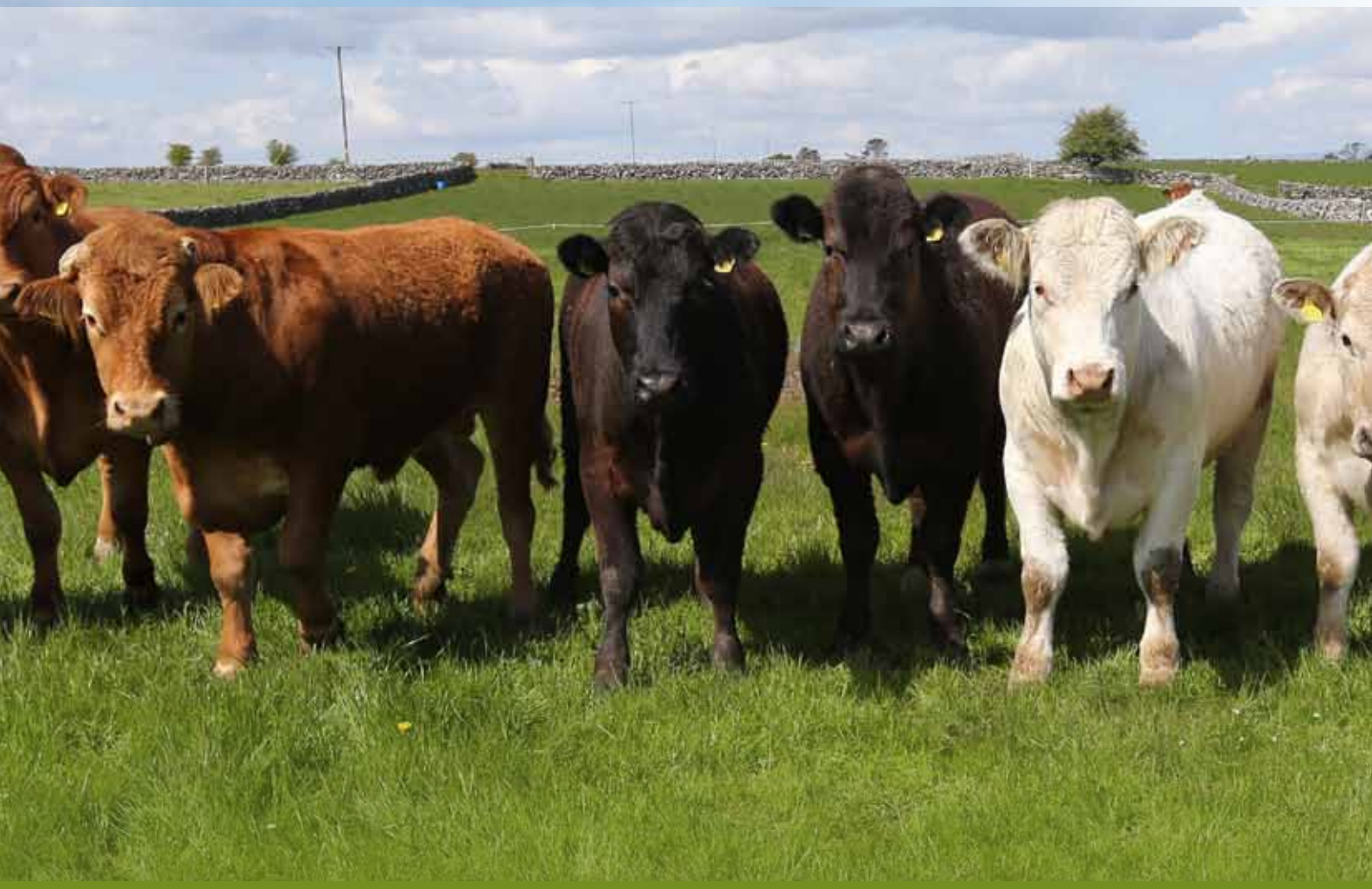
Irish Grassland Association

Newsletter Issue No. 19 June 2013

"to advance the knowledge of good grassland management in Irish Farming"



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Deirdre Hennessy
President of the Irish Grassland Association 2012/13

Dear Member,

Welcome to this edition of the Irish Grassland Association Newsletter. Spring 2013 has proved challenging for all involved in grassland farming in Ireland. On farm focus is moving towards silage making. On many farms silage harvesting will be delayed, and in some cases there will be split harvests as silage area is closed once grass growth is adequate to meet the feed demands of grazing livestock. Two articles by Padraig O'Kiely and Tim Keady in this Newsletter provide good information on making good quality silage and on the feeding value of silage. In early March, the Irish Grassland Association hosted a 'Making Good Quality Silage' event in Ballyhaise and in Westport. These were excellent events with great presentations by researchers, advisors and the host framers, and good discussion took place at both locations. We would like to thank Yara for sponsoring this event.

In January approximately 300 people attended the annual Irish Grassland Association's Dairy Conference, sponsored by Pfizer Animal Health, in Clonmel. The conference, 'Back to Basics', provided a lot of technical information for farmers on the day through excellent presentations from farmers, advisors and researchers. A review of the event can be read on page 8.

In January, the Irish Grassland Association commenced its involvement in an EU funded project, AutoGrassMilk, which is exploring the role of automatic milking systems in Ireland's grass based milk production systems. Find out more on page 30. Information on the progress of and results from the project will be available in future newsletters.

The next few months will be busy for the Irish Grassland Association. The planning of the Beef Conference and Farm Walk which will take place on 18th June in Claremorris, Co. Mayo is well underway. This will be followed by the Sheep Conference and Farm Walk in Co. Roscommon on 23rd July and the Dairy Summer Tour in Co. Waterford on 14th August.

More information on these events will be available soon on our website www.irishgrassland.com and on our facebook page www.facebook.com/irishgrassland or by contacting the Office Manager, Maura Callery, secretary@irishgrassland.com.

Yours sincerely,

DEIRDRE HENNESSY
President of the Irish Grassland Association 2012/13

DATES FOR YOUR DIARY

Beef Conference and Farm Walk

The Irish Grassland Association Beef Conference and Farm Walk 2013 is titled *"Healthy Land, Healthy Cattle, Healthy Margins"* and will take place on Tuesday 18th of June. The event kicks off with the beef conference in the McWilliam Park Hotel, Claremorris, Co. Mayo followed by the farm walk on the nearby farm of Michael Mellett. This is a BTAP approved event.

Michael farms in Shrule, Co. Mayo and operates a store to finish system, finishing approximately 120 cattle on 100 acres. He purchases mostly suckler-bred cattle at about 470 kg and finishes them as steers at 24 to 28 months of age. A key objective of Michael's system is to achieve a high proportion of live weight gain on the farm from grazed grass; this requires very high levels of grassland management as will be highlighted during the farm walk. A rotational grazing system, managed within traditional stone walled paddocks, ensures that cattle are provided with excellent quality grass at all times. A long grazing season is also key, and Michael typically turns cattle out in February/March. Early spring grazing is made possible by close attention to autumn grassland management. Paddocks are closed in rotation starting in October.

To ensure that live weight targets are met at each stage in the production cycle, routine weighing of cattle is carried out on Michael's farm. Grass-fed steer beef systems remain the predominant system on Irish cattle farms and therefore, this farm walk will be of great interest to many farmers. In addition, the use of stone walled paddocks will demonstrate the use of traditional field layouts for rotational grazing.

L to R: Karen Dukelow, Irish Grassland Association, Michael Mellett, Host Farmer, Alan Nolan, Teagasc B&T advisor, Adam Woods, Irish Grassland Association.

The beef conference will feature two sessions. The first session will deal with making the most out of heavy land. James O'Loughlin (Teagasc, Moorepark) will present a paper on identifying drainage issues and the alternative methods available to rectify them. Local farmer, Michael Biggins will describe how he plans to improve some of the wetter parts of his farm and how he has gained better access to paddocks by installing new roadways.

The second session will deal with the area of weanling health. Vaccination programmes form part of the management of weanlings to prevent herd health issues arising, such as respiratory outbreaks. In addition, management to reduce stress, particularly around the weaning and housing period, has an important role to play in the health status of weanlings. This session will consist of two papers including Bernadette Earley from Teagasc, Grange who will present the latest research on weaning management strategies, much of which contributed to the guidelines for the recent Suckler Welfare Scheme.

Sheep Conference and Farm Walk

The Irish Grassland Association Sheep Conference is set for July 23rd and will be held in Co. Roscommon and the Association is delighted to welcome sponsorship by Mullinahone co-op and Sheep Ireland of this event again.

Mullinahone Co-op

Sheep Ireland
www.sheep.ie

WE WOULD LIKE TO THANK OUR SPONSORS MULLINAHONE CO-OP & SHEEP IRELAND

Dairy Summer Tour

Dr. Anne Finnegan, AIB, sponsor of the Irish Grassland Association Dairy Summer tour and Dr. Padraig French, Irish Grassland Association

The Irish Grassland Association Dairy Summer Tour will take place in Co. Waterford this year. A large amount of expansion has taking place in this area of Munster over the past few years. The Irish Grassland Association is delighted to have AIB as the event's sponsor again this year. The event is titled "Growing your farm business efficiently". The summer tour will take place on Wednesday 14th August.
Further information will follow in the next newsletter

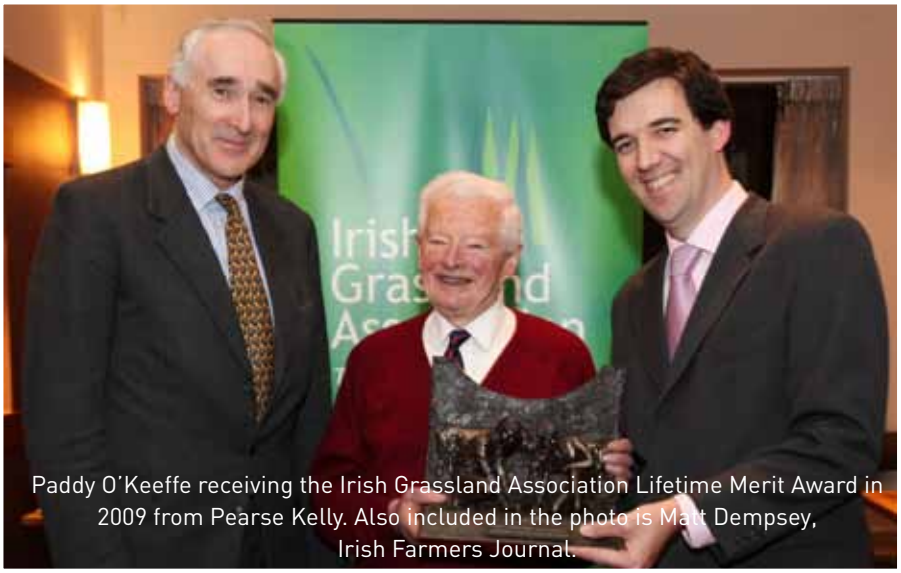
WE WOULD LIKE TO THANK OUR SPONSOR AIB

AIB

For further information on all these events visit www.irishgrasslands.com or contact Maura at 087 9626483.

Deirdre Hennessy, President of the Irish Grassland Association, pays tribute to the late Paddy O'Keeffe.

During his lifetime Paddy O'Keeffe made an extraordinary contribution to Irish grassland agriculture. He was a founding member of the Irish Grassland Association (in 1946), and strongly promoted the use of grassland technologies, including relevant research.



Paddy O'Keeffe receiving the Irish Grassland Association Lifetime Merit Award in 2009 from Pearse Kelly. Also included in the photo is Matt Dempsey, Irish Farmers Journal.

Paddy was a regular attendee at Irish Grassland Association events, and indeed attended the Irish Grassland Association Dairy Conference 2013 in Clonmel. Paddy saw the value of the Association in providing a forum for good farmers to meet and compare notes and benefit from the experiences of others. He encouraged the importing of appropriate best practice in grassland farming, especially from New Zealand, to Ireland. Paddy had a unique enthusiasm for Irish agriculture and his interest in knowledge development in agriculture and food, and particularly in grassland management, continued right up until his passing. Paddy was secretary of the Irish Grassland Association in the early years and was President in 1967-68; in 2009 he received the Irish Grassland Association's inaugural Lifetime Merit Award in recognition of his enormous contribution to Irish grassland farming. The Irish Grassland Association extends its sympathies to Paddy's wife Jane and to his children Margaret, Elizabeth, Josephine and Patrick.

