US grasslands carbon neutral

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Cattle grazing systems on native grassland in the northern United States are reducing greenhouse gases, a new study reports.

The US Department of Agriculture (USDA) researchers set out to get a local perspective on European conclusions that managed grasslands are greenhouse gas sinks—(although when methane and nitrous oxide emissions were taken into account, the greenhouse gas balance in the European sites was closer to neutral).

The USDA study, reported this week in the Journal of Environmental Quality, came to a mixed conclusion.

It confirmed that in the North Dakota study area, all grazing treatments sequestered significant quantities of carbon and minor quantities of atmospheric methane.

However, lead author Mark Liebig later noted that the study does not account for greenhouse gas emissions through the full life-cycle of a steer, and the study is not a comment on the greenhouse potential of beef production as a whole.

But the study does paint an encouraging picture of pasture-based cattle production.

The authors looked at three grazing treatments: moderately and heavily-stocked native pastures that have been grazed since 1916, and an “improved” crested wheatgrass pasture initially sown down in 1932.

They assessed soil organic carbon levels by comparing soil samples taken in 1959 with fresh samples taken in 2003.

All grazing treatments showed significant increases in carbon down to 15 cm, and lesser increases down to 60 cm.

When the researchers compared soil carbon levels in equivalent soil masses across the treatments, they concluded that the crested wheatgrass gained 20 tonnes of carbon per hectare (t C/ha) in the 44 years between samples.

The heavily grazed native pasture gained 18 t C/ha, and the moderately grazed pasture gained 17 t C/ha.

The researchers then looked at whether soils were sequestering or emitting methane and nitrous oxide, and calculated methane emissions from cattle and nitrous oxide emissions from fertilizer.

In more heavily grazed pastures, about a third of all sequestration is negated by cattle methane production, although this drops to 12 per cent in moderately-grazed pastures.

Fertilizing improved pastures also negates the sequestration benefit because of the nitrous oxide emissions given off by the fertilizer.

The authors concluded that the “global warming potential” of the native pasture treatments is negative, meaning that they act as net greenhouse gas sinks.

The reverse was true of the improved crested wheatgrass pasture, which had a positive global warming potential because of emissions from fertilizer.

The difference in global warming potential between the native pastures and improved pasture was given a figure: 1098 kilograms of CO2 equivalents per hectare per year.

However, the relatively fertile silty loam soils of the US trial sites bear little relation to most Australian grazing land, which is reflected in stocking rates during North Dakota’s six-month May-Oct grazing window.

The yearling steers used in the research were grazed at 0.39 steers per hectare in the moderately-grazed plot, 1.1 steers per ha in the heavily grazed plot, and ranged from 0.4-0.9 steers per ha in the fertilized crested wheatgrass plot.

Cattle were set-stocked throughout the duration of the trial.

The North Dakota climate is classed as semi-arid, with 440 mm of annual average rainfall, of which about three quarters falls in the growing period.

Only about a third of the North Dakota year is considered frost-free.

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