



NDC &
Kerrygold

Quality
Milk
Awards

Teagasc National Milk Quality Farm Walk

On the farm of the 2018 NDC & Kerrygold Quality Milk Award Winners
Darran & Denise McKenna and Family

McKenna Family Farm, Derrygasson, Emyvale, Co. Monaghan
Wednesday, 12th June 2019





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Welcome from:

The McKenna family

We would like to welcome everyone to the Drumlin Hills of Emyvale in North County Monaghan. Our family have been farming here for at least five generations and it has gradually grown and progressed into what we have today.

The main objective to producing milk on this farm has always been to provide a good living for our family in the most profitable and efficient way possible. For us that is in spring-calving grass based milk production.

We would like to thank Majella McCafferty and Paul Crossan from LacPatrick Dairies for nominating us for the Quality Milk Awards. Also Trevor Dunwoody, our Teagasc advisor for sharing the knowledge to make it possible for us to win the Quality Milk Awards for 2018. To the National Dairy Council and Kerrygold for the recognition of all the hard work we put into producing a quality product. Our family have had some very memorable experiences and it will definitely be a year that will never be forgotten and we will be forever grateful for this.

To Lakeland Dairies & Teagasc for all the effort they have put in to making today possible.

Many thanks to all. We hope you all have an informative and enjoyable day.



Welcome from:

**Con Feighery, Regional Manager, Teagasc
and**

Zoë Kavanagh, Chief Executive National Dairy Council

The NDC & Kerrygold Quality Milk Awards are an important acknowledgment of the unique knowledge base and excellent husbandry skills of Irish milk producers. They recognise the hard work of Irish dairy farmers and their commitment to the rigorous standards necessary to produce top quality milk. The combination of our natural grassland, sustainable farming practices and the passion and dedication of our farmers and their families means we can bring quality products to markets around the world, with absolute confidence and pride.

Darran and Denise McKenna of Derrygasson, Co. Monaghan were the winners of the 2018 NDC & Kerrygold Quality Milk Awards which have been running since 1996 and celebrate excellence in Irish dairy farming. Nine finalists were shortlisted in 2018 by judges and the winning McKenna Farm was announced at the awards ceremony in Dublin on 3rd October.

The NDC, Ornuia and Teagasc would like to thank the McKenna family for hosting today's event. At least five generations of the family are known to have farmed here in Derrygasson. The McKenna's farm is very much a family farm. Nephews and nieces are all available to help out in times of need and their neighbour Cormack helps out with relief milking. Darran defines success as the ability to grow and convert pasture to high quality dairy products in a sustainable way. The excellent performance figures returned by the McKenna farm year-on-year are testament to that. We look forward to the opportunity to view excellence in operation during today's event.

Welcome from:

Alo Duffy, Chairman, Lakeland Dairies

On behalf of Lakeland Dairies, I am delighted and proud to welcome you all to the beautiful rolling drumlins of Co. Monaghan and to the award-winning farm of Darran and Denise McKenna.

We are extremely proud to have suppliers the calibre of Darran and Denise. Their achievement in winning the 2018 National Dairy Council (NDC) / Kerrygold Quality Milk Award is quite outstanding.

Darran and Denise's skill, dedication and commitment to excellence over the years made them a very deserving winner of last year's award. Being the first winners from the northern half of the country is an extra special recognition for their achievement. The McKennas bring passion to all aspects of their farm family and it is clear to see this as you walk about the farm.

Lakeland is honoured to be involved with Teagasc, the NDC and Ornuia today and as part of our shared vision for creating a strong, sustainable industry for all.

Once again, we would like to congratulate the McKennas and we hope you all have an enjoyable and informative day here in Co. Monaghan.

The McKenna Family Dairy Farm

Introduction

Emyvale, Co. Monaghan is home to Darran McKenna, his wife Denise, their four children Daithi, Caragh, Micheál, Annie and Darran's parents Seamus and Philomena. In 2018, the family was awarded the top prize in the NDC & Kerrygold Quality Milk Awards. The McKennas milk 109 cows and their milk is supplied to Lakeland Dairies.

Darran went into partnership with his parents in 1994 and took over the running of the farm in 1995 when his father availed of the Early Retirement Scheme. The family had a herd of around 60 cows with some beef cattle in 1995. The McKennas have become increasingly specialised in dairying and phased out the cattle enterprise on the farm by 2013. The McKennas get valued support from the Teagasc advisory team.

