

## Breeding has significantly improved reproductive performance

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A major and important factor in modern dairy production is good reproduction. Good reproduction ensures a stable number of calvings, making consistent production overtime possible. At the same time, good reproduction increases the possibility of selecting more cows for slaughter or sale based on voluntary culling reasons rather than failure to become pregnant, which is considered an involuntary culling reason.

### Fertility – an important trait

In breeding, the trait female fertility describes the heifer's or cow's genetic ability to start or resume the estrus cycle after calving, show heat, and become pregnant. The higher the breeding value is, the better is the fertility and thereby the reproduction. For Holstein and RDC, fertility is the trait with the second-highest weighting in NTM, only passed by production. For Jersey, fertility has the fourth-highest weighting, surpassed only by production, udder health and saved feed.

For Nordic farmers, fertility has always been a very important trait, and Nordic bulls have the highest genetic level in the world. According to Interbull, which calculates breeding indexes between member countries, Holstein and Jersey from the NAV countries (Denmark, Sweden, and Finland) are significantly better than all other countries worldwide. RDC ranks second, only passed by Norway, which has focused heavily on fertility for many years.

### Significant progress in the genetic level for fertility

All three dairy breeds have had great genetic progress in fertility over the last 10 years, but Holstein stand out with the greatest genetic improvement. This was also necessary, as Holstein experienced genetic decline in fertility during the 1990s and 2000s. As shown in Table 1, Holstein increased by 12.9 fertility index units, RDC by 9.6 units, and Jersey by 7.6 units.

*Did you know?*

Breeding makes a significant contribution to efficiency improvements in Nordic cattle herds. The efficiency gain comes from both breeding and management. In this article series, the focus will be on what breeding has contributed over the past 10 years.

| Breed                                                           | HOL  | JER | RDC  |
|-----------------------------------------------------------------|------|-----|------|
| <b>Fertility</b>                                                | 12.9 | 7.6 | 9.6  |
| <b>Interval from first to last insemination (heifers), days</b> | 8.5  | 8.9 | 4.7  |
| <b>Number of inseminations (heifers)</b>                        | 5.3  | 6.8 | 1.9  |
| <b>Interval from calving to first insemination (cows), days</b> | 5.9  | 5.4 | 6.7  |
| <b>Interval from first to last insemination (cows), days</b>    | 14.0 | 7.1 | 10.6 |
| <b>Number of inseminations (cows)</b>                           | 9.3  | 3.5 | 6.5  |

Table 1: Progress in index units from 2014 to 2024 for heifers and cows from Denmark, Finland and Sweden.

Looking deeper, fertility is divided into five subtraits—two for heifers and three for cows. Jersey has had the greatest progress in heifers, closely followed by Holstein. Among cows, Holstein has had the greatest progress, especially in the subtraits “interval from first to last insemination” and “number of inseminations.” RDC follows, while Jersey has had the smallest progress among cows, though still positive in all subtraits.

### The effect of breeding in the barn

When the genetic improvements are translated into a direct effect in the barn, the result is a significant improvement in reproduction over the last 10 years. Holstein has achieved the greatest progress. Due to earlier fertility challenges in Holstein, there has been greater genetic variation, which means that each index unit has a larger phenotypic value and therefore results in greater improvement per index unit.

Across the breeds, the interval from first to last insemination for heifers has been reduced by 1.4 to 3.4 days. The number of inseminations for heifers has decreased by 0.02 to 0.07. It may not sound like much, but for Holstein the reduction of 3.4 days is actually a 13% decrease, and with a baseline of 1.6 inseminations, even a change of 0.07 becomes meaningful.

For cows, an even greater effect is seen. The interval from first to last insemination has decreased by 4.3 to 11.2 days across the breeds. With an interval of 43 days today, the 11.2-day reduction corresponds to a 20% improvement for Holstein. Think about

that — 20% improvement over 10 years in a fertility trait. For Jersey, the improvement in the interval from first to last insemination is 11%, while it is around 16% for RDC. The number of inseminations has decreased by 0.04 to 0.09, and today 1.8 to 2.0 inseminations are used across the breeds.

The interval from calving to first insemination has decreased by 2.2 to 3.5 days across the breeds. This interval indicates how quickly the cows return to the estrus cycle after calving, but the trait is highly influenced by management decisions, specifically how early the dairy producer chooses to begin insemination after calving.

In contrast, the interval from first to last insemination is less affected by management, since it can be assumed that once insemination has begun, the goal is for the cow to become pregnant as quickly as possible.

| Breed                                                           | HOL   | JER   | RDC   |
|-----------------------------------------------------------------|-------|-------|-------|
| <b>Interval from first to last insemination (heifers), days</b> | -3.4  | -2.7  | -1.4  |
| <b>Number of inseminations (heifers)</b>                        | -0.05 | -0.07 | -0.02 |
| <b>Interval from calving to first insemination (cows), days</b> | -3.5  | -2.2  | -2.7  |
| <b>Interval from first to last insemination (cows), days</b>    | -11.2 | -4.3  | -8.5  |
| <b>Number of inseminations (cows)</b>                           | -0.09 | -0.04 | -0.07 |

Table 2: Genetic progress in performance potential from 2014 to 2024 for heifers and cows from Denmark, Finland and Sweden.



October 2026

### **Not always visible to the naked eye**

Even though there is strong genetic progress in a trait, it does not necessarily mean that you see major improvements in your herd. This is because some traits are genetically correlated. For example, milk yield and fertility are negatively correlated, meaning increased milk yield negatively impacts fertility. Higher yield stresses cows and makes it harder for them to become pregnant.

Without breeding for improved fertility, you would have seen a decline in reproduction in your herd caused by the increased production. The major genetic progress in fertility over the past 10 years has compensated for the negative effect of higher yield and even improved fertility, so that cows and heifers today have better reproduction than they did ten years ago.