

A Nuffield Farming Scholarships Trust Report

Award sponsored by

David Allen, Esq.

All Winter Grazing for Sheep

Michael Miller

July 2015

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A Nuffield (UK) Farming Scholarships Trust Report



Date of report: July 2015

"Leading positive change in agriculture. Inspiring passion and potential in people."

Title	All Winter Grazing for Sheep				
Scholar	Michael Miller				
Sponsor	David Allen, Esq.				
Objectives of Study Tour	To extend the knowledge of Sheep All Winter Grazing as practised in the UK.				
	To highlight the potential and limitations of All Winter Grazing.				
	Look at other wintering options.				
Countries Visited	Ireland, New Zealand, Australia, Canada. Northern Ireland, Wales, Scotland.				
Messages	 Grass All Winter Grazing can be successfully achieved with a moderate stocking rate. Higher stocking rates require additional away grazing, forage crops or conserved forage. Feed budgets are important to optimise farm output and alleviate potential shortages and loss of production. Pasture quality needs to be assessed for accurate feed allocation. Extended grazing is achievable on all farms, reducing housing costs. Grazing residual levels can have an important impact on future grass output and need to be closely monitored. 				

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DISCLAIMER

The opinions expressed in this report are my own and not necessarily those of the Nuffield Farming Scholarships Trust, or of my sponsor, or of any other sponsoring body.

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1. Introduction

I feel it is important that, before you read, browse or just take in the main conclusions/ recommendations of my report, you have some context of my farming career and background.

I was born in April 1971 in Dorset, a dairy farmer's son with an older brother and sister. We had a busy childhood on the farm, either helping out or riding ponies throughout the school holidays. Both my parents are keen horse people, my Dad being Champion Point to Point jockey in the 1970s and a Master of Foxhounds, so horses and riding have always played a large part in my life.

From the age of 16 I rode regularly as an amateur jockey amassing 175 Point to Point wins and 21 National Hunt winners - something I am very proud of.

Formal agricultural education came in the shape of a 2:1 Honours Degree at Plymouth University (the now sadly-closed Seale Hayne College). My sandwich year was spent in New Zealand for 7 months, then working for ICI on crop trials in East Anglia.

On leaving university I worked on an arable/beef farm in mid Dorset, and followed on to contractfarm the unit when the owner retired. During this time I established a flock of Polled Dorset ewes, lambing in the autumn for the Waitrose Dorset Lamb scheme. This fitted in really well with the arable operations. My future wife Anna joined me at this point and we set up a 5000 free range hen unit also supplying Waitrose.

In 2006 an opportunity arose to share-farm 1000 commercial ewes with a local farmer/landowner. It seemed the right step at the time to become a large sheep farmer as opposed to a small arable farmer with about 120ha of cropping. At the same time my brother, who had been farming the family farm, was moving to pastures new. It was decided amongst the family that Anna and I would move



Figure 1: My wife Anna and I have 2 lovely girls, Maisy 8 and Josie 5, who are both pony mad

back "home" to farm the 100ha former dairy farm.

The predominantly grass-land unit went into organic conversion in the first year. We set up a single suckler beef herd and moved one 3000-bird layer shed with us. The latter only lasted a few years due to a diminishing profit margin and heavy clay soils being not wholly suited to ranging birds! Anna also began a "glamping" enterprise in partnership with Featherdown Farm Days.

2. My Nuffield Farming study.

2a. Where did the journey begin?

Horse racing had taken up a large part of my adult life to this point, and farming – well, to be honest, it was what filled the time between hurtling over fences at speed. My farming achievements could best be described as fairly average. But following my retirement from riding I knew things had to change and, with a flock of 1400 commercial ewes and an expanding flock of pedigree New Zealand Suffolks, I had great potential to give my sheep farming career a good kick up the backside.

In September 2012 I attended a SAC and Eblex open day entitled "All Winter Grazing" (AWG), held at Dave Sanders's farm in Cornwall. A host of industry experts including John Vipond, Rhidian Jones and Liz Genever were all at hand to explain the philosophy behind the idea.

Dave Sanders initially had the idea of bringing the New Zealand-inspired controlled grazing system back to the UK and had worked with John Vipond the previous winter with his flock of NZ Romneys to see how, practically, AWG could work in the UK climate. The results were encouraging and more farmers were invited to take up the system for the approaching winter season and join a discussion group to share experiences and ideas. I was one of about six farmers who took up the challenge!

Over the following two winters AGW was adopted for the share farming flock. The Southern Winter-Grazing discussion group met regularly, facilitated by John Vipond. Experiences were shared and we had a guest speaker, John Scandrett from New Zealand, to give us his expert views. A second, Northern group was set up, many of whose members visited us in Dorset, and indeed I also travelled to Northumberland to see them in 2013.

A Nuffield Farming Scholarship had been on my radar for a few years and it was John Vipond who suggested undertaking a study on AGW, potentially to see first-hand how the NZ farmers are using the system, and also to find out how other international farmers are taking their stock through the winter period in their respective countries. This report and its findings have not been written for those already well established in AWG techniques, but more for the sheep farmer who may be on a traditional set stocking system, who is willing to learn more about grazing systems

Over the past 3 years my knowledge of best practice across all the elements of profitable sheep farming - from genetics to flock health, nutrition, grassland management etc. - has improved massively: but I have to stress that I started from a very low base. This report and its findings have not been written for those already well established in AWG techniques, but more for the sheep farmer who may be on a traditional set stocking system, who is willing to learn more about grazing systems and how they can improve the profitability of their flock by low cost management decisions.

I unearthed no "silver bullet" in the depths of Southland , NZ!

So what I am saying in essence is that, if I had got my hands on this report 5 years ago, I like to think there would have been a lot of information in it I would have found really useful at that stage, which





could have been implemented in my own farming business. Hopefully we can get more and more of the 22 million sheep in the UK utilising winter grass and forage crops to better maintain a strong viable sheep industry.



