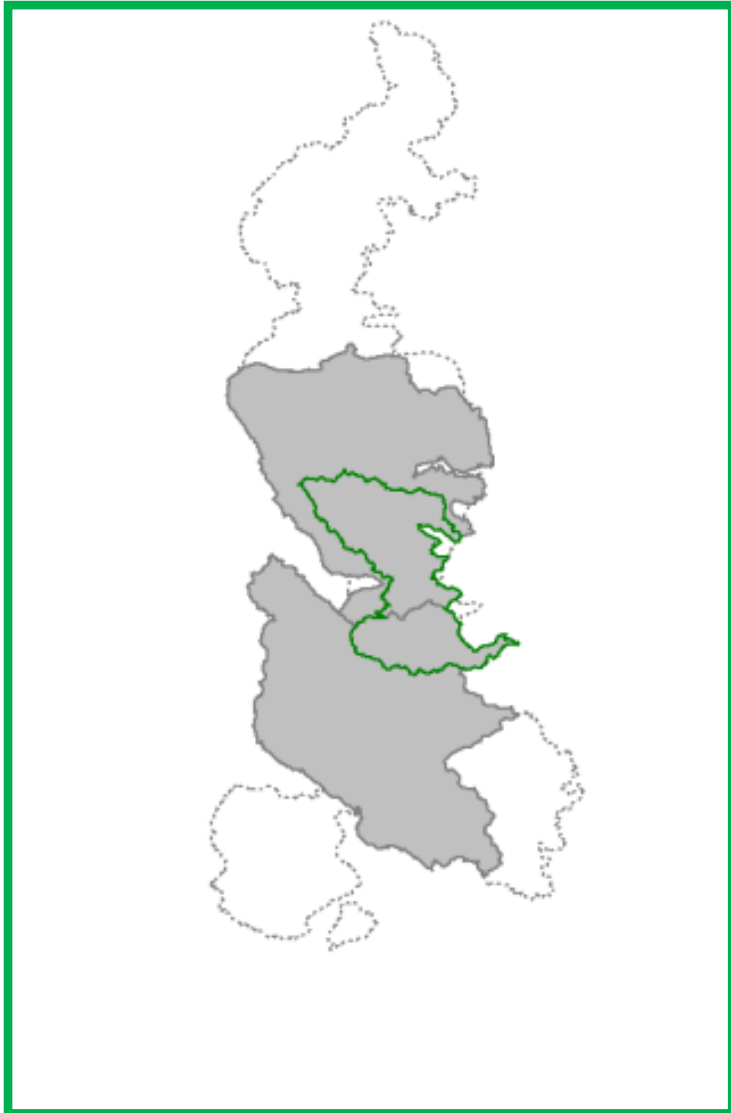




Yorkshire Dales National Park Authority through the Tees-Swale Partnership

Grassland Case Study
May 2022





TEES- SWALE Naturally Connected project funder/partners

NORTH PENNINES
Area of Outstanding Natural Beauty



The project, which has received £5.8 million of funding from the National Lottery Heritage Fund and aims to restore, expand and connect habitats across the uplands of Teesdale and Swaledale, enhancing wildlife and delivering multiple public benefits.

The aim is to work with 300 farmers across the programme area to fund a range of restoration measures, such as reforestation, upland hay meadow restoration and habitat improvements for bird conservation

Crow Trees Farm, managed by the Hunter Family, has been assessing the grassland management in place alongside the performance of the livestock enterprises.

The trigger for the Hunters was when they wondered how much grass they were growing on fields being managed under Stewardship agreement prescriptions versus fields managed without any options, and whether the yields achieved and the payments received all made financial sense.

At the same time, the business has been considering whether the traditional grazing management in place is making the best use of the grass being grown.

