UNDERSTANDING THE DAIRY BEEF INDEX

Dairy Beef Index

BREEDING HIGH QUALITY BEEF CATTLE FROM THE DAIRY HERD

icbf

Modified 31st March 2023

For further information contact the HerdPlus team on 023 882 0452

Contents

What is the Dairy Beef Index? 3
What Does the Dairy Beef Index Select For? 3
Why Use the Dairy Beef Index? 4
How do I Interpret the Dairy Beef Index? 4
Understanding PTAs and Reliabilities 5
PTA 5
Reliability 5
Understanding the Traits in the Dairy Beef Index 6
Risk of Dairy Heifer Calving Difficulty 6
Calving Difficulty 6
Gestation 6
Calf Mortality 6
Carcass Weight 6
Carcass Fat and Carcass Conformation 6
Age at Slaughter 7
'In-Spec' 7
Feed Intake 7
Carbon 7
Polledness 8
How is the Dairy Beef Index Calculated? 9
Who Should Use the Dairy Beef Index? 9
Advice for Dairy Farmers 10
Advice for Beef Breeders 11
Accessing the Dairy Beef Index 11
Animal Search 11
Active Bull List 12
Sales Catalogue 13
Eurostar Profile 14

What is the Dairy Beef Index?

- The Dairy Beef Index (DBI) is a tool to produce quality beef cattle from the dairy herd that have both desirable calving attributes for the dairy herd (i.e., easy calving and short gestation) and valuable carcass merit attributes for the finisher.
- It does this by ranking beef cattle for use in the dairy herd based on their genetic merit for several traits that are important to dairy-beef production systems (i.e., calving and beef traits).

What Does the Dairy Beef Index Select For?

- Easy calving, short gestation, and less calf mortality
- Heavier carcasses of greater conformation and lower fat score
- Cattle that are polled, carbon efficient and have a lower feed intake

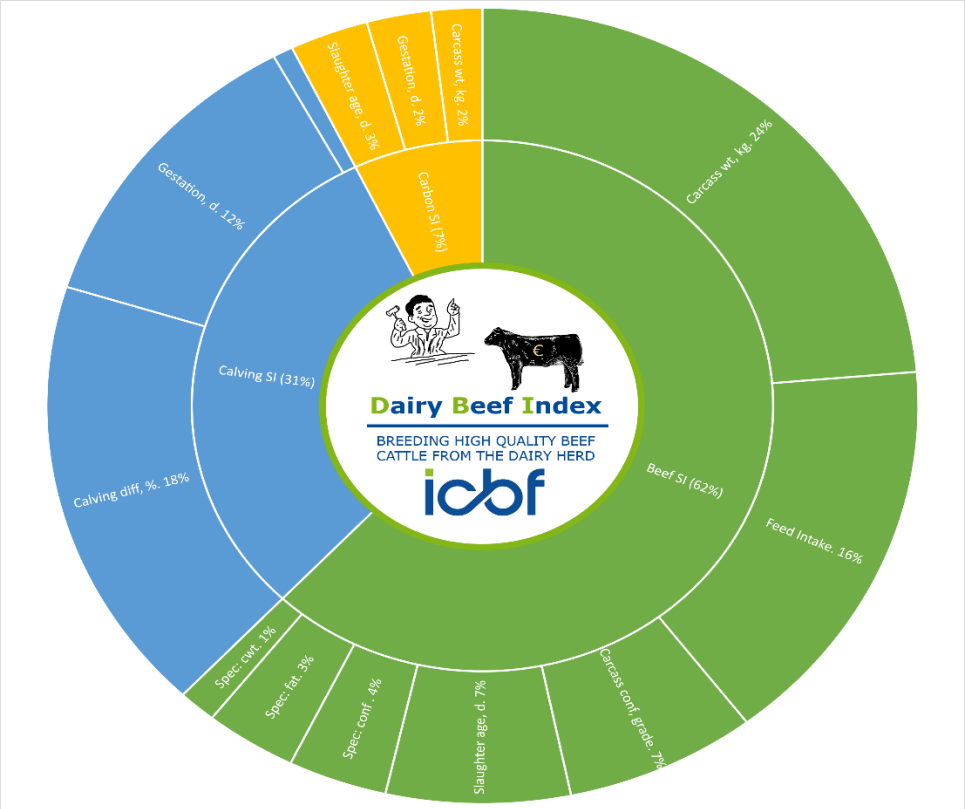


Figure 1. *Relative emphasis of traits included in the Dairy Beef Index (Jan 2023*

Why Use the Dairy Beef Index?

