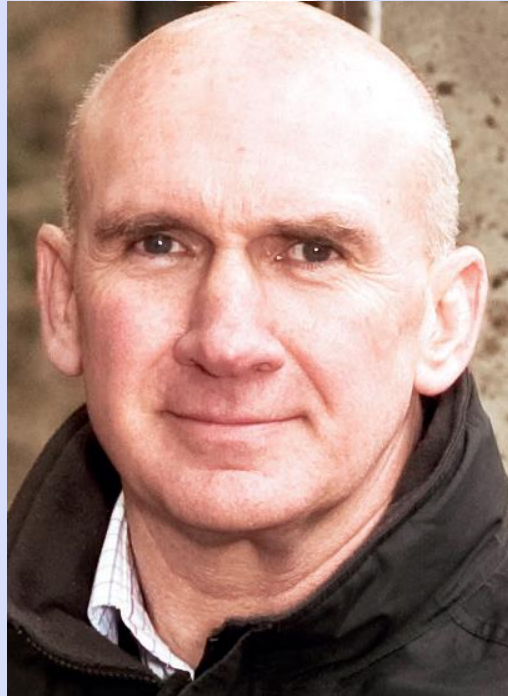


Accelerating Change in Dairy



Mark Roach – Managing Director, Grosvenor Farms Ltd & Chairman Cogent Breeding



The Triple Challenge



Global protein demand is forecasted to increase 30% by 2050, requiring more feed, land and water.

Carbon emissions, feed and water availability, and land use change, are critical consumer concerns and future bovine industry limitations.

Producer margins are variable and often in conflict with delivering global demand in a sustainable way.



GROSVENOR FARMS



Grosvenor Farms is one of the operating companies of the Wearsheaf Group which directly operates, invests in and helps to develop businesses in the food and agriculture sectors.



WEARSHEAF

A Wearsheaf Group company



Who is Grosvenor Farms? By the numbers

Grosvenor Farms
– Commercial farm on
the Eaton Estate near
Chester England



2,500
dairy cows



1,500
dairy heifers

90,000

Produces
more than
90,000
litres of
fresh milk
daily for
the retail
market



6,000

acres of crops used to feed
the livestock and also used
in food production and
animal feed



650
acres



About 11% of the land
is managed to benefit
the environment and
biodiversity



GROSVENOR FARMS

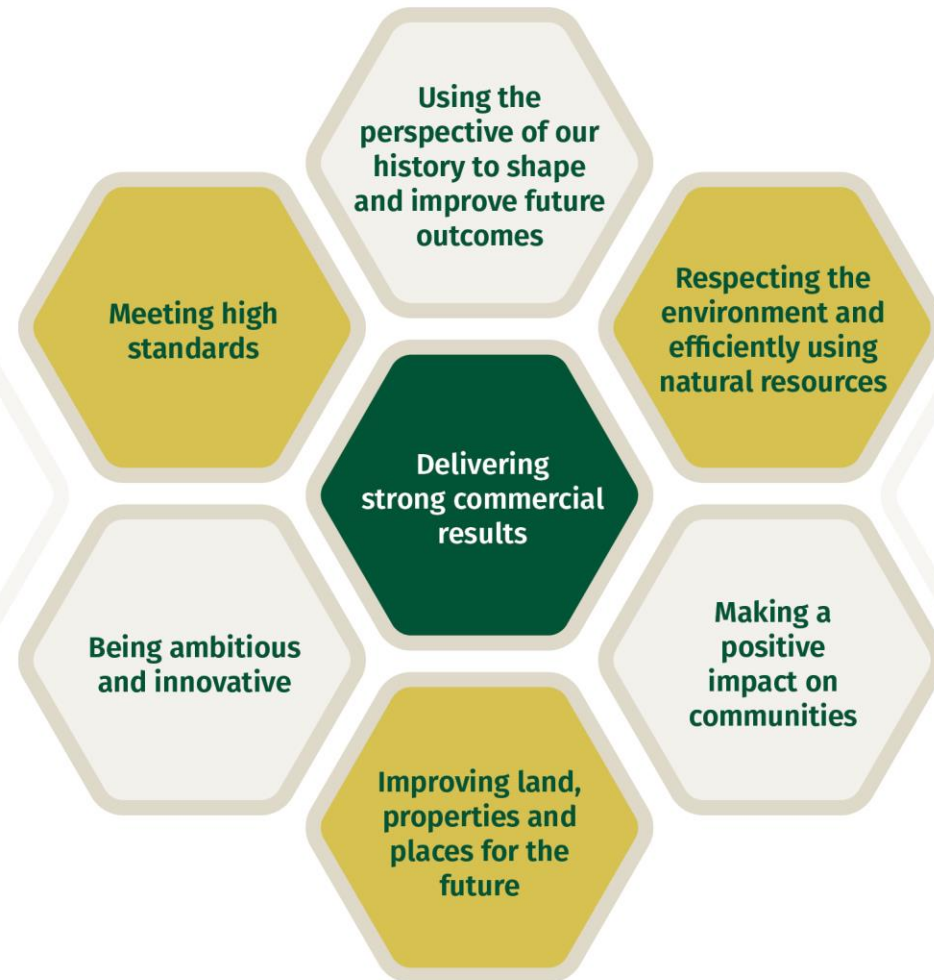
Grosvenor Farms



- Formed 1974
- Then: 242 ha
- Now: 2460 ha
- Tenants of Eaton Estate
- Mixed Dairy/Arable
- 55 Employees
- Turnover £12m
- Corporate Structure



Our Purpose is to Deliver Lasting Commercial and Social Benefit



The Grosvenor Farms Vision

“To deliver a truly sustainable farming system”

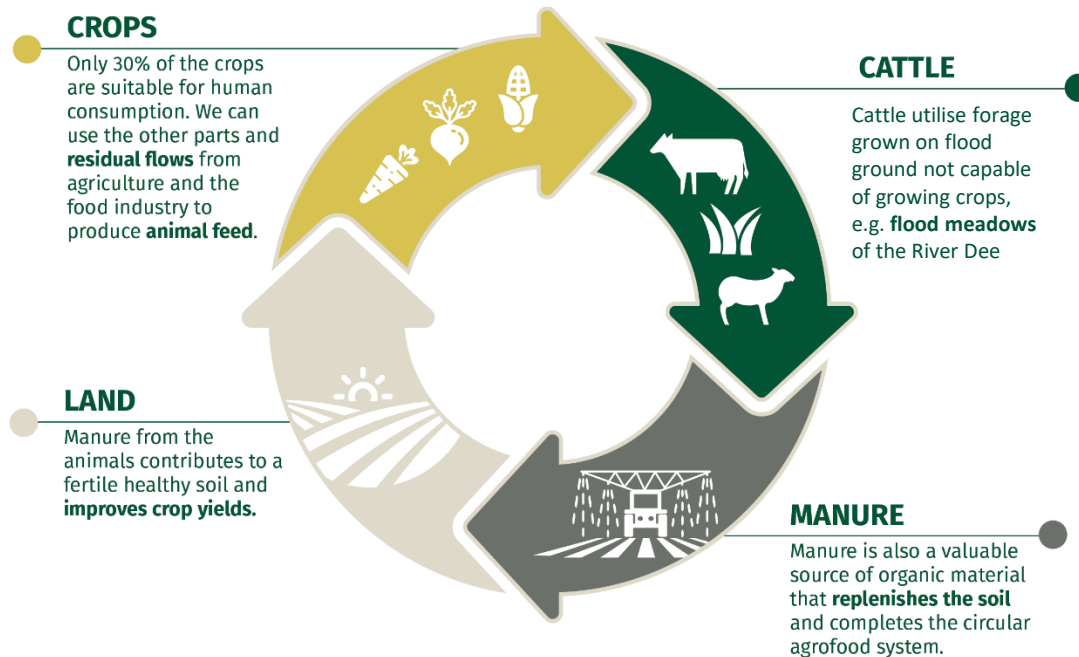


- **Resource efficiency**, using the best scientific and management practices, innovative technology and ethical knowhow
- **Highest standards** for animal health, welfare and comfort
- **We believe** in looking after the land, properties and environment to the highest standards, whilst fostering positive relationships with the communities we serve



GROSVENOR FARMS

The vision in action – Sustainability



- **Manure separation** allows for application of manure in standing crops, when crop demand is highest, reducing losses and artificial fertiliser usage.
- **Matching manure usage** to crop requirements, right place right time, right amount. £84k reduction in nitrogen fertiliser costs alone.
- **73% of forage crops nutrient requirement** from organic manure alone.