FACT FILE – CROW TREES FARM

- **700 acres of inbye ground (460 acres owned and secure tenancy, 240 seasonal tenancies)**
- **Grazing rights on 2 fells (equates to roughly 600 acres of allocated grazing)**
- **Land classed as Severely Disadvantaged and Moorland)**
- **Farms steading sits at 280m above sea level, moorland rises close to 600m above sea level**
- **25 suckler cows (numbers have dropped and breed change to Luing aiming to produce animals at lower cost and utilise grassland better)**
- **650 breeding ewes (including a flock of Swaledale and a flock of Texel X ewes)**
- **Higher Level Stewardship Agreement – covers half of the farm, with remainder in Uplands ELS**
- **Most land covered by stewardship options including EL2, HK6 and HK18. Few fields without prescriptions upon them**

CROW TREES GRASSLAND MANAGEMENT

- Traditionally set stocked
- Recent investment in electric fencing equipment and a plate meter – just starting, with rotational grazing an aim.
- Specialist assessment of soil – no signs of major compaction
- No bagged fertilisers in 2021 – aim to continue this going forwards
- Aim to rot FYM for 12 months before application
- Specialist assessment of swards – most recent reseed 2015. Now looking at mixed sward/herbal leys as an option

GRASS IS THE CHEAPEST FEED



DID YOU KNOW?

Optimum pH for grassland is 6.0

Outside of this range, the availability of nutrient to the root is restricted

If soil pH is 5.5 instead of 6.0, up to 1/3rd of applied bagged nitrogen could be unavailable and up to 50% of applied bagged phosphate could be unavailable (source – Origin Fertilisers, 2019)

Traditional set stocked grazing results in roughly 50% utilization of grass – if fertiliser applied to whole field, only 50% generates growth that is eaten and 50% is wasted.

If you apply 1t of UK produced Ammonium Nitrate (£839/tonne – source AHDB March 22) to a set stocked field with a pH of 5.5, then of the £839 spent £276.87 is wasted due to low pH and £281.06 is wasted in grass that isn't utilized.

Of the £839 spent, only £281 grows grass that ends up in the animal – is that good value for money??

NB – under rotational grazing, utilization could increase from 50% up towards 80% = better use of grass grown

CROW TREES – CASE STUDY FIELD 1



- No stewardship prescriptions
 - Reseeded 2015
 - 8 year ley mixture

CROW TREES – CASE STUDY FIELD 2



- Long term hay meadow
 - In HLS agreement
 - HK6 and HK18

FIELD 1 – NUTRIENT STATUS

SOIL ANALYSIS 2022

Organic Matter – 11.48%

pH – 6.7

P Index = 0

K index = 2-

Mg Index = 3

- No fertiliser applied 2021
- pH is good, potash at target, phosphate is very low
- Assumption = FYM has a good straw content, which has maintained a target index

FIELD 2 – NUTRIENT STATUS

SOIL ANALYSIS 2022

Organic Matter – 20.19

pH – 6.3

P Index = 1

K index = 3

Mg Index = 4

- No fertiliser applied 2021
- pH is good, potash very high, phosphate is low
- Assumption = FYM has a good straw content, and more muck might have been targeted at this field as a result of restrictions on bagged fertiliser – this could have resulted in high potash index

FIELD 1 – YIELD/QUALITY

Calculated yield 2021 – silage only (no account for grazing)

4.2 tonnes of DM/ha

There will be additional yield from 2021 taken through grazing that has not been recorded.

Silage Analysis 2022 (2021 silage)

Dry Matter – 47.8%

D value – 69.8

ME – 11.2 MJ

Crude Protein – 14.5%

Comment – good quality silage but high Dry Matter. Animals likely to achieve daily DM intake requirement before achieving ME/Protein requirement. Could potentially cut earlier to get lower DM?

FIELD 2 – YIELD/QUALITY

Calculated yield 2021 – hay only (no account for grazing)

2.8 tonnes of DM/ha

There will be additional yield from 2021 taken through grazing that has not been recorded.