The farm currently consists of 63 hectares, comprising both owned and leased land. The milking platform is 31 hectares of which 28 hectares is owned land and 3 hectares is leased. The overall farm stocking rate in 2018 was 2.3 LU/ha.

Besides Darran, the main labourer is Cormack Watterson, who works part time in spring during the busy calving and calf rearing season and then acts as relief milker during the remainder of the year. Nieces and nephews also help out when required. Contractors are employed to do silage, round baling, slurry and reseedling. Darran also hosts a student from Ballyhaise Agricultural College each spring.

Darran believes that good breeding and calving practices are very important for quality dairy farming, saying that they actively aim for compact calving and try to avoid late calvers to minimise the workload.



The McKenna family place a big emphasis on strong hygiene practices on the farm to ensure high quality milk is produced. Grass however is the main ingredient. They believe that keeping good quality grass in front of the cows for as long as possible in the year and providing high quality silage for winter feed makes a big contribution to milk quality. Darran aims for a long grazing season targeting 270 days at grass every year. Cows are generally turned out on the 14th of February each year and target housing date is 14th November. In 2018 cows were housed on 10th November and turned out again on 14th February 2019. Darran also aims for the best quality feed possible for his cows during the housing period with very high quality silage cut every year. First cut silage in 2018 measured at 78% DMD with the 2019 first cut being harvested on the 15th of May.

Darran believes in doing all tasks properly and his motto is ***'Do it once, and do it right!'***

Herd Profile

The herd of black and white cows on the McKenna farm come from British Friesian bloodlines with high EBI sires used for the last number of years. Fertility and milk solids are the main criteria when choosing bulls for breeding. The heifers introduced to the herd this year have higher genetic merit for milk solids production and fertility than the older cows. In the last 2 years Darran has used Jersey genetics on a small number of select cows.

Figure 1. Herd EBI Summary¹.

Animal Group	Num of Cows	Milk Kg Fat % Prot %	Surv% CI Days	Milk % Cont	Fertility % Cont	Calv % Cont	Beef % Cont	Maint % Cont	Mgmt % Cont	Health % Cont	EBI €
Cows with EBI	114	31		€ 15	€ 27	€ 32	€ -9	€ 3	€ 1	€ 5	€ 74
Missing EBI*	0	3.0 0.03	0.7	16.3%	29.3%	34.3%	-9.9%	3.5%	0.7%	6%	
Total Cows	114	2.0 0.02	-1.5								
1st Lactation	22	66		€ 43	€ 62	€ 34	€ -9	€ 3	€ 0	€ 8	€ 140
		8.3 0.07 6.0 0.07	1.2 -3.7	26.9%	38.8%	21.4%	-5.9%	2%	-0.1%	4.9%	
2nd Lactation	41	17		€ 16	€ 33	€ 34	€ -9	€ 3	€ 2	€ 5	€ 84
		3.0 0.04 1.9 0.02	0.7 -1.9	15.8%	32.3%	33.2%	-8.7%	3.3%	1.5%	5.1%	
3rd Lactation	19	-30		€ 10	€ 27	€ 34	€ -11	€ 4	€ 0	€ 6	€ 69
		2.3 0.06 0.4 0.02	0.9 -1.2	10.7%	29.8%	37.1%	-11.6%	4.2%	-0.3%	6.3%	
4th Lactation	11	21		€ -11	€ -3	€ 23	€ -8	€ 3	€ 1	€ 5	€ 11
		-1.0 -0.03 -1.2 -0.03	-0.2 0.1	-20.5%	-4.7%	44.1%	-14.2%	5.9%	2.1%	8.5%	
5th Lactation (+)	21	82		€ 3	€ -5	€ 28	€ -9	€ 2	€ 0	€ 4	€ 22
		2.1 -0.01 0.9 -0.03	0.1 0.5	5.2%	-10.1%	54.8%	-17.9%	4.4%	-0.4%	7.3%	

2. Dairy Youngstock

2019 Calves	39	14		€ 45	€ 62	€ 38	€ -12	€ 7	€ 3	€ 5	€ 148
Missing EBI*	0	8.6 0.14	1.8	26.2%	36.1%	22.1%	-7%	4.1%	1.8%	3%	
Total Calves	39	4.8 0.08	-3.2								
2018 Calves	37	58		€ 48	€ 56	€ 38	€ -11	€ 10	€ 2	€ 6	€ 149
Missing EBI*	0	8.0 0.10	1.5	28.1%	32.5%	22%	-6.5%	6%	1.2%	3.7%	
Total Calves	37	6.3 0.08	-2.9								

Buildings

- Calf rearing area and heifer shed with 38 cubicle spaces built in 2017.
- Two underpasses constructed in 2016.
- 16 unit milking parlour with drafting system built in 2011.
- Sufficient slurry storage capacity and cubicles for all animals on the farm.

