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Focus Site Project Review

Phil Cowcher
Penrhiw
Capel Dewi
Llandyssul
Ceredigion



Prepared by:

Rhidian Jones

On behalf of

Kite Consulting

Dunston Business Village

Dunston

Staffordshire

ST18 9AB

Date: April 2018

Tel: 07889 182 364

Email: rjlivestocksystems@btinternet.com



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1.0 Summary

1.1 Farm details

- Organic farm of 200 hectares, 120 owned and 80 rented.
- 700 Highlander ewes & 250 ewe lambs (ewe lambs housed @ Xmas)
- Singles and triplets housed for lambing, twins lamb outside at grass.
- Soya feeding system for sheep
- 70 Stabiliser suckler cows and heifers bulled producing finished cattle and own replacements, calving heifers at 2 years of age
- Cattle were usually finished at 20-24 months of age in February/March and were housed for their second winter for finishing. This is expensive in terms of bedding, forage, organic concentrates (home grown cereals) and taking up housing space.
- 30 cows, mainly heifers and cows that are too closely related to the bulls are AI'd each year. This is also an opportunity to introduce superior new genetics into the herd.



Phil Cowcher

Business Objectives:

- Increase farm stocking rate and reduce reliance on purchased organic feed
- Reduce rented land and make more from owned land closer at hand
- Spread overheads by keeping more stock
- Determine the optimum balance of cattle to sheep to make the most profitable use of the resources available

1.2 Project key objectives

- Evaluate intensive cell grazing system using innovative equipment and software
- Assess additional liveweight gain per hectare compared to conventional set stocked system
- Evaluate cost/benefit of the system
- Reduce rented ground, costing ca £250/hectare (£100/acre) locally

1.3 Project achievements

- Cattle have been finished earlier than in previous years
- Cattle have been finished at reduced cost to previous years largely from grazed grass
- Feed resources have been released for other stock on the farm or for potentially increasing stock numbers in future. For example, some surplus grass was removed for silage in June/July.
- Demonstration of Technograzing system and use of innovative equipment and software and showing the benefits of pasture monitoring and accurate pasture allocation to livestock to ensure high utilisation is achieved.
- The return on investment in equipment and time has already been recouped in one grazing season from extra liveweight gain and savings in subsequent finishing costs. This level of return far exceeds those seen with most agricultural investments in machinery and buildings.
- Intensive rotational grazing has been shown to be an extremely cost-effective practice to grow and finish cattle. This is equally applicable to both conventional and organic farms but in this case, with the farm being organic the potential savings in feed costs will be higher.
- This is a valuable project for Welsh beef production, showing that, with some investment in infrastructure and time, high production levels are possible from grazed grass at lower cost to traditional finishing systems so overall profitability will be increased.
- Significant publicity from KT events, Farming Connect articles and a Farmers Weekly article in September 2017.

1.4 Project Details

First steps

James Daniel of Precision Grazing Ltd was consulted to devise an intensive rotational grazing system that would allow year old Stabiliser bullocks and heifers to grow rapidly and be either finished from grass alone or at least be significantly heavier at the end of the grazing season than in previous years. This would mean a shorter and lower cost finishing period thereafter. In addition, heifers should reach bulling weight quicker and their higher bulling weight should also lead to better fertility results.

Pasture monitoring using a rising plate meter commenced in Mid-February 2017 with 21 cattle turned out in early March. By the end of March, the full complement of 58 cattle weighing an average of 395 kg were turned out onto 13 hectares.

Initial investment

Three fields, totalling 13 hectares were split into sixteen paddocks of approximately 0.8 ha each. Further subdivision allowed 22 cells of 0.6 ha and 32 cells of 0.4 ha each for greater accuracy. A total of £3,827 was spent on the system (£294/ha). This included the electric fencing equipment (quite basic for cattle as only one strand of wire is needed), watering system and energiser as well as regular management advice from James Daniel.