- Using a bull only for his 'easy calving' or 'short gestation' attributes can result in lighter carcasses. However, incorporating several traits simultaneously into selection decisions using an overall index (i.e., the Dairy Beef Index; DBI) can produce more balanced cattle with more favourable economic returns.
- For example, sires that ranked best on calving traits alone (i.e., easy calving, short gestation, and low calf mortality) were compared with sires that ranked best on the DBI (Berry and Ring, 2020). These 2,192 beef sires had farm production records available from 3,065 dairy herds to make comparisons.
- Relative to the best ranked sires on calving traits, the best ranked sires on DBI delivered heavier, more conformed carcasses that had a greater chance of meeting factory specifications for conformation.
- The higher DBI sires achieved the additional performance without increasing the incidence of cow calving difficulty, without increasing gestation length, and without increasing calf mortality.
- The additional revenue to the finisher that slaughtered 20 progeny from sires that ranked best on DBI over sires that ranked best on calving performance, was €829.40. For calving performance, the monetary benefit to the dairy farmer that had 20 calves from high DBI sires compared to sires that ranked best on calving performance was €79.60.

How do I Interpret the Dairy Beef Index?

- The Dairy Beef Index (DBI) is expressed in euros, where a higher euro value is more desirable. For ease of interpretation, the euro value is also presented as stars where 1 star is very poor (i.e., animal ranks among the worst 20% of animals), and 5 stars is very good (i.e., animal ranks among the best 20% of animals).
- Therefore, a bull with a high DBI should pass-on more desirable characteristics to its progeny than a bull with a low DBI. Consequently, progeny from a high DBI bull should generate more revenue than a low DBI bull.
- For example, Bull A has an DBI of €100, while Bull B has an DBI of €143. It is expected that each calf born from Bull B would generate €43 more profit than those from Bull A, through a combination of calving and beef merit attributes. Over a span of 4 years, Bull B should generate €3,440 more revenue than Bull A if he sires 20 calves/year (€43 x 20/calves x 4 years).

Understanding PTAs and Reliabilities

To interrogate how an animal's Dairy Beef Index (DBI) is derived and how to use the DBI, it's essential to have a general understanding of PTAs (i.e., genetic merit) and reliabilities.

PTA

- The predicted transmitting ability, or PTA, is the measure of genetic merit used in the DBI. It tells us how much each animal is expected to pass-on to its progeny for any given trait.
- It is estimated using pedigree information, genomic data (where available), and on-farm performance records (e.g., calving and slaughter data) from an animal itself and its relatives.
- The PTA is generally expressed in the same unit as the trait is scored, and relative to a base group of animals.
- The performance of the base group of animals is not intrinsically important to know, as the key skill is being able to use the PTA to differentiate two animals whose PTA varies for the same trait.
- For example, carcass conformation is scored on a 15-point scale, where 1 is P- and 15 is E+. If Bull A has a PTA (for carcass conformation) of -1.5 and Bull B has a PTA of +1.0, we expect the progeny from Bull B will be, on average, 2.5 conformation grades higher than those from Bull A.
- For ease of interpretation, the PTA for most traits in the DBI are also presented as stars where 1 star is very poor (i.e., animal ranks among the worst 20% of all animals), and 5 stars is very good (i.e., animal ranks among the best 20% of all animals)

Reliability

- Reliability is the measure of confidence surrounding the PTA, expressed as a percentage, typically ranging from 15% to 99%, where a higher % is always more desirable.
- A reliability of 30% indicates that animal's PTA is likely to change substantially as more performance records become available.
- A reliability of 90% indicates that animal's PTA is a very realistic reflection of the performance on-farm, and the PTA is unlikely to change sizably when additional performance records become available.

Understanding the Traits in the Dairy Beef Index

Risk of Dairy Heifer Calving Difficulty

- This determines the likelihood that a bull's true incidence of calving difficulty will go above a safe threshold defined for dairy heifers.
- A bull will be either low, moderate, or high risk.
- Bulls categorised as low risk are preferred for use dairy heifers as they have the easiest calving difficulty % (i.e., PTA), and equally as important, their PTA and on-farm incidence of difficulty is unlikely to increase over-time since they have a high reliability for their breed.

