A UK MEAT INDUSTRY COMMITMENT TO ACTION

MEAT IN A NET ZERO WORLD:

Optimising productivity and minimising waste from farm to fork

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1.0 Overview

This document sets out a vision and set of actions for the UK meat industry to work from farm to fork to improve efficiency and productivity, minimise waste, protect natural assets and reduce global warming.

The aim is to make the UK meat industry a world-leading example of efficient and sustainable meat production and supply, by:

- As a supply chain, helping deliver productivity improvements, greenhouse gas (GHG) emissions reductions and protection of natural assets (e.g. soil, water) during livestock (cattle, sheep, pigs) and poultry rearing;
- Sourcing soya for use in feed that is cultivated in a way that protects against conversion of forests and valuable native vegetation;
- Large meat processors, retailers, and hospitality and food service businesses continuing to take action to reduce their own operational food waste, GHG emissions and water impacts; and
- Helping to halve the amount of meat thrown away at home.

A series of actions and commitments are defined within the document (summarised in Table 1) that will contribute towards existing national-level targets across different timescales:

- Courtauld Commitment 2025 targets to reduce food waste and GHG emissions by 20% between 2015 and 2025;
- UN Sustainable Development Goal 12.3 to halve per capita food waste by 2030;
- NFU’s vision of reaching net zero GHG emissions across the whole of UK agriculture by 2040; and
- The UK's target to bring all GHG emissions to net zero by 2050.

Together the UK meat industry also has ambitions to develop a GHG emission reduction target aligned with what climate science says is necessary to help limit warming to 1.5°C,

The document was compiled and published by WRAP, on behalf of stakeholders across the UK meat supply chain. The actions within will be implemented by supply chain businesses (processors, retailers, hospitality and food service businesses), with support from industry bodies. The term ‘we’ throughout this document refers to these supply chain businesses.

WRAP will also compile evidence to track progress and ensure accountability.
A Collective Commitment to Action

“There has never been a more critical time for action. We are facing a warming world, with more people and less land, water, energy and other resources to go around. As an industry we are committing to work together to ensure that we use these resources efficiently and minimise our impact on the environment, whilst safeguarding the health & welfare of our animals and the livelihoods of our producers. Never has it been more important that we produce food in a sustainable manner, including reducing food waste from farm to fork. By working collectively, we aim to make the UK meat industry a world-leading example of efficient and sustainable meat production and supply”