Farming System

The McKennas calve all of their cows in the spring. This year calving started on 28th January (due date 5th February) and finished on 24th April. The six week calving rate for 2019 year was 85%. The plan for this year is to milk 109 cows.

¹ ICBF Report, 25th March 2019.

They will also graze 29 replacement heifer calves and 37 yearling replacement heifers on the farm. Breeding began on the 6th of May for cows and heifers with Darran having 70 animals in total served in the first 7 days.

Calf rearing is taken very seriously on the McKenna farm with calves receiving a minimum of 3 litres (and more if they'll take it) of colostrum within 1 hour of birth. They are then placed in individual pens for up to 3 days before being grouped in larger numbers on the automatic calf feeder. Bull calves are sold directly off the farm to minimise labour requirement.



Grassland Management

Darran's aim is to gain as many days at grass as possible in spring. In order to achieve early turnout, he uses a spring rotation planner. Good infrastructure with multiple access points off laneways allow for 3 hour allocations when conditions are difficult in spring. While there is extra effort involved, getting a good start to grazing sets the farm up for the rest of the year.

During summer the farm is walked weekly to monitor grass growth and all covers are recorded on PastureBase Ireland. Decisions on grass management are made based on the wedge. Surplus bales are regularly cut off the milking platform. Darran aims for pre-grazing covers of 1,500kg DM/ha during the main grazing season. Depending on pasture cover and projected growth rates, supplements will be fed to maintain a target farm cover of 160-180kg DM per cow during the main grazing season. Where average farm cover exceeds the target, Darran removes paddocks as surplus bales to be fed back later in the season. This helps to maintain sward quality throughout the year.



In the autumn Darran builds up farm covers from early August in preparation for extended autumn grazing. Paddocks are closed after grazing from 1st October onwards with a target of completing the final rotation by early November. Darran aims to close the farm with enough cover (>650kg DM per ha) to guarantee a supply of grass for freshly calved cows in spring.

Financial Performance

The financial performance of the McKenna dairy enterprise is presented in Table 1.

Table 1. Cost and profitability of the McKenna dairy enterprise in 2018.

	€/ha	€/cow	c/litre
Co-op price			34.8
Gross output	5,803	2,432	36.23
Total variable costs	2,273	952	14.19
Total fixed costs	1,225	513	7.65
Net profit	2,306	966	14.39

NDC Award Winning Farm

The McKennas were winners of the 2018 NDC & Kerrygold Milk Quality Awards competition. That's why you are here today. This competition rewards excellence in SCC levels, TBC and Thermoduric readings in raw milk as well as many on farm factors. This raw milk is processed into products which are sold on the international markets. It is the first link in the chain. So, what has marked this farm out as National Winners of this prestigious competition? Firstly, let's look at the trends in volume and quality supplied to the Co-op over the past number of years presented in Table 2.

Table 2. Volume, composition and quality of milk supplied by the McKennas since 2015.

Year	Litres Supplied	Av. Cow No.	Fat (%)	Pr. (%)	Milk Solids (kg/cow)	TBC ²	SCC ¹	Thermoduric ¹
2015	568,188	92	3.83	3.42	460	13	129	175
2016	526,652	96	3.99	3.30	412	14	62	125
2017	531,078	95	4.08	3.47	434	8	86	175
2018	698,595	105	4.19	3.42	521	11	70	125

The McKenna family has produced milk with consistently low SCC and TBC levels over the years. Average annual SCC has decreased by about 60,000 cells/ml over the period.

Monthly sales, composition and quality measures of the milk supplied during 2018 are presented in Table 3. Figure 1 shows the distribution of SCC in the herd based on milking recording; fewer than 5% of cows have SCC exceeding 200,000 cells/ml. Darran completes milk recording at least 4 times per year to monitor changes in SCC and improve breeding decisions.

Table 3. Monthly volume, composition and quality of milk supplied by the McKenna's in 2018.