The vision in action – Sustainability



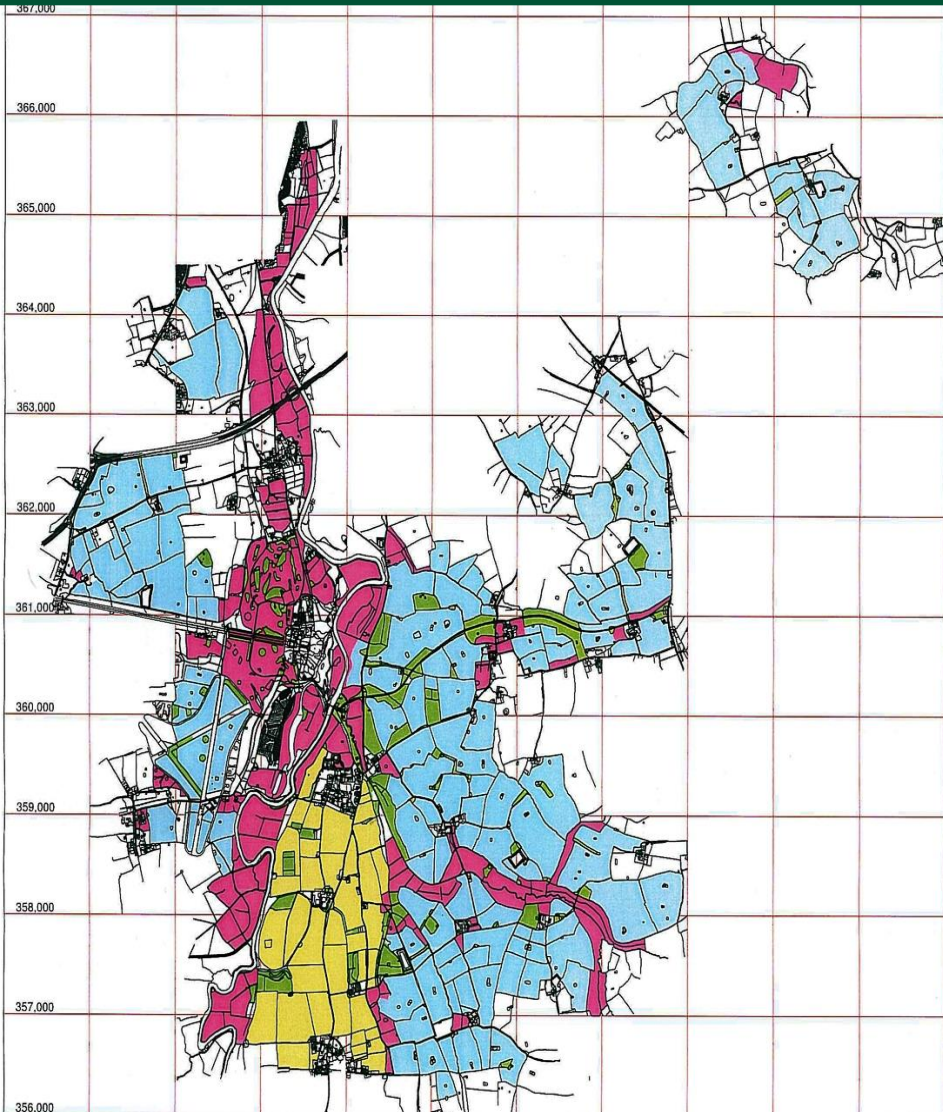
We use our farming expertise to deliver lasting commercial and social benefit.

- **Reduced greenhouse gas emissions**, including replacing manufactured fertilisers with manures, using solar energy
- **Carbon foot printing** to ISO 14067:2018 standard
- **Soil carbon increasing** – currently building on an average of 3.04%, which is *double the UK average* for cultivated soil at 1.76%
- **Over 100,000 trees planted** – on less productive farmland
- **24,000 hedge plants established** in last three years, increasing farm total to 136miles
- **113 ponds on farm, 34 restored** for wildlife



GROSVENOR FARMS

Grosvenor Farms– Land Classification



- 2245 Ha (6000 acres)
- 60% Heavy Cheshire Clay
- 28% Flood Land
- 12% Light Sand Land

- 660mm Average Rainfall
- 20m Above Sea Level
- Mainly Flat





Wetland and Pond Restoration

Improving habitat for:

- *Birds Snipe, Lapwing, Curlew, Reed Bunting*
- *mammals including Water Voles and Otters*



Arable Reversion

72Ha of the River Dee Floodplain

- *Provides forage*
- *Limited nutrient and zero pesticide input.*



Margins 76Ha

- *Bumble bird Mix, Grassland Buffer, Woodland Edge, Floristically enhanced grass margin.*
- *First 6m Field Edge, 50% less productive than the center.*

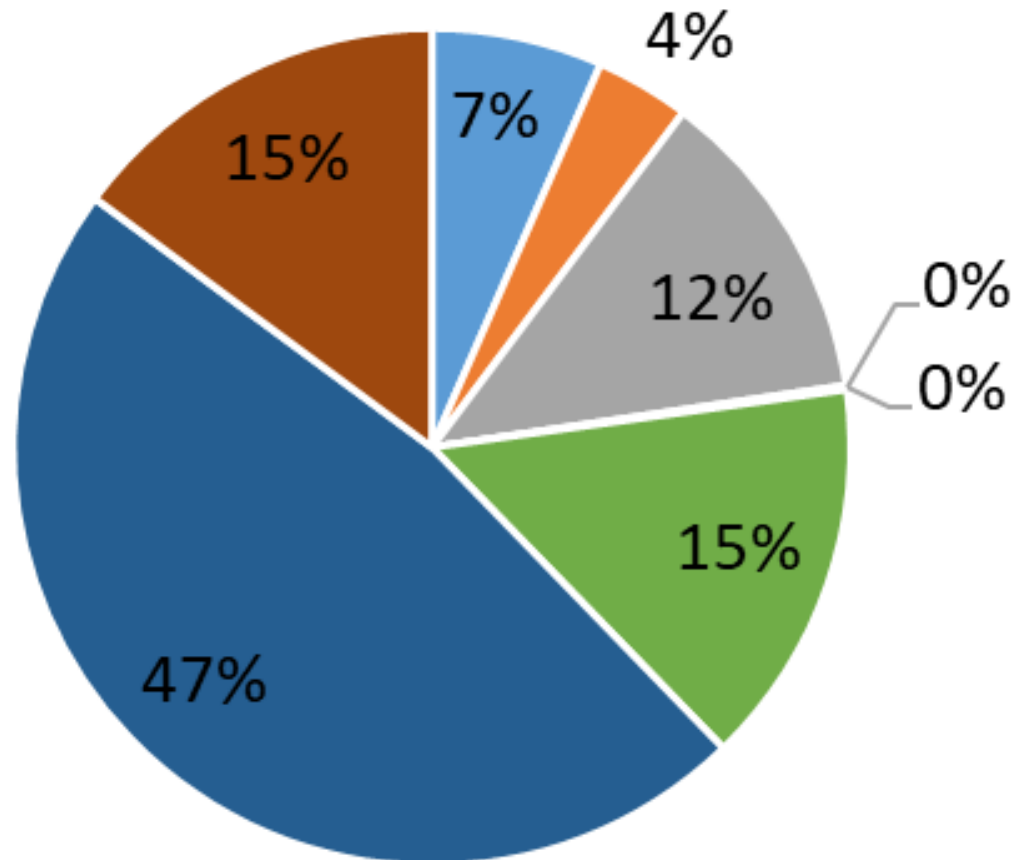


Hedge and Tree Planting

- *Part of scheme plant 100,000 trees*
- *4.1km Hedges planted last 3 years...*
- *Farm Total 218km*