Aerial map of fields used in the project at Penrhiw

Grazing management principles

The grass budget that was devised planned for moving the cattle every 2 days so an available Dry Matter of 1,000kgDM/ha (based on entry to paddocks at 2,500kgDM/ha and exit at 1,500 kgDM/ha). The paddock size can be adjusted to give the mob of animals the desired amount of Dry Matter for the 2 days. Generally Dry Matter Intake is between 2.5% and 3% of the animals' bodyweight.

Higher intakes can be achieved if pasture quality is high enough so potentially 3% of bodyweight of grass Dry Matter could be consumed. The combination of higher intake and higher ME/kg DM gives a total ME intake that is much higher so maintaining pasture quality is a key driver of performance. For example, for a 400 kg bullock grazing grass of different D values (directly related to ME)

- @2.5% of liveweight of 11.2ME grass (70D) = total ME Intake of 112MJ/day
- @3% of liveweight of 12 ME grass (75D) = total ME Intake of 144MJ/day

The extra 32 MJ/day of energy intake is sufficient for around 0.2-0.4kg/hd/day of extra liveweight gain, also depending on other factors such as general health, breed, sex of the animal etc.

NB These are hypothetical figures to illustrate the combined effect of higher pasture quality and Intake can have on performance. There will be a sliding scale of increased intake depending on the D value of the grass. Pasture composition will also play a part in pasture quality- e.g. PRG & clover content, high sugar grasses etc. Also assumes stock are healthy and all other factors favourable.

The key to matching supply of grass to stock demand is continual monitoring of pasture covers, pasture growth rates and livestock demand (number and liveweight). This allows adjustments to be made to paddock size, rotation length, shift frequency and stock numbers as well as for making decisions on removing surplus grass for silage. For non organic farms decisions on Nitrogen applications can also be made to pre-empt grass shortages before they occur.



Very high quality PRG & White Clover (+ some chicory) pasture in mid-September 2017

The quality of the pasture in late summer/early autumn is testament to the fact that grazing management has been excellent during the main part of the grazing season. Management during peak grass growth is particularly crucial to maintain quality thereafter. If grass is allowed to “get away” and is not grazed hard enough then pasture quality, regrowth and stock performance will be compromised. In the case of Penrhiw 3.3 ha was removed for silage in late May to help achieve this goal.

Compensatory growth and acclimatising to forage diet pre-turnout

Compensatory growth occurs when livestock (generally cattle) are moved from a restricted/poor quality diet to an unrestricted, high quality diet. In addition to the extra intake of high quality feed most of the weight gain will be lean meat rather than fat. Lean growth is heavier and more efficient than fat.

