



Unlocking Genetic Potential: The National Genotyping Programme

ICAR 2024, Bled, Session 9

Mark Waters ICBF



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

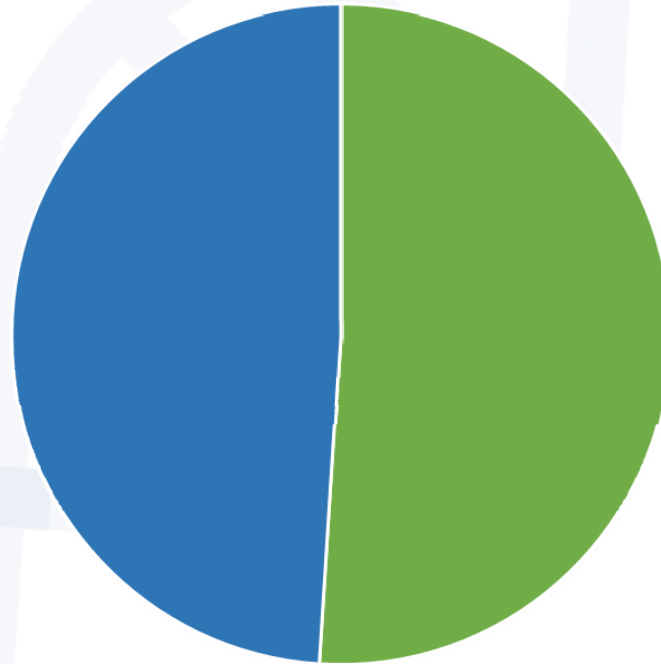
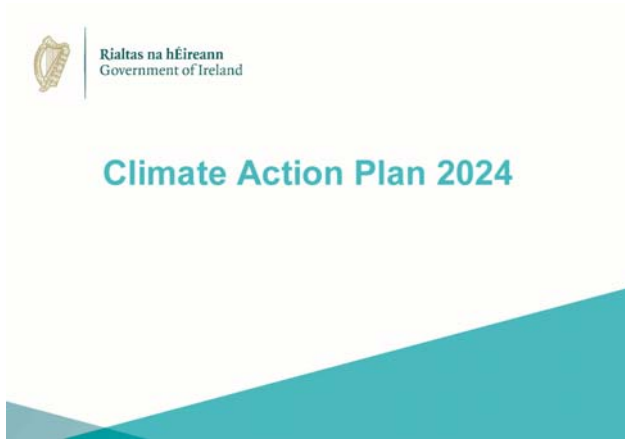
13th May 2024



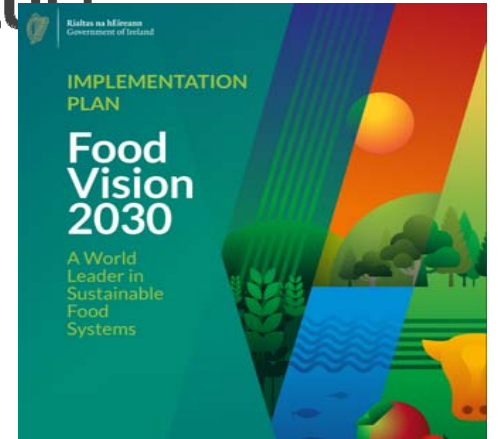
AgTech - it's in our DNA

Why Genotype the National Herd?

Ireland's Total GHG Emissions



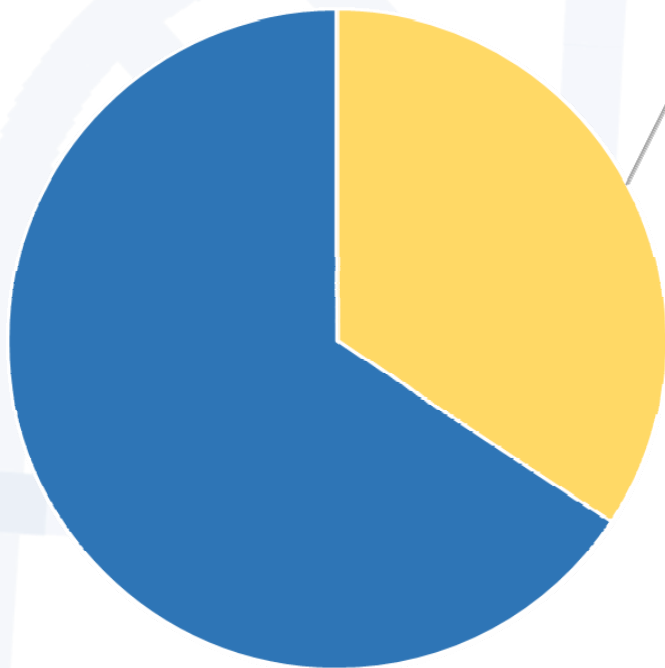
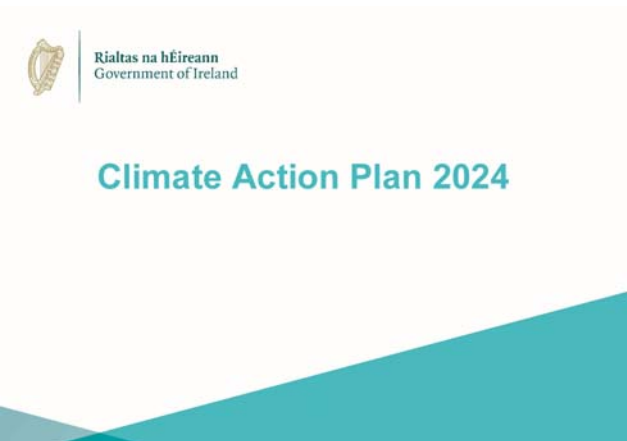
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■ Targeted Emissions Reduction

Why Genotype the National Herd?

Ireland's Total GHG Emissions



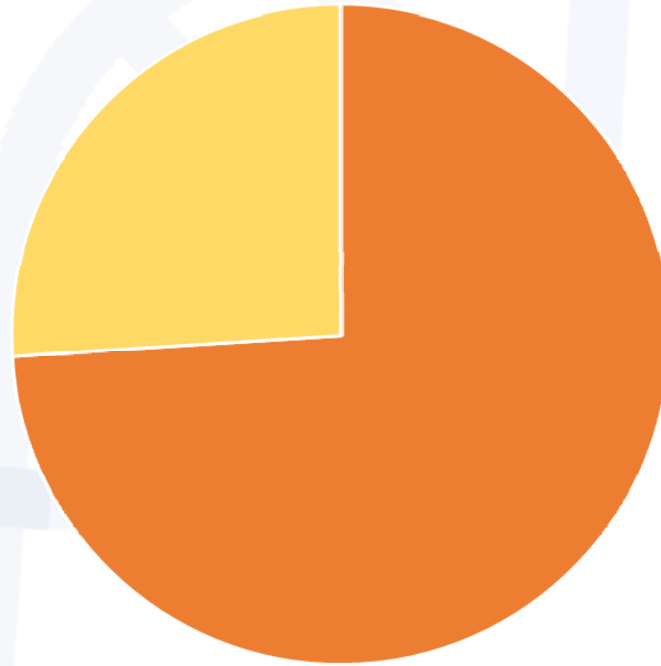
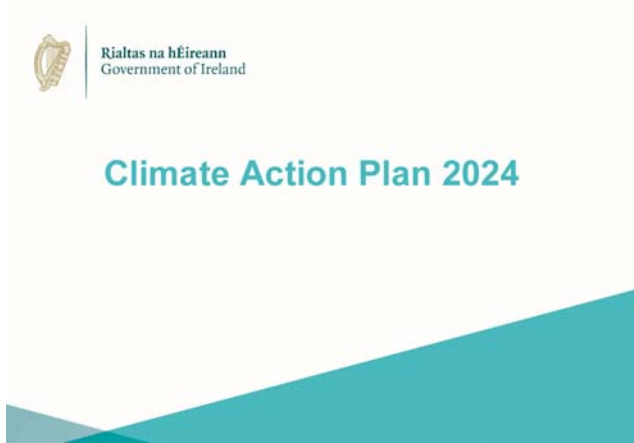
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■ Agricultural Emissions