GFL DAIRY CARBON EMISSIONS BUDGET BY SOURCE 2020

- Energy use
- Fertiliser production
- Feed production
- Bedding
- Indirect - other
- Methane - manure
- Methane - feed digestion
- Nitrous oxide - manures

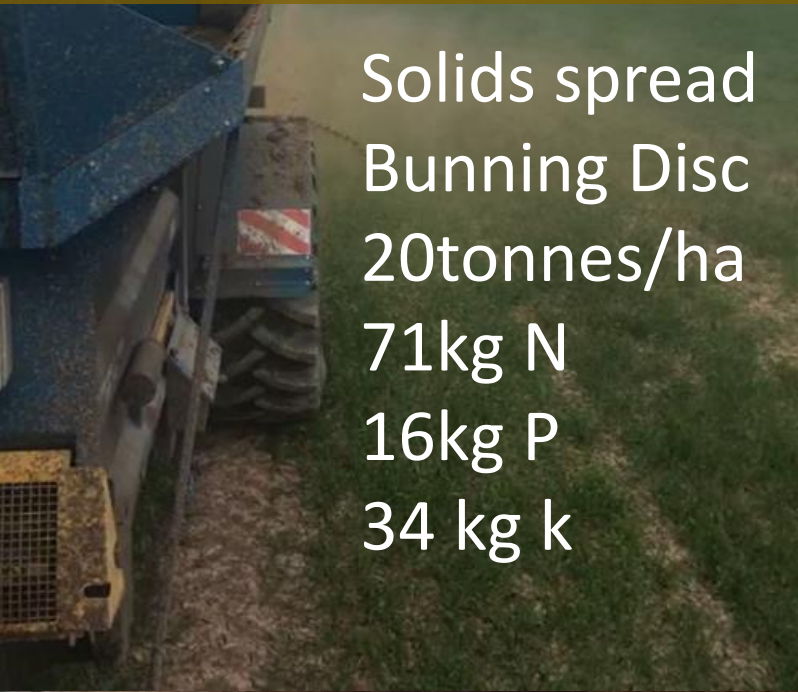


GFL DAIRY CARBON EMISSIONS

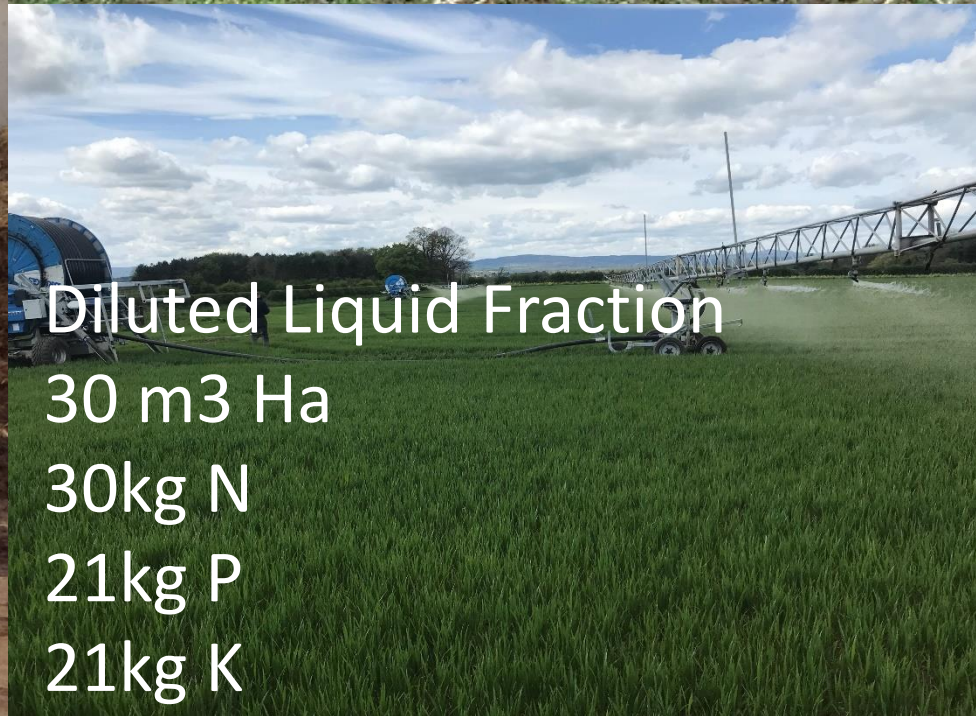
	2014	2018	2020	<i>Change "20vs '18</i>		<i>Change "20vs '14</i>	
	(kg CO2e/kgFPCmilk)			(<i>%</i>)		(<i>%</i>)	
Energyuse	0.10	0.08	0.06	<i>-0.02</i>	<i>-28%</i>	<i>-0.04</i>	<i>-42%</i>
Fertiliserproduction	0.10	0.03	0.03	<i>-0.00</i>	<i>0%</i>	<i>-0.07</i>	<i>-70%</i>
Purchasedfeedprodn.	0.15	0.18	0.11	<i>-0.08</i>	<i>-42%</i>	<i>-0.04</i>	<i>-27%</i>
Bedding	0.04	0.01	0.00	<i>-0.01</i>	<i>-92%</i>	<i>-0.04</i>	<i>-98%</i>
Indirect- other	0.00	0.00	0.00	<i>-0.00</i>	<i>-22%</i>	<i>-0.00</i>	<i>-46%</i>
Methane- manure	0.15	0.13	0.13	<i>-0.00</i>	<i>-2%</i>	<i>-0.02</i>	<i>-14%</i>
Methane- feeddigestion	0.47	0.42	0.41	<i>-0.01</i>	<i>-2%</i>	<i>-0.07</i>	<i>-14%</i>
Nitrousoxide- manures	0.21	0.16	0.13	<i>-0.04</i>	<i>-22%</i>	<i>-0.08</i>	<i>-39%</i>
Total dairyenterprise	1.22	1.02	0.86	<i>-0.16</i>	<i>-16%</i>	<i>-0.36</i>	<i>-30%</i>



Talking Manure...

