changing feeds, there should be a gradual changeover. If changing from wheat to oats or oats to barley, mix the new feed into the old feed over at least four feeds before the old feed cuts out.

Add 2 per cent sodium bentonite to grain rations. This will help reduce the risk of poisoning during grain introduction.

### Enterotoxaemia (pulpy kidney)

**Cause:** Enterotoxaemia is an acute toxæmia caused by the proliferation of specific clostridial bacteria in the intestines which produce toxins. These bacteria, normally present in the gut, multiply and produce toxin whenever the movement of food through the gut is slowed. e.g. by grain poisoning.

**Clinical signs:** Usually sudden death, with rapid decomposition of the carcass, purple discolouration of skin, wool is easily plucked.

**Control and prevention:** All stock should be given a clostridial booster vaccination before feeding. In cases where sheep have not been vaccinated, a full vaccination program should be implemented immediately. (See Agfact A3.9.47 *Vaccination programs for sheep*.)

### Worm infestations

Sheep in drought-feeding situations can be more susceptible to internal parasites than those normally grazing pasture. Sheep that are stressed for any reason can also lose their immunity and may show the effects of worm infestation – e.g. stress through lactation.

**Cause:** The worms commonly involved are brown stomach worm and black scour worm. Where sheep congregate in wet damp areas or after rain, barber's pole worm, and *Nematodirus* (thin-necked intestinal worm) may also cause problems.

**Clinical signs:** One or more of these signs may be present: ill-thrift, anaemia, exercise intolerance, and scouring. Note that if sheep are scouring it may not be worms. It is important to determine the cause of the scouring before reaching for a drench gun. Check using a WormTest.

**Treatment:** When worms are confirmed, drench the sheep with an effective drench.

**Control and prevention:** Ensure that the sheep are on an effective worm control program (for example, WormKill, DrenchPlan or [Far] WestWorm). If sheep are not on a program, do a WormTest first, then drench them if necessary with an effective drench before they are put into a feedlot, or before they are put into small yards or paddocks.

## Liver fluke

**Cause:** This is more common in dry times when sheep graze the wet fluke-prone areas.

**Clinical signs:** Chronic fluke results in anaemia and ill-thrift. Severely affected sheep can develop bottle jaw. It can be confused with barber's pole worm. Acute fluke infestations often cause sudden death in sheep. Sheep with liver fluke are more prone to black disease in areas where it occurs but this can be prevented by a clostridial vaccination program using a multi-valent vaccine e.g. '6-in-1'.

**Treatment:** Sheep affected with fluke should be treated with a triclabendazole drench (e.g. Fasinox®, Flukare®) which will remove both mature and immature fluke.

**Control and prevention:** Prevent sheep from gaining access to fluke-prone areas in drought times, particularly when they are being hand fed.

For a list of drenches for sheep worms including liver fluke, see Agnote DAI-76, *Registered drenches for sheep worms*.

## Sheep lice

**Cause:** This is more common in a drought feeding situation for several reasons:

- the congregation of sheep assists transmission between sheep;
- there is more movement of sheep between mobs and between paddocks;
- sheep in drought-feeding situations tend to have more tender wool and therefore the clinical effects are more marked when sheep rub or bite.

**Treatment:** This depends on the length of wool on the sheep and the previous history. Advice should be sought on the most effective treatment. (See Agfact A3.9.31 *Sheep lice*.)

## Plant poisoning

**Cause:** Hungry sheep gaining access to feed containing toxins – for example, when sheep are changed from a bare paddock to a paddock with some regrowth. Often plants not normally considered toxic may be eaten in excessive amounts and can cause mortalities. Also in drought situations, hungry sheep will eat plants that are not normally eaten.

**Clinical signs:** This depends on the toxins involved. Nitrate and cyanide poisoning will cause sudden death. Other plants may cause scouring and nervous signs including staggers and ataxia.

