MEAT & LIVESTOCK AUSTRALIA

Managing breeding ewes in containment areas

A guide for producers

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Introduction

Drought, or a low availability of pasture, may require either the sale of sheep or hand feeding for periods of time. Breeding ewes have the potential to produce lambs and future income, and may be very expensive to replace later if sold. In this situation, a decision needs to be made as to whether the resources (funds, labour, equipment, mental resilience) are available to feed ewes for an estimated length of time, or if it would be better to sell stock and buy back in when conditions improve. Some producers are now also using containment feeding as a regular strategy to maintain ewes over dry autumn periods when pastures or crop stubbles are not typically sufficient.

Successfully maintaining breeding ewes in containment depends on cost-effectively achieving high sheep welfare and optimal lamb marking rates. These guidelines have been prepared based on scientific evidence to assist in decisions specific to managing breeding ewes in containment and the potential effects of this on health and lamb marking rates.

Is reproductive rate reduced when containment feeding?

Most producers report 'good' levels of reproduction from ewes that have been kept in containment areas at stages of their lives. Pregnancy or marking rates may be higher than if ewes are left exposed to poor pasture conditions, as better feeding and closer monitoring means ewes may lose less condition and any health issues can be promptly actioned. However, low pregnancy rates or outbreaks of disease which reduce lamb marking rates do occasionally occur in containment.

Reproductive performance after containment feeding is variable, as it is under paddock conditions, and in instances of low pregnancy or lamb marking rates it isn't always clear what the cause is. Using practices which minimise the risks of this occurring (such as those discussed throughout this guide) can help to avoid low performance.

Pen design

Regulatory requirements on pen design vary between locations. Key guidelines are:

- The minimum space allowance in outdoor containment areas for heavy sheep is 1.4m^2/sheep, increasing to 1.8m^2/ewe with lambs, as required under the *Australian Animal Welfare Standards and Guidelines* (2014).
- Provide adequate shade if used in hot weather (>25^{o}C) – heat stress may reduce ewe and ram fertility, reduce foetal growth and reduce lamb survival. Existing trees are often used, but need to be protected from ringbarking. Shaded areas also need air flow to aid cooling.
- Shelter against strong and/or cold winds may be desirable, particularly for off-shears sheep.
- Ample clean water (up to 10L/ewe/day in hot weather) is needed. Dams may become boggy and contaminated. The optimum trough length is unknown, but this and flow rate of water must be adequate for all sheep to drink to requirement daily. Troughs will need regular cleaning to maintain water quality.
- Test water quality if in doubt, as mineral concentrations may not be suitable (see Table 1), and contamination from chemicals, bacteria or algae may make water toxic to sheep.

Table 1: Total soluble salt and magnesium concentrations (ppm; where mg/L=ppm) in water and suitability for sheep*

Total soluble salts (ppm)	Magnesium (ppm)	Sheep
>4,500	<250	Not suitable for lambs
4,500–6,000	<250	Suitable for lactating ewes
6,000–15,000	<500	Suitable for non-lactating adult sheep**

* If mineral content in water is high, the addition of salt or minerals to feed may result in excessive salt intake and reduced production
** Production may decline above 10,000 ppm
Source: SCA, 1990

