Artificial Rearing of Lambs: Bulletin

The challenging weather seen over the winter of 2012/2013 may result in an increase in the number of lambs requiring artificial rearing. For some flocks, where triplets and quads are common place this is a continual requirement of the farming system. With the right management there is no reason why survival rates in artificially reared lambs should be significantly different from those raised on the ewe. Critical to the success is that lambs receive adequate colostrum, are regularly fed and high levels of hygiene maintained.

Ten steps to successful artificial rearing

1. Focus on ewe nutrition at least 10 weeks pre-lambing
2. Plan ahead for artificial rearing
3. Ensure adequate colostrum intake
4. Focus on hygiene
5. Ensure regular feeding
6. Minimise group size and match for age
7. Identify an isolation facility
8. Encourage early consumption of creep feed and wean abruptly once targets are met
9. Plan preventative treatments and vaccination programme
10. Know your lamb performance

Artificially reared lambs at 12-14 weeks of age

Do not accept high loss rates in artificially reared lambs. They are not inevitable!
1. **Focus on ewe nutrition at least 10 weeks pre-lambing**

Ewe body condition has a significant impact on both the quantity and quality of colostrum produced. With changes in ewe condition being difficult to achieve in the last 4 weeks of pregnancy, ewes should be carefully managed through tupping and early and mid-pregnancy to ensure target condition scores are met. Further focusing on ewe condition should occur just after scanning, allowing any deficits to be addressed in time for lambing. For multiple bearing ewes in late pregnancy a quality source of protein in the diet also improves her ability to feed two lambs. This should ideally be in the form of soya with the level of any supplementary feeding required dependent on ewe condition, forage analysis and number of lambs scanned.

**Steps for success**

- Regularly condition score ewes
- Sort ewes after scanning
- Analyse forage and plan feeding levels
- Select a quality compound

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2. **Plan ahead for artificial rearing**

Where ewes are in poor condition in the weeks leading up to lambing a ‘worst case’ plan should be put in place. Furthermore, unexpected poor weather can also lead to an increase in the number of lambs requiring artificial rearing particularly for outdoor lambing flocks. With sufficient stocks of colostrum and milk powder along with appropriate facilities a great deal of stress can be avoided!

**Steps for success**

- Set plenty of space aside for artificially reared lambs
- Keep a supply of colostrum for emergencies
Where a triplet born lamb is to be artificially reared consider which is the most appropriate for removal. Some suggest removing the strongest lamb for artificial rearing. The aim should be to leave the ewe with two well matched lambs and this is likely to be the main determiner of which lamb to remove.

Where a number of people are involved at lambing time make sure each is aware of how to deal with lambs requiring artificial rearing – develop a checklist which can be easily referred to.

3. Ensure adequate colostrum intake

Colostrum is the key to lamb survival. If a lamb does not receive enough colostrum, it can succumb to early diseases such as watery mouth. Future immunity will also be compromised with increased risk of joint ill and general infections. With maternally derived antibodies providing protection for a number of weeks ensuring adequate colostrum intake is vital to maximising lamb survival.

It is imperative that the lamb receives colostrum as soon as possible; this is because there is only a short window of opportunity where the lamb’s intestines are able to absorb the antibodies contained in colostrum. After this period, the digestive enzymes of the stomach destroy any ingested colostrum.

An adequate amount of colostrum should be received by the lamb within the first 6 hours of life and ideally within the first 3 hours. Further colostrum is needed to ensure the increased energy requirements of lambs are met over the first 24 hours.
Lamb weight | Requirement for natural colostrum from the ewe
---|---
**Within 6 hours of birth** | **First 24hrs**
50 ml per kg | 200 ml/kg
3kg | 150 ml | 0.6 litres
4kg | 200 ml | 0.8 litres
5kg | 250 ml | 1 litres
6kg | 300 ml | 1.2 litres
7kg | 350 ml | 1.4 litres

* for lambs born outside colostrum requirements should be increased by 15%

Ewe colostrum is the best food for the newborn lamb and in some flocks excess colostrum from ewes with single lambs can be stored. Care should however be taken to ensure that the ewe’s own lamb receives sufficient colostrum. From the table above, a 6kg lamb needs over 1.2 litres of colostrum in the first 24hrs.

In some instances, the sharing of colostrum amongst lambs from different ewes should be avoided due to an underlying disease such as Johnes or Maedi Visna. The decision on how to use colostrum from other ewes in the flock is best discussed with farm veterinary surgeon and should be referred to in the flock health plan.

