Managing replacement heifers for Better Returns
The information in this booklet was compiled by Dr Mary Vickers, AHDB Beef and Lamb with technical input from Scotland’s Rural College (SRUC).

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Heifers are the lifeblood of a herd and a valuable source of new maternal genetics. A maiden heifer requires significant investment whether she is bred and reared on the farm or purchased.

Heifer selection can start before the calf is born, as choosing the right parents is vital to ensure new females fit the production system and meet performance targets.

Once she has been born, she must be managed in a way that optimises her fertility and reproductive output, while minimising any health issues.

Replacements contribute to the new genetic make-up, cost structure and productivity of the herd. Having the right type of animal coming in is crucial for long term herd profitability.

This manual provides advice on sourcing, selecting and managing replacement heifers so they can become productive members of the breeding herd.

Mary Vickers
Senior Livestock Scientist
AHDB Beef and Lamb
Purchasing replacement heifers

Sourcing healthy, fertile replacement heifers that fit a farm's production system is vital to any suckler herd. The decision about purchasing or breeding home-bred heifers needs to be considered carefully.

The main advantage of purchasing heifers lies in its simplification of herd management. All cows are bred to a terminal sire and there are fewer groups of stock on the farm. It also enables more breeding cows to be kept.

The following points need thinking about when purchasing replacement heifers:
• Will they have good maternal traits?
• Will they reach target service weight at the start of the breeding season?
• If purchased in-calf, have they been bred to a desired/known bull with good calving ease characteristics and will they calve at the start of the calving period?
• Can an even batch of heifers of known health status be sourced from a herd operating within a recognised cattle health scheme? A list of accredited schemes can be found on the Cattle Health Certification Standards (CHeCS) website www.checs.co.uk.

Breeding heifers should be purchased well ahead of the breeding season and allowed at least two months to settle into their new surroundings. Screen for infectious diseases and treat or vaccinate according to the herd health plan.

Aim to have heifers calving in the first six weeks of the target calving period.

Dairy cross or beef cross?

Producers buying replacements must decide whether to source them from a beef herd or a dairy herd.

Dairy cross heifers are likely to be:
• Good milkers
• Easy calving
• Potentially more docile than beef-bred females

However:
• There may not be enough of the breed type and health status required
• Their conformation may be too extreme
• Robustness and longevity may be an issue. This will depend on the genetic base of the herd they came from
• Beware that dairy cows may be served with beef semen as a control measure for health or fertility issues, which may lead to subsequent problems in the suckler herd

Beef-bred heifers may have better conformation and growth characteristics. However, it is important they also have the vital maternal traits to become a good suckler cow.
The health risks

Buying in stock is the most common way for new diseases to arrive on farm.

Before agreeing to a purchase, it is crucial to ask the vendor if they are in a CHeCs accredited scheme, what diseases they test for and more importantly, what the results are.

Do not rush any buying decisions. Consult a vet to plan how to manage the introduction of purchased breeding stock. Testing animals before they come may be more effective than testing them once they arrive.

Quarantine all bought-in stock for at least three weeks, until all treatments and tests are complete and the results have been received.

Follow an active health plan that covers vaccination, internal and external parasite treatments.

Consider testing for:
- Bovine Viral Diarrhoea (BVD)
- Campylobacter
- Infectious Bovine Rhinotracheitis (IBR)
- Johne’s disease
- Leptospirosis
- Bovine tuberculosis (TB)

Serious outbreaks of these diseases will cause major financial loss to a beef business.

A buyers checklist for breeding cattle is available at beefandlamb.ahdb.org.uk.

Levels of risk

Different replacement policies have different levels of herd health risk associated with them (Table 1).

Table 1: Risk assessment guidelines for common replacement policies in relation to five important beef cattle disease which affect fertility

<table>
<thead>
<tr>
<th>Common replacement policies</th>
<th>Level of risk that each policy holds for each disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BVD</td>
</tr>
<tr>
<td>Purchase of bulling heifers from accredited free herds</td>
<td>low</td>
</tr>
<tr>
<td>Purchase of bulling heifers from herds of unknown status</td>
<td>moderate</td>
</tr>
<tr>
<td>Purchase of in-calf heifers from herds of unknown status</td>
<td>mod-high</td>
</tr>
<tr>
<td>Purchase of cows with calves at foot</td>
<td>mod-high</td>
</tr>
</tbody>
</table>

