Carbery Milk Quality Winner 2019

FARM WALK

on the farm of

The Daunt Family

Coolcullitha, Innishannon, Co Cork

(By kind permission)

Tuesday, 13st August 2019

CARBERY

Front Cover Photograph

Front Row: Jason Hawkins Chief Executive Carbery, The Daunt Family – Gillian, Dorothy, Nigel, Robert and Lorna, Peter Fleming Chairman of Carbery and Ger Brickley CEO Bandon Co-op.

Back Row: Dermot O'Leary Chairman of Bandon Co-op and Ben Cottrell Vice Chairman Bandon Co-op.

Welcome from
The Daunt Family, Coolcullitha, Innishannon

On behalf of the Daunt family, I would like to welcome you to our farm today. I hope that it will be an enjoyable and informative day for you all.

In 1941 my Grandparents, Thomas and Dorothy Good bought the farm here in Coolcullitha. They introduced a mixed farming system including dairy, beef, sheep and tillage. A suckler to beef system was operated by my parents, Dorothy and Robert thereafter. We formed a partnership in 2015 prior to converting to dairying in 2017.

I am honoured and humbled to have won the prestigious Carbery Milk Quality Award, and I am very thankful to Carbery Group for this. It has been all the more special considering my recent entry to dairying. It is a pleasure to supply milk to the leading milk processor in Ireland.

I would like to highlight the support and advice that I received from members of Bandon Co-op during the conversion process, in particular Leigh-Ann Tobin, John Coffey, Gus O'Brien and Ger Brickley. I would also like to thank all the Teagasc staff for their help with this event.

We greatly appreciate the encouragement, positivity and time given to us by certain farmers during the planning and developmental stages of the conversion.

The 6 months that I spent working on a dairy farm in New Zealand, coupled with another period working on a dairy farm in Cork, has helped to shape the farming system that I am operating and strive to continue developing into the future.

I am extremely grateful to my family for their on-going involvement, support and encouragement, and for allowing me the freedom to introduce significant changes to how the farm previously operated.

It has been a pleasure.

Nigel Daunt & Family.

Welcome Address
Mr Gerard Brickley C.E.O
Bandon Co-operative

Bandon Co-Op would like to congratulate The Daunt Family on their wonderful achievement of winning the 2019 Overall Carbery Quality Milk Award.

A special thank you to The Daunt Family for hosting today's Farm Walk to showcase all that is the best in West Cork Dairy Farming.

Quality Milk is the foundation of sustainable milk production in West Cork. Farms like the Daunt Family farm, a recent new entrant to Dairying are setting an example for others to follow. We endeavour to continue to promote profitable and environmentally sustainable dairy farming into the future.

We hope you enjoy your visit to the farm today and that the experience will be beneficial to you.

Ger Brickley

Welcome Address
Thomas Curran
Regional Manager - Cork West

On behalf of the Teagasc Advisory Team in West Cork I would like to congratulate Nigel and the Daunt family on winning this prestigious award. We are delighted to be associated with the success of our dedicated clients and hope that advice and support received has contributed to their success. Congratulations also to our local advisors John Crowley (Drystock) and Nigel Kennington (Dairy) who have worked with the family prior to and since the conversion from beef to dairy farming.

Today's farm walk is particularly interesting as the farm has converted from beef to dairy in the past number of years. There is an opportunity to learn why the decision to convert was made and what the steps involved to begin the dairy enterprise were.

High quality milk drives milk price as it enables the production and marketing of high quality dairy products that command a premium price in the market place. A key focus on this farm has been the production of milk that is quality assured by implementing high standards of animal health and hygiene.

Teagasc provides learning opportunities for farmers by interacting with them on all aspects of farming and milk production. Farmers participating in our discussion groups have a unique opportunity on a monthly basis to learn best practice from one another.

The milk quality production system and environmental quality on this farm, is a great example for all attending. When applied, the principal take home messages can contribute handsomely to the sustainability of farming and food production in West Cork.

Thomas Curran

Farm Background and Converting from Beef to Dairy

Nigel Daunt is currently farming in registered farm partnership with his father Robert and mother Dorothy since 2015. Nigel is the third generation of his family farming this land in Coolculitha Innishannon, Co. Cork, which has traditionally been operated through the years in a beef production system.

Robert & Dorothy grew the both Autumn and Spring calving suckler herd up for many years to their peak in 2016 when the farm was carrying 75 suckler cows and followers some of which were finished on farm.

Nigel always had a keen interest in farming, he knew their beef farm very well from a young age and although profitable he was aware that the farm was heavily reliant on farm subsidies from the E.U. He also noted that the marginal return that their beef system was operating at would leave relatively little room to allow money to be invested back into the farm. Nigel felt that it would be challenging to support more than one income if he was to enter into full time farming with his parents.

It was when Nigel was finishing in secondary school and going to college that Nigel took his first major step towards a future in dairy farming, by selecting Dairy Business in UCD as his first choice on his CAO. As part of this course he got a great taste of what dairy farming had to offer and gained a great level of technical knowledge as well as practical farm experience. At the start of his third year in UCD he undertook a 6 month professional work experience placement on an 830 cow dairy farm in New Zealand. It was here that he got a real taste through hands on experience of what it would be like to run a dairy farm full time.

Following his graduation from UCD in 2014, Nigel gained further experience working on a dairy farm for the following Summer/Autumn before entering into the partnership with his parents in 2015.

Although much thought and decision making was made before this stage the first big step for converting the farm was when 33 high EBI dairy bred heifer calves were purchased from a single dairy herd in the Spring of 2015. This was followed with another 24 calves from the same farm the following Spring with the aim to begin milking in Spring 2017. The Daunt family had always operated a closed herd and when it came to sourcing stock to set up their dairy herd although buying in stock could not be avoided, biosecurity was still of huge importance for them. It was for this reason that all stock were purchased from a single herd with a known disease status and herd health/vaccination programme.