Cow colostrum can make a useful substitute for the ewe’s own colostrum. Feed levels need to be increased by 20-40% to account for the lower nutrient levels present. Ideally, cows will have been vaccinated with a clostridial vaccine before they calve to improve the quality of the colostrum but veterinary advice should be sought on whether this is appropriate. Disease risks should also be considered and in some cases individual cows can produce colostrum which subsequently leads to severe anaemia in 1-2 week old lambs. Pooling of cows colostrum can help reduce the risk.

Many flocks now use artificial colostrum as a substitute. Differences exist in the quality of colostrum products sold. The challenge for those looking to purchase the best product is that manufacturers are not allowed to make claims on the antibody levels contained in the product or claims that the product reduces disease as they are not licensed as medicines. This is also something which can be discussed with the vet well in advance of the start of lambing.

**Steps for success**

- **Keep an eye on colostrum quality.** Colostrum from well fed ewes should be thick and yellow. Pale, watery colostrum is an indicator of poor nutrition pre-lambing.
- **Do not try and replace the first feed of colostrum with milk.** As well as containing antibodies colostrum also contains significantly higher fat and protein content.
- **Have a back-up of artificial colostrum available and speak to the veterinary surgeon about selecting the most appropriate product.**
4. **Focus on hygiene**

Bacteria multiply in warm, moist conditions so both bedding and feeding equipment provide an ideal environment for rapid proliferation. Regular cleaning and disinfection therefore underpins successful artificial rearing.

A cleaning procedure should be put in place for all equipment used around lambs. Stomach tubes and feeding bottles should be cleaned after each use and where milk buckets or fully automated machines are used these should be regularly cleaned including teats and pipes.

Warm water and detergent is suitable in most cases but where a disease problems occurs a sterilisation procedure should be put in place using either an appropriate product or through boiling where this is appropriate.

**Steps for success**

- If possible ensure access to warm water and ideally a kettle for sterilising equipment
- Select a suitable sterilising agent which will work in the presence of organic matter and is safe for use around ewes and lambs

5. **Ensure regular feeding**

Young lambs need to be fed three to four times daily, which is a time-consuming task. Often, lambs are not fed correctly and end up as runts and this is probably the main reason why pet lambs are unwelcome on many sheep farms.

Unless very few lambs are present bottle feeding is not a suitable method for artificially rearing lambs. Whilst it is possible to hire fully automated feeding systems for rearing lambs these machines are most cost-effective when in excess of 70 lambs are reared annually. It is however possible to purchase feeders which upon mixing the milk manually keep the milk warm. These feeders are particularly useful for the initial stages of lamb rearing where lambs are being trained. Design of these feeders also means that lambs can learn from one another and whilst this doesn’t remove the need for human intervention it can speed up the process of training lambs. A further option is to use ‘milk bars’ with lambs offered cold milk on an ad-lib basis. This can help reduce the incidence of digestive disturbances and help prevent gorging.

Whatever system is used for feeding it is vital to ensure that any equipment is regularly cleaned and any remaining milk regularly replaced.

<table>
<thead>
<tr>
<th>Bottle feeding</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td></td>
<td>Easy to monitor intake and health of individual lambs</td>
<td>Time-consuming</td>
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<tr>
<td></td>
<td>Easy cleaning and disinfection</td>
<td>Difficult to feed lambs sufficient quantities</td>
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<td></td>
<td>Reduced risk of disease spread</td>
<td>Requires a regular feeding pattern</td>
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<td></td>
<td></td>
<td>Increased risk of digestive upset</td>
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<td></td>
<td></td>
<td>Lower growth rates</td>
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<tr>
<td></td>
<td></td>
<td>Capital outlay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very low</td>
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</tbody>
</table>

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**Bottle feeding**

Advantages: Easy to monitor intake and health of individual lambs, easy cleaning and disinfection, reduced risk of disease spread.

Disadvantages: Time-consuming, difficult to feed lambs sufficient quantities, requires a regular feeding pattern, increased risk of digestive upset, lower growth rates.

Capital outlay: Very low.
### Milk bars or buckets

**Advantages**
- Little and often approach to milk consumption
- Reduced labour requirements
- Can supply cold milk which will reduce the risk of gorging

**Disadvantages**
- Excess milk will need disposal
- Increased cleaning and disinfectant requirements

**Capital outlay**
- Low

### Heated nested buckets

**Advantages**
- Provides constant access to warm milk
- Can help with initial training of lambs
- Little and often approach to milk consumption
- Reduced labour requirements

**Disadvantages**
- Relatively small bucket size can reduce suitability for groups of older lambs
- Excess milk will need disposal
- Increased cleaning and disinfectant requirements

