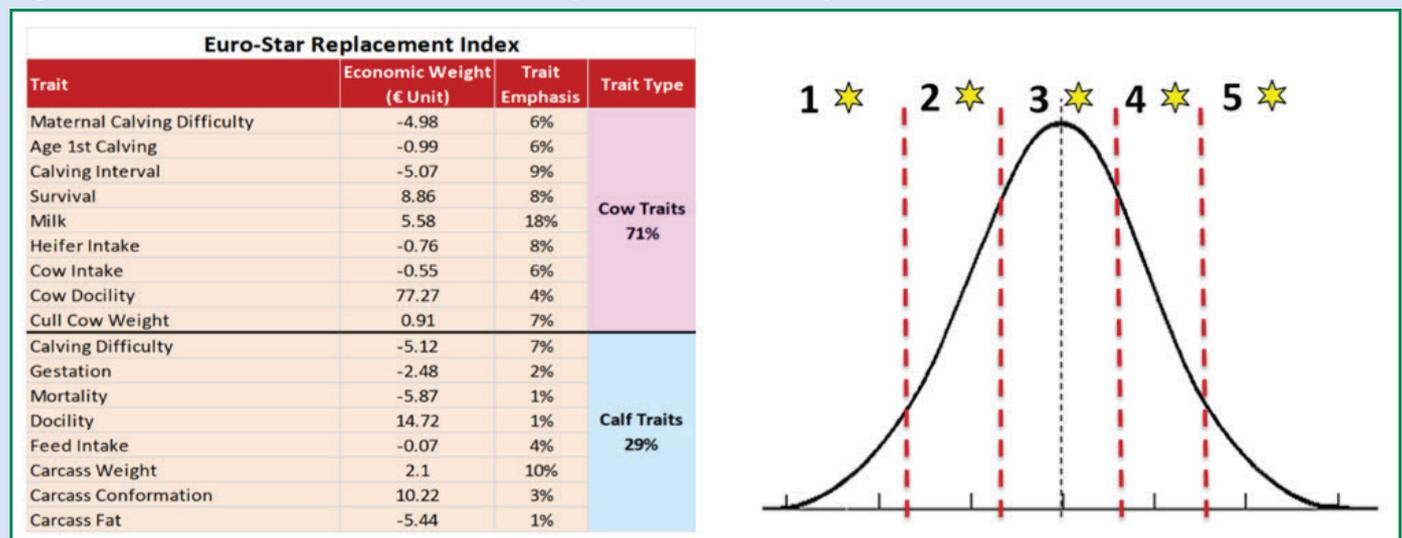# ICBF; Breeding for more Sustainable Beef Production

The principle of "more from less" is the key foundation upon which ICBF's genetic evaluation programs for beef cattle are based. Using performance, ancestry and genomic data from over 15 million beef cattle (the largest beef cattle database in the world), the goal is to identify the superior animals within the breeding program for key traits such as maternal milk, female fertility, cost of calving, cost of feed and carcass growth rate. These traits are then combined into an overall index, the €uro-Star Replacement Index, with all animals then ranked on this Replacement Index value into star cut-off's, the top 20% of which are deemed as "5-star" based on this overall sustainability metric (See Figure 1).

**Figure 1:- Overview of ICBF's €uro-Star Replacement Index System**



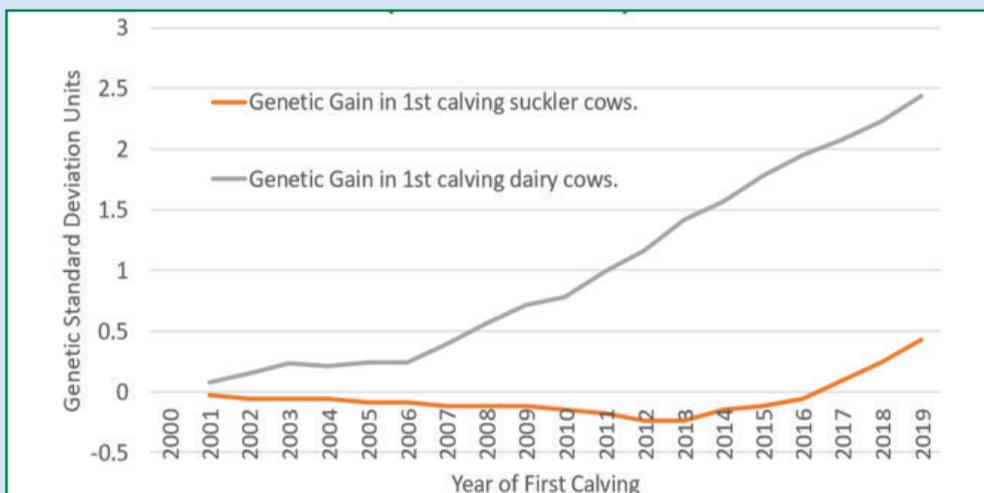| Euro-Star Replacement Index | | | |
|---|---|---|---|
| Trait | Economic Weight (€ Unit) | Trait Emphasis | Trait Type |
| Maternal Calving Difficulty | -4.98 | 6% | Cow Traits 71% |
| Age 1st Calving | -0.99 | 6% | |
| Calving Interval | -5.07 | 9% | |
| Survival | 8.86 | 8% | |
| Milk | 5.58 | 18% | |
| Heifer Intake | -0.76 | 8% | |
| Cow Intake | -0.55 | 6% | |
| Cow Docility | 77.27 | 4% | |
| Cull Cow Weight | 0.91 | 7% | |
| Calving Difficulty | -5.12 | 7% | Calf Traits 29% |
| Gestation | -2.48 | 2% | |
| Mortality | -5.87 | 1% | |
| Docility | 14.72 | 1% | |
| Feed Intake | -0.07 | 4% | |
| Carcass Weight | 2.1 | 10% | |
| Carcass Conformation | 10.22 | 3% | |
| Carcass Fat | -5.44 | 1% | |