Month	Litres	Fat (%)	Pr. (%)	TBC ^{2,3}	SCC ¹	Thermoduric ¹
Jan	7,376	4.50	3.36	6	95	100
Feb	37,653	4.42	3.45	6	149	100
Mar	72,724	4.43	3.16	5	57	100
Apr	81,008	4.43	3.17	10	61	100
May	91,091	3.93	3.28	5	89	100
Jun	84,423	3.67	3.28	26	57	100
Jul	75,513	3.73	3.32	14	47	100
Aug	72,765	4.09	3.43	16	65	300
Sep	60,958	4.28	3.81	10	49	100
Oct	53,396	4.54	3.96	7	77	100
Nov	42,230	4.87	3.82	7	90	200
Dec	19,458	4.53	3.57	6	55	100
Av.	698,595	4.19	3.42	11	70	125

² '000 cells/ml

³ Test 1 / 2

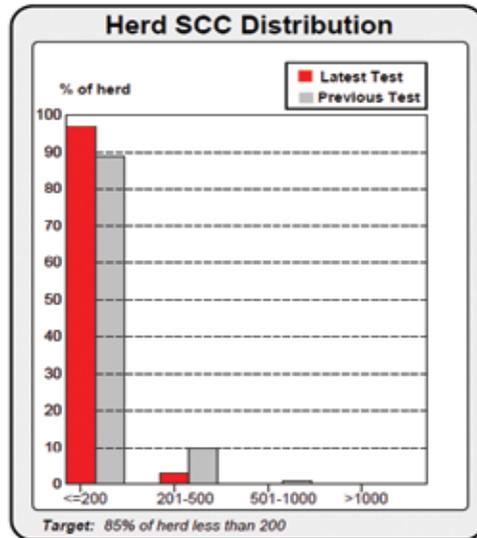


Figure 1. Distribution of herd SCC based on milk recording.

Key Management Practices to Ensure High Quality Milk

The McKenna farm was selected as overall winner of the NDC Milk Quality Awards based on its overall excellence in production of quality milk. The judges noted some key elements where the farm has demonstrated excellence.

1. Very good milk quality and composition
2. A clean environment for the production of high quality food
3. Clear animal breeding, health and welfare policies in place
4. A sustainable system and good place to work



1. Drying Off

- The first cows (thin cows, heifers) are dried off in early November, with the remainder of the herd dried off in batches through to mid-December. Last year the entire herd was dried off by late December and there was a 4-week break from milking until late January.
- No more than 20 cows dried off on any one day.
- Cows are milked twice a day as normal until day of drying off.
- Drying off is completed as a separate task to milking. Cows to be treated are separated after final milking and the dry off procedure is carried out in a washed down parlour after morning milking. Darran is adamant that it is 'not a job to be rushed'.
- Darran is meticulous about hygiene at dry off. Cows' tails are clipped in advance. Best practices for using gloves and disinfectant wipes are observed.
- A long acting antibiotic tube plus sealer are used. Last year Darran used sealer-only on cows dried off early. He plans to increase the use of selective dry cow therapy in the coming years.
- Cows are observed twice daily for problems after dry off until udders dry up.
- In-calf heifers are trained to the parlour from 3 weeks pre-calving. They are teat dipped and inspected each time as part of this routine.

2. Managing Freshly Calved Cows

- Cows calve in the boxes close to the milking parlour.
 - Cows tails are clipped before calving.
 - At morning or evening milking freshly calved cows are milked and milk fed to their own calf.
 - Milk is withheld from the bulk tank for 4 days.
- 

3. Milking Routine

- Gloves worn at every milking.
- All operators are instructed to have a quiet calm milking routine from start to finish.
- Freshly calved cows are pre-dipped and washed at each milking during the colostrum period.
- Cows are not individually stripped at every milking but milk filter sock is closely inspected each time. SCC monitored on bulk milk collection test results also.
- Cows are teat-sprayed with high quality product after each milking.

4. Managing Cows with Mastitis

- Incidence rates of mastitis have been low in the last few years, with 1 clinical case in 2018 and 4 to date in 2019.
- Affected cows are milked into the dump-line.
- The affected quarter is treated with the appropriate antibiotic tube.
- The cow is marked for dumping milk. Withdrawal times are strictly observed.
- The mastitis incident is recorded.



5. Milking Equipment Wash Routine

- Parlour and clusters thoroughly washed after each milking. Collecting yard washed down also.
- 7 hot washes carried out per week, start temp 80°C and finish temp 55°C.
- A detergent steriliser of 14.5% caustic 2.4% Cl is used.
- Non-chlorinated product used for washing bulk tank.
- Acid descale carried out once weekly on the machine and fortnightly on the bulk tank.
- Plant is rinsed at rate of 12.5 litres water per unit.
- Milk stored at 3.5°C.
- TBC and Thermoduric levels monitored closely via bulk milk test results.