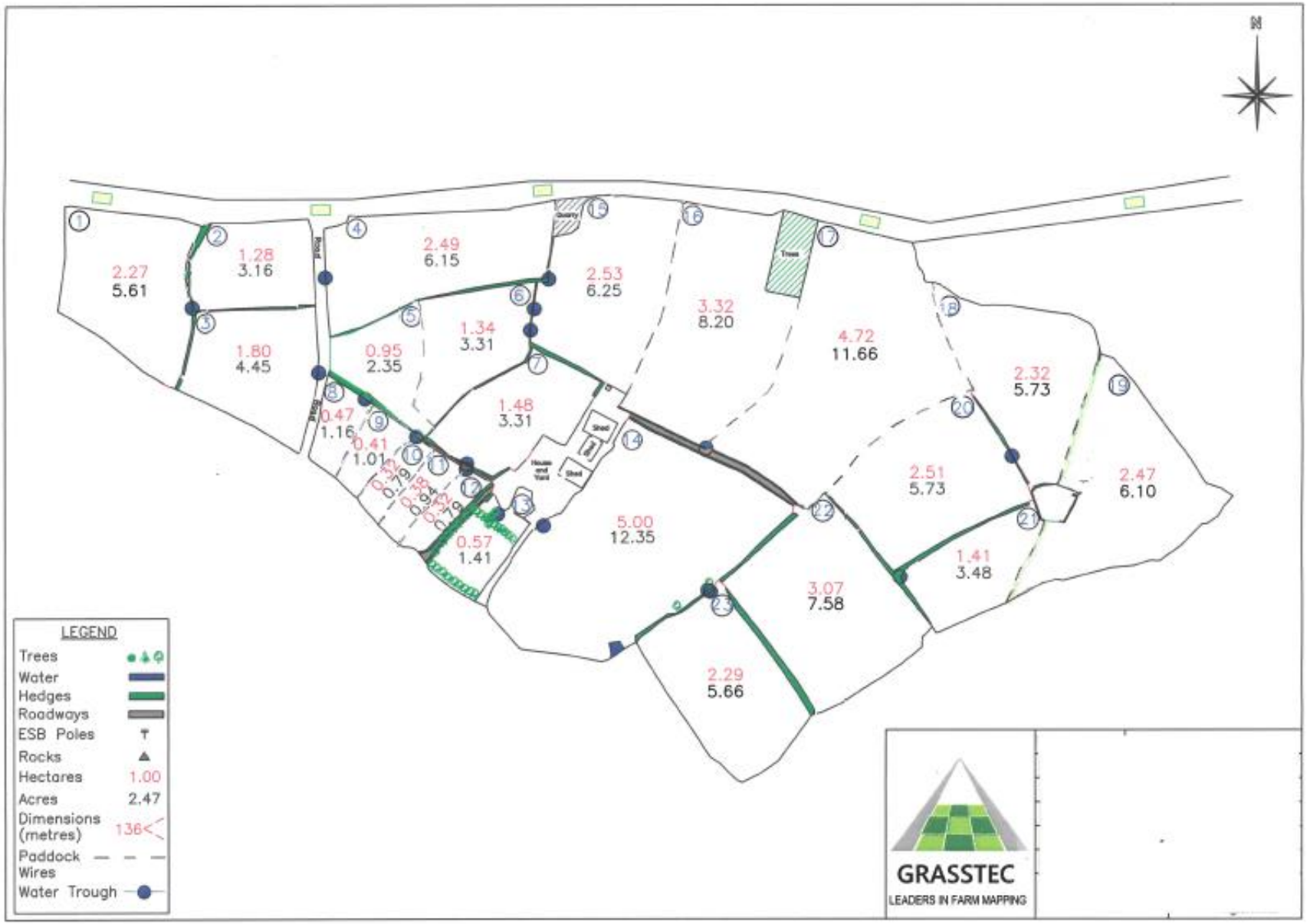
Costs of Investment in Infrastructure

When considering a change of farm system it is important to carry out accurate budgeting of the costs which will be incurred in the conversion between systems and also to account for the additional revenue which will gained from the switch of enterprise. The Daunts prioritised grazing infrastructure as a starting point for an area to improve at the beginning of the conversion process. Below are some example costings for upgrading grazing infrastructure.