Why Genotype the National Herd?

Ireland's Agricultural GHG Emissions



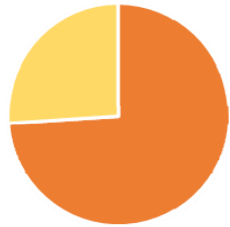
■ Livestock Emissions

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Why Genotype the National Herd?

Ireland's Agricultural GHG Emissions [VALUE]



■ Livestock Emissions



Marginal Abatement Cost Curve 2023

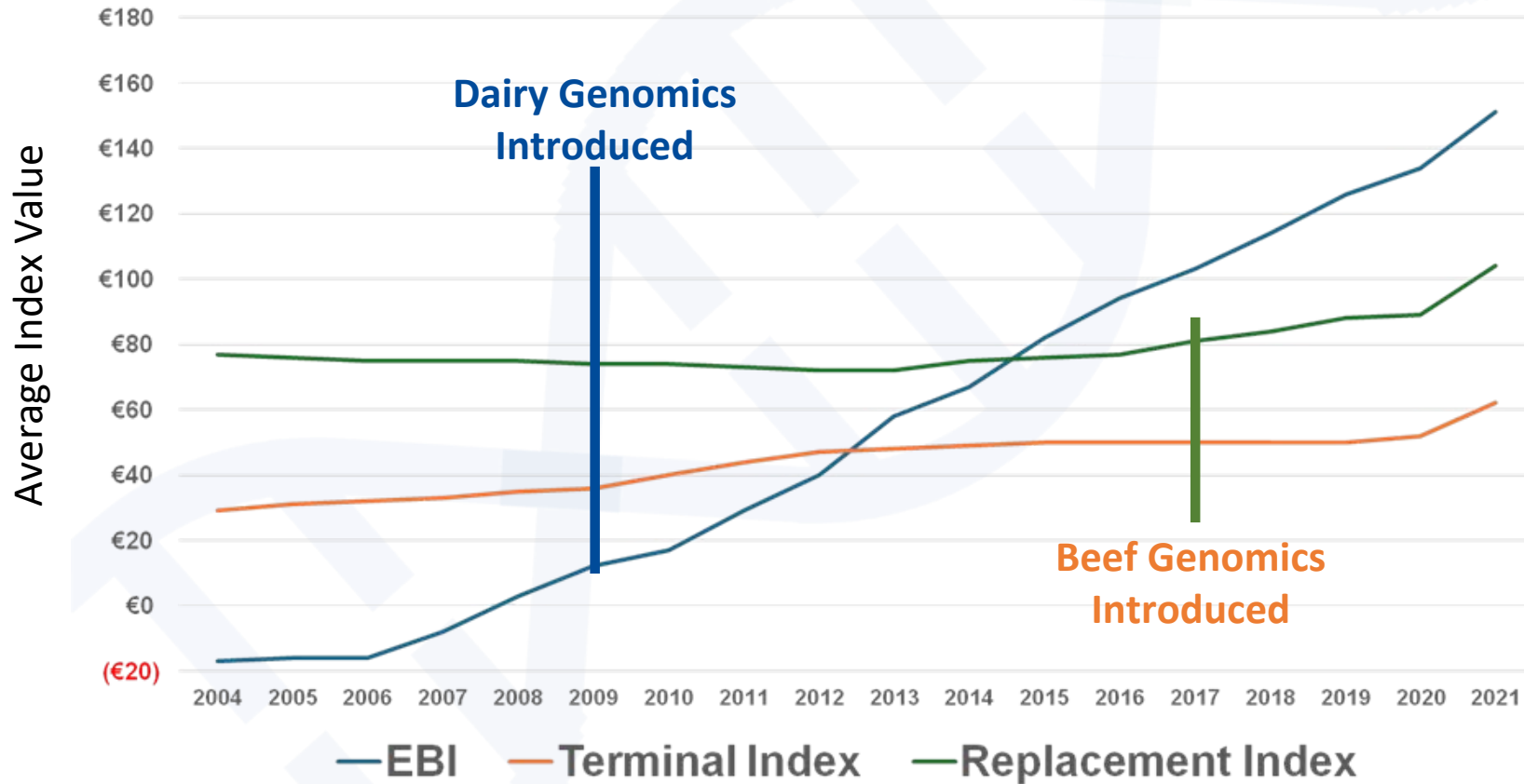
Executive Summary



Breeding = Win Win!

The Effect of Genomics on Genetic Gain

Average EBI and Beef Euro-Star Indexes Over Time



Rewards of Genotyping

400%!



Where Are We Starting From?



Level of Genotyping **Up to 2023**

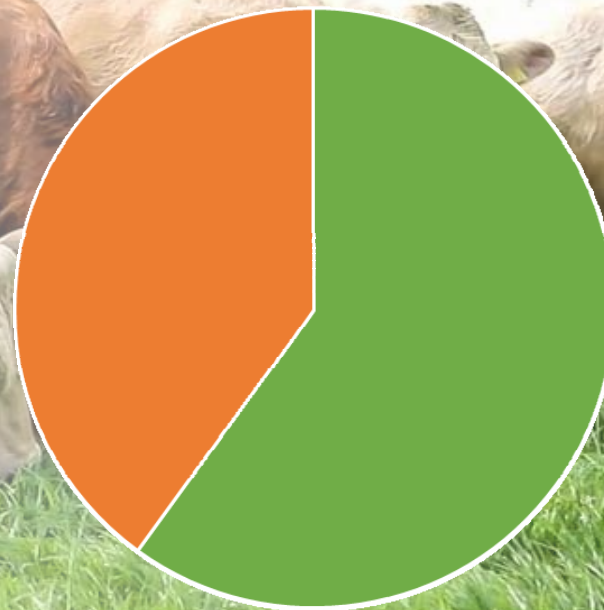
Percentage of National Suckler Herd Genotyped

2023

[VALUE]

>3 Million Genotypes
Total

350-400K New
Genotypes/Year
from Government Schemes
(BDGP and SCEP)



