Further Developments in Carcase Classification of Beef and Lamb

Improving Grass Utilisation on Beef and Sheep Farms

A two part study funded by the Farming Connect, Farm Management Exchange Programme

John Yeomans

June 2019

The views expressed in this report are entirely my own words and do not necessarily reflect the views of my sponsor Farming Connect or Welsh Government.

Thanks

I would like to thank all the people who have helped, encouraged and inspired me throughout my life and particularly on my Farm Management Exchange travels.

I must start with my wife Sarah and sons Tom, Jack and Joe. Without Sarah's constant support, and hard work keeping the farm running during my travels, I would not have been able to even apply for this study tour. We are lucky to have many good friends and neighbours who are always available to support, advise and help.

All of the people I have met on my travels who have shared their knowledge and advice, and often in the case of my Carcase Classification investigations, even shared commercially sensitive information. I truly appreciate your openness....... in most cases!

Many people have influenced me but I must mention my late parents who always supported me.

I would like to thank Farming Connect for this tremendous opportunity. The concept of the Farm Management Exchange Programme is outstanding. Sharing and exchanging knowledge is always positive, but the idea of bringing back to Wales, like minded people from other parts of the UK and Europe to share their thoughts and experiences with the Welsh farming and forestry community is to be applauded.

I would strongly recommend applying for this opportunity to seek out new knowledge, meet some amazing people and make some lifelong friends. I have been very lucky to have had the opportunity to travel in the past to study and extend my agricultural interests. Each time I have learned something new and worthwhile for my own farming business. Get outside of your farm gate and take a look around!

Introduction

I was born and brought up in the middle of Birmingham, the son of a butcher and a librarian. I started farming with my parents after leaving the Welsh Agricultural College in 1984. I now farm in partnership with my wife, Sarah. We have three sons, Tom, Jack and Joe, all who have picked up the 'travel bug' and are working and travelling widely throughout the world. We farm around 285 acres of owned and rented upland in the rolling hills of Montgomeryshire in Mid Wales. The farm is fragmented, spread over several miles which can be quite challenging for matching grass growth to stocking pressure. We keep 80-90 mainly Limousin and British Blue suckler cows and heifers along with around 700 mainly Beulah ewes and ewe lambs. We sell store cattle, breeding cattle and a few breeding bulls alongside finished lambs, breeding ewes, ewe lambs and rams. We also sell some boxed beef and lamb direct to consumers.

My travels and experience

I have taken several flights and train journeys, and driven many kilometres, got lost in numerous parts of the UK, Northern Ireland, the Republic of Ireland and Finland, but it has all been a great experience! Who knew there were two airports in Helsinki, certainly not my hire car's sat nav!

Conscious of my carbon footprint, at home we have continued our environmental works, restoring old hedges, and planting new ones. We are looking forward to watching around 8000 hedge plants grow and further develop our farm's biodiversity. We also continually strive to improve efficiency and grass utilisation.

New hedgerow twelve months after planting on one of our hill blocks. Encouraging wildlife, providing shelter and aiding grazing control.

I have visited abattoirs, bull testing stations, farms, colleges, research establishments, butchers, supermarkets, conferences and even the Houses Of Parliament during this study tour. It has been a thoroughly interesting and enjoyable experience.

Background to my studies

My studies have been twofold:

i)   Carcase grading systems
ii)   Grass growth and utilisation

Carcase grading

I wanted to take another look at the carcase classification of beef and lamb in the UK following my Nuffield studies back in 2006. Along with many others, I am keen to try and influence a change from the current subjective, opinion based, EUROP Grid system towards an objective

saleable meat yield of primals system, which along with bringing consistency, should, in my opinion be more relevant throughout the production chain.

Establishing objective payment systems which accurately reward carcase value is of enormous importance to the beef and sheep industries world-wide, let alone the Welsh Farming Community. Technological developments such as Video Imaging Analysis (VIA) systems may now provide a means not only to overcome the concerns above but also provide the basis for a 'value based marketing system' for the UK beef and sheep sector. However, such systems must be able to predict carcase composition with a high level of accuracy in order for a value based grading system to be effective.

I first saw a pilot VIA grading system on the HCC Stand at the Royal Welsh Show in back in 2003. It struck me that such a system could have a great deal to offer British meat farmers and abattoirs. Could this type of system be what we had been looking for in order to reward us for many years of performance recording cattle and sheep here at Llwyn y Brain, and their resulting genetic gain?

I am well aware of the commercial sensitivity of the subject matter. I have tried to keep this in mind when writing this report and it is important to recognise and respect the openness of the vast majority of people I met.

My grassland study was focused around improving utilisation with particular relevance to an upland family run farm such as ours. It is well recognised that the introduction of rotational grazing can soon bring benefits of at least a 20% increase in yield and utilisation. The visit to Finland was particularly relevant due to their very limited five month grass growing season and how they maximise production with particular emphasis on the constituent species of their leys.

The Farm Management Exchange Programme has afforded me the opportunity to investigate these two subjects further.

Aims of the Study

i) Carcase classification

- to assess the current carcase classification system in the UK
- to research alternative systems of carcase assessment available and under trial
- to look at systems already in use and under trial in the UK
- to gauge the reaction of the industry to these technologies
- to look at the benefits and disadvantages of these alternative systems to the UK

ii) Improving grassland utilisation

- to draw conclusions and suggest recommendations for change in the UK
- to assess the crucial factors to improving grass and forage yield and utilisation.
- to look at how other parts of the UK and Europe are improving grassland management and utilisation
- to assess constituent species of grass leys suitable for a farm such as ours
- to look at restricting factors for improving utilisation
- to assess any negatives of these systems

- to see if we can put into practice on our farm at home what I have seen on my travels

Following the harsh winter and spring of 2013, Sarah and I introduced rotational grazing to our farming system. I wanted to improve our grass growth and utilisation in order to optimise stocking rates and reduce purchased feed. The overall aim was to improve margins as farmers are placed under increasing pressure from the changing political landscape, whilst at the same time caring for and enhancing the environment.

Further developments in carcase classification of beef and lamb

The crux of my study was to look at the systems that are currently being used in plants in the UK and Northern Ireland. What I am hoping for, not unreasonably I believe, is that on any given day, at any time of day, in any plant, within any company in the UK, the same lamb or beast should receive the same carcase classification. I do not believe that this is currently the case.

We have been performance recording since the mid-1980s, including regular weighing of our cattle and sheep, as well as back-fat and eye-muscle scanning a high proportion of the pure Beulah lambs. I believe that we are producing more saleable meat for the same weight of animal than we were years ago. Under the current subjective EUROP Grid system we do not get rewarded for this.

The EUROP Grid carcase classification system. Note 'S' added for the more extreme animals graded in mainland Europe.

Since my previous travels in 2006, a number of companies have moved towards objective rather than opinion-based systems. While there are other systems in development, for the focus of this report I will concentrate on the Video Imaging Analysis system from the German company e + v headed up by Axel Heinz.

There are several other systems in use and in development around the world such as X-Ray and 3-D. Some, such as the Meat Standards Australia Grading System, combine factors linking rib fat depth, colour, eye muscle area, ultimate pH (5.3-5.7) and breed, taking account of the Bos Indicus (tropical cattle) genetic influence affecting toughness. Their technical data shows that there is a strong link between eye muscle and overall carcase meat yield.

I was fortunate to spend some time in January this year with Australians Murray Patrick of Meat and Livestock Australia and Rod Polkinghorne who has been very involved from the outset with the development of the MSA Grading System. They called at Llwyn y Brain for an interesting and informative chat which helped focus my mind on the need for a value-based classification system. They were here in Wales working with HCC, looking at a broader approach to classification including assessing other factors such as tenderness.

Since my travels back in 2006 several companies processing lamb and /or beef have now installed e + v VIA systems. Some are clearly looking for better consistency in carcase grading as well as additional carcase and carcase yield information.

The plants I visited were:

ABP Ellesmere

ABP Shrewsbury

ABP Yetminster

Dunbia Dungannon

Farmers Fresh Kenilworth

As mentioned earlier I will not be speaking about the specifics of each plant that I visited out of respect for issues of commercial sensitivity, but I am very grateful to those that gave me their time.

Some of the research work that I saw on my travels showed accuracy levels in some plants using VIA for lamb classification to be around the upper 90% level, compared to manual/visual grading which was just over 60%. I know that if I was on our sorting gate and Sarah was sending sheep up the race, if I was only sorting 60 – 70% of them correctly, I would be in serious trouble from her!