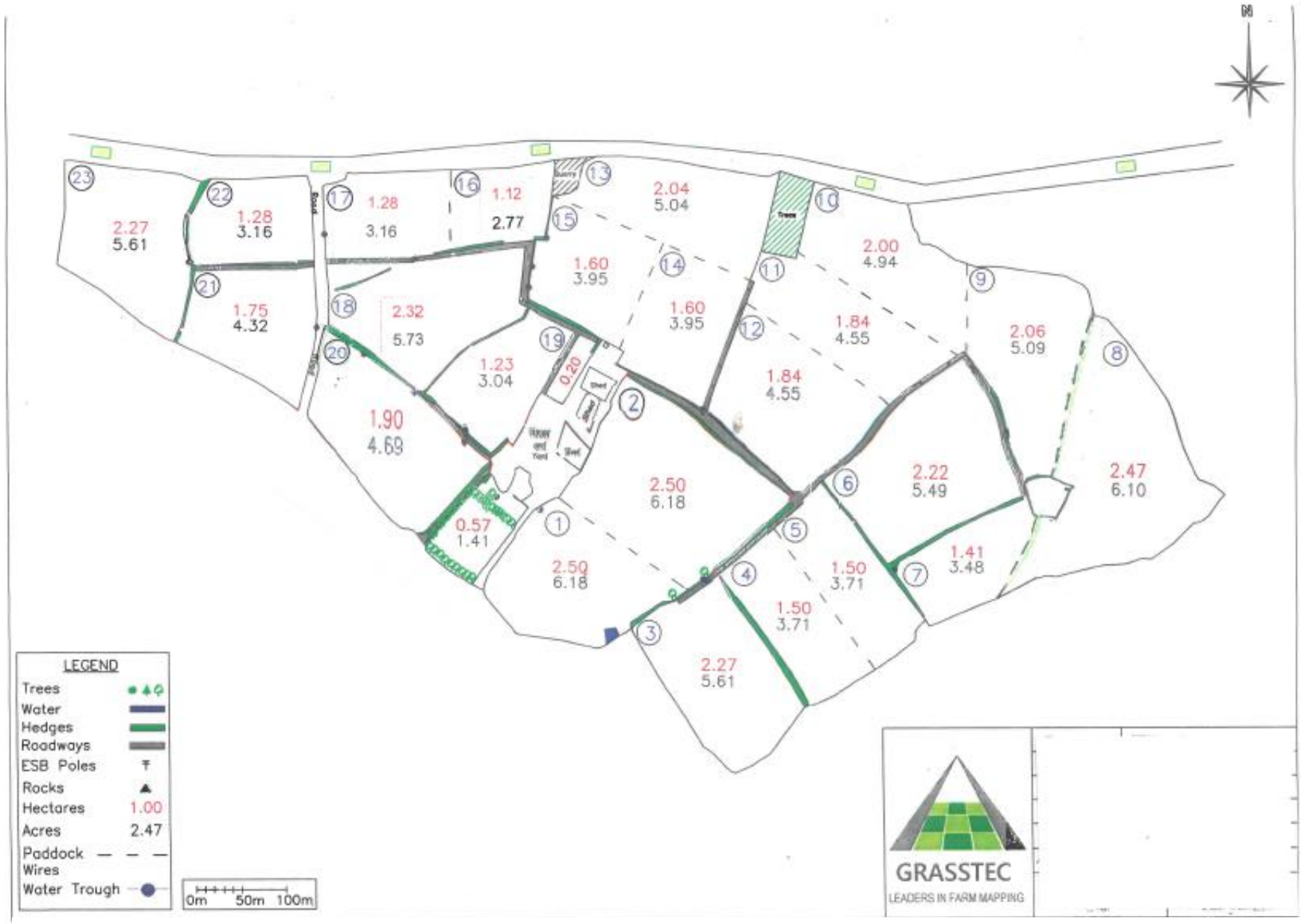
Item	Quantity/Ha	Unit Cost (€)	Total/Ha (€)
Lime	5 tonne	€25/tonne	€125
Reseeding	2.5 acres	€270/acre	€675
New Roads	25 metre/ha	€20/metre	€500
Fencing	212 metre/ha	€1.3/metre	€275
Water	2.5 cow/ha	€100/cow	€250

*Cost can vary dramatically relative to the specific farm, these figures are a starting point for completing budgets however more detailed costings should be carried out for the individual farm.
**Other considerations which may need to be taken into account and are specific to the individual farm include; land drainage and increasing soil fertility (i.e bringing up soil phosphorus and potassium to optimum levels).

On this farm the potential milking platform had very little grazing infrastructure in place. A lot of work was carried out reseeding fields and tiding up ditches which had been encroaching too much into certain fields. The 43.3 hectare milking platform was mapped professionally and divided into 23 paddocks each aiming to be roughly around 2ha each. A roadway network was also designed at this point to make sure that every paddock was accessible to the farm road. Where possible multiple entry and exit points for each paddock were created to allow for ease of management during difficult grazing conditions in the Spring and Autumn time.



Above shows the layout of the potential milking platform for the farm before the conversion had begun. There was very little grazing infrastructure in terms of farm roadways and paddock design was not best suited to a dairy herd. Also the water infrastructure required upgrading to facilitate larger stock numbers.



Above shows the future layout of the milking platform for the farm. A lot of work has been carried out in making suitable paddock sizes and ensuring that there is roadway access to each paddock. Not all work on the above map has been completed yet but this is what the farm will look like upon completion.

The Daunts were fortunate in the fact that the farm's background in sucklers/beef meant there was a lot of existing housing, slurry and dung storage already available on the farm. There was also enough silage pits and calving facilities/ calf housing to get them started initially.

Example costings for additional infrastructure are shown below:

Item	Quantity	Cost (€)	Total/cow(€)
Cubicles	-	-	€1,100
Slurry storage	-	-	€530
Silage Pit	-	-	€250
Calving pens	-	-	€80
Calf Housing	-	-	€80
Milking Parlour	Per unit (7 rows)	€4,000	€571
Plant	Per unit (7 rows)	€4,000	€571
Feeders	2 per unit (7 rows)	€1000	€142
Bulk tank	60 litres per cow	€2.5/litre	€150

The first heifers calved down on the farm in Spring 2017, with 29 first lactation cows trained into the new 8 unit parlour that year. The parlour currently holds 8 units but it is designed to fit 20 units in order to accommodate the future expansion of the herd. The collecting yard is also designed with future cow numbers in mind. Much of the existing suckler and cattle housing already present on the farm is now used to house the dairy cows and replacement heifers over the Winter months.