Calving Difficulty

- The PTA for calving difficulty indicates the expected incidence of difficult births (considerable/vet assistance) that will ensue due to using a bull on either dairy heifers or dairy cows.
- Easier calving bulls are more desirable; hence, lower PTA values are preferred.
- For example, where a bull has a PTA for calving difficulty of 8% on dairy heifers, approx. 2 out of every 25 calves (i.e., 8/100) born to dairy heifers are expected to require considerable assistance, due to a heavy birth size, for example.

Gestation

- Gestation is the expected number of days between conception (i.e., AI or natural serve event) and birth.
- Bulls that have a shorter gestation are more desirable since the dairy female will return to the milking parlour sooner; hence, bulls with lower PTA values for gestation are preferable.
- For example, if Bull A has a genetic merit (for gestation) of -5 and Bull B has a genetic merit of +1, we expect the progeny from Bull B, on average, to have a 6 day longer gestation period than those from Bull A.

Calf Mortality

- Calf mortality is an indication of the number of expected calf deaths at, or soon after birth.
- Since no calf deaths are optimal, lower PTA values for calf mortality are preferable.

Carcass Weight

- Bulls with a high PTA for carcass weight are expected to produce progeny with a heavier carcass than bulls with lower PTA values for carcass weight.
- For example, if Bull A has a PTA (for carcass weight) of +10 kg and Bull B has a PTA of -5 kg, we expect the progeny from Bull A will, on average, produce progeny that are 15 kg heavier carcass than Bull B.

Carcass Conformation

- Carcass conformation is an indicator of the conformation grade an animal's progeny are

expected to achieve in the factory.

- The traits are categorised using the EUROP grid which is scored on a 15-point scale, where and 1 is P- and 15 is E+ for carcass conformation.
- Bulls with higher PTA values for carcass conformation are more desirable.
- For example, if Bull A has a PTA for carcass conformation of -1.5 and Bull B has a PTA of +1.0, we expect the progeny from Bull B will be, on average, 2.5 conformation grades higher than those from Bull A.

Age at Slaughter

- Age at slaughter is an indication of the number of days it will take cattle to reach slaughter.

Bulls with a lower PTA for age at slaughter are expected to produce progeny that finish earlier than bulls with a higher PTA for age at slaughter. 'In-Spec'

- The DBI has a composite 'in-spec' trait which identifies progeny that conform to desired factory specifications for carcass weight (280 to 380 kg), conformation (O= and better), and fat (2+ to 4=).
- Cattle that do not meet desired specifications are penalised in the factory and the DBI reflects those penalties.

For simplicity, the 'in-spec' trait is expressed on webscreens and profiles etc. as euro values. Since economically it is optimal if no cattle fall outside the minimum factory specifications, higher€ values for the in-spec trait is more desirable. Feed Intake

- Feed intake is an indication of the expected progeny feed consumption.
- If less feed is required in the diet (e.g., grass, silage, or concentrates) there are less costs on the production system; therefore, bulls with lower PTA values for feed intake are preferable.

Carbon

- It's likely farmers will be charged for carbon in the near future; to reflect that a carbon sub-index has been added to the DBI which will allow farmers breed cattle with a lower carbon footprint.
- The carbon value is assessed as the change in total emissions per unit change in the trait of interest holding all other traits constant. Traits that increase feed intake (e.g., carcass weight) – increase emissions and hence, are penalised in the carbon sub-index Traits that reduce feed intake or change diet reduce emissions (e.g., gestation, age at slaughter) and hence, are rewarded in the carbon sub-index. Total carbon value is converted to an economic value by a price per tonne of carbon; this has been set at €80/tonne.
- Traits included in the carbon sub-index include; gestation, carcass weight and age at slaughter
- Bulls with higher € values on the carbon sub-index are preferable.
-

Docility

• Docility is an indicator of how quiet or docile a bull's progeny are expected to be.

• Docility is scored by farmers on a scale of 1 to 5 where 1 is a very flighty animal, and 5 is a very quiet animal.

• Therefore, bulls with higher PTA values for docility are more desirable.

Polledness

- Polledness is an indication of whether all, none, or half, a bull's progeny is expected to have horns.
- Polled animals are more desirable since there is no requirement for disbudding, therefore, polled bulls are rewarded in the DBI.

How is the Dairy Beef Index Calculated?

