

# Teagasc's Next Generation dairy herd

## Frank Buckley, Morgan O'Sullivan, Orlaith Quigley, Ben Lahart, Laurence Shalloo and Donal O'Brien

Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

### Summary

- The *Next Generation Herd* represents a futuristic national herd, and is a strategically important resource providing a “forward view” of the performance of high EBI herds under varying grazing strategies.
- Results to date highlight productivity, fertility (and survival) and financial benefits that Irish dairy farmers stand to gain through improvements in EBI.
- Increasing EBI reduces environmental impact of milk production.

### Introduction

The ‘*Next Generation Herd*’ was established as a strategic resource to validate that genetic selection using the EBI will increase productivity and profitability under intensive grass based systems. The herd is situated at the Dairygold Research Farm in Kilworth. The herd has two distinct EBI groups: 90 extremely high EBI (ELITE) and 45 national average (NA) females. All are exclusively Holstein-Friesian. All animals are genotyped. Genetic diversity (sire lines) has been maximised. The ELITE females are firmly inside the top 1% in the country based on EBI. The most recent breeding values for the herd are presented in Table 1.

**Table 1. EBI, sub-indices and PTA values for ELITE and National Average (NA) cows within the Next Generation Herd (ICBF, January 2019)**

	EBI	Sub-Indices (€)						
		Milk	Fertility	Calving	Beef	Maintenance	Health	Management
ELITE	214	61	102	42	-15	16	5	3
NA	110	38	39	36	-11	7	2	1

	PTAs				
	Milk Kg	Fat Kg	Prot kg	Calv Int	Survival
ELITE	+36.7	+10.7	+7.2	-5.3	+2.9
NA	+70.9	+6.3	+5.4	-2.0	+1.1

Each year, the two EBI groups were evaluated under three contrasting seasonal pasture-based feeding treatments. This was undertaken to determine if their performance differs depending on feeding level. The results presented are from the first four years of the study.

### Results

The NA cows had greater milk volume compared with the ELITE cows. The ELITE cows, however, had higher milk solids yield (+9 kg during first four years, but more recently increasing to +12 kg); due to higher milk fat and protein content (Table 2). Somatic cell count (116,000 cells/ml and 130,000 cells/ml), incidence of mastitis (9% and 14% annually, or 20% and 27% on an individual cow basis), and incidence of lameness (9% and 11% annually, or 19% and 21% on an individual cow basis) did not differ significantly between the ELITE and NA genotypes, respectively. On average, the ELITE cows were slightly lighter

but had significantly higher body condition score over lactation. Large differences in fertility performance have been observed.

A simulation to determine the economic (at 29 c/l milk price) and environmental consequence at farm level was based on the biological data generated in the *Next Generation Herd Study*, extrapolated to simulate a 40 ha unit. The results indicate that the profit differences (over €200 /cow and over €600 /ha in favour of the ELITE cows) are in line with expectation based on EBI. Of note, ELITE cows are more profitable regardless of feeding treatment. The results estimate that ELITE milk generates 14% less emissions than NA milk. The low emissions intensity of ELITE milk indicates improving EBI has strong potential to improve the dairy sector's environmental as well as economic performance.

**Table 2. EBI group effect on lactation performance**

	ELITE	NA
Milk yield (kg/cow)	5,413	5,612
Fat (%)	4.47	4.19
Fat (kg)	241	235
Protein (%)	3.72	3.55
Protein (kg)	202	199
Average body condition score (1-5)	2.92	2.74
Average weight (kg)	500	506
Six week in-calf rate (%)	73	58
12 week in-calf rate (%)	92	81
Net Profit per cow (€)	844	622
Net Profit per ha (€)	2,322	1,709

There were no differences in daily feed intake between the ELITE and NA cows, but subtle differences in intake capacity, grazing behaviour and energy utilisation were observed. Intake capacity, expressed as total dry matter intake relative to body weight, production efficiency expressed as yield of milk solids relative to body weight and intensity of grazing activity were all greater in ELITE compared with NA. On the other hand, milk solids per unit intake, or the proportion of energy intake utilised for milk production having accounted for maintenance indicates a slight reduction in the utilization of ingested energy for milk production in ELITE compared to NA cows. This is considered desirable, however, as it facilitates more favourable energy balance in ELITE compared with NA, consistent with the greater body condition and reproductive success observed with the ELITE cows.

### NEXTGEN AI sires

A secondary objective of the *Next Generation Herd* is to make available the very highest EBI bull calves born in the herd to the Irish AI industry. A number of young NEXTGEN bulls have been prominent on ICBF's Active Bull List. The most notable include 'NEXTGEN PHC Emer' (AI code FR2460) and 'NEXTGEN YKG Candy' (AI code FR2385), and more recently 'NEXTGEN Heatwave' (AI code FR4803).

### Conclusions

The results provide confidence that the EBI is working to identify more profitable dairy genetics. The average Irish dairy farmer stands to gain financially from increasing herd EBI, and must continue to improve the genetic merit of their herds. Long term, this strategy will improve milk solids production, fertility and longevity to maximise profitability and environmental sustainability from seasonal pasture-based production.