Figure 2: Winter grazing at home in 2012

2b. "All Winter Grazing" versus "All Grass Wintering"

I suppose there can be some confusion between the two descriptions in the sub-heading above. I have had many farmers comment that: "We don't have enough grass for the whole winter" or: "The ground gets too wet for us to do that". In its pure sense **All Grass Wintering** as advocated by EBLEX in their *Better Return Programme* is just that: using solely grass on farm to see you through a 110-day winter from post tupping to lambing. This can be achieved, depending on grass growth through

winter and the farm's stocking density. Obviously the South West of England is more favourable for winter growth than the North.

I didn't want my study to tie me down just to the pure, grassonly wintering system, but additionally to allow me to explore the other grazing options on offer in the form of various forage crops, with the ultimate aim of trying to avoid the extra costs of bringing the sheep into a barn. Indeed, in Canada the grass growth in winter is zero - and that's if you can see it through the snow - but they have some novel feed options. Indeed, in Canada the grass growth in winter is zero - and that's if you can see it through the snow but they have some novel feed options.

So, to simplify and avoid any confusion, from now on I will refer to both these systems combined as:

All Winter Grazing or AWG

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3. All Winter Grazing

3a. Where did it start?

Rotational grazing is far from a modern concept. Rhidian Jones from SAC gave me an amazing piece written by **John Anderson in 1777** about cell grazing in Scotland at that time.

"To obtain this constant supply of fresh grass, let us suppose that a farmer who has any extent of pasture ground, should have it divided into 15 or 20 divisions, nearly all of equal value: and that, instead of allowing his beasts to roam indiscriminately through the whole at once, he collects the whole number of beasts that he intends to feed into one flock, and turns them all at once into these divisions; which, being quite fresh, and of sufficient length of bite, would please their pallet so much as to induce them to eat of it greedily, and fill their bellies before they thought of roaming about, and thus destroying it with their feet.

And if the number of beasts were so great as to consume the best part of the grass of one of these enclosures in one day, they might be allowed to remain there no longer; giving them a fresh park every morning, so as that same delicious repast might be again repeated.

And, if there were just so many parks as there required days to make the grass of these fields advance to a proper length after being eat bare down, the first field would be ready to receive them by the time they had gone over all the others; so that they might be thus carried round in a constant rotation."

The concept of AWG was probably first developed in New Zealand and Australia as far back as the 1950s, when a short-lived but extreme increase in the wool price via American demand as a result of the Korean War gave both countries a massive economic boom. The sheep population grew dramatically and farms had high stocking densities to maintain throughout the year. With slower winter grass growth large numbers of sheep would be mobbed up and given a small fenced area to graze for a day. No actual consideration was taken of the intake required for an individual sheep. It was just a case of trying to keep as many sheep as possible alive through the winter on the land available, so the wool could be taken the following season. The ewe having a lamb was a bonus but not essential. Someone described it to me as controlled starvation!

Over time, as lamb meat became the main income for the sheep producer, more attention to the ewe was needed if she was to perform to her optimum. With the predominantly grass-fed outdoor flock in NZ, coupled with all agricultural subsidies being withdrawn in 1984, a new focus on grassland management was needed. This led to the fine-tuning of the winter cell-grazing system with the emphasis on the ewe's nutritional needs to maintain her body condition score through the winter, so as to be in peak condition for the most important period of her year, lambing.



3b. The fundamentals

When I visited Dave Sanders's farm, I was really looking for answers on a better way to get my ewes through that difficult late winter stage rather than have to use expensive conserved forage or concentrates. I had no adequate housing for the majority of the flock. I'm sure I'm not the only farmer who has got to February and thought: "Help - where next?". We had a fair proportion of free draining permanent pastures on the farm so we really had an ideal setup to start AWG.

The theory behind AWG is to utilise grass which has been stockpiled in the late autumn, plus any extra growth which may be achieved through the winter period. Grass utilisation on a set stocked system may be as low as 50% whilst, under controlled grazing, this can be raised to around 80%. Winter grass quality can be surprisingly good: analysis from my own farm in December on

permanent pasture swards showed an ME of 10.5MJ/kg and Crude Protein 22%. Having said this, by mid-January as a result of dead matter accumulation as sward senescence exceeds leaf production from November onwards, the feed value of extended grazed herbage is equivalent to low feed value grass silages. However, with a well-managed rotation and adequate feed allocation in the right climate, ewes can be successfully wintered with no supplements needed; potentially making significant savings in an enterprise which as all sheep farmers know has tight margins.

The theory behind AWG is to utilise grass which has been stockpiled in the late autumn, plus any extra growth which may be achieved through the winter period.

I like to see it as creating an outdoor grass ration for our ewes. If you brought your sheep inside to winter you would know how much silage/hay to feed your ewes, plus any extra concentrates they required on a daily basis. You would have an idea of forage DM or fresh weight you had in stock, along with the total quantities of concentrates needed to see you through until the ewes went out to grass. AWG is the same principle: it's just that the feedstocks or Dry Matter are in the field and we have to ration them there. We are taking the stock to the feed and not vice versa.

3c. Grass measuring

So first up, using a plate meter or calibrated sward stick, we need to measure what we have in the field on the winter pastures we can utilise. Measuring grass is not an exact science. There are many variables which have to be taken into consideration when estimating the DM availability:

- Differences between new leys and permanent pastures (PP) need to be taken account of. Generally speaking, 15% can be added to the DM of PP, taking into account its higher sward density and ability to withstand high stocking in poor weather conditions.
- Quality of sward: a high proportion of stems may overestimate the actual available DM.