- The PTA for each trait in the Dairy Beef Index is simply multiplied by its respective economic weight (i.e., euro values in equation below). Each trait is them summed together to derive a single monetary value that is expressed in euros.

$$
\begin{aligned}
&Dairy\ Beef\ Index = (\ €53 + \\
&(Combined\ Dairy\ Calving\ Difficulty\ PTA * Economic\ Weight\ (Figure\ 2)) + \\
&(Gestation\ PTA * -€7.47) + \\
&(Calf\ mortality\ PTA * -€1.73) + \\
&(Feed\ intake\ PTA * -€35.17) + \\
&(Docility\ PTA * €11.71) + \\
&(Carcass\ weight\ PTA * €2.68) + \\
&(Carcass\ conformation\ PTA * €10.90) + \\
&\\
&In\ spec + \\
&(Age\ at\ slaughter\ PTA * -€0.84) + \\
&\qquad (Polledness * €5.33)\ + \text{carbon subindex})
\end{aligned}
$$

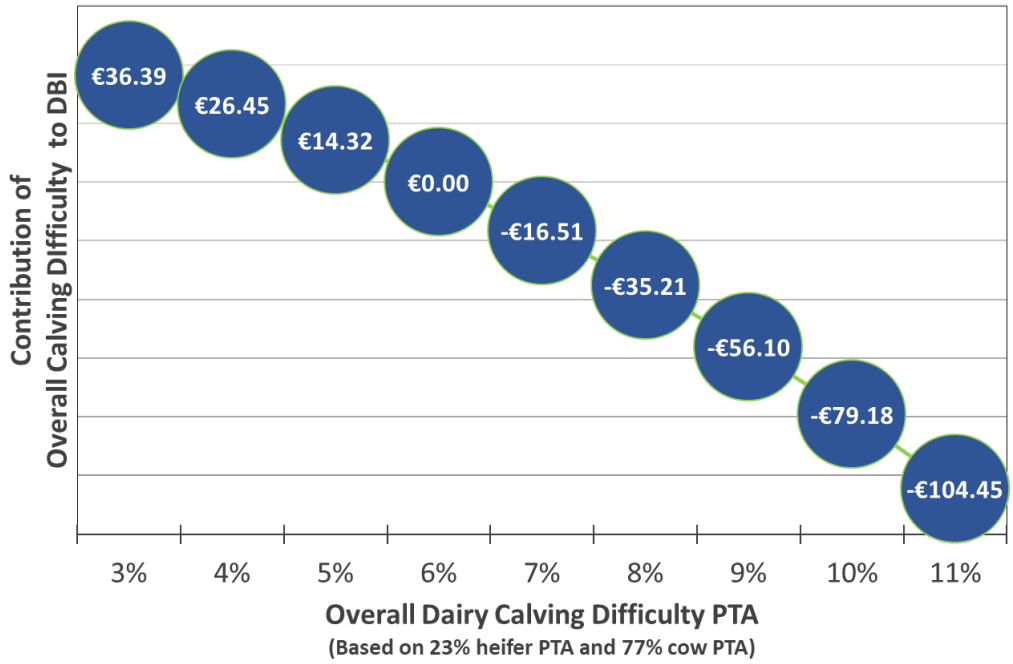


Figure 2. *The economic weight of calving difficulty in the Dairy Beef Index penalises harder calving bulls much more severely than easier calving bulls, meaning the more difficult calving a bull is the less likely he is to rank high on the Dairy Beef Index. The economic weight of calving difficulty in the Dairy Beef Index is calculated based on the overall dairy calving difficulty PTA, which is combination of 23% of the dairy heifer PTA and 77% of the dairy cow PTA. For example, a bull with a dairy heifer calving difficulty PTA of 9% and a dairy cow calving difficulty PTA of 4% would have an overall dairy calving difficulty PTA of 5% ((9% x 0.23) + (4% x 0.77) = 5%)*

Who Should Use the Dairy Beef Index?

- Dairy farmers that use beef bulls, and
- Beef breeders that target the dairy-beef market for bull sales

Advice for Dairy Farmers

- Maximise the genetic potential of your dairy herd by breeding your best stock to dairy AI
    - Generally, heifers are the most genetically elite animals in a herd; therefore, to maximise the genetic potential of their progeny, use dairy AI, not a beef bull.
    - Poorer, 'problem' cows, of higher SCC, that calve late, or are of lower EBI (Figure 3) should be considered for beef matings, irrespective of whether they are bred in the 1st week or 8th week of the breeding season.