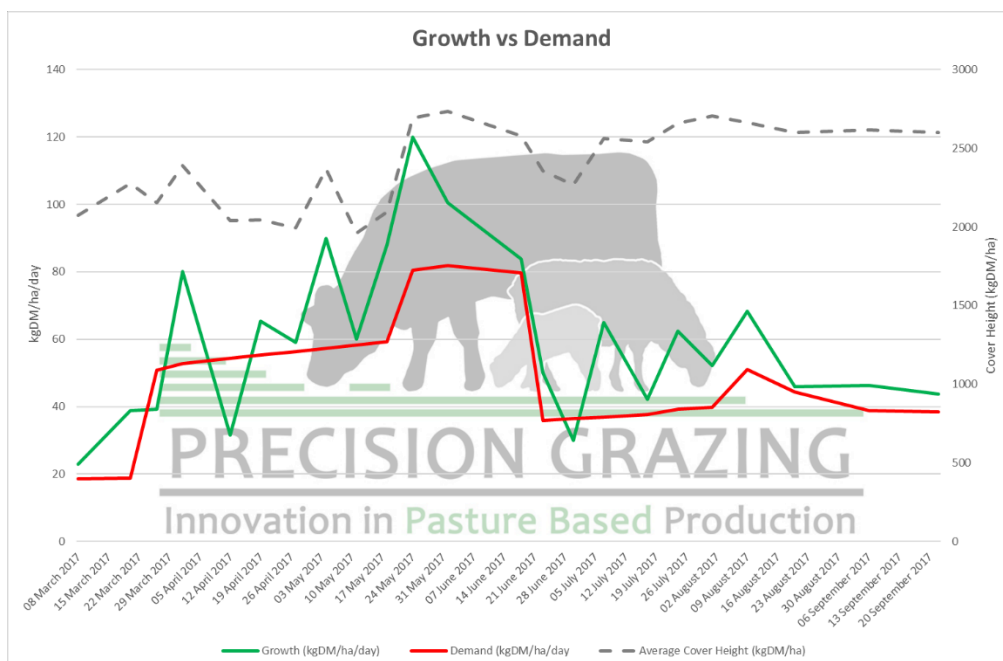
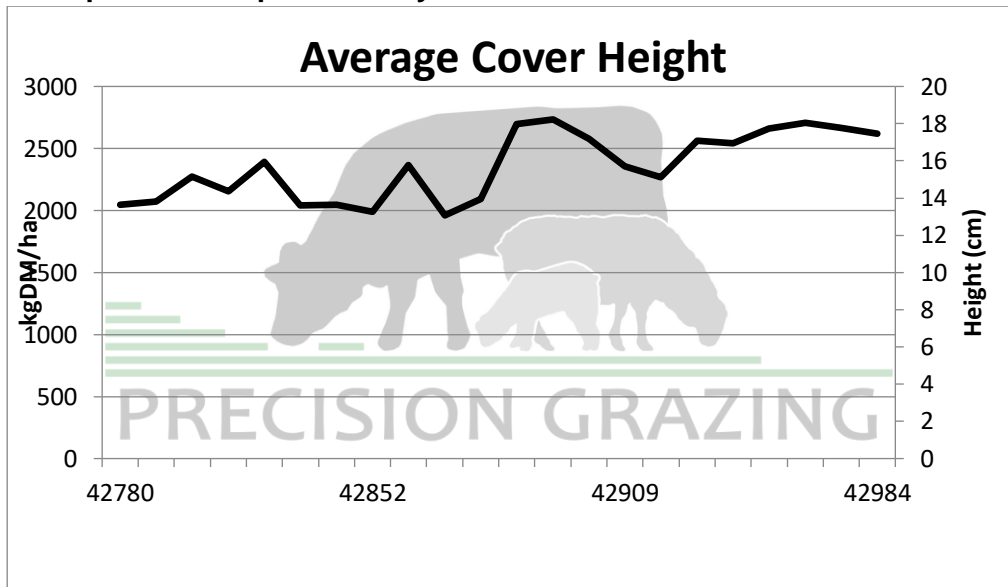
Many advocate restricting store cattle growth rates before turnout to maximise the effect of compensatory growth at grass, which is the cheapest source of feed. However, to fully benefit from the weight foregone pre-turnout, the grazing season must be long (early turnout) and grazing management needs to be high quality.

A more prudent approach may be to keep the cattle growing at a reasonable rate inside but to gradually reduce their concentrates as turnout approaches, so their rumens are more acclimatised to a high forage diet. This way they are less likely to suffer a growth check at turnout but will not have foregone as much weight gain in the period before turnout as they will eat more forage as their concentrates are reduced.

Input from James Daniel

James Daniel provided weekly recommendations based on stock numbers, weights and pasture readings provided by Phil Cowcher. A fee in the region of £215/month (included in the investment figures above) was charged for this input which represents good value for money given the performance attained. Farmax decision support software was used to provide supply and demand graphs and data to base decisions on. Currently this is available to UK farmers (updated UK version) for £50/month.

Examples of data produced by James Daniel



Some key events

- Late March- all stock turned out so demand spikes upwards then steady increase as cattle liveweight increases
- May/June supply exceeds demand, so grass is taken out for silage
- 23rd June- heifers removed so demand curve drops then in early August some cattle sold and heifers returned to system

James Daniel's summary

Grazing Management has the greatest effect on the amount of pasture grown.

