

Section 4



Achieving high reproductive performance in beef herds

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Introduction

As calves are the major output, reproductive efficiency is a key factor determining profitability in the beef herd.

- ① What are the main reproduction targets for a beef cow herd?
- ② What determines the reproductive efficiency of the cow or heifer?
- ③ What determines overall herd reproductive efficiency?
- ④ Does breed type influence age at puberty?
- ⑤ How do I deal with late-calving cows?
- ⑥ Is bull infertility a major risk?

Achieving high reproductive performance in beef herds

1 What are the main reproduction targets for a beef cow herd?

Checklist



- Compact calving (80% of cows calved in 60 days).
- A 365-day calving interval.
- Low culling rate (less than 5%) for barrenness.
- Replacement heifers are bred from maternally tested AI bulls.
- 5-6 calves/cow/lifetime on average.
- 0.95 calves reared /cow/ year.
- Less than 5% calf mortality by 28 days.
- Maximum use of cross-breeding (hybrid vigour) to improve cow fertility and calf survival.
- Maximum use of grazed grass.

These targets are extremely challenging for beef herds because of the long pregnancy in beef cows, particularly continental-cross cows bred to continental bulls, long post-calving intervals, and variable heat detection efficiency (where AI is used) and variable conception rates.

Key facts



In Ireland fewer than 10% of heifers first calve by 24 months of age, the calving-to-calving interval is frequently greater than 400 days and less than 75% of cows produce a calf in a 12-month period.

Key term



The time from when a cow or heifer calves to when she begins her reproductive cycle and displays heat is known as the 'anoestrous' period.

2 What determines the reproductive efficiency of the cow or heifer?

1. The interval from calving and return to heat.
2. Heat detection efficiency (where AI is used).
3. Conception rate.

Average intervals from calving to first heat of 50-55 days are common in beef cows, which is almost twice as long as for dairy cows.

Checklist



The main reasons why beef cows have a longer post calving anoestrous interval are:

1. **The strong bond between the dam and her calf.** This is primarily based on sight and smell and to a lesser extent by the suckling effect.
2. **Body condition score (BCS) at calving.** Pre-calving nutrition, as reflected by the BCS of the cow at calving, is the 2nd major factor, and is more important than the level of nutrition after calving. The "cow-calf bonding effect" is compounded by having beef cows in a low body condition score (BCS) at calving.
3. **Heifer effect.** For beef heifers after their first calving, the anoestrous period is usually 10-15 days longer than for mature cows. This is because the heifer needs energy for growth as well as maintenance and milk production.

Begin breeding heifer replacements 2-3 weeks before the main herd so that they will be longer calved at the start of the breeding season following their 1st calving. Heifers should be well grown at planned time of breeding and the breeding period should be restricted to eight weeks. Late-calving heifers usually become late-calving cows.
4. **Season.** There is some evidence that cows that calve in late autumn-winter have a longer post-calving anoestrous interval than cows that calve in late spring/summer. It is not clear whether this is due to day length or feed supply during late autumn/winter. Cows calving during late autumn-winter should be in a higher BCS at point of calving to offset these seasonal effects

Key fact



The role of nutrition

The BCS of a cow at calving is critical in determining when cows commence oestrous cycles after calving. The negative effects of low BCS at calving are only partially reversed by putting cows on a high plane of nutrition after calving. Consequently, producers should regularly body condition score their cows during the dry period. Cows in low body condition score (less than 2.5) should be selected out for additional feeding to reach a target of 3.0 at point of calving (depending on time of calving - see chart below). Cows at BCS greater than 3.5 can afford to lose some body condition without it affecting their subsequent reproductive performance.

Minimum Target BCS for beef cows

Calving season	Calving	Mating	Mid-Pregnancy
Jan-Feb	3.0	2.50	3.0
March to May	2.75	2.50	3.0
Autumn	3.25	2.75	2.25

Conception rate: In beef cows, conception rates of 60-70% are achievable to either AI or natural service unless there are problems with semen quality, AI technique or bull fertility.

Conception rates reach a normal level in cows bred at 60 or more days after calving. However, when cows are bred at 40 days or less after calving, conception rate is usually less than 45% but it is still advisable to breed such cows once breeding has commenced.

