

Ecofeed Project

Executive Summary

Rose A Jackson BVSC, DBR MRCVS; Head of Genetics, Kite Consulting

Overview

Kite Consulting have just completed a 3-year project in collaboration with Cogent investigating the potential of genetics to accelerate productivity and sustainability on four commercial dairy farms.

Feed is one of the biggest costs on farm – not just from a financial point of view but also from the impact on carbon footprint – around 70% of a dairy farm's carbon footprint relates to feed and enteric methane.

Selecting for higher Feed Efficiency (FE) as a secondary selection criteria to a farm's current breeding objectives would have a positive impact on profitability and sustainability.

Project Key Objectives

- Demonstrate the benefit of Genomics for improved rate of **genetic gain** and overall opportunity for increased **profitability** and **sustainability**
- **Establish baseline** for Ecofeed (Genomic Feed Efficiency trait) scores across the 4 trial farms
- **Quantify potential** for increasing the Ecofeed scores during the 3-year trial period

Trial farms

Four commercial dairy farms located in Derbyshire (herd size range 180-500) – all Arla farmer members and aligned to Asda at the start of the trial; members of the Pathfinders Innovators group.

Method

- Genomic testing of all females eligible to serve to Sexed semen – all heifers born during the trial period to also be genotyped
- PrecisionMAP analysis (Cogent's breeding program and reporting tool) for each farm with associated female breeding selection
- Breeding program and protocol following PrecisionMAP recommendations
- Female Dairy Sexed on all identified genetic elite females to breed sufficient next generation replacements
- All matings to be performed by means of Chromosomal Mating (using genomic inbreeding instead of traditional pedigree inbreeding – more accurate prediction of inbreeding)
- Ecofeed genetic audit with identified trends relative to £CCI/Milk Contract and milk recording data (£CCI is Cogent's Customer Index which is based on £PLI but weighted to each farmer's own milk contract)





Ecofeed is a genomic trait that aims to predict Residual feed intake (RFI) in an individual bull or heifer/cow. RFI is the difference between actual and predicted DM (Dry matter) intakes (based on body size & production).

Results

Genetic Progress: £PLI

	Av £PLI gain/year (over 5 years)
Farm 1	82
Farm 2	55
Farm 3	73
Farm 4	68
Average	69.50

On average, the rate of genetic gain quantified by **£PLI** (Profitable Lifetime Index) was £69.50/year over a 5-year period which is significantly higher than the UK average of £60/year.

Genetic Progress: Total milk solids

	Total Solids gPTA gain (whole herd vs 0-12 m)	% Increase	Total solids/cow/year (kg) 2020	Total solids/cow/year (kg) 2023	% Increase
Farm 1	14.5	49	814	1027	26
Farm 2	11.3	57	815	1008	24
Farm 3	12.1	51	896	1011	13
Farm 4	15.8	48	932	1072	15
Average	13.4	51	864	1030	19

The average genetic gain for **total milk solids** (gPTA, genomic Predicted Transmitting Ability) was 13.43 kg comparing the whole herd to the 0-12 heifer group; this was an 51% increase meaning these heifers, have 51% more potential to produce milk solids when they enter the herd compared to where the herd is today.





In terms of **actual** total solids performance (from milk recording data), all four trial farms achieved or have exceeded 1000kg/cow/year in 2023. It is estimated that up to 50% of this improved output is down to genetics.

Ecofeed Summary

	2020	2023	Change
Farm 1	96.8	99.5	2.7
Farm 2	96.4	99.8	3.4
Farm 3	98.0	102.3	4.3
Farm 4	94.0	98.8	4.8
Average	96.3	100.1	3.8

Ecofeed is expressed relative to a baseline of 100; scores over 100 mean better feed efficiency and vice versa. There was a wider range of variation in Ecofeed scores between the 4 farms in 2020 compared to 2023. On average, they have improved by 3.8 Ecofeed points; this equates to a predicted DMI saving of **0.2kg/cow/day**.

Climate Check Score (Carbon Footprint)

	2000	2023	Difference
Farm 1	1.50	1.07	-29%
Farm 2	1.09	1.02	-6%
Farm 3	1.07	1.02	-5%
Farm 4	1.09	1.05	-4%

On average, the trial farms improved their climate check score by 11%; there are also environmental factors that contributed to this but the genetic focus will have had a big part to play too.



Predicted Future Carbon Footprint Reduction Modelling

Carbon saving modelling based on genetic predictions for Ecofeed, total solids (kg), SCC, lifespan, fertility and maintenance was carried out. The impact of increased rate of genetic gain on the four trial farms is predicted to reduce the kgCO₂e /kg ECM by 0.15kg from 2023 to 2030; the cumulative reduction in Carbon footprint is therefore 14% over 7 years.

Conclusions

Using a combination of genomic testing and strategic use of sexed semen, the four trial farms have made significant gains in terms of genetic potential for production and also actual total solids production. This has had a positive impact on their climate check scores now and, based on genetic predictions will also have a significant impact over the next 7 years up to 2030.

Genetic strategies to focus on in order to improve the sustainability of a dairy herd:

- Maximise production output (particularly total solids)/cow space (without negatively impacting fertility and health traits)
- Leverage genomic testing and selective sexed semen use to maximise the rate of genetic gain
- Maximise the average number of lactations in a herd – ideal is 4+
- Don't let cows get too big – keep an eye on stature/maintenance
- Use Ecofeed as a secondary selection criterion to further improve sustainability and profitability.