Invest in Infrastructure.

Management (measuring, planning) adds value NOT the time spent on allocation (moving fences).

Value Your Time - Busy Idiot?

Take the Easy Wins - Divide big fields first, best leys, highest value stock.

Each Morning Think: *Are my stock growing to their full potential?*

Anything that is not pasture is a supplement and an extra cost.

Equipment

The system used purpose built electric fencing equipment from “Kiwitech”. This equipment and the system “Technograzing” were developed in New Zealand by Harry Weir and is now commercially available in the UK via James Daniel of “Precision Grazing Ltd”. It features strong yet lightweight materials, easily erected and moved, flexible posts allowing them to be driven over by quad bikes. The water system features quick release couplings and mobile troughs that can be tipped over easily and towed via the connecting pipe to the next paddock.



Portable water trough with angled side to allow tipping out



Troughs getting moved to next paddock



Stock being shifted by taking down end reel

System flexibility and Leader Follower system

The schedule earlier shows some key events that demonstrate the flexibility of a rotational grazing system to match grass supply to stock demand. These include-

- Gradual turnout of stock as grass growth increases in spring
- Shutting up a field for silage as grass growth exceeds demand
- Removing stock to reduce demand- e.g. heifers removed once they reached bulling weight, cattle sold when ready
- Bringing paddocks back into the system after taking a silage cut (increase supply)
- Bringing stock back into the system in late summer as silage fields become available for grazing again and cattle are getting heavier, so demand is increasing.
- Leader follower system for the heifers reintroduced on 9th August. Leader follower grazing allows the leading group of high priority cattle to be given the best grass to maximise intakes and the quality of grass they eat while the following group are lower priority and can graze down to the desired residuals. In this case the heifers had met bulling targets, been inseminated and did not need to be pushed hard so they made a suitable following group to the growing/finishing cattle.



Leaders on left pre-shift



Leaders moving to high quality grass



Followers waiting to be moved

Stock performance and cost savings

- Cattle grew at an average of 1kg/hd/day on the system compared to an average under the previous – set stocked system of 0.6 kg/hd/day.
- For a 210-day grazing season (Mid-March to Mid-October) this represents an extra liveweight gain per head of 84 kg on average.
- In addition to this weight gain being cheaper than that on a housed diet it also means that there is 84 kg less weight to gain on the subsequent diet, so a double benefit is seen.
- It is difficult to put exact figures on this, as farm costs vary greatly, and, in this case, the farm is organic, so feed costs are different again.
- It is estimated though that the extra weight gained is in the region of 2,590 kg which has a value of over £6,000 at current organic beef prices.
- The time required to finish cattle previously would have been in the region of 100 days housed on average (but ranging from 60 to 180 depending on size/age/sex of the individual animals). With an average diet of say 20kg silage and 3 kg of organic cereals this would cost in the region of £150/hd (2 tonnes silage @ £25/t, 300kg of cereals @ £250/t and 0.25 tonnes of straw @ £100/t).

Stock sales dates and weights

- 18/8/17 6 bullocks and 3 heifers sold, average carcass weight 282 kg
- 08/9/17 7 bullocks sold, average carcass weight 284 kg
- 10/11/17 9 bullocks sold, average carcass weight 305 kg
- 22/12/17 4 bullocks and 2 heifers sold, average carcass weight 303 kg

The two early sales of cattle were generally at grade R2 or R3. It was deemed beneficial to sell these at lighter weights than usual as the organic price was advantageous at the time due to scarcity (20-40p/kg dcw higher than for the later sales) and to reduce the pasture demand so remaining cattle would benefit more.

