

Report on FIVs trip to Scotland on Advanced Breeding Technologies in Dairying 6-7 Sep 2023

A group of 24 dairy farmers from across Northern Ireland went on this trip where the aim was to learn how various breeding technologies could be used to aid breeding decisions and speed up genetic selection on dairy farms whilst improving the environmental sustainability of dairy production. The two-day trip was organised in conjunction with Scotland's Rural College (the SRUC) and included an evening workshop led by Prof Mike Coffey (SRUC) and Marco Winters (AHDB) who work together on the UK's national dairy genetic evaluations programme. There were visits to five genetically progressive dairy farms between Stranraer and Dumfries, four of which had average annual yields of 10,000 litres or more:

a) Euan McCaig – Stranraer

Euan and his father have a family run farm with 280 commercial Holstein all-year-round calving cows producing around 10,000 litres at 4.2% BF and 3.5% PR, similar to many farms in Northern Ireland. The aim is to breed commercial cows that can produce large quantities of quality milk from a forage system. Cows are managed as one group and fed just over 3 tonnes of concentrate per year, grazing by day and being housed at night through the summer. Heifers calve at 24 months and the herd has a 381-day calving interval with 49% conception rate to sexed semen.



Euan is involved in a breeding program with Semex and uses the top 50% of cows and heifers to breed his replacements – the rest get Wagu semen. All heifer calves are genomically tested and sexed semen is used from young genomically tested bulls from the top of the £PLI list that have high PTAs for milk (>700), protein (>0.05) and fertility (>5). SmaxTec boluses are being used to monitor and report activity, temperature, rumination and provide heat, health and calving reports.

b) Michael Kyle - Dumfries

Michael is originally from Northern Ireland and moved to Scotland in 2006 where he owns a 730-cow spring-block calving crossbred herd producing around 5,500 litres at 4.9% BF and 3.9% PR – around 480 kg milk solids from his 480 kg Jersey x Holstein cows. These all calve inside 10 weeks from 14 Feb each year, have a 365-day calving interval and are fed just 850 kg concentrate.



Michael believes that profitability has to come first and has joined a group of like-minded spring-calving farmers (the FastBreeders) to advance the genetics of his herd. This project is led by Prof Mike Coffey from the SRUC in Edinburgh and uses various breeding technologies – use of herd genetic reports to guide breeding decisions, use of the Spring Calving Index (£SCI) to select sires across a range of breeds, breeding replacements from the top 20% of cows as ranked on the FastBreeder index and use

of a mating program to maximise genetic progress. In doing all this there have been fewer Jersey sires used in the last few years herd with greater use of the Holstein-Friesian and red breeds which have greater potential for milk production whilst having the ability to produce some 1.2 kg milk solids per kg of liveweight.

c) Brian and Michael Yates – Castle Douglas

Brian and Michael run a family farm with 450 pedigree Holstein cows across two sites that average 11,800 litres at 4.0% BF and 3.3% PR. The cows are milked three times per day, calve and are housed all year round, managed in one milking group and fed a TMR of silage from a multi-cut system along with wholecrop. Heifers calve at 22-24 months with cows having a 60-day voluntary waiting period post-calving. There is a strong emphasis on dairy type with cows being shown at the Highland Show (where they achieved Supreme Champion in 2023), AgriScot and the UK DairyDay at Telford.



All heifer replacements are genomically tested using Zoetis Clarifide+ with replacements being bred from maiden heifers and the highest ranking 75% of cows on the home farm as assessed using a World Wide Sires ranking program. Sires used in the herd are selected for high milk yield, protein%, good legs/feet and good dairy conformation using the US Total Production Index (\$TPI) which is strongly weighted for linear traits. Only sexed semen is used and the World Wide Sires corrective mating program is used to correct for weaknesses in cow type and avoid inbreeding. There is a strong emphasis on cow families and the highest-ranking cows are flushed for embryo transfer to speed up the rate of genetic progress. SenseHub collars are used for heat detection, rumination and health.

d) Robert Wallace – Castle Douglas

Robert runs a family farm of 640 ha across two sites with a total of 1,400 commercial Holstein dairy cows, employs some 29 mainly full-time staff and milks three times per day. The cows average 11,500 litres at 4.0% BF and 3.3% PR. They calve and are housed all year round. Heifers calve at 22-24 months and cows have a 50-day VWP after calving.



Robert is keen to improve the genetic merit of his herd so uses the AHDB Herd Genetic Report and his own customised cow selection index on his UniformAgri software to select cows from which to breed replacements (top 60% of herd). Surplus dairy heifers are sold. Sires are selected in association with Genus using the US Net Merit Index (their equivalent of £PLI) and all semen is sexed. The Genus GMS program is used for corrective mating and to avoid inbreeding with all cows served by Genus RMS. Robert is also involved in the Genus DeNovo program where cows are implanted with embryos. Resultant heifer calves are retained in the herd but bull calves are taken to stud.

e) Coopon Carse – Newton Stewart

The 260 ha Coopon Carse farm is owned by the Pon family of Alta Genetics and managed by Alex Robertson. The herd previously had 500 pedigree Holstein cows which were milked twice daily through a 22-point rotary parlour but this has been replaced with 7 Lely A5 robots in the last 5 years. With a reduction in herd size to 430 cows and more frequent milking the average yield has increased to 12,200 litres at 4.15% BF and 3.55% PR with cows being fed around 4 tonnes of concentrate. Heifers calve at 22-24 months and breeding is conducted all year round with the aim being to consistently have 25 replacement heifers born per month.