6. Milk Recording

- Milk recording is carried out at least 4 times per year- March, June, August and October approximately.
- Data is used to identify high SCC cows- this is especially important in spring and before dry off.
- High SCC cows will be quarter tested using CMT teat and treated appropriately.
- Dry-off therapy can be altered based on SCC results. Darran is planning to make more use of selective therapy in the coming years and milk recording will be an essential tool for that.

7. Cow Hygiene and Comfort

- Adequate cubicle and feed space per cow is provided.
- Cubicles are cleaned and limed twice daily in winter.
- Collecting yards are cleaned and washed regularly to prevent build-up of dirt.
- Calving sheds and calf housing kept clean and tidy.
- Farm roadway and access points are kept clean to prevent dirt and damage to feet and udders.

Chlorine-free Cleaning Protocols for Milking Equipment

David Gleeson and Bernadette O'Brien

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

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.

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°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. (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°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/animals/dairy/milk-quality>

Agricultural Sustainability Support and Advisory Programme (ASSAP)

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Summary

- Ireland has been set a target by the E.U. Water Framework Directive of achieving ‘Good Status’ for all waters.
- The River Basin Management Plan for Ireland 2018 – 2021 sets out Irelands plan to achieve good status.
- The ASSAP service is available to farmers in 190 Priority Areas for Action (PAA’s) and is a key part of helping achieve good status.
- The ASSAP is a free and confidential advisory service available to all farmers in a PAA.

Introduction

In Ireland all water policy and management is led by the Water Framework Directive. Under this directive Ireland has been set a target of achieving ‘good status’ for all waters in Ireland. However, despite a lot of good work over the last 20-30 years we are falling short in achieving this target and water quality has declined slightly in recent years.

Ireland’s response to challenges around water quality is set out under the national river basin management plan. As part of this plan, 190 priority areas for action (PAA) have been identified across the country where water quality improvements need to be made. There are multiple pressures across each of these PAA’s including industry, waste water treatment plants and septic tanks, forestry, agriculture and urban pressures.

Darran McKenna’s farm is on the border of the Mountain Water & Emy Lough PAA. Overland flow is the main pathway within the PAA with phosphate (PO_4) the significant issue.

Implementation of the ASSAP

The local authorities have deployed a catchment assessment team of 60 scientists across the country to assess the PAA's in detail and identify the significant pressures in each PAA. This group communicates the detailed information about the PAA to all of the stakeholders across the local community including agricultural and non-agricultural land owners and businesses.

Where an agricultural pressure is identified the farmers in the area will receive the offer of a free farm visit from an advisor under the ASSAP programme.

The ASSAP programme is made up of a group of 30 advisors (20 working under Teagasc jointly funded by DHPLG and DAFM and 10 from the dairy industry). These advisors are available to provide farmers with a free and confidential advisory service that farmers in a PAA can avail of on a voluntary basis.

The advisors will meet the farmer to assess the farm for any potential issues that are having an effect on the water quality in the local stream. In general an advisor will assess (1) the *farmyard*, (2) *nutrient management practices* and (3) *general farm land management practices including the use of pesticides etc.*



At the end of a visit the advisor and farmer will agree on where the farmer should focus improvements or actions, if any are required, on his farm. The practical advice will be designed to 'break the pathway' and prevent nutrients from entering water. A written summary of the advice and actions will be provided and a timeframe for completion agreed between them.



Figure 1: Heavy rainfall leads to over-land flow of water, Phosphorus and soil particles.

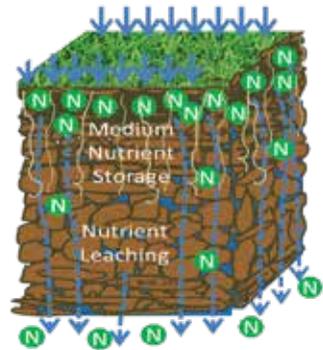


Figure 2: Nitrogen that is not used up by grass/plant growth is available to be leached to groundwater/streams during heavy rainfall.

Conclusion

The ASSAP programme is collaborative and the funding and support received from DAFM, DHPLG and the dairy industry has been critical to allow a new approach to enabling local landowners to engage positively in seeking solutions to local problems with the support of a confidential advisory service. Support from the farming organisations for the programme has been very strong and this is vital in communicating and informing farmers about the ASSAP programme and its key messages.

It is important to stress that we can achieve both, (1) Sustainable farming and (2) improved water quality.