**Treatment:** This depends on the plant species involved. Seek veterinary advice if plant poisoning is suspected.

**Control and prevention:** Prevent access to toxic plants by hungry stock. Ensure sheep have a full stomach before they are moved out of a bare paddock.

## Urea poisoning

**Cause:** Ingestion of excess amounts of urea in blocks, in mixed feed, or when sheep drink pools of water on the top of urea blocks after rain.

**Clinical signs:** Abdominal pain, nervous signs including excess salivation and sudden death.

**Treatment:** Not usually successful.

**Control and prevention:** Ensure that urea is mixed thoroughly with feed when used as a supplement. Keep blocks out of the rain in sheltered areas.

## Salmonellosis

**Cause:** Faecal contamination of feed and water supplies with Salmonella organisms. It is often associated with stress and with sheep in areas that are wet and muddy following heavy rain or from overflowing water troughs. Coccidiosis, which may result in scouring and dysentery, can also occur under these conditions.

**Clinical signs:** Fever, scouring and sudden death.

**Treatment:** This requires antibiotic treatment and advice should be sought from your veterinarian.

**Control and prevention:** Prevent faecal contamination of feed and water. Do not keep sheep that are under stress in wet, muddy areas. Withhold affected sheep from slaughter until outbreak is controlled.

## Pink eye

**Cause:** A bacterial infection of the eye, aggravated by the congregation of sheep in dusty areas, especially if flies are present.

**Treatment:** Antibiotic ointment in severe cases. Most sheep will recover if left alone but ensure that they have access to feed and water.

**Control and prevention:** Difficult in drought situations when sheep are being brought into confined areas.

## Urinary calculi (bladder stones) in wethers and rams

**Cause:** The common predisposing cause is a limited water intake. This can occur as a result of faecal contamination of water, stagnant or

brackish water, or high salt content in the water. Losses also occur when sheep are fed on grain rations without a calcium supplement.

**Clinical signs:** Often sudden death. When sheep are examined there is a grossly enlarged bladder caused by an obstruction.

**Treatment:** Not practical and rarely successful.

**Control and prevention:** If problems are occurring, then an increase in the salt content of the ration may assist. The aim is to increase the water intake of sheep. However, this will only work if the water is drinkable. The disease is best prevented by ensuring that sheep have access to drinkable water supplies at all time.

### **Grass seed infestation of the gums**

**Cause:** Feeding hay with a lot of mature grass seed.

**Clinical signs:** Sheep failing to eat, sometimes slobbering at the mouth. Examination of the mouth indicates masses of grass seed around the inside of the gums.

**Treatment:** Removal of the grass seed.

**Control and prevention:** Take care when feeding pasture hay heavily contaminated with grass seed.

## **AFFECTING MAINLY YOUNG SHEEP**

### **Enterotoxaemia**

This is more common in young stock and the same precautions described under 'Affecting all ages' (above) should be followed.

### **Pneumonia**

**Cause:** Bacterial infections aggravated by dry, dusty conditions. It is more common where lambs are being fed on dry, dusty feeds in troughs, especially finely hammer milled hay.

**Clinical signs:** Nasal discharge, coughing, ill-thrift and sudden death.

**Treatment:** In severe cases antibiotic treatment can be used as advised by a veterinarian.

**Control and prevention:** Avoid feeding dry, dusty feeds. This may require some damping down of the feed in troughs.

### **Vitamin A deficiency**

**Cause:** Vitamin A deficiency can occur in lambs born to grain-fed or drought-fed ewes. Grain and most hays are low in Vitamin A. Lambs must be completely off green feed for some months before clinical signs will occur.

**Clinical signs:** Night blindness, eye discharges and ill-thrift.

**Treatment:** Vitamin A drench.

**Control and prevention:** Lambs off green feed or lucerne hay for 3–4 months may need a vitamin A supplement. A single drench should give six months protection.

### **Vitamin E deficiency**

**Cause:** Vitamin E deficiency is often associated with feeding weaners on hay or grain over extended periods, especially young weaners.