Each individual field needs to be measured, multiplied by the field size, and then all fields added together to end up with a total of available DM for the winter. It's just like knowing how many bales of feed we have in the barn.



3d. Ewe requirements

An average liveweight will need to be established for your ewes to determine a maintenance ration.

I have seen a wide range of calculations for what the ewe actually needs to maintain her body condition, but generally speaking a ewe's intake requirement up to scanning will be 1.5% of her bodyweight. So an average 65kg ewe will need about 1kg DM/day of good-to-high quality grass per day. (65kg ewe x 0.0015 = 0.975)

After scanning, ewes ideally need to be managed differently, depending on whether they are carrying single or multiple lambs

I found John Scandrett's *Quick Feed Calculator* really useful for this: it takes not only the number of lambs into account but also the quality of the feed available. As with a lot of feed budgeting we are making educated guesses on the actual figures, but some starting points are always needed and can be fine-tuned on individual farms.

Ewe Live weight: 65kg						
The values given are the average	Feed Requirements Mating to Scanning (kg DM/ewe/day)					
for each whole period	Feed quality	Single	Twin	Triplet		
	Low	1.39	1.42	1.44		
All values have been adjusted	Medium	1.14	1.16	1.17		
for trampling losses	High	0.95	0.97	0.98		
	Feed Requirements Scanning to Lambing (kg DM/ewe/day)					
	Feed quality	Single	Twin	Triplet		
	Low	2.03	2.45	2.76		
	Medium	1.68	2.04	2.30		
	High	1.42	1.74	1.96		

Table 1: John Scandrett's Quick Feed calculator

This table can be found at <u>www.farmingsheep.co.nz</u> created by John Scandrett where you can alter the liveweight figure to that of your own flock average.

3e. Feed budgets

Now we have an understanding of the animal's requirements and know the covers in the field we can start putting together a feed budget. This is fundamental in making sure you have enough feed for winter and be proactive, not reactive, to shortages.

Table 2 shows a simplified version of the budget we at home put together in November 2014 for the 2014/15 winter to gauge how our own winter stocks were looking. (*See Table 2 on next page*). Probably the most important figure to look at in a budget is the bottom line highlighted in red in Table 2. The covers in mid-March are lower than desirable when we are really looking for a minimum figure of 1500kgDM/ha pre lambing - and many would say this should be closer to 2000kgDM/ha to achieve optimum ewe performance. More of that will come later.



In our circumstances we have a wintering block which is included in this budget, whilst the lambing area is treated as a separate area - generally too wet for winter grazing - which would be at higher covers for lambing. Obviously this could be added to a whole-farm budget but we find for management it is easier to keep it separate.

If levels do indicate a shortfall leading up to lambing then supplementation would be needed which can be achieved in a number of ways; the most obvious providing extra DM in the form of silage or hay. In fact I met many NZ farmers using forage wagons or rolling out hay to balance out their winter shortfalls.

Month	Dec	Jan	Feb	Mar
Grazing area (ha)	50	50	50	50
Grazing days	31	31	28	20
Grass Growth (kg/DM/day)	10	8	10	12
Ewe Numbers	800	800	800	800
Weight(Av.Kg)	64	66	68	70
Intake(%bodyweight)	1	1.5	2.5	2.8
Daily Intake (kg DM)	0.96	1	1.7	1.96
Total daily requiement (kg DM)	768	800	1360	1568
Total monthly animal intake (kg DM)	24738	24800	38080	31360
Animal intake per ha (kg DM/ha/day)	15.4	16	27.2	31.36
Diff btwn growth and intake				
(kg DM/ha/day)	-5.4	-8	-17.2	-19.36
Average farm cover kg DM/ha	2333	2085	1603	1215

Table 2: Feed budget for 800 ewes on my own farm before winter 2014/15.The initial average DM cover across the 50 hectares was 2500kg DM/ha.

3d. Day-to-day management

With the data collected in the autumn for the winter ahead a physical system needs to be put in place to control the grazing. In most cases this is in the form of temporary electric fencing dividing the field up into daily (or potentially longer) moves. Generally we will have a fixed number of ewes in a particular mob, whether that be pre- or post-scanning: therefore we are splitting the field to suit the mob size in relation to the available grass.

One thing to mention here is the amount of residue we decide to leave when the ewes move off the paddock as this will determine our available feed figure. For the purpose of this example we will leave a residue of 900kg DM/ha. The residue left is something discussed later in the report as it may vary considerably depending various factors.

To get started we do some calculations:

Worked Example for a 5ha field

Multiply the ewe feed demand by the flock size: 1.0kg/DM x 800 = 800kg DM **Daily Feed Demand**

Grass Feed Available :

Cover minus residue (2500kg DM/ha -900kg DM/ha) x 5ha field= 8000kg DM

Divide the **Feed Available** by the **Daily Feed Demand** : 8000/800 = 10 days of feed in the 5ha paddock .

So the field can be split into 10 half hectare paddocks for daily moves.

3f. Management tools

There are various software packages available to help with feed budgets and grass growth monitoring. I have seen a couple: one supplied by Agrinet in Ireland, and the market leader in New Zealand is Farmax.

Farmax is a tool developed in NZ for "*planning and controlling how you can most effectively convert pasture into profit*". The software is based around predicting grass growth through the season against seasonal demand from the stock on farm. Livestock weights and predicted weight gains are forecast to give an accurate forward budget of grass supply. It allows farmers to be aware of potential future problems, enabling them to react accordingly: e.g. to apply nitrogen or sell stock to alleviate future shortages. Steve Wynn Harris, an impressive grassland manager in the Hawkes Bay region, had Farmax pasture cover graphs dating back to March 2003, an important historical reference for management decisions today.



