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Achieving a 365-day calving interval in beef cows

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Summary

Reproductive efficiency is key to the biological and economic sustainability of suckled beef enterprises and is influenced by four main factors:

- Puberty and age at first calving.
- Duration of the post-calving anoestrous interval which is largely influenced by cow-calf bonding and pre-calving nutrition.
- Heat detection efficiency where AI is used.
- Bull fertility in herds using natural service herds.

Introduction

Reproductive efficiency is a major factor determining production and ultimately the profitability of beef cow enterprises. In Ireland there is evidence that less than 10% of heifers first calve at 24 months of age, the calving-to-calving interval is frequently in excess of 400 days and less than 25% of cows produce a calf within a 12-month period.

Targets for a beef herd

The following are the reproduction and production targets for a beef suckler cow herd: 1) 365 d calving-to-calving interval; 2) <5% cows culled annually as barren; 3) >95% of cows calving to wean a calf; 4) heifers calving at 24 months of age; 5) compact calving with 80% of cows calved in 42 days; 6) replacement rate 16-18%; 7) sustained genetic improvement of the cow herd for economically important traits relating to reproduction, calving ability and calf weaning weight; and 8) close alignment of calving date with onset of pasture availability in the spring. There are four key benchmarks that must be achieved in a timely fashion in order to meet the above targets. These are:

- 1) Occurrence and timing of puberty and breeding of replacement heifers.
- 2) Resumption of oestrous cycles post calving.
- 3) Expression and detection of oestrus.
- 4) Breeding and the establishment of pregnancy.

1. Occurrence and timing of puberty and breeding of replacement heifers

Replacement heifers represent the next generation of cows in herd and ideally each year's cohort of heifers should be genetically superior to their predecessors. Significant costs are incurred during the rearing of replacement heifers and it is imperative that they become pregnant early in their first breeding season, encounter minimal dystocia, are successfully rebred to calve again within 365 days and ultimately have long (>8 lactations) and productive lives within the herd. Delaying first calving to

3 years of age significantly increases costs. Therefore, the target should be calving at 2 years of age. Beef heifers that conceive early during their initial breeding season and calve as 2-year-old females have greater probability of becoming pregnant as first calving cows, have greater lifetime production (calf weaning weights), and tended to calve earlier in subsequent years compared with heifers that conceived later in their first breeding season. Hence, age at which puberty occurs (defined as the developmental stage that supports normal oestrous cycles combined with the ability to become pregnant) will impact on the time of conception in the first breeding season and ultimately, lifetime productivity. Additionally, conception rates are typically lower at the pubertal compared with subsequent heats.

Factors affecting puberty in heifers: Crossbred heifers typically reach puberty up to 6 weeks earlier than the average of their parental breeds. Larger European continental breeds of cattle are older at puberty than traditional early-maturing beef breeds or dairy breeds. Breeds historically selected for milk production such as the Simmental reach puberty at a significantly younger age than breeds such as the Charolais and Limousin. Replacement heifers should reach circa 0.65 of mature body weight at the start of the breeding period in order to conceive early in the breeding season with a target of 60-70% pregnant after 3 weeks of the breeding season. Target weights for some breed types are presented in Table 1.

Breeding of heifers: It is frequently suggested that heifers should be bred up to one month in advance of the cow herd, allowing these young animals more time to recover between first calving and second breeding. While this in theory is commendable, it does extend the calving season and requires that heifers have reached puberty at approximately 12.5 months and are undergoing regular ovarian cyclicity at 13-14 months of age, where the objective is first calving at 24 months. The attainment of a target 65% of their expected mature bodyweight at 14 months of age may be too difficult or costly to achieve particularly with late-maturing breed types. An alternative strategy might be to commence the breeding of replacement heifers coincident with the breeding of mature cows and use hormonal regimens to advance breeding dates and to restrict the breeding period for heifers to 6 weeks.

Table 1 – Recommended target weight at 14 months of age for heifers of some of the common beef breed crosses.