May he rest in peace.

Congratulations to John Donworth

The Irish Grassland Association would like to congratulate John Donworth, Past President, on his recent appointment as Teagasc Regional Manager for the Kerry/ Limerick Advisory Region.

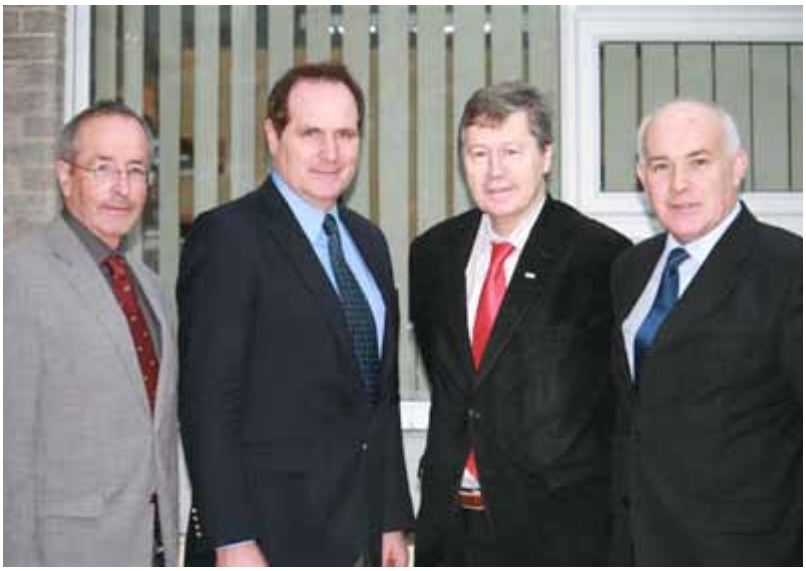
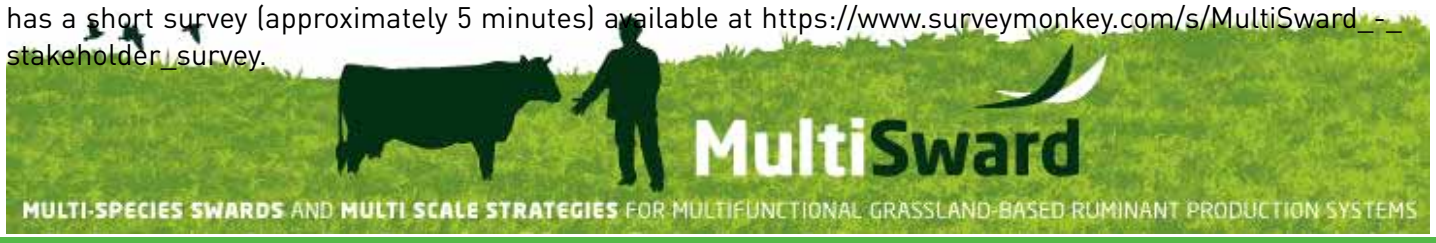


Photo: John Donworth, Regional Manager, Kerry/Limerick Advisory Region; Ben Wilkenson, Regional Manager, Sligo/ Leitrim/Donegal Advisory Region; Peter Leonard, Regional Manager, Mayo Advisory Region and Billy Kelleher, Regional Manager, Cork West Advisory Region.

The EU funded project MultiSward is undertaking a short survey on the importance of grassland in Europe. It is important that the opinions of as many people in Europe are gathered. To contribute your views the project has a short survey (approximately 5 minutes) available at https://www.surveymonkey.com/s/MultiSward_-_stakeholder_survey.



Speakers, Sponsor and Irish Grassland Association Council at the Dairy Conference in Clonmel in January 2013.

REVIEW: IRISH GRASSLAND ASSOCIATION 2013 DAIRY CONFERENCE – 'BACK TO BASICS'

Deirdre Hennessy and Michael Bateman, Irish Grassland Association

On the 8th January, 300 people attended the Irish Grassland Association's annual Dairy Conference for 2013 at the Clonmel Park Hotel, Co. Tipperary. The event was sponsored by Zoetis. This year's event had a very exciting line up of speakers covering a range of topics. The focus of the conference was on many of the 'basics' of Irish dairy farming grass, soil fertility and cow fertility. The topics were very timely and provided food for thought for those preparing for the post milk quota era. The conference had four sessions and plenty of time for questions and discussion.

The first session was *'Ensuring maximum production from cultivars sown on farm'*. Growing and utilising large quantities of grass on farm are key components of profitable milk production systems. Sowing the most productive and persistent grass cultivars is hugely important in ensuring high quality, productive and persistent swards. Dermot Grogan from the Department of Agriculture, Food and the Marine described how grass cultivars are evaluated for use in Ireland. He outlined the changes that have been implemented in the evaluation process so that it better reflects the requirements of grassland farmers in Ireland by having more frequent cutting to simulate intensive grazing. Dr. Mary McEvoy, Teagasc Moorepark presented a very interesting paper on how the Grass Selection Index will be used to assist in the decision making required around cultivar selection in the coming years. Mary showed the components of the grass selection index, and their relative importance. The components are spring, mid-season and autumn DM yield, herbage quality, first cut silage DM yield, second cut silage DM yield, and persistency. Mary also showed the total economic merit of 63 perennial ryegrass cultivars evaluated by the Department of Agriculture, Food and the Marine, as well as the total economic merit of the subcomponents such as DM yield, quality and silage.

The second session was *'The benefits of getting soil fertility right'* and had three speakers, Stan Lalor, Teagasc Johnstown Castle, who outlined the investment required to achieve optimum soil fertility and the return that can be expected from this investment, Aidan Brennan, Teagasc Moorepark who outlined his management of soil fertility to grow 16 t DM/ha at Curtins Farm, and Connor Creedon discussed how he is addressing declining soil fertility on his dairy farm in Co. Kerry. This was a very interesting session and was followed by a lively discussion with significant audience participation. Many of the questions surrounded soil pH and making the best of on farm nutrients, i.e. slurry. Stan indicated that if no slurry is used, it will cost €100/ha per year to build soil from

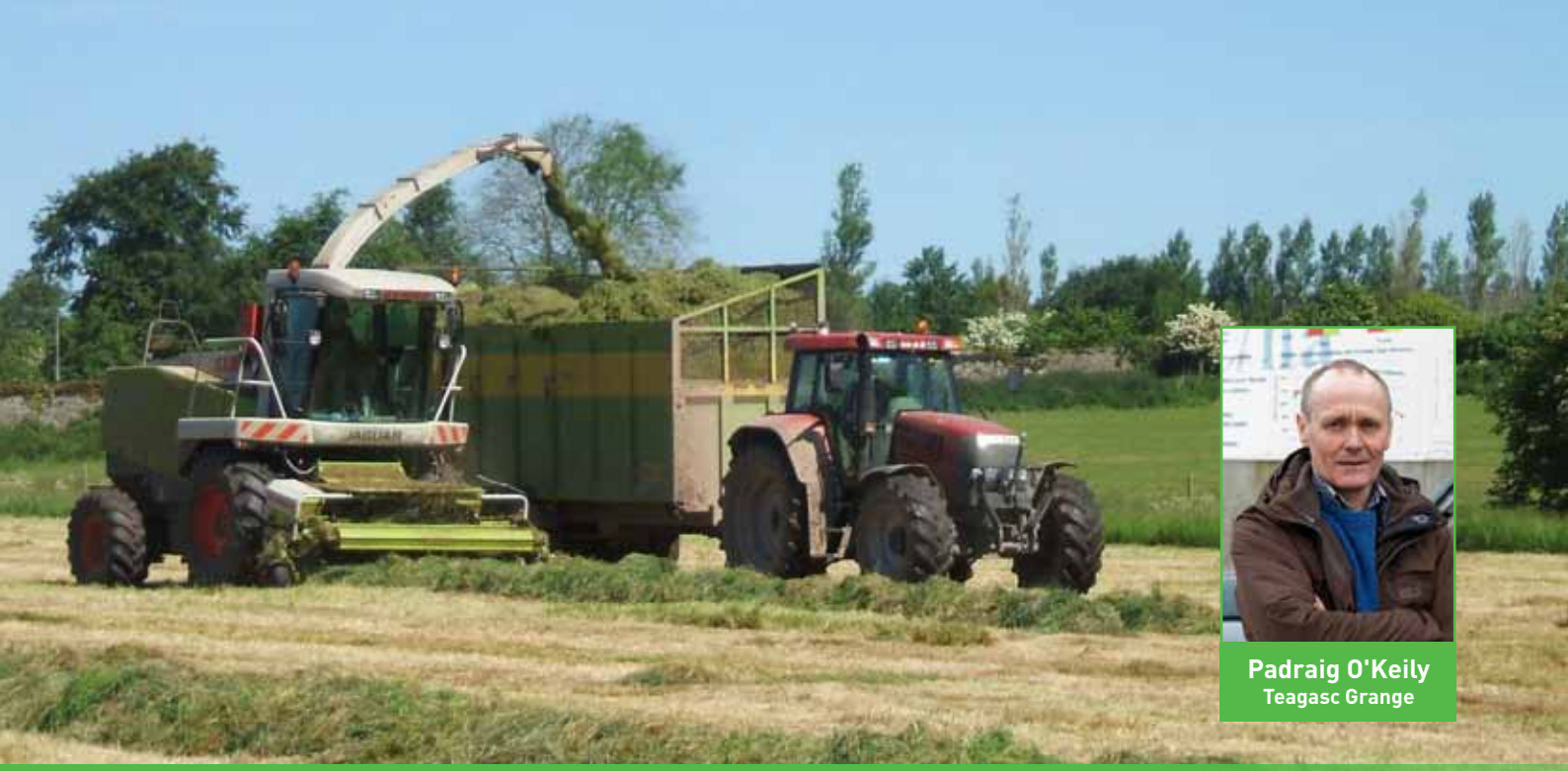
Index 1 for P and K to Index 3. While this is a large investment, Stan showed that soils with low P levels will have lower herbage production, up to 1.5 t DM/ha/year, which is currently potentially worth somewhere in the region of €400/ha/year. It was very interesting to see that both Connor Creedon and Aidan Brennan have taken on board the scientific information provided by Stan Lalor and are seeing the results in terms of grass growth on their farms. Conor Creedon showed that if you maintain optimum soil fertility, swards that are up to 20 years old will still be highly productive (grew an average of 14 t DM/ha over the last four years) and have a very high quantity of perennial ryegrass present.

The first of the afternoon sessions, *'The benefits of getting cow fertility right'*, focussed on achieving good milk production while maintaining high fertility on farm. George Ramsbottom provided some very interesting information to support the statement that 'optimising fertility will increase production and therefore profit'. George discussed each of the four legs of the 'fertility stool', they being nutrition, disease control, mating management and genetics. George showed that the national average dairy cow is producing 150 kg MS/year less than that which has been measured at Moorepark. Most of this loss in milk production is due to poor fertility as calving date is delayed, the number of milking days is reduced at a cost of 1.35 kg MS/cow/day. George concluded that a fertility sub index of €125 is associated with a calving interval of 365 days. In the second paper Lawrence Sexton outlined how and why he is aiming for high fertility within his own herd. Lawrence has increased herd size over the last 10 years and outlined the challenges in terms of fertility associated with growing the herd from around 56 cows to his current herd of 215+ cows. This expansion came about through a partnership with a neighbour who brought land and cows to the business, and leasing land. Lawrence outlined the many challenges he encountered in terms of nutrition, disease control, mating management and genetics. He highlighted the importance of a range of issues when expanding the herd, these included vaccination when mixing herds, the requirement for professional help to deal with problems such as mastitis, good mating management and observation, high quality grass for cows and maiden heifers, length of breeding season, cow type, and the importance of keeping records. Lawrence is convinced that keeping good detailed records, and reviewing this regularly, can help to overcome many problems on the dairy farm.

