# Dairy breeding policy for 2021 breeding season


## Summary

It's important to start planning now for the 2021 breeding season, and it is important that dairy farmers have a clear breeding policy as it will have a significant influence on their farm profitability, farm sustainability and animal welfare performance:

1. Use high EBI AI genetics to generate the required number of replacement heifers and in tandem increase the EBI of your herd. Target your heifers and highest EBI cows to generate replacements.
2. A balanced team of dairy AI sires should be used across the heifers and cows selected for breeding replacements. This will increase the reliability of the sire team as a whole. The optimum number of AI bulls to be used will vary with herd size; your Teagasc adviser will help you calculate this and to correctly match cows to AI sires.
3. Incorporate a proportion of sexed semen into your AI strategy (if using Jersey or Jersey crossbreed genetics, use only sexed semen) while taking into account the considerations and guidelines outlined below - discuss with your Teagasc advisor.
4. Using the Dairy Beef Index (DBI) to select suitable beef AI sires, use beef sires on your lowest EBI/ late calving cows and once satisfied you have achieved sufficient dairy pregnancies to generate your targeted number of replacements.
5. Dairy 'sweeper' bulls should not be used. Use easy calving short gestation length beef bulls with a high Dairy Beef Index should be used. An alternative to beef stock bulls is the use of vasectomised bulls in conjunction with beef AI.


## Background

The Irish dairy industry has benefited enormously from the increase in the EBI of the Irish dairy herd since its establishment in 2001. However, there are still significant benefits to be obtained by further increasing the EBI of the national dairy herd. This is clearly demonstrated by Teagasc's Next Generation Herd. Therefore, dairy farmers should select a team of high EBI AI bulls taking cognisance of relatedness, reliability, herd size and suitability to their farm system.

Dairy cow numbers have increased significantly over the last 10 years. This was facilitated by greater use of dairy AI genetics on dairy farms. This rapid increase in dairy cow numbers has now slowed down, and replacement rates on dairy farms have also reduced due to better fertility and longevity in the dairy herd. Therefore dairy farmers that are not focused on expansion will require only 3 to 5 weeks of dairy AI to generate enough dairy replacements depending on use of sexed semen and herd fertility. ICBF launched the Dairy Beef Index (DBI) in 2018 with the objective of identifying beef bulls that are suitable for use on dairy herds. It is necessary to minimise the number of low value dairy calves within the dairy industry. All dairy farmers should first calculate the number of replacement heifers they want, and then calculate the number of dairy AI straws needed to generate that number of replacements. Beef AI bulls and beef stock bulls should be used to sire the remaining calves.

Sexed semen can also play an important role in reducing the number of low value male dairy calves. Dairy farmers who want to use Jersey or Jersey crossbred genetics should only use sexed semen. For dairy farmers that wish to use sexed Holstein-Friesian (HF) semen, the number of bulls available and their EBI is increasing as demand increases. It is important to note that if you use sexed semen, conception rates will likely be less than with conventional semen (see Appendix 1 Guidelines for sexed semen usage in dairy herds).

Many dairy farmers use AI for a period, followed by the use of natural service/stock bull. In order to minimise the number of low value male calves generated annually it is important that all natural service stock bulls used are of a beef breed, easy calving and short gestation; ideally the bull should be genomically tested to provide a higher reliability estimate of his dairy beef genetic merit (DBI is available for all beef bulls, including beef stock bulls). Where beef bulls are to be purchased, consideration (and run-in time) must be given to acclimatisation, suitable health status (via diagnosis) and appropriate vaccination protocol, ideally in advance of purchase but certainly in advance of use on your farm. An alternative to a beef stock bull is the use of vasectomised teaser bulls in conjunction with beef AI.

In recent years, there has been a trend to use less beef stock bulls and use more AI; this is preferable due to greater reliability and reduced biosecurity and safety risks.

