Data Collection Methods used in the BDGP and the Development of Restful API’s for Recording Herd Data.

Craig Vigors
Irish Cattle Breeding Federation
Beef Data and Genomics Programme

- 6 year scheme approved by the European Commission
- Launched by the Department of Agriculture in 2015
- Part of Ireland’s 2014 – 2020 Rural Development Programme
- Goals:
  1. Increase the Genetic Merit of the Suckler Herds
  2. Reduce Greenhouse Gas Emissions of the Irish Beef Herds
- Expanded in 2017
Beef Data and Genomics Programme

6 Requirements

1. Record Calving Details
2. Complete Animal Surveys
3. Genotyping
4. Stock Bull and Female Replacement Strategy
5. Carbon Navigator
6. Training

23500 Participants
- 33% Online Users
Paper Forms

Information Collected

**Calf**
- Sire
- Calving Ease
- Birth Size
- Vigor (at 5 months)
- Quality
- Docility
- Scour
- Pneumonia

**Dam**
- Docility
- Milk-ability
- Departure Reason

**Stock Bull**
- Docility
- Functionality
- Departure Reason
**Paper Forms**

**Beef Data & Genomics Programme**

Herd Id: D1234567 / IE1234567  
Date: 24-Jan-2018

The following calves are missing a valid sire and / or calving ease. Please review and correct these details and return this page in the freepost envelope provided.

**Note:** Correct information on sire and calving ease must be given as part of your requirements under the Beef Data & Genomics Programme.

- If the Calving Ease is not circled, circle the relevant number (see bottom of page for more information)
- Enter the correct Sire AI Code or Sire Ear Tag here. If it is already filled, there is no need to enter any number
- Only if the Sire is not known, tick the box below.

<table>
<thead>
<tr>
<th>Calf Tag</th>
<th>Birth Date</th>
<th>Calving Ease</th>
<th>Valid Sire AI Code or Sire Ear Tag</th>
<th>Sire Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-0869</td>
<td>2013-03-13</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-0870</td>
<td>2013-03-14</td>
<td>1 2 3 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Paper Forms

### Information Collected

The calves listed below were alive and in your herd at 5 months of age. Calf quality and calf docility must be recorded on all animals in this section.

<table>
<thead>
<tr>
<th>Calf Ear Tag</th>
<th>Birth Date</th>
<th>Calf Docility</th>
<th>Calf Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE123456780127</td>
<td>01-Jan-2016</td>
<td>VG G A P VP</td>
<td>VG G A P VP</td>
</tr>
<tr>
<td>IE123456780128</td>
<td>08-Jan-2016</td>
<td>VG G A P VP</td>
<td>VG G A P VP</td>
</tr>
</tbody>
</table>

---

**Herd Id:** D1234567 / IE1234567

**Date:** 24-Jan-2016

---

**BAS3**

**Beef Data & Genomics Programme**

**Requirement 2: Animal Survey**

---

**ICBF.com**
The stock bull(s) that have left your herd since they sired your 2016+ born calves are listed below. Mark up to 3 of the most relevant reasons for the animal leaving your herd with an X. For a more extensive list of reasons, record this information on www.icbf.com.

At least one reason must be recorded on all animals in this section.

### Bull Reasons for Leaving the Herd

<table>
<thead>
<tr>
<th>Stock Bull Ear Tag</th>
<th>Depart Date</th>
<th>FY</th>
<th>DC</th>
<th>DL</th>
<th>EB</th>
<th>LJ</th>
<th>LM</th>
<th>MA</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE12345670220</td>
<td>20-Feb-2016</td>
<td>F</td>
<td>D</td>
<td></td>
<td></td>
<td>L</td>
<td></td>
<td></td>
<td>Z</td>
</tr>
<tr>
<td>37212345670227</td>
<td>20-Feb-2016</td>
<td>F</td>
<td></td>
<td>D</td>
<td></td>
<td>L</td>
<td></td>
<td></td>
<td>Z</td>
</tr>
<tr>
<td>IE12345670229</td>
<td>20-Feb-2016</td>
<td>F</td>
<td></td>
<td></td>
<td>D</td>
<td>L</td>
<td></td>
<td></td>
<td>Z</td>
</tr>
</tbody>
</table>

(Ensure at least one box is marked with an X)
### Paper Forms – Processing

#### Index - ICBF Forms

<table>
<thead>
<tr>
<th>DocID</th>
<th>Document Type</th>
<th>Form Number</th>
<th>Batch Number</th>
<th>Box Number</th>
<th>Scan Date</th>
<th>Page Number</th>
<th>Scan User</th>
<th>Tag Number</th>
<th>Score1</th>
<th>Score2</th>
<th>Score3</th>
<th>CSVExportDateTime</th>
</tr>
</thead>
<tbody>
<tr>
<td>14162986</td>
<td>BAS3</td>
<td>19599</td>
<td>2067</td>
<td>BAS3</td>
<td>26/04/2017 16:18</td>
<td>3</td>
<td>LOR</td>
<td>02419</td>
<td>2017</td>
<td>0</td>
<td>0</td>
<td>28/04/2017 22:30</td>
</tr>
<tr>
<td>14162986</td>
<td>BAS3</td>
<td>19599</td>
<td>2067</td>
<td>BAS3</td>
<td>26/04/2017 16:18</td>
<td>3</td>
<td>LOR</td>
<td>0257</td>
<td>2016</td>
<td>A</td>
<td>G</td>
<td>28/04/2017 22:30</td>
</tr>
<tr>
<td>14162986</td>
<td>BAS3</td>
<td>19599</td>
<td>2067</td>
<td>BAS3</td>
<td>26/04/2017 16:18</td>
<td>3</td>
<td>LOR</td>
<td>0259</td>
<td>2016</td>
<td>G</td>
<td>G</td>
<td>28/04/2017 22:30</td>
</tr>
<tr>
<td>14162986</td>
<td>BAS3</td>
<td>19599</td>
<td>2067</td>
<td>BAS3</td>
<td>26/04/2017 16:18</td>
<td>3</td>
<td>LOR</td>
<td>0260</td>
<td>2016</td>
<td>A</td>
<td>G</td>
<td>28/04/2017 22:30</td>
</tr>
<tr>
<td>14162986</td>
<td>BAS3</td>
<td>19599</td>
<td>2067</td>
<td>BAS3</td>
<td>26/04/2017 16:18</td>
<td>3</td>
<td>LOR</td>
<td>0261</td>
<td>2016</td>
<td>A</td>
<td>G</td>
<td>28/04/2017 22:30</td>
</tr>
</tbody>
</table>
# Beef Data & Genomics Programme