7 Steps to Improving Farm Sustainability



7. Using the ASSAP advisors to help improve water quality



6. Incorporating forestry and hedgerows on farm



5. Improved energy efficiency and renewable energy



4. Reducing losses from slurry



3. Changing to protected urea



2. Substituting clover for chemical fertiliser



1. Improved EBI and extending the grazing season

Selective Use of Antibiotics - A Dry Cow Management Strategy

Finola McCoy, CellCheck Programme Manager, Animal Health Ireland

Antibiotics are essential medicines for humans and animals. The use of antibiotics on-farm is known to be one of the factors contributing to a rise in antimicrobial resistance, which in turn poses a risk to public (and animal) health in the future. It has been common practice to treat all quarters of all cows with an antibiotic tube at drying off, which is known as blanket dry cow treatment. In order to help protect the ability of antibiotics to fight infection, the CellCheck Technical Working Group (TWG) supports the move away from blanket dry cow treatment towards a selective dry cow strategy, in a prudent manner, in appropriate herds.

A selective dry cow strategy involves administering internal teat sealant only to a selected proportion of suitable cows at drying off, with the remainder of the cows receiving both an antibiotic tube and an internal teat sealant. Selective dry cow therapy is not without risk, hence the importance of sound protocols when making farm-level decisions.

A selective dry cow strategy may be considered in herds where:

- i. There is good evidence of a low prevalence of infection, for example a bulk milk SCC consistently below 200,000 cells/ml, a dry period new infection rate of less than 10% etc., and
- ii. Good practices and high levels of hygiene can be achieved at drying off, throughout the dry period and at calving*, and
- iii. Regular milk recording is carried out, with at least one recording in the last month prior to drying off, and
- iv. The herd keeper is willing to engage with their veterinary practitioner in decision-making around their dry cow treatment programme.

Within these herds:

- Cows with an SCC consistently below 100,000 cells/ml** throughout the lactation and with no history of clinical mastitis may be considered suitable for internal teat sealant only at drying off, provided high levels of hygiene can be achieved during administration.
- In all other cows, the TWG recommends using an internal teat sealant as well as an antibiotic tube.

*For more details, see CellCheck Farm Guidelines for Mastitis Control-Guidelines 1, 17-19 and Management Notes D, E and L.

** There is ongoing Irish and international research to determine appropriate SCC (or other) thresholds, to select cows suitable for internal teat sealant only. As yet, however, appropriate thresholds have not been clearly defined. This is reflected in the use of differing cow thresholds in different countries. These AHI recommendations will be reviewed in the future on the basis of new research conclusions.



Pasture Feeding Improves the Nutritional Composition of Milk

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Summary

- Pasture feeding has a beneficial effect on the nutritional composition of milk and dairy products.
- TMR feeding resulted in increased milk yield.
- Pasture feeding resulted in milks with increased concentrations of true protein and fat, with increased content of Omega (Ω) 3 fatty acids and other beneficial nutrients.
- TMR feeding resulted in milks with increased contents of Ω 6 fatty acids and palmitic acid, the latter of which has been attributed to increase the hardness of high fat products i.e. butter.
- Fresh pasture feeding produced butters with a characteristic “golden” yellow colour due to increased intake of β -carotene in fresh grass.

Introduction

It is estimated that 10% of the global bovine milk supply is derived from pasture feeding systems. Ireland’s somewhat unique pasture based dairy systems places its dairy manufacturers in a unique position to capitalize on recent consumer trends for healthier more natural food products. With that there has been a surge in the prevalence of “Grass-fed” dairy products available, often commanding a premium price. Ireland’s temperate climate with plentiful rainfall results in the Irish cow diet being comprised of fresh grazed pasture, where cows graze outdoors for at least 260 days of the year. In fact, recent research has shown that the typical Irish cow diet is composed of forage, particularly pasture with 96% of the diet on a fresh matter basis and 82% of dry matter intake.

Robust scientific data is required to substantiate any potential claims that may be used for the marketing and differentiation of Irish dairy products from competitors. The objective of the “**Profiling Milk from Grass**” project carried out in Teagasc Moorepark, was to examine the impact of pasture (perennial ryegrass and perennial ryegrass with 20% white clover) and indoor total mixed ration feeding systems on the composition and quality of milk and dairy products.

Experimental Design

Fifty four spring calving Friesian cows were allocated to three groups (n = 18) at the Teagasc, Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland.