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

2. Resumption of oestrous cycles post calving

Beef cows are on average much longer calved when they resume oestrus cycles than dairy cows. Studies at Teagasc recorded average calving to first ovulation intervals of 50-55 days in beef cows, which is almost twice as long as the interval for dairy cows. For first-calving beef cows (heifers) this interval is usually 10-15 days longer than mature cows.

Cow-calf bonding: The predominant reasons for this long anoestrous interval is the strong maternal-off-spring bond that exists between the dam and her calf. This bond is predominately affected through sign and smell. Teagasc studies have shown the “cow-calf bonding effect” is further compounded by having beef cows in a low body condition score (BCS) at calving. The effects of low BCS at calving are only partially reversed by putting cows on a high plane of nutrition after calving. The combined

effects of long gestation lengths and long post-partum anoestrous intervals leaves a very short interval to ensure the achievement of a 365-day calving interval and 95% of cows successfully bred. For herd owners planning to use calf separation the following is recommended:

Commence calf separation and twice daily suckling at day 30 post calving and continue for 2 weeks. Ideally keep the calves and cows 50 metres apart. Between 85-90% of cows will exhibit fertile heat within 18-22 days. About 10-15% of cows fail to ovulate in response to calf separation (nutritional anoestrus). It is unlikely that these cows will respond to synchronisation until such time as their BCS has improved. Calf separation is particularly applicable to late calving cows and first-calvers. However, it does entail some additional labour.

Role of nutrition: From the published literature it is clear that 1) prepartum nutrition is more important than postpartum nutrition in determining the duration of postpartum anoestrus; 2) energy is the primary nutrient regulating reproduction in female beef cattle and inadequate dietary energy during late pregnancy lowers fertility even when dietary energy is adequate during lactation; and 3) a BCS of 2.5-3.0 (scale 0-5) will ensure that body reserves are adequate for postpartum reproduction. The reported effects of increased nutrient intake after calving on duration of the postpartum anoestrous interval are inconsistent. However, there is evidence that thin cows at calving and particularly first-calvers and young cows respond to increased postpartum nutrient intake with enhanced reproductive performance although reproductive performance may still be less than adequate. It may well be that a certain level of body fatness may be prerequisite for occurrence of puberty and resumption of postpartum oestrous cyclicity.

Use of body condition scoring: Body condition scoring has been frequently advocated as a practical tool for the nutritional management of beef cows. From the foregoing and from published literature it is clear that the critical time to achieve a minimum target BCS is at calving. The recommended BCS at calving for mature cows and first and second calving cows are score 2.5 and 3.0 on a scale of 0-5, respectively. The somewhat higher BCS is warranted for younger cows and heifers because, after calving, they have an additional feed requirement for growth.

3. Expression and detection of oestrus

To be detected in standing heat a cow must engage the attention of a herd mate willing to mount her. Numerous factors affect the expression of heat, the more important of which are briefly discussed.

Floor surface: Cows dislike being mounted while standing on concrete and have preference for softer underfoot surfaces such as grass, earth or straw bedded yards. Mounting activity is reduced by almost 50% when cows are on concrete as opposed to softer underfoot conditions while the duration of oestrous activity is reduced by about 25%. Cows distinctly dislike being mounted by herd mates if the floor surface is either slippery or very coarse.

Status of herd mates: The number of cows in heat simultaneously has a major impact on overall heat activity and on the average number of mounts per cow. The number of mounts per cow increased with the number of cows that are in heat simultaneously (up to about 3-4 cows in heat). In smaller and even in larger herds as more cows become pregnant, the likelihood of more than one cow being on heat on any given day is less, thus making heat detection more difficult.