Later in the afternoon the conference focus changed slightly to look *'In to the future'*. Dr. Deirdre Hennessy outlined the role of the Irish Grassland Association in supporting Irish research through a new EU funded project examining the role of automatic milking systems in Ireland. Dr. Bernadette O'Brien, Teagasc Moorepark presented initial results from the automatic milking system (AMS) at Moorepark. The results to date indicate that the AMS can work well in Ireland's grass based system with good management. Interesting results include the speed at which cows adapt to the system, approximately 4 days, and the low SCC observed, average 133 in 2012. Rhys Williams, a dairy farmer and Nuffield Scholar from Cefnamwlch Tudweiliog in North Wales presented an interesting paper on expansion through multiple units which could be an option for Irish dairy farms to grow the dairy farm business should the opportunity arise. Rhys has come from a 10 acre farm in north Wales to be a 50:50 partner on a 1400 cow operation on rented land. While the scale is not applicable to everyone, three main points that Rhys made are, they are people, system and clarity. Rhys feels very strongly that the people in any business, farming or otherwise are a hugely important resource. All persons in the business must clearly know their role, be allowed to contribute and clear leadership and direction must be provided.

The papers and presentations form the conference are available on the Irish Grassland Association website (www.irishgrassland.com), and there are also a number of short interviews with a number of the speakers.

L – R: Conor Creedon, Dairy Farmer, Michael Bateman, Irish Grassland Association, Aidan Brennan, Teagasc Moorepark, Stan Lalor, Teagasc Johnstown at the the Irish Grassland Association Dairy Conference Session 2 'The benefits of getting soil fertility right'.



Padraig O'Keily
Teagasc Grange

PLANNING FOR FIRST-CUT SILAGE IN 2013

Dr. Padraig O'Kiely, Teagasc Animal and Grassland Research and Innovation Centre, Grange, Dunsany, Co. Meath

Perspective

One of the clear messages from 2012 was that, in addition to needing silage as a winter feed, grassland farmers require a reserve of silage to carry their livestock through periods when grass is either unavailable or inaccessible for grazing. A further lesson was the premium value of highly digestible, well preserved grass silage.

In planning for first-cut silage in 2013, the important goals are to achieve high yields of digestible grass, to ensure good preservation and the absence of mould, to minimise losses during the silage-making and feeding processes, and to constrain production costs.

Soil fertility and 'condition'

It is apparent that on some farms soil phosphorous (P) and potassium (K) concentrations and pH (reflecting lime requirement) have been depleted in recent years. This is reflected in sub-optimal grass growth and thus light yields at target harvest dates. Soil fertility deficiencies clearly need to be avoided, and it is therefore important to have an ongoing programme of testing representative soil samples from your farm in order to determine the appropriate amount of compound fertiliser to apply in addition to slurry. Both machinery and livestock can damage soil structure during wet conditions, and this can subsequently impede both drainage and grass growth. It is particularly important to avoid causing soil compaction, and it may be necessary to employ a remedy such as subsoiling under dry conditions to alleviate a compaction problem in affected areas.

Sward type

Swards dominated by perennial ryegrass are the foundation for producing relatively high yields of good quality silage, over an extended number of years. Ryegrass swards can have a higher digestibility at silage harvesting time than old pastures dominated by bent grasses, yorkshire fog, meadow grasses, etc. In addition, ryegrasses have about twice the sugar concentration of many of the grasses in old pastures, and this helps greatly in preserving the silage. In an experiment at Grange, silages made from the annual output of a perennial ryegrass sward produced 108 kg more beef carcase per hectare than silages made from an old pasture that contained only 10% ryegrass.

Dead grass

One explanation for disappointingly low silage digestibilities is if the harvested grass contained a lot of dead herbage. This 'dead butt' can have a DMD (dry matter digestibility) of only 40-50% and it will lower the overall digestibility of what may otherwise be excellent quality grass. Table 1 summarises an experiment in which grass was (a) left ungrazed in autumn and spring, (b) grazed bare in autumn, or (c) grazed bare in spring (mid March). When first cut silage was being harvested, the grass that was ungrazed in autumn or spring had accumulated a lot of dead herbage and was over 6% units lower in DMD than when the sward was grazed bare (i.e. to a 5 cm stubble) at one of these times. Clearly, tightly grazing swards in late autumn or by the end of March should avoid this problem.

Table 1 Grass digestibility (%) for an early first-cut harvest on 18 May, depending on previous management (average of two years)

	Previous grazing management Ungrazed in autumn or spring	Graze bare (to 5 cm stubble) In autumn
DMD%	75.4	82.1

Source: Teagasc Grange

Spring grazing

On many farms in spring, cattle graze the silage fields first. This provides them with excellent quality, low cost feed. However, a consequence is that grass yields for silage will be lower in late May (Table 2). The yields for silage can be partially retrieved by delaying harvesting for about 10 days, at which stage the DMD will be approximately similar to the non-grazed sward at the earlier harvest date. However, crude protein values will be about 1.5% units lower.

If silage fields are being grazed in spring, the target should be to complete this process by late March, having grazed evenly to a stubble of not more than 5 cm high (graze grass below the height that will eventually be accessible to the mower/silage harvester).

Table 2 'First cut' grass dry matter (DM) yield, digestibility and protein content in response to spring grazing

Yield (tonnes DM/ha)		DMD (%)		Crude protein (% of DM)	
Spring grazing		Spring grazing		Spring grazing	
Silage harvest date	Once[1]	Not grazed	Once[1]	Not grazed	Once[1]
20-May	3.97	5.41	79.6	77.0	12.6
31-May	5.13	7.13	76.1	74.4	12.1
09-Jun	6.60	8.25	75.7	72.2	9.8
21-Jun	7.67	9.76	70.4	68.7	8.9

Source: Teagasc Grange [1]Grazed on 29 March

Slurry and nitrogen fertiliser

When slurry is being applied to silage fields in spring it should only be spread onto short grass, and in a manner that avoids any residual physical contamination remaining on the crop at harvest time. In addition, all regulations regarding spreading date, maintenance of boundaries, etc., need to be adhered to.

Nitrogen (N) fertiliser is usually applied as urea (46%N) or calcium ammonium nitrate (CAN; 27.5%N) and, since both are effective for first-cut silage, urea is usually the preferred choice on a cost per 1 kg N basis. General official advice for applying N for first-cut silage includes:

A The total application of N (including the contribution from applied slurry) can be up to 125 kg N/ha permanent pasture. For pastures that were reseeded within the previous four years the total rate can be up to 150 kg N/ha. In all cases, the maximum allowance of N prescribed in statutory regulations (S.I. 378 of 2006) must not be breached.

B About 30% of the 5 kg N present in each 1000 litres (i.e. 1 tonne) of standard cattle slurry is available to the grass crop. Hence, if 28 tonnes slurry were applied per hectare (2500 gallons/acre) there would be 41 kg N available from the slurry, and the amount of inorganic fertiliser N to be applied should be reduced so as not to exceed a total input of 125 kg N/ha permanent pasture (i.e. 125-41 = 84 kg inorganic N/ha to be spread).

C If cattle have already (i.e. earlier this spring) grazed fields intended for first-cut silage, then assume that 20% of the N applied for this early grazing is still available for the silage crop, and reduce the amount of N applied directly to the silage crop accordingly.

It is important to leave sufficient time between spreading N fertiliser and harvesting the crop for silage for two reasons. Firstly, it allows the full yield response to applied N to occur, and secondly it improves the likelihood of proper silage preservation. The general aim is to have at least 6-7 weeks between applying N and harvesting grass for silage.

Rolling

If silage fields need to be rolled, then roll the fields when the grass is still quite short but when growth is active. Soil conditions should be firm enough to avoid wheel damage to the field and pliable enough to allow both 'levelling' by the roller and pressing down of moderate sized stones. Don't roll the grass after it starts to elongate as this can impair growth. On some soils a better 'levelling' effect can be got with a grass harrow.

Weeds

A heavy infestation of weeds can depress grass yield and sward digestibility markedly. For example, even leafy docks (before seed-head formation) have a DMD of only 65%. They can also make the silage more difficult to preserve properly.

Other issues

- Clean out silos that are due to be filled, and complete any required repairs in plenty of time.
- Have plastic sheets, sandbags, etc., ready for covering the silo.
- Stack tyres conveniently.
- Agitate the slurry, so it will be ready for spreading on the silage stubble.
- Clean the effluent channels and empty the effluent collection tank.
- Monitor the silage fields from late April and book the contractor in time. If weather conditions are favourable, be prepared to harvest a few days early.
- Measure grass sugar content the day before harvesting, to find out how easy or difficult the crop will be to preserve.

Silage-making

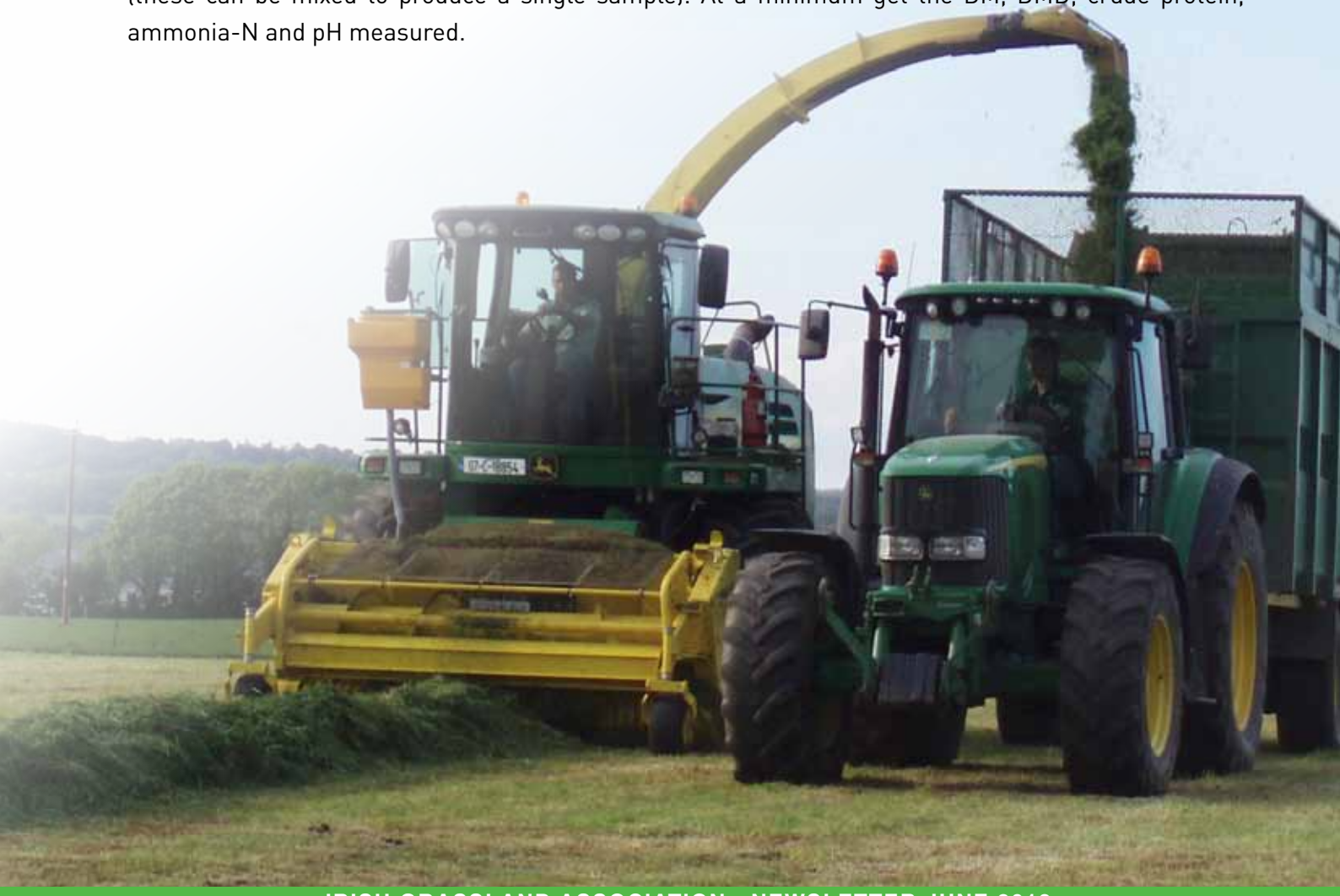
- Only start mowing meadows when you are sure weather conditions will allow you complete the harvesting and ensiling processes.
- To produce high DMD silage, mow the crop when seedheads start to emerge from the grass.
- Ensure no soil contamination occurs to the grass during harvesting.
- Either ensile immediately after mowing or wilt to over 25% DM within 24 hours of mowing. Successful wilting depends on mowing a dry crop and having sufficiently wide swaths that are capable of field-drying in good weather.
- Fill the silo quickly, and shape it to facilitate proper sealing and appropriate removal of rainfall.
- Use a 'wall sheet' plus two cover layers of black polythene sheeting. Fix the sheeting edges with a continuous layer of sandbags, etc., and cover edge-to-edge with tyres. Check the covering and sealing as the silage settles, and intervene as necessary to maintain the seal. Periodically throughout the storage period, inspect the plastic cover and repair any damage that occurs to the polythene.