4. Adoption of AWG in New Zealand and globally

I was encouraged by New Zealand sheep scientist and breeder Murray Rohloff to travel into the Southland region to really get a feel for the popularity of the system. I make no excuses for basing much of my report on how the Kiwis winter their sheep. They are the world leaders in this area and geographically this is where the majority of knowledge has been compiled over many years.

Even though winter-allocated grazing is not commonplace in the UK, in New Zealand sheep farmers have adopted the practice widely and, if travelling the main sheep areas in July (midwinter for them), large mobs of sheep are fenced behind "wires" everywhere you look.



Figure 3: Controlled grazing: December 2014, Southland, NZ

My first port of call was at Nithdale Station, with the Tripp family. It is a 1200Ha beef and sheep unit carrying around 7000 ewes including 1450 stud Romneys, 430 Stud Suffolks , 3300 commercial ewes, plus a 250 beef herd. There was also the obligatory 275ha Dairy unit with 870 milkers. These were big numbers for me, with my relatively small flock, to digest! All the sheep needed the appropriate ration for the appropriate time of year.

When scanning the pedigree Romney ewes, the singles were separated from the multiple-bearing ewes. Singles were to be allocated 1.3kgDM/day similar to the pre scan budget; multiples were increased to 1.6kgDM/day rising to 1.8kgDM/day a month before lambing. Recording of this high performing Romney flock, purchased from Murray Rohloff in 2008, has moved on from the catch



and tag system used in the past, to all the ewes and rams being DNA-recorded. The ewes are now lambed on hill country unshepherded, then the lambs identified at tailing using DNA parentage technology from tissue samples.

When I spent time with one of the junior shepherds I soon appreciated how comfortable everyone on the farm was with feed budgeting and ewe allocation. He was spending time in the break room working out his next field splits for the afternoon. He knew all the facts and figures he needed to get those sheep through the winter period. Andrew Tripp, the owner, had regular staff meetings but day-to-day rationing was very much a job for the men on the ground, not management. I had to

think to myself: how many farm workers back home knew the Dry Matter allocation for a twin-bearing ewe in midwinter? I know a lot of farmers without that knowledge. The New Zealand philosophy to think in DM - whether that be in grass, silage, hay or grain - is something I feel needs to be encouraged for the improvement of the sheep industry at home. It's an area where the dairy industry is well ahead of the sheep one.

Even with large mobs on the big stations I visited, electric fencing and feeding seemed nearly a full time occupation through the winter months. The farm had moved to three- or four-day shifts to try and minimise pugging and compaction, which can be problems with one-day shifts in high rainfall areas such as the Southland region. The New Zealand philosophy to think in DM whether that be in grass, silage, hay or grain - is something I feel needs to be encouraged for the improvement of the sheep industry at home. It's an area where the dairy industry is well ahead of the sheep one.

4a. One-day or three/four day shifts

Along with John Scandrett, David Stevens is a well known advocate of AWG. He has carried out a lot of scientific research into the subject and agreed to meet me. He explained that the early research into increasing shift length was based around the possibilities of reducing bearings (vaginal prolapses) in the run up to lambing. The initial hypothesis was "significant loss of condition or a series of physiological checks through temporary underfeeding could be contributing to the incidence of bearings". This could potentially occur due to the emphasis on feed supply rather than animal requirement, resulting in loss of liveweight and body condition score.

Two years of farm trials were conducted from 2009 and they showed no significant improvement in the rates of bearings although anecdotal evidence indicated that on many farms the problem had improved. Prolapses seem to be a little understood issue and far from being solved. There were consequently thought to be more benefits from 4-day shifts, including reduced cost in terms of labour putting up fences, improved feed management and utilisation, and more settled sheep.

I can't say everyone I visited had adopted 3/4 day shifts but definitely the majority had. Peter Ponsonby, near Lawrence, South Otago, South Island, was still a firm believer in daily shifts on his wetter soil type, maintaining that there was too much soil damage on a longer shift with fields



getting very muddy and grass utilisation falling dramatically. This was something one of our discussion group members, John Thomas in Glamorgan, found on new grass leys. He had actually moved to 12-hour shifts to maintain high utilisation and reduce soil damage. On our own farm we found that, on older swards, to get a better clean-out of the pasture base, the daily shift actually appeared to be more efficient. This may have been due to the extra trampling of sheep in a small area, rather than dead matter consumed. The treading in of the dead matter will speed up the rate at which it is broken down into the soil.

A 4-day shift can allow for some controlled nutrient transfer; there may be potential to sub fence a poor soil area on the first day so that yesterday's grass can be deposited onto today's area.

Trials on daily or twice weekly allocation were carried out at Athenry, Ireland, by Keady and Hanrahan in 2007. They found that frequency of herbage allocation did not alter forage intake or utilisation. Furthermore there was no effect on lamb birth or weaning weights, or lamb growth rate from birth to weaning. (For further reading see http://www.teagasc.ie/publications/ 2013/3012/Extended_grazing_potentias_limitations.pdf)



Figure 4: Four-day shifts near Gore, NZ

4b. Grass Quality

One thing that became apparent whilst travelling around - admittedly with some of the better grassland managers - was the quality of the grass on offer to the sheep. Even permanent pasture swards had very little dead material in them, with predominantly green leaf. This allows for more accurate feed allocation with little reduction needed for poor quality feed. I believe in my first



winter I over-estimated the quality of my herbage on offer, leading to a loss in body condition midwinter in a proportion of my ewes, thus resulting in a lighter average birthweight.

In the early 2000s AgResearch developed a visual pasture quality assessment protocol along with accompanying software Q-Graze. The results are used to predict the intake of young growing sheep and cattle, and their liveweight gain.

