



Low-Carbon Livestock Farming Scenario

Summary of key points

Background:

- Grassland for grazing livestock is the dominant land use in Cumbria.
- These systems have high carbon emissions, including from the livestock, and where the intensity of management is high, can have negative impacts on biodiversity and water quality.
- There is a range of practice, and some lower-carbon livestock systems are being used.
- The following data is estimated impacts for different livestock systems on 50,000 ha of farmed land in Cumbria.

Scenario analysis:

- A low-carbon livestock system is compared to a low-carbon system, using data from existing systems and the baseline Cumbria Natural Capital Account.
- Compared to the conventional scenario, the low-carbon scenario **emits 20,000 (over 80%) less tonnes of CO₂e per year**, but **provides only 25% of the income**.
- There is potential to have more woodland in the landscape as part of the low-carbon system. Which could sequester additional carbon.
- Displacement of emissions means the additionality of carbon savings is uncertain. For the production volume, conventionally farmed, the low carbon system **reduces emissions by 8,500 tonnes of CO₂e per year**.

Under the low carbon scenario the farming system can potentially have income streams from:

1. Meat from livestock.
2. Carbon credits for reduction in emissions from livestock and additional woodland creation.
3. Value of public benefits potential be funded through ELMS.
4. Other private markets, such as biodiversity units for biodiversity net gain, or catchment management (e.g. for water quality).

To take investment forward:

- Length of contracts on the income sources need to align with a potential investment horizon.
- An enhanced monitoring & verification system would be needed to account for required returns.

1.1 Context

Agriculture is key to future economic, social and environmental targets in Cumbria

- Grassland is the dominant land use in Cumbria, covering 59% of land, and the livestock sector generates an estimated income of £131m¹ per year for the County.
- These systems have high carbon emissions, including from the livestock which may omit ½ a million tonnes of CO₂e per year, and where the intensity of management is high, can have negative impacts on biodiversity and water quality.
- As described in the [Lake District Management Plan Consultation](#), the sector faces multiple challenges relating to changes to public support payments, climate change adaption, and delivering nature recovery and net zero climate targets.
- More details on the extent, condition and benefits from woodland and other natural capital in Cumbria can be found in the draft [Baseline Natural Capital Account](#), produced as part of the Green Investment Plan Cumbria.

1.2 Livestock farming scenarios

We would expect a conventional beef and sheep system to have the following annual impacts:

| | Valuation metric | Value to Businesses | Value to the rest of society |
|------------------------|---|---------------------|------------------------------|
| Annual values | | | |
| Food provision | Livestock income | £7.63m | |
| Air quality regulation | Value of PM2.5 removal by woodland | | £600k |
| Carbon sequestration | Tonnes of CO ₂ e sequestered in woodland | | 7,100 |
| | Tonnes of CO ₂ e emitted by livestock | | (28,800) |

The same data for a low-carbon livestock systems comparable data are as follows:

| | Valuation metric | Value to Businesses | Value to the rest of society |
|------------------------|---|---------------------|------------------------------|
| Annual values | | | |
| Food provision | Livestock income | £1.93m | |
| Air quality regulation | Value of PM2.5 removal by woodland | | £600k |
| Carbon sequestration | Tonnes of CO ₂ e sequestered in woodland | | 7,100 |
| | Tonnes of CO ₂ e emitted by livestock | | (8,800) |

1.3 Low-carbon vs Conventional Comparison

Compared to the conventional scenario, the low-carbon scenario **emits 20,000 (over80%) less tonnes of CO₂e per year**, but **provides only 25% of the income**. In comparing the production and carbon emissions from these systems. Two further factors are:

- Potential to have woodland in the landscape as part of the low-carbon system. Increasing woodland cover from 2% to 10% of the landscape in these farming systems would reduce

¹ Based on expected gross margins.

production output (by a further £0.15m per year), and could eventually (once the woodland has matured) sequester an **additional 21,000 tonnes of CO₂e per year**.

- ii. Displacement of emissions from reduced livestock system production. If demand for meat is unchanged, production elsewhere may increase and overall UK emissions are unaffected. This affects how the 'carbon saving' from the low-carbon livestock system is measured. A more conservative estimate of the carbon savings is therefore to assess the expected emissions if the volume of production in the low-carbon system, was produced conventionally. This would give total annual emissions of 15,600 tonnes of CO₂e. Compared to this, the **low-carbon scenario reduces emissions by 8,500 tonnes of CO₂e per year**.

1.4 Farmer Income

Under the low-carbon scenario the farmers potentially have a variety of income streams:

1. Meat from livestock: **£1.93m**, but could be higher depending on the quality/price premium for the meat.
2. Value of carbon: Using a market price of future carbon credits at approx. £45/tonne of CO₂e (average over last 6 months²):
 - o For additional woodland creation, sequestering 21,000 tonnes of CO₂e per year could be **worth £945k per year**. However, these can't be realised immediately.
 - o For the 8,500 tonnes of CO₂e emissions saved under 1.4 ii) above are **worth £382k per year**.
3. Value of public benefits – e.g. landscape, biodiversity³, air quality regulation, water quality, flood management, health benefits from recreation, etc. Although several of these benefits can be valued, none have an established market price. They can potentially be funded through ELMS or other private markets.

Compared to the £7.63m/yr of revenue under conventional systems, income sources 1 & 2 above give £3.26m of income per year, a shortfall of £4.37m, or £65 per ha.

1.5 Discussion

- A challenge is for length of contracts on the different income sources to align with a potential investment horizon.
- An enhanced monitoring & verification system would be needed to account for the carbon and other benefits required as returns on investment/public funding. For example, there are risks of double-counting if credits for carbon, biodiversity etc are stacked within different funding instruments.

² [Carbon Price Viewer - Ember \(ember-climate.org\)](https://ember-climate.org/)

³ Approx. biodiversity unit increase (estimated using Defra Metric, note these scores are subject to time-delay and other multipliers if used in BU trading):

- Distinctiveness of habitat: changing from moderate condition modified grassland to moderate condition neutral grassland increases score by 4.4 BU (4.4 – 8.8)
- Condition of habitat, improving a modified grassland from fairly poor condition to fairly good increases score by 2.1 BU (3.3-5.5).