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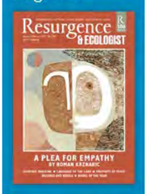
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Climate change and farming: let's be part of the solution!

Anna Bowen

9th January 2017

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What with rising rainfall in the west, and hotter, drier summers in the east, British farmers place plenty of challenges from global warming, writes Anna Bowen. But there are also positive opportunities for agricultural innovators to adapt their farming systems to changing conditions, make their operations more resilient and sustainable, and make themselves part of the solution.



Submerged valley near Foel, Wales. Should farmers consider switching to growing rice in their flooded fields? Photo: Jonathan Pagel via Flickr (CC BY).

> Warm, wet conditions are perfect for other already common pathogens and pests. The consequences of climate change could increase fly numbers, increasing the incidence rate of summer mastitis and fly-strike.

"I think it's time to change my farming system", said my client. *"A switch from dairy to rice paddies."*

Looking at his sodden fields, it wasn't hard to imagine.

When you work with farmers, conversations about the weather are inevitable. Their livelihoods are intrinsically linked to the climate, and very often they and their animals are at the mercy of the elements.

As a consultant I work with long-term financial projections and business plans. In light of rising global temperatures it would be foolish to overlook the impact that climate change may have on my dairy farming clients in the dampness of West Wales.

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The last decade has seen record-setting wet years for Britain, and the risk of flooding and the problems associated with sodden ground look likely to be an increasing challenge for farmers. The Environment Agency state that precipitation in the West of the country is expected to increase by up to 33%, a significant rise for an area that already experiences some of the highest rainfall in the UK.

When the fields are wet it becomes difficult to conserve forage for winter consumption. So in the future may bring problems with lack of good-quality silage, resulting in lower milk yields and poorer cow health.

Another problem on the horizon: the South of England, source of much of the straw that is used to feed and bed Welsh dairy herds, is expected to see drier, hotter weather. This too could negatively impact crop production, putting further pressure on cow nutrition.

Good news as well as bad

Conversely warmer weather, if coupled with sufficient dry periods and if access to fields is not limited, could lengthen the grazing season for grass-fed animals. This would aid sustainable agricultural practices and lower the cost of feeding concentrate feed. And that could be very helpful if there were shortages of imported feed due to desertification and drought overseas.

Warmer weather could also improve grass growth in upland areas, allowing these parts to be grazed with a mixture of species rather than just sheep. This would promote a more diverse range of flora and fauna - provided of course that species variety has not already been lost to climatic stress.

But warmer weather may bring problems too. The bluetongue virus first entered the UK in the mid-2000s. Although its spread cannot wholly be attributed to climate change, warmer weather could certainly have played a role in the proliferation of its *Culicoides* midge vector. Its emergence is significant because it heralds an age where more and more previously exotic diseases could become endemic in the UK cattle herd.

Vector-borne diseases are the obvious risk when considering that climate change could extend suitable habitats for various biting insects. It is also worth considering that warm, wet conditions are perfect for other already common pathogens and pests. The consequences of climate change could increase fly numbers, increasing the incidence rate of summer mastitis and fly-strike.

All of these health challenges could have serious impacts on herd management and performance. Bluetongue may be just the beginning in an unprecedented change in disease prevalence.

The one certainty - disruption

While paddy fields may be a step too far, climate change may bring the opportunity for some farmers to diversify into new enterprises, and force others to change their system. In some cases, this will be good for individual businesses and for certain sectors, for example an increase in domestic wine production or the lengthening of grazing seasons.

However, it will also necessitate a change in consumption patterns and an upheaval for farmers who have invested heavily in a particular sector.

Climate change overseas could potentially disrupt global supplies of grain, for both human and animal consumption. Droughts, like those seen recently in Australia, may hit important growing regions.

This would increase the price of cattle feed, again forcing farmers to move towards more extensive grass-based systems. In the long term this will provoke more sustainable production systems and possibly mitigate some of the damage associated with greenhouse gas emissions.

Making farming part of the solution

While agriculture is just one player in the system that has precipitated climate change, it has to take its share of the task of reducing its effects. Resource saving practices and renewable energy sources such as rainwater collection, solar panels, and wind turbines have already cropped up on farms and their use should increase.

Cattle can be fed in ways that minimise methane production. Regular soil sampling can optimise the use of nitrogen, potassium and phosphorous, reducing fertiliser bills and environmental impacts.

Innovative pasture management practices like 'mob grazing' on herbal leys can deepen plants' root systems, sequestering carbon in soils, and capturing water and nutrients that would otherwise go to waste. The use of 'companion planting' and cover crops can bring similar benefits in arable farming systems, while improving soil structure and fertility, and raising resilience to changing conditions.

Climate change brings extreme challenges to the agricultural sector, along with opportunities that will be exploited by those who feel that the situation won't be reversed in a hurry. The industry must take responsibility for its emissions and work with stakeholders to minimise them. At the individual farmer level there will be difficulties in adaption.

Farmers feed us all. My job will be to help them continue to do so.

Anna Bowen *is an agricultural consultant working mostly with grass- based dairy systems. She has an MSc in Sustainable Agriculture and Food Security from the Royal Agricultural College and was the 2013 winner of the Guild of Agricultural Journalists / John Deere Training Award. Her blog can be found at askauntannie.com and covers a range of rural topics. Outside of work she helps on her family's dairy farm and is a keen side saddle rider and athlete.*

Metrology for Earth Observation and Climate (MetEOC-2) is a project led by the National Physical Laboratory (NPL) to reduce the measurement uncertainties of Earth observation satellites. The project is part of a broader movement in the European measurement science community to provide ever more accurate Earth observation data to climate scientists. Ultimately, this work will allow the development of more sophisticated climate models, which are used to inform policy and develop strategies to mitigate climate change.

As part of this project, NPL ran a competition encouraging 16 to 25-year-old 'citizen scientists' to write about how they think climate change will impact their life and what they think should be done to combat it. They were encouraged to present an evidence-based argument, written with passion and conviction.

This winning piece was chosen based on these qualities as well as its excellent reflection of the current scientific understanding of climate change and the importance of accurate measurement.