

TO IDENTIFY EASY CALVING, SHORT GESTATION BEEF BULLS WITH MORE SALEABLE CALVES USE THE DAIRY BEEF INDEX



WHAT IS THE DAIRY BEEF INDEX?

The Dairy Beef Index (DBI) is a breeding goal for Irish dairy and beef farmers to promote high quality beef cattle bred from the dairy herd that are more saleable as calves and profitable at slaughter yet, they have minimal consequences on the calving difficulty or gestation length of the dairy cow. The DBI was developed by ICBF and Teagasc and launched in January 2019.

WHY WE NEED A DAIRY BEEF INDEX?

The dairy herd is expanding, and it is benefitting from improvements in cow fertility, due predominantly to genetic gain arising from the Economic Breeding Index (EBI). Such changes have resulted in an increased number of dairy male calves and the increased usage of beef bulls in the dairy herd. Dairy farmers predominantly select beef bulls that have a short gestation length and are easy calving, without considering the beef carcass merit of the resulting calves; therefore, the quality and viability of Irish beef production is at risk of deterioration. A recent analysis of beef cattle slaughtered in Irish factories (Figure 1 and Table 1) revealed that many cattle bred from dairy dams did not meet the minimum carcass weight or carcass conformation specifications (Table 1). Improving the quality of beef cattle from the dairy herd will generate economic benefits for all involved in the beef supply chain.

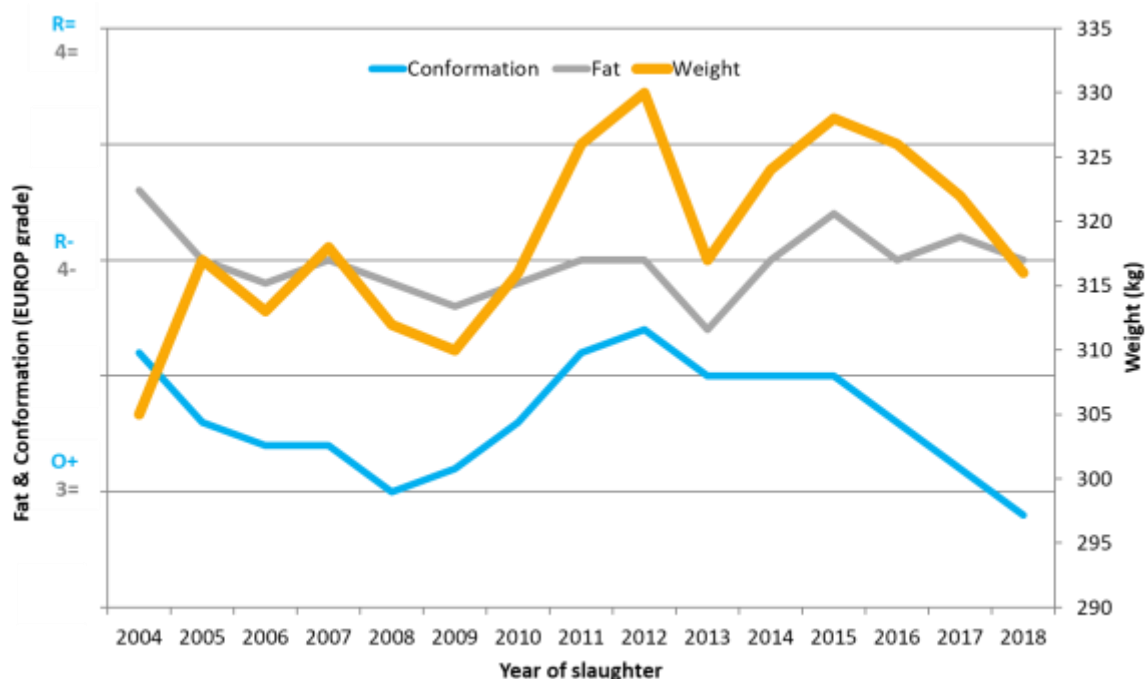


Figure 1. Average performance of beef cattle bred from to dairy dams that were slaughtered between 2004 and 2018

Table 1. Breakdown, by sire breed, of the percentage of cattle born to dairy dams that were slaughtered in 2017 which did not meet the minimum carcass weight specification or the minimum carcass conformation specification