Visual assessments are made in field to determine:

- 1. Dry matter yield DM/ha
- 2. Dead matter as a %age of the total dry weight (=dead +clover and herbs +green grass leaf + seedhead and weeds)
- 3. Clover and herbs as a %age of the green dry weight (=clover and herbs + green grass leaf + seedhead and weeds)
- 4. Green grass leaf as a %age of the rest (=green grass leaf + seedhead and weeds)

Dead matter is the main determinant of pasture quality and is the most important one to be able to access accurately. Midwinter dead matter percentages from farms in the South Island, NZ, ranged from 2% up to 60% in year 2000, which would have a huge effect on feed value offered.

Although one may not necessarily be aiming to grow stock through the winter, to have some idea of the quality of grass on offer is essential and must be taken into account when devising feed budgets. The potential intake of high quality herbage is greater due to its high digestibility and speed of passage through the animal. As soon as dead matter is consumed, intake is reduced as the speed of passage is reduced.

Pasture quality assessments using the Q–graze system are not available in the UK as far as I understand, and some form of training is no doubt advantageous for it to be adopted accurately. Nonetheless, using the Although one may not necessarily be aiming to grow stock through the winter, to have some idea of the quality of grass on offer is essential and must be taken into account when devising feed budgets.

principles involved we can begin to get a better understanding of our pastures' potential or limitations!

4c. Year-round considerations

In choosing a wintering system a farmer must regard it as just one part of his year-round management and give due thought to its effect on overall productivity.

Autumn management is geared to giving ewes a high quality diet to maximise lambing percentage, either through a "flushing" period or maintaining a constant level plain of nutrition. Allied to this is an attempt to build a wedge of feed as the farm goes into the winter.

Early spring management is all aimed at providing ewes with maximum quality with suitable quantity to achieve adequate nutrition for late pregnancy, followed by high milk production for early



lamb growth. Here we are trying to reduce the feed wedge: all feed should be utilised otherwise the farm is understocked.

Kevin Knowler at Woodlands Agresearch Centre, Invercargill, NZ, really got me thinking about how my wintering was to fit in with the rest-of-year performance.

Woodlands is home to one of New Zealand's Central Progeny Testing (CPT) centres where high index rams are evaluated and compared by cross breed analysis. Roughly 600 ewes have performance-recorded lambs by an average of 25 sires. Kevin explained how important it was to maintain high quality pasture for all the animals to perform to their genetic potential so that reliable information can be fed back to the sheep industry.

A rule of thumb I had been given before was to have 1500kgDM/ha going into winter across the whole farm, and 1500kgDM/ha going into the spring. Kevin suggested we needed to maintain higher covers for our sheep to maximise performance, bearing in mind a ewe at peak lactation, about 3 weeks after lambing, needs to consume at least 3kgDM/day. This is the equivalent of 20kg of fresh grass and is hard to achieve with a 1500kgDM/ha cover. He was talking more in the region of 2500kg/DM/ha. To achieve this, higher residues are needed. The wintering system at this research station was three- or four-day shifts depending on paddock size, and residues normally around 1000kg/DM/ha. This left a good leaf area to capture the available sunlight. This is obviously limited at this time of year but at times good winter growth can still be recorded if the plant has some solar panels to capture what sunlight there is. Looking around Woodlands it was impressive to see the amount and quality of midwinter grass in a climate very similar to much of the UK's. A research unit has some great resources but nevertheless it does go to show what good grassland management can achieve with attention to detail.

Within our UK discussion group and certainly on my farm we had used the high stocking density in a confined area to really "pull out" the pasture with residues down to around 750kgDM/ha, bearing in mind 500 of that is virtually mud. I felt this was resetting the pasture, treading in old material so as to have an improved pasture come the spring. I still feel this can work on old swards that may have

been let go or under-grazed in the past, but for newer leys a lighter touch may be beneficial. At Woodlands the clean-out process was achieved in the late summer/early autumn when the production pressure was off the ewes and only maintenance was required. My other concern about leaving higher residues was whether the ewes could potentially get too fat. This was dismissed by researcher David Stevens who thought it unlikely on winter grass.

Another point of discussion with Mr Knowler was regarding grass varieties, and tetraploids compared to diploids. Generally the diploid with its denser sward Generally the diploid with its denser sward could be deemed more suitable for sheep grazing, but the tetraploid, being more upright allowing for easier mouthfuls, could allow for higher intakes.

could be deemed more suitable for sheep grazing, but the tetraploid, being more upright allowing for easier mouthfuls, could allow for higher intakes. Tetraploids also have higher leaf-to-stem ratios and higher digestibility. These are more areas to consider as we push for improved performance.



4d. Spring growth

When travelling in Ireland I visited the excellent Teagasc Research Farm at Athenry, where many major studies on extended grazing have been carried out. Some interesting findings on the impact of winter grazing on subsequent herbage yield have been recorded. Each one-day delay in grazing date from December 12th onwards reduced dry matter yield by 54.2kg/ha, which is equivalent to 18 ewe grazing days: see Figure 5 below. This is backed up by some early research in NZ which found frequent hard grazing events to less than 1cm limited spring pasture growth onset by approximately 4 to 6 weeks, and total yield by up to 50% (*Harris & Brown 1970. Black 1975*).

Research in Ireland into pasture damage from midwinter grazing assessed the percentage of the sward categorised as bare ground. In early April, variations from 3% to 22% were recorded for pastures grazed at high (1.8kg/ewe/day) and low (1.0kg/ewe/day) grass dry matter allowances. However, by mid-May the percentage of bare ground was reduced to 5.5% and 8.8% respectively. I have seen conflicting results into winter grazing on botanical composition, Irish research suggesting perennial ryegrass content decreased after December grazing, whilst in NZ the same grasses were found to be more resilient. (*From Irish Grassland Association Journal 2007. Extended grazing – its potentials and limitations. Drs. Tim Keady and J P Hanrahan*)





Source: Extended Grazing – An Alternative System for Low to Moderately Stocked Farms, Tim Keady.

