NET ZERO & LIVESTOCK

How farmers can reduce emissions: DAIRY

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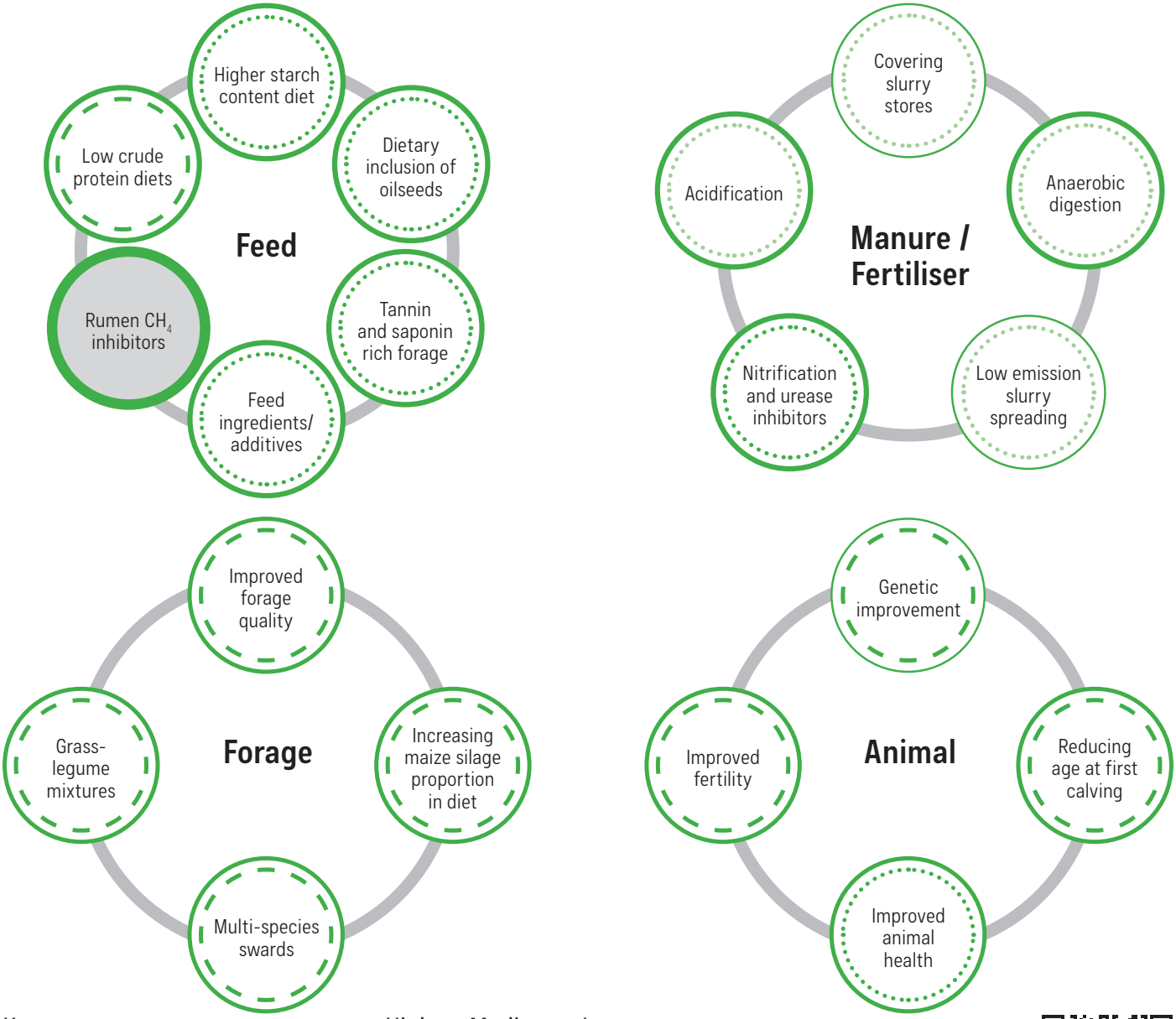
Current sector snapshot

- Milk Production £4.4bn 2020 (16.4% total agricultural output)
- Main GHG emissions: CH_4 (digestion and slurry) and N_2O (manure and fertiliser)
- Total emissions reduced by 16.1%*
- Dairy cow numbers down by 35%* ↑ Average annual milk production per cow up by 59%*

Potential for mitigating GHG emissions in dairy cattle



Key	High	Medium	Low
Impact on Carbon Footprint	●	○	○
Cost	◌	◌	◌
Mitigation not yet widely available	●		

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*Between 1990 and 2020

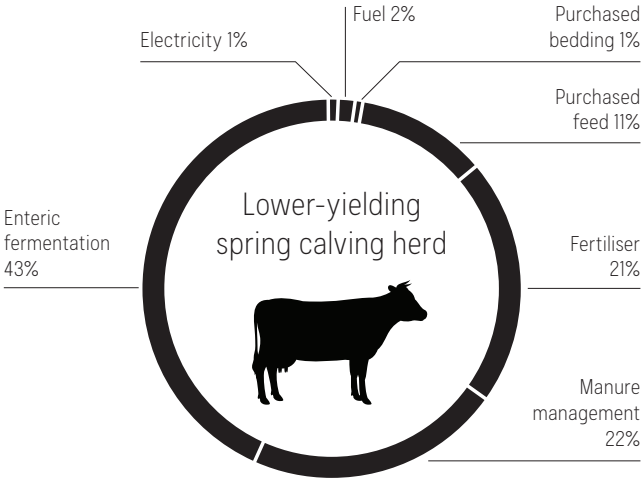
Putting it to the test: Lower-yielding, spring calving dairy herd

Using real farms to calculate emissions generated by specific scenarios that are indicative of the potential savings available in the sector.

