NET ZERO & LIVESTOCK

How farmers can reduce emissions: **Pork**

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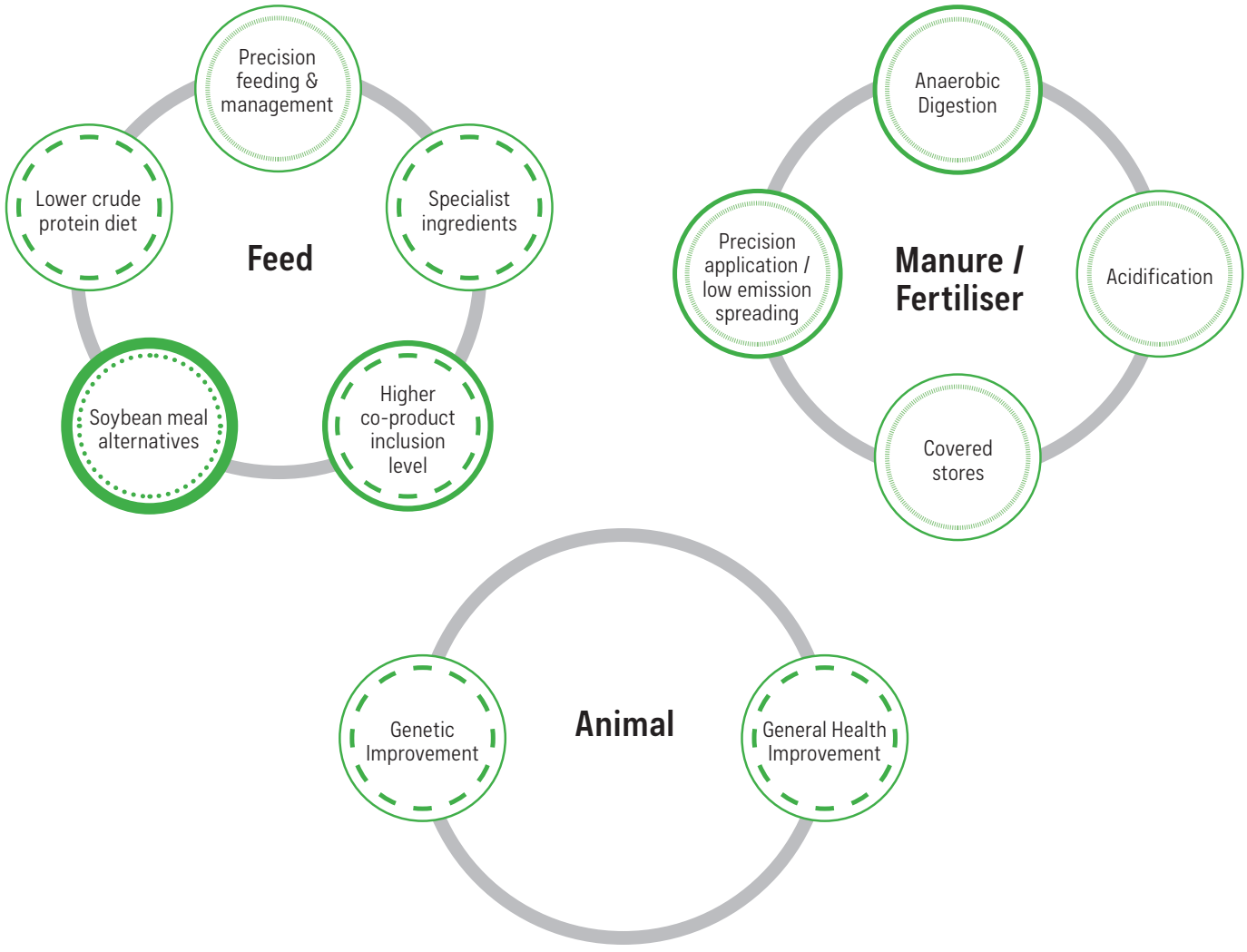
Current sector snapshot

- £1.4bn – Value of UK pork production (2020)
- Relatively low GHG impact per unit of pig meat vs dairy, sheep and beef sectors
- Key sustainability challenge = contribution to acidification and eutrophication, due to emissions of nitrogen and phosphorus from livestock manure
- Pork is one of the sectors where differences in carbon footprinting at farm level vs the National Inventory approach are relevant:
  - Top source of GHG emissions = Feed (≈ 75 – 80% as determined by LCA using a **carbon calculator**)
  - Key sources of direct emissions from UK pig systems = Manure and Enteric Fermentation (as accounted for under **inventory accounting**)