So from the research it becomes apparent that utilising the grass through the winter months entails sacrifices being made on the subsequent spring grass output, the consequences of which will no doubt reflect on ewe and lamb performance.

4e. Stocking Rate

A most interesting study from Ireland evaluated two systems: a traditional higher stocked system involving winter housing, and a lower stocked system utilising extended winter grazing. System had no effect on litter size or the numbers of lambs reared per ewe put to the ram. Year round grazing did increase lamb birthweight (as opposed to unshorn housed ewes) and subsequent lamb performance. However, stocking rate had to be reduced by 4



ewes/ha (27%). So although actual margin/ewe was increased on the year round grazing system, the lower stocking rate reduced total lamb carcass output by 26%, equivalent to 116kg/ha. Costs on every farm can vary but it is unlikely than the savings made on a lower stocking rate can offset the much reduced output per ha. This research points to a maximum of 10 ewes/ha (4 ewes/acre) limit on all year grazing. *(Extended Grazing – An Alternative System for Low to Moderately Stocked Farms. Dr. Tim Keady.)*

Some financial data from SAC economist Robert Logan looking at the effect on profit from AWG, based on physical ewe performance and infrastructure changes needed, suggested an increased profit of £17.80/ewe/year. (*EBLEX All Grass Wintering of Sheep – Better Returns Programme.* These figures are based on results from Dave Sanders's farm in Cornwall). Again this is a per-ewe figure, not per-hectare which is the key measure of profitability. Individual farm data, both financial and physical, is probably the most appropriate way of assessing financial implications when contemplating changing to AWG.



5. Alternative sources of winter feed

5a. Conserved forage

New Zealand sheep farming is pastoral-based: very few animals are housed. So the question is: "If there is inadequate grass to cover the entire winter how can we fill the shortfall?" As mentioned previously, many farmers will be adding to the feed allocation in field with conserved silage or hay, some unrolling bales or using a forage wagon to top up the ration. Dependent on ground conditions many find this difficult in the UK due to the wet soils, but it is an option on drier soils.

The Welsh family at Twin Farm near Gore, NZ, were utilising over-wintered stubbles to feed their sheep in round feeders, and rotating them around paddocks to reduce damage. The ewes grazed volunteer cereals and assisted the breakdown of the stubbles back into the soils by hoof fall.



Figure 6: Feeding alfalfa hay on winter stubble. Gore, South Island, NZ

5b. Forage crops

Another very common solution is to grow a main crop forage crop: most popular was swedes, with an increasing amount of fodder beet and some turnips. High quantities of dry matter can be grown on small areas to be fed when there is a real pinch grass supply. A main crop planted in May or June and grazed in January and February will yield as much as the forfeited grass. A good swede crop can yield 12t/ha and fodder beet considerably more; 100% utilisation can be achieved with good management on the right soil type. These crops provide high energy but low protein. Some form of



buffer feed may be needed with extra silage or straw providing up to a total of 20% DM of the ration.

Care needs to be taken when using swedes or fodder beet too close to lambing ewes carrying multiples, as the high dry matter crop can restrict her intake, resulting in underfeeding at a critical stage. Hence most of these ewes I visited in NZ were moved onto grass around 40 days pre lambing, whilst single bearing ewes were less sensitive and could be kept on crop for longer. Most farmers were practising four-day breaks on the fodder crops to maximise utilisation. The advantages of getting the sheep off the winter grass could offset some of the negative impacts in terms of reduced spring yield and poaching soils at vulnerable times, and there would be benefit from any winter growth.



Figure 7: Ewes on swedes in Invercargill, NZ

One farm I passed near Gore, South Island, NZ, was utilising a 500-metre hill top by aerial spraying and planting a forage crop, although the farmer commented that a team of Sherpas was needed to move the fence!

See photo on next page.





Figure 8: Mountain-top swedes! Gore, NZ

5c. Cereals.

In Tasmania many sheep farmers I visited were mainly arable producers and utilised the mild winters to grow a second cereal crop. This was then grazed through the winter months during breaks. I saw amazing stands of oats and wheat at vegetative stages drilled post-harvest: high quality feed for finishing lambs or growing stock. Double cropping was pushing the land hard for high returns. There

are farmers grazing crops through the winter till the start of stem extension with either no or small effects on yield.

With the trend towards more cover crop establishment in the UK, both through legislation and the need to improve organic matter levels in soils, there will potentially be a need for more sheep on There are farmers grazing crops through the winter till the start of stem extension with either no or small effects on yield.

arable land to complete the nutrient cycle. With controlled grazing of sheep, dung and urine is distributed evenly across the field, recycling the crop effectively back into the soils.



6. Extended winter grazing In Canada

6a. Marginal land

In December 2014 I visited farms in Ontario, Canada, to get a feel for how sheep farmers cope in extreme winters.

Sheep numbers in Canada are relatively small: roughly 1 million ewes over this entire vast country, concentrated around the large urban populations. Many of the farms I visited were utilising marginal land, much of which had been cropped when prices were higher but this had since become unviable. This land, much of which is rough grazing, attracts low rents so gives an opportunity for sheep graziers. As you may expect, many sheep are housed over the long, cold winter and flock size is commonly restricted by the old traditional buildings, certainly not ideal in modern day agriculture. Of those who are out-wintering sheep, many are using grass or higher quality alfalfa hay. The round bales are unrolled across the frozen and regularly snow-covered pastures. The benefit of the freezing conditions means wet soils and mud are not a problem so feeding outside can be carried out freely. Roughly one round bale of hay was allocated per ewe for the winter period, which could last as long as October to June. It was commented that stock farmers spent all summer making and hauling hay and then all winter feeding it out! In terms of suitability for making hay it was surprising to me to realise that at one point I was stood on the 42nd parallel in Southern Ontario, which is as far south as Rome and Barcelona, so very hot summer days provide ample opportunity to make good hay. Another reason why alfalfa (lucerne) is commonly grown is to cope with the dry summer conditions.