Adapted from: QMS – A Guide to Improving Suckler Herd Fertility
## Retaining home-bred replacements

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good knowledge of breeding history and health</td>
<td>Can limit the size of the herd by using up land and feed</td>
</tr>
<tr>
<td>Parents can be selected based on specific desirable traits</td>
<td>May not have the desired genetics for maternal traits</td>
</tr>
<tr>
<td>No risk of buying in health problems. Animals will be resistant to some on-farm infections and already part of the farm health plan</td>
<td>May require the purchase of another bull with good maternal traits. Bull calves from a maternal bull may be of lower value than if they were bred from a terminal sire</td>
</tr>
<tr>
<td>Heifers are managed to the herd's own protocol over which the herd owner has full control</td>
<td>More groups of cattle to manage</td>
</tr>
<tr>
<td>May provide a good batch of similar sized heifers with same breeding background</td>
<td>May be difficult to find an even batch of heifers if the calving season has been protracted</td>
</tr>
</tbody>
</table>

Successful breeding of home-bred replacements relies on making a conscious decision to use a sire with strong maternal traits on some of the herd’s cows.

Any use of a purchased or hired stock bull represents some risk of introducing disease. Risks can be minimised by sourcing young bulls that have not mated any females and that come from accredited herds.

### Contract-reared heifers

Contract-rearing heifers is a growing practice in the dairy industry. Specialist units focus on producing high quality, healthy animals. This frees up space, feed and labour on the herd owner’s farm. Contracts usually apply to heifers from weaning to four to six weeks before calving. They are generally costed on a daily or per kg liveweight gain basis. Detailed knowledge of the costs involved in rearing heifers and a well-planned contract, detailing performance targets and health protocols, are essential for a successful contract-rearing arrangement.
How many heifers are required?

The rearing of heifer replacements on farm can tie up significant resources and as a consequence reduce the size of the breeding herd. The two factors which have the biggest impact on the total number of heifer replacements required are:

- Cow longevity
- Age at first calving

Table 2 shows that three times as many replacements are required for a herd that calves heifers at three years of age and only rears four calves per cow, compared to a herd calving heifers at two years of age and rearing eight calves per cow.

Table 2: Factors affecting the total number of heifer replacements on farm

<table>
<thead>
<tr>
<th>Number of calves reared per cow</th>
<th>4</th>
<th>6</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement %</td>
<td>25</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Age at first calving (yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(100-cow breeding herd)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of replacements on farm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>33</td>
<td>25</td>
</tr>
<tr>
<td>2.5</td>
<td>63</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>50</td>
<td>38</td>
</tr>
</tbody>
</table>

In the case of home-bred replacements, more heifers need to be born than are required as breeding females. This is because not all weaned heifer calves will meet the standard for entry into the herd, perhaps due to poor physical soundness, temperament or performance and not all will become pregnant in a short six to eight week service period.

Given that heifers going to the bull were conceived at least two years previously, planning ahead is vital. It is always better to have too many heifers than too few.

Mating a relatively large group of heifers (ie more than are needed as replacements), at the start of the breeding season has two advantages:

- Only those heifers that become pregnant in a short six week breeding season can be kept for breeding, allowing the others to be finished or sold. This means only the most fertile heifers join the herd
- These heifers will then calve at the beginning of the next calving season the following year, allowing them time to recover before the next breeding season starts
Investing in the right genetics

Replacements contribute to the new genetic make-up of the herd. Having the right type of heifers joining the herd is crucial for long term profitability.

A bull chosen to produce heifers should be used at the start of the breeding period. This means potential breeding females will be born early in the season and are likely to reach target weight for the start of the subsequent breeding period.

Sire selection tools

Estimated Breeding Values (EBVs) provide an assessment of an animal’s breeding potential for a specific trait. There is a range of EBVs for important traits related to breeding productive suckler cows.

**Calving ease**

- **Calving Ease – Direct EBV**
  Identifies bulls whose progeny will require less assistance when they are born

- **Calving Ease – Maternal EBV**
  Identifies bulls whose female progeny will require less assistance when they calve themselves as breeding females

- **Birthweight EBV**
  Enables sires to be selected that will produce smaller calves at birth, which are likely to be born more easily

- **Gestation Length EBV**
  Enables producers to shorten gestation length

**Fertility**

The age at which heifers reach puberty and become sexually active varies between breeds, e.g., native breeds tend to mature earlier than continental ones.