Hay Analysis 2022 (2021 Hay)

Dry Matter – 84.8%

D value – 69.2

ME – 10.7 MJ

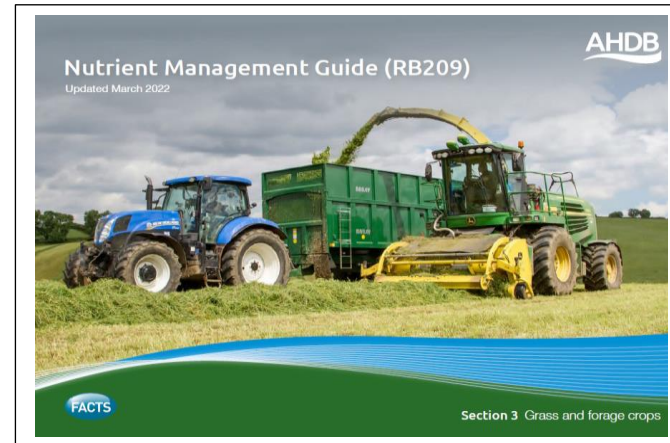
Crude Protein – 9.1%

Comment – good quality hay. Possibly higher ME than expected. Animals likely to achieve daily DM intake requirement before achieving ME/Protein requirement. Need to supplement?

NUTRIENT MANAGEMENT

Future aims:

- maintain pH with appropriate liming
- Utilise well-rotted farm yard manure
- Keep purchased fertiliser to a minimum



Under the Farming Rules for Water, every grass field that receives fertiliser at least once every 3 years should get a soil sample done every 5 years, and annually the business should prepare a nutrient management plan to justify any materials that are going to be applied. The system to use to create a nutrient plan is RB209 (freely available from AHDB).

Nitrogen – nitrogen recommendations are based on tonnes/ha of Dry Matter yield. This is another reason to start measuring grass yield. Often for an upland grassland system, RB209 states that the amount of nitrogen justified is slightly more than is actually put on. This is likely because RB209 is assuming the fertiliser is being applied to a responsive grass sward containing lots of ryegrass, and not a semi-natural/natural grass sward such as those found in Swaledale.

If the aim is to start utilizing nitrogen from legumes and herbal leys, the business will be achieving the majority of the nitrogen requirement through these sources.

Even though legumes might be the main nitrogen source going forwards, the Farming Rules for Water still requires the calculation to be done if FYM is going to be applied.

NUTRIENT MANAGEMENT

Phosphate and Potash – RB209 recommends quantities of P and K with the ultimate aim of maintaining the soil at target index of P2 and K 2-. These target indices have been set over the past 50 years and have shown that if an index is below target, it could be holding back crop yield. If a target is above index, there is no additional crop benefit and there could be environmental issues. If the indices are at target, the recommendations will cover the nutrient being removed in that year to maintain that index. If below target, the recommendations will cover the crop offtake for that year PLUS a build factor, which will aim to get that index up to target over time.

Phosphate – the P indices for both fields are low (0 and 1). This means RB209 might recommend a fairly large amount of P to help build the target. It's questionable whether Crow Trees will have enough FYM to apply at such a rate that they can cover all of the P required. There is also an issue with regard to potash (below).

Potash – interestingly, both potash indices are either at target or high (2- and 3). This is likely as a result of the high potash content of straw, and the modest yields identified which are not taking lots of potash out of the ground. Whilst there might still be a small potash requirement according to RB209, the problem that arises is linked to the Farming Rules for Water. The rules state that an annual nutrient management plan is needed to justify applying material, and to ensure it is not being applied in excess.

Per tonne of cattle FYM, on average, there are 3.2kg of Total Phosphate and 9.4kg of Total Potash.

If the business applies a large amount of FYM to try to build the P index, they will also be applying a lot of K, and the index will rise further. In this instance, K is the limiting factor, and the rate of FYM applied should not over supply Potash. By dropping the rate to not over-supply potash, the amount of phosphate applied will likely be a lot lower than required.

This will require the business to look for other forms of phosphate fertiliser to meet crop requirement.

Physical Performance

Field 1 achieved 1.4t DM/ha in conserved forage more than field 2.

Having reduced fertiliser applications last year, the main difference between fields 1 and 2 will be the cutting date; due to HLS prescriptions field 2 cannot be cut until much later.

The later cutting date of field 2 might be assumed to provide more Dry Matter, but as Field 2 has been managed less intensively for 10 yrs and being a traditional hay meadow, Field 1 achieved more Dry Matter (50% more) due to having been reseeded and managed more intensively.

We have not accounted for any yield from grazing in the above.

Even with Dry Matter from yield accounted for, the yields of both fields would likely be fairly average for similar fields in the project catchment.