Rachel Hackett, Group Sustainability Director – 2 Sisters Food Group  
John Durkan, Group Sustainability and Environmental Manager – ABP  
Jane King, Chief Executive - Agriculture and Horticulture Development Board  
Liz Fox, Corporate Responsibility Director – Aldi  
Chris Brown, Senior Director Sustainability and Sourcing – ASDA  
Andrew Brodie, People, Sustainability & Communications Director – Avara Foods  
Joe Cornes, Managing Director – Becketts Foods Ltd  
Anna Proffitt, Policy Technical Manager – British Meat Processors Association  
Richard Griffiths, Chief Executive – British Poultry Council  
Leah Riley Brown, Sustainability Policy Advisor – British Retail Consortium  
Edward Morgan, Group CSR & Training Manager – Castell Howell Foods  
Caroline Mason, Head of Agriculture – Co-op  
Jim Brisby, Commercial Director – Cranswick  
Gill Higgins, Group Head of CSR & Sustainability – Dawn Meats Group / Dunbia  
Tony Stanton, Managing Director – Direct Table Foods  
Nick Dunn, HS&E Manager – Dovecote Park  
Penny Tomlinson, Managing Director – Fairfax Meadow  
Malachy McAteer, Operations Director – Foyle Food Group  
Nigel Edwards, Group CSR Director – Hilton Food Group  
Gwyn Howells, CEO – Hybu Cig Cymru  
Andrew Staniland, Trading Director – Iceland Foods  
Simon Hewitt, Group Technical and Compliance Director – Karro Food Group  
Kate O’Driscoll, Group Head Of Sustainability - Kepak Group  
Amali Bunter, Senior Responsible Sourcing Manager – Lidl  
Sophie Throup, Head of Agriculture, Fisheries and Sustainable Sourcing - Wm Morrison plc  
Declan Cunningham, Head of Sustainability and Risk – Moy Park  
Steve McLean, Head of Agriculture & Fisheries – M&S  
Henry Unwin, Do The Right Thing Manager – Nando’s  
Rebecca Veale, Senior Policy Adviser – National Pig Association  
Richard Findlay, National Livestock Board Chair – NFU  
Jim Moseley, CEO – Red Tractor Assurance  
Barney Kay, Head of Agriculture – Sainsbury’s  
Andrew Stephen, Chief Executive – Sustainable Restaurant Association  
Christina Downend, Responsible Sourcing Manager - Tesco  
Andrew Cracknell, CEO – Tulip Ltd  
Alan Clarke, Chief Executive – Quality Meat Scotland  
Robert Hues, Partner & Manager, Agriculture, Aquaculture & Fisheries – Waitrose  
Iain Clunie, Programme Manager - Food & Drink, Zero Waste Scotland
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MEAT IN A NET ZERO WORLD
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| Halving the amount of meat thrown away at home between 2007 and 2030 (in line with SDG 12.3) | **Actions for retailers and meat processors / brands:**  
  - Adopt known best practices for on-pack labelling and guidance across the key areas identified for poultry, pork, beef, lamb items (Section 3.5).  
  - Work on new solutions and innovations in the key areas identified (e.g. packaging/other innovations to extend shelf life, optimising pack sizes, encouraging more freezing/defrosting and use of leftovers).  
  - Support consumer-facing campaigns to increase awareness of ways to reduce meat being wasted, such as Love Food Hate Waste.  
  - Actively engage with employees (as citizens) on wasting less food.  
  **Actions for retailers and meat processors / brands:**  
  - Set an ambitious food waste reduction target (e.g. to halve food waste by 2030).  
  - Adopt a GHG reduction target in line with the principles of the science-based target initiative.  
  - Robustly measure and report on progress towards reducing food waste and GHG emissions.  
  - Where surplus is unavoidable, increase the amount sent to redistribution charities to avoid waste.  
  - Actively engage with staff on wasting less food.  
  - Have food waste reduction plans in place with suppliers.  
  - Improve the efficiency of water use in processing operations and support collective action to protect water resources in key sourcing areas, e.g. through the Courtauld 2025 Water Ambition. | Full set of KPIs outlined in Section 3.5 (tracked via WRAP surveys).  
WRAP will also repeat its household food waste survey on a periodic basis and generate a UK-level estimate, for comparison with 2007 data. |
| Large meat processors, retailers, and hospitality and food service businesses are taking action to reduce their own operational food waste, GHG emissions and water impacts | **Actions for meat processors, hospitality and food service (HaFS) businesses:**  
  - Set an ambitious food waste reduction target (e.g. to halve food waste by 2030).  
  - Adopt a GHG reduction target in line with the principles of the science-based target initiative.  
  - Robustly measure and report on progress towards reducing food waste and GHG emissions.  
  - Where surplus is unavoidable, increase the amount sent to redistribution charities to avoid waste.  
  - Actively engage with staff on wasting less food.  
  - Have food waste reduction plans in place with suppliers.  
  - Improve the efficiency of water use in processing operations and support collective action to protect water resources in key sourcing areas, e.g. through the Courtauld 2025 Water Ambition. |
| Playing our part as a supply chain to help deliver productivity improvements, GHG emissions reductions and protection of natural assets during livestock (cattle, sheep, pigs) and poultry rearing. | **Actions for meat processors, retailers, HaFS businesses:**  
  - Assist the development and implementation of delivery plans for NFU’s Net Zero and the UK Cattle Sustainability Platform, including adopting a common approach to measuring GHG emissions.  
  - Support the development and tracking of metrics / KPIs within each sector (beef, sheep, pigs and poultry) and the use of common tools to measure progress.  
  - Encourage better communication between producers and retail customers on market requirements, to help inform production plans  
  - Use the data received from FSA inspections to provide timely feedback to producers to help inform their animal health plans.  
  - Use producer groups, and other Knowledge Transfer mechanisms, to share best practice, share insights on short / medium / longer term horizons and enable feedback from producers.  
  - Continue to invest in R&D and new technologies to aid improvements in productivity and reduce the environmental impact of feed.  
  - Support collective action to protect water resources and other natural assets in key sourcing locations. | Metrics and means of tracking progress to be developed, in conjunction with NFU, AHDB, QMS, HCC, Red Tractor, UK Cattle Sustainability Platform and others. |
| Sourcing soya for use in feed that is cultivated in a way that protects against conversion of forests and valuable native vegetation | **Actions for meat processors, retailers, HaFS businesses:**  
  - Commit to the goal of the UK Roundtable on Sustainable Soya  
  - Publish timebound plans to source soya that is cultivated in a way that protects against conversion of forests and valuable native vegetation.  
  - Develop / implement practical action plans, with support from Efeca and others (e.g. NGO’s, technology providers, certification schemes). | Proportion of UK soya sourcing for feed covered by an action plan under the UK Roundtable on Sustainable Soya (currently 27%) – tracked and reported by the UK Roundtable on Sustainable Soya |
2.0 A Cross-Industry Vision