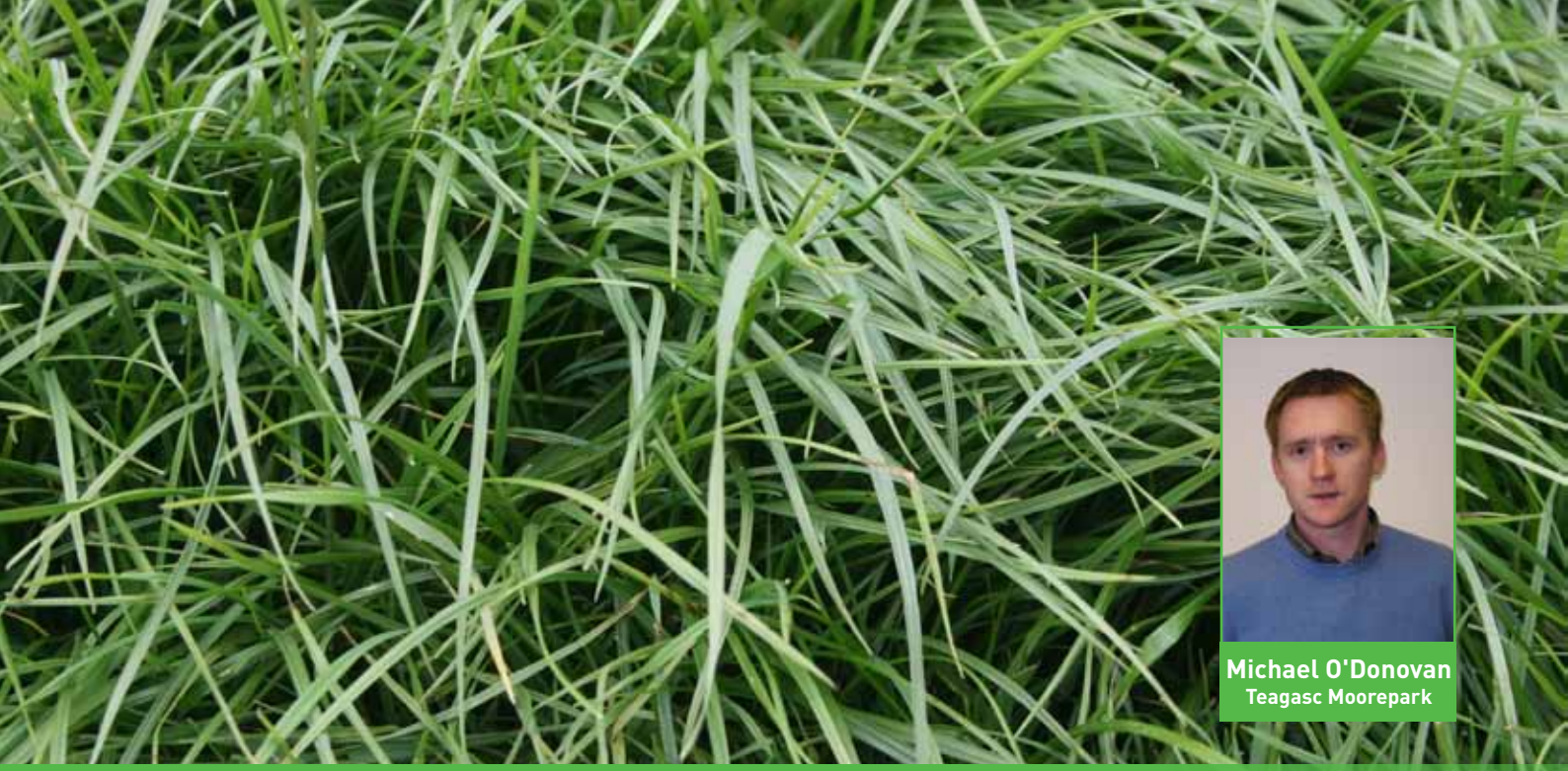
Safety

Silage-making and slurry-spreading pose a series of dangers. Plan to avoid any mishaps.

Inventory

- Once silage is made, calculate the amount of silage DM in storage. Compare this to the expected requirement for your livestock. Use the amount of silage produced to help you evaluate the grassland management practices used.
- About three weeks before silage-feeding commences, take at least two core samples from each silo (these can be mixed to produce a single sample). At a minimum get the DM, DMD, crude protein, ammonia-N and pH measured.





Michael O'Donovan
Teagasc Moorepark

NEW YEAR – NEW PASTURES

Dr. Michael O'Donovan, Grassland Science Department, Teagasc, Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co Cork

Last year presented huge difficulty for farmers to graze pastures and cut silage never mind trying to reseed paddocks. In 2013, a large number of farms have damaged swards that need to be to repaired and re-established as productive pastures. Some paddocks which were earmarked for reseeding in 2012 will hopefully be reseeded this year. In recent years we have seen a decline in soil fertility nationally; pH (lime) status and P and K levels have all declined. Soil fertility and reseeding are separate improvements at farm level and farmers should not confuse one with the other. Reseeding is the replacement of unproductive swards across a farm, while maintaining soil fertility is ensuring the farm is at a level of pH and has a P and K status to grow large quantities of grass. Perennial ryegrass content will deteriorate at low nutrient levels, while annual meadow grass (weed grass) is highly prevalent at low pH levels. Maintaining soil fertility is a continuous process.

Concentrate and fertilizer costs are at historically high levels, and so having a productive grass growing farm was never as important as now. From our assessments of paddock perennial ryegrass contents in February as part of a wider grassland study, there is huge variation within farms. Many paddocks have very low levels of perennial ryegrass and are putting pressure on the farm as a whole to grow grass. The reasons for this are varied:

1. No reseeding policy on farms
2. Under grazing of swards
3. No soil testing plan or reaction to the soil test when completed
4. Little slurry usage on the grazing platform
5. Persistent sward damage
6. Poor drainage

A common feature on farms is that historically rented or leased land has been reseeded and the home grazing platform has been excluded from reseeding. In the coming years, reseeding must focus on the grazing platform. All farming enterprises would like to have swards that last for as long as possible. However,

our national reseeding levels are too low for a country focused on grass based ruminant production. All farmers in all livestock production enterprises need to identify their poorer performing pastures and put in place an action plan to improve their performance. This aspect of grassland management is as important on beef and sheep farms as it is on dairy farms.

Reseeding methods

Table 1 shows the main reseeding methods employed at farm level. In general ploughing is still a popular method of reseeding; however, minimal cultivation techniques do have their advantages due to topography and stone issues on farms. A lot of farmers sow grass seed themselves in the reseeding process as a mechanism to keep contractor costs to a minimum. It is likely in the future minimal cultivation techniques will become even more popular.

Table 1 Effect of Stocking Rate (SR) and Quota Category (Qcat) on seedbed preparation, sowing methods and seeding rates used by participants when reseeding

Method of seedbed prep. (Prop.)	**SR ≤ 1.5 LU/ha**	**SR ≤ 2 LU/ha**	**SR ≥ 2 LU/ha**	**Qcat ≤ 231,442 L**	**Qcat ≤ 358,913 L**	**Qcat ≥ 358,913 L**
Plough	48.6	47.8	54.0	62.3	41.6	49.3
Minimum cultivation	21.2	21.6	17.0	14.9	27.0	16.7
Discing	1.8	6.7	4.0	2.6	5.1	4.9
Combination of all	28.4	23.9	25.0	20.2	26.3	29.2
Method of sowing seed (Prop.)						
Fertiliser Spreader	41.8	34.6	32.5	44.7	31.4	32.9
Seed Barrow	23.6	31.6	25.8	30.7	25.6	25.9
One Pass	25.5	21.1	27.8	14.9	27.0	30.8
Pneumatic	3.6	5.3	6.6	2.6	8.0	4.9
Combination of all	5.5	7.5	6.6	6.1	8.0	5.6

Conventional Reseeding (Ploughing)

Ploughing helps the drainage of the soil, but involves a lot more cultivation passes in the reseeding process. It provides the basis for a sound seedbed and more level surface. Deep ploughing is only a wasted exercise in today's climate as too many important soil nutrients are buried too deep. As with all methods, after ploughing the objective is to develop a fine, firm and level seedbed. If the tilt is too rough, grass seed will be lost too deep into the soil and will not be able to germinate.

Minimum Cultivation

Most minimal cultivation techniques involve spraying the existing vegetation – the seedbed is then prepared using shallow cultivation equipment. Soil disturbance is minimised so the more fertile soil remains at ground level for use by the young seedlings, as well as better support for both machinery and animals at the early stages of pasture establishment. This is a fast and simplistic method of reseeding. It is important pre cultivation that the sward is grazed tightly, if minimum cultivation techniques are to be used. Surface trash will not be buried, some surface trash will remain and as this thrash (dead organic matter) decays it releases organic acids which may inhibit seed germination. Applying about 2 t lime/acre before cultivation will help neutralise this effect. With minimum cultivation more weeds may appear making the use of post emergence spray even more critical.

At Moorepark, a number of reseeding methods were compared for spring reseeding. The methods compared were as follows: (i) Control – permanent pasture, (ii) Plough + level + one pass, (iii) One pass, (iv) Direct drill, (v) Discing + one pass. All swards were sprayed off with Glyphosate (e.g. Roundup) in mid April,

except the control. Cultivation of the areas took place on May 7th and the first grazing took place on July 2nd. Grass DM production was measured across the year pre spraying off and after cultivation to quantify the total grass DM production for the year. Grass DM production for the treatments were: Control – 9.8 t DM/ha; Plough + level + one pass – 8.9 t DM/ha; One pass – 10.2 t DM/ha; Direct drill – 9.2 t DM/ha; Discing + one pass – 10.4 t DM/ha.

These results clearly show that although the reseeded areas were out of production for almost three months their annual grass DM production was similar, if not greater than, the control area which was accessible for the entire year. Little difference was found between reseeding methods. In the second year after reseeding the total DM production was: Control - 10.0 t DM/ha; Ploughing - 12.7 t DM/ha; One-pass - 12.0 t DM/ha; Disc - 12.6 t DM/ha; Direct drill - 11.4 t DM/ha.

Turnaround time

The target turnaround time in which to get a reseed back into production should be approximately 60 days. Generally farmers are slow to reseed pastures because they think that paddocks are out of production for too long. The time that the sward is out of production can be minimized by cultivating 7-10 days after spraying off the old grass; there is no need to wait beyond this time.

Weed control

The best time to control docks and all other weeds is after reseeding. Using a post emergence spray, seedling weeds can be destroyed before they properly develop and establish root stocks. Established weeds can seriously reduce the yield potential and economic lifetime of the reseeded sward. To ensure that a post emergence spray can be applied reseeding should be targeted for the spring when establishment conditions are much more suitable and the opportunity for weed control is guaranteed. The post emergence spray should be applied approximately 5-6 weeks (spraying when grass is at the two leaf stage) after establishment, before the first grazing takes place.

Grazing management of reseeded swards

Care needs to be taken when grazing newly reseeded swards. The sward should be grazed as soon as the new grass plants roots are strong enough to withstand grazing (root stays anchored in the ground when pulled). Early grazing is important to allow light to the base of the plant to encourage tillering. Light grazing by animals such as calves, weanlings or sheep is preferred as ground conditions may still be somewhat fragile depending on establishment method used. Grazing new reseeds with larger animals can create high levels of tiller pulling. The first grazing of a new reseed can occur at pre grazing yields of 600-1000 kg DM/ha. Frequent grazing of the reseeds at approximately 1400 kg DM/ha over the first year post establishment will have a beneficial effect on the sward. The aim is to produce a uniform, well tillered sward. Particular care is needed during periods of wet weather as damage to newly established swards can have long term detrimental consequences as it gives weed grasses an opportunity to invade. If possible newly reseeded swards should not be closed for silage in their first year of production as the shading effect of heavy covers of grass will inhibit tillering of the new grass plants.