- Containment limits sheep from walking long distances looking for feed, so reduces energy use and feed requirements. Existing small paddocks or holding yards may be suitable rather than building special facilities for infrequent use.
- Site selection – consider freedom from chemical contamination, freedom from toxic plants, low risk of fire or waterlogging, access to sheep yards and feeding equipment, existing shade and impact on surrounds.
- The optimum feeding method, if there is one, is unknown. Below are examples of different feeding methods to consider:
    - Trail feeding on the ground is often used, but is best in dry conditions with hard-packed soil. Trail feeding may increase the risk of some diseases (e.g. campylobacteriosis, if ewes are fed post-joining and not vaccinated), but needs minimal equipment and trail length can be easily adapted to different mob sizes.
    - Various forms of belting can be used to avoid feeding directly on the ground.
    - Trough systems are an alternative to trail feeding, but will require regular cleaning.
    - Self-feeders, either purchased or home-made, protect feed in wet weather, but may be expensive, require more equipment to efficiently fill, and may make it difficult to control the quantity fed.
- Simple feeding systems work. Many producers successfully feed grain and hay separately, so feed mixers and processing are not required. Processing of grains for sheep increases the risk of digestive upsets.
- The optimal feeding system may depend on soil type and time of year. Trail feeding on sandy soils increases wastage of feed, while clay soils may be suitable if dry, but become muddy if wet. Belt or trough systems may reduce wastage and contamination of feed.

Mob size

The optimum mob size for breeding ewes in containment areas is not known, although some producers successfully feed mobs of more than 700 ewes. Small mobs may not use rams efficiently, and where only two or three rams are used per mob, this may increase the risk of individual rams reducing pregnancy rates. Larger mob sizes may reduce labour and equipment costs, but increase the difficulty in identifying and

Image courtesy of Dr Susan Robertson of Charles Sturt University

removing shy feeders and may also increase the rate of shy feeders if access to feed is not optimal.

The importance of monitoring

Regular monitoring of ewe health is important to avoid small problems becoming larger welfare issues, and ensures producers can reduce the costs associated with poor animal welfare, minimise any reduction in performance and achieve targets for reproductive performance.

Individual sheep should not fall below condition score 2 to maintain welfare. Monitoring is particularly important when containment feeding as ewes may be in lower condition than normal when feeding starts due to drought conditions.

When determining whether or not the quantity being fed is adequate, feed tests are an important guide. However, factors such as genetic variability, weather conditions, accuracy of determining quantities fed and individual variability between sheep all influence whether the quantity fed is adequate. Therefore, regular monitoring of condition score is the best means to assess whether feed quantity needs to be adjusted, although training in condition score assessment is recommended to improve accuracy. Weighing of pregnant ewes may not be useful because weight increases with foetal growth, so ewes may lose condition (fat) while gaining weight.

Monitoring the condition score of approximately 50 ewes per pen gives a guide to the average mob performance. However, a common issue with containment feeding is shy feeders (sheep which don't eat enough and lose condition). All ewes need to be monitored so that shy feeders can be removed and managed separately. Visual monitoring may not be adequate if ewes have long wool.

Monitoring every two to three weeks is recommended, particularly when ewes are first introduced to containment areas, to avoid large reductions in the condition of any individuals.

Ewes identified as shy feeders should be removed and either fed in a separate pen, where they may start eating adequately, or returned to paddocks where they may still need feeding, but are in a more natural environment. Shy feeders seem to occur at an average rate of about 5%, but can also occur at higher rates.

Ewes which were introduced to a specific type of feed when they were lambs, or at a time prior to containment feeding, are likely to recognise the feed and adapt to feeding more quickly than those that haven't. This can prevent a two to three-week delay from their introduction to feed to eating adequately.

Any ewes with health issues may need to be removed and placed in a separate hospital pen for easy monitoring and access to treatment, or they may need to be humanely put down.

Separating ewes on breed, age, condition and pregnancy status

There is no clear data suggesting that separation of specific ewe groups improves reproduction or health. However, there is some evidence that different breeds may be best maintained in separate pens, as crossbreds may dominate Merinos at feed troughs.

Younger ewes (lambs, hoggets) are best penned separately because their lighter weights mean their feed requirements differ from adult ewes.

Ewes in lower or higher condition score may also be penned separately to allow feeding to increase or reduce condition score.

Pregnancy scanning is recommended and producers should aim to scan 42 days or more after the ram **out** date and maintain a short joining interval (<58 days) to ensure all ewes are within the target age range for foetal age at the time of scanning.