Figure 9: Ewes utilising marginal grazing in Ontario, Canada

6b. Intensive Systems

Mark and Helen Carere near Lindsay, Ontario, try to offset the higher costs of housing and feeding sheep by practising accelerated lambing. Achieving 3 crops of lambs in 2 years they were lambing in -



October, January and May. A ration mainly consisting of alfalfa and grain maize was fed in outside yards to lactating ewes at 2kgDM/head. All crops were grown on the farm. Most lambs were reared and finished on an intensive diet which, unlike in the UK, is accepted as the norm. Most cattle and lambs are grain-fed because it is the preferred taste for North Americans. The dry ewes were grazed during the summer both on grass and alfalfa stands.

Along with Jack Kyle (OMAFRA – Ontario Ministry for Agriculture, Food and Rural Affairs - grazing specialist) we had interesting discussions regarding the residue issue. We were standing in a field in mid-December in sub zero temperatures, looking at what I regarded as quite a high dead matter rough pasture, and I was advocating the need to clean out the pasture now with mob grazing pressure so in the spring the grass was effectively reset for a higher quality sward. But Jack was experienced in the harsh Canadian winters and argued that without the insulating effect of that thatch of sward the soils would take longer to warm up and delay spring further. So what did I know!

6c. Maize

Grain maize harvest was in full swing in Ontario in December and many livestock farmers were making use of the *Corn Stover* left post-harvest: basically this was all the residue following the harvesting process. It is a useful by-product which could potentially keep one cow/acre for 30days. It was a fairly unusual feed for sheep to be grazing but I visited two farmers fencing their harvested fields with flexinet to get an extra bite and thus extending their grazing season.

Other innovative sheep farmers were John and Eadie Steele farming near Norwood, Ontario. They had a large of flock by Canadian standards with 2300 ewes, selling breeding ewes and terminal sires. By any country's standards this was a truly forward thinking and impressive sheep enterprise, with many unique and novel ideas to cope with the extreme weather in Canada.

John is growing maize as a forage crop to extend his grazing into the winter: he estimates he gets 2000 ewe grazing days per acre on the maize. Establishment and growing costs are \$200/acre, therefore costs per ewe/day are 10 cents, compared to average wintering on hay costing 15cents/day. The ewes are break fed onto the maize daily. During my visit they were mainly feeding the cobs and supplemented with alfalfa hay. Earlier in the season they can utilise more of the green

(he) is growing maize as a forage crop to extend his grazing into the winter: he estimates he gets 2000 ewe grazing days per acre on the maize.

vegetative parts of the plant without the need for supplementation. Maize is ideally suited to the high temperatures in the summer provided there is adequate moisture to aid establishment, hence high yielding stands can be achieved. Other root crops have been experimented with but once the temperatures start falling sheep cannot eat the frozen roots.

Farming sheep in Canada not only has its climatic challenges, but also wildlife threats. Coyotes and wolves are a constant danger to both lambs and adult sheep. Guardian dogs live with the sheep all year round to try and deter attacks.





Figure 10: Extended winter grazing with standing maize, on John Steele's farm, Ontario



Figure 11: Guardian dog with 1000 ewes, Ontario, Canada

7. Conclusions



- 2. The need for feed budgeting and sward quality assessment is paramount for an inflation-proof sheep enterprise. New Zealand's non-subsidised, pastoral farming with many large flocks means a huge emphasis has been put on these aspects of production. Much research has been carried out both there and indeed in Ireland, which can give us knowledge and confidence to adopt improved management in the future.
- 3. I found personally and also from discussion group feedback, that starting the All Winter Grazing process gives us the management tools we need to really understand grass measuring and animal allocation during a relatively benign time, when grass growth is minimal and animal numbers are static. With these skills acquired, it is an almost seamless transition into carrying out year round budgeting, rotational grazing and using software like Farmax to assist management decisions.
- 4. It is important we don't take our winter grazing strategy in isolation. Careful consideration needs to be placed on how it dovetails into autumn grass availability at mating and the crucial spring flush timing, when maximum demands need to be met. This is when variables such as residue sward heights, speed of shifts and alternative forage crop/buffer feeding decisions can be made.
- 5. A solely grass-based wintering system on a ring fenced unit will obviously have its limitations on stocking rates, resulting in a lower output/ha, but many farms have the flexibility provided by off farm grazing, forage crops or, indeed, the potential to house a proportion of the flock, to optimise the stocking rate when grass growth accelerates in the spring. Every farm's situation is different. It may be the case that your farm is too wet to keep sheep out all winter, but some extension of the grazing could reduce winter costs. We can see how others achieve results, then explore the options for our personal circumstances. Sub zero temperatures in Canada haven't deterred farmers from exploring their options. They are extending winter grazing with maize and maize residues.



- 6. Potentially an all-grass based sheep enterprise could attract young entrants with limited capital. Start-up costs could be reduced to temporary fencing, quad bike, and mobile handling without the need for any buildings or fixed plant. Cover crops or winter forage crops could be readily utilised by a "mobile" flock.
- 7. As an overall industry 'stuck in the past' might not be too harsh an assessment of a lot of sheep farming practices. That is not to say there aren't a lot of excellent, innovative producers across the UK; but to develop a strong and sustainable sheep industry, in my view, more of the grassland management techniques I have witnessed on my travels need to be widely adopted, along with the suitable genetics to optimise those improvements. By this I mean: source breeding stock from breeders who can provide stock that can improve your bottom line. Stock that will thrive and finish on pasture only; have easy lambing and high survivability; natural resistance to diseases, footrot, worms and fly strike; and provide overall general improvements in productivity to counter the inflation of farm inputs. This means not using a £100 ram from the neighbour who forgot to ring a few of his pet flock!!