In Teagasc herds, the breeding policy for 2021 is as follows:

- The use of high EBI HF genetics to include a combination of sex-sorted and conventional semen.
- Where Jersey or crossbreed Jersey genetics is to be used, it will be with sex-sorted AI only.
- The number of low value dairy calves will be reduced in the 2022 calving season by using suitable beef semen. Beef semen will be selected using the DBI with particular emphasis on easy calving, short gestation length bulls with good beef merit.
- No dairy ‘sweeper’ bulls will be used; in the limited situation where stock bulls will be used, it will be high DBI beef bred.

## Appendix 1: Guidelines for sexed semen usage in dairy herds

The current sexed semen product produced by Sexing Technologies and Cogent is marketed under the tradename Sexed ULTRA 4M. This product was evaluated in field trials conducted in Ireland in 2018 (AI after detected heat) and 2019 (fixed-time AI). In both trials, using bulls that were resident in a stud at the sex-sorting laboratory, the mean conception rate for sexed semen was poorer than conventional semen (2018: 50.2% vs. 60.3%; 2019: 50.1 vs. 61.1% for sexed and conventional, respectively). The performance of sexed semen versus conventional is often expressed as the relative conception rate [(CR for SS ÷ CR for CONV) × 100]. In 2018 and 2019, the mean relative conception rate ranged from 82% to 84%. This means that the conception rates achieved with sexed semen, on average, were 82% to 84% of those achieved with conventional semen. Maximising conception rate with sexed semen requires careful animal selection, appropriate timing of AI, and attention to detail regarding straw handling.

### Bull selection

Identify the bulls with the highest EBI that are available sexed, and within that list, identify the bulls that are suited to the herd's breeding objectives. At present, it is not possible to predict which bulls will have good field fertility and which bulls will have poor field fertility after the sorting process. To mitigate the risk, use sexed semen from a large team of bulls (≥5) in equal proportions.

### Dam selection

Sexed semen use must be targeted towards the dams with the expected best fertility to maximise the likelihood of conception.

- Heifers
  - Have achieved the target live-weight for breed and BCS ≥3.25.
  - Regularly cycling.
- Cows
  - Parity 1 to 4.
  - >50 days in milk on day of AI.
  - BCS ≥3.00 on the day of AI.
  - Regularly cycling.
  - Free of postpartum disorders and uterine disease.

### Timing of AI

Sperm cells are damaged during the sorting process, and consequently the viability of the sex-sorted sperm cells in the reproductive tract is shorter (<12 h) than for conventional sperm cells (>24 h). Hence, the timing of AI is more important when using sex-sorted semen straws than conventional semen straws. When heifers/cows are being inseminated with sexed semen after observed heat, AI should be conducted 14 to 20 h after heat onset. In the

table below, the dams that are best suited for AI with sexed semen are indicated based on time since onset of heat. If AI is being conducted once a day, some dams will be at the optimum time for sexed semen, and all others should receive conventional semen. If AI is being conducted twice a day, most dams will be at the optimum time for sexed semen either in the morning or in the evening.

| First obs. heat | Hours since heat onset at 7 AM | Suitable for sexed | Suitable for conv | Hours since heat onset at 3 PM | Suitable for sexed | Suitable for conv |
|---|---|---|---|---|---|---|
| 06:00 | 1 h | - | ++ | 9 h | + | ++++ |
| 10:00 | 21 h | ++++ | ++ | 5 h | - | +++ |
| 14:00 | 17 h | ++++ | ++++ | 1 h | - | ++ |
| 18:00 | 13 h | +++ | ++++ | 21 h | ++++ | ++ |
| 22:00 | 9 h | + | ++++ | 17 h | ++++ | ++++ |

Fixed time AI is costly, but provides some advantages when using sexed semen. It facilitates targeting of sexed semen usage on the dams that it is desirable to get replacements from, and importantly, this can be scheduled to be completed on the farm mating start date. Conducting AI with sex-sorted semen straws on the farm mating start date advances the submission of the targeted heifers/cows, and mitigates the risk of poor conception rates causing a deterioration in the calving pattern.