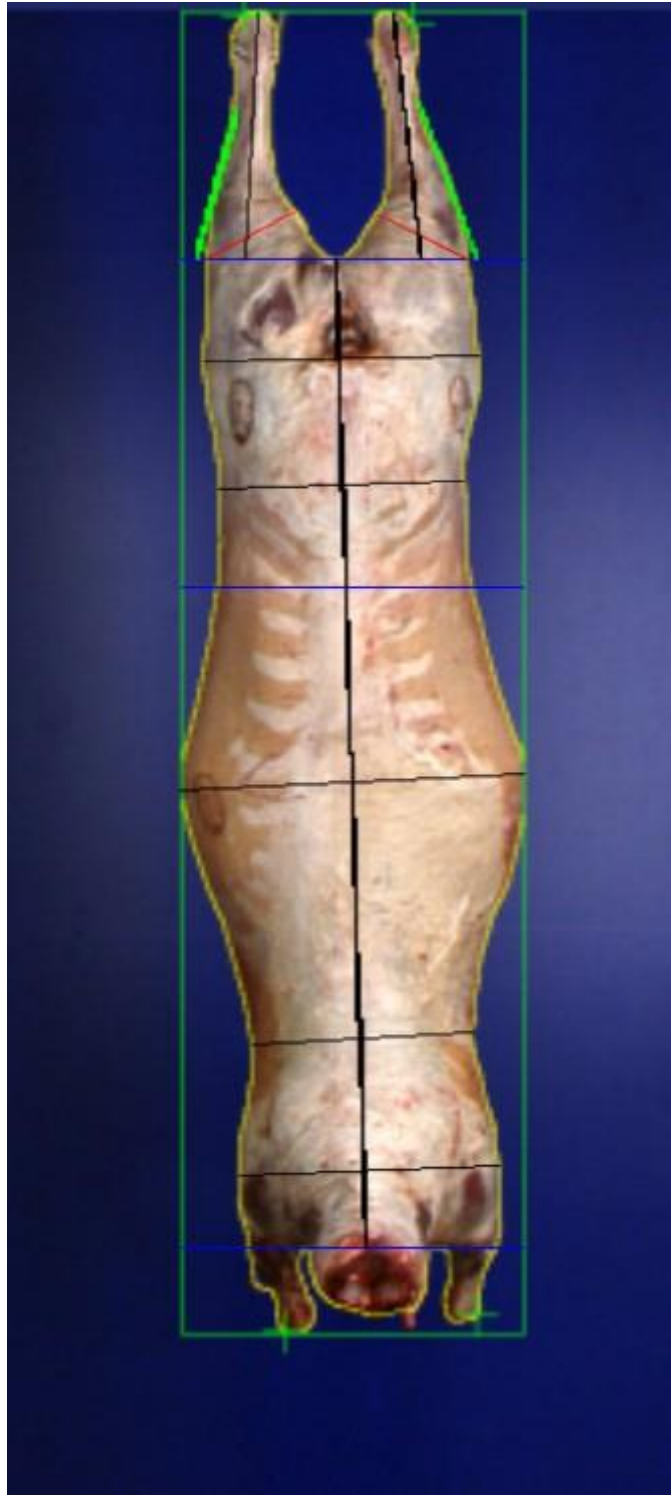e+v sheep VIA system in a UK plant I visited.

VSS 2000

Which informations are determined?

- conformation and fat class
- weight and yield of the most valuable cuts
- derivation of sort criteria

MOV   e+v   EXIT

Sheep carcase measurement points on the e+v system

To add some context, graders in many plants must cope with line speeds of around 600 lambs per hour and 250-400 cattle per day. Classifying a lamb every six seconds is clearly a high-pressure job, often with a farmer looking on and wanting the best grade possible.

Work done a few years ago by a large beef breed society and a large abattoir group showed there could be huge variation in meat retail value from similar carcases. Looking at a number of carcases of the same weight and visually assessed EUROP Grid classification, the variation in retail value was something in the region of £700. This, of course, does not mean that producers should get the wholesale equivalent of £700 more for their carcase. It means the wholesale value of some carcases is £350 less and some are £350 more than the average.

Farmer producers should not make the mistake of thinking any new system of carcase grading would necessarily mean more money for them, but improved consistency would surely be better for producer, abattoir and cutting plant. Pressure throughout the production chain means that any system needs to be accurate, reliable and able to easily handle line speeds of 600 lamb carcases per hour. In the case of the VIA lamb system, around 200 measurements are taken, momentarily, and matched to the system's memory of carcase measurements and currently in the UK matched to a EUROP Grid score. I would hope in the medium rather than long term that this would move to yield prediction. As I understand it, the VIA system was originally designed for yield prediction, so some might consider that a natural progression would be to use it for this purpose.

There is some feeling among users that, while showing acceptable levels of accuracy on conformation and meat yield, VIA systems struggle with fat assessment, although that can be augmented by other suitable systems such as near infrared spectroscopy (NIR). Another disadvantage is that if the carcase is damaged, for example during hide removal, the reading is less accurate. I do feel that more work to improve mechanical hide removal could be useful to avoid this problem.

Some of the plants I visited on my travels in 2006 would pay a batch average for these damaged carcases while others retained a human grader to visually assess the damaged carcases to determine payment for the individual carcase. These systems can work at line speeds of 600-800 carcases/hour in sheep. The extensive trials some years ago at the now dormant Welsh Country Foods plant, looked promising, especially for assessing carcase conformation and assessing lean meat yield for lambs. In Ireland 90% of beef carcases are now graded on the EUROP Grid using this same e + v system. Interestingly, amongst the plants that I visited some removed the producer details at the point where the system overseer verified the system's classification reading to further add to the credibility of the read.

Putting our money where my mouth is!

Aside from a small number of cattle sold direct to the consumer in boxes, our cattle are primarily sold as stores through the livestock market for further finishing by specialised finishers. Some females go for breeding and a handful of pedigree Limousin bulls are sold for breeding from home. Earlier this year when it became apparent that one of our young pedigree Limousin bulls, Llwynybrain Opel, would not be suitable for breeding, we took him to a plant for slaughter and classification using the VIA System.

Llwynybrain Opel - 633kg liveweight

Llwynybrain Opel

VIA assessment of Llwynybrain Opel

Measurement points of the e+v VIA beef system (example animal)

Version 1 10 051

REMITTANCE DETAIL REPORT

Shrewsbury

Vendor: 9Y0082
Yeomans & Partners

Yeomans & Partners
Llwyn Y Brain
Adfa
Newtown
Powys
SY16 3DA

Anglo Beef Processors (SH)
Battlefield Road
Harlescott
Shrewsbury
Shropshire
SY1 4AH
VAT REG   GB 245 973 626

Batch	123034
Remittance	1200332
Kill Date	03 May 2019
Buyer	ABP Direct
Quantity	1

Kill	Type	Eartag	Grade	Net Weight	Cond. Weight	P/KG	Value
47	A Young Bull	UK700764701135	U+2- (A)	385.9		367.0	1,416.2
			Total Weight =	385.9			1,416.2

Additional Charges

Description	Per Carcass	QTY	Value	VAT	Total
AHDB Levy	4.050	1	4.05	0.81	4.86
Waste Disposal	7.500	1	7.50	1.50	9.00
Classification	0.500	1	0.50	0.10	0.60
Insurance	3.000	1	3.00	0.60	3.60
Antemortem Inspection	3.400	1	3.40	0.68	4.08
			18.45	3.69	22.14

Total net Value =   1,394.11

Dressed to UK Specification. (A) = Classification carried out by Automatic Grading.   OR (M) = Manual Classification.

abp
Food Group

CATTLE CARCASE CLASSIFICATION REPORT
Carcase Services
KILL DATE: 03/05/2019

PRODUCER: 9Y0082
NAME: Yeomans & Partners
CONTACT: John Yeomans
ADDRESS: Llwyn Y Brain
Adfa
Newtown

SY16 3DA

CENTRE NAME: Shrewsbury
CENTRE NO: 5994
EEC PLANT: 4109
DRESSING SPEC: UK Spec

LOT ID: 123034

ADDRESS: Anglo Beef Processors (SH)
Battlefield Road
Harlescott
Shrewsbury
Shropshire
SY1 4AH

KILL NO	EARTAG	CAT	GRADE	NET WT	BREED	AGE MONTHS (DAYS)	TLH	HOT WT	REBATE WT	COND WT	DWG
47	UK700764701135	YB	U+2-(A)	385.90	LIM	15(27)	482	393.80	7.90	0.00	0.80

				Heifer	Cow	Young Bull	Steer	Calf
TOTAL WEIGHT:	385.90							
AVERAGE WEIGHT:	385.90	Average Weight		0.00	0.00	385.90	0.00	0.00
CARCASSES QUANTITY:	1							

The carcasses on this form were classified by (A) = Classification carried out by Automatic Grading OR (M) Manual Classification at the centre shown above. The carcasses were dressed and the hot weight rebates were calculated in accordance with the standard conditions of deadweight purchase.

