Livestock Towards Net Zero

What are the key emission challenges?

Emissions intensity

The UK average emission intensity for beef is less than two-thirds of the global level, indicating that British beef and lamb are among the most efficient and sustainable meat in the world[1]. This is mainly due to our extensive, grass-based systems. There is, however, still change needed in the sector to further reduce emissions and transition to net zero.

Valuing less productive land

The relatively high emissions from the sector, compared to other agricultural sectors, is reflective of the fact that much of UK livestock inhabits some of the least productive land in the country. As such, driving performance on this land has always been, and will remain, challenging.

Profitability and fragmentation

The livestock sector (beef and sheep) is relatively fragmented when compared to other sectors such as dairy, pigs and poultry. The significant range of performance is partly down to the range of systems in use across these two sectors, also the fact that the sector operates on a large variety of holdings across a wide geographic spread.

Where should you start to prioritise reducing emissions on your farm?

In 2019, the agricultural industry was the source of 10% of total emissions in the UK. Almost 50% of these associated emissions are rooted in livestock (beef and lamb) production, as methane is produced naturally as a by-product of ruminant digestion and decomposition of manure[2].

Priorities you should identify for your farm include improving the efficiency of feed, manure and nutrient, and land management. Effective utilisation of these key areas will promote productivity of livestock, boost soil health and carbon uptake, whilst reducing costs and emissions associated with purchased feed and artificial fertiliser[3]. Completing an annual carbon footprinting report is an important action to help you establish a baseline, identify, and monitor hotspots, and to target key areas that will have the greatest improvement on your farm.

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There are six key actions that can be implemented as part of an immediate plan to begin to combat emissions produced within the livestock sector.

1. Reducing emissions from slurry and manure management
2. Integrating clover and herbal leys into grazed grassland
3. Adopting grazing practises to unlock soil potential – mob grazing
4. Increasing animal health and productivity through diet
5. Use creep feeding techniques to finish lambs quicker
6. Installation of anaerobic digesters

What practical steps could you take?

Below are three key underlying principles that can be immediately implemented on any type of livestock holding, to combat on-farm emissions:

1. Manage waste and nutrients more appropriately to reduce emissions and the need to apply artificial fertilisers
2. Improve feed quality and intakes through effective feed management to increase productivity
3. Utilise various land management and grazing practises to promote soil health and carbon sequestration

What is the practise?	Why would this be of benefit to your farm?	How can I do this well?
Adapting diets to improve animal health and productivity	Feed is a vital element of livestock efficiency, as it provides the ruminant with the essential nutrients and energy needed to generate required outputs. However, around 6–12% of the energy in cow feed is lost as methane during the fermentation process in ruminant digestion[4]. With 87% of UK beef grown on predominantly forage-based diets[4], the requirement to improve feed quality is paramount[5]. Replacing the amount of cellulose in forage-fed ruminant diets, with easily digestible forms of starch, sugar, and fat, can be done by including multi-species swards in grazing pasture[6].	Select types of forage based on utilisation of the rumen and nutritional values, depending on required purpose and outputs. For example, increasing red clover will provide higher protein content, which is ideal for finishing fattening cattle, but can affect fertility of breeding ewes at tupping[4]. Speaking to an impartial nutritionist can provide information on feed digestibility, metabolic performance and recommended pasture mixes, that can be tailored to the desired output of your farm.
Integrating clover and herbal leys	Integrating herbal and legume leys into grazed grassland and arable rotations provide a range of benefits from improving soil health to increasing the efficiency in utilisation of protein in ruminant feed. The presence of legumes, particularly red clover[7], provide a key source of homegrown crude protein in ruminant feed, reducing need for purchase feed, accelerating animal growth rates, whilst having additional nitrogen fixing benefits.	Establishment needs to be between April and October, allowing a minimum of a year in the ground to build a good foundation, and to recover the initial seed investment cost. Understanding the chosen fields' soil type is important when choosing seed varieties, therefore referring to soil samples and guidance is beneficial. Financial incentives are available through the Countryside Stewardship Schemes for conserving and restoring wildlife habitats.
Adopt regenerative grazing strategies e.g. mob grazing	Including livestock grazing in rotations has known benefits to soil organic matter and carbon sequestration capabilities. Under improved grazing management schemes, grassland has the capability to increase carbon sequestration and storage by 0.28 tonnes C ha-1yr-1[8]. Adopting grazing management practises, such as mob grazing – a technique of rotational high density grazing for short durations with longer grass recovery periods[9], can assist in unlocking the soil's potential to sequester and store carbon, meanwhile offsetting some of the emissions produced on-farm.	Regenerative methods of grazing livestock are usually flexible and at a relatively low cost to the farmer, yet yield higher outputs, through increased growth rates from healthy soils due to fertilisation from livestock excrement, improving soil structure and organic matter[10]. Trialling helps identify which system/pattern suits each individual farm. Depending on the desired outputs this can be time consuming, but once established mob grazing can yield consistently valuable results.

What's next? What should I look at beyond two years?

Future scope for progress within the livestock industry to reduce emissions on-farm are vast, from adopting regenerative practices to transitioning to modern methods underpinned by innovative agritech. These include:

- Livestock genetics to enhance health and welfare, paramount to profitability and outputs in production. Selecting animal genetics based on higher growth/conversion rates of feed to meat, reduces the number of animals required to produce the same equivalent output. Ruminants that reach slaughter weight faster due to efficient feed conversion ratios underpinned by genetics, emit less direct emissions through digestion and manure, improving the farms efficiency. Promoting key animal welfare and health indicators, including: high fertility, low mortality, and reducing days to slaughter, have been proven to aid in reduction of on-farm emissions[11].
- Agroforestry in pastoral systems offer wide opportunities for increasing carbon sequestration (up to a further six mega tonnes CO2e savings by 2050[12]) and can be integrated into grazing systems, to offer additional benefits of shade, shelter and fodder.
- Further developments in agritech are unearthing methods of reducing methane emissions produced on-farm through the use of plasma. The technology involves using plasma treatment to simultaneously reduce ammonia and methanogenic emissions in livestock slurry/digestate, whilst increasing the nitrogen content of the waste product, allowing for production of high-quality fertiliser.
- The storage and handling of liquid slurry in open-air lagoons and/or pits, produces significantly higher quantities of methane, compared with solid manure[6]. Use of an impermeable slurry storage cover enhances the potential nitrogen content and value of slurry, benefitting for soil health and limiting reliance on purchased artificial fertilisers. Funding options and guidance is available through regulatory bodies, to ensure new additions to stores are compliant and in line with new regulations.

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References

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[3] CIEL: Net Zero and Livestock, 2022.

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[10] Cotswold Seeds Ltd. Mob Grazing: A Farmer Guide.

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[12] Committee on Climate Change. Land use: Policies for a Net Zero UK. 2020.

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