

Farming for a Better Climate



Balruddery Farm

Located seven miles west of Dundee, Balruddery Farm is a 170 ha arable unit between 70 and 125m above sea level on the lower slopes of the Sidlaw Hills. The soil is a sandy loam, slightly shallow in depth.

Farm boundaries are marked by drystone dykes with wooded den of the Balruddery Burn running through the centre of the farm. There are mature tree lines and an old hedgerow along some of the dykes and two smaller watercourses that run west to east across the farm and feed into Balruddery Den.

The farm, owned by The James Hutton Institute (JHI), has grown oilseed rape, potatoes, beans barley, and wheat. It is the site for the Centre for Sustainable Cropping (CSC), a LEAF Innovation Centre and is the

host for *Cereals in Practice* and *Potatoes in Practice* events.

JHI also own nearby Mylnefield farm; some of the measures relating to work at Mylnefield have been included for completeness.



Name	Euan Caldwell
Farm	Balruddery
Locality	Dundee
Farm type	Arable
Size	170 ha

How might climate change affect Balruddery Farm?

Farmers have always had to work with the weather, but over the past few years we are seeing more unpredictability, for example colder wetter springs and warmer autumns, making the job much harder to plan for.

Adapting to climate change is already becoming part of our routine business. By taking steps now, such as securing water supplies for irrigation or reducing soil erosion risks, we are reducing the risk that predicted climate change impacts could have on our business.

Case Study

Find out what other farmers are doing to improve profitability and adapt to a changing climate in our series of case studies.

There are five sets of Practical Guides covering :

Use energy and fuels efficiently

Develop renewable energy

Lock carbon into soils and vegetation

Optimise the application of fertilisers and manures

Optimise livestock management and the storage of manure and slurry

Find further information, including links to other Practical Guides and Case Studies, at



www.farmingforabetterclimate.org

Funded by the Scottish Government as part of their Climate Change Advisory Activity

Websites

www.farmingforabetterclimate.org
www.hutton.ac.uk
www.leafuk.org
www.climateexchange.org.uk
www.adaptationscotland.org.uk
www.farmingfutures.org.uk/
www.soilassociation.org/scotland
www.agrecalc.com



Balruddery

Better use of water for irrigation

Tied ridges in potato crops

Tied ridges are small dams within the wheelings between potato drills which are created at planting. The ridges help crop and soil management in both dry and wet conditions, as irrigation water can be held in the drills at drier times and helps us to apply irrigation more accurately and uniformly over a sloping field. This enables better use of our water and prevents or reduces runoff taking water, nutrient and soils off the farm.

With heavier and more intense rainfall, ordinary drills in potato crops can promote a lot of runoff from a sloping field. In a year where little or no irrigation is required because of increased or prolonged rainfall, these tied ridges can help to control rain water runoff and prevent pooling or "soft spots" in fields that have dips or troughs in them. At the end of the season preventing these soft spots can allow our harvester on the field earlier than we would otherwise be able to and help prevent further damage to soil structure.

Avoiding compaction

Working alongside scientists studying soil compaction has made it easier to understand the need to avoid working land in poor conditions or with the wrong equipment.

We plough as much land as we can before the ground gets too wet and winter is upon us, then the remainder is left unploughed as over winter stubble, providing a habitat for wildlife. Ploughing re-starts in late winter/early spring when conditions allow. Low pressure tyres help to spread machinery weight and reduce soil compaction risks.

Both drought and low rainfall can be issues for potato crops, especially at establishment and tuber development. We have installed a borehole and a ring main irrigation system to channel our water to all of our fields; this enables us to efficiently water our crops during dry spells. There are hydrant connection points in our fields which can provide irrigation via a rain gun, boom sprinkler or drip system. This can be applied as rainfall and soil moisture conditions dictate.

The irrigation pump sets are variable speed units and can increase or reduce in speed as demand changes; maintaining a constant pressure in the system no matter how many additional irrigation units are operating. This also allows timers to be used in fruit crops that require water in very small amounts repeatedly throughout the day. For example at the JHI owned Mylnefield Farm, we may irrigate container grown fruit plants in a tunnel for 3 minutes 10 times per day in a warm summer. This prevents the plant suffering any drought stress, reduces risk of over watering and ensures best possible use of water.

Reducing erosion risks

We have recently started to drill our commercial crops across the slope to try to prevent erosion, particularly on winter sown crops. We don't mark out tram lines and instead rely on the GPS guidance on the spray tractor to mark in its own tram lines when operating up and down the slope as we would traditionally. Once the crop is established there is no bare ground to encourage water runoff and we have also created barriers across the slope (rows of grain) to further prevent it.



Reducing storm damage

We have established new hedge rows and tree lines which we use as natural wind breaks to protect our polytunnels from the prevailing north-westerly winds. In addition to considering natural wind breaks, we have an emergency action plan for polytunnels at our Mylnefield Farm if high wind is forecast. Setting out a programme of priorities allows us to target the most vulnerable sites first should we need to dismantle a tunnel block quickly to protect the structure.

A shift in timings

All of our winter sown barley and wheat crops, whether they are small plot scale cereal trials, breeding programs or commercially cropped areas are now ploughed the same day that they are sown and where possible, we try to roll that same field or trial the same day too so that there is no delay in getting back on the land if we are caught out by heavy or prolonged rain showers.

We use a very accurate GPS system on both our small scale plot drill and our commercial drill, this not only speeds up and improves the accuracy of our work but it makes more efficient use of our inputs of seed, fuel and fertilisers. Given that we grow potatoes and that we have so many detailed plot scale trials within our overall crop rotation it is impossible to explore the option of controlled traffic farming. However we have recognized from previous work that under cereal cropping, over 80% of over-winter losses of sediment, phosphorus and nitrogen in surface run-off to the edge of the field are associated with tramline wheelings.

Balruddery Farm currently hosts a large scale tramline project which evaluates some well thought out approaches in reducing these losses; early results suggest that the spiked harrow (see photo) and the use of low pressure tyres are the most effective in reducing runoff from tramlines.