Reducing Carbon Emissions and Finding the Tastiest Steak
Our Vision

“Empowering sustainable farming through collaboration and excellence in genetics and big data solutions”
About ICBF

Next generation of animals are more environmentally and economically sustainable than the last.

World-leading (research => implementation).
• 2\textsuperscript{nd} in world to launch dairy genomics.
• Beef Genomics => largest cattle genomics project globally.
Irish Industry: Overview and Challenges
Overview

Irish Agriculture accounts for:

- 7.6% of Ireland's economy-wide GVA (Gross Value Added)
- 10.7% of Ireland’s exports
- 8.4% of total national employment

“Irish Agri-food and drink exports target €19 bn by 2025”
**Dairy**
- Grass based seasonal
- 1.5m dairy cows
- 17,000 herds
- Avg herd size: 80 cows
- Export 90% of milk produced

**Overview**
- Grass based seasonal
- 0.95m beef cows
- 66,000 herds
- Avg herd size: 14 cows
- Export 90% beef

**Beef**
- Grass based seasonal
- 1.5m dairy cows
- 17,000 herds
- Avg herd size: 80 cows
- Export 90% of milk produced
Overview

Average Farm Income

- Dairy: €52,155
- Cattle Rearing: €12,516
- Cattle Other: €16,853
- Sheep: €15,708
- Tillage: €30,840

“Average Irish farmer aged 56”
Who contributes to Irish Agriculture?

AI Orgs

Co-ops

Milk Recording

Herd Books

AIM

Farmer

National Programmes

Farm Advisory

Marts

Abattoirs

Vets & Vet Labs

Teagasc Research

Consumer

ICBF

AgTech it’s in our DNA
Overview

Genetic Trends in Dairy & Beef

Sustained 0.25 genetic standard deviation gain in Dairy
- €1.5bn to Dairy Industry

2016 BDGP - Beef
- €100m to Beef Industry
- €600m by 2030
- 10% drop in GHG – 300k tonnes
Challenges

Animal GHG Emissions

- Global GHG Emissions from Agriculture is 12%
- EU average is 10%
- In Ireland it is 33%

- Total Irish GHG output is ~20 Million tonnes
- Irish Ag action plan to drop to ~18 Million
  - ~300k Beef
  - ~500k Dairy

Cattle = 65% of Total livestock GHG

Environmental Solution
Cut our cattle herd

Irish Solution
Breed more sustainable animals
(BDGP 2015-2020)
Global Overview

World Beef Consumption Trend

Source: H Charles, J Godfrey et al. Science 2018;361
Global Overview

Meat Consumption in Tonnes

Source: H Charles, J Godfrey et al. Science 2018;361
Tech Stack:
Tech Stack

Highfield

Shinagh

Data Guard

Backups

ICBF
AgTech-It’s in our DNA

ORACLE® Cloud

10 GbE

10 GbE

Backups
Evaluation Compute

Ram 2GB  
Disk 80GB

Ram 16GB  
Disk 279GB

Ram 64GB  
Disk 698GB

Ram 120GB 
Disk 1,800GB

Ram 356 GB 
Disk 4,000 GB

Ram 6,000 GB  
Disk 40,000 GB

x 3,000
Yearly Data Figures

- 102k Herds
- 2.2 Million Slaughter Records
- 2.4 Million BVD Records
- 6.5 Million Live Animals
- 7.7 Million Farm Movements
- 2.4 Million Animal Births
- 4.8 Million Milk Recording Records
- 850k AI Records
- 1 Oracle Exadata Platform
Genomics:
Genomics

Non-Genomic Index  Genomic Index
Genotype Data Sets

**Bovine Genome**
- Contains 3 billion nucleotides
- Scientists have discovered 40 million SNPs

3 billion rows of data per animal

**Ireland Genotypes**
- 380k animals per year on a 54k SNP Chip

First full genome sequence cost $300 million

Today costs = $1,000
**Genotype Data Sets**

- Start: 1,800,000,000
- Jan-15: 8,600,000,000
- Mar-16: 18,300,000,000
- Mar-18: 62,700,000,000
- Aug-19: 95,000,000,000

*ICBF*

*AgTech-It’s in our DNA*
DNA Calf Registration

Output (within 28 days)
- Registration
- Parentage
- Major Genes
- Genomic Evaluation

Geno DB
- Sire
- Dam
- Sex
- Sire Breed

DOB

ICBF
AgTech-It’s in our DNA
**Greenbreed Project**

- **20.2MT CO2**
  - Agricultural emissions in Ireland

- **15% - 20%**
  - GHG output difference between individual animals

- **10% Reduction**
  - By altering slaughter profiles by 2 months

Opportunity to breed even more climate efficient cows for the future.
Farm of the Future

IoT & Big Data
- IoT devices in agriculture will reach 75M in 2020
- Growing 20% annually

Geofencing & tracking
- Smart sensors
- Smart tractors

Blockchain
- Traceability
- Consumer Feedback

Climate & Environment
- Low carbon cows
- Sustainable farming
Meat Eating Quality: Breeding for a Tasty Steak
Breeding for Tasty Steak

Important to the consumer
• Tenderness
• Juiciness
• Taste

• Traceability
• Environmental Impact
Breeding for Tasty Steak (Meat Eating Quality)

- Sensory testing with trained panellists to generate breeding values.
- Partnerships with Eolas, Teagasc, Industry through MTI.
- Already being used in a “structured way” by Meat & Livestock Australia (MSA grading).
- Can we use consumer data in a more “unstructured” way?

Can consumer pick the difference?
How does the consumer compare with trained panellist?
Partners & Collaboration
How does Blockchain impact ICBF?

Enable **Farm to Fork traceability** using Blockchain technology to include additional parties involved in the supply chain.
Who benefits?

**Consumer**
Increased understanding, visibility, trust & transparency
Informed purchase decision (buy local / buy green / buy tasty.

**ICBF**
In line with strategic mission
Enabler of current programs:
- Meat tasting => crowd source!
- GHG Emissions => increased consumer awareness

**Industry**
Enables surgical like recalls
Further enhances Ireland’s already stellar agri image, adding value to the industry as a whole
Is there a precedent?

Wyoming Beef Chain: [https://beefchain.com](https://beefchain.com)
# Blockchain Platform Selection

<table>
<thead>
<tr>
<th>Approach</th>
<th>Permissionless</th>
<th>vs</th>
<th>Permissioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform</td>
<td>Ethereum</td>
<td>vs</td>
<td>Hyperledger FABRIC</td>
</tr>
</tbody>
</table>

---

*ICBF*  
AgTech—It’s in our DNA
Blockchain as a Service Vendor Selection

Why?
- Reduce cost
- Rapid deployment
- Reduce risk
- Accelerated development

Who?
- Amazon Web Services
- Azure
- Oracle

AgTech - It’s in our DNA
Solution Overview

Mobile App

Blockchain Network

ICBF

Future Participants
- Standards
- Suppliers
- Distributors
- Supermarkets
Mobile App

Scan

Place your QR code inside the area
Scanning will start automatically

Your Purchase History
Provide feedback on 2 purchases

Most Popular Beef AI Sires in Suckler Herds – 2018
Click here for more details

PRODUCT INFORMATION

RATHOSHEEN P DUKE (AA4682)
Birth Place: Bandon Cork
Sex: Male

Cut of meat: Striploin
Farmer Name: Geneireland Maternal Progr
Breed: Aberdeen Angus
Dry Aged: 32 days

Meat Quality Rating

Green Rating

75%

ICBF
AgTech-It’s in our DNA
Thank you for listening

#WeBreedInnovation

Thank you for listening