**Straw Handling**

It is important to be fully aware that the sex-sorting process causes some damage to the sperm cells. Hence, careful handling of the straws from the time of removal from the AI tank to deposition of sperm cells into the uterus is more critical for sexed semen than for conventional semen.

- Organise sexed straws into one goblet on the tank, and minimize the frequency that the goblet is lifted.
- Change water in the thawing unit daily, and clean the thawing unit weekly.
- Check that the temperature in the thawing unit is 35 to 37 °C.
- Thaw a maximum of two sexed semen straws at a time.
- Using a timer, thaw the straws for 45 seconds.
- Load straws into pre-warmed AI guns.
- Keep AI guns warm after loading straws, and ensure that inseminations are promptly completed (<5 mins after loading).
- Deposit semen in the uterine body.

**How many sexed semen straws do I need to use?**

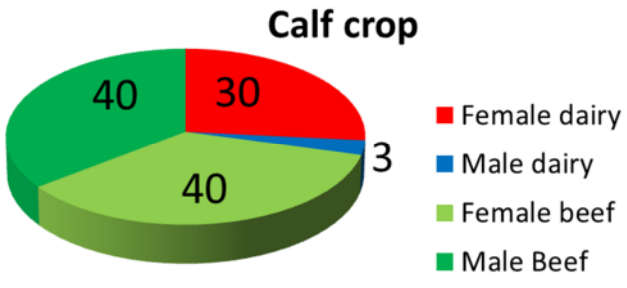
The exact figure depends on herd fertility, so better fertility means fewer sexed semen straws to get the same number of pregnancies. If we take the example of a herd of 100 lactating cows with 25 maiden heifers available for breeding, the goal is to use the number of sexed semen straws required to achieve 30 female dairy calf births. This is done by prioritising sexed semen first for heifers, and then for selected cows using the criteria previously outlined under dam selection. All remaining dams are bred to beef semen (AI for first 6 weeks, AI or natural service bulls thereafter). The assumed conception rates for heifers and cows with conventional and sexed are outlined in Table 1, which equates to approximately 85% relative conception rate.

Table 1. Assumed conception rates in heifers and cows with conventional and sexed semen.

| | Heifer conception rate | Cow conception rate |
|---|---|---|
| Conventional | 70 | 60 |
| Sexed (observed) | 60 | 50 |
| Sexed (TAI) | 60 | 50 |

We assume that all 25 heifers are suitable for sexed semen. With 60% conception rate and 90% sex bias, this will result in 13.5 heifer calves (25 x 0.6 x 0.9). It will also result in 1.5 male calves (25 x 0.6 x 0.1). Any heifers that repeat are bred to an easy-calving beef stock bull for the remainder of the breeding season. If we assume 95% final in-calf rate, this will mean 8.75 beef cross calves.

How many to sexed semen straws need to be used on the lactating dairy cows? We want to achieve 30 female dairy calf births, and 13.5 are coming from the heifers, meaning that 16.5 are required from the lactating cows (30 – 13.5 = 16.5). To achieve 16.5 female calves using sexed semen straws with 50% conception rate and 90% sex bias will require 37 straws (16.5/(0.5 x 0.9) = 37). This will result in 16.7 female dairy calves (37 x 0.5 x 0.9) and 1.9 male dairy calves (37 x 0.5 x 0.1). After the allocation of sexed semen straws have been used, all remaining cows and all repeats are bred to high DBI beef AI followed by a mop-up easy-calving beef stock bulls. If we assume 90% final in-calf rate, this will mean 71.4 beef cross calves.




The calf crop that arises highlights that the required number of female dairy calves was achieved, the number of male dairy calves was greatly reduced, and the number of readily marketable beef calves was markedly increased.