

Understanding the Economic Breeding Index (EBI).

What is EBI?

EBI is a single figure profit index aimed at helping farmers identify the most profitable bulls and cows for breeding dairy herd replacements. It comprises of information on eight sub-indexes related to profitable milk production. These are; (1) Milk Production, (2) Fertility, (3) Calving Performance, (4) Beef Carcass (5) Carbon, Cow Maintenance (6) Health, (7) Maintenance and (8) Management. A summary of the sub-indexes, including traits and relative weightings for traits in the EBI is displayed in **Chart 1**, e.g. Fertility has a 25% weighting in the EBI. Economic values in the index are based on data collected from Irish Dairy Farms and the Dairy Industry. These values were last updated in November 2022.

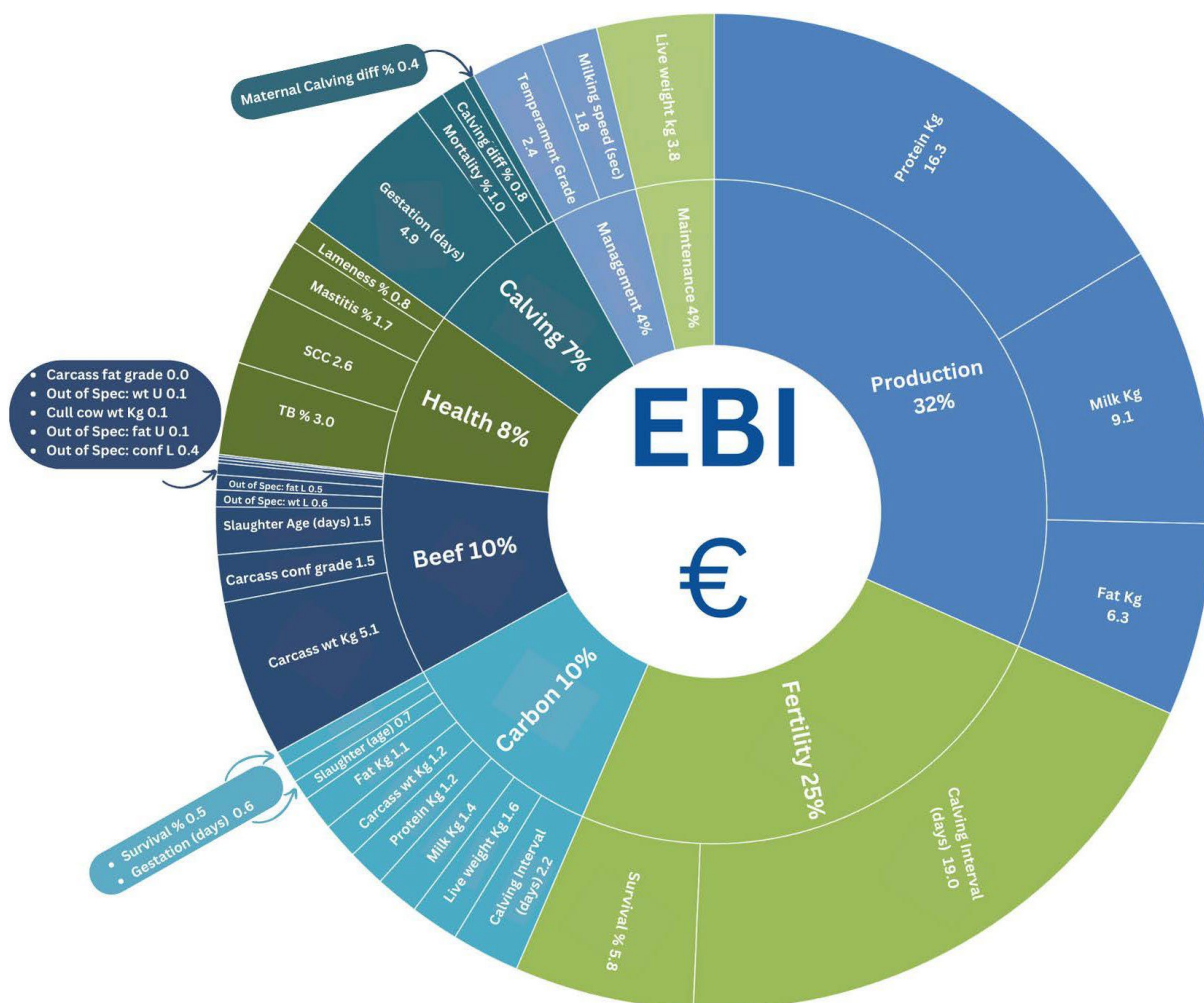


Chart 1. Percentage emphasis of the various traits in the EBI formula. Data based on Jan 2023.