■ Genotyped

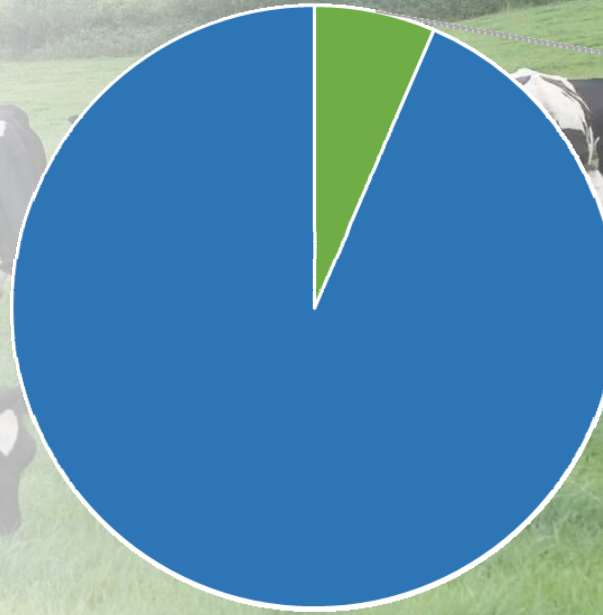
Level of Genotyping Up to 2023

Percentage of National Suckler Herd Genotyped 2023



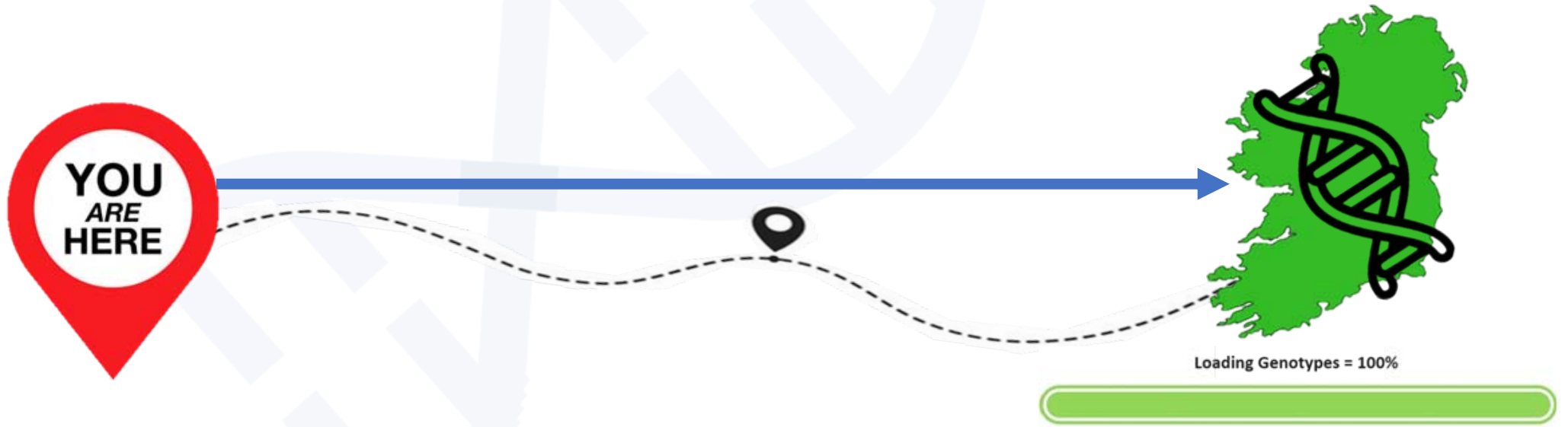
■ Genotyped

Percentage of National Dairy Herd Genotyped 2023



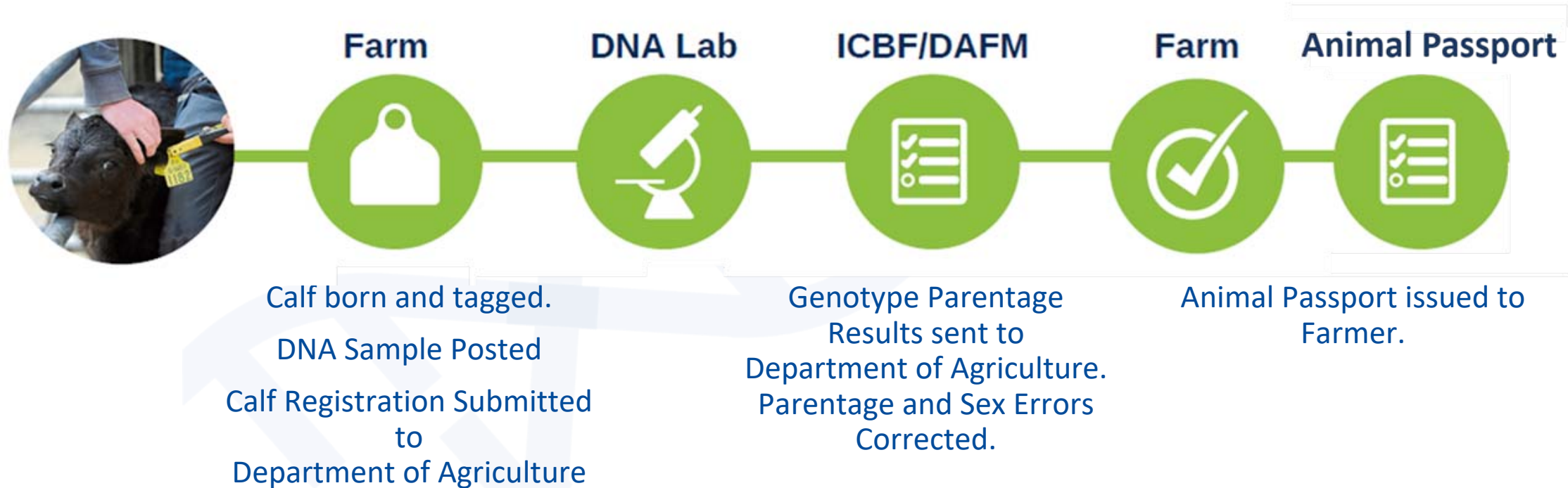
■ Genotyped

How Do We Get to Fully Genotyped?