**Requirement 2: Animal Survey**

**Herd Id:**

The recorded stock bulls used on your calves are listed below. Bull docility and bull functionality must be recorded on all animals in this section.

**Bull Functionality** is the ability of the bull to perform over a long period of time.

<table>
<thead>
<tr>
<th>Stock Bull Ear Tag</th>
<th>Calving Year</th>
<th>Bull Docility</th>
<th>Bull Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
</tr>
</tbody>
</table>

The calves listed below were alive and in your herd at 5 months of age. Calf quality and calf docility must be recorded on all animals in this section.

<table>
<thead>
<tr>
<th>Calf Ear Tag</th>
<th>Birth Date</th>
<th>Calf Docility</th>
<th>Calf Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VG</td>
<td>G</td>
</tr>
</tbody>
</table>
Web Application - Desktop
Web Application - Desktop
Web Application - Mobile
### Data Quality – Calf Docility Heritability

**Farmer: 0.30**  
Genetic correlation of **0.78** between two traits  
**Technician: 0.22**

Farmer has longer to observe the animal?

<table>
<thead>
<tr>
<th>Score</th>
<th>Animals</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Quiet</td>
<td>66144</td>
<td>12.2</td>
</tr>
<tr>
<td>Quiet</td>
<td>219502</td>
<td>40.6</td>
</tr>
<tr>
<td>Average</td>
<td>226709</td>
<td>41.8</td>
</tr>
<tr>
<td>Difficult</td>
<td>28337</td>
<td>5.2</td>
</tr>
<tr>
<td>Very Difficult</td>
<td>1553</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Animals</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Docile</td>
<td>15287</td>
<td>13.9</td>
</tr>
<tr>
<td>Restless</td>
<td>73835</td>
<td>67.3</td>
</tr>
<tr>
<td>Nervous</td>
<td>18880</td>
<td>17.2</td>
</tr>
<tr>
<td>Flighty / Wild</td>
<td>1503</td>
<td>1.4</td>
</tr>
<tr>
<td>Aggressive</td>
<td>144</td>
<td>0.1</td>
</tr>
</tbody>
</table>

API – Application Programming Interface
Herd API’s

- A set of web services available to software and sensor providers to provide data services to farmers.

- REST/JSON
  - Smaller data transfer when compared to SOAP/XML
  - Easy to process (if HAL is used).
  - Flexible authentication using OAuth 2.0
  - Data access is controlled by limiting the scope
Herd API’s – GET Insemination Example

```
{
   "_links": {
      "self": {
         "href": "http://apitest.dev64.icbf.com/herd-fertility/insemination?start_date=01-Apr-17&page=1"
      }
   },
   "_embedded": {
      "insemination": [{
         "id": "1478411718",
         "animal_id": "IE123456790741",
         "activity_date": "03-APR-17",
         "activity_type": "AIN",
         "bull_used": "RUU",
         "editable": "UD",
         "_links": {
            "self": {
               "href": "http://apitest.dev64.icbf.com/herd-fertility/insemination/1478411718"
            }
         }
      }]
   },
   "page_count": 1,
   "page_size": 100,
   "total_items": 1,
   "page": 1
}
```
Herd API Authentication – OAuth 2.0

1. Login with ICBF credentials
3. Send Authorization Code
4. Receive Refresh and Access Tokens

Resource Owner (Farmer)

ICBF Authorisation Server

ICBF.com

www.icbf.com

https://

Irish Cattle Breeding Federation

Sign in using your ICBF username and password

Username: 
Password: 
Login
Herd API’s – Services Available

**Methods Available:** GET (read) POST (create) PUT (update) DELETE

- **Herd Details**
  - Animal Details

- **Fertility**
  - Heat
  - Insemination
  - Pregnancy Diagnosis

- **Evaluation**
  - Beef
  - Dairy

- **Weight**
  - Live Weight

- **Lactation**
  - Period

- **Health**
  - General Health
  - Treatments

- **Veterinary**
  - Medicine
Conclusion

- **Paper**
  - High volume of data, slowly being replaced with new technology
  - Will remain for the foreseeable future

- **Web**
  - Volume increasing over time to a point
  - Provides convenience and timeliness in recording

- **Mobile**
  - Further improvement of convenience and timeliness

- **API**
  - Facilitates many data sources, e.g. sensors
  - Devices that use the API need to be made available.
Questions?