Genetic Evaluations

Knowing the genetic merit of your herd is a **key** component to successfully improving traits of importance on your farm. The observed performance of an individual cow depends on two things:

- a) **The genetic merit of the cows**
- b) **The environment in which she is performing**

Genetic evaluations attempt to disentangle the effects of genes and the environment, to select animals that have high genetic merit, and not those that perform well simply because they are well managed and fed. For example, if Cow X has a much higher genetic merit for milk yield than Cow Y, Cow Y will need much more feed to milk the same as Cow X. Alternatively, if Cow X and Y are fed the same, Cow X will outperform Cow Y for milk yield. Genetic evaluations allow us to directly compare animals that are performing in many environments, by removing the part of the observed performance that is due to the environment and management of the cows.

We cannot directly alter the genetic merit of an individual cow, however improvements can be made for specific traits in the offspring of the cow provided she is bred to a sire that is better than she is for those traits. Therefore, it

is important to know both the genetic merit of the cow and the sire, to make genetic improvements in traits of economic importance.

How do I interpret the Predicted figures for Milk kg, Fat kg, etc. on my EBI Report?

We call these Predicted Transmitting Ability figures (PTAs). An animal's PTA indicates the amount of a particular trait an animal is expected to pass on to its progeny, relative to the base cow population. The PTA is equal to half of its own Breeding Value since a cow only passes on half her genes to her offspring. All values on the EBI report are expressed as PTA's. Information on bulls (in catalogues, bull search, etc.) is also presented in terms of PTA.

What is the Base Cow?

The base for production and fertility is 2005 born cows, calved and milk recorded for the first time in 2007, with at least 2 years out of 5 milk recorded (Table 1). The production figure uses a weighting of each lactation used in the evaluations; 1st lactation 0.41, second lactation 0.33 and 3+ lactation 0.26. These weightings are based on the number of records in the evaluation.

	Milk Kg	Fat Kg	Prot Kg	Fat %	Prot %	Weighting	Calv Int	Sur%
Parity 1	5538	216.3	188.0	3.91	3.39	0.41		
Parity 2	6246	243.7	216.1	3.90	3.46	0.33		
Parity 3+	6587	258.0	227.1	3.92	3.45	0.26		
Base Cow Performance	6044	236.2	207.5	3.91	3.43	1.00	398.8	85.3

Table 1. Base Population Performance – 2005 born cows, calved and milk recorded in 2007 (Updated Dec 2017)

The daughters of a bull with a PTA of 150kg for milk yield would be expected to produce, on average, 100kg more milk per lactation than the daughters of a bull with a PTA of 50kg if their dams have equal genetic merit. The actual difference will not be exact for comparing individual daughters because no two daughters get exactly the same combination of genes and are not exposed to exactly the same environment. Thus, daughters of the same sire may have varying performance.

Example:

Cow 972 (Fig 1. below) has a Milk kg PTA of **+167kg** which means that she would be expected to produce 334 kg more milk than the base cow (167kg x 2 = 334kg). If she is mated to a bull with a Milk kg of **+233kg** the resultant offspring will have a potential for milk (i.e. Breeding Value) of **+400kg**.

FB	Cow ID	Sire ID	Sire EBI	C. Date	Milk Kg		Milk	Fertility	Calving Health	Beef Mainten	EBI €
Name		Dam FB	Dam EBI	Age	Fat Kg	%					
Breed		MG Sire ID	MGS EBI	Lact.	Prot Kg	%					Herd Rank
972	IE151013760972	RUU	138	25/01/2009	167		€ 25	€ 32	€ 26	€ 5	€ 84
P TRUDY 8		383	39	3y 2m	9.0	0.05			€ 3	€ -9	
HO 93.8%		ASI	34	1	5.0	-0.01					64

Fig 1. Example of an animal's PTA in the EBI Report

Does this mean the offspring, assuming a heifer, will milk 400Kg more than the "base cow" (i.e. 6044kg + 400kg = 6444kg)? The answer always depends on the level of management – the heifer will be genetically capable of milking 400kg more than the base cow but how much she physically outperforms the base cow will be dependent on the management of the animal. In a higher input environment, she could perform much more than this or in a lower input environment it may be less than this.

Key Point: Although the potential of the offspring heifer is **+400kg**, she will only pass on half of this to her own offspring, therefore her PTA for milk kg is **+200kg** (½ her Breeding Value) and this is what is displayed on the EBI report.

In simple terms, to improve the potential of a cow's offspring to milk more, you need to use bulls that have a higher PTA for milk kg than the cow itself. The same applies to all other traits, be it milk solids yield, fat and protein % etc.

When selecting a team of bulls, you should pick bulls that are higher than the herd PTA for the traits you want to improve. To improve individual cow weaknesses use the cow PTA to help you determine the best bull to use on her.