8. Recommendations

8a. For the farmer

- 1. Make a winter feed budget.
- 2. Get a good understanding of your ewes' feed requirements based on weight and stage of pregnancy.
- 3. Focus on autumn grass allocation for mating and building a suitable wedge of grass for the winter period.
- 4. Ensure you budget for an adequate grass supply for optimum ewe performance at lambing. Use of forage crops or conserved grass may be required to achieve this.
- 5. Leave higher residues for improved spring growth.
- 6. Make accurate assessments of pasture quality; there can be big variations in winter herbage quality, so adjust rations accordingly.
- 7. Maintain the ewe's body condition throughout winter (may minimise prolapse risk) so regular condition scoring is essential with AWG.
- 8. Train all members of staff to think in Dry Matter terms for all feed quantities and animal allocation.
- 9. Think outside the box for winter solutions, don't settle for what you've always done, go and see controlled winter grazing in practice: seeing is believing.

8b. For the industry

- 1. Establish farmer workshops on feed budgeting, pasture quantity and quality.
- 2. Establishment of UK specific feed budget and pasture quality computer software.

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9. After my Nuffield Farming study tour

My Nuffield Farming Scholarship has certainly turned both my way of thinking and my farming business on their heads. I feel I have finished my travels with many more questions on broader farming topics than answers. I have been introduced to areas of agriculture I had never considered before, from the soil food web to on-farm methane trials with breeding rams.

One question I took with me on my Scholarship was linked to my own share farming operation and fundamentally its low return - how could these big flocks in the Antipodes be run with minimal labour? I knew that labour costs were too high on my farm. The answers soon became clear when viewing the infrastructure on many of the

My Nuffield Farming Scholarship has certainly turned both my way of thinking and my farming business on their heads.

large/medium units. Many farms are ring fenced with large arterial raceways radiating from central handling facilities and impressive shearing barns. The movement of large numbers of sheep can be achieved relatively easily with this infrastructure. With our system, which was fitted around an arable unit, movement was very difficult with many different, fragmented fields and regular road crossings. Extra time and labour was needed just to get to the handling facilities. Not a very efficient use of time.

Also inspired by the potential high outputs achieved from smaller units in Ireland, Isaac Crilly who regularly achieves phenomenal output/ha, and the research farm at Athenry, and Woodlands Grassland Research Centre in New Zealand, I decided to finish the share farming and concentrate on my 110 ha home farm, with just family help.

We are expanding a pedigree flock of New Zealand Suffolk ewes, selling rams to commercial farmers, alongside 400 commercial ewes purchased from the share farming business. The suckler beef herd has been reduced to 40 cows and will be more of a grassland management tool. We have started using Farmax software to utilise the farm's grass growing potential with an optimum stocking rate. I have learnt to focus on the key profit drivers in any sheep unit, getting lambs finished and off farm as fast as possible, and pushing the lambing percentage to its optimum level.

Meeting potential clients of New Zealand rams at both various shows and on farm is a great time to talk about my travels and findings, hopefully inspiring farmers to try improved grassland management techniques. I have done some public speaking about my Nuffield Farming travels and aim to continue to get the message of improved pasture management out into the wider farming community. My aim is to build on the knowledge I have gained through more travel and study, to drive my farming business forward so that it can become both profitable and sustainable.



10. Executive Summary

The pinch point for many UK sheep farmers is during the winter months when grass growth slows or stops completely. This means extra feed and forage needs to be made or purchased: both add considerable expenses to the enterprise. If we can better ration and utilise the grass and forage crops on farm through the winter these costs can be significantly reduced.

Some UK farmers are adopting the principles of All Winter Gazing to good effect. My Nuffield Farming journey aimed to build on the knowledge already established.

There is no better place for a pastoral farming Scholar to visit than New Zealand, where All Winter Grazing has been practised for many years and, travelling the country, controlled grazing is commonplace, especially in Southland which has a climate similar to much of the UK's. Canada with its more extreme winters has had to look at more inventive ideas to extend grazing. Solutions involve standing maize and swathing cereals alongside traditional hay feeding.

Knowing the dietary requirements of ewes, measuring grass and feed budgeting using software programmes, then rationing grass through a set winter period are all easily achieved with low capital investment. These skills, once mastered, offer a great introduction into year round rotational grazing. Although some farms will struggle to achieve a true out-wintered season due to wet soils, with planning and some imagination an extended period of grazing should be possible.

Using grazed grass as a sole source of winter feed is achievable but stocking rate will be compromised, research suggesting 10ewes/ha would be a maximum level. For higher ewe numbers per hectare, additional rations of conserved forage and/or forage crops such as swedes or fodder beet need to be grown. Careful consideration needs to be given to the effects of extended grazing on autumn grass stocks and more importantly spring growth and quality. Residual dry matter levels post winter grazing will have an impact on ewe intakes (affected by dead material, stalks etc). They will also have a big influence on spring grass yields, along with sward composition, and could potentially compromise lamb performance if misjudged. Leaving a higher residue will optimise any winter and early spring growth. Four-day shifts as opposed to daily moves can provide easier management, less labour and fences, and a larger area to carry stock if wet.

The challenge for all sheep producers is to counter input price inflation and volatile lamb prices by continuously evaluating all aspects of their business. Alongside generational advances in productivity through genetics, and closely monitoring flock health and welfare, there are great opportunities for improved grassland management techniques, especially through the winter and early spring, to improve farm profitability.

Michael Miller



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Further Reading and Information Sources

EBLEX All Grass Wintering of Sheep – Better Returns Programme + Teagasc – Technical Updates on Sheep Production Beef and Lamb - New Zealand 400 Plus (November 2010)