Detecting singles and twins as well as non-pregnant ewes allows separation and more cost-efficient feeding, as the energy requirements differ in late pregnancy and after lambing. Foetal ageing may also allow ewes to be separated and more efficiently fed to requirements, but depends on the accuracy of the scanner.

Feed types and quantities

Cereal grains and hay or straw are typically fed in containment areas due to their availability, however, a wide variety of feeds can be used. Be aware that meals and high oil content feeds should not be fed at high percentages of a ration. Key points to consider include:

- Ensure feeds used are free from chemicals, mould, contamination or other toxins which may cause disease or reduce reproduction.
- The minimum energy and protein requirements vary for the frame size, stage of pregnancy, and expected number of lambs per ewe.
    - The minimum protein requirement of unmated and early pregnant ewes in the feed dry matter is about 7%; this increases to 12% for the last six weeks of pregnancy and during lactation. Examples of energy requirements are shown in Table 2.
    - Requirements increase after lambing. Detailed feeding guides are available on state agriculture/primary industry department websites.
- The quantities fed need to be adjusted depending on whether single and twin-bearing ewes are fed in separate mobs and for the expected duration of lambing. Most (70%) ewes are expected to lamb in weeks three to five for non-teased spring-joined (before February) flocks, or in the first three weeks for autumn-joined (from February) flocks. Scanning and separation on foetal age, as well as foetal numbers, will allow for more precise feeding to requirements where ewes are fed during the last six weeks of pregnancy. If ewes are not scanned, the proportion with twin foetuses will need to be estimated – on average this is 30% in Merino flocks but varies widely.

Table 2. Daily maintenance metabolisable energy (MJ ME/day) requirements of 50kg or 60kg frame size ewes in condition score 3 at different stages of pregnancy, not grazing. Calculated using SheepExplorer software (CSIRO)

	Medium frame ewe (50kg)		Large frame ewe (60kg)	
Day of pregnancy	Single fetus (MJ ME/day)	Twin fetus (MJ ME/day)	Single fetus (MJ ME/day)	Twin fetus (MJ ME/day)
0	7.5	7.5	8.3	8.3
70	8	8.5	9	9.5
90	8.8	9.7	9.9	11
110	9.9	11.7	11.3	13.4
130	11.8	14.9	13.6	17.3
150	14.5	19.5	16.8	22.7