Farm facts

- 203.5ha grazing platform
- 394 crossbred cows
- Yielding 5267 l/cow at 4.50% butterfat and 3.67% protein
- Age at first calving: 24 months
- Stocking rate: 2.64LU/ha
- 242kg N/ha fertiliser

Baseline emissions



Mitigations modelled

Mitigation	Carbon footprint (kg CO_2 -eq/kg milk)	% Change
Baseline	**1.46**	
Sale of surplus followers and improved grassland; released land used for forestry	1.20	**-17.8%**
Application of fertiliser amendments protected urea and N_2O inhibitors	1.42	**-2.7%**
Inclusion of legumes in grassland	1.34	**-8.2%**
Employing methane inhibitor at 30% effectiveness	1.25	**-14.4%**
Combined effect (Sale of surplus followers + improved grassland + dietary methane inhibitor @30% effective + released land used for forestry)	**1.00**	-31.5%

The combined effect of the dietary inhibitor, selling surplus heifers, plus improved grassland productivity along with forestry sequestration resulted in a 31.5% reduction in associated carbon footprint.

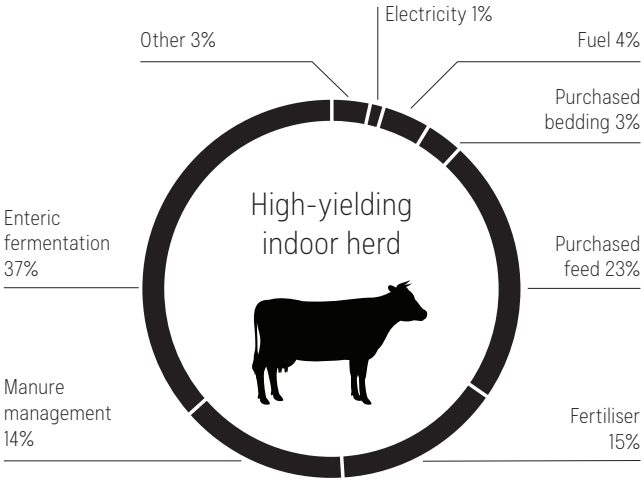
Putting it to the test: Higher-yielding, indoor dairy herd

Using real farms to calculate emissions generated by specific scenarios that are indicative of the potential savings available in the sector.

Farm facts

- 251.6ha grazing platform
- 410 Holstein cows
- Yielding 10377 l/cow at 3.49% butterfat and 3.24% protein
- Age at first calving: 25 months
- Stocking rate: 2.27LU/ha
- 159kg N/ha fertiliser

Baseline emissions



Mitigations modelled

Mitigation	Carbon footprint (kg CO_2 -eq/kg milk)	% Change
Baseline	**1.18**	
Reducing age at first calving from 25 to 24 months; released land used for forestry	1.12	**-5.1%**
Application of fertiliser amendments protected urea and N_2O inhibitors	1.15	**-2.5%**
Inclusion of legumes in grassland	1.14	**-3.4%**
Employing methane inhibitor at 30% effectiveness	1.01	**-14.4%**
Combined effect (Reducing age cows first calf + dietary methane inhibitor @30% effective + released land used for forestry)	**0.98**	-16.9%

Improving age at first calving and use of a dietary methane inhibitor (30% effective) along with forestry sequestration resulted in a 17% reduction in emissions and associated carbon footprint in a high-yielding indoor dairy herd.

Taking practical steps towards net zero: **DAIRY**

Complete regular carbon audits using a reliable carbon calculator

- Establish baseline
- Identify hotspots
- Monitor emission reductions and changes in carbon footprint.

Herd management whilst maintaining high animal health status

- Reduce age first calving
- Optimise calving interval, replacement rate, cow longevity
- Optimise feed inputs to match animal need.

Focus genetic improvement on specific traits

- Productivity relative to cow size
- Feed efficiency
- Fertility, longevity, or health.

Maintain or enhance sward productivity, reducing need for artificial fertiliser

- Include legumes in pasture mix
- Promote soil health and fertility.

Improve quality and utilisation of forage

- Harvest early, increase grazing frequency, decrease regrowth interval, etc.
- Increase maize silage proportion in diet.

Adjust diet and consider carbon footprint of feed components and farm nutrient balance

- Increase starch & concentrate proportions within recommended guidance levels
- Boost dietary oil and fat content
- Consider low crude protein diets
- Feed tannin- and saponin-rich forage
- Explore solutions such as CH_4 inhibitors – 3-NOP; Nitrate; seaweeds
- Make use of specialised feed ingredients/additives.

Adapt approach to storing and utilising slurry or manure

- Cover slurry stores
- Use additives to reduce emissions from stored manure
- Practice low emission slurry spreading
- Adopt precision application of manure and fertiliser
- Carry out soil testing
- Make use of nitrification and urease inhibitors, anaerobic digestion, acidification.

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