The question is whether yield can be increased in both a financially sensible way, but also to comply with stewardship scheme prescriptions.

Financial Assessment

If the value of 1t of DM is estimated to be £100, then based on the above where Field 1 grew 1.4t DM/ha more than Field 2, then Field 1 was offering £140/ha more value.

It is unlikely that under current prescriptions the fields in Stewardship options will have much potential to increase Dry Matter Yield.

Fields which have been reseeded more recently and have no prescriptions should be the focus going forwards to measure grass yield more accurately, as these could potentially grow more grass.

Financial Assessment

Every SDA field will have received BPS SDA Payment (2021) – £231.60/ha

The above is all that Field 1 will have received.

Other fields will receive the above plus EL2 permanent grassland with low inputs in the SDA - £35/ha

Field 2 will have received the BPS payment plus HK6 management of species rich grassland -£200/ha plus the HK18 haymaking supplement - £75/ha

Field 1 will therefore be generating £231.60/ha plus a value of £420/ha in forage dry matter = £651.60/ha

Field 2 will therefore be generating £231.60/ha plus £275/ha stewardship, plus £280/ha in forage dry matter = £786.6

Other fields (if they are assumed to achieve the same yield as Field 1) will be generating £231.60/ha plus £35/ha stewardship, plus £420/ha in forage dry matter = **£686.6**

Grassland Financial Output

Based on the calculations on the previous page, Field 2 appears to be generating the most income (£786.6/ha) followed by the majority of the land in standard ELS options (£686.6) and finally Field 1 (£651.6).

In reality, it is unlikely the majority of the land will be yielding the same as Field 1 due to the fact that it has not been reseeded recently, unlike Field 1. This means that the majority of the land under standard stewardship options might be generating less income than the field that has been improved.

Field 2 appears best at income generation, but this is primarily due to subsidy payments to protect the hay meadow. Without the subsidy, the income generation falls significantly, and this factor will be relevant for many farmers in the project area.

The Future Post BPS

BPS will be phased out by 2028, and the current Stewardship is being rolled over, like many others, meaning there is no long term security of income from this scheme going forwards.

Under the Environmental Land Management Scheme, due to replace the current funding system, will be split into 3 levels:

- The Sustainable Farming Incentive – accessible to all land managers
- Local Nature Recovery
- Landscape Recovery

There is little definite detail about Local Nature Recovery and Landscape Recovery as yet. More is known about the Sustainable Farming Incentive, but nothing is as yet definite.

The SFI will be made up of a series of standards, and each standard will be split into 3 levels of engagement. Land managers will have to assess the requirements of each level, and determine what they can achieve, accepting the payment linked to each level.

Within the SFI pilot, the standard most appropriate for the land at Crow Trees would be the following (including potential payment rates): NB – the prescriptions and payment rates are all liable to change by the time the scheme is introduced

Low or No Input Grassland

Introductory standard - £22/ha

Intermediate standard - £114/ha

Advanced Standard - £120/ha

At Crow Trees, it appeared that the Introductory Level for the Low or No Input Grassland Standard would easily be achieved, but would only generate £22/ha. The Intermediate posed more problems, most notably the fact that 50% of the area cut had to be conserved as hay. The advanced level, generating £120/ha would be trickier, with 75% of the area cut to be conserved as hay.

Field 1 –

Current income generation estimate =
£656.1/ha

No BPS/Stewardship

SFI Intro Level , current yield = £442/ha

SFI Inter Level, current yield = £534/ha

SFI Adv Level, current yield = £540/ha

Advanced SFI vs current position = 18%
reduction, but may not be possible due to
prescriptions

Field 2 –

Current income generation estimate =
£786.6/ha

No BPS/Stewardship

SFI Intro Level , current yield = £302/ha

SFI Inter Level, current yield = £394/ha

SFI Adv Level, current yield = £400/ha

Advanced SFI vs current position = 50%
reduction, but may not be possible due to
prescriptions

NB – the above calculations will appear different to how BPS and Stewardship is accounted for. For many livestock farms, the BPS will make up a sizeable portion of the profit, so suggesting the changes above will only reduce income by 20% on the better ground might appear inaccurate. But what the above is doing is placing a value on the grass, which is not something many farmers currently do. This will have to be a key consideration for all grassland farms going forwards; how much grass do you grow, how much grass can you grow, how much does it cost grow that grass, and how much is concentrate costing you to top up the feed if the grass isn't performing.