Sire breed	Number of sires	Number of progeny	Progeny not meeting carcass weight spec (280 kg)	Progeny not meeting carcass conformation spec (O=)
Aberdeen Angus	35	2,309	32%	12%
Belgian Blue	29	2,405	8%	2%
Hereford	31	1,251	27%	17%
Limousin	25	4,834	10%	1%
Friesian	117	2,066	26%	51%
Holstein	509	957	31%	74%
Jersey	50	244	66%	84%
Norwegian Red	10	168	29%	62%

UNDERSTANDING THE DAIRY BEEF INDEX

The Dairy Beef Index (DBI) ranks beef bulls, for use in the dairy herd, according to their genetic merit for a range of calving performance and carcass performance traits. The overall DBI is expressed in euros (€). Each €1 increase in DBI can be interpreted as a €1 expected increase in profit for that bull’s progeny compared to progeny born to the average Holstein-Friesian bull. For example, a beef bull with a DBI of €100 is expected to produce progeny born to dairy cows that will generate €100 more profit compared to progeny sired by the average Holstein-Friesian bull. Therefore, higher DBI bulls generate more profitable progeny.

The DBI can be segregated into two sub-indexes, 1) the value of calving sub-index which makes up 64% of the index, and 2) the value of beef sub-index which makes up the remaining 36% of the index (Figure 2). A

total of 12 traits are included in the DBI; these include: gestation length, calving difficulty, calf mortality, feed intake, docility, carcass weight, carcass conformation, carcass fat, and two 'out of spec' traits. Where applicable, a polled and a carcass bonus trait (specific to the breed) are also included in the DBI (Figure 2). An explanation of each of the traits included in the DBI is in Table 2. A breakdown of the DBI percentiles for pedigree beef cattle born between 2013 and 2018 is in Table 3.

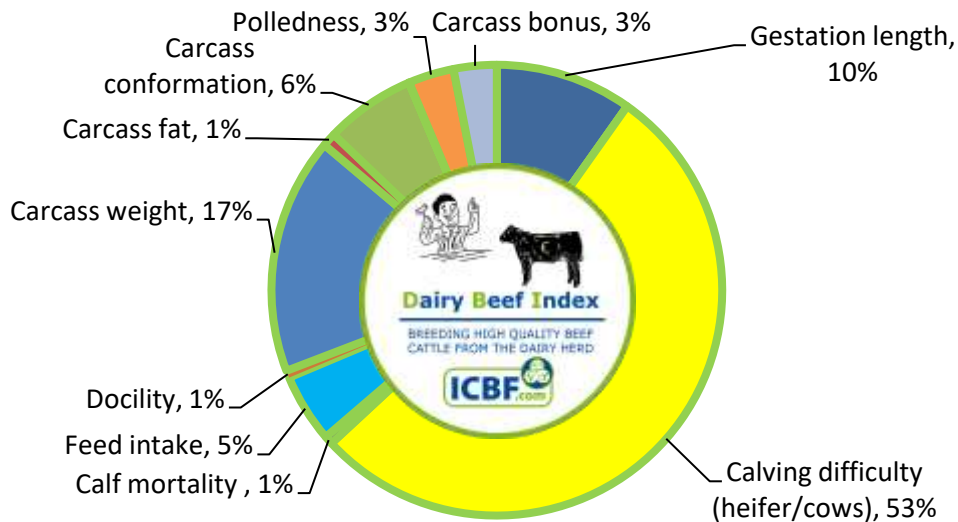


Figure 2. Relative emphasis of the traits included in the Dairy Beef Index (Spring 2019)

Table 2. Explanation of the traits included in the Dairy Beef Index together with their economic value (Spring 2019) and the desirable direction of selection