There is also within-breed variation that can be exploited by using the EBVs below.

- **Age at First Calving EBV**
  Identifies female breeding lines that are reproductively active and able to conceive at an early age

- **Scrotal Circumference EBV**
  Increasing scrotal circumference in bulls enhances reproductive performance in both male and female progeny

- **Calving Interval/Days to Calving EBV**
  Identifies females that have a shorter interval between successive calvings

**Growth**

Heifers must reach their target weight by first service and go on to produce calves that grow efficiently, so genetics for good growth are important. They must also have sufficient milk to enable fast rates of calf growth to weaning.

- **200 Day Growth EBV**
  Indicates breeding potential for growth to 200 days

- **200 Day Milk EBV**
  Identifies breeding lines that will produce more milk
Maternal performance

Suckler cow performance is a culmination of many traits but fertility, calf growth, mature size and longevity all have a bearing on profitability.

However, not all these traits are complementary. For example, over-emphasis on milk production may have detrimental effects on fertility ie, if the cow struggles to maintain body condition because she is putting a lot of her energy into milk production. On the other hand, milk is a key driver of calf growth.

Fat depth is another area for consideration. Whilst lean carcases are desirable in the slaughter generation, a breeding female requires a reasonable level of fat cover to maintain body condition and fertility, particularly in harsher environments or if outwintered. A balance needs to be found when selecting an appropriate sire.

Look out for bulls that have good EBVs for 200 day growth but moderate mature size.

- **Mature Size EBV** Estimates the weight of the mature cow
- **Longevity EBV** Estimates how long cows will be reproductively active within the herd

NB: Selecting to improve growth rates will lead to bigger mature cows. Larger cows need more feed to maintain body condition and therefore fertility. This cost may outweigh any advantage in calf performance and cull cow value associated with selecting for improved growth rates.

**Figure 1: Example of EBVs for a bull that would be suitable for breeding replacement heifers, given his good figures for calving ease, growth and milk**

For further information go to beefandlamb.ahdb.org.uk and look at BRP+ Breeding female replacements for the suckler herd.
Breeding options

Selective mating
In large herds, or when artificial insemination (AI) is used, cows or heifers can be selected to be individually bred to a specific bull to produce replacements. If previous heifer selection has been based on the genetic merit of their sire and dam (based on EBVs), female calves born to first calvers should be the highest genetic merit females in the herd.

Cross-breeding
Whether sourcing beef or dairy-bred heifers, it is worth capitalising on the benefits of cross-breeding. This provides valuable hybrid vigour – an increase in performance of the cross-bred offspring over and above the average performance of its two parents. This is particularly important for traits with low heritability such as fertility, calf survival, longevity and other maternal traits. The effect of hybrid vigour on crossbred cows is shown in Table 3.

Table 3: The positive effects of hybrid vigour on cows

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception rate</td>
<td>+ 10%</td>
</tr>
<tr>
<td>Calving ease</td>
<td>+ 10%</td>
</tr>
<tr>
<td>Number of calves weaned</td>
<td>+ 7.5%</td>
</tr>
<tr>
<td>Milk yield</td>
<td>+ 5 -10%</td>
</tr>
</tbody>
</table>

Age at first calving
The age a heifer calves for the first time can have a significant impact on the total number of calves she produces during her lifetime. Well-managed heifers calving down at two years of age will produce more calves and be more profitable than heifers calving for the first time at three years old.

Whilst calving heifers at two years of age may not suit every herd, if managed well it can improve herd productivity significantly. It allows fewer groups of stock to be kept on the farm and at least 10% more productive cows in the herd than when calving heifers at three years of age.

Work in Ireland has demonstrated that for spring-calving, grass-based suckler systems, delaying age at first calving from 24 to 36 months of age, decreased net margin per hectare by 50%.

Calving at two years also reduces the time between generations, leading to a faster rate of overall genetic improvement in the herd.

Calving at older than two years of age
Farmers purchasing heifers, or running spring and autumn-calving herds on the same farm, can calve heifers at ages between two and three years. However the same principles of heifer selection and management apply as for calving heifers at 24 months of age. Regular weighing is essential to monitor growth and ensure performance is on track to meet liveweight targets.
Selecting replacement heifers

At birth

Select heifers born in the first half of the calving period, ideally in the first six weeks. These heifers are likely to be the oldest and heaviest, and are likely to be cycling when service starts. Later-born heifers have to grow faster to reach their target weight at first service and in doing so, risk laying down fat rather than growing frame.