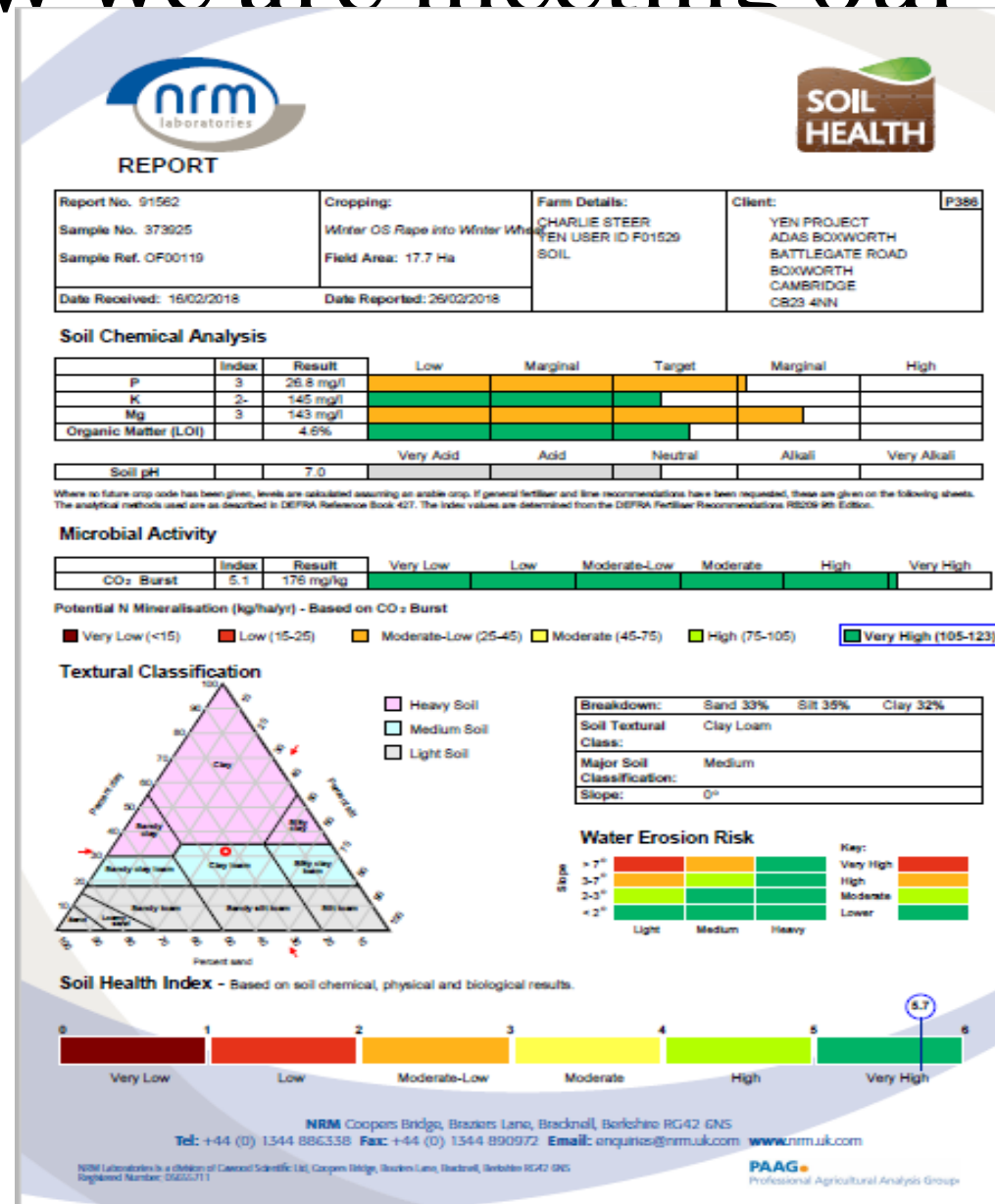


Solids spread
Bunning Disc
20tonnes/ha
71kg N
16kg P
34 kg k



97% Forages

How do we know we are meeting our goals?



1980s- 1996

TIME - LINE

1996 Introduction of Cogent



2000-2010, Cogent separated, stopped Potatoes

2014 Creation of Lea Manor Farm



Chapel House Farm - 300 cows

Edgerley Farm - 300 cows

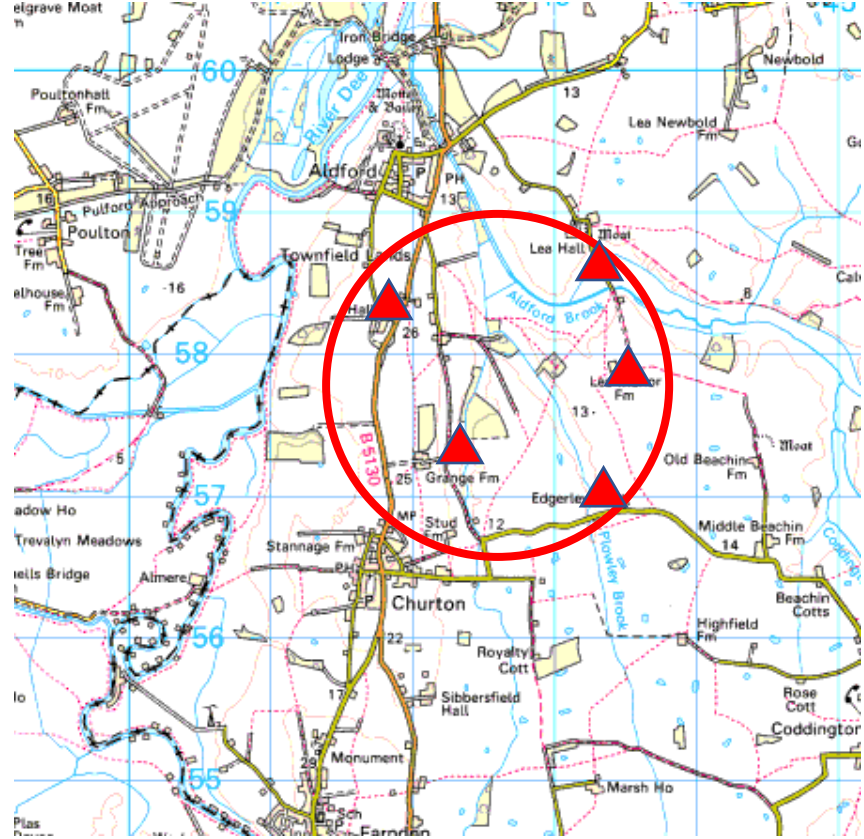
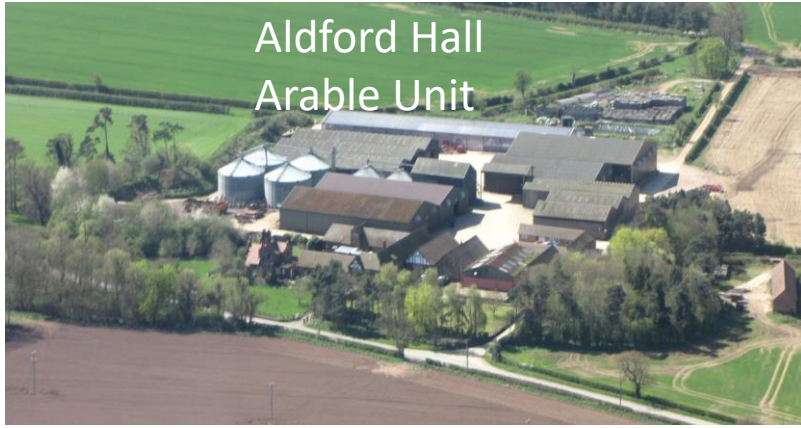
Park Farm - 500 cows

Hatton Heath - 300 cows

Total of 1400 cows

Total of 2500 cows





HERD PERFORMANCE

Rolling Av	2014	2019	Target
Cows in herd	1400	1984	2800
Milk Yield	10,920	12,455	14,000
Milk Price	33.9	30.3	29.7
Feed Costs (ppl)	10.1	7.6	7.1
MOPF (£/Cow)	2,606	2,832	3164
Butterfat %	3.71	3.91	4.00
Protein %	3.34	3.49	3.30
SCC	190	163	140
Bactoscans	21	15	15
Culling Rate %	34	24	25



Health Metrics

	2014	2019
Milk fever(%)	2	1
Retained Placentas(%)	10	3
Displaced Abomasums(%)	1	1
Metritis(%)	9	2
Locomotion(%0-100)	81	96
Pregnancy Rate(%)	19	28
Mastitis (%)	35	10

Antibiotic use has been reduced by half



NUTRITION

KG/Hd	Milkers	Close Up Drys	Far Off Drys
Maize Silage	15	7.5	
Grass Silage	8	3	5
Wholecrop Silage	7	7	5
Straw		7	8.5
Trafford Gold	6	1.5	1.5
Bread	5	1.5	1.5
Rapemeal	5	3	2
Water	8	10	10
Fat	0.3		
Barley	3		
Molasses	1		
Lime/Minerals/Urea	0.51	0.42	0.09





- **Parlour Software**
- **Moo-Monitors Collars**
- **Feed Accuracy**
- **Automated Foot Care**
- **Hand Held Devices**
- **GPS**