Milk Quality

2018 milk quality performance on the Daunt's farm

	Fat %	Protein %	SCC ('000)	TBC ('000)
Jan	-	-	-	-
Feb	4.32	3.51	79	7
Mar	4.21	3.18	37	6
Apr	4.18	3.18	38	5
May	4.11	3.41	44	3
June	3.94	3.46	33	1
July	3.93	3.62	30	2
Aug	4.12	3.72	38	3
Sept	4.46	4.04	30	4
Oct	4.59	4.31	35	5
Nov	4.50	4.44	72	7
Dec	-	-	-	-
Average 2018	4.20%	3.64%	39	4

The back bone of any dairy enterprise is the technique employed to harvest the milk from the cow as gently and efficiently as possible. This milk must be stored as hygienically as possible to deliver a top quality product on a consistent basis. On the Daunt farm we will look at a number of issues, e.g. What regime is employed to identify and treat mastitis cases? Nigel is achieving excellent TBC (total bacteria counts) and SCC (somatic cell count) results on a consistent basis; we will outline his wash regime and milking routine that contributes to this consistent high performance.

Nigel milks in an 8 unit GEA/Westfalia plant with the option of expanding to a 20 unit parlour in time. Automatic cluster removers are present and no in-parlour feeding system is installed.

Milking Routine

1. All milkers wear gloves during milking.
2. All cows are dry wiped prior to milking, dirty cows are cleaned and wiped with a paper towel.
3. From calving to start of breeding all cows are stripped once per day.
4. Clusters are applied and ACR's remove clusters.

5. All cows are dipped with NANODUAL; great care is given to accurate quick teat dipping post milking.

Mastitis detection and treatment regime

1. Milk recording has started this year and two recordings have been carried out to date. SCC at present is running at 43,000 with only 4 cows out of 65 over 100,000 SCC.
2. When mastitis is detected in a cow, the cow is marked, not milked and is drafted out until the last row.
3. By leaving the cow last, it avoids cross infection and it allows proper treatment and inspection to take place.
4. A sample is taken from the first case of the season and is sent for culture and sensitivity.
5. All cases are treated with Bovaclox milking cow tubes or Synulox milking cow's tubes.
6. Two red bands are placed on both back legs to identify the cow in subsequent lactations.
7. As cows are being brought in for the next milking antibiotic cows are held back until the last row.

Wash Regime

1. All clusters are washed down after every milking.
2. Excess milk is purged out of the system.
3. Milk sock is removed and inspected it is washed down and inserted back in for the wash cycle to prevent debris from entering the plate cooler. A new milk sock is used for every milking.
4. The plant is rinsed with 150 litres of fresh clean water.
5. The plant is cold washed in the morning and hot washed in the evening, with new solution used at every wash cycle. 150 litres is used during the wash cycle. A hot descale is carried out every Tuesday and Saturday. Products used are Circoaction AFM detergent and Circoaction SFD Descale. Hot water at 75ºC is used and hot wash is circulated for 6 minutes max as once water falls below 45ºC debris starts sticking back to plant again. This is dumped after every wash cycle.
6. Bulk tank is hot washed after every collection, it is programmed for a descale wash once every four collections.
7. TBC is 2 on Nigel's farm at present and Thermoduric are <100.

Dry Cow Regime

1. All cows are milked twice per day up to dry off.
2. Ration is removed 1 week prior to dry off.
3. Cepravin Dry Cow with a Sealer is used on all cows and is picked based on a culture and sensitivity.
4. Cows are dried off in batches of 4; all cows receive 11 weeks of a dry period.
5. Once dried off, cows are put out to a paddock for 2 days, and then put on a straw bed for 2 weeks, following these 2 weeks cows are housed on slats until 2 weeks prior to calving at which point they are housed on straw until calving.
6. All heifers are teat sealed; this is carried out by outside help using the aid of a flip over crush 6 to 8 weeks prior to calving. All heifers are sealed the same day.

The strength in Nigel's wash and milking regime is the consistency of approach. Early identification of mastitis, with drafting out until the last row to prevent cross infection enables a steady low SCC. Temperature, turbulence and Detergent are the 3 criteria required for a good wash cycle; Nigel is ticking all these boxes.

Teagasc Dairy Profit Monitor Results for 2018

	2018 (c/l)	2018 per cow(€)
Total Dairy Output	**41.93**	**2,060**
Total Variable Costs	**15.19**	**748**
Total Fixed costs	**9.45**	**464**
Total Costs	**24.64**	**1,211**
Return for family labour	**10.00**	**491**
Total costs inc own labour	**34.64**	**1,702**
Profit remaining	**7.29**	**358**
This remaining profit is to cover bank repayments for farm investments, tax, & return on capital		

The above profit monitor figures show good levels of performance for a new herd in what was a very challenging year in Irish dairy farming due to extreme weather conditions. The figure of 10c/l allocated to return for

family labour is a generalised figure and is different for each individual farm, however it is very important that return for family labour is accounted for when analysing farm financial performance.

Dairy Herd Performance 2018 (Profit Monitor)

Total Adjusted Area Farmed	**66.35 (164 acres)**	
Average Number of Cows	**48**	
Heifers in Herd	**44%**	
Stocking Rate	**2.03 LU/Ha (overall farm)**	
Milk Yield / cow (delivered)	**4,914 litres**	
Co-op Butterfat	**4.2%**	**213Kg / cow**
Co-op Protein	**3.64 %**	**184Kg / cow**
Total Solids / Cow	**397Kg / cow**	
Kg of Milk Solids	**807 Kg/dairy hectare**	
Milk Price (Net)	**39.8cents / litre**	
Meals Fed	**1,100 Kg / cow**	

Breeding/ Genetics

The stock that the Daunts bought was predominantly high EBI New Zealand/Holstein Friesian genetics. The herd currently has an EBI of €153. A nice mix of fertility and milk sub-indexes exist in the herd, €53 for milk and €62 for fertility. These animals have been crossed with Jersey A.I for the past three years to exploit the benefits of hybrid vigour in the resulting offspring. As is common in a lot of crossbreeding herds, the first crosses are then bred back to a Friesian for the next generation. Although still building stock numbers at the moment, the farm still only breeds from the stock which are most profitable. Selecting out the poorest performing animals and deciding that they are not the type of stock which are wanted to breed replacement heifers from, therefore the home bred Angus stock bull is used for these cows.