Potential for mitigating GHG emissions in pork production



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

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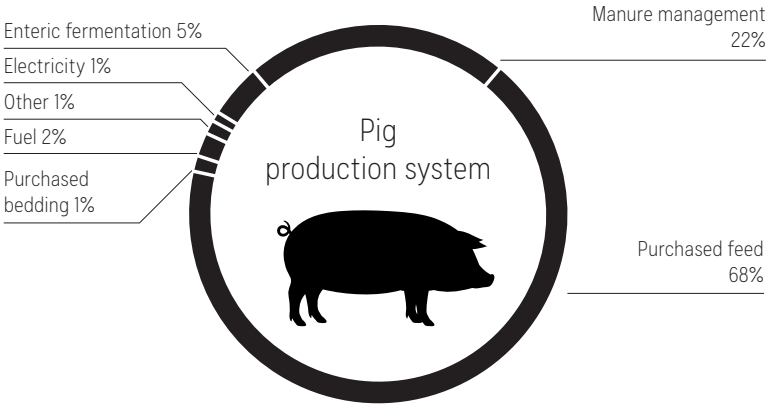
Putting it to the test: Pig production system (finisher)

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

Farm facts:

- 552 sows
- 342kg of feed per head
- Farrow to finish system
- Base finisher diet 19.2% soya
- 110kg slaughter liveweight
- 1109t/year of pig meat produced

Baseline emissions



Mitigation modelled

Impacts on emissions and carbon footprint of dietary protein source, including the effect of land use change (LUC).

What is Land Use Change? A process by which human activities transform the natural landscape (e.g. conversion of forest into agricultural land).

Diet* Base = Soya 19.2% Alternate = Soya 11%, Rapeseed meal 14%	Carbon footprint from feed (kg CO_2 - eq/kg deadweight)	% Difference for emissions and for carbon footprint from feed
1. Comparing TWO Diets – No LUC		
Base diet	2.16	
Alternate diet	2.15	↓ -0.5%

When the soy or rapeseed was not associated with land use change there was essentially no change in the GHG emissions from pig systems between the different diets.

2. Comparing TWO Diets – With LUC		
Base diet	4.39	
Alternate diet	4.05	↓ -8%

When the soy or rapeseed was associated with land use change, replacing soybean meal with rapeseed meal resulted in reductions of 8% of the GHG emissions from pig systems.

3. Comparing Base Diet – With and without LUC		
No LUC	2.16	
With LUC	4.39	↑ +103%

4. Comparing Alternate Diet – With and without LUC		
No LUC	2.15	
With LUC	4.05	↑ +88%

The greatest impact on the carbon footprint arose from when the feed was associated with land use change.

*Assumptions about emissions associated with LUC based on values reported in the Global Feed LCA Institute (GFLI) Inventory.

Application of mitigations to the National Inventory

The GHG and ammonia reductions achieved within the UK pig herd by reducing the Crude Protein (CP) content of diets, application of Anaerobic Digestate (AD) and use of a Nitrification Inhibitor.

			% Reduction for pig sector		% Reduction for Agriculture Inventory	
Mitigation options		GHG kt CO_2 - eq	GHG	NH_3	GHG	NH_3
1% reduction in CP content	Applied to all growing and finisher pig feed in UK (100% adoption). Assumed reduction of 8% in N excretion from grower and finisher pigs.	29	2.4%	6.1%	0.1%	0.5%
+ **All pig slurry to AD** (not farm yard manure)	Methane conversion factor of 4% assumed to account for 'escaped' emissions.	192	15.9%	7.1%	0.5%	0.6%
Nitrification inhibitor used with pig slurry application	Assumed to reduce N_2O emissions from soils after spreading by 40%.	21	1.7%	0.0%	0.1%	0.0%
Combined effect of above 3 mitigations		242	↓ **20.3%**	↓ **12.8%**	0.6%	1.0%

Taking practical steps towards net zero:
PORK (Indoor and outdoor breeding systems)

Improve feed efficiency

- Reduces both CH_4 and N_2O
- Great impact for reducing emissions on-farm and directly impacts on inventory GHG.

Adjust diet and consider carbon footprint of feed components

- Replace soybean meal with protein not associated with land use change
- Improvements in feed processing technologies and inclusion of specialist ingredients e.g. synthetic amino acids, enzymes and probiotics can offer some reductions in carbon footprint.

Focus genetic improvement on reducing carcass fatness

- Other trait improvements, such as increases in piglets per sow per year, deliver smaller reductions.

Enhance pig health

- Improves feed efficiency
- Reduces maintenance requirement, mortality and culling.

Capitalise on pigs' role as recyclers of 'waste'

- Can play a major role in circular agriculture
- Benefits greatest in finisher pigs.

Consider precision feeding and management strategies

- Potential to reduce emissions but currently high cost
- Technological advances could make such strategies cheaper and more readily available in the longer term.

Adapt approach to storing and utilising manure

- Cover slurry stores
- Make use of acidification and anaerobic digestion
- Practice low emission manure spreading
- Such emission reductions are directly accounted for in inventory accounting.

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