Three feeding systems were compared over a full lactation;

- Group 1 was housed indoors and fed a total mixed ration diet (TMR).
- Group 2 was maintained outdoors on perennial ryegrass pasture (GRS).
- Group 3 was also maintained outdoors on a perennial ryegrass/white clover (*Trifolium repens* L.) pasture (CLV).

Cows on the TMR were offered, on a DM basis, 7.15kg of grass silage, 7.15kg of maize silage and 8.3kg concentrates daily. Cows on the pasture-based systems were stocked at 2.74 cows ha⁻¹ and were offered ~ 18kg DM day⁻¹ (> 4 cm). The CLV sward contained approximately 20% white clover across the grazing season.

Cows were milked twice daily, at approx. 0630 and 1530 h. Individual daily milk yield (kg) was recorded at each milking. Milk fat and protein concentrations were determined weekly from one successive evening and morning milking. Milk solids yield (kg) was calculated as the yield of milk fat plus the yield of milk protein. Bulk milk samples were collected post-morning milking weekly throughout lactation.

Bulk milk samples were also collected for the production of sweet cream butter and cheddar cheese during early, mid and late lactation.

Butter samples were analysed for triglyceride content, texture profile analysis, β -carotene, colour, thermal properties, volatile and sensory analysis. Cheeses were analysed for triglyceride content, proteolysis, texture profile analysis, colour, β -carotene, volatile and sensory analysis.

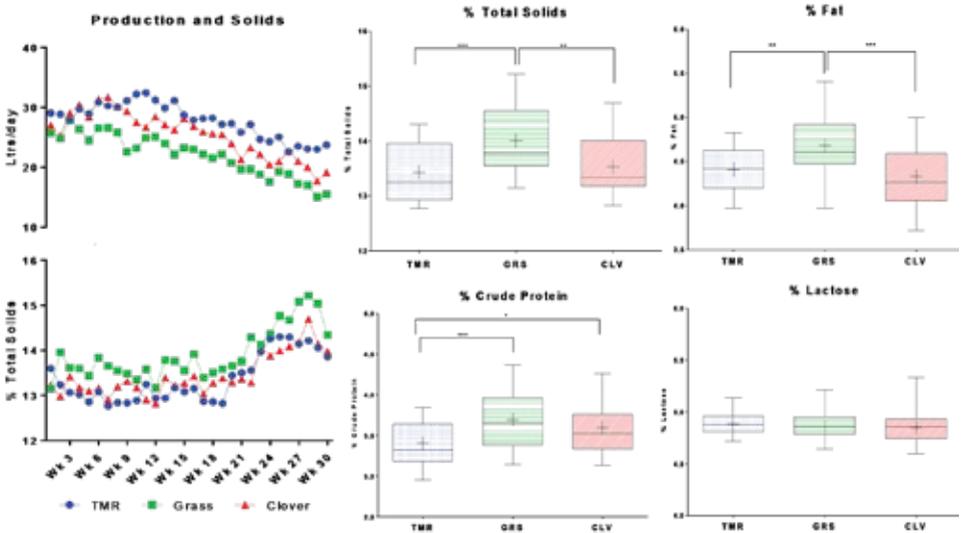


Figure 1. Production and % total solids from pasture and TMR cows across lactation.

Results and Discussion

Yield per Cow

Total mixed ration feeding resulted in higher annual milk yield and MS yield than the GRS and CLV treatments Fig 1. Clover inclusion in the diet increased MS yield by 39kg MS cow-compared to the GRS treatment. The TMR treatment had greater daily MS yield than the GRS and CLV treatments. The TMR treatment had greater milk production than the GRS and CLV treatments, most likely due to the higher and more consistent quality of the TMR diet compared to the pasture based diets. The CLV treatment resulted in increased milk production compared to the GRS, particularly from June until the end of lactation when sward clover content increases resulting in increased herbage quality.

Product Quality

The GRS feeding system produced milk with greater concentrations of fat (4.65% v. 4.39%) and protein (3.65% v. 3.38%) compared to the TMR system (Fig 1). Moreover, the GRS feeding system produced milks with improved quality protein with increased true protein concentrations compared to the TMR system (3.46% v. 3.19%). The inclusion of CLV appeared to produce milk with comparable compositional concentrations to that of GRS. However, CLV had significantly greater non-protein nitrogen (NPN) than that of GRS and TMR. Pasture feeding appeared to beneficially alter the nutritional status of milks with greater than two-fold increases in total concentration of conjugated linoleic acid (CLA) c9t11, offering further confirmation to previous studies that revealed an association between increased milk CLA and fresh grass feeding.