**Clinical signs:** Animals go down. They appear bright and alert but they are reluctant to stand. In other cases there is sudden death. Examination of dead animals reveals pale muscles.

**Treatment:** When the diagnosis is confirmed, treat with an oral drench of water-soluble Vitamin E using a dose rate of 3000 IU per animal.

**Control and prevention:** There is no preventative treatment. Watch weaners and young sheep for signs suggesting Vitamin E deficiency and seek advice. Note that vitamin E deficiency can resemble white muscle disease due to selenium deficiency. However, selenium deficiency is most unlikely in a drought situation.

### **Nematodirus infection (thin-necked intestinal worm)**

**Cause:** A mass hatch of Nematodirus worm eggs after an autumn break when sheep graze on short green pick.

**Clinical signs:** Scouring, ill-thrift and weaner deaths. Clinical signs may occur before there is an increase in Nematodirus egg counts on WormTest

**Treatment:** Drench with an effective drench.

**Control and prevention:** Difficult because of the long-term survival of the Nematodirus eggs and the mass hatch following the autumn break or rain after a prolonged dry spell.

### **Coccidiosis**

**Cause:** Stress and overstocking of lambs and weaners under moist conditions – such as muddy feeding and watering areas. Heavy pasture contamination and stress can lead to a build-up of infestations. The clinical effects are aggravated by concurrent worm infestations.

**Clinical signs:** Scouring with watery faeces which may contain blood, lack of appetite, dehydration, with anaemia and ill-thrift in some cases.

**Treatment:** Confirm diagnosis and seek the advice of a veterinarian.

**Control and prevention:** Avoid placing lambs and weaners in situations where gross faecal contamination of feed will occur.

### Teeth abnormalities

**Cause:** Long-term feeding of weaners on grain without calcium supplementation.

**Clinical signs:** Dribbling from the mouth and abnormalities of the molar teeth.

**Control and prevention:** Ensure that young sheep on grain rations receive a calcium supplement of at least 1.5 per cent of their ration in ground limestone.

## AFFECTING ADULT SHEEP

### Periodontal disease

**Cause:** Often faulty molar dentition. The incisor teeth are not so important. The effect of molar teeth abnormalities may not become obvious until sheep are stressed in drought feeding situations.

**Clinical signs:** Ill-thrift, emaciation and sometimes a cud discharge from the mouth.

**Treatment:** There is no treatment. Remove affected animals from the flock.

**Control and prevention:** Cull old sheep early in the drought rather than hand feeding them.

### Johne's disease

**Cause:** a chronic bacterial infection of the intestines in sheep, which becomes more obvious when sheep are stressed.

**Clinical signs:** Wasting and ill-thrift in sheep two years of age and older, which will not respond to drenching or other treatments. Sheep die within 3–4 months of first showing signs of the disease. Diagnosis is on post-mortem.

**Treatment:** There is no treatment.

**Control and prevention:** If animals are at risk from the disease, vaccinate with Gudair®. This is a once in a lifetime vaccine that provides effective protection against infection. In areas where OJD is a threat, supplementary feeding should be offered in troughs and feeders to avoid ingestion of soil. The disease is notifiable and advice should be sought from your local District Veterinarian.

## AFFECTING PREGNANT EWES

### Pregnancy toxaemia

**Cause:** Poor nutrition in late pregnancy, especially in twin-bearing ewes. Outbreaks of pregnancy toxaemia are often brought on by stress.

**Clinical signs:** Affected animals are dull and listless, and may appear blind and wander into objects. Animals eventually become recumbent and very depressed.

**Treatment:** Products such as Ceton®, Ketol®, Vytrate® or Lectade®. When cases occur, increase feeding levels.

**Control and prevention:** Ensure an adequate ration, especially for twin-bearing ewes. Note. It is important that pregnancy toxaemia be differentiated from hypocalcaemia and polioencephalomalacia.

