

# Resource efficiency



## Background

Laraich farm is a 129 ha arable and livestock farm. When the new farm manager took on the farm, he realised that the soil was not in good health, due to previous mono-cropping. The soil lacked organic matter and made the land more vulnerable to excessive rainfall and drought. The ground suffered from compaction due to use of heavy machinery and the low soil pH (acid soil) was preventing the uptake of soil nutrients. The farm manager undertook a variety of measures to improve soil condition, in order to improve crop yield and increase the resilience of his business.

## Approach

As a manager of an integrated arable and livestock enterprise he knew that resource efficiency was key and started to carry out more in-depth soil analysis. He used the results from the soil analysis and advice to better understand the right amount and timing of inputs required, reducing waste. He created field margins on the farm to prevent leaching of nutrients to water courses. He used crop rotation, including nitrogen fixing clovers to help build soil fertility. The integration with livestock provided manure and organic matter and significantly reduced his dependency on artificial fertiliser. The adoption of conservation tillage (min-til) in some fields, helped protect soil structure and prevent nutrient loss.

## Cost and benefits

This farm manager has made a significant investment in soil health, these include:

Soil testing and analysis.

Sub-soiling to address compaction.

Assessing existing field drains and considering when to reinstate and when to leave the drains and take wetter areas out of arable production and manage through Ecological Focus Area options or agri-environment.

Spreading lime, informed by the soil test analysis.

Spreading farmyard manure.

Liming has helped to increase pH levels and improve nutrient solubility; field drain works have helped to reduce waterlogging; and added farmyard manure has improved soil organic matter and soil structure. Despite what has been a significant investment in capital works, when the cost is paid back over 5 years, the overall result has been a marginal benefit of £52.17 per hectare. This has arisen primarily because of significant improvements in crop yields, with spring malting barley on the farm now consistently yielding 6.80 tonnes per hectare compared with 5.8 tonnes previously.

Cover crops and min-till farming could help improve soil health further. In future, precision farming using GPS-technology may help pinpoint specific areas that need additional nutrients, enhancing resource efficiency of the farm.

**Table with cost and benefits – Resource efficiency**

| Annual Marginal Costs                               | Per Hectare (£) |
|---|-----------------|
| Capital works paid back over 5 years @ 4%           | 58.13           |
| Spreading FYM - tractor and side-discharge spreader | 46.70           |
| <b>Total</b>  | <b>104.83</b>   |
| Annual Marginal Benefits                            |                 |
| Improved yield – Spring Malting Barley GM           | 157.00          |
| <b>Total</b>  | <b>157.00</b>   |
| <b>Annual Marginal Cost: Benefit</b>                | <b>52.17</b>    |

## Challenges

Reducing risk exposure to volatile input prices enhances profitability and business resilience. There is a balance to be struck between increasing yields and adding costs. It takes time for the soil to recover and some investments in soil (soil analysis, cover cropping) will pay off over a longer period of time.

## More information

Soil Association: Testing your soil <https://www.soilassociation.org/farmers-growers/technicalinformation/soil-health/testing-your-soil/>

FAS A guide to the Visual Evaluation of Soil Structure (VESS) <https://www.fas.scot/publication/a-guide-to-the-visual-evaluation-of-soil-structure-vess/>

FAS (2022) Making your soil analysis help you manage fertiliser costs <https://www.fas.scot/downloads/valuing-soils-practical-guidance-scottish-farmers/>

FAS Useful Publications <https://www.fas.scot/crops-soils/soils/understanding-soils-publications/>

Scotland's soils <https://soils.environment.gov.scot/>

## What next?

Invest in soil testing (including pH, soil carbon and soil organic matter), or use some simple methods to do your own soil testing across all your fields.