- The quantity of feed may also need to be increased in cold weather if ewes have less than 3cm of wool or if feed is trampled (therefore not eaten). Monitoring feed wastage and ewe condition is key to ensuring feed is adequate.
- Guides to energy and protein contents of feeds are available from state agriculture/primary industry department websites, but quality varies widely for the same type of feed, so getting a FeedTest done is a safer option to ensure feed requirements are met.
- Grain is often cheaper per unit of energy than hay. A minimum of 10% roughage is recommended to maintain rumen health. Higher levels of roughage (20%) may be needed in lactation to promote milk production, but the optimum is unknown. Avoid high percentages of low-quality roughage during late pregnancy and lactation as this may prevent ewes eating enough to meet energy requirements. Lupin grain contains sufficient fibre to be fed alone, but is usually expensive.
- Grains and cereals/grass hays contain insufficient calcium on their own. Add 1 to 1.5% limestone and salt to feeds, or supply a 1:1 mix of limestone and coarse salt as a loose lick. Magnesium requirements increase during late pregnancy and lactation, so add 1 to 1.5% Causmag® to feeds for the last month of pregnancy and during lactation. A loose lick of limestone, Causmag® and salt in the ratio 1:1:1 minimises the risk of hypocalcaemia and hypomagnesaemia which may cause ewe mortalities.
- Urea is sometimes used with low-protein feeds to increase nitrogen supply and promote rumen microbial protein. Avoid using urea at more than 1% during joining, as this may cause loss of embryos and reduced pregnancy rates.
- Sheep must be introduced to grains and grain-based pellets slowly to avoid acidosis. The addition of 1% limestone will reduce the risk, but adequate introduction over time to grain is the key. It will take two to three weeks to introduce the final quantity of grain. Feed daily, starting at 50g/ewe/day, 100g on day three, and increase by 100g/ewe every second day. After day 14, sheep can be fed every second day to reduce labour. Ensure that ample roughage is available during introduction and reduce the quantity as the grain increases. Other feed additives (i.e. buffers) are unnecessary if ewes are adequately introduced.
- Changes in the type of grain or batch of grain being fed also need to be gradual to avoid acidosis. Mix batches over several feeds.
- Reduce shy feeders by feeding straw rather than hay with grain-based rations. High levels of straw as an energy source should be avoided in late pregnancy and lactation as they will limit energy intake. At these times, replacing straw with a higher energy roughage (e.g. hay) is recommended. Where roughage is a large part of the ration, feed test to ensure quality is adequate for maintenance given intake limits.
- Feeding every second or third day (rather than daily) reduces the number of shy feeders, but increases the risk of acidosis. Monitor regularly so corrective actions can be taken promptly. However, ewes should be fed daily (or have constant access to some feed) during at least the last three weeks of pregnancy to reduce the risk of pregnancy toxaemia.
- The optimal method of feeding hasn't been established. Simple feeding systems (grain and hay provided separately) are effective. Trail feeding may reduce the number of shy feeders compared with self-feeders, but this hasn't been proven. Trail feeding on the ground reduces costs for equipment, but is most suited to hard-packed soil types in dry weather. Feeding on the ground may also increase the risk of some diseases.
- Feeding systems need to be long enough to ensure all sheep can gain access to feed.

Ram preparation

Healthy, working rams are critical to achieving good lamb marking percentages. Allow two months of ram preparation before joining.

- Aim for rams to be in a minimum condition score of 3 at joining as rams ≤2.5 or ≥4 produce less or lower quality sperm.
- Increase sperm production by maintaining good nutrition for at least seven weeks prior to joining, as sperm production takes around 50 days. Feeding 500g/ram/day of lupin grain for this period, in addition to the normal ration or grazing, will increase semen production, particularly when rams are grazing dry pasture. There may be little benefit for British-breed rams during spring or if grazing ample green pasture.
- Rams may be deficient in vitamin A if they have no access to green hay, pasture or maize grain for three months. Consider a vitamin A injection at least two months before joining if this is the case.
- Shear rams to avoid long wool at joining. Short wool reduces heat stress in humid conditions, while increasing length to 4cm reduces heat stress under dry heat conditions. Protect ram fertility from heat stress for at least two months before and during joining with ventilated shade.
- Introduce rams to the containment ration of ewes 2–3 weeks before joining to avoid acidosis from high grain diets.
- Vaccinate rams for pulpy kidney and other clostridials before feeding, and drench before entry to the containment area.
- Protect rams from flystrike, as this may reduce mating activity and fertility for several weeks after its occurrence. Preventive chemicals may also be beneficial if joining during warm weather. Rams fight, and this increases the risk of poll strike.

Joining management

- Ensure ewes are drenched if needed and vaccinated against pulpy kidney and other clostridial diseases before the start of feeding.
- Consider selling ewes or not joining if the increased costs of feeding pregnant and/or lactating ewes is too high. Alternatively, ewes may be joined, and a decision made before late pregnancy as to whether some or all ewes can be retained through lambing, depending on improved pasture conditions.