Post-calving conception rates are often lower for first-calvers compared to mature cows, which again reflects the young cow's need to grow, maintain herself and produce milk for the calf and calve early as a heifer

3 What determines overall herd reproductive efficiency?

Once cows have begun oestrous cycles after calving it is then the product of heat detection efficiency and conception rate that determine overall herd reproductive efficiency and compactness of calving.

The effect of heat detection and conception rates on the % of the herd that is pregnant at 90 days after the onset of the breeding season:

		Conception Rate %			
		60	50	40	30
Heat Detection	90	96	91	83	71
Rate %	70	89	82	73	61
	50	76	68	59	48
	40	67	59	50	40

With excellent heat detection (90%) and conception (60%) rates, 96% of cows will conceive in a 90-day period (see table). At 70% heat detection and 50% conception just 82 % of the cows are projected to conceive in the same period.

When a bull is running with a herd of cows, heat detection should be very close to 100%. Compactness of conception and subsequent calving will be determined by the conception rate once cows are cycling.

How to

Ensure good conception rates.



In beef cows and heifers conception rate should typically be 60-70%. For a herd using AI:

- Follow the a.m./p.m. rule regarding time of AI
- For DIY AI operators ensure that the inseminate is placed in the body of the uterus or, for skilled operators, place half the straw in each uterine horn.

For herds using natural service, on average about 4% of bulls can be infertile while a further 30% may be sub-fertile resulting in low conception rates and a prolonged calving season next year.

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Ensure that the bull is:

- purchased at least two months before planned start of breeding season.
- placed on a moderate plane of nutrition following purchase.
- regularly checked and is serving the cows.

And that:

- the first cows bred are checked for repeat heats.
- the first cows served are scanned for pregnancy at 30-40 days after service.

The ability of a bull to get cows pregnant is the best test of his fertility.

Key fact

In the heifer, puberty is defined as the age of 1st oestrus accompanied by spontaneous ovulation. A low plane of nutrition reduces growth rate and delays puberty by weeks and months.

4 Does breed type influence age at puberty?

Heifers from dairy breeds or breeds of dairy origin (Jersey, Friesian-Holstein, Simmental) reach puberty at the youngest ages, followed by British beef breeds (Aberdeen Angus and Hereford). Larger continental breeds (Charolais, Limousin and Blonde d'Aquitaine) are oldest when they reach puberty.

Key fact

Conception rate is as low as 20% to 30% following breeding at the first or second heats after puberty and only reaches normal levels at subsequent heats. Therefore, heifers should have reached puberty two months before start of planned breeding.

For seasonally calving herds and where the aim is to calve heifers at two years of age, it is important that all replacement heifers reach a minimum weight at 14 months of age.

Breed	Target weight at 14 months of age (Kg)
Aberdeen Angus X	370
Hereford X	370
Shorthorn X	370
Simmental X	400
Limousin X	420
Charolais X	430

This will ensure that heifers are cyclic at the start of the breeding season and are on a growth trajectory that will ensure that they reach 85-90% of their mature weight at time of 1st calving. The benefits include less difficulty calving and a quicker return to heat after their 1st calving. To achieve these target weights, heifers need to be on a very good plane of nutrition from birth.

Key fact

The later that puberty begins in heifers the longer is their post calving anoestrous period as beef cows.

Key risk

It is possible to get heifers pregnant at lighter weights but after their 1st calving a prolonged anoestrous period is likely.

Key target

To get replacement heifers bred early so they calve in the first six weeks of the calving season.

Any slippage in average calving date that occurs in older cows can be counterbalanced by having heifers calve early. Having heifers calve early will ensure that a high proportion of them are again cyclic at the planned start of the mating season. It is not desirable to breed heifers that are old when they show heat for the first time.

5 How do I deal with late-calving cows?

A proportion of cows may fail to show heat by 60-70 days after calving and will be later calving the following year unless actions are taken. Generally, these will be young cows, cows in low BCS (less than 2.0) at calving and/or twin-producing cows. Also it is desirable to bring forward calving date for late-calving cows. There are three options.

1. Remove/separate the calf. The bond between a suckler cow and her calf is the major factor delaying onset of cyclicity after calving. For late-calving cows, cow-calf separation should begin when cows are 30 days calved and should continue for 2-3 weeks with calves allowed to suckle morning and evening. About 85% of cows will exhibit heat by the time they are 50 days calved.

