CARBON STORAGE AND RELEASE IN A CHANGING PASTORAL LANDSCAPE

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The stock of carbon in Welsh soil and vegetation dwarfs our annual fossil fuel CO_2 emissions. Woodlands contain around 30% more C per ha on average than permanent grassland, but grazed habitats (grasslands and uplands) cover 73% of the Welsh landscape and contain 78% of the total C stock in soil and vegetation. Changes in grazing management are likely as a result of CAP reform, and may have significant effects on C emissions. Most C is in soil rather than in plants, and thus any changes to the soil stock have larger effects than changes to current inputs of plant material and manure. There was a sharp loss of soil C in Welsh permanent grassland between 1980 and 1996, equivalent to around £360 M in EU CO_2 emissions trading credits. No data are available to assess changes before 1980. The decline in soil C was most likely due to land drainage causing soil organic matter to dry out and be oxidised more rapidly. Recent evidence suggests that water infiltration can be halved in intensively grazed fields compared with more extensive grazing, and this may also have made pasture soils drier. Drainage reversal to restore waterlogged conditions in selected areas may be the most effective way to maximise the soil C sink. The largest amounts of C are found in peaty and boggy soils, so C management should be targeted on these areas. Wet woods could be created to enhance C storage in unproductive areas.