ROTHAMSTED RESEARCH

RESEARCH INSIGHTS

Assessing the environmental impacts of alternative grazing management

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IN A NUTSHELL

Established in 2018, this grazing experiment compares set-stocking vs. cell grazing (TechnoGrazing) in a dairy x beef production system to assess the impact of managed rotational grazing approaches on environmental factors, as well as other relevant metrics of sustainability. Data from the first four grazing seasons demonstrated higher overall productivity associated with the managed rotational grazing system compared to the set stocked system, with indications of improvements in soil carbon and forage quality as well. Although individual liveweight gain was lower in the cell graze system, overall productivity was higher in this system due to its ability to support higher stocking rates per hectare. The long-term assessment of this type of intervention (stocking method) is critical to quantify its real impact on sustainability.

BACKGROUND

TechnoGrazing, a form of managed rotational grazing, has the potential to promote more productive beef farming and meet socio-economic targets through improved environmental and regenerative impacts. Managed rotational grazing increases land productivity and, it has been claimed, delivers positive impacts including increased soil organic carbon and reduced inputs like fertiliser, but there is currently a lack of peer reviewed evidence to support this. Established in 2018, with an initial 3 years of funding from the ERDF Agri-tech Cornwall project, this trial assessed the environmental and sustainability credentials of TechnoGrazing.

At the start of 2018, six experimental plots were set up at North Wyke, consisting of three replicate 1.75ha plots for set-stocking and three 1.0ha plots for TechnoGrazing. Each plot is individually monitored and managed with all inputs and outputs recorded. The set-stocked plots are continuously stocked with dairy x beef steers at a fixed stocking rate of around 1,400kg LW/ha, and receive no active management of sward height; whereas the TechnoGrazing plots are rotationally grazed with the cattle moving every one to two days and the stocking rate is varied depending on pasture growth and availability. Pasture covers are measured weekly using a rising plate meter and feed demand of the animals is estimated based on a % bodyweight calculation, which in turn is used to calculate grazing area to achieve the desired rotation length.

Figure 1. Layout of ERDF Cell Grazing project

FINDINGS

- TechnoGrazing increases the proportion of sown species, meaning the productivity of a pasture can be sustained for longer and reduce the requirement for re-seeding.
- The metabolizable energy (ME) content of forage is slightly higher in the TechnoGrazing system, with average values of 11.2 MJ ME/kg DM, compared to 11.0 MJ ME/kg DM for the set stocking.
- Output per animal is reduced with TechnoGrazing, with DLWG around 22% lower than set-stocking. However, this grazing system supported greater output per ha, which was on average 44% higher than set-stocking across the first four years of the study (Figure 2).
- Pasture production (kg dry matter/ha) is 38% higher and pasture growth rate is 27% greater in the TechnoGrazing.

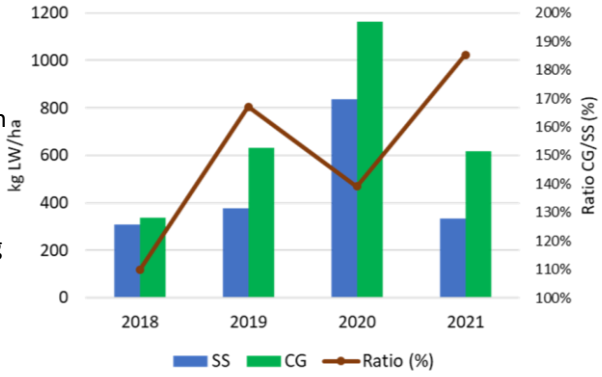

Figure 2. Land productivity - liveweight gain/ha. Brown line shows % superiority in output from TechnoGrazing (CG) vs Set Stocking (SS)

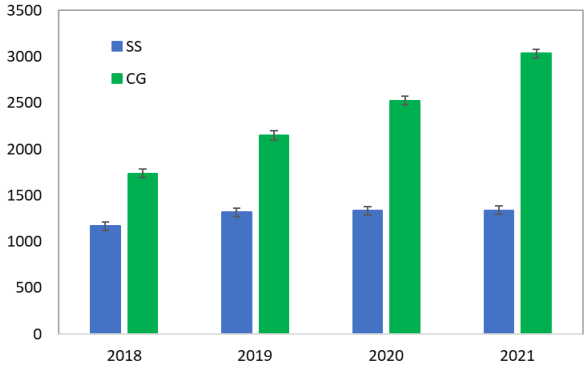

Figure 3. Carrying capacity: stocking rate (kg LW/ha) of set-stocked (SS) and TechnoGrazing (CG).

- TechnoGrazing is able to support a higher stocking rate, which has increased year on year from just below 2,000 Kg LW/ha in 2018 to over 3,000 kg LW/ha in 2021; compared to set-stocking which has maintained a stocking rate of around 1,400 Kg LW/ha (Figure 3).
- Soil carbon stocks increased at a rate of 1.24 t C/ha per year in the TechnoGrazing system, while no increase in carbon storage has been detected in the set-stocking.
- Soil compaction levels do not differ between methods, despite the higher stocking densities applied in the TechnoGrazing system.

TAKE HOME MESSAGE

Managed rotational grazing can increase carrying capacity and land productivity of beef production systems, although animal individual performance can be limited to some extent. Results from the first four years of this project indicate the potential of these systems to increase soil carbon and productivity across time, highlighting the need for long-term studies to assess the impacts of grazing management on sustainability.

NEXT STEPS

This project was incorporated into Rothamsted's Growing Health Institute Strategic Programme in April 2023 which runs until March 2028, at which point we will have 10 years of data on these contrasting grazing management systems. This will allow the required long-term assessment of productivity and environmental variables. The project demonstrated the impact of grazing management on a range of outcomes as well as the importance of field scale, long-term research. In 2022, further funding was secured to enable the experiment to be continued and it is currently (as of 2024) in its seventh grazing season.

DOWNLOAD THE INTERIM REPORT HERE

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