### Hypocalcaemia

**Cause:** A sudden fall in blood calcium levels in late pregnancy and early lactation.

**Clinical signs:** Often sheep are found down or may appear listless. They may show some nervous signs. It commonly occurs shortly after lambing.

**Treatment:** Intravenous or subcutaneous calcium borogluconate.

**Control and prevention:** Prevent sudden changes of diet or other forms of stress. Calcium supplementation of diets is only recommended when sheep are being hand fed on grain and concentrate diets over several months. Sheep can also develop hypocalcaemia when grazing short lush green feed immediately after a drought has broken. Grazing of high oxalate plants such as sorrel, oxalis or portulaca can also cause hypocalcaemia.

### Chronic copper poisoning

**Cause:** Long-term excessive intake of copper in the diet, or as a result of a build-up of copper associated with liver damage caused by grazing on paterson's curse or heliotrope. Clinical disease is brought on by some form of stress – for example, nutritional or lactation stress.

**Clinical signs:** Animals show severe jaundice.

**Treatment:** Incorporation of molybdenum in the diet will help control outbreaks. However, molybdenum should not be added to the rations of normal sheep as it may predispose to copper deficiency.

**Control and prevention:** The disease can be prevented in susceptible groups of animals by incorporating molybdenum at certain times on the advice of your veterinarian.

## Toxoplasma abortion

**Cause:** Feeding of pregnant ewes on hay or grain contaminated with cat faeces.

**Clinical signs:** Abortion, dry ewes or the birth of small, weak lambs.

**Treatment:** There is no economic treatment once the outbreak commences.

**Control and prevention:** Ensure that pregnant ewes are fed on hay or grain which is not contaminated by cat faeces. That is, reserve silo-stored grain for the pregnant animals.

## Campylobacter abortion

**Cause:** Bacterial infection of sheep picked up by ingestion of the organism. Carrier animals excrete the organism in their faeces. Outbreaks occur when ewes in the last two months of pregnancy are hand fed on the ground under cool, moist conditions when the organism will survive on pasture.

**Clinical signs:** Abortion in the last two months of pregnancy.

**Treatment:** There is little value in treatment in most circumstances. Valuable animals might be treated with antibiotics on the advice of a veterinarian.

**Control and prevention:** Outbreaks occur as a result of faecal contamination of feed. When feeding pregnant ewes, care should be taken to try to reduce the degree of faecal contamination – especially when sheep are being hand fed under cool, moist conditions. This may be shortly after a drought breaks where hand feeding continues until pasture growth is established.

# OJD and sheep movement

OJD is managed in NSW on the basis of buyers making informed decisions on the risk of OJD being in sheep they plan to purchase, and making decisions on that basis. There are no movement restrictions in place for OJD in any part of NSW.

Other states do have restrictions in place for OJD. These are expressed in terms of the minimum number of ABC credit points the sheep must have on the Sheep Health Statement that accompanies the sheep.

**Remember.** All sheep and goats **must** be accompanied by an approved movement document as part of NLIS for Sheep and Goats. These documents are a Sheep Health Statement (formerly an Animal Health Statement), Travelling Stock Statement or National Vendor Declaration.

The national approach to the management of OJD is underpinned by four key elements:

- free movement based on informed trade,
- use of prevalence areas as one of the elements that help buyers to assess risk,
- establishment of a nationally agreed trading system using Sheep Health Statements and assurance-based credit (ABC) points,
- unrestricted access to Gudair® Vaccine.

The NSW approach to OJD management is consistent with the NAOJD, and is underpinned by the mandatory use of Sheep Health Statements. While NSW includes four different prevalence areas, the state is essentially managed in two parts.

**The Management Areas** mainly comprise the higher prevalence areas, where producers are encouraged to manage their own risk by using strategies such as vaccination, on-farm management and informed purchase of sheep.