Cultivar choice

No single grass cultivar has all the desired agronomic traits. Based on some recent research on monoculture swards versus mixtures, there appears to be no advantage to diluting the effects of high performing cultivars with other lowering performing cultivars, such a practice only serves to reduce the production of a sward. While some cultivars have better characteristics than others, placing emphasis on increasing cultivar number in mixtures does not increase the performance of the mixture. Within the first

11 months of sowing a grass mixture, the sward hierarchy is established. There is little to be gained from sowing ←3 kg of individual cultivars within seed mixes. Ensure that the cultivars you choose are fit for purpose.

When using a grass cultivar mix, the objective must be to combine cultivars offering traits to obtain good seasonal DM production (spring/autumn) and high quality and sward density. When choosing a silage mix, high overall DM production and density are the most important traits. When considering heading date it is better to use a small range in heading dates (e.g. 7-10 days), a wider range in heading dates used will be reflected in a longer heading period. There are two recommended lists available in Ireland, from DAFM (www.agriculture.gov.ie) and AFBI (www.darni.gov.uk), see Table 2 for varieties documented in the DAFM 2013 recommended list. *Grass cultivars which have been tested and are on recommended lists (DAFM or AFBI) should only be used in mixes.* Tetraploids have a lot to offer grass swards in terms of higher seasonal growth and better quality and can be included at up to 50% of a mixture on drier type soils.

Table 2. Department of Agriculture Food and the Marine recommended list of Intermediate and Late heading perennial ryegrass cultivars 2013.

	Intermediate/Late heading cultivars	
Heading Date	**Tetraploid**	**Diploid**
18 May	Malone/Giant	
20 May	Magician	Boyne
21 May		Solomon
22 May		Rosetta
23 May	Trend/Carraig	Premium
25 May		Rodrigo
27 May		Aberstar
28 May		Abermagic
29 May	Dunluce	
31 May	Orion	Stefani
1 June	Delphin	Majestic
2 June	Glencar	Glenveagh/Denver/Piccadilly
3 June		Soriento/Tyrella
4 June	Abercraigs	
5 June	Abergain/Navan	Portstewart
6 June	Twymax/Kintyre	Mezquita
7 June	Drumbo	
9 June	Aberchoice/Malambo	
10 June	Canacan	

Repairing poaching damage in 2013

Irrespective of soil type and location, many paddocks were badly damaged by poaching in 2012. This damage will reduce grass DM production in 2013. On some farms these paddocks cannot be reseeded within the grazing rotation, or cash flow will not allow for them to be reseeded this year. It is possible that over seeding these swards in spring may help increase perennial ryegrass content. Over seeding can be used as a short term substitute to full reseeding. It probably should be only considered where the farmer can carry out the tractor work to minimize costs. If over seeding is being considered, its success is dependent on getting as much seed to soil contact as possible and having moist conditions post germination. Use a tetraploid (bigger seeds) grass cultivar at a seedling rate of 15 – 20 kg/ha (6-8 kg/acre). Roll with a ring roller which can follow the undulations of the paddock. The more open the pasture the more likely that

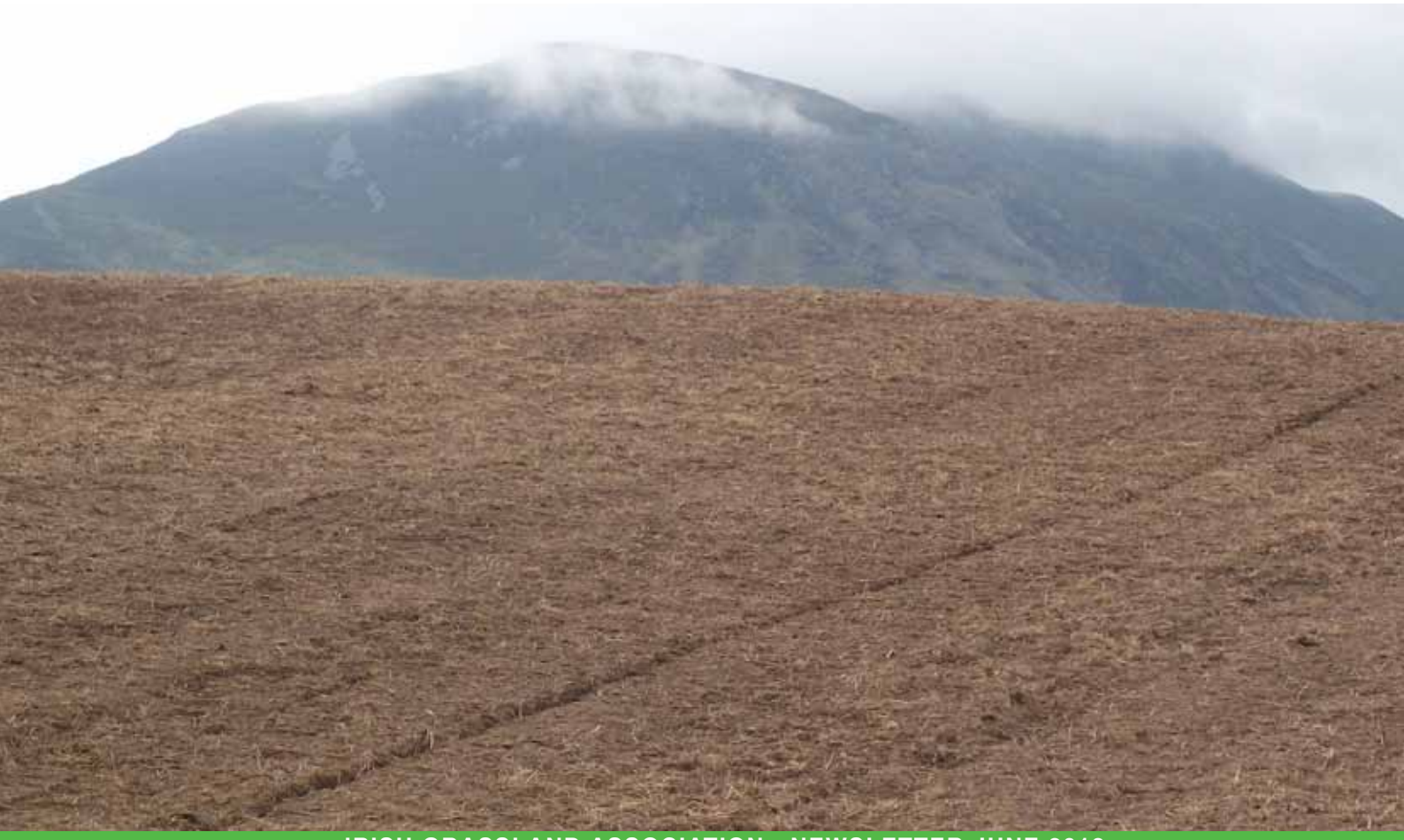
over seeding will be successful. The best time for over seeding is late April or mid summer (after silage cuts); however this is not possible on all farms. Ensure the paddock is grazed frequently with low grass covers for the remainder of the year. It will only be on the third or fourth rotation that the new plants will start making a contribution to the sward. Two over seeding methods are outlined hereunder.

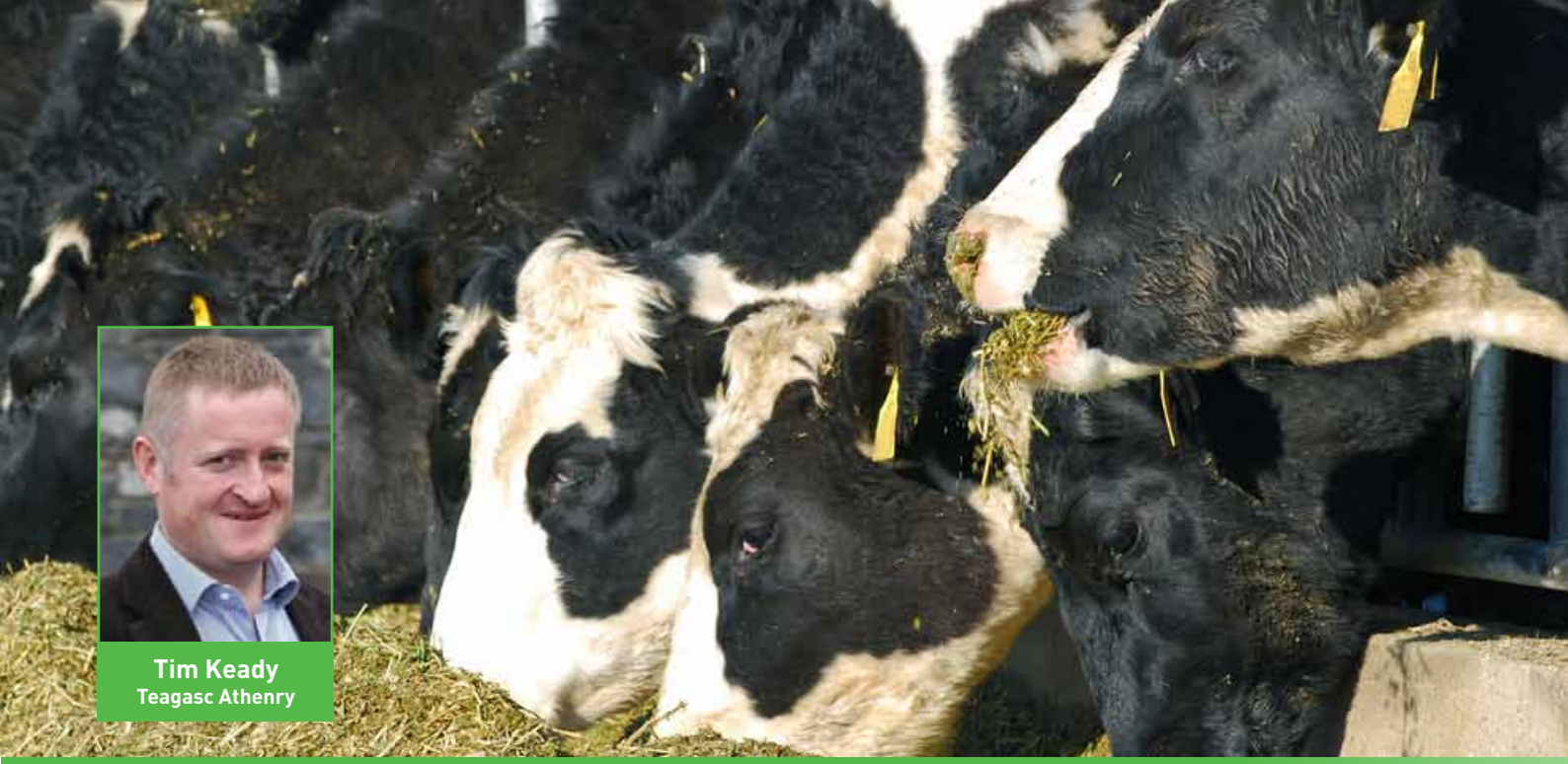
Method 1. Grass Harrow + Fertilizer spreader combination

Ensure the pasture is tightly grazed off (3.5 cm). Harrow with a grass harrow to ensure levelling of the divots and disturbance on the soil surface. Spread grass seed (15 – 20 kg/ha) with the fertilizer spreader. Then spread compound fertilizer, 2.5 – 5 bags/ha (1-2 bags/ac) of 18:6:12 or 10:10:20. Roll pasture with a Cambridge roller (if available) or a light roller. Spread a light coating of slurry (1000-1500 gallons/acre). Ensure pasture is grazed frequently thereafter. Do not expect to see major differences within the pasture instantly, it will take a period of time for the new seeds to establish, but ensure the pasture is grazed at light covers to assist seedling germination and tillering. It is advisable to use a tetraploid cultivar as tetraploid seed sizes are much larger than diploids. Over seeding will not work if seeding is followed by dry conditions, if this happens, continue to spread light levels of slurry (1000-1200 gallons/ac) or soiled water after grazing. These swards may require a post emergence spray upon establishment.