- **KPIs**
- **Cost of Production**
- **Forages**
- **Soils**
- **Manures**
- **Work Rates**
- **Benchmarking**

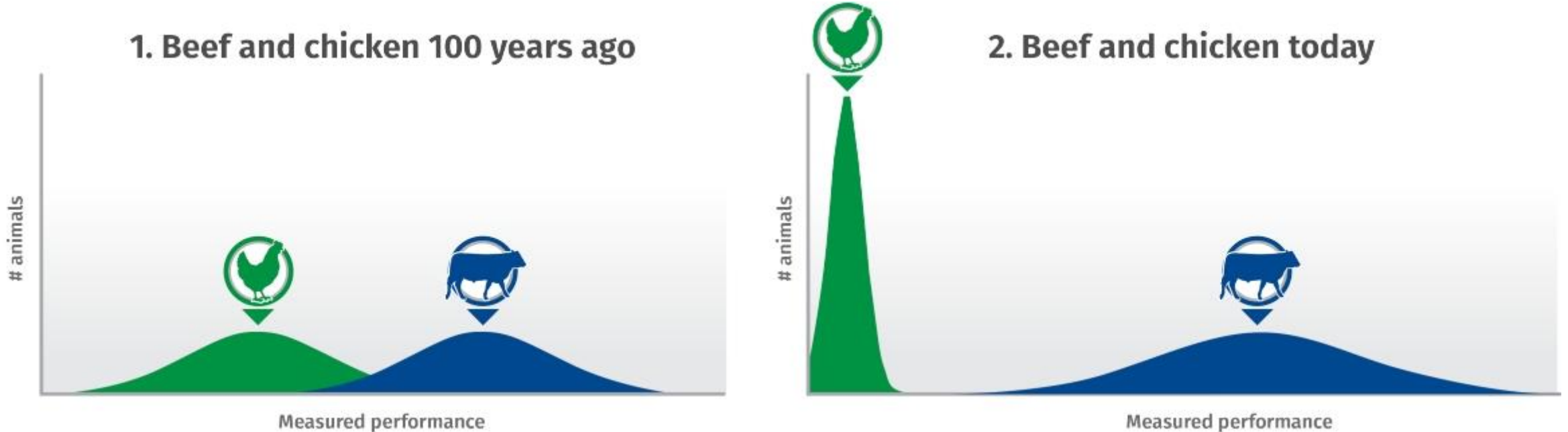


Genetics

Grosvenor Farms – Cogent Herd Genetic Audit



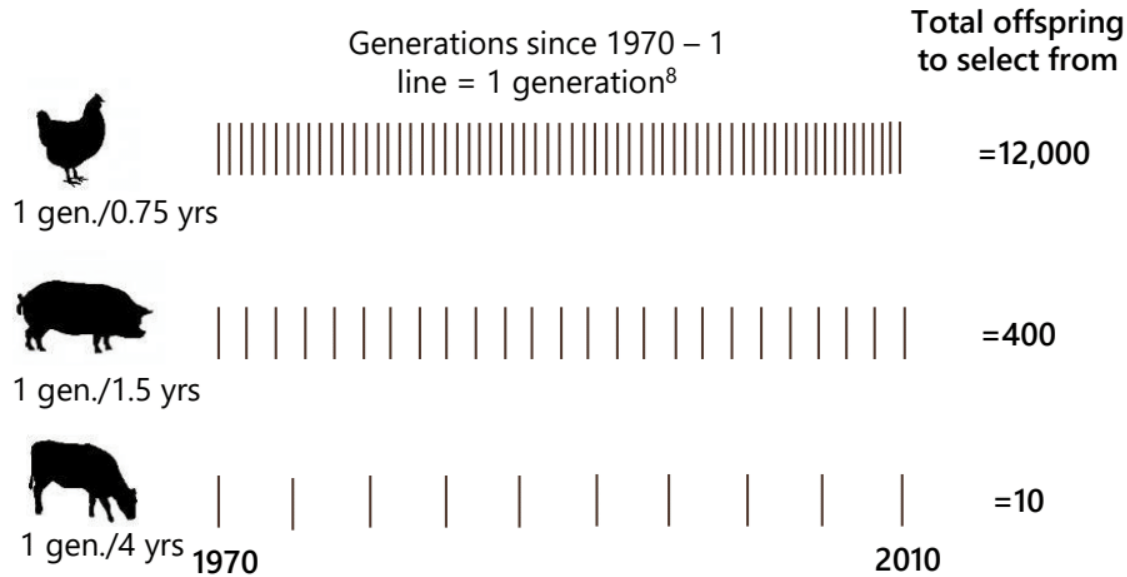
Genetic Progress in Bovine has been Slow, Highly Variable, and less efficient than monogastric



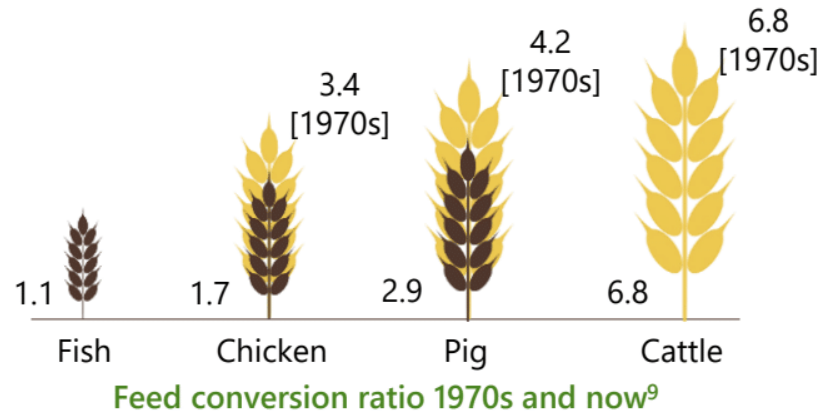
$$\text{Genetic progress } (\Delta G) = \frac{\text{Selection Intensity} \times \text{Accuracy} \times \text{Variation}}{\text{Generation Interval}}$$