**The Exclusion Areas** (EAs) comprise most of the very low prevalence regions and have demonstrated local producer support for self-funded and self-managed district programs that are designed to minimise the risk of OJD coming into, and moving within, each area.

The landholder moving sheep into the EA has to obtain the Sheep Health Statement and provide a copy of it, along with the landholder's name and details of the destination of the sheep, to the RLPB within seven days of the movement being completed.

The Board uses that information to assess the risk of those sheep having OJD. If the risk is too high the Board can require the landholder to plan how they will manage the risk, but the plan is up to the landholder.

Individual landholders, including the owner of a saleyard or showground, or an RLPB in control of a TSR, may require a minimum OJD standard for entry of sheep onto that land. However, an EA can only recommend a minimum OJD standard for entry of sheep into the EA.

Nothing prevents any sheep entering an Exclusion Area. The receiver of the sheep is responsible for managing their risk.

## Key principles

- OJD is a notifiable disease. An owner is required to notify an Inspector if they know a flock is infected. A vet is required to notify an Inspector if they suspect or know that a flock is infected. No regulatory action or investigation is required following notification.
  - The Sheep Health Statement is mandatory for all sheep sold as re-stockers or moved for agistment. It is signed by the seller, and accompanies the sheep and provides a prospective buyer with an indication of OJD assurance or risk, using assurance based credit (ABC) points. ABC points provide assurance for trade but are not required for movements within NSW but may be required for interstate movements. The statement provides other information as well, and may be used as a Travelling Stock Statement.
  - SheepMAP approved vets are responsible for certifying approved vaccinates. NSW guidelines for approved vaccinates are:
    - lambs vaccinated by 16 weeks of age,
    - sheep vaccinated over 16 weeks of age in flocks participating in the SheepMAP,
    - sheep vaccinated over 16 weeks of age in flocks in very low and low prevalence areas, where there is no known risk of exposure prior to vaccination.
  - Owners of flocks that are known or suspected to be infected are required to indicate this under category A of the Sheep Health Statement. Resolution of suspicion is normally the responsibility of the owner and an approved vet, with advice available from DVs and DPI vets, or from the OJD vet panel. Infection is normally confirmed by laboratory testing, i.e. positive histopathology or positive culture. However an owner filling out a Sheep Health Statement may conclude, on other evidence, that his/her flock is infected.
- Property Disease Management Plans (PDMPs) may be developed for flocks suspected of being infected, but approved vets are generally advised against certifying low-risk sheep from such flocks until suspicion has been resolved by veterinary investigation, normally including testing. Note that in some cases intensive investigation is unable to resolve suspicion in the short-term.

# NLIS and sheep movement

Before you move your stock, make sure you meet the requirements for NLIS. NLIS for sheep and goats started on 1 January 2006. The requirements are:

1. All sheep and goats must be accompanied by an approved movement document. These are a Sheep Health Statement (formerly known as an Animal Health Statement), a Travelling Stock Statement, or a National Vendor Declaration.
2. All lambs and kids born on or after 1 January 2006 must be tagged before they leave the property.
3. All sheep and goats will have to be tagged on and after 1 January 2009.
4. Tags have to be of durable plastic and have the Property Identification Code (PIC) machine printed on them with letters/numbers at least 5 mm in height.
5. Sheep that are exempt from tagging are those
  - being consigned from property of birth direct to slaughter for sale over the hooks on a c/kg basis,
  - being moved for emergencies such as fire and flood, which will be tagged once they arrive at their destination,
  - being taken to a place to be tagged, or
  - young lambs moved with ewes and remaining with those ewes.
6. Goats have the above exemptions. They are also exempt if they are sold over the hooks via an aggregation depot or they are in the Western Division and remain in that division.

NLIS for sheep and goats was introduced by industry to protect markets and assist with biosecurity. International markets are expecting to be able to trace meat product back to point of production. The ability to trace stock when residues are found or when diseases are suspected improves our ability to deal with these risks.