There has never been a more critical time for action. We are facing a warming world, with more people and less land, water, energy and other resources to go around. As an industry we need to work together to ensure that we use these resources efficiently and minimise our impact on the environment, whilst safeguarding the health & welfare of our animals and the livelihoods of our producers.

To deliver quality food to our customers, we work as a supply chain, and everyone has a role to play:

- **Producers** – rear animals to meet a range of production standards, health & welfare outcomes and other market specifications;

- **Feed producers** – produce the feed that these animals need to thrive;

- **Processors** – source animals meeting requirements and process these into a number of products meeting specifications on size, weight, fat cover, etc.

- **Retailers and hospitality and food service businesses** – market products attractively to consumers; balancing fluctuating daily/ weekly/ monthly/ annual demands and changing trends; and

- **Consumers** – make daily choices on what, where & how to buy, store, cook and eat food.

Every link in the chain is a steward of the resources invested to produce the products that consumers value.

Individually each part of the chain has taken major strides to improve efficiency and reduce environmental impacts. But action at individual points in the chain can only take us so far and can create inefficiencies for another part of the chain. So we need to work together to achieve more.

For example, WRAP estimates that around 380,000 tonnes / year of the meat intended for consumption is never eaten, and the greenhouse gas (GHG) emissions associated with producing this amount to more than 4 million tonnes CO₂-equivalents. Much of this is discarded after purchase, at home - but there are actions that can be taken at different points in the supply chain to help reduce wastage.
Our commitments

We are collectively working towards a joint vision of improved resource efficiency from farm to fork. We aim to make the UK meat industry a world-leading example of efficient and sustainable meat production and supply.

We will achieve this by:

✓ Playing our part as a supply chain to help deliver productivity improvements, GHG emissions reductions and protection of natural assets (e.g. soil, water) during livestock (cattle, sheep, pigs) and poultry rearing;

✓ Sourcing soya for use in feed that is cultivated in a way that protects against conversion of forests and valuable native vegetation;

✓ Large meat processors, retailers, and hospitality and food service businesses continuing to take action to reduce their own operational food waste, GHG emissions and water impacts; and

✓ Helping to halve the amount of meat thrown away at home.

Specific actions and progress indicators at each stage are included within this document.