Other benefits of the system

- Concentrates management of youngstock closer to home, cows on poorer grazing further from home or more off lying fields
- This included management of bulling heifers until target bulling weights are achieved when they can be removed to reduce demand.
- Improves pasture quality for whole summer and for subsequent autumn sheep grazing
- Should potentially mean less rented grazing is required which is costly and scarce especially considering issues such as organic status
- Alternatively, the stocking rate can be increased, and the extra Gross Margin produced will spread the existing overheads.
- Reduced housing requirement means that stock are not as tightly stocked in sheds so reduced bedding is required and the environment for ventilation and health is improved
- Housing space released for youngstock can be used to house more dry cows

1.5 Farmer commentary – Phil Cowcher

Here at Penrhiw, we set up a paddock grazing system for our yearling calves, as part of a Farming Connect trial. The main reason I was interested in paddock grazing was to improve profitability per ha. I had seen an increase in production from doing some rotational grazing and wanted to increase the benefits by doing a more intensive, cell/paddock grazing system.

We used Kiwitech equipment and had weekly grazing plans from Precision grazing. The grazing plans were based on grass and cattle growth rates. For the slight increase in labour associated with moving electric fences, the returns were very good. The stocking rate and cattle growth rates, were both at least a third higher. This led to a much higher gross margin per ha.

The main factors that I believe have led to this gain are;

- Maintaining grass quality throughout the season
- Increased grass growth rate
- Higher utilisation
- Grass budgeting allowed us to react quickly to any changes in grass growth and avoid feed deficits

These were achieved as a direct result of the paddock grazing system and forward planning. We have learnt a lot from doing this project and from taking advice from specialists in the subject. The benefits were so clear, that we plan to expand this type of grazing system over the rest of the farm.

2 Business Review

2.1 Herd baseline data (GM/hd for suckler herd for 2016 and 2017 year ends)

	2016	2017
Gross Output/hd	1,139	1,203
Variable costs/hd	380	390
Gross Margin/hd	759	813

This data needs to be updated when 2017-18 data is available

2.2 Potential impact of the project on the business

This project has shown that investing in infrastructure to allow rotational grazing to take place is very worthwhile with a rapid return on investment and a positive annual financial return. The equipment will last several years (10 +) and has already paid for itself. The experience of the project has given Phil confidence to roll this out to other parts of the farm which will increase grass production, improve forage quality and lead to higher numbers of higher performing stock and dilution of essential overheads.

3 Project Review

3.1 SWOT analysis

STRENGTHS	<ul style="list-style-type: none">• Innovative approach to grazing management• Farmer is receptive to new ideas and for grass-based systems• Farm has cattle that are bred for high forage intakes• Good organic premiums for summer finished cattle make the system very attractive when also considering the cost (or value if homegrown) of organic concentrates
WEAKNESSES	<ul style="list-style-type: none">• Cost of rented land of questionable quality in the area (needs to be organic?)
OPPORTUNITIES	<ul style="list-style-type: none">• Roll out over whole farm, increase stock numbers, increase farm GM and spread overheads• Pasture improvement through grazing management especially of owned land or ground that is closer to home• Improve performance post turnout by acclimatising cattle to higher forage diet pre-turnout (ie reduce concentrates)
THREATS	<ul style="list-style-type: none">• Brexit and uncertainty for livestock production• Extreme weather events affecting ground conditions• Increased parasite burden potentially but offset by better nutrition from higher quality pasture

3.2 Benefits for other Welsh sheep/beef businesses

From a KT perspective this project has proved useful already in terms of farm open days and articles etc. Many Welsh livestock farm businesses will benefit from the findings of the project. The principles, techniques and equipment are also equally applicable to sheep or milk production.

The system can be scaled up or down although the benefits are perhaps more applicable to small to medium sized units (or organic farms), where land is the main limiting factor. Larger farms can still benefit but may have more options for environmental or diversified income streams and can still produce a suitable farm income without pushing the stocking rate.

From an environmental point of view keeping more stock and producing more kg of meat per hectare will reduce the carbon footprint per kg produced. In addition, with higher quality grazed grass (and more grass availability on a year-round basis) there will be reduced requirement for conserving grass as silage and for supplementary feeding of concentrates. These will both reduce costs and the environmental impact, fuel, haulage etc of the system.