The comparison between current estimated income versus potential under the SFI is clear; the fields in HLS options which pay good rates today might see a significant drop in income (50% estimated) if the SFI is the only scheme they are eligible for.

It is quite possible that the Local Nature Recovery strand of ELMS might offer additional funding for species rich hay meadow such as Field 2, but this is not guaranteed to happen.

Field 2 provides less opportunity to make changes too.

For example, with Field 1, the business is already looking at newer ley mixes and yield monitoring, with the aim that Dry Matter yield/ha can be increased. If the support payments do drop income generation by 18% for Field 1 by 2028, the target would be to boost yield by another 2t DM/ha to compensate.

With Field 2, there is less opportunity to reseed and try to boost output.

As such, it might be that the business will need to split the ground into most valuable areas for yield, and most valuable areas for habitats and biodiversity. The management might then consist of improving output on the most productive areas to significantly lift yield if possible, whilst the higher nature value areas would be managed more for the public goods they provide, and hope that this attracts funding.

Carbon will also play a role in the above decision making.

CARBON IN GRASSLAND

A complicated subject, but one which will become more relevant to farmers in the next 5 to 10 years, as the country strives to meet the Net Zero 2050 target.

The introduction of carbon at a time when the support mechanisms for agriculture are going through major change means that it is something that may well be bottom of the agenda for many farmers.

Grassland management and carbon neutrality might go hand in hand for livestock farmers, and is a subject that will take many years to fully understand. As such, beginning to look at what it means and what changes might be needed could also coincide with changes that businesses need to make as a result of the changing subsidy system.

A baseline carbon audit was prepared for Crow Trees.

CARBON AUDIT

Some of the data entered was a “guestimate” at best. The aim was to run a baseline to give a starting position, and in future the business can collect the data more regularly to improve the over-all accuracy of the audit.

Emissions from farming activity = 489,576kg CO₂e

Soil Carbon Sequestration = -196,894kg CO₂e

Woodland sequestration = -17,751kg CO₂e

Net emissions from operation = 274,932kg CO₂e

The above suggests that the sequestration currently taking place is off-setting roughly 44% of farming emissions, meaning the business is half way to being Net Zero.

Stocking rate, age of sward, reseeding option (full plough vs direct drill) and grazing strategy (set stocking vs rotational grazing) all have an impact on the amount of carbon sequestration being achieved.

As does clover content. The tool used, Agrecalc, asks for an average % clover content of the sward. For the mainly pasture fields we entered 1% and for the cutting fields we entered 5%, and the sequestration value above was generated.

If we changed the pasture figure to 5% and the cutting figure to 10%, the potential sequestration jumps to 1,201,754kg CO₂e from soil carbon sequestration. If this is true, the business would already be better than Net Zero, it would be Net Negative (i.e. the soil is sequestering more carbon than the business emits).

The key point here is data. Knowing the exact figures rather than guess work will give a much more accurate result.

Summary

- Changes to farming support payments have made the business consider how the farm can adapt. The current proposal for the SFI appears to lead to a reduction in income across all fields, but the high nature value fields could see the biggest reduction.
- Grassland management has been pin-pointed as the key area to consider
- Current performance is at an expected level for the land type
- Forage quality appears good, but will require ration formulation to match nutrient requirement to stock classes, and potentially supplementation
- Reduction in the levels of support payment will significantly affect the income generation per hectare
- Scope to increase yield of grass through targeted reseeding and grazing strategy where stewardship prescriptions allow
- Measuring grass yield and introducing rotational grazing will allow the business to increase utilisation of the grass grown
- Not all ground will be able to undergo some of the management changes suggested.
- Areas of lower production but higher nature value should be considered as public goods, and income generated through other strands of the Environmental Land Management Scheme
- Sward composition and clover content, alongside grazing system, will be crucial for farmers hoping to reach Net Zero through soil carbon sequestration.
- Over-all significant change is coming, but is being embraced by Crow Trees.