Together these actions will make a significant contribution to the UK food and drink sector achieving the ambitious targets set out in the Courtauld Commitment 2025 and UN Sustainable Development Goal 12.3 to halve per capita food waste by 2030. They will also make an important contribution to the UK’s target to bring all GHG emissions to net zero by 2050.

Together the UK meat industry also has ambitions to develop a GHG emission reduction target aligned with what climate science says is necessary to help limit warming to 1.5°C.

Tracking our progress

In partnership with WRAP we will track our progress – and provide examples of the actions we are taking to inspire others. Working with WRAP will further ensure that results are independently verified and publicly reported.
3.0 Action Areas

Five areas in which we believe we can make a real difference to improving resource efficiency from farm to fork have been identified.

These mirror the key steps in the supply chain – and the major points of interface between different supply chain stages.

1. Rearing / primary production
2. Processing
3. Point of sale - retail
4. Point of sale - hospitality and food service
5. Food waste at home

Figure 1 overleaf shows the relative scale of production volumes, wastes and GHG emissions across these different stages – and where priorities for improving resource efficiency lie.

The following Sections set out our specific actions and commitments in each area. These actions are also summarised in Table 1.

Defining ‘food waste’

At each stage in the value chain, ‘waste / food waste’ is defined as: any meat product, or animal-derived material sent to a waste destination (including anaerobic digestion, incineration /controlled combustion, rendering with minimal valorisation (typically category 1 rendering), land application, sewer/wastewater treatment). For the purpose of this ambition, we are focused on material that, if managed differently, could have remained in the food chain. Of lower priority is material classified as ‘inedible parts’ of food. ‘Inedible parts’ include category 1 ABPs (e.g. specified risk material), feathers, hides, hair, etc. from processing; as well as bones, skin, etc. that typically would not be eaten at home / out of home. In most cases this material cannot be avoided, and so cannot typically be a target for waste reduction (although it is important to quantify these ‘inedible parts’, take steps to get maximum value from them, and minimise the impact of their use / disposal on the environment).
Figure 1 – Approximate scale of food waste and greenhouse gas emissions at different stages in the meat supply chain

See Appendix 1 for data sources and assumptions.

NB - all GHG / CO₂e values are estimates based on the GWP100 metric. There is ongoing discussion regarding alternative accounting approaches for short-lived biogenic methane, as summarised in https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/ p41-44.
3.1 Rearing / Primary Production

Rearing livestock and poultry is the stage of the supply chain in which significant resources are typically invested (e.g. water, feed, fuel, land, etc.), and where most GHG emissions occur. However, farms are also important sinks for carbon sequestration and storage in soils and vegetation, and are increasingly investing in renewable energy generation. Farms are therefore well-placed to also contribute to reducing the UK's overall GHG emissions.

Continued focus is being placed on improving both the health & welfare of animals and improving the environmental footprint of farming systems.

**ACTION AREAS**

Action is being focused in the following areas:

1. **Improving the productive efficiency of rearing.** Focusing on ways to produce the same quantity of food, or more, with fewer inputs. This encompasses actions such as:
   - On-farm measurement of metrics linked to improved productivity – for example AHDB’s beef and lamb farm productivity KPIs; close monitoring of feed conversion efficiency in poultry and pig production, etc.
   - A continued focus on health and welfare outcomes, responsible anti-microbial use, improved biosecurity and disease risk mitigation.
   - Ongoing genetic evaluations and research to improve productivity and reduce GHG emissions through breeding.
   - Supply chain communications and feedback to rear animals that best match consumer demands for cuts, size, eating characteristics, etc.
   - Research into feed additives and feeding regimes to increase conversion efficiency, or reduce direct emissions from ruminant livestock (e.g. Rothamsted's sheep 'farm lab').
   - Actions to reduce N$_2$O emissions through grassland management / manure spreading.