Method 2. Guttler/Stitching-In machines

Graze off pasture to 3.5 cm. If this is not possible mow pasture down tight to this height. Use a Guttler or stitch - in seeder across the pasture at a seeding rate of 15 – 20 kg/ha. Spread compound fertilizer 3.75 – 5 bags/ha (1.5 – 2 bags/ac), either 18:6:12 or 10:10:20. Roll the pasture with Cambridge or other light ring roller. Apply light coating of slurry (1000-1500 gallons/ac). These swards may require post emergence spray upon establishment. When using a stitching in machine it is advisable to use slug pellets at sowing. Ensure frequent grazing thereafter until new seedlings have emerged. Graze with lighter stock if possible.





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THE EFFECTS OF SILAGE DIGESTIBILITY ON THE PERFORMANCE OF BEEF CATTLE, DAIRY COWS, PREGNANT EWES AND FINISHING LAMBS

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Introduction

Grass silage is the basal forage for the majority of beef cattle, dairy cows and pregnant ewes during the winter indoor feeding period in Ireland. Silage production is the largest harvest that occurs in Ireland. Approximately 22 million tonnes are ensiled annually, which has a value of approximately Đ0.7 billion. Whilst 2012 proved to be a difficult year for silage production the high cost of producing bad quality silage is clear, as indicated by the additional concentrate supplementation required to maintain animal performance. My objective in this paper is to present the effects of silage digestibility on the performance of lactating dairy cows, finishing beef cattle, pregnant ewes and finishing lambs. Furthermore the potential 'concentrate sparing effect' of increasing silage digestibility is discussed. Finally, the major factors that affect silage digestibility, and which are under the control of the farmer, are also presented.

Variability in silage feed value

The composition of silage produced on farms in Ireland varies dramatically in terms of feed value and chemical composition (Table 1). The variation in feed value is dependent on the composition of the herbage harvested, regrowth interval, sward type, harvest date, harvest number, wilting period, prevailing weather conditions, additive treatment and ensiling management. The chemical composition of silage produced in Ireland and offered to livestock in the winter of 2012-2013, as analysed by the Hillsborough Feeding Information System (HFIS), is presented in Table 1. Silage composition was extremely variable as indicated by the data for the concentrations of DM, ammonia nitrogen (N) and crude protein, and by DM digestibility (DMD). Silages with low DMD have low intake characteristics. The effect of silage feed value on animal performance is also presented in Table 1. The poorer quality silages produced on commercial farms would not even support animal maintenance whilst the best silages, when offered as the sole diet, would sustain 23 litres milk/cow daily, a daily live-weight gain of 1.1 kg per finishing steer and a daily live-weight gain of 173 g per finishing lamb. The data in Table 1 clearly indicate the importance of producing high feed value

silage to support high levels of animal performance.

In 2012, silage harvest was delayed on many farms due to higher than normal rainfall. In some cases the delay reflected the desire of producers to obtain a wilt, therefore delaying harvest in the hope of dry weather, which rarely materialised, and ground conditions deteriorated. It is interesting to note that the mean DMD for all silages analysed in 2011 (HFIS) was 71% DMD; results were similar for samples from Northern Ireland and the Republic of Ireland. However in 2012, whilst the mean DMD was 67.3%, the mean DMD for silages produced in Northern Ireland and the Republic were 68.9% and 65.8% DMD, a decline of 2.2 and 5.5% units, respectively, from the previous year.

Table 1 Chemical composition of silages ensiled in 2012 (11,500 samples)

	Mean	Minimum	Maximum
Predicted silage DM intake per day(g/kg W $^{0.75}$)	87	50	105
pH	4.2	3.5	5.6
Dry matter (g/kg)	262	112	681
Ammonia N (g/kg N)	84	50	260
Crude protein (g/kg DM)	108	80	195
Dry matter digestibility (DMD)(g/kg DM)	673	520	820
Metabolisable energy (MJ/kg DM)	10.4	8.3	12.3
Potential animal performance supported under *ad-libitum*feeding			
Milk yield (kg/d)	9.8	0	22.6
Steer live-weight gain (kg/d)	0.45	0	1.1
Lamb live-weight gain (g/d)	48	0	173

(Hillsborough Feeding Information System)

Silage feed value

The feed value of grass silage is a combination of its intake potential and nutritive value, both of which are determined primarily by digestibility.

Effects of silage digestibility on animal performance

Lactating dairy cows

The effects of increasing silage digestibility on the performance of lactating dairy cows, summarised from 23 comparisons, are presented in Table 2. There is a substantial body of evidence from studies with lactating dairy cows that increasing digestibility increased milk yield, protein concentration and the yields of fat plus protein. The data presented in Table 2 clearly show that the mean daily response for each 1 percentage unit increase in silage DMD is 0.33 kg milk and 0.009 percentage units of milk protein, respectively. Therefore, increasing silage DMD by 5 percentage units (e.g. from 68 to 73 %) increases milk yield by 1.65 kg/day. However, the response to silage digestibility depends on the level of concentrate offered. As concentrate feed level increases, silage intake declines, consequently silage forms a smaller proportion of the diet; therefore the response to increasing silage digestibility is reduced. For silage-based diets consisting of forage:concentrate (DM:DM) ratios of 80:20, 60:40 and 40:60 (equivalent to daily concentrate feed levels of 4.2, 8.4 and 12.6 kg, respectively; Table 5) each 5 percentage unit increase in silage DMD increases milk yield by 2.9, 1.9 and 0.8 kg/day, and milk protein concentration by 0.07, 0.03 and 0.13 percentage units, respectively. Consequently, even when cows are offered high levels of concentrate (60% of the diet DM) increasing silage digestibility increases the yields of milk and fat plus protein, and milk protein concentration.

Table 2 The effects of silage digestibility on dairy cow performance (mean of 23 comparisons)

		Silage DMD (%)
		67.6
Silage DM intake (kg/day)	10.1	11.6
Milk yield (kg/day)	25.0	27.4
Milk composition (%)		
	Fat	3.98
	Protein	3.20
		(Keady et al, 2013)

Finishing beef cattle

The effects of increasing silage digestibility on the performance of finishing beef cattle, summarised from 34 comparisons, are presented in Table 3. There is a substantial body of evidence to indicate that increasing silage digestibility increases daily live-weight and carcass gains of beef cattle. The data presented in Table 3 show that the mean daily response for each 1 percentage unit increase in silage DMD is 30.6 g and 23.8 g of live-weight gain and carcass gain, respectively. Consequently, if silage DMD is increased by 5 units (e.g. from 68 to 73% DMD) daily carcass gain increases by 0.119 kg/day, which is equivalent to 17.9 kg carcass gain during a standard 150 day finishing period, thus increasing carcass value by approximately Đ75. However, the response to silage digestibility depends on the level of concentrate offered. As concentrate feed level increases the response to increasing silage digestibility declines, as silage forms a smaller proportion of the diet. For silage based diets consisting of forage:concentrate ratios of 100:0, 80:20, 60:40 and 40:60 (equivalent to daily concentrate intakes of 0, 2.1, 4.2, 6.3; Table 5) each 5 percentage unit increase in DMD increases daily carcass gain by 0.18, 0.13, 0.09 and 0.04 kg, respectively. Thus for cattle offered diets with forage:concentrate ratios of 100:0, 80:20, 60:40 and 40:60 for a 150-day finishing period each increase of 5 percentage units in silage DMD increases carcass gain by 26.3, 19.5, 12.8 and 6.0 kg, thus increasing carcass value by Đ110, Đ82, Đ54 and Đ25, respectively. Consequently, even when cattle are offered high levels of concentrate (60% of diet DM) increasing silage digestibility increases carcass weight and carcass value.

Table 3 The effects of silage digestibility on the performance of finishing beef cattle (mean of 24 comparisons)

	Silage DMD (%)	
	67.0	73.9
Silage DM intake (kg/day)	5.6	6.1
Live-weight gain (kg/day)	0.75	0.95
Carcass gain	- (kg/day)	0.49
	- (kg/150-day winter)	73.5
	(Keady et al, 2013)	

Finishing lambs

The effects of silage digestibility on the performance of finishing lambs, from the mean of 10 comparisons, are presented in Table 4. The available data show that increasing silage digestibility increases daily liveweight and carcass gains. The data presented in Table 4 show that the mean daily response for each 1 percentage unit increase in silage DMD is 14.4 and 9.3 grams, respectively. Consequently, if silage DMD is increased by 5 units (e.g., from 68 to 73%) daily carcass gain increases by 46.5 g which is equivalent to 3.3 kg carcass during a 70-day finishing period, thus increasing carcass value by approximately Đ15. However the response to silage digestibility depends on the level of concentrate offered. As concentrate

feed level increases the response to increasing silage digestibility declines, because silage forms a smaller proportion of the diet. For silage-based diets consisting of forage:concentrate ratios of 100:0, 80:20, 60:40 and 40:60 (equivalent to daily concentrate intakes of 0, 0.3, 0.6 and 0.9 kg; Table 5) each 5 percentage unit increase in DMD increases daily carcass gain by 80, 65, 45 and 30 grams, respectively. Thus, for finishing lambs offered diets with forage:concentrate ratios of 100:0, 80:20, 60:40 and 40:60 over a 70-day finishing period each increase of 5 percentage units in silage DMD increases carcass gain by 5.6, 4.6, 3.2 and 2.1 kg; thus, increasing carcass value by Đ25.2, Đ20.7, Đ14.4 and Đ9.5, respectively. Consequently, even when finishing lambs are offered high levels of concentrate (60% of the diet) increasing silage digestibility increases carcass weight and carcass value.

Table 4 The effects of silage digestibility on the performance of finishing lambs (mean of 10 comparisons)

	Silage DMD (%)	
	72.8	76.8
Silage DM intake (kg/day)	0.52	0.72
Live-weight gain (g/day)	75	128
Carcass gain	- (g/day)	38
	- (kg/70 day finishing period)	2.7

(Keady et al, 2013)

Table 5 Response in the performance of lactating dairy cows, finishing beef cattle and lambs to a change of 5 percentage units in silage DMD, at various forage: concentrate ratios.

		Forage: concentrate ratio			
Animal type	Performance trait	100:0	80:20	60:40	40:60
Dairy cows	Milk yield (kg/day)		2.9	1.9	0.8
	Fat plus protein yield (kg/day)		0.19	0.13	0.08
	Milk composition (%)	- Fat		0.00	-0.04
		- Protein		0.07	0.03
Beef cattle	Carcass gain	- (kg/day)	0.18	0.13	0.09
		- kg per 150 day finishing period	26.3	19.5	12.8
Finishing lambs	Carcass gain	- g/day	80	65	45
		- kg per 70 day finishing period	5.6	4.6	3.2

(Keady and Hanrahan, 2013)

Pregnant ewes

The effect of increasing silage digestibility on the performance of pregnant ewes is presented in Table 6. In these studies the ewes received on average 19.4 kg concentrate during late pregnancy. The evidence shows that increasing silage digestibility increases ewe weight immediately post lambing and lamb birth weight. Previous studies at Athenry have shown that each 1 kg increase in lamb birth weight increases weaning weight by 3.2 kg. The data presented in Table 6 show that the mean increase in ewe weight post lambing and in lamb birth weight for each 1 percentage unit increase in silage DMD is 1.3 kg and 52 g, respectively. Consequently, if silage DMD is increased by 5 percentage units ewe weight at lambing and lamb birth weight are expected to increase by 6.5 kg and 0.25 kg, respectively.

Table 6 The effects of silage digestibility on the performance of pregnant ewes (mean of 9 comparisons).

	Silage DMD (%)
	713
Ewe weight post lambing (kg)	68.5
Lamb birth weight (kg)	4.69
	(Keady et al, 2013)

Effects of silage digestibility on concentrate sparing effects

The level of concentrate supplementation required to ensure that target performance levels are achieved with silage-based diets is dependant on the feed value of the silage and the stage of the production cycle of the animals involved. The price of concentrate is volatile; for example, prices have increased by up to 35% over the past 12 months. Therefore, when concentrate price is high relative to product price (milk or meat) one of the potential benefits of increasing silage feed value (DMD) is that animal performance can be maintained whilst reducing the level of concentrate supplementation offered. This is referred to as the 'potential concentrate sparing effect' (i.e., the reduction in level of concentrate supplementation required to maintain animal performance). The cost of production and price risk are also reduced.