The genetics of the herd is improving each year with the in calf heifers due to join the herd next year having an average EBI of €184 and with the 2019 calves having an average EBI of €197.

The fertility performance of this herd has been very good even for a new herd. Calving started on 22nd January 2019 and half of the herd were calved by 9th February (18 days). The average calving interval for the herd is 379 days, with 89% of the herd calving in 6 weeks in 2019. Fertility is a key area of focus for this family farm, they know that in a Spring calving dairy herd like this, additional days in milk will drive milk production, so compact calving is a strong goal and is being achieved from the offset.

Calving and Fertility Statistics

	2019
Herd EBI	**€153**
2019 Calves EBI	**€197**
Calving Start Date	**22nd Jan**
Days to Calf Half the Herd	**18**
% Calved in 6 weeks	**89%**
Calving Interval	**379 days**
% heifers calved 22-26 mths	**83%**

Grazing Management

The farm is walked regularly to access grass covers throughout the main grazing season. With two grass walks carried out per week for most of the Summer, covers are then inputted on **Pasturebase** Ireland software. Management decisions are then made based on the results of the figures available and the grass wedge at the present time. The paddocks on the farm have not been topped or pre-mowed yet this year, any paddock which has become too strong for grazing is removed as a surplus in the form of baled silage. This is a crucial method of correcting grass quality on the farm. Nigel feels that topping and pre-mowing result in grass rotting into the ground and ultimately grass ends up being wasted. Nigel believes that if a paddock is entered into for grazing at the right pre-grazing height (1,400 kgs DM/ha) that an excellent clean out can be achieved and the target residual can be met without the corrective treatment of a topper or mower.

Clover

The Daunts have carried out a lot of reseeding in the last few years. Clover plays a big role in the system which the Daunts wish to run and is a crucial element to the future sustainability of the farm. Clover is either included in the grass seed mix at sowing time or else added to the sward at a later stage. Research work is showing that swards including clover at the optimum level (20-30%) are resulting in higher milk solids production per ha and have the potential for reduced fertiliser Nitrogen rates also. Nigel manages clover in a way to minimise bloat issues. Paddocks with the highest clover content are grazed in sequence when possible to do so. Bloat oil is placed in water troughs 24 hours before cows will enter a paddock with a particularly high clover content. Sometimes during high risk periods cows are checked in the paddock 2-3 hours after milking to ensure that there are no overly swelled stomachs present.

Future Plans

Nigel feels the farm is well capable of carrying 120 cows on the 43.3 ha milking platform, this would result in a stocking rate of 2.77 cows/ha on the milking platform. The land situated across the road will be used for rearing of replacement heifers and producing any additional silage which may be needed. The Daunts do not have an intention to use this ground for grazing as it is very marginal land and is only really manageable for grazing during the middle of the year / Summer months.

A lot of work has been put into getting the farm dairy system up and running. Nigel is grateful to his parents who have supported him in this conversion and given him the responsibilities to take a strong role in the farm. An area which will require further investment in the future will be the water infrastructure for grazing (i.e. upgrading water pipe size and troughs). It has also been decided that future investment will be put into having enough cubicle space for each cow and possibly housing all cows under one roof.

Future Systems: Growing Sustainably

Brendan Horan, Donal O'Brien & David Wall

Why should Irish dairy farmers be concerned with sustainability?

In the context of an expanding, export-dependent agri-food sector, the sustainability of Ireland's dairy industry is now very much in focus. Customers, both at home and abroad, have become more engaged in the provenance, nutritive value and sustainability credentials of the food they consume. The business case for improving the environmental performance of dairy farms is compelling, as efficiencies gained also enhance the economic performance of a farm. At farm level, environmental sustainability comes down to minimising the amount of resources used (e.g., nutrients, electricity, feed, water, etc.) to produce each kg of output. Indicators of sustainable intensification are essential to verify the comparative advantage of Irish pasture-based food production systems. Even under current regulations, Irish agriculture faces significant environmental constraints in terms of water quality, ammonia (NH_3) and greenhouse gas (GHG) emissions and biodiversity loss which may result in EU fines (NH_3) and the necessity for Ireland to purchase credits (GHG's) for exceeding target levels in the future. There is a national ceiling on NH_3 emissions; as agriculture produces more than 90% of total NH_3 emissions, this is a de facto ceiling for agriculture. In comparison with intensive agriculture in other countries, Irish farming is not particularly intensive. Nevertheless, the EPA estimates that agriculture, principally cattle, contributed approximately a third of Ireland's GHG's in 2017, whereas the corresponding average for the EU was just over 10%. As Ireland has recently declared a national climate emergency, the Irish government is currently formulating targets for each sector to achieve a low carbon, climate-resilient and environmentally sustainable economy by 2050. As part of this national plan, agriculture (and land-use including forestry) will be required to reduce total emissions without compromising our capacity for sustainable food production. Irish dairy farmers need to be aware of, and proactive in, adapting dairy production systems to these new requirements.