2. **Reducing the environmental impact of producing feed.** As well as improving the productive efficiency of feed use (i.e. as above), this encompasses actions to:
   - **Avoid deforestation linked to soya use in feed.** Soya is a valuable protein source that can improve productive efficiency, particularly in pig and poultry rearing. However, some cultivation methods are linked to tropical deforestation and conversion of native vegetation, which is a major source of global GHG emissions. This has prompted action through the UK Roundtable on Sustainable Soya (see below), and R&D into alternative feed formulations and/or breeding approaches that utilise less soya.
   - **Use more circular feed sources.** – e.g. optimising grass in livestock systems; or use of surplus from food production that are safe to eat by animals, with no effect on biosecurity
or productive efficiency. This could include linking arable or horticultural and livestock farmers to reduce waste on farm.

- Explore the potential for scale-up of novel feed ingredients - that could deliver improvements in land-use and GHG emissions. Such ingredients may include single cell proteins, algae, insects and amino acids. This is the focus of the Forum for the Future’s Feed Compass programme – which has developed criteria to assess and compare the sustainability of different feedstocks. An Insect Biomass Task & Finish Group represents key stakeholders who are working together to deliver insect production at scale in the UK.

3. Farmland carbon storage, protecting natural resources and renewable energy generation.
Recognising the positive contribution that farmland can make to reducing GHG emissions, protecting water resources and other natural capital benefits such as flood protection, this encompasses actions to:

- Increase the sequestration and storage of carbon on farmland – for example through improved grassland management, enhancing soil health and organic matter testing; enhancing and increasing hedgerows; woodland / shelter belt management and planting; and peatland / wetland restoration to reduce losses.

- Manage natural assets on farmland - for example through interventions to reduce soil erosion and increase woodland planting, buffer strips, ponds or wetland features. These actions all contribute to improving water quality, habitat provision, carbon sequestration or flood mitigation.

- Generate renewable energy on-farm – for example through anaerobic digestion of animal manures; on-farm solar panels and wind turbines.

DELIVERING CHANGE AT SCALE
A series of sector-wide initiatives are set to have a transformative effect on reducing the environmental impact of livestock and poultry rearing.

We recognise, however, that they will only deliver if we, as a supply chain, all get behind them. We also recognise the need for clear and consistent messages to our suppliers.

- Net Zero: Farming’s 2040 vision. The NFU has a game-changing vision to reach net zero GHG emissions for agricultural production by 2040. This will be delivered by boosting productivity, increasing farmland carbon storage and coupling bioenergy to carbon capture and storage. This is a hugely important ambition and will require partnership working across the supply chain, as well as government, academics and other stakeholders. Delivery plans and metrics to track progress are being developed ¹.

¹ NB – ‘net zero’ will be delivered across the whole industry combined, not individual enterprises, such as a livestock enterprise. However, each sector will have a role to play, particularly in delivering productivity improvements and reducing direct emissions, which together are estimated to contribute c.25% of the GHG savings needed (https://www.nfuonline.com/_nfouonline/business/regulation/achieving-net-zero-farmings-2040-goal/).
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- **European Roundtable for Beef Sustainability / UK Cattle Sustainability Platform.** The UK Cattle Sustainability Platform is a group of businesses committed to delivering the eight core outcomes agreed within the European Roundtable for Beef Sustainability. Spanning the core sustainability pillars of environmental impacts, animal medicines, animal health & welfare and farm managements, these outcomes include a specific action to reduce GHG emissions intensity by 15% by 2025. Delivery plans and metrics to track progress are being developed and agreed within the group.

- **UK Roundtable on Sustainable Soya.** The UK Roundtable on Sustainable Soya brings together food & drink business, feed companies and industry bodies to work together to achieve a shared goal of a secure, resilient, sustainable supply of soya to the UK. Signatories have a commitment to publish timebound plans to source soya that is cultivated in a way that protects against conversion of forests and valuable native vegetation. Businesses are now developing practical action plans, with support from Efeca (facilitator of the Roundtable and wider UK Sustainable Soya Initiative) and a wider network of partners including NGO’s, technology providers, certification schemes and others. 27% of UK soya sourcing is now covered by a deforestation and conversion free soya standard – aiming for 100% deforestation and conversion free sourcing.