Signature...................... Date 5/3/2019

Page: 1

61% killing out percentage

Views of some key industry personalities

Adam Quinney, Chair AHDB Beef and Lamb

'The present system of cattle classification using the EUROP Grid is a good predictor of meat yield and is a relatively simple and cost-effective way of classifying carcases. What it is not good at, is predicting eating quality or retail value of the carcase. There is a need to improve this information for the farmer in order to lead to improvements in the cattle genetics being used and how the animal is fed to meet ever more demanding and competitive markets. The cattle processing industry around the world is investing millions to try and find solutions either on the processing line or in the cold store afterwards. The UK industry has expressed a preference for online classification rather than the following day post slaughter. Many of the smaller abattoirs cannot warrant the investment in expensive machine classification.

There is an opportunity though to standardise the eating quality " bolt ons" at 24 hours similar to the Meat Livestock Australia system, that is being used to grade cattle for eating quality in Australia. Whilst much can be done in the processing plants we should not ignore new technologies such as 3D cameras and genomics to predict retail value and eating quality in animals, many months prior to slaughter, to aid breeding selection and management on

farm. The ultimate goal of producing high retail value carcasses with fantastic eating quality is vital for the future success of the Beef industry in the future.'

Mike Gooding, Farmers Fresh

'Farmers Fresh procures stock from across the UK to fulfill orders to 12 different European countries, and the vast majority of that trade is as whole carcasses. Consistency of grading is critically important as the grade is the basis of orders placed by customers as well as the return to producers. Accurate and consistent grading is much more important to the business than accessing meat yield to inform a cutting room, and as a farmer-owned, farmer-led company clarity around grading is central to the company's offering to its farmer shareholders who choose to supply the business on a dead-weight basis. Farmers Fresh at Kenilworth has had VIA technology in situ for over twelve months and has redesigned the line to accommodate the technology. Much work and trials have been completed to ensure individual carcasses are presented correctly and disruption to the image is minimized.

The potential benefits to Farmers Fresh and its supplying farmers remain, however the technology has yet to achieve the accuracy and consistency required by the business, to the point where the business is prepared to switch to fully automated VIA grading. Re-calibration and testing continues with carcase variation and fat cover presenting the greatest challenge to the accuracy of the technology.'

Gwyn Howells, CEO, Hybu Cig Cymru

'Hybu Cig Cymru sees great potential in moves towards objective carcase measurement. Inevitably, inconsistencies exist as a result of 'naked eye' human appraisal. Technology is being developed that could significantly and practically improve supply chain efficiency and product consistency, and offer greater information and transparency for producers.'

Jim Dobson, Chair, Dunbia

Jim Dobson feels that any change in carcase classification should be mandatory across all plants over a certain throughput. Individual companies changing system can distort throughput and it would be sensible to have the same system for all plants involved. There is more work to be done to improve the current system.

Clearly smaller plants should not need to be involved due to the financial outlay.

David Peace, Chair, MLCSL

Towards the end of last year our company acquired, from AHDB, the leading independent classification service, MLCSL (Meat and Livestock Commercial Services Limited). MLCSL's services currently focus entirely on manual carcase classification, and although we made ourselves well aware of the various initiatives in place to develop automated services, and also of those automated systems that are already available for installation, we believe firmly

that MLCSL's independence and strong expertise will mean that it will continue to play a key role in carcase classification services into the future.

Since the acquisition, we have spent much time in Europe, learning about and assessing the way carcase classification is delivered and regulated in a number of other EU member states. In particular, we have been interested to discover the interaction of regulatory authorities and other EU classification service providers with any of the automated systems which have already been deployed. Our assessment is still very much 'work-in-progress', but our view is nevertheless unchanged; that MLCSL will play a key role in ensuring the future independence of classification services, whether these are manually delivered, or by machine, or a combination of both.

To add to the growing industry interest in considering carcase yield as part of the value determination we, as are many other businesses requiring highly skilled staff, are facing increasing challenges in recruiting and training the required numbers of new staff. Put simply, it is becoming increasingly challenging to recruit and train sufficient staff and that process can take a year or more to complete. So the development of automated classification technology, as a supplement to our current services, could help us to maintain service levels to customers, and with the objective of continual improvement. A dual approach embracing new technology will provide a robust way forward to meet industry challenges.

We are therefore seeking opportunities to engage with the technological offerings in development or existence, and have indeed also been considering how we can introduce a prediction around the yield of primal cuts. I hope to be able to announce more on this topic very soon

Benefits of alternative systems such as VIA

There are several potential benefits that these alternative systems can provide:

- o because they are based on objective measurements, these systems should be more consistent than the human eye, removing inaccuracies from carcase to carcase and from plant to plant (using the same systems)
- o should be seen by producers as independent, thereby removing much of the mistrust that surrounds existing subjective grading systems
- o unlike current subjective grading systems, they appear to have the potential to assess meat yield of carcases
- o the potential to move to a payment system based on meat yield will provide a fairer payments structure for all in the supply chain if the payment structure is right
- o should lead to improved hygiene from less handling of carcase, leading to improved shelf life of the meat
- o some systems are reset between batches to maintain accuracy and give confidence to the producer
- o can operate at line speeds (carcases/hour) typical of the fastest currently available in the world (800 lambs/hour)

Disadvantages of alternative systems

As well as the potential benefits listed above, there are a number of potential disadvantages that will also need to be considered:

- o these systems are only as good as the people who design and set them, and the accuracy of the algorithms within the software on which the evaluations are based
- o damage to carcases during automated pelt removal can negate results in some systems
- o some systems may struggle with wide variation in fat class and carcase size and shape, particularly with sheep
- o there are problems of perception where the systems have replaced graders perceived by farmers as more lenient
- o movement to a payment system based on meat yield, while fairer and appropriately rewarding those producers who 'get it right', will result in some producers losing out

Conclusions

The EUROP Grid is now surely out-dated. The EU has moved on, and farming and livestock production systems have changed. The prospect of leaving the EU may mean that a move away from the subjective, opinion based EUROP Grid might be easier to achieve.

In addition, sectors of the industry have embraced genetic improvements of carcase quality in both sheep and beef cattle, but are currently not being rewarded adequately for such investments. Most abattoirs that I visited in the UK and Ireland priced on the extremes and the middle of the EUROP Grid so why is there a need for so many grades? Given that VIA is based on objective measurements, how realistic is it to calibrate it against the EUROP Grid system which itself is subjective and imprecise? Indeed, the introduction of VIA systems to meet the legal requirements of the EU for beef carcase classification are only permitted as long as it is possible to demonstrate statistically that there is a high correlation between the subjective visual assessment and VIA across the range of carcase grades typical for each member state! The EUROP Grid is not very good at predicting saleable meat yield whereas VIA is much better. Surely the time has come to introduce objective systems of carcase grading better able to reward producers for the meat yield of each individual carcase. Under current UK grid pricing systems, stock of the required fat class are subsidising over-fat animals. This is because the penalties for over-fatness are only a fraction of what they ought to be based on the extra fat trim and the labour costs of removing it, the environmental and financial costs of getting rid of that extra fat, and the reduced saleable meat yield that results. Such anomalies are widely accepted within the abattoir sector, yet no-one is willing to change on their own for fear of losing throughput and hence plant viability. Conversely, they pay premiums for increased conformation on the hindquarter that cannot be justified on the basis of increased saleable meat yield, at least with lamb. Due to the nature of the meat industry in the UK it is unlikely, without legislation, that all beef and lamb slaughter plants would move forward together to introduce a grading system based on meat yield, although I feel this would be of great benefit to the industry. These grading systems would seem more financially beneficial to plants that are doing further cutting rather than selling whole carcases. Yet, I also visited plants whose trade was primarily whole carcase based, but who clearly saw huge

value in investing in new systems to improve consistency for not just themselves, but their suppliers and customers.

Abattoirs must get the price schedule right to maintain their throughput and profitability if moving to these systems. For example, a plant I visited when travelling in the Southern Hemisphere a few years ago and that was using 'VIAscan' paid 55% of the lamb carcase price for the loin, even though this is only 12-15% of the carcase weight. Many southern hemisphere plants felt that forequarters were worth only around 50% of the value of the loin. Transparency in pricing structures will be essential so that it can lead or drive farmers in the right direction. Attitude may be more of a problem than science when looking at the pros and cons of introducing these new technologies and moving towards yield based payments. However, there is an obvious desire to find more efficient methods of assessing both carcase and eating quality.

Recommendations

A number of recommendations arise from my investigations:

- o   there should be a gradual move towards a yield-based payment system underpinned by these new technologies
- o   the payment structure should be based on primal cuts rather than the whole carcase
- o   there will be winners and losers with any new system, and I believe producers must be given a transition period to adapt (running systems side by side in a move away from EUROP to yield)
- o   there is a need for improvement in automated hide removal techniques to avoid problems associated with grading carcases with such blemishes
- o   there will be opportunities for MLCSL graders or RPA to oversee calibration and maintenance of machines to assure farmers of independence
- o   forget taste and tenderness at your peril; any new systems should also involve assessment of eating quality
- o   there is a need to develop an eating quality initiative for beef and lamb to improve the whole production chain
- o   data from these new technologies could be linked to stock recording programmes to aid genetic improvement services provided by Signet and others, thus improving robustness of performance recording
- o   to get the best out of these new technologies for the whole chain it would seem sensible for meat companies and supermarkets to work with ram and bull breeders, by providing carcase breakdown and yield assessments. This would have long term benefits for all involved
- o   more exchange of relevant information across the industry, although difficult due to commercial competition
- o   a link person through the whole supply chain to work with farmers, abattoirs and customers to try and make the most for all involved. Some companies have already introduced this role
- o   legislation is needed to bring all larger plants over a certain throughput into line to use one common system with independent verification
- o   this would require outside funding due to pressures in the abattoir sector

Unfortunately, it was my opinion that an opportunity was missed a few years ago to trial one classification system in the three main lamb plants in Wales. Although, I firmly believe the will was there, staff at Welsh Government and HCC unable to bring the plan to fruition.