HerdPlus® Profit through Science
Call 023-8820452

Economic Breeding Index (EBI) Top/Bottom cows - Nov 2019

ICBF.com

TOP 10 COWS ON EBI

	Jumbo	Lac	Milk	Fert	Calv	Other	EBI
1	588	2	€119	€59	€35	€10	**€223**
2	929	9	€24	€168	€27	€-1	**€218**
3	587	2	€82	€98	€31	€4	**€215**
4	537	2	€86	€58	€52	€3	**€199**
5	117	7	€33	€134	€13	€17	**€197**
6	704	1	€95	€60	€43	€-3	**€195**
7	896	9	€24	€126	€27	€16	**€194**
8	378	4	€79	€91	€21	€0	**€192**
9	577	2	€97	€56	€33	€1	**€187**
10	637	1	€60	€74	€49	€-5	**€178**

BOTTOM 10 COWS ON EBI

	Jumbo	Lac	Milk	Fert	Calv	Other	EBI
1	149	6	€-58	€-11	€26	€1	**€-42**
2	400	4	€40	€-9	€11	€9	**€51**
3	585	2	€9	€3	€40	€0	**€53**
4	357	4	€40	€-14	€29	€-1	**€53**
5	257	5	€70	€-18	€20	€-8	**€63**
6	552	2	€16	€27	€35	€-13	**€66**
7	232	5	€-18	€53	€35	€-3	**€67**
8	536	2	€13	€35	€26	€4	**€79**
9	270	5	€34	€5	€36	€5	**€79**
10	273	5	€24	€35	€10	€15	**€85**

Figure 3. *Consider mating some of the bottom cows in your herd ranked on EBI to beef bulls. These can be identified using your EBI report*

- To maximise dairy-beef profitability, use beef bulls with the highest Dairy Beef Index.
    - If using beef AI, identify the best bulls from the active bull list; ideally use a team of bulls.
    - If purchasing a stock bull, ask the breeder for the bull's tag and obtain his DBI from the animal search, sales catalogue, or stock bull finder.
- Consider the traits that make up a bull's Dairy Beef Index. On average, 31% of an animal's DBI will come from calving value traits while the remaining will come from beef value traits 62% and Carbon 7%. That said, where a bull is extremely good on 1 trait (e.g., calving difficulty) almost all its index could come from that trait. With that in mind it's good practice to look at some key traits:
    - **Calving Difficulty:** is the expected incidence of difficulty tolerable for your herd and the females being mating? Remember a PTA of 3% on dairy cows is expected to result in considerable assistance in 3 out of 100 dairy cow calvings. Also remember if you are mating cows, you should only consider the dairy cow calving difficulty PTA, not the dairy heifer PTA.
    - **Gestation:** shorter gestations are most desirable. However, consider using longer

gestation bulls early in the breeding season, provided they excel in other traits.

- **Carcass Merit:** Try to maximise carcass merit, by selecting bulls with the highest PTAs for carcass weight and conformation.

Advice for Beef Breeders

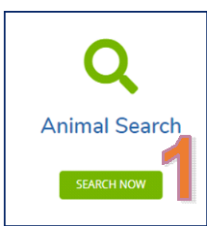
- Use the index that best reflects your system:
  - When selecting sires for the beef herd continue to use either the replacement or terminal index. Use the Replacement Index to generate replacement heifer calves for the beef herd, where all other offspring are destined for slaughter. Use the Terminal Index to generate offspring that are solely destined for slaughter (i.e., no replacements retained).
  - Use the Dairy Beef Index to identify breeding males and females to produce beef bulls for the dairy herd. The DBI of each animal in your herd can be viewed under the Euro-Star Profile or on the Animal Search Tool.
- Remember some of the key traits that make up an animal's Dairy Beef Index:
  - **Calving Difficulty:** Dairy farmers are only concerned with dairy calving difficulty figures, not beef, so this needs to be reflected in selection decisions. A bull that is easy calving on beef cows is not necessarily easy calving on dairy cows.
  - **Gestation:** shorter gestation bulls are most desirable.
  - **Carcass Merit:** Try to maximise carcass merit, by selecting bulls with the highest PTAs for carcass weight and conformation.
- Provide the most up-to date Dairy Beef Index to potential bull buyers