Understanding the signs of heat: Standing to be mounted by herd mates or by a bull is the primary sign of heat and is the most definite and accurate sign that a cow is in heat. Because standing heat may not always be observed, stockmen must frequently use other signs (secondary signs) of heat in arriving at a decision as to whether or not to inseminate a cow. These secondary signs of heat may indicate that a cow is coming in heat, in which case closer attention should be given to her over the following 48 hours, or they may be indicative of a recent heat in which case she should be given close attention 17-20 days later. Indicators to look for are: vaginal discharge or clear mucus, mounting other cows, restlessness, swelling and reddening of vulva, hair loss and dirt marks. Blood stains on the tail or vulval area (metoestrous bleeding) are normal and indicative of a recent heat.

Use an aid to improve heat detection

Vasectomised bulls with chin-ball marking harness: Active vasectomised teaser or detector bulls are useful in identifying cows either coming into or on heat. Vasectomy should be carried out 40-60 days prior to introduction to the herd. The cost of the vasectomy varies from €90-120 per bull. Many herds are now finding that teaser bulls are particularly useful after the first 3 weeks of the breeding season when fewer cows are in heat each day and when the level of heat-related activity in the herd is reduced as more cows become pregnant.

Heat detection patches: Recently a number of “scratch card-type” patches have come on the market. These are affixed to the cow’s tail head. Friction from mounting activity rubs off the silver coating to reveal a bright coloured patch underneath. These devices, when properly applied, are very useful as an aid to heat detection. They cost between €1.00 and €1.50 per patch.

Checking cows: The use of either a teaser bull or a heat detection patch will increase the detection rate and also reduce the duration and the number of observation periods from 3 times daily to twice daily that cows need to be checked. When one of the above aids is used cows should be observed at least twice daily – early morning and late evening, otherwise cows should be checked 3-times daily. Spend a minimum of 20-30 minutes observing them during each observation period. Disturb the cows and carefully check and record cows that are sliming or exhibiting any signs of restlessness as these are important secondary or indicator signs of an imminent heat. Early morning and late evening are critical times to check cows.

Importance of commitment: Where AI is the chosen method of breeding, farmers must be committed to heat detection, at least twice daily (early morning and late evening), for each day of the breeding season. In order to reduce the work time involved it is highly recommended that one of the aids described above is used.

4. Breeding and the establishment of pregnancy

In beef cows, unlike dairy cows, there is not substantial evidence of a decline in conception rate and typical 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 in 60 or more days after calving. However, when cows are bred at 40 days or less after calving conception rate is usually <40% but it is still advisable to breed such cows once breeding has commenced. What’s more, post-calving conception rates are often lower for first-calvers compared to mature cows, which is a reflection of the increased nutritional demands of the young cow for growth in addition to maintenance and lactation requirements. Fertility is highest following AI at 12-18 hours after heat onset but is not greatly reduced following early insemination. However, late insemination, at 24 hours or later, after onset of standing heat, should be avoided.

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Footnote comment from Simon Marsh, Principal Lecturer – Beef Cattle Specialist, Harper Adams University

Some UK suckler herds have recently evaluated heat detection systems such as Heatime and Pinpoint to facilitate oestrous detection and the use of AI. NBA Board member James Evans used the Pinpoint system from Cogent on a group of autumn calving Stabiliser suckler cows in 2013/4 and reported the following: “We put 98 collars on and served the cows over a 21 day period, this year we shall extend it to 25 days as some cows were missed at 21 days i.e. the heats ranged from 18 days to 25 days at a cost of £30 per collar including services plus semen. We achieved 72% conception from cows served and then swept up with bulls for another 2 cycles achieving 98% conception. Big advantages obviously using top genetics but also it didn't affect the cows natural cycle as everything is served on natural heats. In the past synchronising led to an extended calving period. I think it's important to note we only do this in our autumn herd when the cows are housed, this year we will be using sexed semen.” James adds; “By using easy calving bulls with a positive EBV for Calving Ease and a low Birth Weight will result in easier calving, with less stress to the cow, which will allow her to quickly return to oestrus. Once you have the confidence of using easy calving bulls it allows you to calve the cows down at a higher condition score which means they will be in a better position to get back in calf quicker.”