**Capital outlay**
- Medium

### Fully automated machine

**Advantages**
- Reduced labour requirements
- Fastest growth rate
- Provides constant access to warm milk
- Little and often approach to milk consumption

**Disadvantages**
- Routine maintenance vital including weekly calibration

**Capital outlay**
- High (but can be rented)

### Steps for success

- **Begin the lambing season by weighing milk powder and carefully making up the correct dilution rate**
- **Train the lambs to feed from the teat as soon as possible after colostrum has finished being fed. If training to use an automated feeder (including milk bar or bucket) try and avoid bottle feeding first. It can help to have a lamb which is already trained in the pen but make sure it doesn’t lead to bullying**
- **Only use milk powder specifically produced for lambs**
- **For automatic feeders check teat height allows all lambs to feed easily and adjust as lambs grow**
- **Keep bedding round the feeding area dry**

### 6. Minimise group size and match to age

Despite the best of efforts, some lambs being artificially reared will be more vulnerable to infection and disease. Minimising the number of lambs in each group will help reduce both the exposure to disease organisms as well as reduce its spread should a disease outbreak occur. Ideally group sizes should be limited to 10 lambs but group sizes up to a maximum of 25 can be practised if the lambs are matched to age.
Steps for success
Set aside a number of pens for artificial rearing so lambs can be kept in small groups of similar ages.

Consider introducing a system of marking lambs according to week or date of birth. This will also help with the weaning process (see later section). This can be as simple as a different coloured spray mark for each week of lambing.

7. Identify an isolation facility
Ideally, all lambs identified for artificial rearing should undergo a 48 hour ‘quarantine’ period. These lambs don’t necessarily need to be in isolation from other similarly aged animals but should remain separate from any ‘established’ lambs. Many of the problems affecting young lambs are infectious so isolating any potential issues can significantly improve survival rates of all artificially reared lambs and also reduce the overall labour requirements associated with their management.

Facilities should also allow for easy cleaning of the pen should an infection occur and a specific isolation area identified. Where a lamb is showing signs of disease such as drooling or scouring the lamb should be immediately be placed in the designated ‘isolation’ facility. Separate feeding utensils should be used for such lambs and whilst affected lambs can remain in the same building (for ease of management) there should be sufficient distance between affected and non-affected lambs to prevent cross-transfer of disease. It is vital to ensure such lambs can be easily accessed so that timely feeding can still be carried out as well as any veterinary treatments required.

Steps for success
- Try and keep lambs of different ages separate.
- Isolate any lambs showing any signs of disease.
- Seek veterinary advice before lambing begins on the most appropriate antibiotics and anti-inflammatory painkillers for use in diseases affecting young lambs.
- Keep a record of lamb losses – diseases such as watery mouth are a sign of poor colostrum intake and can indicate underfeeding of ewes pre-lambing.

Infrared lamps can help revive hypothermic lambs and improve the welfare of very young lambs but avoid their use in older lambs as they can increase the risk of disease build up.

Isolation facilities can help prevent the spread of disease.

8. Encourage early consumption of creep feed and wean abruptly once targets are met
Abrupt removal of milk is the most appropriate method of weaning and successful artificial rearing requires a balance between minimal use of milk powder and maximum performance. In practice lambs should not be weaned before 35 days of age and removing the milk supply from lambs less than 30 days old will severely compromise future performance. Given the relative cost of milk powder as compared to lamb creep it is vital that lambs begin consuming creep feed at a young age. Fresh feed and water should therefore be made available from 7-10 days of age. A source of palatable fibre such as well-made hay should also be available. Consumption of creep should be monitored with the final decision on when to wean based on the following;
- Minimum age of 35 days
- Minimum weight of 10kg and ideally 2.5 times their birth-weight
- Minimum creep consumption of 250g/day

<table>
<thead>
<tr>
<th>Birth-weight</th>
<th>Minimum weight at weaning</th>
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<tr>
<td>3kg</td>
<td>7.5kg</td>
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<tr>
<td>4kg</td>
<td>10kg</td>
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<tr>
<td>5kg</td>
<td>12.5kg</td>
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<tr>
<td>6kg</td>
<td>15kg</td>
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<tr>
<td>7kg</td>
<td>17.5kg</td>
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A common observation on many farms is that lambs that have been artificially reared look well until they are turned out to pasture after weaning. No research has been carried out on the cause of this change in performance but in practice this is likely to be due in large part to worm and general disease challenges.
Unless lambs have access to very high quality pastures, in most cases creep feeding will be required to substitute the ewe’s milk. This can lead to additional disease challenges such as coccidiosis and scald/footrot. Preventative health planning can however help reduce such problems.

