DairyCo-BGS Demo Farms

Demonstrating Research in Practice

Farm Visit

Trink Dairy

Mr Chris and Mrs Rachel Knowles
Trink Dairy
Trink
St Ives
TR26 3JG

25th August 2015
10.30 – 14.30

Event Schedule

10.30 Arrival, Tea and Coffee

10.50 Welcome and Introductions

11.00 Project introduction and AHDB Dairy research

11.10 Farm introduction

11.25 Healthy Grassland Soils presentation

12.10 Visit to the aeration demo field

13.00 Lunch

13.45 Feedback, summary and close

Speakers

- Mr Chris Knowles, Host Farmer
- Dr Elizabeth Stockdale, Newcastle University
- Dr Debbie McConnell, AHDB Dairy R&D Manager

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AHDB Dairy – BGS Demo Farms

The AHDB Dairy-BGS Demo Farms project is part of the DairyCo Grassland, Forage and Soils Research Partnership. This is a five year research collaboration with SRUC (Scotland's Rural College) in partnership with Harper Adams University and the University of Reading.

This encompasses 20 different research projects which span a range of topics under the headings of: grass, alternative forages, soil, out-wintering and economics.

To tell farmers about the latest findings of these research projects, DairyCo and the British Grassland Society (BGS) have set a series of demonstration farms across the country. These farms will run demonstrations replicating some of the current research trials, showing how they translate into on-farm practices.

More details of the research projects within the Partnership can be found on the AHDB Dairy website http://dairy.ahdb.org.uk/

University of Reading

SRUC

Harper Adams University

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Farm Profile

The Knowles family currently run a 325 cow herd with 285 youngstock (25% Jersey x 75% Friesian) at Trink Dairy between Hayle and St Ives, Cornwall. Since the late 1990's they have operated an extended grazing system, which was their solution to the low milk prices of that period. The grazing platform at Trink comprises 250 acres, with a further 250 acres off-land, all of which is down to either short or long-term grassland.

Soils at Trink are classified as Moretonhampstead type, described as loam over granite with typical characteristics of a gritty, freely draining, medium soil with a humose surface horizon in places. Although these soils are more suited to extended grazing than heavier, wetter soils Chris still notices the influence of soil compaction, especially where fields have been trafficked and during prolonged or intense wet weather events.

Over recent years Chris has been using a soil aerator annually as a matter of course. As part of the DairyCo-BGS Demo Farms Project the Trink Dairy has been running trials to investigate the influence on soil condition and grassland productivity of a) the type

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of aerator used and b) the timing of undertaking the aeration operation.

Farm Details

Soil type	Cropping	Grass mix
Medium – Sandy Loam	Grassland – 202.5 ha	PRG + white clover

Staff	2 full time employed 1 full time family 1 part-time family
Production (l)	5500
Butterfat	4.6
Cell count	120
Concentrate per cow	1 t
Concentrate per l	0.18 kg
Calving	Spring block

Grazing

Cows are generally turned out on 10th February and are in by night from the 1st November onward depending on weather. Average annual grass growth is 13t/ha DM, with 2150 average covers across the farm at peak growth (29th July 2014).

Farm SWOT

Strengths: A simple system which is profitable and sustainable in terms of keeping costs manageable.
Weaknesses: Natural constraint of the soil type and exposure (moorland) and the narrow lanes accessing the holding.

Opportunities/Goals: To achieve a work/life balance. Trying to sell more surplus stock and improve our replacement rate.
Threats: The market and price volatility and that we seem to be experiencing more extremes of weather.

Soil Aeration

Sandy, light soils are often overlooked in terms of treating compaction.

The aims in this demo are to assess:

I. The value of good soil structure
II. The pro's and con's of regular aeration of soil and any impact on productivity

Field Site

A five yea grass-clover ley on the grazing platform has been split into five different areas and allocated different aeration treatments to be undertaken in either Spring or Autumn.

1. Spring, Slit Aerator
2. Spring, Aerator plus Harrow
3. Autumn, Slit Aerator
4. Autumn, Aerator plus Harrow
5. Control, no treatment

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The field has yielded c. 12 t DM/ha/annum for the last five years and has received regular aeration in the past.

	pH	P	K	Mg	LoI*(%)
mg/l (index)	6.2	25.4 (2)	95 (1)	115 (3)	9.5

Plots were aerated in Spring and Autumn 2014 and following this some soil structural assessments have been undertaken.

	Maximum **resistance to penetration (top 20cm)** (PSI)	Dry **bulk density** (top 7cm) (g/cm^3)
Spring 1	337	1.32
Spring 2	381	1.39
Autumn 1	407	1.18
Autumn 2	422	1.37
Control	393	1.43

There was very little difference between in soil condition in either soil bulk density or maximum resistance to penetration across the plots. This is most likely due to the good soil structure currently in place however it is notable that above resistance to penetration of 300 PSI soil roots can be affected by compaction, in contrast bulk density values are typically above 1.80 before there is any significant effect on root penetration. The results collected from this farm suggest that soil structure in the top soil horizon (<10cm) is good however there may be some slight structural problems further down the soil profile.

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Soil from plot 2 (spring aerator + harrow) showing good structure, 28/07/2014

Soil from plot 2 a few days after treatment, showing the slit created by the aerator.

Results from other demo farms:

On sandy-clay loam soils in Cheshire, exhibiting severe compaction, sward lifting and spike aeration resulted in a 11 and 4% increase in grass yield, respectively over the grazing season.

However, in contrast, following aeration at the demo farm near Yarm, there was little visible improvement in soil structure or grass yield with aeration at early grazings. In this example, aeration was undertaken in slightly wetter conditions on heavy clay soils and therefore may have had a negative impact initially. By the end of the season grass growth across all plots was equal.