With the need for political will and funding to drive this change our local MP, Glyn Davies facilitated a meeting for me with Neil Parish MP, Chair of the Agriculture Select Committee in December 2018. I had a chance to exchange thoughts with them both and Glyn is hoping that we can all meet again in July this year.

I have no particular allegiance to any system. We can keep waiting in the hope of the best system ever possible to assess yield, tenderness, or any other criteria, or we can get moving with a system which is available now. If we have a long journey to travel, do we wait until we can afford a Rolls Royce in fifty years' time, or do we buy the best car available for our current budget and start travelling now? I would rather get moving!

Improving Grass Utilisation on Beef and Sheep Farms

Where do we start?

Brent Gibbon of NuFarm, who Sarah and I have worked with for many years said to me recently, in his opinion, the two most important criteria on the journey to improve grass utilisation are:-

i)   Correcting compaction issues
ii)   Correcting pH.

Finland to Wales and Wales to Finland

Following a chance meeting between Richard Tudor, Anu Ella and Jarkko Storberg at a muck event in England in 2017, we invited them over to visit Wales in May 2018. Anu and Jarrko are amongst Finland's top grassland advisors. Whilst they were in Wales, Anu spoke at the Royal Welsh Agricultural Society Grassland Event which received wide coverage in the agricultural press, radio and television. As vice chair of the event I was pleased that their visit added an international flavour. After the challenging spring we had experienced in 2018, Anu and Jarkko's knowledge of short growing seasons and challenging weather was very welcome to us all. They also spoke at a number of Farming Connect events and visited several farms.

Me, Jarkko Storburg, and Anu Ella at RWAS Grassland Event May 2018
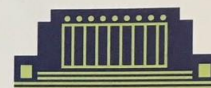
FINLAND FACTS

Nature

188,000 lakes

area 390,908 km²

75% land covered by forests

Monthly temperatures in Helsinki (2017):

20°C
15°C
10°C
5°C
0°C
-5°C
-10°C
J F M A M J J A S O N D

7% land used for agriculture

National bird whooper swan

Government

1917 Sovereign parliamentary republic

1995 Member of EU since January 1995

200 members elected for four-year terms

Parliament

President elected every six years; current president is Sauli Niinistö, who was re-elected to a second term in January 2018

Population

5.5 million

Languages
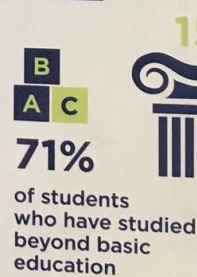
SÁ
SE
FI

88% speak **Finnish**
5.2% speak **Swedish**
0.04% speak **Sámi**

Economy

GDP (2017*)

€224 billion the annual change in volume 2.6% *preliminary

Currency € EURO

Education

B
A C

71% of students who have studied beyond basic education

Universities 15

Fun facts

National food: rye bread

12.3 l Ice cream consumed per capita

2,000,000* saunas *estimate

Consumption of coffee per capita **9.9kg**

600,000* overnight stays by foreign travellers (Feb. 2018) *preliminary

SOURCE: STATISTICS FINLAND ILLUSTRATION: ANGELINA LUZHINA

Later that month I met Richard Tudor in Helsinki. We travelled out from the city to join Anu, Jarkko and their colleagues from ProAgria on farm visits with their grazing groups. I was very taken with the atmosphere and camaraderie of the groups. The groups keep in regular contact with each other and their advisors through WhatsApp Groups. They travel throughout the world seeking new techniques and are really supportive of their fellow members with advice

and as often happens, they progress into the finals of the Finnish grassland competitions. The group meetings started with an informal chat, over some refreshments, and an update from the previous meeting.

Informal grassland group meeting with one of Anu and Jarkko's groups.

Out on the farm discussing compaction, root structure and future action for the field

They then head out to the fields to dig holes and assess the needs of the farm and business.

The openness, and free exchange of information within each group and eagerness to heed the advice of Anu and Jarkko has led to huge improvements in grass yield. Between 2010 and 2017 some groups had increased production from 5000kg dm/ha/year to 10000kgdm/ha/year. Regular soil testing was an important feature of Finnish grassland farming. Reacting to these results, correcting deficiencies, regular reseeding with high quality bespoke grass mixtures have all contributed to these impressive results.

Anu and Jarkko told me that it was a legislative requirement that all Finnish farmers soil test every five years. In Wales, soil testing can be funded through Farming Connect from 80-100%, yet only around a third of farmers have taken advantage of this opportunity. In Finland the aim was for a pH of 6.5 for grassland whilst back at home it has been more acceptable, certainly in the past, to aim for 6. In many circumstances that extra lift in pH would give a much better response to fertiliser response in sown grass species.

Just prior to our visit, Jarkko had purchased a drone to enable him and his clients to gauge crop damage and take an overview of each field's strong and weak areas.

Jarkko had recently purchased a drone to enable his clients to look at their field. Assessing frost damage etc.
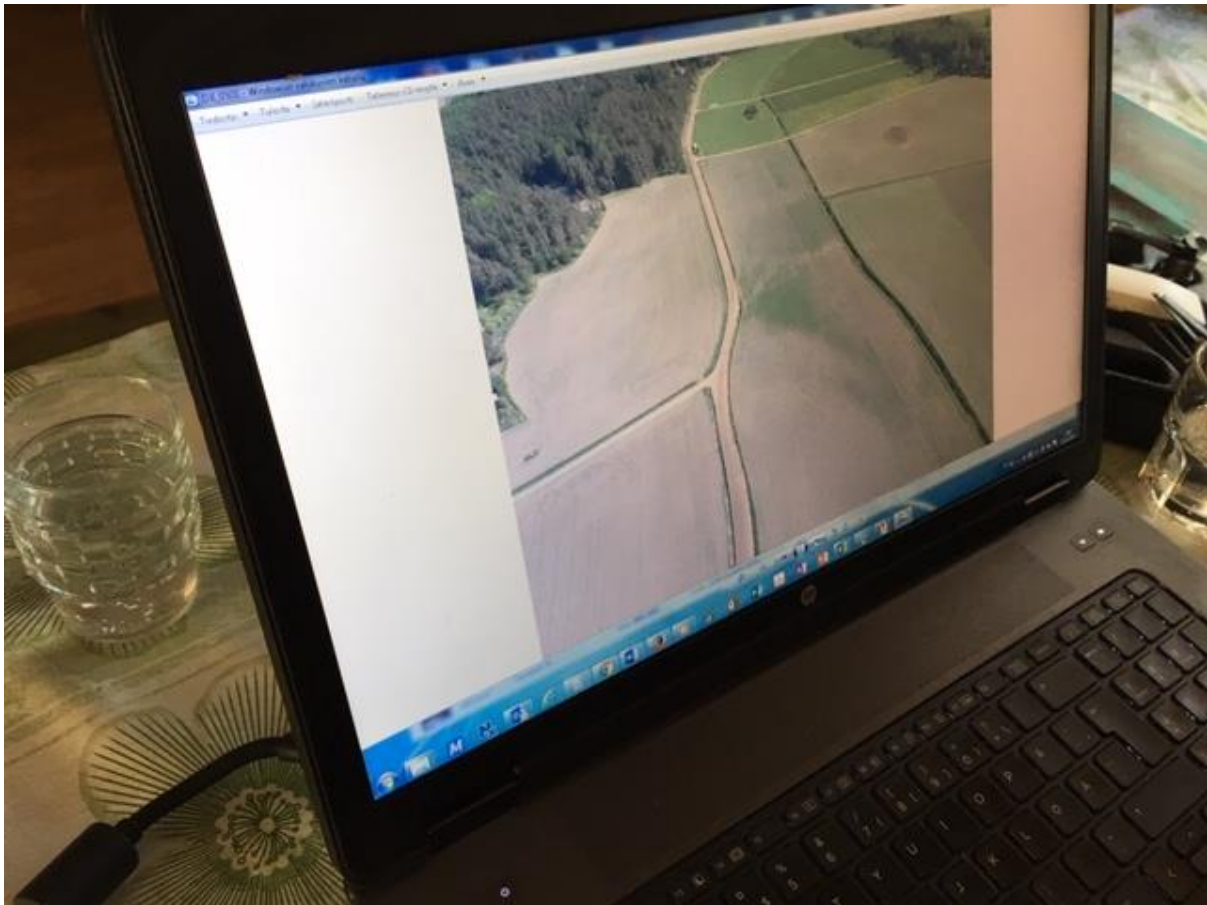
Drone footage

We also heard that regular reseeding was vital to their uplift in production. The vast majority of farms would reseed at least every five years with the top farms even more regularly.