Making genetic progress on productivity has historically been challenging

Cause



Effect

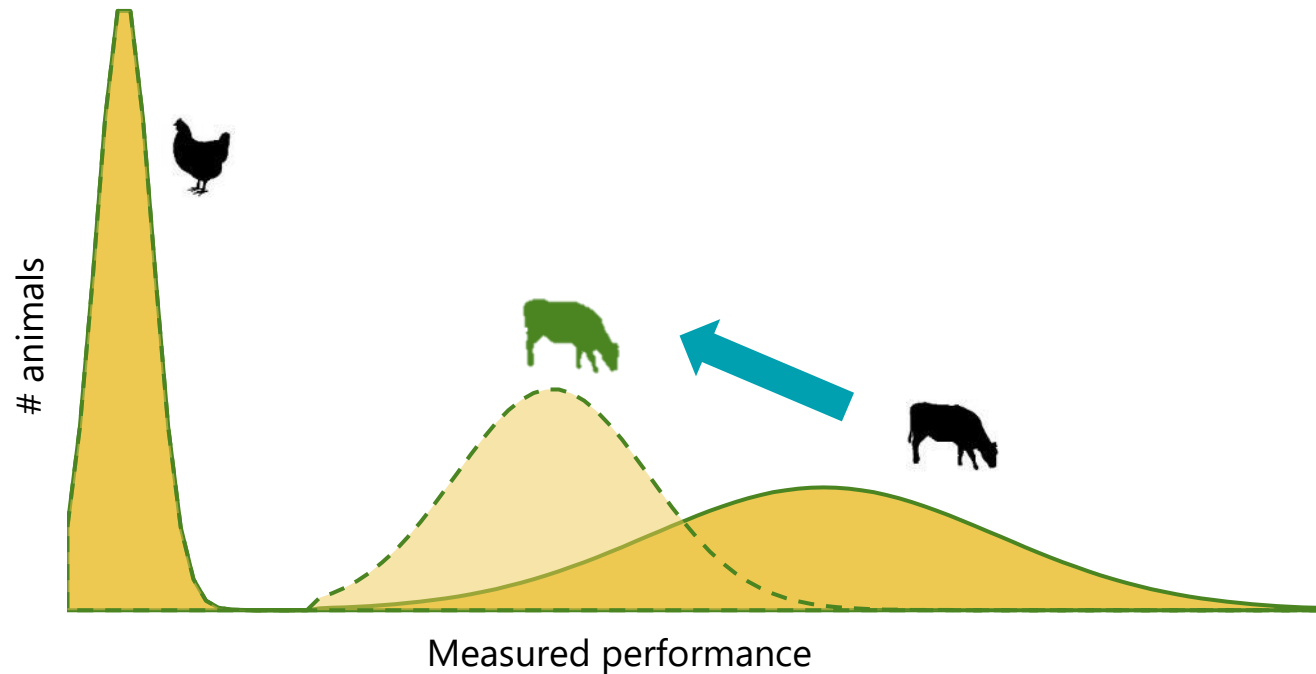


Other proteins are biologically advantaged when breeding to make genetic progress.

Slow genetic progress means bovine animals severely lag other livestock on resource sensitive measures such as feed conversion efficiency.

Bringing together the technologies and expertise to change this

$$\text{Genetic progress } (\Delta G) = \frac{\text{Selection intensity} \times \text{Accuracy} \times \text{Variation}}{\text{Generation Interval}}$$



$$\Delta G = \frac{i \times r \times \sigma}{L}$$

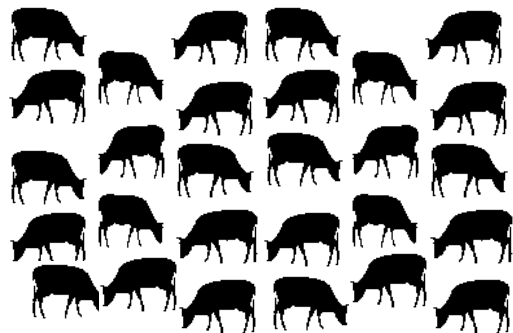
'Delta G' is at the core of game changing technology.



GrowSafe - highest resolution production

$$\Delta G = \frac{i \times r \times \sigma}{L}$$

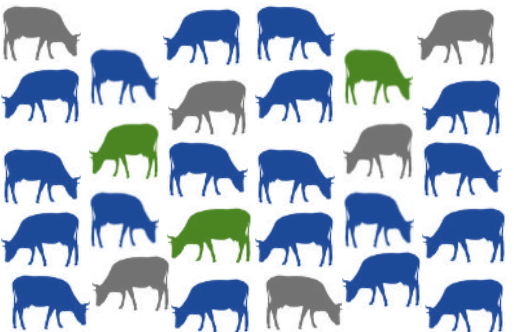
What the industry sees today



Performance averaged across herd



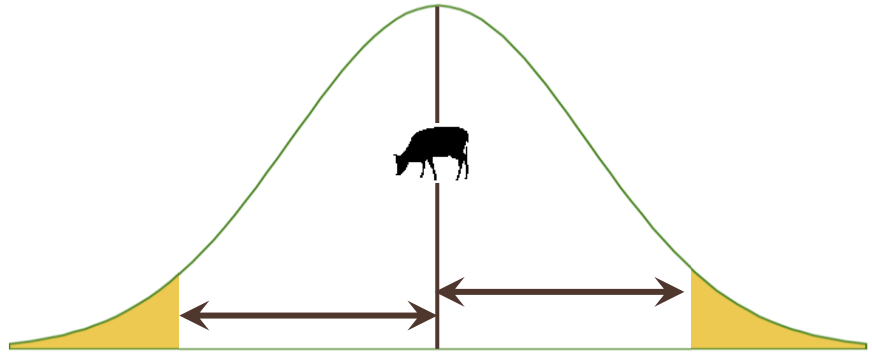
What we see



Identifies elite breeding animals.

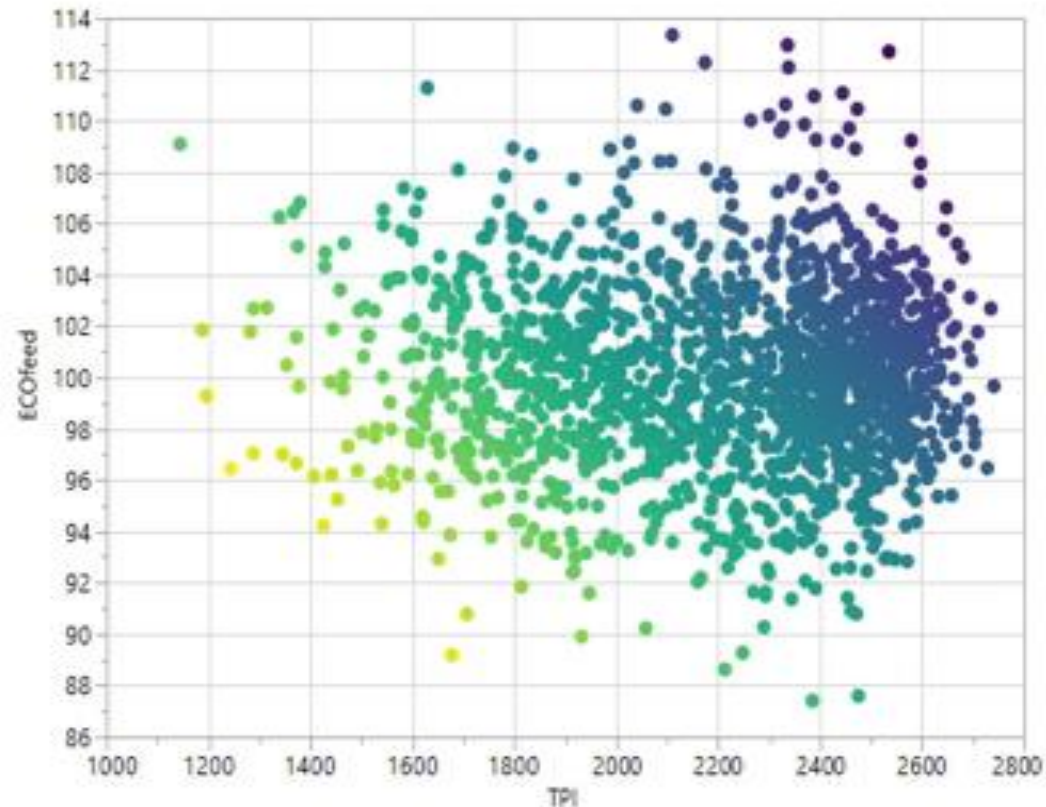
Identifies inefficient animals.