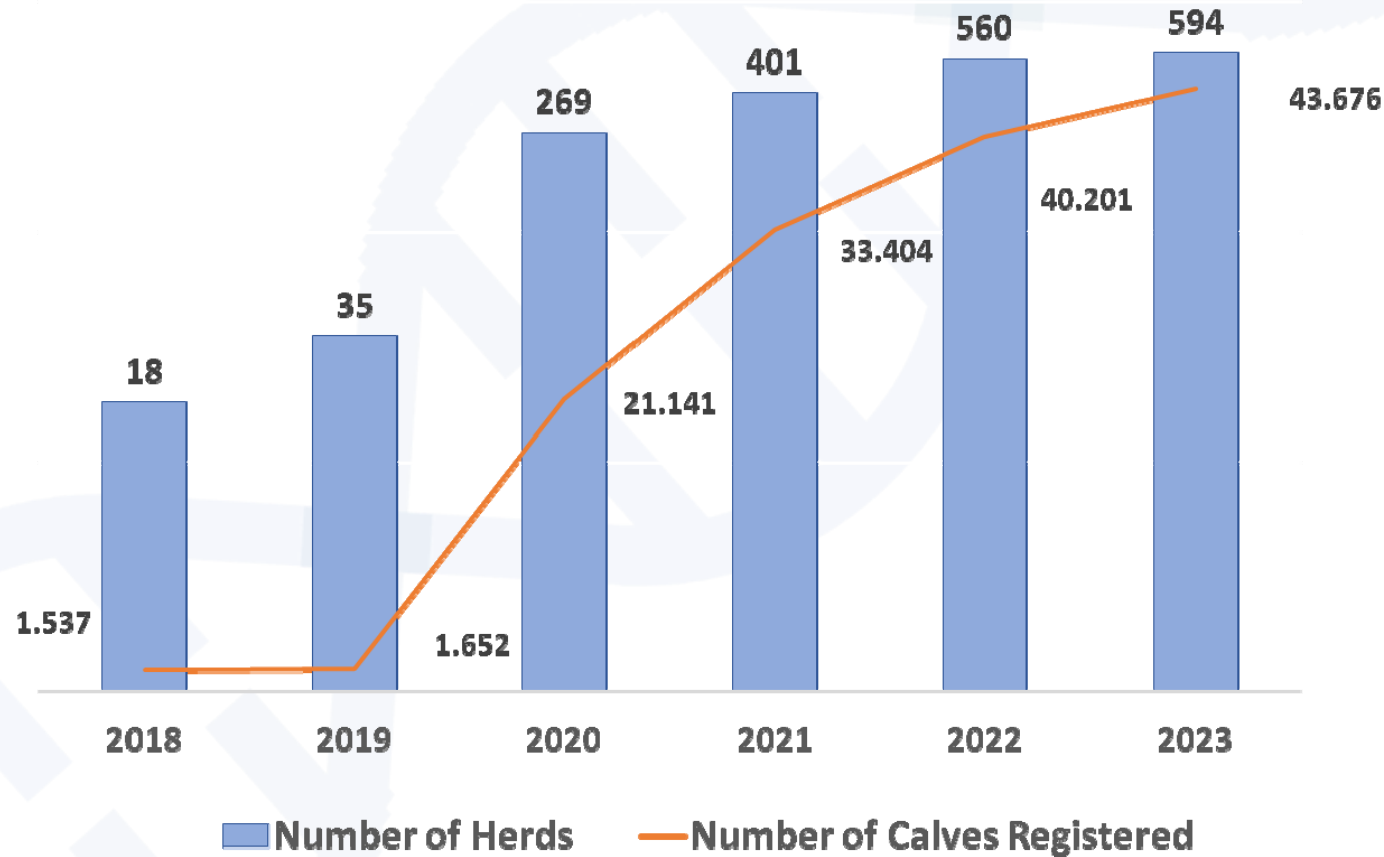


DNA Calf Registration System

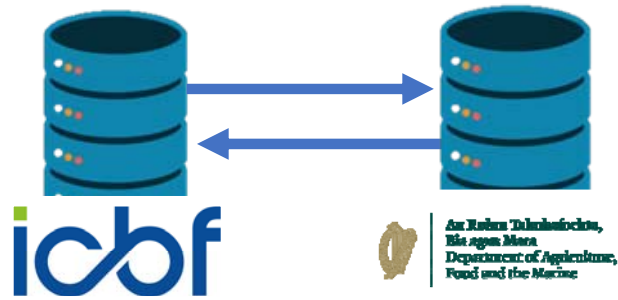
Typical DNA Registration Timeline



DNA Calf Registration Pilots



DNA Calf Registration Pilots



Data Integration
and Transfer



Reduced
Turnaround Times



“Double Tissue”
Calf Tags

National Genotyping Programme (NGP)



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Department of Agriculture,
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National Genotyping Programme

National Genotyping Programme (NGP)



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**National
Genotyping
Programme**

Launched June 2023

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NGP Phase 1 - 2023



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National Genotyping Programme



Apply today!