Record any heifer calves born with a bull twin calf (freemartin) as they are highly likely to be infertile and should not be bred from.

Take note of the dam’s temperament, udder shape and teat placement soon after calving to check she has suitable maternal traits to pass onto the next generation.

At weaning

Growth rate

Calf growth rate from birth to weaning is a good indicator of the dam’s milking ability and the calf’s genetic potential for growth. When comparing calf growth rates take account of any creep feed offered, calf sex and cow age.

Larger cows cost more to feed. By keeping heifers from moderately sized cows that have reached their target weight at weaning, future feed inputs can be reduced, whilst maintaining or improving calf weights.

Heifers usually start cycling once they reach around 50% of mature weight. Keep young heifers separate from bulls from the age of five months to avoid any unplanned matings.

Structural soundness

Heifers must have sound legs and feet and be able to move well. Also take into account the structural soundness of the parents.

Temperament

Do not keep flighty and excitable heifers or heifers from flighty cows. Early life experiences of calves can have a significant effect on their lifetime temperament.
Target weights for replacement heifers

Heifers that are well grown at first service will continue to grow until maturity at around five years of age. Table 4 shows target liveweights for heifers joining the herd which are aiming to calve at two years of age.

Table 4: Example growth rates and liveweight targets for replacement heifers aiming to calve at 24 months of age

<table>
<thead>
<tr>
<th>Mature cow weight</th>
<th>Growth rate from birth to first service (kg/day)</th>
<th>First service (15 months of age)</th>
<th>Start of second breeding season</th>
<th>Start of third breeding season</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of mature weight</td>
<td></td>
<td>65</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td>600kg</td>
<td>0.80</td>
<td>390</td>
<td>510</td>
<td>570</td>
</tr>
<tr>
<td>650kg</td>
<td>0.85</td>
<td>423</td>
<td>553</td>
<td>618</td>
</tr>
<tr>
<td>700kg</td>
<td>0.90</td>
<td>455</td>
<td>595</td>
<td>665</td>
</tr>
</tbody>
</table>

The weight gain targets are expressed relative to mature cow weight, so it is important that recorded mature cow weights are used to calculate them. A good indication of mature cow weights can be gained from sale weights of cull cows, provided they are sold in reasonable body condition.

To calve at two years old, a heifer must conceive by 15 months of age. Assuming heifer calves grow at around 1.0kg/day whilst suckling their dam, subsequent growth rates to bulling need to be approximately 0.7-0.8 kg/day, depending on breed type.

However, liveweight is a more important determinant of onset of puberty than age, so monitoring weight gain to ensure heifers have grown sufficiently well to be heavy enough at first service is vital.

If heifers fail to reach their liveweight targets but do conceive, they are more likely to struggle to become pregnant as second calvers. This is due to increased nutrient demand post-calving, making it difficult for them to maintain sufficient body condition whilst growing themselves, feeding a suckling calf and potentially supporting another pregnancy.

The growth rates required for heifers to calve successfully at two years of age are achievable in most systems. Ideally this requires breeding heifers to be managed as a separate group, given access to good quality grazing and supplemented during the winter according to silage quality.

Regular weighing is essential to keep them on track to meet their liveweight targets.
Weaning to breeding

For spring-calving herds the time between weaning and breeding is during winter. Performance of those weaned heifer calves will be determined by the quality of the silage offered and level of supplementation.

- Calculate a target growth rate for this period
- Send off forage samples for nutritional analysis
- Formulate a ration to meet the animals’ nutrient requirements
- Offer appropriate vitamin and mineral supplementation

Nutrition pre-breeding

Maintaining a steady growth rate after weaning is crucial. The aim is to keep heifers growing well without getting over-fat.

Creep feeding replacement heifers enables weaning weight to be maximised whilst minimising the weaning check. For spring-born heifers, excessive growth rates during their first winter should be avoided (>1.2 kg/day), particularly during the two to three months before they go outside. Heifers should not have any signs of patchy fat on the tail head and should be fed a high forage diet pre-turnout, so they can acclimatise to grazing as quickly as possible.