- **Courtauld 2025 Water Ambition.** The Courtauld 2025 Water Ambition brings together food & drink businesses, water companies and on-the-ground advisory bodies to improve supplier resilience linked to water availability, water quality, flooding and soil protection. Led by The Rivers Trust, WWF and others, it includes a programme of collective action projects in key sourcing locations (e.g. South West England for cattle; East Anglia for pigs; Welsh borders for poultry) – each of which has identified a set of locally-specifically objectives and KPIs to improve water quality, soil retention, etc.

**OUR COLLECTIVE COMMITMENT TO ACTION**

Recognising the important role that we, as a supply chain, can play; our commitment is to support the delivery and outcome of these important initiatives.

Specifically, we will:

- Assist the development and implementation of delivery plans for Net Zero and the UK Cattle Sustainability Platform, including adopting a common approach to estimating/reporting on GHG emissions.

- Support the development and tracking of metrics / KPIs within each sector (beef, sheep, pigs and poultry) and the use of common tools to measure progress.

- Use the data we receive from FSA inspections to provide timely feedback to producers to help inform their animal health plans, using the common terminologies agreed across industry.

- Encourage better communication between producers and retail customers on market requirements, to help inform production plans.
MEAT IN A NET ZERO WORLD

✔ Use our producer groups, and other Knowledge Transfer mechanisms, to share best practice, share insights on short / medium / longer term horizons and enable feedback from producers.

✔ Deliver our commitments to source soya for use in feed that is cultivated in a way that protects against conversion of forests and valuable native vegetation.

✔ Continue to invest in R&D and new technologies based on the latest science and evidence, to aid improvements in productivity and reduce the environmental impact of feed.

✔ Support knowledge exchange at all levels to make sure producers are best equipped to make the correct decisions for their business and to reduce global warming.

✔ Support collective action to protect water resources and other natural assets in key sourcing locations, e.g. through the Courtauld 2025 Water Ambition.

We will report on the actions we have taken.

EXAMPLES OF ACTION IN PROGRESS

Producer Case Studies

NFU case studies

NFU have collated a series of case studies that demonstrate how the actions outlined are already being applied in practice on farms across the UK: British Livestock and Climate Change.

Kepak producer case study: elite sheep genetics that are improving efficiency and reducing GHG emissions

Kepak St Merryn producer Geordie Parker keeps 650 ewes in the hills at Slaidburn, near Clitheroe in Lancashire. He was one of the first producers to join an innovative scheme developed by St Merryn in 2016 which provides exclusive access to Kepak Focus Prime rams. Bred in the UK for St Merryn, these rams are selected for growth, muscling, lambing ease and lamb survival to provide Kepak suppliers with a sire that leaves more lambs on the ground, growing quickly on a forage based system to meet Kepak specifications.

Geordie now has a gang of 5 Kepak Focus Prime rams – half of the number of rams he was needing to cover the same ewes before. The lambs are finishing well off grass, meeting the St Merryn weights and grades 2-3 weeks earlier than his other terminal sired lambs and with lambs reaching the target specification in just 11 weeks. Getting the lambs away earlier frees up more grass for his breeding sheep so that he needs to use less concentrates in the run up to tupping. With lambs spending fewer days on farm, making more use of his grass and needing less concentrates plus a team of rams that earn their keep, this new approach is good for his on farm efficiency and reduces methane emissions.
Using data and research to improve performance

**Research activities**

Significant R&D efforts are being invested to identify effective interventions across each of the action areas above. Notable research groups include: ADAS; AFBINI; Harper Adams; IBERS; Rothamsted North Wyke; SRUC; University of Nottingham. AHDB, Hybu Cig Cymru and Quality Meat Scotland all have extensive research programmes.