Beginning with the end in mind

Sustainability is not just confined to environmental considerations, but also encompasses the economic well-being of those involved in farming, the quality of food produced and the welfare of animals. There is a growing understanding of the role of pasture-based food production in efficiently converting human inedible grazed forage to high quality human edible nutrients with a low environmental footprint. In contrast, confinement dairy systems use a large proportion of maize silage as the

forage, which must be balanced by imported protein-rich feedstuffs. In effect, this outsources a considerable proportion of the environmental impacts to South America, where the expansion in soybean cultivation has been a major environmental concern. Permanent pastures also provide an important biological filter to reduce nutrient and chemical losses, conserve soils and store carbon, while also supporting high levels of biodiversity (particularly avifauna). In a European context, improving the efficiency of grazing production systems is recognised as the primary opportunity for sustainable intensification of food production for the future.

Core principles of efficient pasture-based grazing systems

Future pasture-based dairy systems will continue to be dependent on highly productive pastures combined with efficient ruminants (Table 1). Substantial additional gains in farm profitability can be achieved on most farms through refinement of Irish grazing systems. The greatest gains will come from increasing pasture production and utilisation followed by conversion to milk fat plus protein (milk solids; MS), and this will provide the primary avenue to improved environmental efficiency over the next two decades. Research modelling results indicate that for each 1 t DM/ha increase in pasture utilisation on dairy farms, GHG emission intensity is reduced by 4% and net farm profit is increased by €173/ha. Further improvements in pasture productivity can be realised by improving grazing management, reseeding unproductive swards and improving soil fertility to optimum levels. Optimising the soil pH to ≥ 6.3 through application of lime on acidic mineral grassland soils is vital to ensure efficient use of applied nutrients. Teagasc data indicates that a 10 day increase in grazing season length increased annual farm profitability by €30 per cow, and reduced GHG emissions by 2% per annum. In addition, where soils are maintained within the optimum soil pH range, productive grass and clover persist for longer, resulting in reduced cultivation and increased C sequestration.

The selection of more efficient dairy cows is also of paramount importance. From an animal breeding standpoint, there are two key improvement goals: firstly, extend the lifespan of each animal and reduce the requirement for replacements; and secondly, to further increase individual animal performance for grazed pasture. Increasing herd Economic Breeding Index (EBI) by €10 per year increases annual farm profitability (by €20/cow/yr) and reduces GHG emissions by 2% per annum. In addition, selection of dairy cows that are capable of achieving large intakes of forage relative to their size and genetic potential for milk production increases feed efficiency and also reduces nutrient losses.

Efficient grazing animals should produce in excess of 90% of bodyweight in annual milk solids production to increase N use efficiency. On that basis, dairy farmers should aggressively select on EBI and use milk recording to eliminate inefficient animals to further advance both the economic and environmental efficiency of Irish dairy herds.

Table 1. Performance indicators for current average, top performing and future dairy systems.

	NFS[1]	Top 10%	Future Target
Net profit (€/ha incl. full labour)	473	1,032	2,500
Dairy Economic Breeding Index (€)[2]	86	122	200
Herd maturity (No. calvings/cow)[2]	3.4	4.1	4.5+
Calving rate (% calved in 42 days)[2]	64	85	90
Optimum soil fertility (% farm area)	10	75	100
Fertiliser N (kg chemical N/ha)	180	250	*150 - 250**
Grazing season length (No. days/cow)	235	265	280
Stocking rate (LU/ha)	2.1	2.3	2.8
Pasture utilised (t DM/ha)	7.3	9.6	13.0
Supplement (kg DM/cow)	1,050	910	500
Fat plus protein (kg sold/ ha)	825	1,021	1,350
Total GHG emissions (t CO_2 eq./ha)	9.2	13.9	12.6
GHG intensity (kg CO_2 eq./kg FPC milk)	1.14	1.00	0.71
Total Ammonia emissions (kg NH_3 eq./ha)	46.9	65.1	46.2
Ammonia intensity (kg NH_3 eq./'000 kg FPC milk)	6.2	4.8	2.6
Nitrogen/ Phosphorus surplus (kg N or P/ha)	164/10	225/9	160/10
Nitrogen / Phosphorus use efficiency (%)	25/62	26/70	35/85
Energy use (kWh/1,000L milk sold)	59	42	30
Biodiversity cover (% habitat area)	7	5-10	10+

[1]NFS: National Farm Survey (2015 to 2017), [2]ICBF (2018).

**Where an overall sward white clover content of 25% is achieved, chemical N can be reduced to 150 kg/ha*

Farming for the future – new practices for intensive dairy farms

Irish dairy farmers have been to the forefront in terms of innovation over the last decade, which has contributed greatly to improvements in productivity within the sector. The adoption of the following research practices on intensive dairy farms could further reduce both emissions and nutrient losses, and facilitate the achievement of the future industry targets set out in Table 1 above.

Grass clover swards

Traditionally, white clover was included in perennial ryegrass mixtures to improve sward nutritive value and reduce N fertiliser use. The availability of cheap N fertiliser, however, reduced the variability in pasture production during spring and increased overall pasture production. This led to a reduction in the use of white clover, with declining levels reported in temperate grazing regions such as Western Europe and New Zealand. Managing grassland with less mineral N fertiliser inputs and with greater reliance on biological N fixation from clover can reduce costs (less mineral N fertiliser), reduce GHG emissions (industrial synthesis of mineral N fertiliser is energy intensive) and increase the digestibility of herbage. Data was compiled from multiple studies to quantify the milk production response associated with introduction of clover into perennial ryegrass swards. At a mean sward clover content of 32%, mean daily milk and milk solids yield per cow were increased by 1.4 and 0.12 kg/day, respectively, compared with grass only swards. The same studies indicated that there is potential to replace up to 100 kg fertiliser N/ha, while maintaining output and profitability on intensive dairy farms where white clover content exceeds 25% of the sward biomass. Ongoing analysis of trial results indicate that the combined animal performance gains and cost saving from reduced N fertiliser use in ryegrass plus white clover pastures could increase annual farm profitability by €450/ha, while also reducing GHG emissions by up to 10%.