Trait	Explanation	Economic value	Desirable trait direction
Gestation length	Number of days the cow is expected to carry the foetus in-utero	-€7.47	Lower values are better
Calving difficulty	Percentage of progeny expected to require considerable assistance at calving, either with or without veterinary assistance	Non-linear calculation	Lower values are better
Calf mortality	Percentage of progeny expected to die at or soon after birth	-€1.73	Lower values are better
Feed intake	Kilograms of feed consumed by progeny (measured as dry matter intake)	-€35.17	Lower values are better
Docility	The expected quietness of progeny	€11.71	Higher values are better
Carcass weight	Expected weight (kg) of progeny post-slaughter	+€2.37	Higher values are better
Carcass fat	Expected carcass fat score of progeny on the EUROP classification grid	-€5.11	Lower values are better
Carcass conformation	Expected carcass conformation score of progeny on the EUROP classification grid	+€10.90	Higher values are better
Out of spec: weight	Percentage of progeny not expected to meet the minimum carcass conformation specification required (O=)	-€0.43	Lower values are better
Out of spec: conformation	Percentage of progeny not expected to meet the minimum carcass weight required (280 kg)	-€0.25	Lower values are better
Polledness	Whether all, half, or none of the progeny are expected to have horns	+€5.33	Higher values are better
Carcass bonus	Additional carcass premium paid for Aberdeen Angus and Hereford progeny	+€7.81	Higher values are better

Table 3. Breakdown of the Dairy Beef Index (Spring 2019), the calving sub-index, the beef sub-index, as well as genetic merit for calving difficulty for pedigree beef cattle born between 2013 and 2018

	Worst 10%	Worst 20%	Worst 40%	Average	Best 40%	Best 20%	Best 10%
Overall Dairy Beef Index (€)	-€193	-€134	€4	€25	€39	€61	€77
Value of Calving sub-index (€)	-€309	-€184	-€83	-€31	€7	€35	€48
Value of Beef sub-index (€)	-€48	-€31	€42	€81	€112	€137	€149
Genetic merit for calving difficulty: dairy heifers (%)	24.3%	19.8%	14.1%	11.5%	9.2%	6.7%	5.7%
Genetic merit for calving difficulty: dairy cows (%)	12.7%	9.8%	6.5%	5%	3.4%	2.6%	2.3%

ON-FARM BENEFITS OF USING THE DAIRY BEEF INDEX

The Dairy Beef Index (DBI) provides a simple method of identifying beef bulls that are both easy calving and short gestation. In addition, progeny sired by high DBI bulls generate a higher calf price and they have better carcass performance than progeny sired by beef bulls that were simply used for their ease of calving and short gestation.

Compared to the progeny performance of beef bulls that sired most beef calves in dairy herds (between 2015 and 2018), beef bulls that were at the top of the DBI Active bull list (Jan '19):

- Were easier calving on cows (1 percentage unit easier)
- Generated a higher calf price (€18 more)
- Had a heavier carcass weight (20 kg heavier)
- Had a better conformation score (1 grade higher), and
- Had more carcasses that met carcass specifications for weight (280 kg) and conformation grade (O=)

These benefits required the extra effort of providing considerable assistance at calving to just 1 extra heifer out of 100, and 1 day longer gestation (Table 4). The accumulation of benefits arising from using the top DBI bulls over the beef bulls that have been used the most in dairy herds, was €114.21.

Table 4. Performance of beef calves born to dairy dams when the beef sires were a) the 5 most used beef sire in dairy herds (between 2015 and 2018), or b) the top 5 sires ranked on the Dairy Beef Index Active Bull List (Jan '19)

Bull	Top beef AI bulls on DBI€	Most used beef AI bulls	Difference between progeny	Value of difference on-farm	Overall value of using the top bulls over the most used bulls	
DBI (€)	100	43	€57 higher DBI			
VALUE TO DAIRY FARMER						
Gestation length (days)	284	283	1 day longer gestation	-€7.47	Value to dairy farmer → €9.67	Overall value → €114.21
Calving difficulty on dairy heifers (%)	9	8	Assist an extra 1% of heifers at calving	-€6.44		
Calving difficulty on dairy cows (%)	3	4	Assist 1% fewer cows at calving	€5.58		
Calf mortality (%)	2	2	No difference in calf mortality	-		
Calf price (€)	242	224	€18 higher calf price	€18.00		
VALUE TO FINISHER						
Carcass weight (kg)	330	313	17 kg heavier carcass	QPS grid payment & base of €3.82, & incl. QA	Value to finisher → €104.54	
Carcass conformation	R-	O+	1 conformation grade better			
Carcass fat	4-	4-	No difference in carcass fat			

REVAMPED GENETIC EVALUATION FOR CALVING DIFFICULTY IN THE DAIRY BEEF INDEX

The Dairy Beef Index (DBI) includes a revamped genetic evaluation for calving difficulty which has four major improvements compared to the genetic evaluation for calving difficulty (which will continue to be presented in the Euro-star indexes and the EBI for 2019). These are:

- 1) It provides a better indication of how suitable a beef bull is for use on dairy heifers and on dairy cows, by separating the heifer trait from the cow trait
- 2) More sources of data are being used (i.e., calf birth size and calf birth weight) with the farmer scored calving difficulty records which have always been used
- 3) Additional strict editing criteria are applied to the data to remove herds that have low levels of data recording
- 4) It takes into consideration that the economic value for calving difficulty is linear up to a point (i.e., a genetic merit of 2.5% for calving difficulty), after which the cost of calving difficulty increases in a non-linear fashion. This updated non-linear economic value reflects the view of dairy farmers which will only choose to use more difficult calving beef bulls where a higher price is paid for the resulting calf compared to easier calving beef bulls.

The net effect of these improvements has resulted in an increase of the average genetic merit of all animals for calving difficulty. For example, of the beef AI bulls on the DBI Spring 2019 Active bull list, their genetic merit for calving difficulty has increased on average by 7.4 percentage units on the new dairy heifer scale, or by 1 percentage unit on the new dairy cow scale.

DIFFERENCES BETWEEN THE EBI, EURO-STAR INDEXES, AND THE DAIRY BEEF INDEX

Table 5. Differences between the EBI, Euro-star Indexes, and the Dairy Beef Index for Spring 2019

	EBI	Euro-star Indexes	Dairy Beef Index
Animals that have the index	Dairy animals	Beef animals	Beef AI bulls (Spring 2019); over time both beef AI bulls and beef stock bulls will have the index
Herds that should use the index	Dairy herds	Beef herds	Dairy herds
Why use the index	To breed more profitable dairy males and females for the dairy herd	To breed more profitable beef males and females for the beef herd	To breed more profitable beef cattle from the dairy herd which are easy calving, have a short gestation, have a high calf price, and a high carcass merit
Genetic evaluation for calving difficulty	Old genetic evaluation for calving difficulty is in use for Spring 2019. Each animal’s genetic merit for calving difficulty is expressed as one figure which is applicable to dairy heifers and dairy cows.	Old genetic evaluation for calving difficulty is in use for Spring 2019. Each animal’s genetic merit for calving difficulty is expressed as one figure which is applicable to dairy heifers, dairy cows, beef heifers, and beef cows	Revamped genetic evaluation is used with stricter editing criteria resulting in an increase in the average genetic merit of all animals for calving difficulty. Each bull has two genetic merit figures for calving difficulty: 1) for selecting bulls for use on dairy heifers, 2) for selecting bulls for use on dairy cows

WHAT ANIMALS HAVE A DAIRY BEEF INDEX AND WHERE CAN I FIND IT?

For Spring 2019, only beef AI bulls that have ≥30 progeny in dairy herds (i.e., born to dairy dams) will have a Dairy Beef Index (DBI) which will initially be published on www.icbf.com. Over time, the DBI will be made available for all beef bulls (AI and stock bulls) and it will be incorporated into the Animal Search tool, profiles, and other reports etc.

ADVICE FOR DAIRY FARMERS USING BEEF AI BULLS FOR SPRING 2019

When selecting beef AI bulls for use in the dairy herd, choose bulls from the Dairy Beef Index Active bull list. Ideally, use a team of bulls to increase the reliability of the team. Some scenarios and breeding advice for 2019 on the team of beef bulls that should be selected is given in Table 5.

Table 5. Beef bull selection advice for use in dairy herds based on various scenarios

<i>What I want</i>	<i>Advice</i>
<i>Easy calving, short gestation, high calf price (if sold as a calf), and beef cattle that will return a decent margin at slaughter</i>	Select a team of bulls from the Dairy Beef Index Active bull list with the highest Dairy Beef Index € value
<i>Easy calving and short gestation are most important; not concerned with calf price or slaughter performance</i>	Select a team of bulls from the Dairy Beef Index Active bull list with the highest € value of calving sub-index
<i>Easy calving on dairy heifers and a short gestation; not concerned with calf price or slaughter performance</i>	Select a team of bulls from the Dairy Beef Index Active bull list with the highest € value of calving sub-index which have the lowest % calving difficulty in heifers with a high reliability.