Table 5: Concentrate feed rates for spring-born heifer calves fed different quality silages

<table>
<thead>
<tr>
<th>Average liveweight over winter</th>
<th>Target growth rate</th>
<th>Poor quality (DM = 20%, ME = 9.5MJ/kg DM, CP = 10%)</th>
<th>Good quality (DM = 30%, ME = 11.5MJ/kg DM, CP = 16%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300kg</td>
<td>0.8kg</td>
<td>3.7</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>1.0kg</td>
<td>N/A</td>
<td>3.2</td>
</tr>
<tr>
<td>400kg</td>
<td>0.8kg</td>
<td>4.1</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>1.0kg</td>
<td>N/A</td>
<td>2.9</td>
</tr>
</tbody>
</table>

*Assuming concentrate value of 12.5 MJ ME/kg DM and 12% CP in the DM.
N/A = Not achievable with a minimum of 45% long roughage in the DM.

If concentrates are fed at more than 0.5kg per 100kg liveweight (LW), they should be given in two feeds per day. Quantities above 4kg per day should include a source of digestible fibre such as sugar beet pulp.
At grass

If well managed, good quality grass can sustain growth rates of more than 1kg per day in weaned cattle, particularly during spring.

However, this growth rate can be difficult to maintain over the whole season if grass quantity and quality declines. Grazing grass at the right height will optimise the quality of forage eaten over a longer period (Table 6).

Table 6: Sward height targets for grazing growing beef cattle

<table>
<thead>
<tr>
<th>Grazing period</th>
<th>Rotational grazing</th>
<th>Set stocking (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-grazing (cm)</td>
<td>Post-grazing (cm)</td>
</tr>
<tr>
<td>Turnout-May</td>
<td>10-12</td>
<td>5-6</td>
</tr>
<tr>
<td>June-July</td>
<td>10-14</td>
<td>6-7</td>
</tr>
<tr>
<td>Aug-Nov</td>
<td>10-15</td>
<td>7-8</td>
</tr>
</tbody>
</table>

For more information on grazing strategies see BRP Beef and Sheep Manual 8: Planning grazing strategies for Better Returns.

Management of autumn-calvers around breeding

Management around mating for autumn-calving replacements can be tightly controlled as it occurs during the winter feeding period. With heifers normally being weaned around three months before housing, they will be well over the weaning check and should not be too fat.

The target is to have heifers on their full winter rations by at least three weeks before the start of mating. Target growth rates should be between 0.7 and 0.8kg per day depending on their mature size. Rations should be kept constant until at least six weeks after mating ends. Thereafter, rations can be adjusted for the rest of the winter to ensure heifers are fit but not fat at turnout. Heifers should be pregnancy diagnosed (PD’d) before going out, remembering that the earliest pregnancy can be diagnosed is five weeks after service.

On spring grass, growth rates will be high – often over 1kg per day. This can potentially result in heifers becoming over-fat and having more calving difficulties. To avoid this, the condition of the heifers should be carefully assessed in June and if necessary, the grazing adjusted accordingly.

Before mating:

• Ensure all health treatments are up-to-date

• Assess trace element status and address any deficiencies identified

• Complete the vaccination programme, eg for BVD or/and Leptospirosis, at least two weeks before service

• Treat all heifers for worms and fluke if required
Serving heifers

Serve heifers for six weeks at the start of the service period so that:

- Only fertile heifers that conceive quickly join the herd
- Heifers will calve early and have more time to recover before the next breeding season starts, than if calved later
- They can be monitored closely at calving time and given assistance if required

Heifers tend to have a longer anoestrus period (the time between calving and when they start cycling) than cows. Calving them early allows for this and minimises the risk of the calving interval slipping beyond 365 days.

Heifers that are being managed to calve down at two years of age need to be born early in the calving season to ensure they are well grown at bulling. Heifers born later than the first six weeks are unlikely to meet the target weight for bulling.

Figure 2: Strict selection and a short breeding period ensures heifers calve at the start of the calving season

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select replacements born early in the calving season (weeks one to six)</td>
<td>Only heifers born during the first six weeks of the calving season are likely to meet the target weight for bulling the following year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Heifers born in the first six weeks of the calving season will be 15-13.5 months old when they go to the bull</td>
<td>Breed for first six weeks of breeding season</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Calving in first six weeks of calving season at approx. 24 months old</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remember: Late-calving heifers usually become late-calving cows.
**Calving difficulties**

Heifers are more prone to calving difficulties than cows, so select a sire to mate the heifers with good EBVs for:

- Calving ease – direct
- Short gestation length
- Low birthweight

Calving difficulties will often reduce subsequent fertility so should be minimised by good sire selection and nutritional management. Calving heifers older than two years will not necessarily reduce calving problems, as there is a danger they will become over-fat, increasing the risk of a difficult birth.