Great emphasis was placed on timothy grass varieties, which were included in levels up of to 40% by weight within the total seeds mixture. Tall fescue and white clover were regular companion species. In some areas perennial ryegrass was also used although it had been found unsuitable to the climate in some parts of Finland.

Interestingly we were told that most leys were bespoke, made to the farm and farmer's requirements. It is more usual in the UK to sow 'off the shelf' leys from seed companies. Upland, grazing, silage or whatever the farmer and seed merchant feels is appropriate.

Up until recent years when we started to work closely with Germinal, we used the knowledge of Dr Iwan Owen and Chris Duller for advice on the best species and varieties for our specific needs. Since 2014 we had moved back to the 'off the shelf leys' which are of course much easier for the seed merchants to prepare and sell. I have recently wondered whether these are always the most appropriate for us.

For some time, we had felt perhaps we needed to return to our old practice of specific grasses and varieties for certain fields according to what we had planned, alongside the soil type and

topography. The Finnish trip certainly set me thinking about how we could apply some of what I had seen, back on the farm at home.

All of the people we met were very open about their practices and the challenges to their businesses.

At Timo Suni's dairy farm, we were joined by soil specialist Tuomas Mattila. His thoughts on soil compaction and measuring it with a simple probe were compelling. Using a simple steel rod with a T bar handle, he said 'use your hands, biceps and head'. Think about what the probe is encountering. Since returning from Finland we have now made a copy of Tuomas's probe as an aid to assess compaction at Llwyn y Brain.

Toumas assessing root structure and compaction.

At Johanna Jahkola and her family's farm we saw some of the quietest cattle I have ever come across. They used electric fencing to aid grazing pressure, cattle were moved every few days to fresh grazing.

Johanna Jahkola and her Hereford herd.

Next we travelled to Niko Ukkonen, who is one of Anu's top farmers. His surname meant thunder in Finnish and he had arms like Thor! Despite Finland's worst drought for many years he was still achieving tremendous grass yields and was only days away from harvest on his best fields when we visited.

Niko and Anu showing the use of a sward stick for assessing grass yield.

On our final day we gave short presentations to the ProAgria staff about our home farms and what we were hoping to gain from our visit, and how we may put it into practice back on our home farms in Wales.

ProAgria consultants.

I was particularly interested to learn that after we had left, some of the staff were meeting representatives from allied industries to discuss cases of concern. These were farmers that had been highlighted with financial and/or mental health issues. This is particularly relevant back home with many farmers feeling under considerable pressure from the uncertain future regarding Europe, Tb, financial and many other challenges.

Our last visit was to Teroho Hosike. Primarily an arable farmer, he was interested in expanding his beef suckler herd using rotational grazing. Richard and I were able to explain our experiences and suggest a potential layout of grazing paddocks for him.

On returning to the UK I visited several other farms for inspiration, including Marcus and Carolyn Bullock and their rotationally grazed Lleyn Flock, and Adam and Sarah Quinney with their Easy Care flock and Saler and Angus cross sucklers.

Republic of Ireland

In October Sarah and I had the opportunity to visit the Republic of Ireland with our Dunbia, Randall Parker, Sainsbury's Lamb Group. It was a whistle stop tour with a lot crammed into a two day visit.

We visited a number of research institutions and farms, bull testing stations and looked at some of the practical work that Teagasc were carrying out on commercial farms. I was particularly impressed with their work with Pat Molloy in Tullamore as part of the Teagasc Green Acres Project. The 60 acres of land belonging to Pat that we were looking at had traditionally been grazed with around 60 dairy bred beef cattle with not much in the way of internal fencing. Previously his cattle drank from a ditch which was not ideal. Under the guidance of Teagasc staff, the ditch was fenced off and a solar powered water pump purchased.

'Clean Acres' – Pat Molloy, Tullamore Spring 2018

'Clean acres' – Pat Molloy, Tullamore – Summer 2018
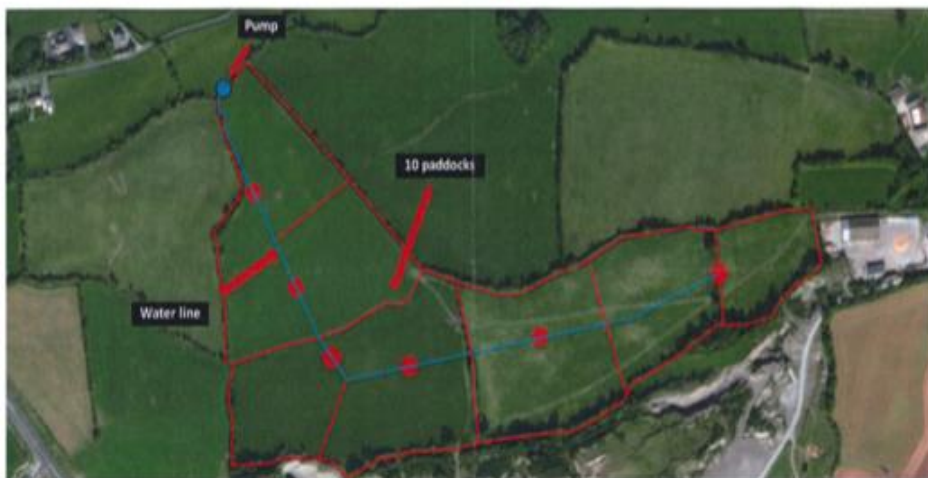
Not only did this run a small pressure pump, but also powered an electric fence energiser, via two leisure type batteries. This had enabled the formation of ten paddocks with ample water to each. A rotational grazing system had been implemented and stocking was already up to 100 cattle. Pat has increased this number to 126 this year! No reseeding had taken place as yet. This was being achieved simply through better utilisation and by resting paddocks to allow pasture recovery between grazings. Clearly a huge improvement in stocking rate from an outlay of around 3-4000 Euros for the solar unit and the electric fencing equipment, troughs and piping. We were really impressed with this concept.

The solar powered water pump and electric fence set up that has revolutionised Pat Molloy's grazing and more than doubled his stocking rate.

Northern Ireland

I went to Northern Ireland later in the autumn of 2018. I visited dairy, beef and sheep farms, an abattoir, along with a tour of the CAFRE Greenmount beef unit. Again, I was impressed with the quality of grassland management and high stocking rates. Some of the sheep farmers I met were contracted to supply a large supermarket. They were very pleased with the relationship, and the security it offered them in these uncertain times.

There was clearly huge pride in Greenmount and friendly rivalry with another institution, Hillsborough. Both appeared to me to receive strong support from the government in Northern Ireland. I felt that there was a real sense of linkage and pride between agriculture and the wider population in both NI and south of the border, sadly lacking on this side of the water. I was told that Greenmount is regularly reviewing the needs and challenges of Northern Irish agriculture and amending its farm policy accordingly.