It is important that calves are at least 50 metres from cows but not necessarily out of sight or earshot. This is a cheap, non-hormonal option but demands time and appropriate facilities (very good fencing, etc). Calf removal/separation can equally be applied to cows that are longer calved and are not cyclic. Again, about 85% of these cows will show heat within 2-3 weeks of the first separation.

Once cows show heat and are bred there is no benefit to continuing the calf separation. If heat is not induced within three weeks of calf separation it is likely that the cows are not cyclic for nutritional reasons and a more aggressive treatment such as the use of a PRID or CIDR is needed. These animals will also require a longer period of high-plane feeding to overcome the nutritional effects on the reproductive system and resume cycling.

2. Hormonal treatment. The insertion of an intravaginal progestagen device such as a Delta- PRID or CIDR for 8 days is capable of inducing heat in about 80-90% of anoestrous cows (see later) .

3. Longer-term solutions

- Ensure that cows calve down in good BCS (3.0+).
- Ensure that replacement heifers are well grown at time of 1st breeding and are bred to calve at the start of the calving season.
- Adopt a higher replacement rate for a number of years and cull late calving cows.

- Limit the breeding period to 12 weeks.
- If you are using AI pay particular attention to heat detection.
- If using natural service monitor bull fertility and never assume that a bull is fertile.



Estimates suggest that 3-4% of stock bulls are infertile and that a further 25% of bulls are 'sub-fertile' Bulls must have: Good legs and feet at start of breeding season, good body condition, a strong libido and produce a good supply of semen with a high concentration of highly motile sperm.

6 Is bull infertility a major risk?

Generally well-fed bulls will reach puberty at 11-14 months of age. British breed bulls such as the Aberdeen Angus and Hereford will usually be 4-6 weeks younger when they reach puberty than the later maturing continental breeds such as Charolais, Limousin and Blonde d'Aquitaine. Simmental is closer to the British breeds in terms of age at puberty reflecting its dairy origin.

Key tip

As a general rule up to 25-30 cows/heifers should be assigned to a yearling bull with up to 45-50 cows/heifers to an adult bull.

Key risk

We don't have data in Ireland for the incidence of bull infertility or sub-fertility in stock bulls.

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International data suggests that 4-5% of bulls at any one time are infertile, and therefore incapable of getting a cow pregnant. A further 20-25% are sub-fertile. Anecdotal evidence for Ireland would support the international figures for the incidence of bull infertility-subfertility. Sub-fertile bulls are capable of getting some cows pregnant but are incapable of managing a large herd of cows at a normal recommended cow:bull ratio.

How to

Minimise the risk associated with a bull being infertile

There is no single 100% reliable test of a bull's fertility except his ability to get cows or heifers pregnant. Following the introduction to a herd, a farmer should regularly check a bull to ensure that he is properly mating the cows.

The first cows served should be recorded and checked for repeats at 18-24 days and ideally be scanned when 28-40 days bred. On the first suspicion that a bull may be infertile the herd owner should immediately switch to AI, or alternatively introduce another bull to the herd.

Key tip

A semen test is useful in identifying an infertile bull if it reveals a total absence of motile sperm or a sample is produced with a very high proportion of abnormal sperm. However, frequently a bull that is infertile will produce a sample of apparently 'normal' semen with good sperm motility and yet be infertile. Therefore, a semen evaluation test is only of value when there is an absence of motile sperm in the ejaculate.

Checklist

other causes of bull infertility or sub fertility.

- abnormalities of the penis such as corkscrew penis (frequently seen in older bulls),
- arthritis conditions,
- lameness,
- poor libido.

Sometimes a bull can regain his fertility. However, herd owners need to be cautious and should test such a bull on a number of cows or heifers (6-7) in advance of turning him out with a larger herd of cows. This should be followed by scanning them at 28-40 days post-breeding to evaluate the bulls performance.

Each season, herd owners should monitor a bull's performance through the breeding season to ensure that he is properly serving the cows. The first cows served should be recorded and checked for repeats at 18-24 days and ideally be scanned when 28-40 days bred.