There are, however, challenges with the adoption of white clover on dairy farms. The use of white clover is not widespread (on derogation farms or on farms in general), and may be problematic on wetland soils. The yield stability of white clover in intensively managed pastures remains problematic and the limited range of clover friendly grassland herbicides and risk of bloat in grazing livestock have discouraged some farmers. While research has shown the possibilities for overcoming these obstacles through improved grazing management, over-sowing swards and the use of bloat prevention technologies, further work is

required to increase the stability and persistency of white clover and more generally encourage greater adoption.

Low Emissions Slurry Spreading (LESS)

Slurry is an important source of nutrients (N, P & K) and application to grassland must be properly timed to maximise the efficiency of nutrient capture and replenish soil fertility levels. The targeted application of slurry in spring, based on soil test results, will ensure the most efficient use of slurry nutrients for grass production and minimise potential NH_3 losses. Slurry N losses in the form of NH_3 emissions are potentially the largest loss of reactive N on Irish farms, with manure spreading responsible for a quarter of all NH_3 losses in Ireland. Using LESS methods, such as trailing shoe or band spreaders, has a large effect on N losses and increases slurry N value by 10%, thereby increasing pasture productivity and further reducing chemical N requirements.

Protected Urea Fertiliser

There is a strong yield response from ryegrass swards to supplemental N addition, including from mineral fertilisers. Loss of N, via NH_3 and nitrous oxide (N_2O) emissions and N leaching, however, must be reduced. Recent studies have shown that protecting urea with a urease inhibitor reduces loss of NH_3 to the environment by 80%. Furthermore, protected urea reduces N_2O losses by 71% compared with ammonium nitrate, without compromising productivity. Results from several studies indicate that protecting 50 kg/ha of urea-N will save 6 kg N/ha, which can increase the value of grass growth by up to €40/ha per yr. Protected urea can help reduce N losses to water by holding N in ammonium form, which is more stable in soil particularly during wet conditions.

Reducing Concentrate Crude Protein Content

On average, Irish dairy cows have a requirement for a diet with a Crude Protein (CP) content of 15 to 17%. In general, high quality grazed pasture has a CP content in excess of 18% during the grazing season. Therefore, grazed grass more than adequately meets animal requirements for crude protein. Several studies have been completed during the last 10 years that showed no benefit from feeding rations with high CP content at pasture. Indeed, feeding high CP content concentrates during the grazing season provide excess CP to the dairy cow, who must then expend energy to excrete the excess N. From an environmental perspective, reducing concentrate CP content will reduce N surplus and loss to the environment. A 1% reduction in CP of dairy concentrates reduces N excretion by 1% and also results in a 5% reduction in GHG and NH_3 emissions. On that basis, using concentrates

with a CP content of 12 to 14% is recommended when animals are at pasture.

Protecting Biodiversity

Biodiversity is an important primary environmental indicator of sustainable agricultural systems. Although extensively managed farmland will always provide the highest quality ecosystems, improving biodiversity on intensively-managed farms can also play an important role in halting the decline of farmland biodiversity and maintaining soil C. Pasture-based farming systems are uniquely well positioned to support wildlife within the landscape; it is estimated that natural habitats constitute 12-14% of the area of grassland farms in Ireland. Greater efforts are required to improve both the area and quality of high biodiversity habitats. Examples include maintaining and managing existing habitats such as hedgerows and field margins, and the inclusion of watercourse buffer strips.

Energy & Water Efficiency

Although average electricity costs on Irish dairy farms are €5 per 1,000 litres of milk produced, large variation exists between farms (from €2.60 to €8.70). The main energy uses are for milk cooling (31%), milking (20%) and water heating (23%). Teagasc research suggests that it is possible to reduce on farm electricity consumption, and related CO_2 emissions, by up to 60% and save over €2,500 (100 cow herd) by installing an effective milk pre-cooler (e.g. plate cooler), variable speed drives on the vacuum and milk pumps and solar photovoltaic systems.

Future opportunities - Methane reducing feed additives

Methane from the cow's digestive system is the main source of GHG/C emission from milk production. Numerous additives have been fed to cows to reduce methane emissions, but most are not effective or their effect weakens after a short period i.e. 8 weeks. Moreover, some additives have a negative effect on animal production or the environment (e.g., the ozone layer). New research in the USA and Europe, however, indicates that mixing the inhibitor 3-NOP (3-nitrooxypropanol) into the feed ration or feeding plant extracts (e.g., Mootral™) can persistently reduce cow methane by up to 30% without any significant adverse effects, and may improve cow productivity. These additives are likely to be required to meet long term (2050) emission and food targets, but testing is required to determine if these additives reduce emissions in grazing dairy cows.

Conclusions

Improved efficiency in dairy systems is a significant challenge for the future. The world demand for food will increase further in the coming decades, but intensive milk production systems must become more sustainable with lower nutrient surpluses and increased emissions efficiency. Irish dairy farm systems can grow sustainably based on highly productive swards and genetically elite dairy cattle consuming a predominantly pasture diet. Considerable gains in both farm profitability and environmental efficiency can be achieved through incorporation of white clover into grassland swards coupled with the use of protected urea fertilisers and low emissions slurry application methods.