**Synchronisation and artificial insemination (AI)**

Serving heifers by AI means high genetic merit bulls can be used and sires chosen with important traits for heifers such as calving ease-direct.

Synchronising the mating of heifers before AI allows them all to be inseminated on the same day, which will condense the calving period and enable replacements to give birth early in the season.

Allow just two rounds of AI to ensure only fertile heifers join the herd.

Conception rates can be improved if heifers are:

- 65% of mature weight at service
- At the correct body condition score (BCS) 2.5-3
- Not socially stressed due to mixing groups six weeks before or after service
- Handled calmly by experienced stock people using good handling facilities
- Inseminators are experienced and implement best practice

There are many synchronisation programmes available. Discuss the options with a vet.

For more information see the BRP+ online publication *Al and oestrus synchronisation of beef cattle* at [beefandlamb.ahdb.org.uk](http://beefandlamb.ahdb.org.uk).

**Pregnancy diagnosis (PD)**

Pregnancy scanning can be carried out from around 35 days after breeding to confirm if a heifer is in-calf or not and if she is carrying twins. However, be aware that foetuses can be reabsorbed up to day 42 post-conception. Scanning can also predict calving date in animals that are up to three months pregnant. This is particularly useful to know so rations can be planned accordingly and animals grouped by calving date so that supervision can be targeted.

Late-calving females, which will fall outside the target calving period, can be identified for sale pre- or post-calving.
Breeding to first calving

After service, heifers should be fed for maintenance and growth, as well as for developing the foetus. If possible, heifers should be kept and managed separately from the main herd throughout pregnancy. This means they can be given supplementary feed without being bullied by more dominant herd mates. Pregnant heifers can be grouped with thin cows needing to regain condition. Major adjustments in growth rates should be avoided, particularly in early pregnancy where embryonic loss may occur, or in late gestation where it may adversely affect calf size.

Heifers require a higher quality ration compared to mature cows because they are growing as well as producing a calf, as shown in Table 7. The aim should be a steady rate of liveweight gain throughout pregnancy up to the last two months. Maternal weight should then be maintained until calving.

Table 7: Comparison of the nutrient requirements for pregnant heifers (calving at two years of age) and mature cows

<table>
<thead>
<tr>
<th></th>
<th>Heifer in mid pregnancy</th>
<th>Heifer in last two months of pregnancy</th>
<th>Mature cow in last two months of pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heifer/cow weight excluding calf and membranes (kg)</td>
<td>520</td>
<td>580</td>
<td>650</td>
</tr>
<tr>
<td>Heifer/cow weight including calf and membranes (kg)</td>
<td>530</td>
<td>635</td>
<td>705</td>
</tr>
<tr>
<td>Weight gain of heifer/cow herself (kg/d)</td>
<td>0.7</td>
<td>0</td>
<td>-0.25</td>
</tr>
<tr>
<td>Energy requirements (MJ ME/d)</td>
<td>90</td>
<td>92</td>
<td>75</td>
</tr>
<tr>
<td>Crude protein (CP) % of diet</td>
<td>11</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

These targets can be met with the following diets which will also maintain gut fill and keep the animals content.

Table 8: Example diets (kg fresh weight per day) for pregnant heifers and cows

<table>
<thead>
<tr>
<th></th>
<th>Heifer in mid pregnancy</th>
<th>Heifer in last two months of pregnancy</th>
<th>Mature cow in last two months of pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Example diet one</td>
<td>Example diet two</td>
<td>Example diet one</td>
</tr>
<tr>
<td>Silage*</td>
<td>34</td>
<td>-</td>
<td>32</td>
</tr>
<tr>
<td>Straw</td>
<td>1</td>
<td>7.0</td>
<td>2</td>
</tr>
<tr>
<td>Concentrates**</td>
<td>-</td>
<td>4.5</td>
<td>-</td>
</tr>
</tbody>
</table>

*Silage composition: 24% DM, 10.6MJ ME/kg DM, 13% CP in DM
**Concentrates should contain 22% CP in DM
Managing first calvers

Monitoring heifers closely around calving is important, as lengthy and difficult calvings will reduce subsequent fertility and increase the calving interval beyond the ideal 365 days.