Image courtesy of Hamish Dickson, AgriPartner Consulting Pty Ltd

- Use enough healthy rams. Avoid mating ewes to single rams as there is a chance these rams may have poor fertility or aren't good workers. A rate of 1% + 1 extra ram for each adverse factor is generally adequate for a five to eight week joining. A higher rate of 2% is recommended for ewe lambs and maiden ewes, and for shorter joinings this may increase pregnancy and twinning rates.
- Join ewe lambs, maiden ewes and adult ewes in separate mobs to avoid lower pregnancy rates in young ewes and/or a potential extended lambing period. Young ewes do not compete for rams as well as adult ewes.
- Sheep are seasonal breeders. To allow ewes two chances to mate requires joining for five weeks in autumn (from February) or seven weeks in spring (before February). The use of vasectomised rams for two weeks before spring to early February joinings allows the length of joining to working rams to be reduced to five weeks. Insufficient length of joining risks less ewes falling pregnant while longer joinings may not increase pregnancy rates and make it more difficult to efficiently manage nutrition in late pregnancy and lambing.
- A minimum condition score of 2 at joining is needed to avoid low pregnancy rates and potential welfare issues in later pregnancy. Ewes in condition score 3 are expected to have higher twinning rates so produce more lambs, although genetic variation means there may be no further benefit above score 3 or 2 in some lines. Avoid having adult ewes greater than condition score 4 as these need to lose condition in early to mid-pregnancy to reduce the risk of late pregnancy toxaemia and dystocia. Pregnancy rates for ewe lambs may increase up to condition score 3–3.5 at joining.
- Ewes without access to any green hay or pasture for two months may be deficient in vitamin A. Other mineral deficiencies may also be present in some areas. In these cases, consult a veterinarian.
- Ensure ewes are adapted to feeding before joining where possible to reduce the risk of weight loss during joining, as this will reduce twinning rates.
- Avoid feeding well above maintenance levels during joining as this may reduce pregnancy rates.
- Provide adequate shade during joining and pregnancy. Heat stress can reduce ewe and ram fertility and reduce foetal growth, potentially reducing rates of lamb survival after birth.

Managing pregnant ewes

- Vaccinate pre and post-joining for campylobacteriosis, and an annual booster is recommended, particularly if ewes are fed on the ground.
- When pregnant ewes are brought into containment, where possible adapt them to feeding before the last six weeks of pregnancy to minimise the risk of acidosis or other disturbances which may cause pregnancy toxaemia.
- Adequate feeding of ewes during late pregnancy and lambing is critical for lamb survival. The goal should be to maintain ewe condition score during late pregnancy as a loss in ewe condition during this period may reduce milk production, produce poor ewe behaviour after birth and reduce lamb energy stores, all of which will reduce lamb survival. The reduction will be greater for twins and in cold weather.
- Excess gain in condition score during late pregnancy, or overfat (condition score 4) ewes increases the risk of large lambs and lambing difficulties.
- Provide adequate shade during pregnancy as heat stress can reduce foetal growth, potentially reducing lamb survival after birth.
- Vaccinate against clostridial diseases four to six weeks before lambing to protect lambs after birth.
- Avoid shearing or any other activity which restricts feed intake for prolonged periods during the last six weeks of pregnancy, as this may trigger pregnancy toxaemia. If ewes have to be yarded (e.g. for vaccination) or mustered to other paddocks, limit the time off feed and handle gently.
- No data on the management of lambing in containment is available, however, the practice is undesirable if paddock lambing is an option due to potential mismothering associated with feeding and high stocking rates.

Removing ewes from containment

When removing ewes from containment, vaccinate for pulpy kidney. Feed before releasing, and adapt ewes to pasture over several days by increasing grazing time, or by continuing to feed. Ewe losses from pregnancy toxaemia have occurred where pasture has been inadequate; therefore, supplementary feeding may still be needed. A gradual change in diet will also minimise the risk of causing a reduction in the staple strength of wool.

Health

The prevention of health issues is best practice when containment feeding. Following the guidelines in this manual will minimise the risks to health. Consult a veterinarian to diagnose and advise on treatment if health issues occur.

