

Appendix 2

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Table 2. Summary of responses: What developments are in trial that have potential to roll out in the next ten years?

Category	Academia	Manufacturing	Farmers & veterinary surgeon	Other
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Farming methods

- Animal breeding
- More efficient and resilient animals
- Lower carbon footprint
- Precision agriculture in crops and livestock
- Integration of arable and livestock systems
- Soil health
- Sustainable intensification
- Lower carbon agronomy
- Crop production
- Leguminous plants co cropped with wheat to replace nitrogen fertiliser
- Nitrogen without CO2
- Aquaculture
- Multi-stream culture systems (e.g., fish plus water plants such as watercress)
- Ocean farming and harvesting of seaweed
- Crop production
- Mixed rotations
- Less use of manufactured fertilisers
- Perennial energy crops (miscanthus, willow)
- Crop inputs
- Reduced inputs and increased sequestration
- Reduced reliance on ammonium nitrate fertiliser-circular economy development
- Precision crop and livestock agriculture
- Improved reproductive performance
- Specific genetic progress
- Gene editing precision
- Regenerative agriculture techniques
- Livestock development e.g., indoor dairy farming
- Accelerated biopesticide
- Slurry co-mitigation ammonia emissions
- Agroforestry, precision agriculture, urban agriculture, vertical farming, advanced breeding techniques

Energy

- Zero fossil fuel use
- Electrification
- Hydrogen generation plants
- Bio-hydrogen
- Ohmic and pulsed electric field heating
- Refrigeration
- Improving efficiency
- Onsite energy generation
- Renewable energy
- Electricity generation
- Wind and solar are variable
- Tides are predictable
- Next generation technologies that consume less energy using advanced process control.
- Green energy
- Electric generation
- Gas to grid
- Tractor biogas fuelling
- Land-based renewables and energy storage, for on-farm and export
- Reduced emissions methods
- Scrubbers and catalyst systems
- Anaerobic digestion to generate "negative emissions"
- Green energy
- Hydrogen supply chain for transport factory
- Vehicle and machine electrification

Animal feed

- Alternative feed
 - Biotechnology in feed ingredients, including generation of enzymes and supplements
 - Reduce enteric fermentation's emission of methane - including archaeal suppressant commercial use
 - Feed rations that deliver lowest carbon footprint per product (not just feed input)
 - Home grown feed replacement of soya
- Alternative sources of protein
- Optimal nutrition including use of supplements to manage the rumen microbiome to reduce methane
- Diet
 - In cattle reduce methane production
 - Insect protein (including aquaculture)
 - Improved feed utilization
 - Alternative soya in feed formulations

Land use

- Changes in subsidies to farmers will change land use especially in the uplands.
- Peatland restoration, farm woodland / agroforestry, more hedgerows,
- ELMS (Environmental Land Management Scheme)

- Nature-based solutions
- Increased increments in hedges, new woodlands, soil carbon management
- Agroforestry

- Optimising for carbon sequestration

Consumer diet change

- Dietary change
- Reduced meat and dairy consumption

- Alternative sources of protein

- More dairy, less meat substitution
- Novel proteins
- Cultured meat
- Minimally processed
- Eating less but high quality
- Eat local

Waste

- Use of former foods and utilisation of coproducts
- Reducing food waste
- Supply chain integration to reduce stocks and waste.
- Circular economy principles for waste reduction
- NPD based on food by-products.
- Endemic disease control to reduce the waste associated with disease and increased productivity

- Measure reduce food and waste
- Waste valorisation
- Abstract slurry
- Reduced waste in a result of increase
- Recycling PET 5

Packaging

- Food packaging changes.
- Closed loop recycling of plastic packaging

- More info supplied packs reduce carbon footprint of products
- Biobased packaging materials
- Closed loop packaging

Measurement

- Better use of manures and measures to reduce N₂O and NH₃ loss on farm
- Farmers using tools to measure what is going on farm

Manufacturing

- Zero carbon factories
- Cellular agriculture to produce factory grown meat

- Product process (net zero design) redistribution manufact

Technology

- Urban farms based on Light Emitting Diode (LED) technology for salad and similar crops.

- New technologies
- Genetic
- Feed additives
- Feed proteins
- Robotics
- Drones
- Electric agricultural machinery