Conclusions

Factors for improving grass and forage yield.
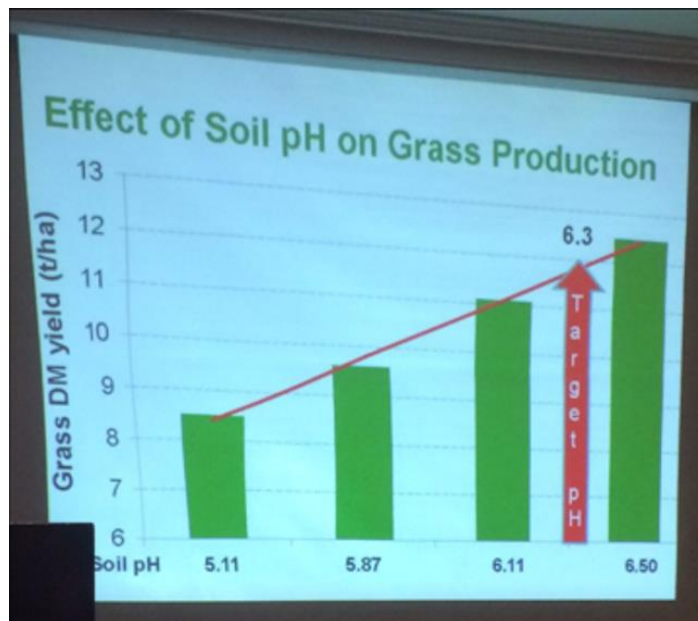
The graph above that I have borrowed from Richard Tudor, well demonstrates the need to strive for optimum pH.
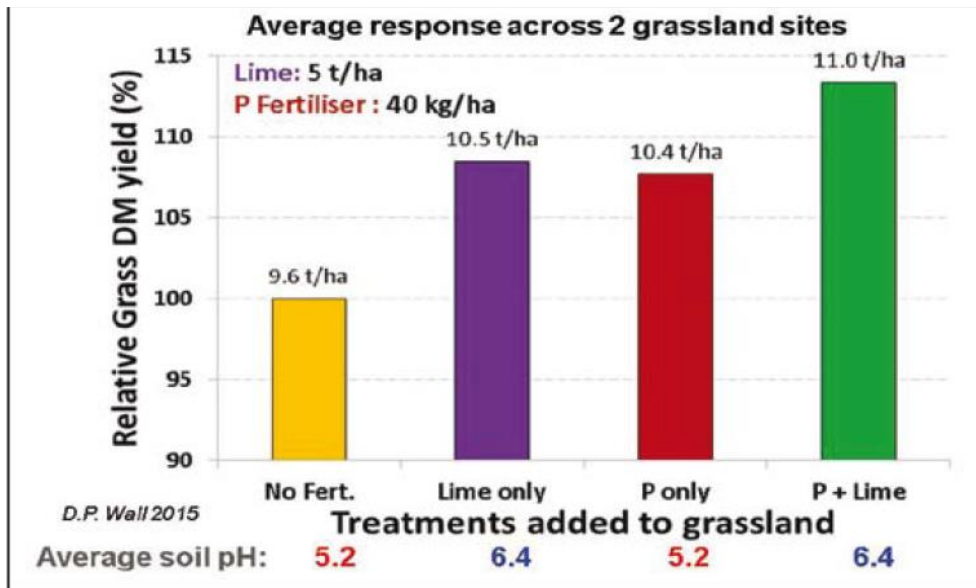
Figure 2. Relative grass DM yield response in grassland treated with Lime (5 t/ha of lime), P fertiliser (40 kg/ha of P), and P + Lime over a full growing season

From what I have seen on my travels, I believe the highest performing beef and cattle businesses also have high stocking rates.

Figure 1. Relative ewe carrying capacity (May-October) of permanent pastures receiving different nutrient inputs
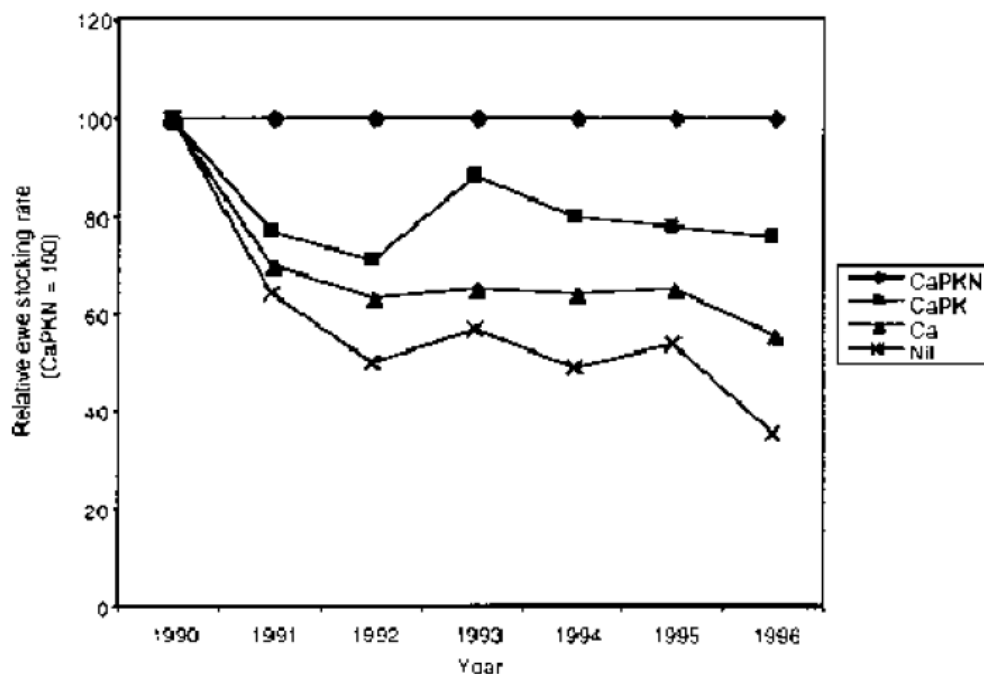
Llwyn y Brain is a fairly heavily stocked farm, in terms of the type of farm we have and its fragmented nature. Due to this we do have an abundance of farm yard manure. We use a lot of straw as all our stock are loose housed. I have said for many years we have the straw three times. The animals eat it, they lie on it and they give it us back as a fertiliser and soil

builder and conditioner. I have never viewed muck as a waste product. It is a huge asset to us. It is important to remember this.

Value of organic manures

	Crop available N[1]	Total phosphate	Total potash	Approx. financial value[2]
	kg/t or kg/m³			£/t or £/m³
Cattle FYM (old)	0.6	3.2	9.4	£7.15
Pig FYM (old)	0.7	6.0	8.0	£8.55
Cattle slurry (6% dry matter)	0.9	1.2	2.5	£2.71 (£12.20)
Layer manure	5	10.5	13.1	£17
Broiler litter	8.4	17	21	£28
Digested sludge cake	1.7	18	0.6	£14.35

[1] Assumes spring surface (broadcast) application.
[2] Financial value is based on AN @ £264/t (77 p/kg), TSP @ £335/t (71 p/kg), MoP @ £282/t (47p/kg)

ADAS

Aside from the important factors above, good fencing and water supply rank highly in the list of criteria essential for improving grass utilisation.

Many of the people I visited had made huge strides in stocking rate and grass yield without reseeding. There was however, a strong belief in Finland and with a number of my other hosts that the production lift in regular reseeding with the most suitable component species and varieties of grass and forage more than paid for the financial outlay.

It is important to select a grass and forage mixture which is most suited to the purpose and site for which it is intended.

As already mentioned, good fencing and water supply are crucial, be they temporary and portable or permanent. At home we have found portable solar fencing units are well suited to our needs.

In my view the negatives of rotational grazing are few. Perception may be one. Seeing large numbers of livestock on a small area can raise concerns from some quarters. Poaching can be an issue in some weather and on wetter ground, but we have found that the land and the ley soon heal if stock are moved regularly. There is also clearly a cost to setting up fencing, water etc. In our experience this is well worth the investment. Tangled electric fencing wire can also test one's spirits.......luckily as an avid yoga practitioner I am able to remain calm in such times of stress....whilst Sarah gets to the bottom of the knots and loops!

The biggest barrier to giving these things a go is in the farmer's head!

What have I learned and how are we using my findings at Llwyn y Brain?

On my return from Finland I approached a number of people who Sarah and I have worked with before to put together a project to increase production on one of our hill blocks. Particularly helped by Chris Duller and Iwan Owen, we have submitted a European Innovation Project assessing the suitability of Finnish timothy at increasing inclusion levels over a three year trial. The hill block runs to 1400 feet above sea level and is mainly wet deep peat.
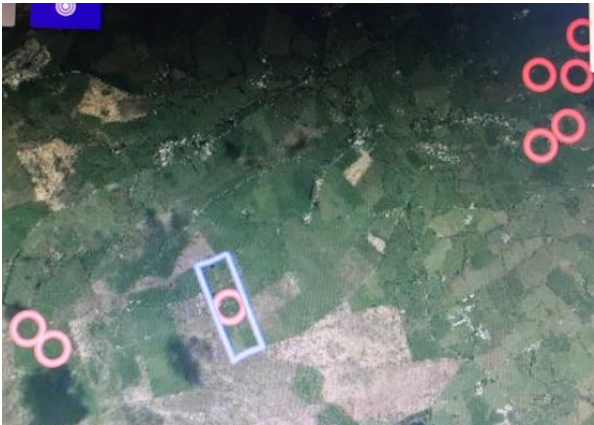
Red rings denote the spread of our land parcels.
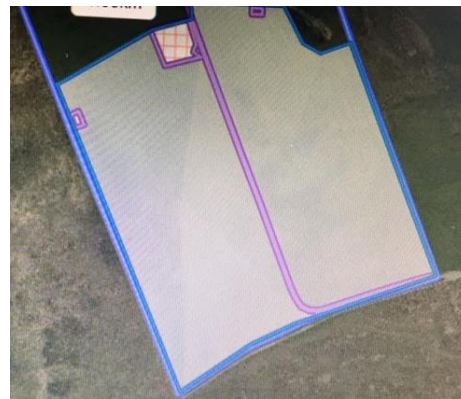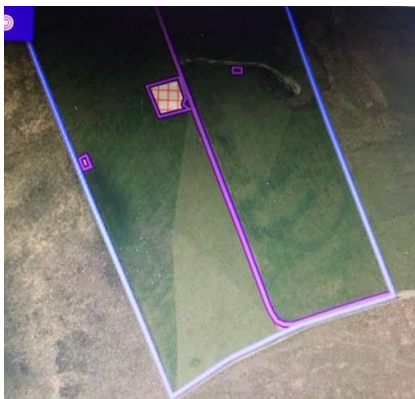
As can be seen from the above photo, we have already been using rotational grazing. Shaded area denoted main site for the Finnish timothy trial.