Accessing the Dairy Beef Index

- The Dairy Beef Index is available for all beef animals via the:
  - Animal Search
  - Active Bull List
  - Sales Catalogue
  - Eurostar Profile
  - Stock Bull Finder

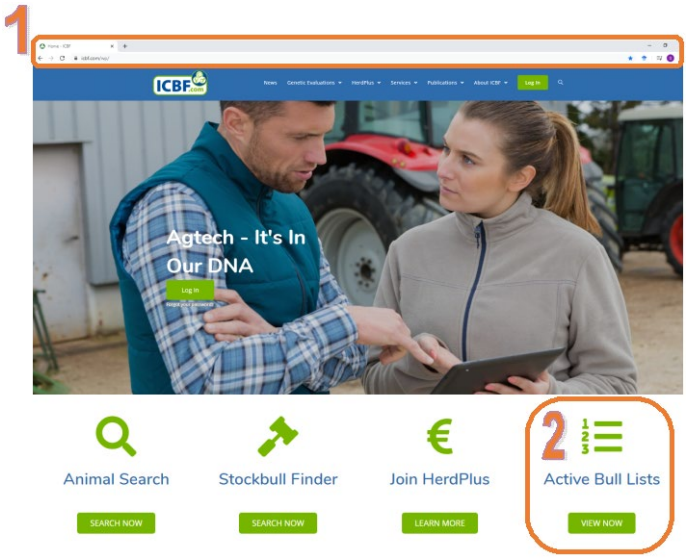
Animal Search

1. Go to the Animal Search on www.icbf.com
2. Enter the animal's tag or AI code; press search



Active Bull List

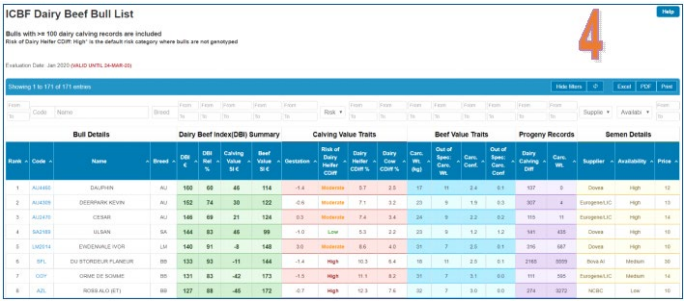
1. Log on to www.icbf.com



2. Scroll down the homepage and select Active Bull Lists

3. Select Dairy Beef Index from the available lists

4. Bulls are ordered based on their desirability for dairy-beef systems. Using the filters, you can reduce the number of bulls available that meet your selection criteria

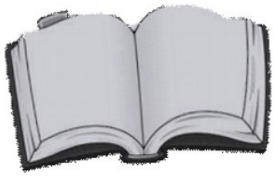


Sales Catalogue

1. The Dairy Beef Index is not presented at the start of the catalogue. You must move to the end of the catalogue (approximately last 3rd of the catalogue)

2. The Dairy Beef Index and key traits are provided for each bull at the sale; 3 bulls per page are presented. To compare a bull on key traits against his breed or other breeds use the breed averages box (highlighted in green below)

1



2

Dairy-Beef Index and Key Profit Traits

Evaluation Date:Jan 2020 Next Evaluation Date: 24-Mar-2020

	Dairy Beef Index	Calving Value SI	Beef Value SI	Gestation	Dairy Heifer CDiff	Dairy Cow CDiff	Carcass Weight	Carcass Conf
All Breed Average	€35.44	-€49.05	€89.79	+2.65 days	12.88%	6.08%	16.39kg	1.4
Angus Breed Average	€61.37	€19.95	€42.49	+0.35 days	8.73%	2.92%	5.98kg	0.66

Compare bull against breed averages

Lot 2
LANIGAN RED DEEP CANYON ET ZLL

Breed Angus
Birthdate 18-Nov-2007
Sire AA948971 (Red Leachman Grand Canyon);
Dam AA1297723 (Red Bar Mm Annie 51r);