AHDB Dairy Research: The impact of compaction

Researchers at SRUC and HAU are currently investigating the impact of cattle trampling and tractor compaction on soil structural damage and grass yield. In 2011 researchers imposed three treatments on a permanent grassland sward: cattle trampling, tractor and no compaction.

Results:

a) Impact of compaction on soil structure.

Trampling Tractor No compaction

Compaction had a negative effect on soil structure, increasing bulk density of the soil and resulting in an increase in the number of large, blocky, angular aggregates (as indicated above).

b) Impact of compaction on soil water filled pore space

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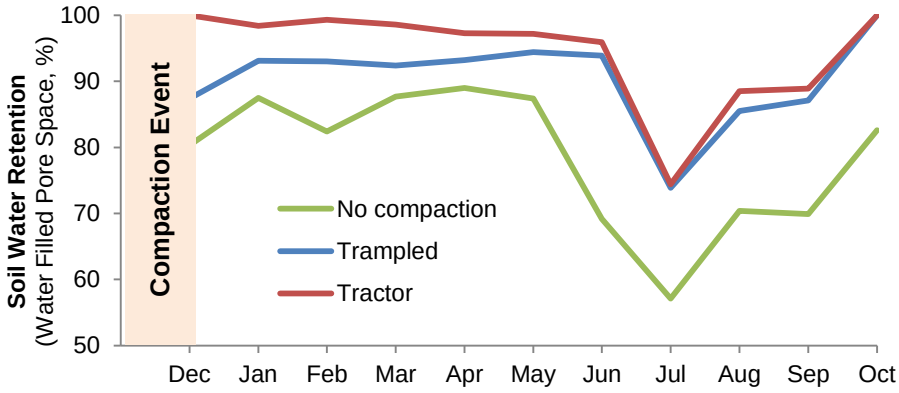
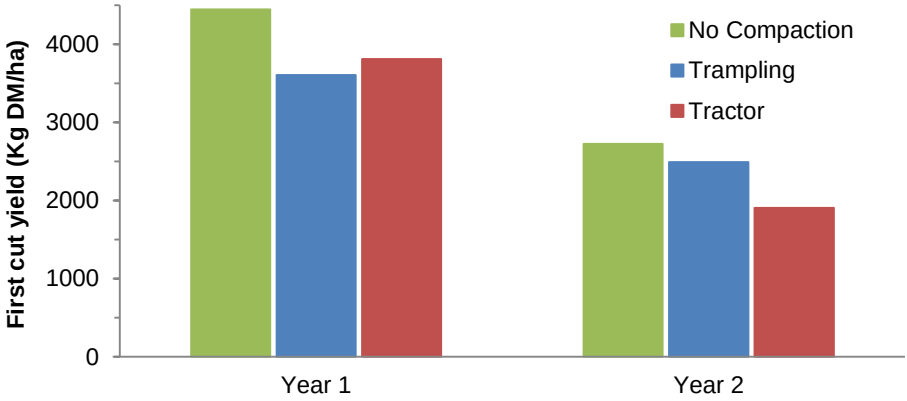


c) Impact of compaction on first cut grass dry matter yield



Initial findings:

- Both tractor and cattle compaction increased soil bulk density as indicated by large number of blocky, angular aggregates
- Compaction increased water retention in the soil by 17%
- Trampling and tractor compaction reduced first cut grass yields by approximately 20%.

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Top tips for using top-soil looseners*

Guidelines from ADAS work in the 1980s provide some clear messages for producers when using topsoil looseners. The most timely one is to aim to remedy compaction in the autumn, as dealing with compaction in the spring may cause more problems.

The ADAS guidelines are as follows:

1. Do not use topsoil looseners unless there are clear signs of soil compaction and the moisture content is suitable:

- Examine the soil by digging holes to find out the nature and depth of any compacted layers, as well as the moisture content and friability of the soil
- Topsoil loosening in conditions which are too wet will potentially lead to increased soil damage through smearing and wheel slip
- Topsoil loosening in dry conditions is likely to lead to the formation of large clods, sward tearing and excessive surface heave giving an uneven surface finish

2. Topsoil loosening is not recommended in poorly drained soils if there is no drainage system present, as this is likely to cause excessive wetness in low lying areas which will potentially be at further risk of poaching and re-compaction. In these situations, and on heavy textured soils, a mole plough may be more effective in improving the soil drainage status than topsoil loosening

3. Topsoil loosening should be carried out in the autumn when grass growth is declining. If carried out in the spring or summer when grass is growing rapidly, disturbance to the root system can lead to severe sward death

4. Use the appropriate equipment and set it up correctly. The depth of compaction will dictate the depth of working required - make sure the compacted layer is about 2.5 cm above the critical working depth of the implement used and examine the extent of shatter on a trial run, adjusting the equipment if necessary

5. Recently loosened soil is very sensitive to re-compaction and it is important to allow the newly loosened structure to be stabilised by root activity and natural soil processes:

- Cut or graze the site immediately before treatment to ensure sward height is low (<4 cm)
- Avoid grazing after loosening and conserve rather than graze in the first spring after treatment
- If late growth needs utilising, use sheep rather than cattle to minimise re-compaction damage
- Do not spread slurry on recently loosened fields

*Adapted from ADAS Technical Briefing notes (ADAS, 1984; 1987).

Feedback

Please use this space to make notes during the event. Your feedback is important and we will review it at the end of the session.

What worked?	What could be improved?
Ideas or suggestions for improvements?	Questions / things I would like to find out more about?
Other	

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