

How might farming be affected by climate change over the next 50 years?

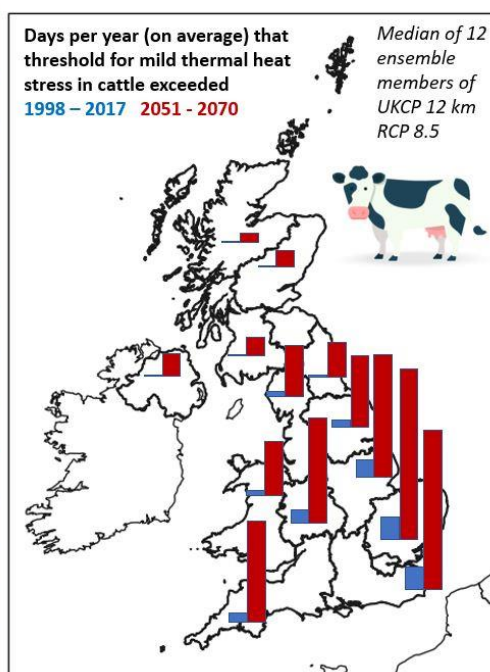
Have you thought about how cows and potatoes might be affected under climate change in the UK? Scientists at the Met Office do! I am Freya Garry, and I spent the first 6 years of my life on a farm in Cumbria, before moving to the Isle of Man. I have always loved the countryside and have fond memories of rural science lessons including helping to raise chicks and sheep at school. My love of the natural world led me to study ocean science at university before becoming a climate scientist. You can read more about my career in science [here](#).



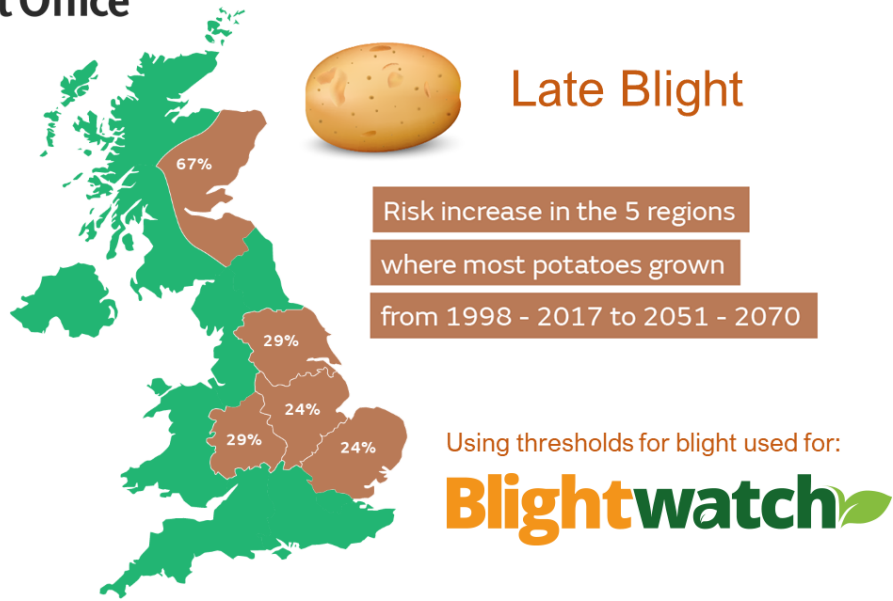
Cows, and other livestock, can be affected by hot and humid weather, which we call experiencing heat stress. Last year, I published a paper which found that future thermal heat stress in dairy cattle is likely to be greatest across England, and particularly in the South East around the London area, where in 30 - 50 years' time there may be up to 2 months more per year where cattle are stressed compared to the present day. In our local area, the South West, the region that contains the most dairy cattle, there may be 10 times more days per year on average when cattle are stressed.

The number of days per year that are projected to be warm and humid enough to cause mild heat stress in dairy cattle in 2051 – 2070 compared to 1998 – 2017 (averages across regions).

Region	Approx. Cattle (thousands)	Days/year (1998-2017)	Days/year (2051-2070)
South West England	757	2.7	28
Northern Ireland	531	0.21	6.2
Wales	432	1.4	15
North West England	496	1.5	14
West Midlands	289	3.5	29
West Scotland	279	0.20	5.1
Yorkshire and the Humber	154	2.1	20
South East	118	6.3	44
East Midlands	141	4.8	34
East Scotland	41	0.13	4.5
North East England	24	0.50	9.5
East of England	30	7.9	47
North Scotland	7.6	0.084	2.5



Potatoes are vulnerable to a disease called late blight, which also occurs in warm, humid weather. The conditions where blight occurs are likely to occur more often in the future across the UK, with the greatest increases in western regions. Most potatoes are grown in the east of the UK, where potato blight occurs less often, and so there are likely to be smaller increases in these important regions for potato growing (20-30% increase in potato blight occurrence). However, in east Scotland, a region which currently has lots of potato farming, potato blight may occur around 70% more often. In the South West, the risk to potatoes is projected to increase by only around 10%.