First, soil testing of the nine plots was carried out. The existing vegetation was sprayed off with Snapper at a rate of 3.9l/Ha in 200l of water. Snapper is a dual salt, glyphosphate with whetter.

The plots were then topped.

Lime applied as required.

The seeds were sown using two different establishment methods.

Scratching and sowing using an Opico Air Seeder and Spring Tine Harrow.

Surface following two passes at 90 degrees with OPICO Harrow, seed sown at half rate (x 2).

Moores Unidrill slot seeder.

Showing surface after seeding with a Moores Unidrill on the left of the photo, two passes of the OPICO Harrow on the right.
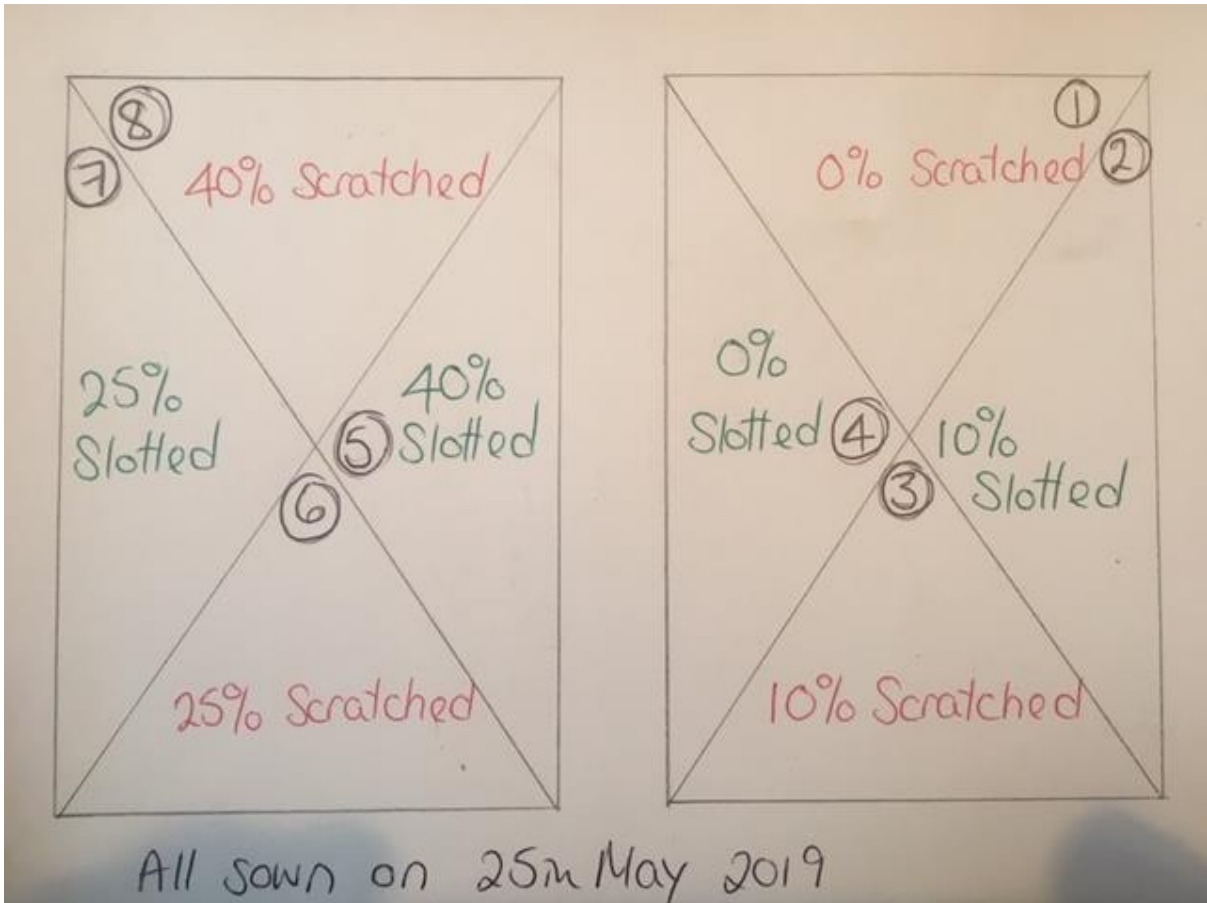
Layout of the plots.

The seeds mixture used increasing levels of Diandra Finnish timothy, imported on our behalf by Julian Godwin at Foxley Farm Supplies. Starting with zero and rising through 10%, 25% and 40%, by weight, with corresponding reductions in ryegrass content.

Label No: D6888261

Seed Mixture of / for

Agricultural Use

Ref No: 7256/570

Month & Year sealed: 05/19

Weight: 14 KG

List of Species and Varieties:

FOXLEY SEEDS

Control Mix

7% Tonic Plantain
25% Toddington Late PRG
20% Aberchoice Late PRG
20% Romark Late PRG
21% Abergain Tet Late PRG
3.5% Rivendel White Clover
3.5% Merwi White Clover

14kg Total – This Pack 1 Acre

Seed Mixture of / for

Agricultural Use

Ref No: 7256/571

Month & Year sealed: 05/19

Weight: 14 KG

List of Species and Varieties:

FOXLEY SEEDS

10% Timothy

10% Diandra Timothy
7% Tonic Plantain
20% Toddington Late PRG
18% Aberchoice Late PRG
18% Romark Late PRG
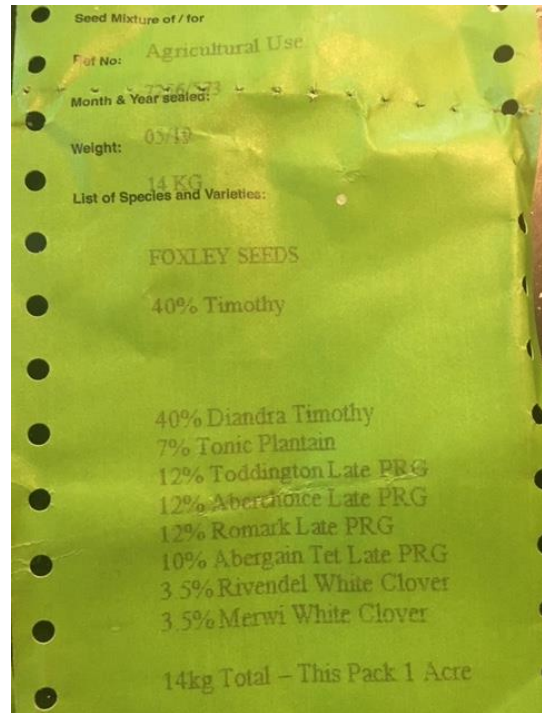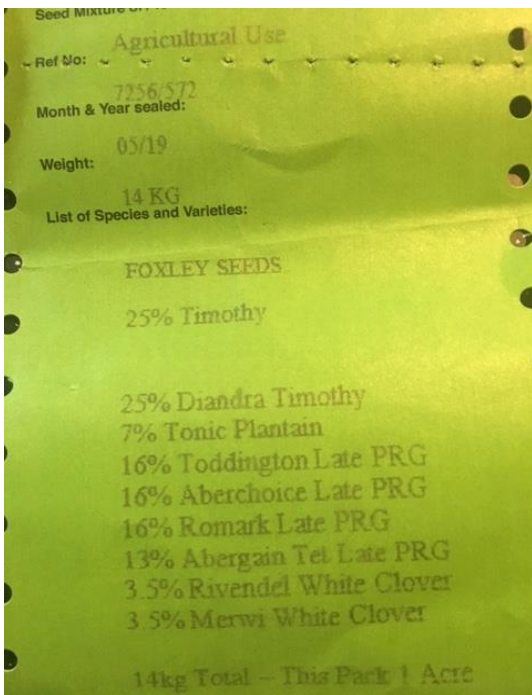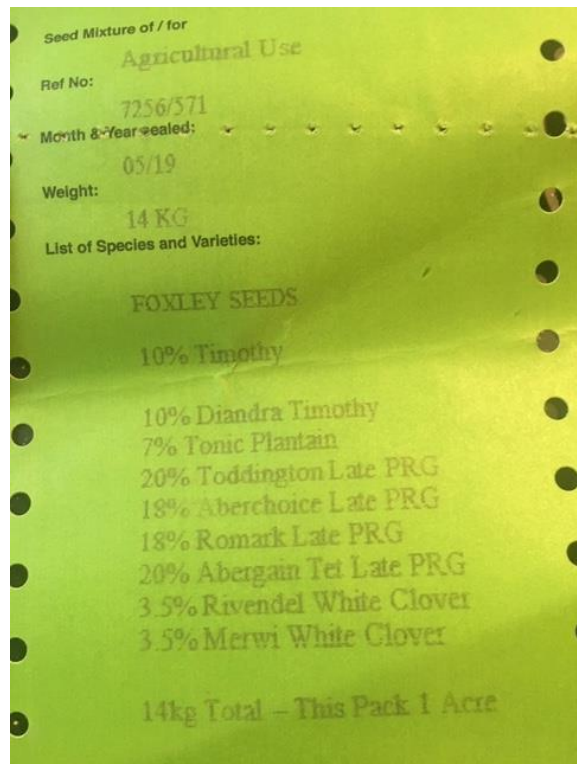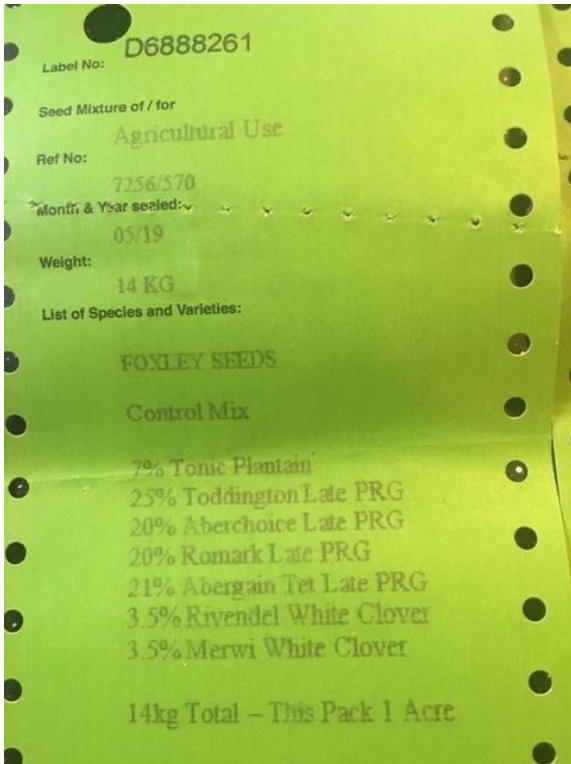20% Abergain Tet Late PRG
3.5% Rivendel White Clover
3.5% Merwi White Clover