# Impact of the Beef Data and Genomics Program (BDGP)

Whilst the ICBF €uro-Star Replacement Index system had been in place since 2011, its impact on the maternal/cost of production traits had been minimal, due to the continued focus by our industry on the terminal traits (i.e., growth and confirmation). All of that changed completely with the introduction of the BDGP by the DAFM as part of its 2015-2020 EU Rural Development Program.

With the clear objective of increasing the sustainability of our suckler herd, the program sought to stop the negative trends for maternal/cost of production traits and instead ensure a balanced improvement in all of the traits linked to sustainable suckler beef production. Innovative actions were introduced, with participants required to meet certain targets regarding data collection, genotyping and herd replacement strategy.

The success of the program has been quite remarkable with the rate of genetic gain for Replacement Index, now comparable with the rate of genetic gain in Dairy EBI, an outcome that few would have believed possible at the start of the program 5 years ago (See Figure 2).

**Table 1. A validation comparison of suckler cows ranked on €uro-Star Replacement Index, based on key performance metrics***

| Genetic Merit | | Cow Traits | | | | | | Calf Traits | | Progeny Carcass Traits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Rep Index | Age 1st Calving Days | CI Days | Cow Lwt Kg | Surv % | Wean Wt kg | Wean Eff % | Birth Wt kg | Calv Assist % | Age at Slau Days | Carcass Wt Kg | Carc conf (1-15) | Carc fat (1-15) |
| Very low | €33 | 990 | 391 | 730 | 83 | 291.1 | 39.9% | 44.7 | 0.15 | 745 | 389.4 | 8.29 | 8.15 |
| Average | €92 | 986 | 390 | 702 | 85 | 292.0 | 41.6% | 43.9 | 0.13 | 743 | 387.1 | 8.31 | 8.17 |
| Very high | €153 | 977 | 389 | 702 | 87 | 294.8 | 42.0% | 43.6 | 0.11 | 740 | 388.1 | 8.22 | 8.26 |

*Validation based on ¾ bred suckler cows born in 2012 & 2013, with subsequent cow and progeny performance data. All metrics corrected to equivalent performance for a 3rd parity cow (Twomey, 2020, in press).*

## Relationship with Methane Output

In addition to trends from Table 1, one of the most significant outcomes from the program to date has been the clear evidence that higher genetic merit animals have significantly lower methane output/day than lower genetic merit animals (up to a 10% difference). This is based on direct measurement of methane data from a Teagasc-ICBF collaborative project "RumenPredict" located at the ICBF Tully performance test station, Co. Kildare, where a range of animals across different breeds, genders and genetic merit are being evaluated.

Indeed, translating these initial findings from Tully into the genetic gains highlighted in Figure 2 indicates that we are now realizing an almost 0.6% reduction in the annual methane output of our suckler herd compared to when the BDGP started in 2015. Taking the average suckler cow and her calf (combined they emit some 3.5 t of methane/year), this simply means that by 2030, we will have reduced the total methane output of that cow and calf by 3%, down to 3.3 t of methane/year. At the same time, we will have increased the profitability of that same cow by some €100/cow year, confirming the very close relationship that exists between profitability and sustainability in the context of beef breeding. Are there other technologies/strategies that can confidently promote this as an outcome for the future?

# Looking forward; Where to next?

Continuing and accelerating these gains, is now the key focus of ICBF, Teagasc, DAFM, Bord Bia and the broader beef breeding industry, as we seek to further improve the sustainability of our suckler beef herd through genetic improvement. Examples include the new Beef Environmental Efficiency Program, which seeks to further improve weanling efficiency traits by promoting large scale weight recording of cows and calves on farms.

Areas of additional focus for the future will include; **(i)** additional genotyping of animals to help accelerate genetic gain, **(ii)** new traits linked to sustainability, such as age at slaughter and meat eating quality, and **(iii)** further direct measurement of methane traits, including the future introduction of these new traits into the €uro-Star replacement, terminal and dairy beef indexes. Combined these three new elements will be crucial in helping us identify the really superior animals for the breeding program, in the context of their future GHG abatement potential. Building upon the gains now being achieved from the Replacement Index, a 10% reduction target from beef breeding is achievable and one that we are now actively working towards.

Ireland is uniquely positioned as having one of the most sustainable and carbon efficient suckler herds in the world. We are also fortunate to have a unique infra-structure and eco-system that promotes the development of programs such as the BDGP and BEEP, including their integration into industry programs such as those operated by ICBF, Teagasc, Bord Bia and the broader beef industry. Combined these are great examples of "policy meeting practice" and in doing so delivering real outcomes for our farmers and our industry.







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For further information on any issues raised in this factsheet, please visit the Irish Cattle Breeding Federation (ICBF) website on www.icbf.com.