The effects of increasing silage digestibility on the 'potential concentrate sparing effect' for lactating dairy cows, finishing beef cattle, finishing lambs and pregnant ewes are presented in Table 7. For lactating dairy cows, reducing silage digestibility by either 1 or 5 percentage units, or harvesting 1 week later increased concentrate requirements, in order to maintain milk yield, by 0.55, 2.75 and 1.8 kg/day, respectively, or by 17, 85 and 56 kg/cow per month of lactation, respectively. Therefore, for a herd of 50 cows this equated to increased concentrate requirements of 0.85 t, 4.25 t and 2.8 t, respectively; a considerable increase in feed costs.

In the case of finishing beef cattle, reducing silage digestibility by either 1 or 5 percentage units, or harvesting 1 week later increases daily concentrate requirements, to maintain carcass gain, by 0.38, 1.9 and 1.25 kg/head; this equates to 57, 285 and 188 kg during a 150-day finishing period. Consequently, for each 50 cattle finished the increased concentrate requirements are 2.9 t, 14.3 t and 9.4 t; a considerable increase in feed costs.

For finishing lambs, reducing silage digestibility by either 1 or 5 percentage units, or harvesting 1 week later, increases daily concentrate requirements, to maintain carcass gain, by 0.07, 0.35 and 0.23 kg/lamb, which equates to 4.9, 24.5 and 16.2 kg for a 70-day finishing period. Consequently, for each 100 lambs finished concentrate inputs must be increased by 0.49 t, 2.45 t and 1.62 t, respectively.

For pregnant ewes, reducing silage digestibility by either 1 or 5 percentage units, or delaying harvest by 1 week increases concentrate requirement during late pregnancy, to maintain lamb birth weight, by 4.5, 22.6 and 14.9 kg, respectively. Thus, for each 100 ewes the concentrate requirement during late pregnancy are increased by 0.45 t, 2.26 t and 1.49 t, respectively; a considerable increase in feed costs.

Table 7 The effects of silage digestibility on concentrate feed required (kg) to maintain animal performance

		Additional concentrate requirements for	
		1 unit reduction in DMD	5 unit reduction in DMD
Cows	- kg/day	0.55	2.75
	- kg/month	17	85
Finishing cattle	- kg/day	0.38	1.9
	- kg/150 day finishing period	57	285
Lambs	- kg/day	0.07	0.35
	- kg/70 day finishing period	4.9	24.5
Pregnant ewes	- kg in late pregnancy	4.5	22.6

(after Keady et al 2013)

Major factors affecting digestibility of grass silage

The factors that determine silage digestibility are harvest date, sward type, silage fermentation, level of fertiliser N applied and wilting.

Harvest date

Harvest date is the most important factor affecting silage digestibility, which declines as harvest date is delayed. Silage digestibility declines by 3.3 percentage units for each 1 week delay in harvest date. Therefore a crop which has a DMD of 75% on 20 May will have a DMD of 71.7% if harvest is delayed by 1 week until 28 May. The rate of decline in digestibility is similar for swards that are closed for first or second cut silage.

Lodging, or flattening, of the grass crop prior to harvest accelerates the rate of decline in herbage digestibility. This accelerated decline in digestibility is due to the accumulation of dead leaf and stem at the base of the sward. Digestibility may decline by as much as 9 percentage units per week in severely lodged crops.

Sward type

It is assumed, normally, that silage produced from old permanent pastures has an intrinsically lower digestibility than silage produced from a perennial ryegrass sward. However, the negative impact of old permanent pasture on silage digestibility is dependent on botanical composition. When old permanent pastures are harvested at the correct stage of growth silage with a high feed value can be produced consistently.

A 2-year study was undertaken at Grange, using 4 harvests per year, to evaluate the effects of sward type on the feed value of grass silage. In the first year of that study, beef carcass output per hectare for silage produced from old permanent pasture (45% meadow grasses, 26% bent grasses, 10% perennial ryegrass, 6.5% meadow foxtail, 2% cocksfoot, 10.5% other) was similar to that for silage from a newly sown perennial ryegrass sward. Carcass output was lower for the silage from the old permanent pasture in the second year of the study, but this was attributable to the fact that the silage produced from the first harvest off this pasture had a lower digestibility than that from the perennial ryegrass sward (swards closed the previous October). However cattle performance did not differ for cattle offered silages from harvests 2, 3 or 4 from either the perennial ryegrass or old permanent pasture swards.

The effects of sward type on feed value of silage harvested from second re-growths (third harvest) of two pasture types are summarised in Table 8. Silage produced from an old permanent pasture (52% perennial ryegrass, 28% creeping bent, 10% meadow grasses, 10% Yorkshire fog) and that from a perennial ryegrass pasture resulted in silages with similar (high) feed value, based on metabolisable energy (ME) concentration (determined *in vivo*) and intake, when offered to growing cattle. The results from these studies show that high feed-value silage can be produced from old permanent pasture provided it has a moderate level of perennial ryegrass and is ensiled at the correct stage of maturity using good ensiling management.

Table 8 Effect of sward type on silage composition, digestibility and intake

	OPP	PG
Silage Composition		
pH	4.1	4.0
NH_3-N (g/kg N)	75	74
ME (MJ/kg DM)	12.0	11.7
Silage DM intake (kg/day)	3.66	3.56

OPP = old permanent pasture, PG = perennial ryegrass

Perennial ryegrass varieties are classified according to heading date. Whilst the general recommendation is to harvest swards at approximately 50% ear emergence, the actual date of emergence for a sward depends on the grass varieties present and their heading dates. The effects of heading date (intermediate or late) of perennial ryegrass varieties, and date of harvest, on the performance of beef cattle were evaluated in two studies and are summarized in Table 9. The intermediate- and late-heading swards each consisted of three different varieties (with similar heading dates) of perennial ryegrass. Whilst the mean heading date of the intermediate- and late-heading swards differed by 24 days (19 May and 12 June), herbage from the late-heading sward had to be ensiled within 8 days of that from the intermediate-heading sward to give the same silage digestibility and daily carcass gain of finishing beef cattle.

Table 9 Effect of sward heading date and harvest date on silage digestibility and animal performance.

Heading date × Harvest date	Silage	Carcass gain (kg/day)
	DMD (%)	DM Intake (kg/day)	
Intermediate (19 May)		
20 May	76.5	6.8
28 May	72.6	6.2
5 June	68.1	6.3
Late (12 June)		
28 May	76.2	6.6
5 June	72.0	6.4
13 June	69.3	5.9

(Steen, 1992)

If the harvest of the late-heading sward was delayed until 50% ear emergence (13 June) the resulting silage DMD would be 5 percentage units lower than the silage from the intermediate-heading sward at the same stage, consequently reducing silage intake and carcass gain (from 0.63 to 0.40 kg/day).
Similarly, results from studies using small scale silos show that herbage from late-heading varieties (heading date 10 June) must be ensiled on 31 May to produce silage with a digestibility similar to that for intermediate-heading varieties (heading date 22 May).

Silage fermentation
Relative to well-preserved silage, poorly-preserved untreated silage with a low lactic acid concentration and a high concentration of ammonia nitrogen normally has lower digestibility. The reduction in DMD in untreated silages due to inappropriate silage fermentation can be as high as 7 to 8 percentage units. However for silages that are treated with an effective inoculant at ensiling, but which have poor fermentation characteristics (at feed out), there is no negative impact on digestibility or on subsequent animal performance.

Fertilizer N application
Application of excess fertilizer N has a negative effect on silage digestibility. Thus, increasing the rate of fertilizer N from 72 to 168 kg/ha for the primary growth of predominantly perennial ryegrass swards reduces silage DMD by 1.5 percentage units.

Wilting
Wilting reduces silage DMD. The decline in digestibility due to wilting is a consequence of the loss of available nutrients and an increase in ash concentration. The decline in digestibility due to wilting depends on the length of time between mowing and ensiling the herbage, and on soil contamination due to mechanical treatment. The rate of loss in digestibility has varied, among studies, from 0.2 to 1 percentage unit per 10 h wilting period. Thus, each day (24 h) of wilting can reduce silage DMD by between 0.5 and 2 percentage units, which is equivalent to delaying harvest by up to 4 days.

Conclusions
It is concluded that:
a Digestibility is the most important factor influencing the feed value of grass silage and consequently the performance of animals offered grass-silage based diets.
b The effect of increasing silage digestibility on animal performance depends on the forage: concentrate ratio of the diet.
c Each 1 percentage unit increase in DMD results in the following average changes:
  c.i. daily milk yield of lactating dairy cows by +0.33 kg
  c.ii. daily carcass gain of beef cattle by +23.8 g
  c.iii. daily carcass gain of finishing lambs by +9.3 g
  c.iv. lamb birth weight by +52.3 g
  c.v. ewe weight post lambing by +1.3 kg
d. Harvest date is the main factor affecting silage digestibility. Each one week delay in harvest reduces digestibility by 3.3 percentage units.
e. To sustain animal performance due to a delay of harvest by one week requires an additional
  e.i. 1.8 kg concentrate DM daily per lactating dairy cow
  e.ii. about 1.5 kg concentrate daily per finishing beef animal
  e.iii. 0.23 kg concentrate daily per finishing lamb
  e.iv. 14.9 kg concentrate per ewe in late pregnancy
f. For finishing beef cattle, lactating dairy cows, pregnant ewes and finishing lambs aim to produce high feed value silage with a DMD of 75%.

MAKING GOOD QUALITY SILAGE - FARM WALK HELD BY THE IRISH GRASSLAND ASSOCIATION IN BALLYHAISE COLLEGE MARCH 2013

David Colbourne, Teagasc Business and Technology Dairy Adviser, Ballyhaise, Co. Cavan.

Making silage is a job that gets taken for granted in many cases on Irish farms nowadays. The task of making quality silage does not get the same attention as it used to generate in the past. If the weather allows, we just get on with it.

Thirty years ago, silage making was a new skill. Bigger and more technical machinery was being developed to cut, process and harvest the crop. Additives like acids and sugars were used to help preserve the product. Silage day was a big deal. Nowadays, the job of making silage is generally over in a day or two. A contractor is normally used to harvest the crop and the weather is the main uncertainty.

Deirdre Hennessy, President of the Irish Grassland Association, introduced the Irish Grassland Association event on 'Making Good Quality Silage' in Ballyhaise College in Cavan on the 1st of March last by reminding the audience that 2012 proved that silage making should not be taken for granted. Subsequent speakers pointed out that even in more 'normal' years, that there are huge differences in the quality of silage being made on farms in Ireland.

Donal Patton, Dairy unit, Teagasc Ballyhaise, outlined the progress in the dairy unit in Ballyhaise. Cows have been out since they calved most of the time and calving is going well. Fertility was particularly good in the herd last year. The year 2012 was a difficult one on the wet research farm and Donal has determined that it is important to always have a reserve of quality silage in case of emergencies; in the case of the Ballyhaise farm, Donal now aims to have at least a bale of high quality silage in reserve per cow for when things get tight.

Dr. Padraig O'Kiely from the Animal and Grassland Research and Innovation Centre, Teagasc, Grange, Co. Meath, spoke next. He outlined the main goal of silage-making as the achievement of high yields of digestible grass and to preserve it well, while minimising losses at silage-making and silage-feeding times. He first spoke of the need for good soil fertility and the importance of avoiding soil compaction,

in order to have good swards of grass in the field. In addition, good grasses are needed, with ryegrass having better yields, better digestibility and better sugar levels than older grasses. Dr. O'Kiely highlighted the negative effect that an old butt at the bottom of the sward can have, that even if the top of the sward is highly digestible, the butt at the bottom will pull down the digestibility. He urged farmers to graze silage fields tight going into the winter, or alternatively to graze well in the spring before closing off the silage ground, to avoid a butt of old dead material that had been growing since the previous late summer or early autumn. If silage fields are grazed in the spring before closing, cutting can be delayed by up to ten days to allow more bulk for cutting; this will give a similar yield to earlier-cut ungrazed swards, although crude protein will be 1.5% units lower, according to Dr.O'Kiely. Grazing silage fields in the spring should finish by the first few days in April.

Other tips from Dr O'Kiely included having a weed-free sward for better quality silage, having the silage pit ready in time and the slurry tank agitated ready for emptying, testing the sugars in the grass to determine how easy the crop will be to preserve and avoiding any soil contamination with the crop coming in.