14kg Total – This Pack 1 Acre

Seed Mixture of / for

Agricultural Use

Ref No: 7256/572

Month & Year sealed: 05/19

Weight: 14 KG

List of Species and Varieties:

FOXLEY SEEDS

25% Timothy

25% Diandra Timothy
7% Tonic Plantain
16% Toddington Late PRG
16% Aberchoice Late PRG
16% Romark Late PRG
13% Abergain Tet Late PRG
3.5% Rivendel White Clover
3.5% Merwi White Clover

14kg Total – This Pack 1 Acre

Seed Mixture of / for

Agricultural Use

Ref No: 7256/573

Month & Year sealed: 05/19

Weight: 14 KG

List of Species and Varieties:

FOXLEY SEEDS

40% Timothy

40% Diandra Timothy
7% Tonic Plantain
12% Toddington Late PRG
12% Aberchoice Late PRG
12% Romark Late PRG
10% Abergain Tet Late PRG
3.5% Rivendel White Clover
3.5% Merwi White Clover

14kg Total – This Pack 1 Acre

Seeds mixtures sown.

Fertiliser in the form of TSP 46% and CF Single Top 27.0.0 12S were applied as required by the soil analysis.

We are also hoping to use a solar powered system similar to the one we saw in Ireland to power the electric fencing system and pump water around the hill to the existing troughs. 2018 saw us carrying water to the hill in an IBC tank. As I stated earlier, water access is an essential part of successful rotational grazing.

It was then rolled. We plan to have two or three cages on each plot to monitor performance and yield. We will also compare to a further Glastir 'No Inputs' area on the same hill. Richard Tudor is also planning to use Finnish timothy at his farm in Llanerfyl.

We look forward to the results, which will be monitored and measured over the next three years, by Chris Duller, Iwan Owen and hopefully some students from Aberystwyth.

We plan as each year goes by, to act on the results using the best performing ley elsewhere on the farm and choose the most suitable establishment method for our requirements.

DEF1005 (2424)

MIXTURE

Label No: D7429207

Seed Mixture of / for **Agricultural**

Ref No: **18/30826/2424**

Month & Year sealed: **08/18**

Weight: **15.000** **Kg NETT**

List of Species and Varieties:

HSG 3 with Timothy

VARIETIES	KILOS
ABERZEUS Lolium perenne	3.000
ABERWOLF Lolium perenne	3.000
ABERGREEN Lolium perenne	3.000
ABERCHOICE Lolium perenne	4.000
PRESTO Phleum pratense	1.000
ABERHERALD Trifolium repens	0.450
ABERPEARL Trifolium repens	0.300
ABERDAI Trifolium repens	0.150
ABERACE Trifolium repens	0.100
Total:	15.000

UK CERTIFYING AUTHORITY: Defra/NAW/DAERA/SG

**ONLY THE INFORMATION GIVEN ABOVE
CONSTITUTES THE OFFICIAL LABEL**

Seeds mixture at home using timothy.

Back at Llwyn y Brain, this spring we have added timothy back into our seeds mixtures as we reseed.

We are also trying to improve our rotational grazing infrastructure, with the addition of nine water troughs in four fields to enable us to back fence to improve resting and re-growth of pastures. We are also continuing our double fencing and hedgerow regeneration programme.

Installing the water infrastructure at home. Spring 2019.

Getting the grazing system underway with forward and back fences, to help reduce prolonged poaching and aid speedier grass recovery and re-growth.

The back fencing has made a big difference. Previously on four of the fields grazed by cattle, the only available water was from natural sources; the river and some ditches. We are gradually fencing these off as an aid to our flock and herd health status. It is now, well recognised that water flowing through holdings with other livestock upstream can be a source of infection.

Environmental Benefits

What we are trying to achieve is clearly not for everyone, but I firmly believe that productive farming and care for the environment do not exclude each other. Indeed, since we have introduced rotational grazing we are seeing a definite increase in wildlife, red kites, lapwing, curlew, lark and hare, along with many other species. Much of the wildlife seems to like the varied sward heights that rotational grazing provides. Through some local beekeepers who we have been working with, there will soon be beehives on the hill, for the summer, along with the three they already have with us at home.

Lapwing nest and hatched lapwing chick on our rotationally grazed pasture at around 1400 feet.

Conversely, in my humble opinion, a number of hills subject to destocking and under-grazing through government policy, seem to be becoming more of a fire hazard than a haven for nature. The very things that were aiming to be protected have become shaded out.

Recommendations

- Regular soil testing every five years (ironically, 80-100% funded soil testing is available in Wales through Farming Connect and yet only around 33% of holdings have taken up the opportunity
- correcting pH, Phosphate and Potash status
- correcting any compaction issues
- sward assessment and reseed where necessary
- good fencing to contain stock. Temporary or permanent is immaterial
- good drinking water supply
- stock heavily and move regularly
- rotational grazing does not suit every animal. Be aware that some may need extra care, and removal from large groups
- give different techniques a try and see what suits
- seek advice. There are plenty of people willing to share their experiences
- the biggest barrier is in the farmer's head!

The ongoing development of our farm is a long process and we are learning every day. The opportunity to travel has been of great benefit both to me personally and hopefully to our farming business.

Finnish timothy grown at Llwyn y Brain, 2019

Acknowledgements

David Lightfoot ABP\

Jim Dobson Dunbia

Alison Harvey Dunbia

John Brocklehurst Ex Sainsbury's

Matt Penfold Sainsbury's

Axel Heinz   e+v

Mike Gooding Farmers Fresh

Marcus and Carolyn Bullock Bank Farm Lleyn

Adam Quinney AHDB

Gwyn Howells HCC

David Peace MLCSL

Richard Miller Fendt UK

Brent Gibbon NuFarm

James Holloway CF Fertilisers

Nick Rider Opico

Julian Godwin Foxley Farm Supplies

Stuart Andrew

Pete Turner

Einir Haf Davies Farming Connect

Gwenno Griffiths Farming Connect

Glyn Davies MP

Neil Parish MP

In Finland:

Anu Ella ProAgria

Jarkko Storburg ProAgria

Riikka Makila ProAgria

Anni and Rauli Jalonen

Leena Lahteenmaki

Perttu Uusitalo

Timo Suni

Tuomas Mattila

Johanna Jahkola

Niko Ukkonen

Teroho Hosike

<u>In the Republic of Ireland:</u>

The Teagasc staff

Pat Molloy

In Northern Ireland:

Stevie Houston

Jen Campbell MRCVS

Barney O'Kane

Steven Johnson CAFRE Greenmount

Steven Clyde CAFRE Greenmount

Eddie Boyd Dunbia

Sam Chesney

John Martin OBE

Crosby Clelland

Daryl McGlaughlin