Young cows need careful management, even after they have calved for the first and second time, to ensure they have adequate nutrition to meet their greater nutrient demand for growth, as well as maintenance and milk production.

Group them separately with thinner cows so they are not bullied and can be fed for growth and to maintain condition. The feed requirements of freshly calved heifers are greater than those of mature cows, particularly for energy, see Table 9.

If turned out, offer first calvers the best grazing, particularly if grass supplies are low.

In autumn-calving herds it is important to provide supplementary magnesium post-calving to minimise the risk of staggers (hypomagnesaemia).

Early weaning

Heifers are prone to significant body condition loss during their first lactation. It is best to avoid this, as thin cows at weaning struggle to calve easily and conceive the following year.

For those first calvers (or other cows) in poor body condition, early weaning offers a useful means of allowing them to regain body condition before calving.

Table 9: Typical rations for mature suckler cows and first calf heifers in the first three months of lactation

<table>
<thead>
<tr>
<th>Cow type</th>
<th>Liveweight</th>
<th>Liveweight change</th>
<th>Milk yield</th>
<th>Grass silage</th>
<th>Barley kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature cow</td>
<td>650kg</td>
<td>-0.25</td>
<td>10</td>
<td>44</td>
<td>0.8</td>
</tr>
<tr>
<td>First calver</td>
<td>580kg</td>
<td>+0.5</td>
<td>8</td>
<td>38</td>
<td>2.8</td>
</tr>
</tbody>
</table>

One of the key factors for success when calving at two years of age is to feed the heifers as well as possible post-calving. Generally, this applies to spring calvers in the period between calving and turnout and for autumn calvers once they are housed.

In addition, spring-calved heifers should be turned out onto the best grass available and autumn calvers should be the first to be housed, so that they can go onto full winter rations as soon as possible.
Replacement heifer checklist

Use this checklist to ensure your heifers will make good replacements.

<table>
<thead>
<tr>
<th>Performance indicator</th>
<th>Target</th>
<th>Your heifers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heifer liveweight at service</td>
<td>65% of mature weight</td>
<td></td>
</tr>
<tr>
<td>Service period</td>
<td>Six weeks (two AI attempts)</td>
<td></td>
</tr>
<tr>
<td>Liveweight at start second breeding season</td>
<td>85% of mature weight</td>
<td></td>
</tr>
</tbody>
</table>

It is also useful to record and monitor information such as number and severity of assisted calvings, pregnancy rate of first and second calvers, age at culling, reasons for culling and longevity.

Monitoring heifer performance

Measuring performance helps to evaluate current heifer management and identify areas that can be improved. Use a few key targets to monitor the progress of each heifer as they become established members of the herd.

Table 10: Heifer performance targets

<table>
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Other BRP publications available

**Beef BRP**
- Manual 1 – Choosing bulls to breed for Better Returns
- Manual 2 – Marketing prime beef cattle for Better Returns
- Manual 3 – Improving cattle handling for Better Returns
- Manual 4 – Beef production from the dairy herd
- Manual 5 – Feeding suckler cows and calves for Better Returns
- Manual 6 – Improve beef housing for Better Returns
- Manual 7 – Feeding growing and finishing cattle for Better Returns
- Manual 8 – Optimising suckler herd fertility for Better Returns
- Manual 9 – Controlling worms and liver fluke in cattle for Better Returns
- Manual 10 – Better returns from pure dairy-bred male calves
- Manual 11 – Managing replacement heifers for Better Returns

**Joint Beef and Sheep BRP**
- Manual 1 – Improving pasture for Better Returns
- Manual 2 – Improved costings for Better Returns
- Manual 3 – Improving soils for Better Returns
- Manual 4 – Managing clover for Better Returns
- Manual 5 – Making grass silage for Better Returns
- Manual 6 – Using brassicas for Better Returns
- Manual 7 – Managing nutrients for Better Returns
- Manual 8 – Planning grazing strategies for Better Returns
- Manual 9 – Minimising carcase losses for Better Returns
- Manual 10 – Growing and feeding maize silage for Better Returns

See the AHDB Beef and Lamb website [beefandlamb.ahdb.org.uk](http://beefandlamb.ahdb.org.uk) for the full list of Better Returns Programme publications for beef and sheep producers.