The research I did provides information about how likely heat stress and potato blight conditions are to occur across the UK, and how they are going to change under climate change, which is important information for people who are helping plan how to respond to climate change.

Heat stress in cattle and potato blight are just two examples of how a particular type of weather hazard, called a compound event. Compound events happen when one or more weather hazards occur at the same time, for example, very hot and very dry weather, or very windy and very wet weather. Thermal heat stress and potato blight conditions occur when temperature and humidity combine. We often experience more serious impacts when two weather hazards occur together rather than separately, or when they occur close in time or close in space.

Short video of Freya talking about compound events:

<https://www.youtube.com/watch?v=Su44fpZl1nU>

Future climate risks from compound events

Compound events happen when two or more weather/climate hazards occur simultaneously or in close succession, potentially causing greater impacts than when the hazards occur alone. Two examples from the UK agriculture sector are shown below.

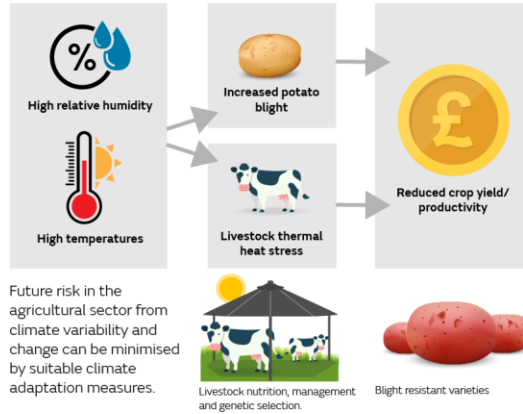
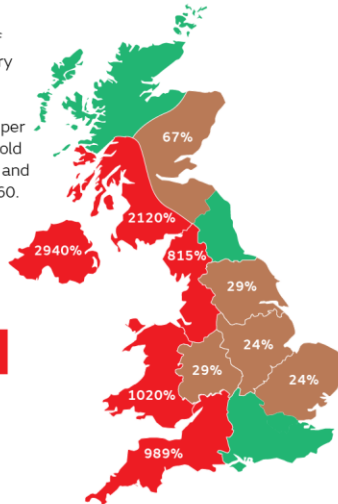
Future projections show UK-wide increases in the frequency and duration of thermal heat stress in dairy cattle and potato blight events. Risk is calculated using the number of days per year that exceed a threshold in the current climate and the future climate of ~2060.



Five regions with high cattle numbers and high risk



Five regions where most potatoes grown



Future risk in the agricultural sector from climate variability and change can be minimised by suitable climate adaptation measures.



Livestock nutrition, management and genetic selection.



Blight resistant varieties

Using UK Climate Projections Regional 1.2km product under a high emissions scenario.

Produced by the Met Office. Met Office and the Met Office logo are registered trademarks. © Crown Copyright 2021, Met Office 01500

Garry et al. 2021. Future Climate risks to UK agriculture from compound events. Climate Risk Management for inclusion in Special Issue on "UK Climate Risk Assessment and Management"

Both food for cattle and humans are likely to be affected by drought (when we get long periods without rain), which we tend to experience when we have particularly hot dry summers, such as in the summer of 2018. Another group of scientists from the Met Office showed that the summer temperatures of 2018 may occur every 1 in 2 years by the middle of the century (McCarthy et al. 2019). You can find out more about [hot weather and its impacts on the Met Office website here](#), and more about [climate change in general here](#). You can also explore our [Met Office resources for schools here](#).

References:

- Garry, F., Bernie, D., Davie, J., Pope, E. 2021. Future climate risks to UK agriculture from compound events. Climate Risk Management for inclusion in Special Issue on "UK Climate Risk Assessment and Management".

To read the full paper, please go to:

<https://doi.org/10.1016/j.crm.2021.100282>

- McCarthy et al. 2019. Drivers of the UK summer heatwave of 2018. Weather, Vol. 74, No. 11. <https://doi.org/10.1002/wea.3628>

Acknowledgements:

This work was funded under the Strategic Priority Fund for UK Climate Resilience. The UK Climate Resilience programme is supported by the UKRI Strategic Priorities Fund. The programme is co-delivered by the Met Office and NERC on behalf of UKRI partners AHRC, EPSRC and ESRC. You can read more about the Strategic Priority Fund for UK Climate Resilience at ukclimateresilience.org.