NGP Phase 1 - 2023



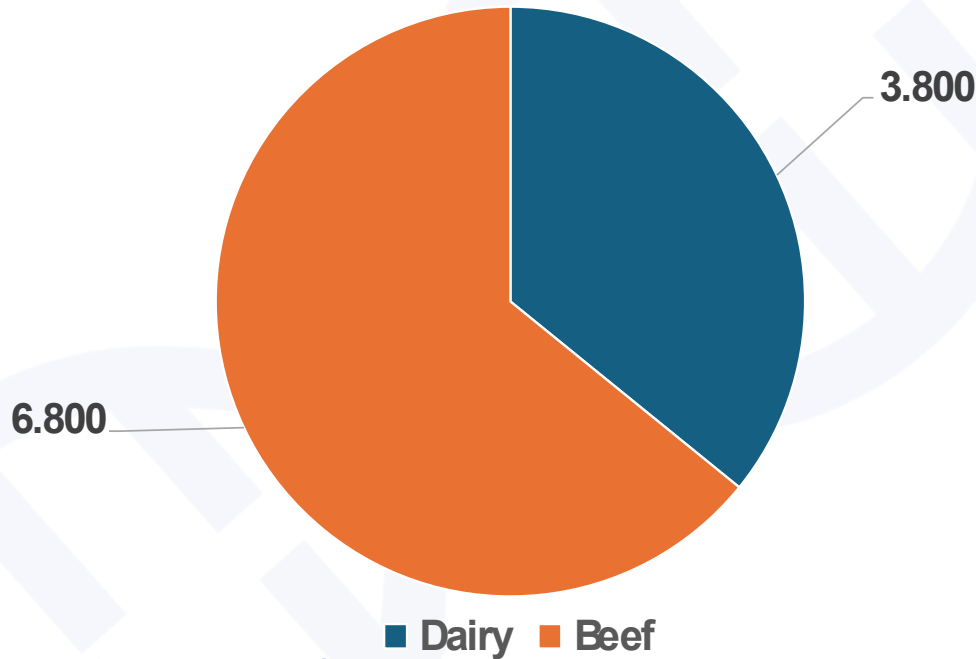
Microsoft Teams



NGP Phase 1 - 2023



Total Herds in NGP

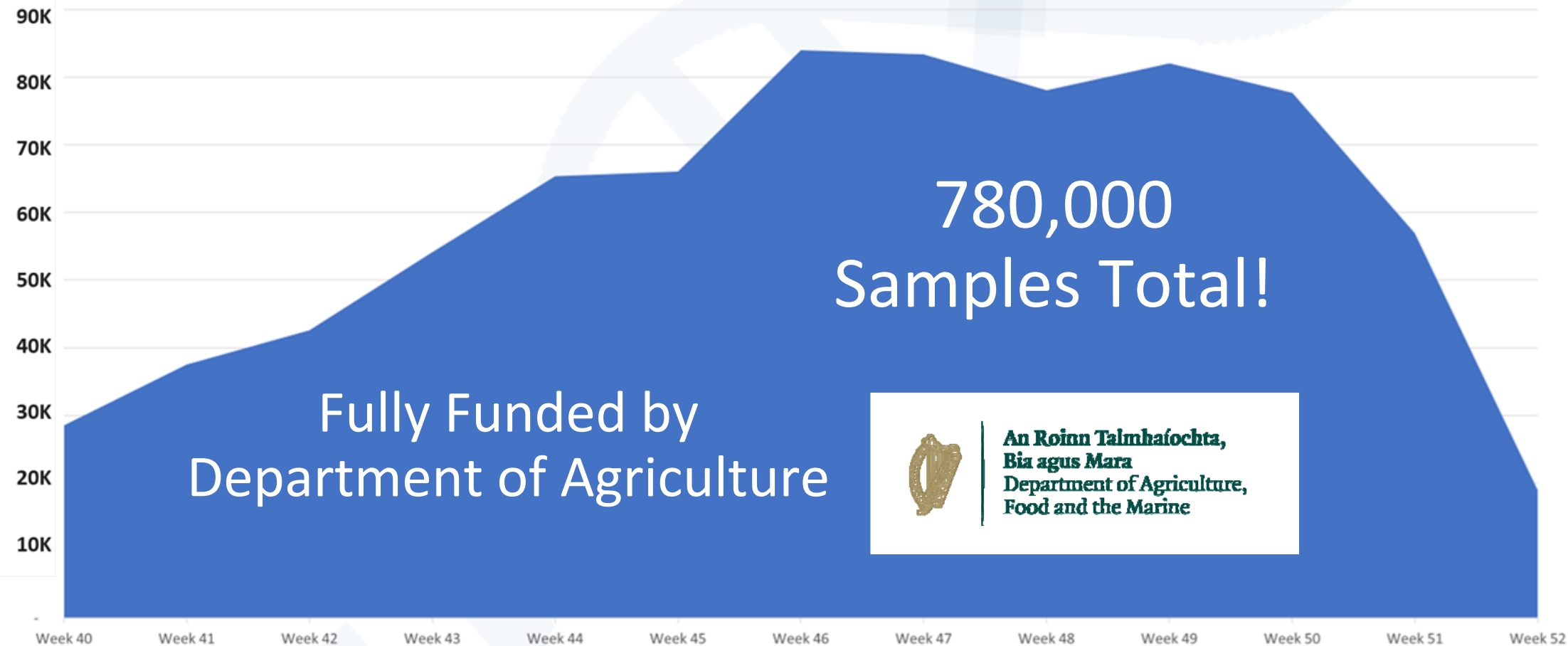


10,600 Herds Total



NGP Phase 1 – 2023

NGP Phase 1 Genotypes Reported by Week



Fully Funded by
Department of Agriculture

780,000
Samples Total!



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Department of Agriculture,
Food and the Marine

Level of Genotyping After NGP Phase 1

620K Genomic Evals
Published at once – Jan
2024

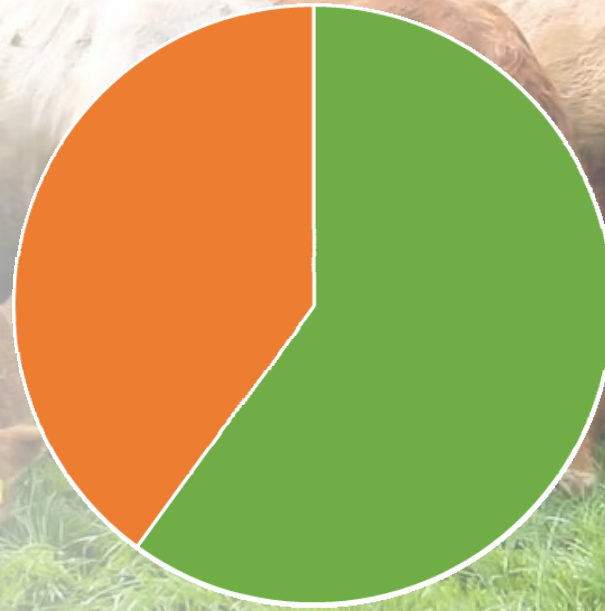


>4 Million
Genotypes
Total

Dairy Genomic Evaluation Report								
Jumbo/DOB	16-Jul-2023				Breed	HO (100%)		
Tag/Sex	372214444041389	M			Sire	372222281262260 (€49) <small>Sire Verified (SNP)</small>		
Name					Dam	372214444061119 (-€2) <small>Dam Verified (SNP)</small>		
Date of Evaluation	11-Aug-2023 (Evaluation valid until 26-Sep-2023)				MGS	IE371131831160 (-€23)		
Index	Official Genomic Evaluation (*)	Reliability	Weighting on Genomics	DNA Value	Parent Average Evaluation	Reliability	Diff. from Parent Avg	Increase in Reliability
EBI €	26	49%	29%	164	24	30%	+2	19%
Milk Sub Index €	33	67%	60%	26	32	36%	+1	31%
Fertility Sub Index €	17	38%	15%	89	21	23%	-4	15%
Carbon Sub Index €	-14	43%			-15	12%	+1	31%
Calving Sub Index €	-5	41%	7%	1	6	26%	-11	15%
Beef Sub Index €	-3	27%	0%	53	-22	29%	+19	-2%
Maintenance Sub Index €	-2	37%	0%	0	2	22%	-4	15%
Management Sub Index	-4	54%	0%	0	-3	29%	-1	25%
Health Sub Index	3	63%	48%	-3	-2	33%	+5	30%
Milk Sub Index								
Milk (Kg)	362	67%	60%	378	279	36%	+83	31%

Level of Genotyping After NGP Phase 1

Percentage of National Suckler Herd Genotyped
2023

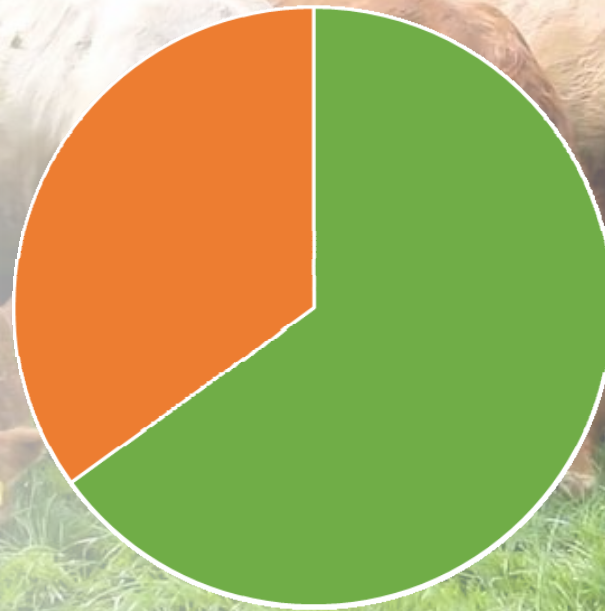


[VALUE]