Dr O'Kiely focused at the end of his presentation on baled silage. It doesn't cost a lot more to make good quality bale silage than poorer bulkier crops, because the harvesting is bulk-related, yet baled silage crops can often be very poor quality material. Most of the same advice applies for making good silage in bales as for pit silage. When wrapping bales, 4 layers of film are necessary and in most cases, no more than 4 layers are needed. Most bale damage occurs when handling wrapped bales, so try to wrap as close to the final bale store as possible and handle bales gently. Move bales to the store as soon as possible after making, to avoid bird damage. Protect bales from birds and other pests, and repair damage quickly.

David Colbourne, dairy adviser, Teagasc Ballyhaise, talked on soil fertility and slurry management. Fertiliser accounts for up to 20% of costs on Irish farms, so soil testing is important to try to spend that money as effectively as possible. Many farmers soil test for REPS or Nitrates Derogations; less farmers make good use of the soil test results to decide what fertiliser products to use on their farms. David highlighted the need to take accurate soil samples across the field; that little soil box has to represent thousands of tonnes of soil in the top 100 mm across the sample area. A sample area of 2-4 ha is recommended, although farmers in derogations are allowed up to 5 ha on average in a soil sample box.

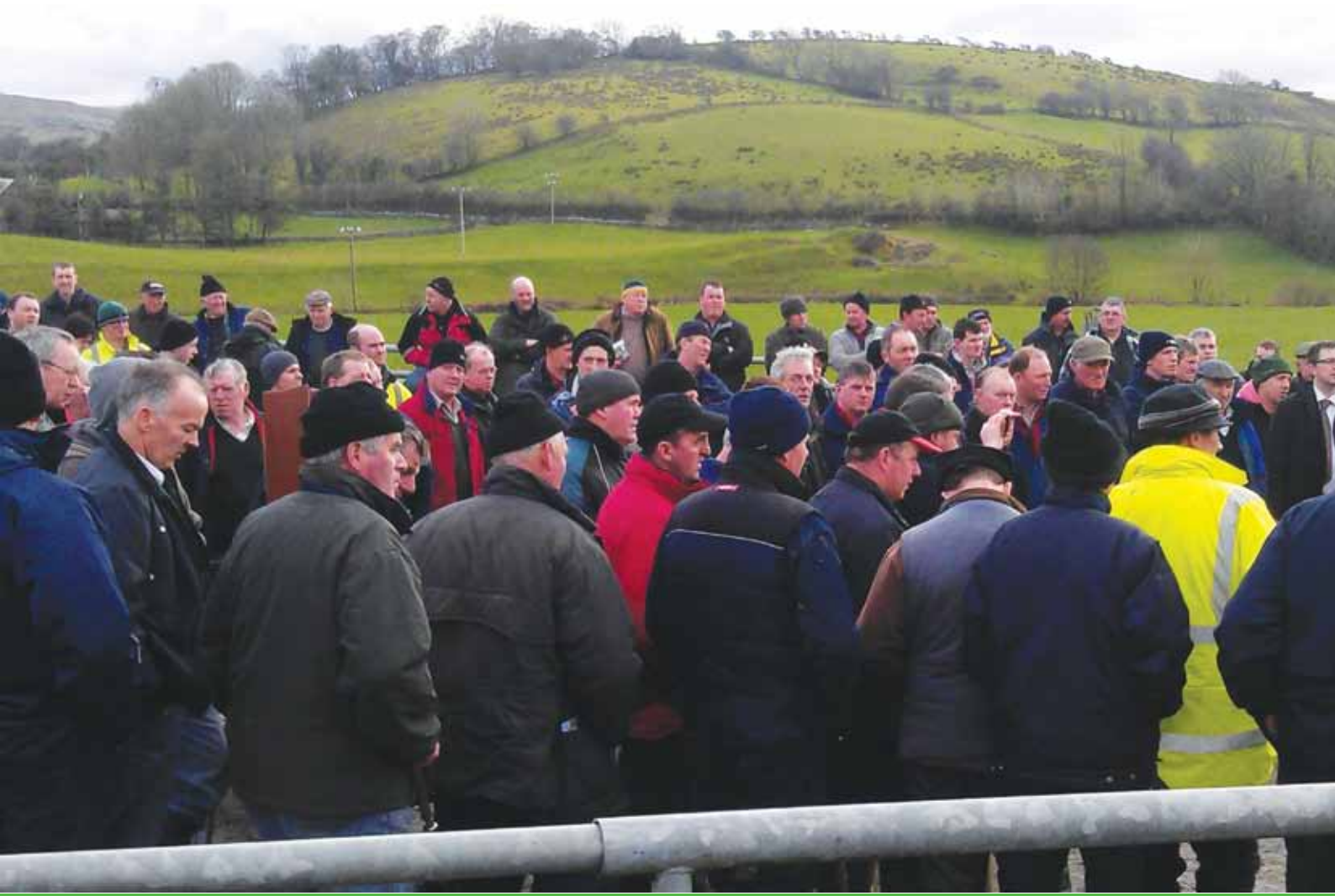
The rate of lime use in Ireland has halved since the 1970's and early 1980's. The average pH of soils coming in for testing is 5.5, when the ideal for growing grass is 6.3. If lime is low, other soil nutrients will not work as well. This holds for P and K as well. There is not much point in applying more nitrogen if a lack of P or K or not enough lime is the problem. Less than 30 % of Irish soils are the ideal index 3 for P and K, which means either farmers are not getting enough crop growth on index 1 and index 2 soils (low in P and /or K) or else they are wasting nutrients on index 4 (excessive P and / or K). With fertility levels falling on Irish farms, more land is in index 1 or 2 now than in the past, and this problem is only getting worse. The difficulty with P is that its use is restricted under the Nitrates Regulations, so farmers should consult with a advisor or draw up a plan of their own to ensure they do not use more P or N than they are allowed under the Nitrates Regulations. David reminded the audience that there is assumed to be 5 kg of P in every tonne of meal purchased onto farms.

Farmers need to make good use of slurry, putting high-K cattle slurry onto low-K fields rather than onto fields that are already high in K from previous high levels of cattle slurry application. Be careful putting slurry onto fields that too much does not go on in the one dressing, or that it is not spread before heavy rain, or too close to watercourses. The best response to the nitrogen in slurry occurs when spreading in

springtime, with poorer responses to summer applications.

Dr. Tim Keady, Animal and Grassland Research and Innovation Centre, Athenry, pointed out that at 22 million tonnes harvested per annum, that silage is the largest harvest in Ireland, and is worth about Đ0.6 billion. He showed how crop quality has a direct effect on animal performance, with poorer silages giving poorer animal performance, either in terms of beef or lamb production or milk yields. Even at high levels of concentrate usage, putting in higher digestibility silage increases animal output. He described the 'concentrate sparing effect' of silage digestibility, where having good silage means less meal is needed to get a particular level of animal performance. There is a dramatic variation in silage quality on farms with some not even supporting maintenance, while others would allow 23 litres of milk production from dairy cows or 1.1 kg weight gain from beef cattle or 173 g weight gain from lambs. This variation, according to Dr. Keady, is due to the composition of the sward being harvested, regrowth interval, harvest date and number, wilt achieved, weather, use of an additive and ensiling management. The DMD of lodged grass, for instance, can fall to be as much as 9% units in a week compared with about 3 units per week decline if the same crop was not lodged. The mean DMD of silages harvested in Ireland in 2011 was 71% DMD, compared with 67.3% in 2012.

A section of the crowd at the Irish Grassland Association Making Good Quality Silage event in Westport.



L to R: At the launch of the AutoGrassMilk Project were Deirdre Hennessy, Irish Grassland Association President, Eddie O'Donnell, Irish Grassland Association, Dr. Bernadette O'Brien, Teagasc Moorepark, Philip Donohoe, Irish Grassland Association and Michael Bateman, Irish Grassland Association

AUTOGRASSMILK: A NEW VENTURE FOR THE IRISH GRASSLAND ASSOCIATION

Dr. Deirdre Hennessy and Philip Donohoe, Irish Grassland Association

Introduction

In 2012 a strategic review of the Irish Grassland Association (IGA) was completed and a new Five Year Plan launched in September 2012. One of the recommendations in the Five Year Plan is to develop a programme which supports the agricultural industry. In 2011 Teagasc Moorepark approached the IGA with a proposal of becoming involved in research project funded by the European Commission. The proposal was a dairy based one called AutoGrassMilk – innovative and sustainable systems combining automatic milking and precision grazing. The project application was successful and the project commenced in January 2013 and will continue for a three year period. The project is a SME Association Project funded through the European Commission Seventh Framework Programme for Research and Technological Development (FP7). The IGA is an SME Association as its individual members, predominantly farmers, are SME's.

AutoGrassMilk

The project team has 15 partners in six different countries, Ireland, France, Belgium, the Netherlands, Sweden and Denmark. There is one research organisation and one SME Association from each country, two SME farms, one each in Ireland and Denmark, and a management partner. The project coordinator is Dr. Bernadette O'Brien, Teagasc Moorepark.

Why explore integrating grass based systems with AMS?

Currently automatic milking system (AMS) units are widely used in continental Europe but there are very few in Ireland (~20). However, there is increasing interest in these systems in Ireland. A large body of research has shown that grass based systems are the most profitable for milk production in Ireland. It is expected that grass based seasonal calving systems will continue to dominate milk production systems in Ireland for the foreseeable future. Research in Australia and New Zealand indicates that AMS and grazing

can work together. Ireland has huge existing expertise in grazing and grassland management, while other participating countries have AMS expertise and technologies.

Food Harvest 2020 is targeting an increase in milk production of 50% by 2020. Some of this increase will be achieved within existing milk production units, particularly after quota abolition in 2015. However, land around milking parlours is a limited resource for most farmers. The number of fragmented farms is likely to increase as dairy farms expand. As well as land availability, the quantity and quality of skilled labour available to operate larger dairy units or additional milking blocks are in increasingly short supply and farmers are beginning to consider the role of automation in the milking process. Therefore, the major issues influencing the development of dairying in Ireland in the immediate future to which AMS could contribute are:

- **Fragmentation** – where farms are divided into more than one block, AMS could offer the opportunity to split the herd which would not happen if milking was conducted conventionally
- **Labour** – AMS has the potential to reduce labour costs on farms, particularly as they expand
- **Entry level** – the successful introduction of AMS in grass based systems could offer farmers an entry level into dairying allowing them to continue other employment until the farm is viable.

What will the Irish Grassland Associations involvement in AutoGrassMilk be?

The Irish portion of the funding will come to the IGA from the project coordinator who will then pay Teagasc to undertake the research, i.e. the research is contracted out by the SME Association to the research partner. The research is not fully funded by the EC and so the IGA have to cover some of the cost of the project. As the time our members commit to the project is fully funded by the EC we will use this contribution to cover the additional research costs. Therefore we need to record members attendance at relevant dissemination events (e.g. IGA conference with AMS paper and farm walks on AMS farms). As a result, we will be asking members of the IGA 'to sign in' at relevant events over the next three years. A sub-committee of the Irish Grassland Association Council chaired by Philip Donohoe was established in 2012 to oversee the project. A subsidiary company was formed in September 2012 through which the IGA's financial and management aspects of the project will be administered. This company is limited by guarantee to remove any financial risk to the IGA through its involvement in the project. The IGA will be involved in bi-annual project meetings. The IGA's biggest role in the project will be the dissemination of the research findings to our members, and indeed the wider Irish dairy farming industry, through conferences, open days, website and printed literature.

Benefits of involvement in the AutoGrassMilk Project for the Irish Grassland Association

This is the first time the IGA is directly involved in a research project. Our involvement in the project provides financial support to investigate a new milk production system for grassland farmers in Ireland. Some of the grassland management technologies developed in the project will also be applicable to conventional dairy farms, beef and sheep farms. The project is a learning experience for the IGA and through our experiences in this project we will be able to explore avenues to apply for funding in the future to support agricultural research. National funding for research is continuously reducing and if high quality agricultural research is to continue the IGA must play an active role in helping to secure funding from alternative sources. The project will also help the Irish Grassland Association to become better known in Europe as a potential partner for future projects and raise our profile to help bring leading international conferences to Ireland.

Irish Grassland Association

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