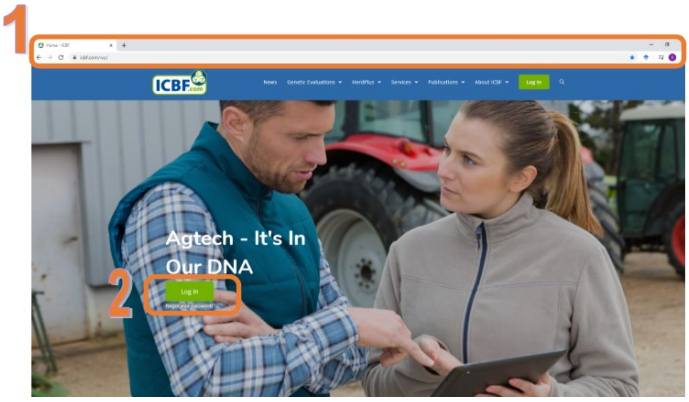
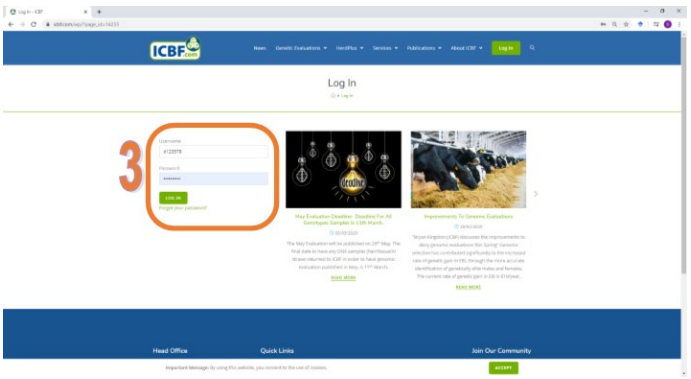
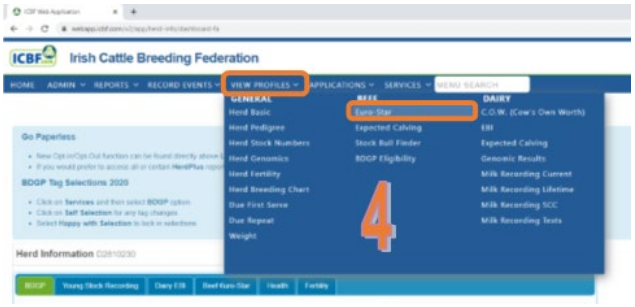
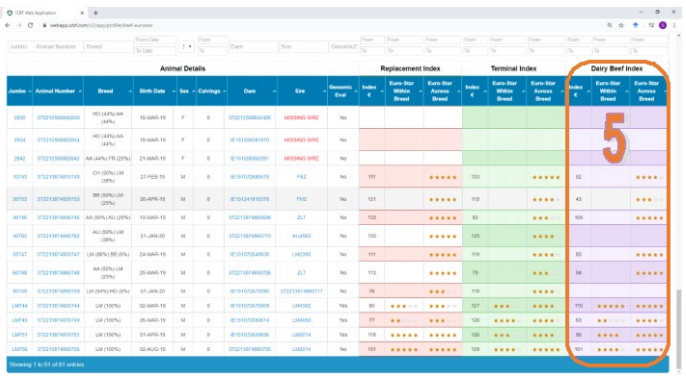
GENOTYPED

Dairy Beef Index	**Dairy Beef Index**	**Calving Value SI**	**Beef Value SI**
	€102 (Rel:91%)	€45 (Rel:89%)	€57 (Rel:94%)

Dairy Beef Index & Sub-indexes

Calving Traits	**Gestation**	**Dairy Cow CDiff**	**Risk of Dairy Heifer CDiff**	**Dairy Heifer CDiff**
	-1.2 days (Rel:99%)	**+2.3% (Rel:88%)**	Low	+6% (Rel:87%)
Beef Traits	**Carcass Weight**	**Carcass Conformation**		
	+12.8kg (Rel:99%)	+0.87 (Rel:99%)		
Additional Information				

Key Dairy Beef Index Traits

Eurostar Profile

1. Log on to www.icbf.com
2. Select Log In from the home screen
3. Enter your username and password. Your username is your herd number. If you cannot remember your password:
   i. Text the word PASS to 089 4577663 to receive your password. NOTE: Your mobile number needs to be stored on our database for this system to work
   ii. Email Support (query@icbf.com)
   iii. Call us on 023-8820452 during office hours (Mon-Fri, 9am – 5.30pm)
4. From the toolbar select "View Profiles" and the "Euro-Star"
5. The Dairy Beef Index is presented as the 3 last columns in the profile. To view more information for an animal, click on the animal's tag and use the toggle button to see the Dairy Beef Index Traits