■ Genotyped

Level of Genotyping After NGP Phase 1

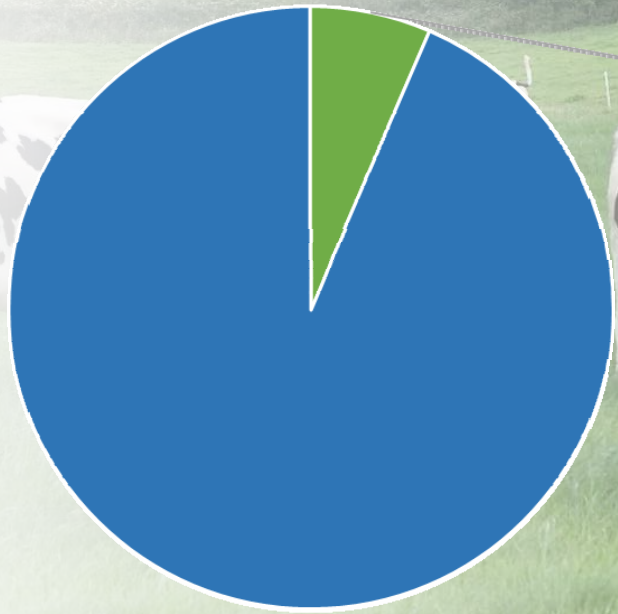
Percentage of National Suckler Herd Genotyped
After NGP Phase 1



■ Genotyped

Level of Genotyping After NGP Phase 1

Percentage of National Dairy Herd Genotyped 2023

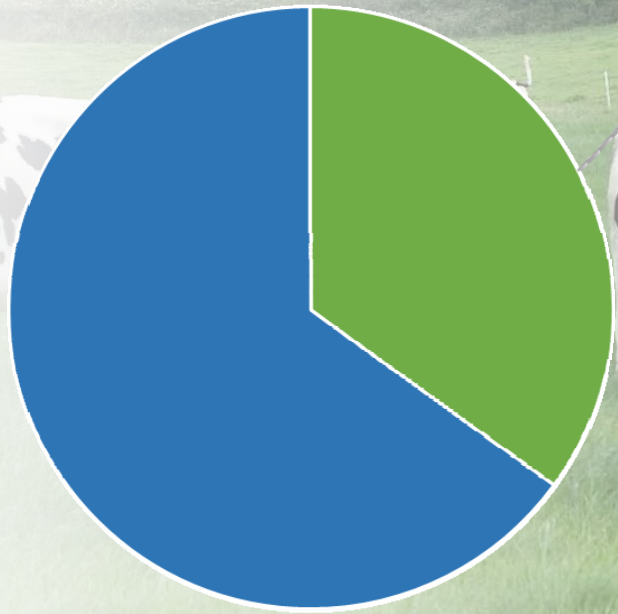


[VALUE]

■ Genotyped

Level of Genotyping After NGP Phase 1

Percentage of National Dairy Herd Genotyped After NGP Phase 1



[VALUE]

■ Genotyped

Lab Infrastructure



Axiom Propel Express
384HT Workflow



ICBF Custom, IDB
version 5
SNP Chip



NGP Phase 2 – 2024 - 2027



NGP Phase 2 (2024 – 2027)



Mullinahone Co-op
DATAMARS
Livestock

 **Cormac
Tagging**

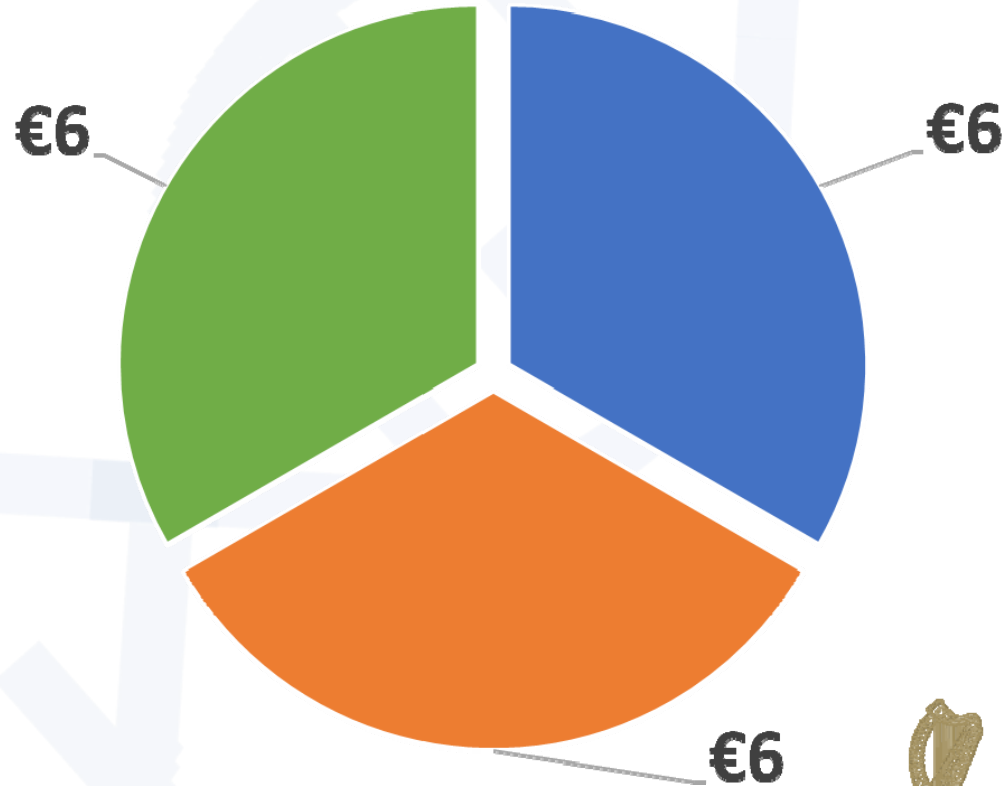
 **AGRITAGS**
providing high quality tags since 1999



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NGP Phase 2 (2024 – 2027)