Pasture feeding systems resulted in significantly greater contents of Omega 3 fatty acids and significantly lower contents of Omega 6 fatty acids than that of TMR milk, which also had a significantly greater thrombogenic index than that of pasture derived milks.

Feeding system resulted in significant differences in fatty acid (FA) compositions of sweet cream butter. Such alterations in the FA compositions contributed to significant differences in textural, thermal, sensory and volatile properties of butters.

Pasture-derived (GRS and CLV) systems produced butters with improved nutritional aspects, including lower thrombogenicity scores and significantly greater concentrations of CLA c9t11 and β -carotene. Sensory panellist data revealed significantly greater scores for GRS derived butter in several attributes including “liking” of appearance, flavour and colour.

Volatile analysis of butters by gas chromatography mass spectrometry (GC-MS) revealed twenty-five different compounds from each of the butters, five of which differed significantly based on feeding system including acetone, 2-butanone, 1-pentenol, toluene and β -pinene.

The nutritional composition of Cheddar cheese was also improved through pasture-based feeding systems with significantly lower thrombogenicity index scores and a greater than two-fold increase in the concentration of vaccenic acid and CLA c9t11, while TMR derived cheeses had significantly greater palmitic acid content.

Pasture derived Cheddar cheeses were shown to have significantly greater Omega 3 fatty acid content while TMR cheeses had significantly greater Omega 6 fatty acid content. The consumption of CLA has been associated with several potential health benefits, with recommended intake of 0.8g CLA d-1 to attain such benefits based on animal models of therapeutic dose.

Adjusting for the mean fat contents of cheeses in this study, 100g of Cheddar cheese from TMR would provide 0.15g of CLA c9t11, 100g of CLV cheese would provide 0.35g of CLA c9t11 whereas 100g of GRS derived Cheddar cheese would provide 0.44g of CLA c9t11.

Such alterations in the FA profile resulted in pasture derived cheeses having reduced hardness scores at room temperature. Both feeding system and ripening time had a significant effect on the volatile and sensory profile of the Cheddar cheeses.

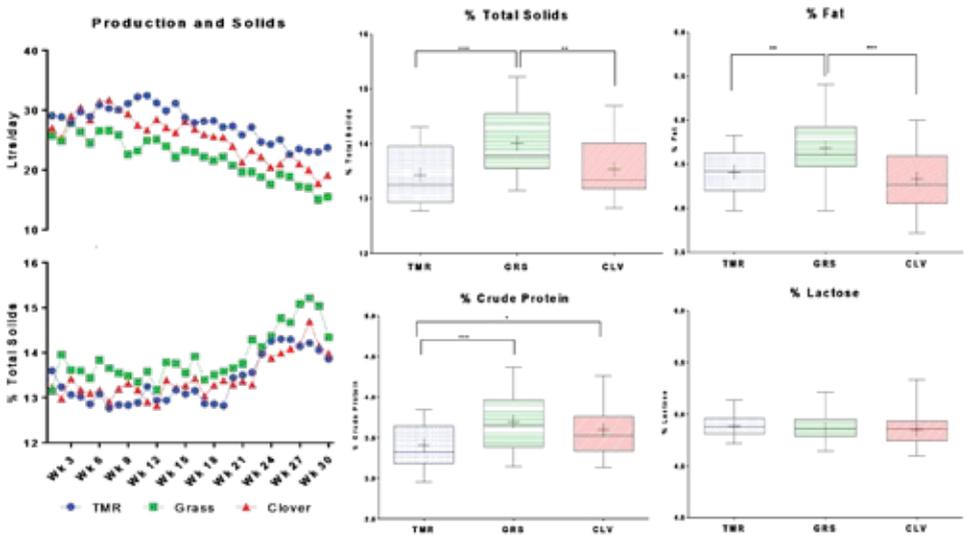


Figure 2: Impact of pasture vs TMR feeding on the fatty acid profile of milk.

Conclusions

Cow feeding system has a significant effect on milk yield and milk solids yield, whereby TMR cows produced significantly higher milk yields than that of pasture cows. However, pasture derived milks have significantly higher concentrations (%) of total solids, driven by increased levels of fat and true protein. Pasture feeding has a beneficial effect on the nutritional profile of milks with significantly higher concentrations of Ω 3 fatty acids, CLA, β -carotene and other beneficial nutrients. The TMR feeding resulted in milk and products with higher levels of palmitic acid and Ω 6 fatty acids.





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