A range of health issues are also detailed on state agriculture/primary industry department websites. The mortality rates in containment systems are reported to be generally very low (<1%), however, problems sometimes occur. The key health risks with containment feeding breeding ewes are outlined below:

Acidosis (grain poisoning)

Signs: Soft manure, tucked up appearance, reluctance to walk, lameness, lethargy (dullness), death.

Prevention: Introduce grain slowly over 14–21 days. Mix new batches of grain or new types of grain over several feeds to avoid a sudden change. Monitor manure to make sure sheep are adapted to the grain before increasing the quantity. Ensure adequate roughage (e.g. straw) is available. Use lower-risk grains. Lupin grain is relatively safe, but is still capable of causing acidosis. The risk increases from oats < barley < triticale < wheat.

Treatment: Remove affected sheep from grain and offer hay. Drench with bi-carbonate of soda (15g/L water). Seek veterinary assistance for large numbers or valuable sheep.

Enterotoxaemia (pulpy kidney)

Signs: Sudden death. Violent convulsions may also occur prior to death.

Prevention: Vaccinate against clostridial diseases. Two vaccinations – an initial vaccination, followed by a booster four weeks later, but prior to entry to containment – are required.

Image courtesy of Dr Susan Robertson of Charles Sturt University

If fed in containment for many weeks, further vaccinations may also help to maintain a low risk. High grain or energy intake (including lush pasture), as well as sudden changes to diet increase the risk of pulpy kidney. Release ewes from containment to pasture gradually, or continue supplementing for a few days after release.

Treatment: No treatments are available, so prevention is key.

Pregnancy toxaemia (twin lamb disease)

Signs: Dullness in the early stage, blindness, star-gazing before ewes become recumbent. The condition develops over several days. A large proportion of the flock may be affected.

Prevention: This is a metabolic disease where if energy intake is not adequate, the sheep breaks down fat reserves, resulting in toxic production of ketones. One affected ewe may be a sign that a large proportion of the flock is at risk. Ensure ewes are fed to meet energy requirements in late pregnancy and are not removed from feed for long periods. Minimise stress and handling. Avoid having ewes in excessively fat (condition score ≥4) or thin (<2) condition score in late pregnancy. Ewes with twins or multiple foetuses are at greater risk due to their higher energy requirements, as are old ewes. Lameness, or other factors such as a poor weather event that restrict ewe intake, may also lead to the condition.

Treatment: Unless treated in the early stage, actions to deal with pregnancy toxaemia are usually unsuccessful. Oral treatments with liquid energy supplements (e.g. Ketol) may be successful in the early stages.

Hypocalcaemia

Signs: Usually occurs in late pregnancy or lactating ewes but can occur in other classes. Muscle tremors or staggering occur before the sheep becomes recumbent and refuses to rise. Symptoms develop rapidly. A large proportion of the flock may be affected.

Prevention: Grains and cereal hay/forage have an imbalance of calcium to phosphorus, resulting in calcium deficiency in the sheep. In addition, calcium requirements are increased in late pregnancy and lactation. Add 1–1.5% ground limestone to grains and cereal/grassy hays. A loose lick of 1:1 limestone and salt is an alternative. Avoid putting stress on sheep through means such as long mustering or transport.

Treatment: Calcium injection. If treated early, recovery can be rapid, but repeated treatment and changes to diet may be required.

Hypomagnesaemia (grass tetany)

Signs: Muscle tremors, violent convulsions and death. Progression is often rapid and easily induced by disturbances such as mustering. Occurs in lactating ewes.

Prevention: The condition is caused by low magnesium intake. Magnesium requirements increase with milk production. Cereals contain low magnesium, and hypomagnesaemia is often seen when grazing cereal forage. The addition of 1% Causmag® to feeds, or the use of a loose lick of limestone, Causmag® and salt in the ratio 1:1:1 during late pregnancy and lactation reduces the risk when ewes are fed deficient diets.

Treatment: Injection with calcium and magnesium solutions may be effective.

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Notes

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