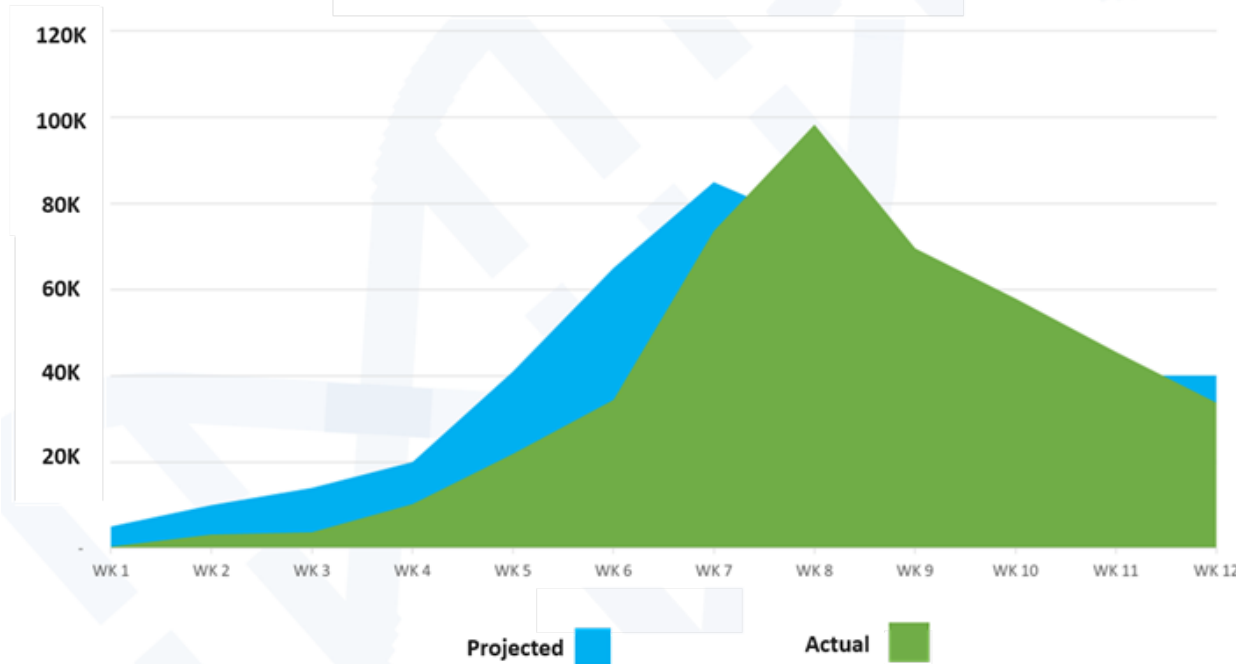
Contribution to Calf Genotypes



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NGP Phase 2 (2024 – 2027)

Calf Sample Processing Forecast vs Actual 2024 (per week)

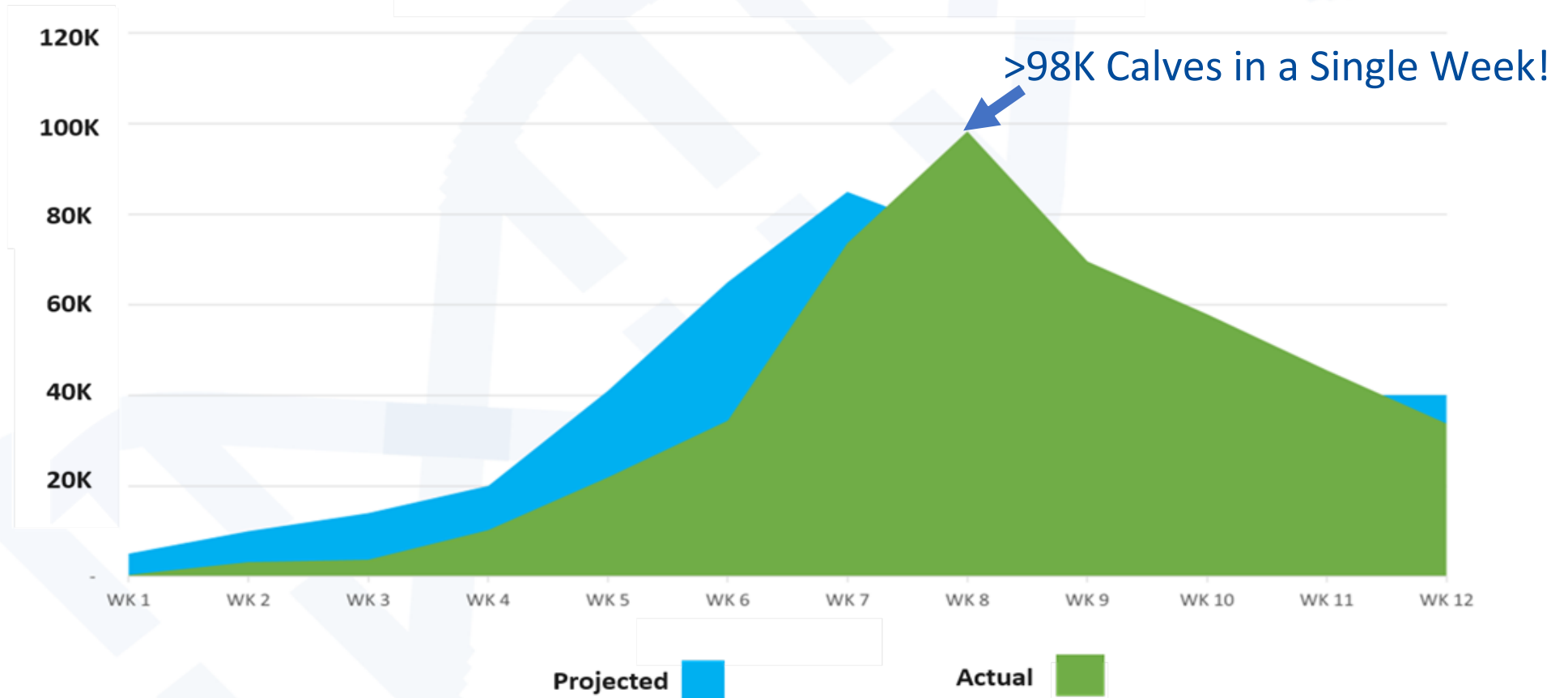


563,000 Genotyped
and Registered by end
of April

35% of all calves!

NGP Phase 2 (2024 – 2027)