3.3 Alignment with sheep/beef sectors strategic goals

This work contributes to the Welsh Red Meat Industry's Strategic Action Plan 2015-2020; specifically, in relation to-

- ***The Strategic Priority “Improve production efficiency (thereby increasing quality supply) whilst maintaining the environment and landscape of Wales”***
- ***Strategic Objective 2- “Increase the contribution of the Welsh red meat sector to Welsh Agricultural Output”- specifically Actions***
 - ***“Develop new business-focussed programmes to improve the management, efficiency and profitability of Welsh red meat businesses”***
 - ***“Establish mechanisms that will maximise outputs from grass based systems and reduce reliance on bought in (imported) feed”.***
 - **Inform/educate the industry about cost saving and conservation, energy and water efficiency, ways to reduce waste and ways to improve knowledge, openness and transparency**
 - **Deliver new technology transfer activities that can demonstrate practical industry solutions to encourage uptake of new technology**
 - **Deliver knowledge transfer activities that promote innovation and encourage the uptake of best practice**

The success of the project has resulted in the business being more profitable due to increased farm output without a significant increase in overheads. The investment has shown a positive annual return and payback will be rapid. The business will have a reduced carbon footprint per kg of beef produced and will be more resilient to withstand the effects of an uncertain political climate.

4 Impact on the industry

4.1 Impact on individual business

The figures calculated show an additional liveweight gain valued at over £6,000 in one year at a cost of under £4,000. In addition, there would be significant cost savings of around £5,000 (34 cattle x ca £150/hd) from the reduced housing and feed costs that would normally be incurred.

4.2 Impact on wider industry

There is currently much interest in improving grassland management and implementing rotational grazing systems. This project has shown the potential on this farm and there is no reason why many other livestock farm businesses can also implement a similar system.

4.3 Impact on Welsh Government's cross cutting and priority themes

Climate change

The UK government is legally required to reduce greenhouse gas emissions across agriculture by 80% of the 1990 levels, by 2050 (there is also an interim reduction target of 11% by 2020). Agriculture has to play a key role in achieving these reductions. A Carbon footprint calculation has not been done yet. However, by increasing farm output and reducing concentrate inputs Penrhiw will have reduced its impact on the climate.

Animal Health and Welfare (AHW)

There is a risk of increasing some health issues such as lameness and parasitic gastroenteritis with increasing stocking density. However, it is generally accepted that rotational grazing systems, properly managed, mitigate against many of these problems by always providing high quality (high ME & Crude Protein) feed that will help to increase an animals immunity. In addition, moving stock to fresh ground on a regular basis is preferable to set stocking for many ailments.

Future Generations

One of the barriers to future generations of farmers entering the Welsh sheep industry is the availability of land as they are unable to buy land and are often competing with established businesses for rented land. Growing and utilising more grass per hectare, increasing stocking density and farm output goes some way towards alleviating this issue. In addition, while not new, rotational grazing has never had a wider choice of equipment, software and grass measuring devices which are all factors to attract capable individuals into the industry.

The Natural Environment

This system could allow higher production from the best land on a farm while more marginal areas can be used for environmental measures.

Tackling Poverty

By farms being more profitable, typically the additional monies are then reinvested back into the business. This results in more money being spent in the locality with suppliers to the business, resulting in continuation of job retention in local communities.

Health & Safety

Rotational grazing means that most stock can be observed, moved etc very easily and quickly. This releases time that can be spent on other aspects on a farm that are often neglected, such as paperwork and Health & Safety issues.

5 Project Team

Phil Cowcher and Mr & Mrs Tom & Eva Cowcher, Penrhiw, Capel Dewi, Llandyssul

James Daniel, Precision Grazing Ltd

Menna Williams; Red Meat Technical Officer, Menter a Busnes,