The Alta BlueLink program uses a combination of pedigree and production data to identify the best cows/heifers that are open and available to breed from each month. Therefore the herd is not genomically tested. BlueLink is also used to identify the best sires to breed from – currently the top 5 £PLI sires from the Alta catalogue that deliver on milk, fat kg and protein kg and which average £818, 852, 33 and 42, respectively. All sires used are genomic and only sexed semen is used for replacements. The BlueLink program is used to pair cows to sires on a program set at 50% production/50% health that avoids inbreeding and Nedap collars supplied as part of the Lely system are used for heat detection and health monitoring.



The evening workshop with Mike Coffey and Marco Winters was centred on the use of data to make breeding decisions on production, longevity and feed efficiency to help achieve a more environmentally sustainable cow that would go some way to achieving future Greenhouse Gas (GHG) targets. The merits of various international breeding indices were discussed where Marco and Mike recommended use of £PLI since it was the best fit for use in the UK since based on UK generated milk recording data and developed for a UK production system with economic values in line with UK-based cheese contracts which suit Northern Ireland in particular. At both a national level and herd level, genetic selection for particular traits can change the phenotype of the cow – this is best explained through the introduction of the PTA for Fertility in 2005 which has contributed to a reduction in the average calving index from over 420 days to less than 400 days. Similarly, average herd milk yield is closely related to PTA Milk as demonstrated from averages taken from the herd genetic reports of both host and visiting farmers (Table 1 and Figure 1).

Table 1: Average PTA for various productive and functional traits for the host farmers.

	£PLI	Milk	BF%	PR%	Lifespan	Fertility	SCC	EnviroCow	FeedAdv	HealthyCow
Euan McCaig	197	145	0.05	0.04	40	2.9	-4.8	0.9	45.7	74
Michael Kyle*	28	-401	0.14	0.09	45	5.5	5.2	0.3	-	36
Brian Yates	266	326	0.03	0.01	40	1.0	-7.1	1.1	0.1	77
Robert Wallace	338	329	0.05	0.02	65	5.4	-8.5	1.5	-	111
Coopon Carse	357	457	0.02	0.03	59	2.3	-8.6	1.5	54.0	89

*Only includes PTAs for cows classified as Holstein within the herd as other breeds have their own genetic base

Genetics have promoted a large increase in milk production over the years but when selecting for milk yield we have inadvertently selected for larger cows. Therefore, compared to 1981, the average 100-cow herd has an extra five cows in additional liveweight to feed each day. To address this the example was given of two cows, one 600 kg and the other 700 kg, each producing the same milk yield of the same milk quality.

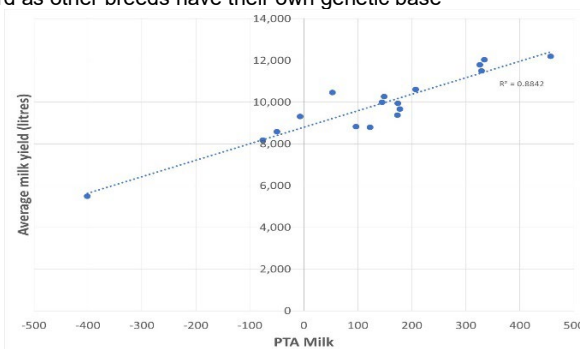


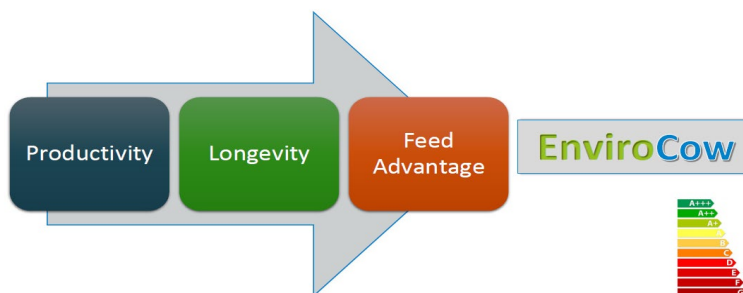
Figure 1: Relationship between PTA Milk and average annual yield

With the creation of a PTA for maintenance now included in the £PLI index the smaller cow is favoured since she is more feed efficient and produces more milk and milk solids per kg liveweight. Animals with the genetic ability to be more feed efficient have a higher score on the new FeedAdvantage index. This has been incorporated into another new index, EnviroCow, that identifies animals predicted to transmit the best environmental credentials (lifespan, production and fertility) to their daughters.

A 1-point increase in EnviroCow which is expressed on a scale from around -3 to +3 is predicted to reduce CO2 emissions by around 10% over the lifetime of a cow whilst consuming some 10% less feed and producing some 33% more milk solids in their lifetime.

Future needs – Produce more from less

AHDB



In so doing, through both direct and indirect effects genetics is predicted to contribute to a 20% reduction in the GHG emissions associated with milk production by 2040.

Breeding technologies investigated as part of the trip are listed below and a number of these could be adopted on dairy farms throughout Northern Ireland to make genetic progress:

- a) Milk recording – to get genetic information on cows where sire is identified
- b) Use of Herd Genetic Report - available from your milk recorder or AHDB
- c) Breeding from your best cows/heifers – to speed up genetic gain
- d) Sire selection - £PLI, EnviroCow, FeedAdvantage – for genetic gain
- e) Use of sexed semen – to improve sustainability by avoiding dairy bull calves
- f) Use of semen from young genomically tested sires – to speed up genetic gain
- g) 24-month calving – to improve environmental sustainability
- h) Genomic testing of heifer replacements – to identify the highest ranking
- i) Corrective mating – to avoid inbreeding, fatal haplotypes and improve type
- j) Embryo transfer