Superior performers



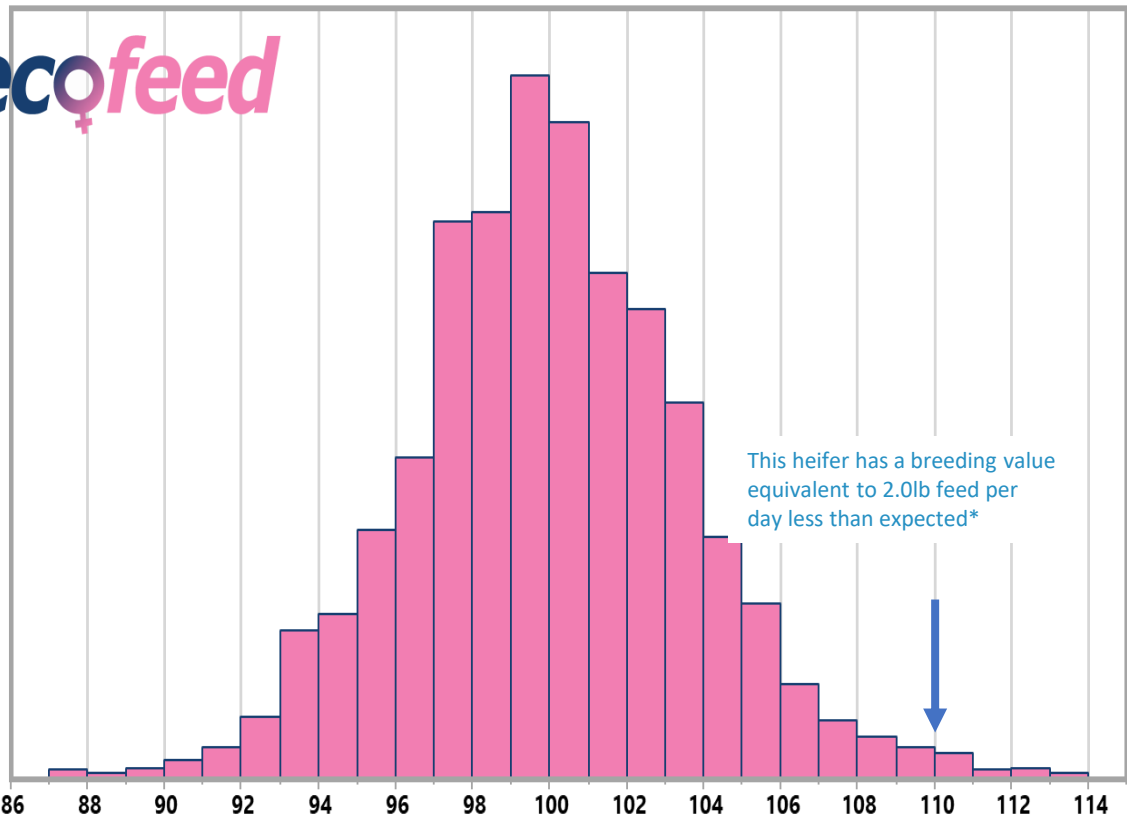
Loss making animals

TPI and EcoFeed are not correlated



Allowing us to continue selecting for high performing animals (TPI) and improving their EcoFeed performance.

Based on 4000 animals tested, there are big differences



Population mean = 100

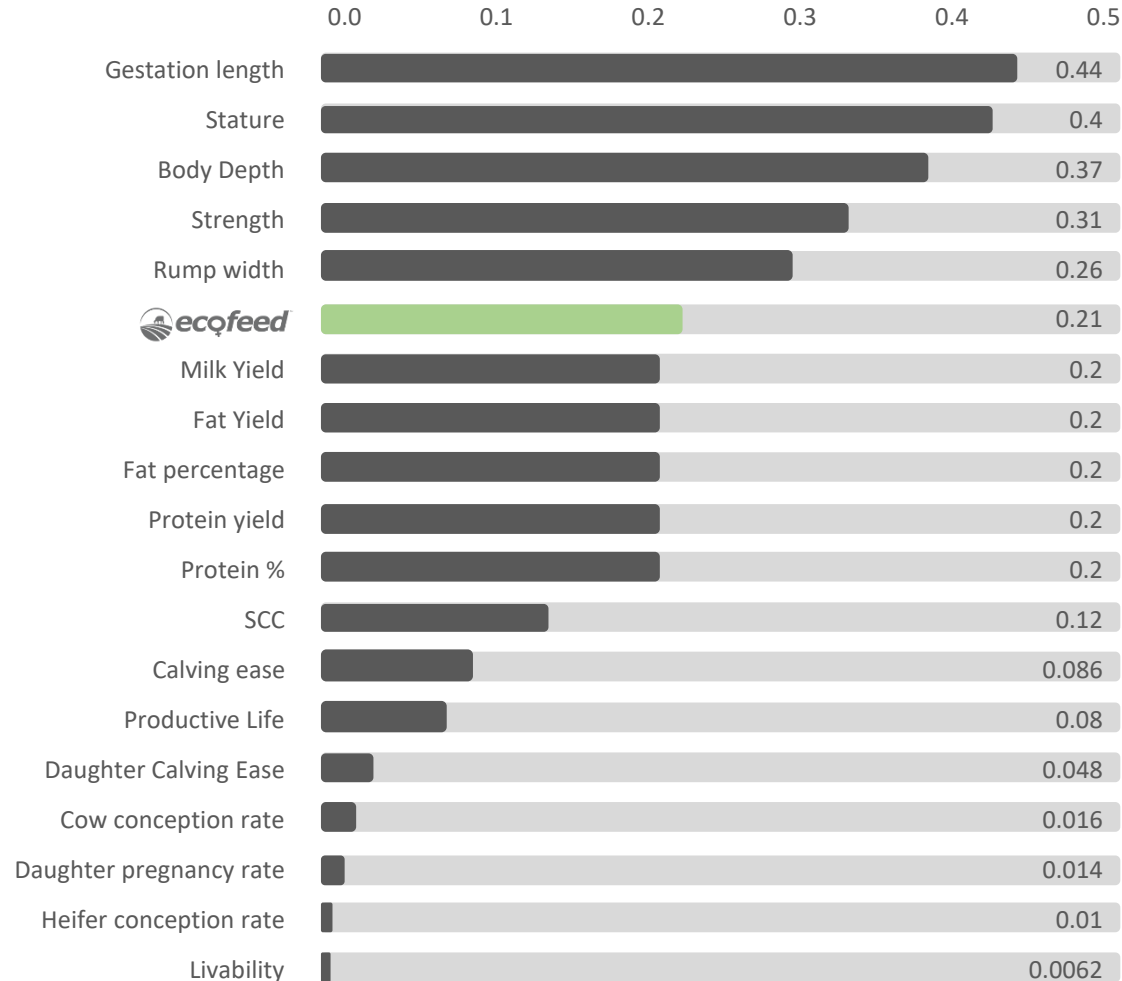
Animals with EcoFeed > 100 have consumed less feed than their counterparts to achieve equal growth.

EcoFeed Index	lb/Cow/Day*
100	0.0
105	-1.0
110	-2.0
115	-3.0
120	-4.0

*EcoFeed is the individual additive genomic breeding value. Half of that value is transmitted to the progeny.