With good management artificially reared lambs can often be fit for sale within 12 to 14 weeks of age and in this case artificially reared lambs are best housed until this point.

Adequate space, ventilation and dry bedding are vital to ensure maximum performance is achieved. Where lambs do require turnout to grass, selecting a ‘safe’ pasture with a low worm challenge can improve performance. Lambs should also be well identified if added to a group of naturally reared lambs and every effort should be made to ensure all lambs are included in routine vaccinations and preventative treatments.

**Steps for success**
- Set targets for weaning and remove milk abruptly
- Housed lambs will perform best with good ventilation (but no draughts), plenty of space and an ample supply of dry bedding
- Continual access to fresh water, a fresh supply of creep feed and a good quality source of forage will further improve lamb performance

**9. Plan preventative treatments and vaccination programme**

Lambs reared artificially have sometimes suffered significant challenges early in life. Where colostrum intake in particular has been compromised these animals will be more prone to disease in the future. Even where high levels of hygiene are practised these lambs can also suffer from increased disease challenges. Many of these problems can however be overcome with appropriate use of preventative treatments and vaccinations. Each flock is unique and the farm’s own veterinary surgeon is best placed to advise on a suitable health plan specifically aimed at any lambs that are artificially reared.

**Steps for success**
- Consider the health needs of artificially reared lambs
- Put a plan in place before lambing but be prepared to adjust depending on the health needs of a particular group
- Record any deaths and promptly investigate significant losses or problems occurring in the lambs

**10. Know your lamb performance**

Whether artificially rearing lambs is cost-effective will depend on a number of factors. Time of lambing is probably the most important element. Early lambing flocks where artificially reared lambs are sold at 10-14 weeks of age without turnout to pasture are most likely to lead to a return on investment.

The biggest influence on profitability is however likely to be the loss of lambs due to disease or poor performance. Lambs which fail to thrive and grow are the biggest concern for many flocks but with good management and careful planning these cases are avoidable.
Monitoring the costs associated with artificial rearing is a vital step in calculating the returns from the system.

The table below provides an example of what could be recorded. The list is not prescriptive and although it can seem like a great deal of effort at the busiest time of year a simple blackboard in a handy location can be used to keep track of all the inputs used.

<table>
<thead>
<tr>
<th>Input</th>
<th>Cost per unit</th>
<th>Number used</th>
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<tbody>
<tr>
<td>Feeds of colostrum</td>
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<tr>
<td>Bags of milk powder</td>
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<td></td>
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<tr>
<td>Bags of creep feed</td>
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<tr>
<td>Bales of hay</td>
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<td>Bales of straw</td>
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Poor management will inevitably lead to uneconomic artificial rearing.

Limit the number of lambs requiring artificial rearing through good feeding and the right genetics.

The European Agricultural Fund for Rural Development: Investing in Rural Areas
Capital outlay
  e.g. heated feeder

Disposal charges
  * Don’t forget to make an allocation for the additional labour required to rear these lambs

Lamb deaths, particularly later losses, have an impact on profitability and a careful note of how many and when losses occur should be kept. The following table provides an indication of the type of information that is of use.

<table>
<thead>
<tr>
<th>Date</th>
<th>Approximate age</th>
<th>Reason died (if known)</th>
<th>Treatments given before death</th>
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Whilst highlighting all the costs associated with rearing lambs is vital, it can also underestimate the potential income that can be generated from a well-managed rearing system. The table below can be used to indicate the cost-benefit of artificial rearing.

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of lambs sold</th>
<th>Average sale weight</th>
<th>Average sale price</th>
<th>Income (remember to consider deductions and transport costs in the final calculation)</th>
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Steps for success
  - Minimise the number of ewes dying after lambing and therefore reducing the number of lambs that require artificial rearing
  - Avoid keeping old ewes in the flock and cull any ewes with udder problems
  - Consider whether ewe nutrition is sufficient to optimise colostrum production and subsequent milk yield
  - Where significant numbers of triplets and quads occur, carefully consider whether these are contributing to, or reducing flock profitability
  - Focus on maximising returns from inputs used rather than simply cutting costs

Checklist for successful artificial rearing
  - Are ewes in good condition at lambing with all veterinary preventative treatments up-to-date?
  - Does everyone helping at lambing know the system of making sure all lambs have had sufficient colostrum?
  - Are suitable facilities in place for lambs requiring artificial rearing?
Are isolation facilities available?

Is there a system in place for identifying when lambs are ready for weaning?

Is there a system in place for noting lamb deaths and identifying the main causes?

Has the flock health plan considered the needs of artificially reared lambs?

Can the number of lambs needing artificial rearing be reduced through changes in flock management?