Chlorine-free cleaning protocols for milking equipment

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Summary

- It is increasingly difficult to achieve dairy product specifications with regard to Trichloromethane (TCM) and Chlorate residues, when chlorine-based cleaning products are used in milking equipment cleaning routines
- Chlorine-free cleaning protocols require increased usage of hot water, acid detergents and higher working solutions of caustic

Introduction

There are increased food safety concerns regarding the use of chlorine for cleaning milking equipment, due to residues of TCM and Chlorate. The removal of chlorine from cleaning routines would significantly reduce the risk of these residues in milk and consequently, in final products, such as lactic butter and milk powder. The adoption of chlorine-free cleaning of milking equipment is currently an on-going process. Some milk processors have already requested their milk suppliers not to use cleaning products that contain chlorine. Others are focussing initially on removal of chlorine products from just bulk tank cleaning routines.

Necessary steps associated with changing to chlorine-free cleaning

Re-calibration of the automatic detergent dosing systems for both milking machine and bulk milk tank: This will ensure correct uptake rates of the different detergent products; uptake rates may be lower for some chlorine-free products and those that have slightly higher caustic content than products previously used. Higher working solutions of caustic (1%) are now applied when cold water is being used.

Hot water for daily cleaning: When chlorine-free liquid based cleaning protocols (as opposed to powder products) are used, regular hot washes (70/80^{o}C) are necessary, with temperatures remaining ≥40^{o}C on completion of the wash cycle. A suggested routine may involve hot and cold circulation cleaning to be operated after AM and PM milking, respectively.

Peracetic acid: a replacement for chlorine: Peracetic acid has similar antimicrobial properties to sodium hypochlorite and is effective against a broad spectrum of bacteria, spores, yeasts, moulds and viruses. Post milking wash routines can include an additional rinse involving peracetic acid. But the caustic detergent solution of the main was circulation must be rinsed thoroughly from the plant before the additional rinse containing peracetic acid. This is important both for safety concerns and effectiveness; otherwise, the caustic could neutralize the acid, making the peracetic acid ineffective.

Chlorine-free cleaning protocols

using powder products: a number of potential options can be considered in addition to the use of the powder product:

(i) Include up to 3 once daily hot acid washes (phosphoric acid) per week
(ii) Include peracetic acid in an additional rinse twice daily
(iii) Add hydrogen peroxide to the diluted powder solution on one occasion per week.

using caustic liquid and acid: Combinations of caustic and acid based products can be selected for use in weekly milking machine wash protocols:

(i) A caustic liquid product (21/29%) used with hot water (70/75^{o}C) 4 times weekly after AM milking and used with cold water 7 times weekly after PM milking. Acid (phosphoric) is then used with hot water on the remaining 3 times weekly after AM milking.

(ii) Alternatively, a caustic liquid product (21/29%) used with hot water 7 times weekly after AM milking and used with cold water 7 times weekly after PM milking may be put in place. An additional rinse containing peracetic acid should be carried out after the completed detergent rinse cycles at both AM and PM milking.

using acid as the main cleaning agent: 'One for all' acid based cleaning products (chlorine-free have been developed. This simplifies the cleaning protocol as one product is multi-functional; it removes organic materials and also sterilizes the stainless steel surfaces.

Chlorine-free cleaning of the bulk milk tank: Various options can be used for fully automatic wash systems:

(i) Dosing unit can be programmed to use caustic detergent (21/29%) after two collections and an acid detergent (phosphoric/nitric) after the third collection, using hot water (60/75^{o}C) at each collection

(ii) Alternatively, the caustic detergent could be used daily with hot water and a second pump could be used to add peracetic acid to an additional final rinse after each collection

(iii) If an acid based 'one for all product' is used, then no other product is required

Conclusion

Visit the Teagasc milk quality webpage to get more information on chlorine–free cleaning of milking equipment:
https://www.teagasc.ie/media/website/animals/dairy/research-farms/Non-chlorine-cleaning-protocol-april-18.pdf

Carbery Sustainable Milk Quality Awards 2019

The Carbery Sustainable Milk Quality Awards programme allows us to demonstrate to customers how our farmer suppliers are reaching high standards in terms of sustainable milk production. The awards and todays farm walk also ensure fellow suppliers the opportunity to get an insight as to how the finalists have gone the extra mile in terms of milk quality. The emphasis on quality alone has also changed, to look at the holistic picture of quality, economics and the environment. So much so that in recent years we also had 'Sustainability' award winners for the four West Cork Co-ops.

If we look at the Daunt's and the other milk quality finalists, each of them had something to show us in the areas of milk quality, sustainable milk production and general approach to dairy farming. This has allowed them to progress their businesses to where they are today and will allow them to ensure their businesses are there for the generations to come. They are without doubt role models for the dairy industry.

As in recent years the Bord Bia Sustainable Dairy Assurance Scheme (SDAS) now plays an important role in all our agendas. It has now become a 'need' to have as opposed to 'nice' to have. All Carbery suppliers and Co-ops continue to work to make sure suppliers are meeting and exceeding the standard, to enable us to continue to sell our high quality products into the global marketplace. With Brexit imminent this has become more important than ever.

For the past fifty years Carbery and its farmers have conducted its business embracing strong quality and sustainability principles. These are evident through our focus on food safety and quality, environmental impact, energy management and nutrition innovation. By producing low SCC and TBC milk, Carbery can attain the best prices for its product and farmers benefit by getting a higher milk price through the SCC bonus. With an impending Brexit we will have to ensure that emphasis on milk quality and sustainability are stronger than ever if we want to safeguard a successful voyage through potential choppy waters.

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"Are you fully trained and qualified to be a farmer?"

"Are you participating in a Discussion Group?"

"Are you looking for assistance with Farm Development?"

"Are you availing of all EU & National Payments?"

Contact your local Teagasc Advisor in West Cork

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2. ***Drystock Advisory Services***
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