Heritability

A unique trait that is as powerful as any other



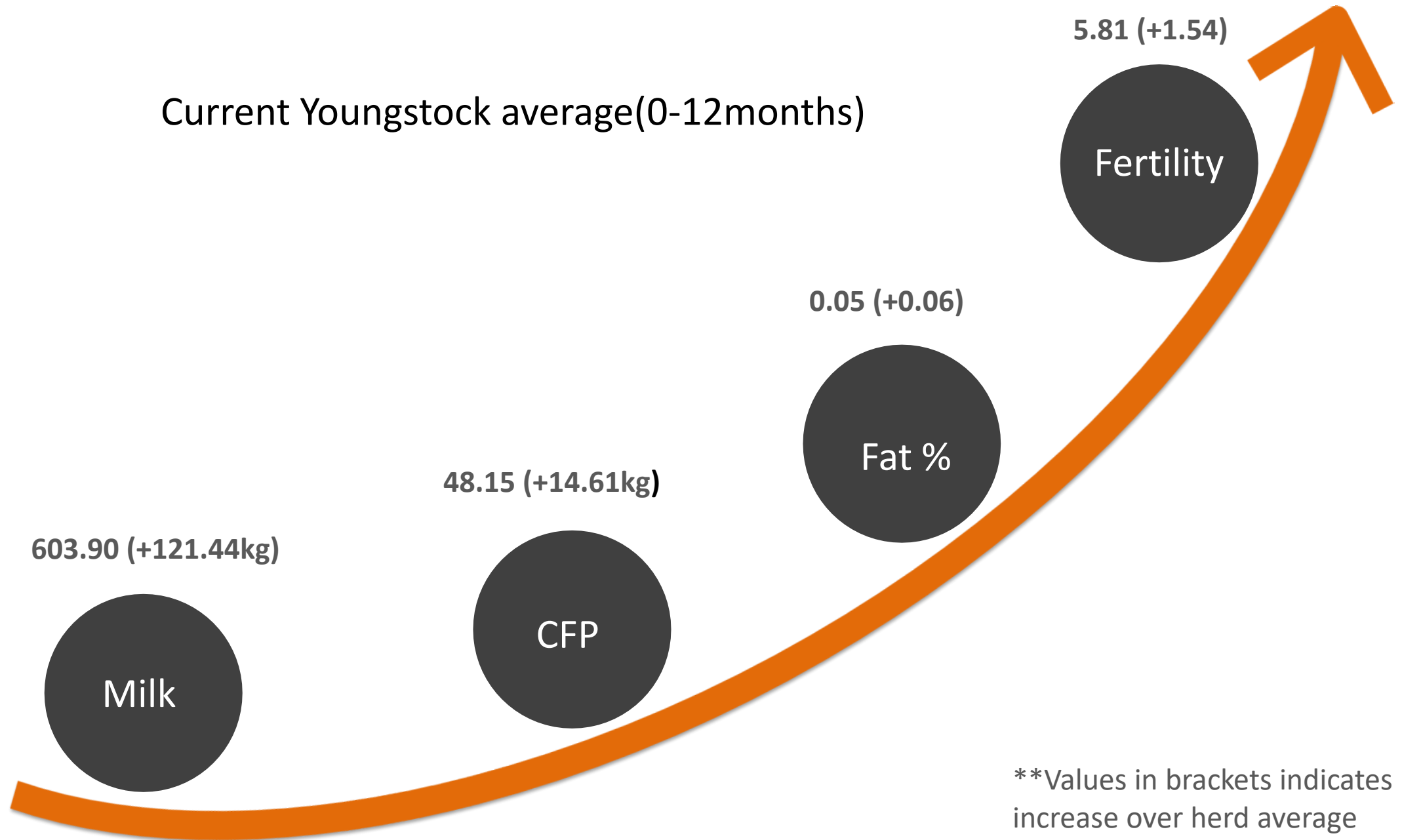
- Heritability of EcoFeed™ is 0.21
- Similar heritability estimates to production traits such as milk yield, fat yield, and protein yield
- Select for high EcoFeed™ animals with the same confidence as other economically important traits

GFL GENOMIC TEST RESULTS (2040 hd)

	Reliability	Milk	Fat	Protein	Fat	Protein	SCC	Lifespan	Fertility	PLI	Type	Udder	Legs	Stature	Ecofeed
	%	Kg	Kg	Kg	%	%		Days		£					
Average	68	533	22	18	0.02	0.01	-12	101	6	452	1.1	0.9	0.7	0.2	97
Highest	77	1251	44	32	0.39	0.2	12	-30	16	740	3	2.4	2.1	2.8	113
Lowest	63	-334	-6	-6	-0.34	-0.15	-38	213	-5	-17	-1.6	-1.4	-0.8	-2.1	83



Aims and Objectives



Cogent Custom Index (£CCI)

- An innovative bespoke indexing approach based on **your** milk contract
- The animals at **Grosvenor Farms Limited** have been ranked on the **Tesco-Muller Index**
- This index will identify those animals that excel for **health and fertility traits**, but also **produce high volumes of milk with superior fat yield**
- £CCI is relatively highly correlated with PLI, but tailored specifically to the mechanism by which you are rewarded for your milk

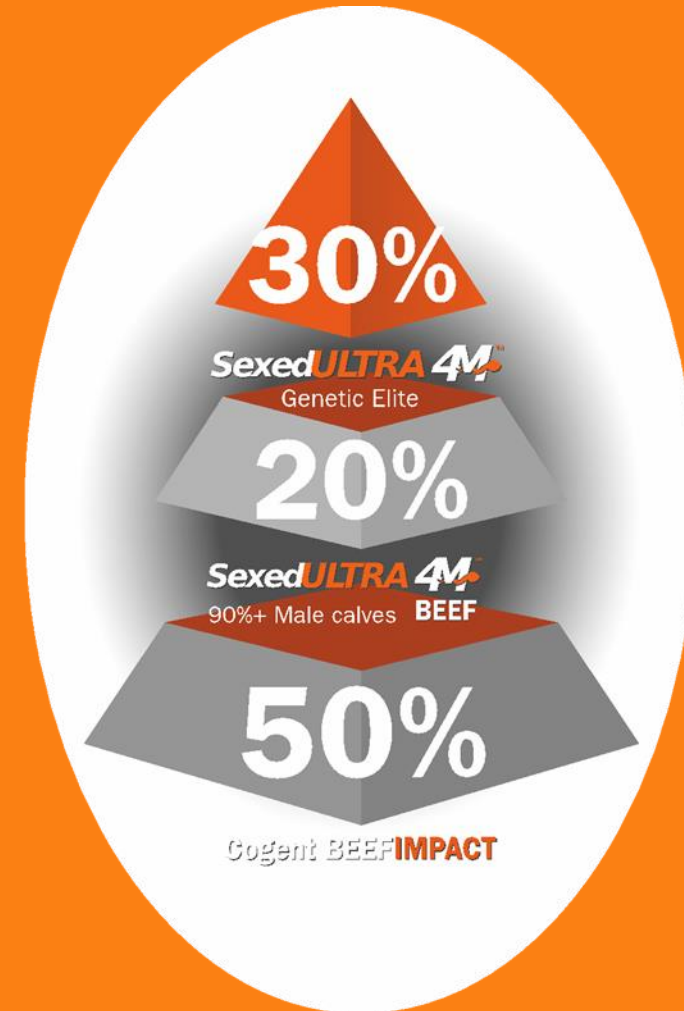


The Effects of Selection Using this Approach

- The following statistics highlight the difference in genetic merit between the portion of the herd selected for Sexed breeding and those put to beef

Breeding Group	£CCI	Milk (Kg's)	Fat (%)	CFP (KG's)	Fertility
SexedULTRA 4M	£406	572	0.03	44.72	6.23
Cogent Beef Impact	£253	435	-0.03	27.62	3.22
Sexed Group Superiority	+£153	+137	+0.06	+17.1	+3.01

- This shows that considerable gain can be made within the herd prior to considering sire selection



Breeding Strategy Simulation



	Conventional + Beef	Sexed+Beef	Sexed+Beef+Genomics
Genetic Variance (Milk Kgs)	249	249	249
Selection Intensity coefficient	0.227	0.83	0.83
Accuracy (Square Root of Reliability)	0.5	0.5	0.81
Response/Generation (Milk Kgs PTA)	28.2615	103.335	167.4027

Sire Influence



Sires represented in youngstock group (0-12 months)

Sire	£CCI	Milk Kg's	CFP	Fat %	Fertility	Nr Daughters
De-Su Spring Silverado	547	885	76	0.1	5.6	86
MR Mastermind	496	1062	67.5	-0.06	6	35
MR Rubicon Dynamo	496	1076	72.3	-0.02	2.5	30
Farnear Delta-Lambda	437	872	52	-0.07	9.6	17
Hartford Rubi-Taz	509	896	69.7	0.08	3.2	8

Sires currently in use

St Gen Helix Paco	596	732	78	0.23	7.3
MR Farnear Helix Twitch	614	775	76	0.07	11.2
EDG Rubicon	583	748	78.4	0.27	1.9
ST Gen Rubicon Jones	580	646	75.8	0.31	3
EDG Outsiders Shooter	587	1005	81.2	0.12	3.6



Flex Cow Numbers
Accelerate Genetic Progress
Increase Yield & Constituents
Improve Forage Quality
Increase Use of Organic Manures
Explore Use of Methane Inhibitors
Increase our use of Renewable Energy

Demonstrate Continual Improvement To Our Environmental Impact

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