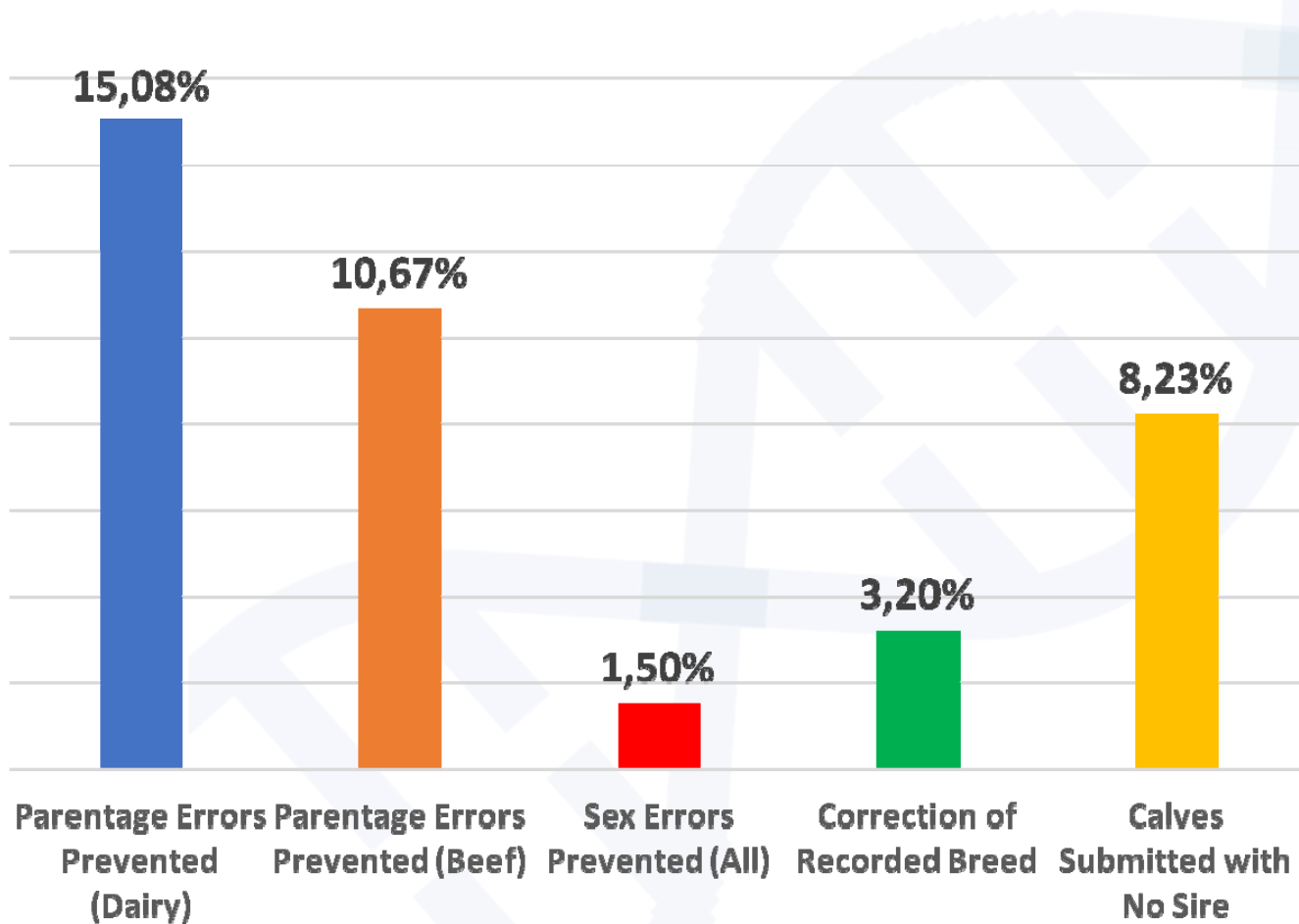
Calf Sample Processing Forecast vs Actual 2024 (per week)



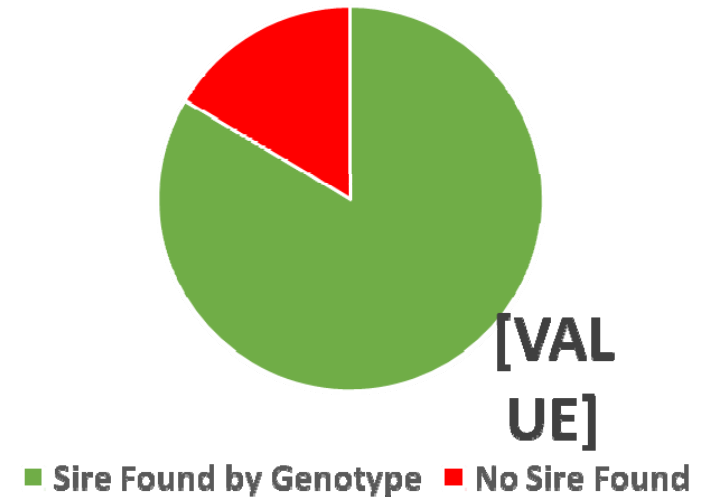
NGP Phase 2 (2024 – 2027)



NGP Phase 2 (2024 – 2027)



Where No Sire Recorded by Farmer



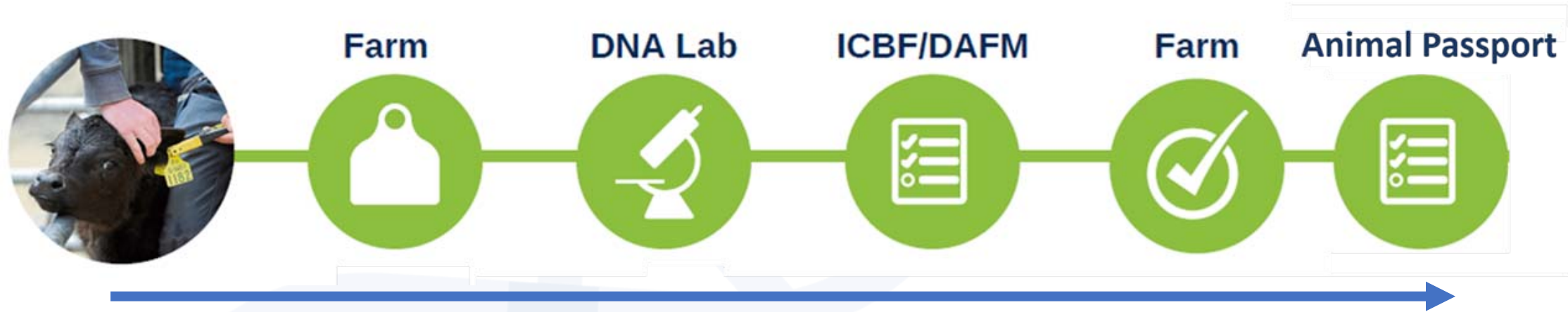
Example of ~18k breed errors corrected:

- 3,890 registered as AA but not AA
- 3,992 AA registered as another breed



NGP Phase 2 (2024 – 2027)

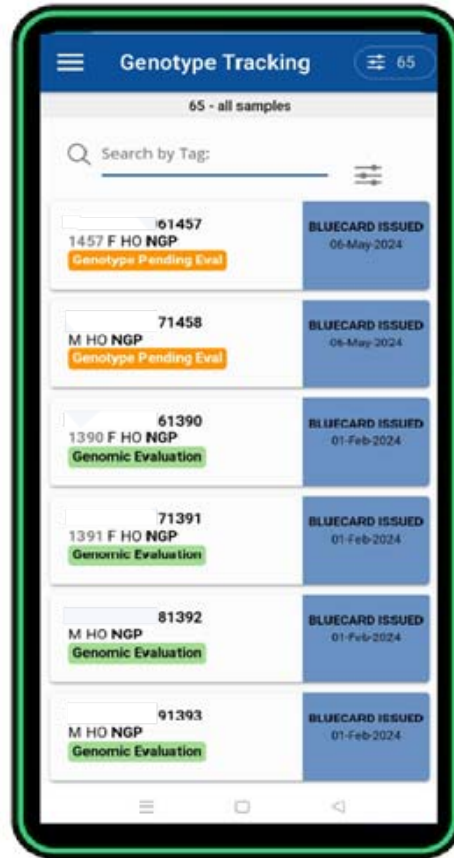
Typical DNA Registration Timeline



Average Birth to Passport issued = 13 days

Each Calf received Genomic Evaluation within 2 weeks of Registration

NGP Phase 2 (2024 – 2027)





Where to Next?



Loading Genotypes = 100%



Any Questions?

Our Farmer & Government Representation



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Department of Agriculture,
Food and the Marine



Our AI & Milk Recording Organisations



Our Herdbooks



Acknowledging Our Members