**AHDB Farmbench**

AHDB Farmbench enables producers to benchmark themselves against others with comparable systems, against a range of productivity measures. An easy to use online benchmarking tool, Farmbench helps to identify where strengths and weaknesses lie within a farm business. At present, it is available for beef, lamb enterprises (as well as dairy, combinable crop, potato and sugar beet).

**Electronic Medicine Book (eMB Pigs)**

E-medicine Book (EMB Pigs) can act as a medicine book for producers but importantly collates the antibiotic usage data for pig producers. All Red Tractor producers (over 90% pigs in the UK) submit their data on a quarterly basis. They can use the system to assess their use but also to benchmark their use against other producers. This information is used by the producer but also by the vet at the quarterly veterinary visit – and is actioned in the veterinary health plan which is put together by the vet annually.

**Supply chain and collaboration examples**

**Cross-sector partnerships to maximise beef from dairy herds**

Beef sourced from the dairy herd is generally significantly less GHG-intensive because its footprint is shared with dairy co-products\(^2\). In the UK, there has been a fundamental shift in the volume of beef sourced from UK dairy herds, with dairy-bred beef now representing over 55% of all UK beef – a 10% increase in the last decade\(^3\). This has been achieved by leading dairy and beef producers working in partnership, and through cross-sector initiatives, to maximise the potential of male calves. AHDB’s manual provides information for dairy farmers wanting to grow and finish their own calves and beef producers purchasing dairy-bred calves.


\(^3\) Arla UK 360 programme
Improving eating quality

All supply chains are striving to produce the quality demanded by their customers. Specifications, based on the blueprints originally produced by the Meat and Livestock Commission, are widely used.

Two projects in Wales - the Beef Eating Quality and Lamb Eating Quality projects – are testing an enhanced carcase quality grading system based on eating quality. This system will enable predictions of beef/lamb carcase eating quality and guide the introduction of new carcase data feedback, benchmarking and decision-support systems to the Welsh Beef and Lamb supply chains. This is aimed primarily at producers, but will help address a challenge later in the supply chain: customer returns linked to eating quality.

Tackling water stress through collective action

Processors and retailers are working together to reduce water stress in three pilot areas across the UK: Tamar in South West England; Wye & Usk on the Welsh borders; and CamEO/Broadlands in East Anglia. Each are important rearing areas cattle, poultry and pigs respectively – and are internationally important river ecosystems, as well as providing critical functions for communities and the local economy. The health of the rivers within each area is threatened by diffuse pollution, in particular linked to soil degradation, nutrient losses from yards or fields, and historic loss of protective wetland and woodland habitats.

Projects are seeking locally-important outcomes, for example to reduce phosphate and nitrogen run-off, reduce soil loss, improve soil structure, provide protective habitat, improve overall water quality classification, etc.

Examples of actions include:

- Streamlining messaging to suppliers and providing access to targeted farm advice, networking, etc.
- Mapping areas of high priority/shared interest to focus effort on interventions with greatest benefit.
- Targeted interventions, such as:
  - Strategic tree-planting for flood alleviation / provision of protective habitat;
  - Installation of silt traps – to capture run-off, improve water quality and reduce flood risk;
- Signposting farmers to other potential schemes and funding support
3.2 Processing

From the point of receipt at an abattoir, through cutting, processing and packing into final product, very little goes to waste. Currently, processors report that up to c.1-2% (sometimes less) of throughput ends up as ‘wasted food’ (excluding the inedible parts never intended for human consumption)\(^4\). Based on volumes processed in the UK\(^5\), this equates to around 75,000 tonnes per annum. The majority of this food waste is used for renewable energy generation / via anaerobic digestion, or is spread on land as fertiliser.

Whilst waste levels are very low, resources like energy, fuel and water are used in processing and efforts are focused on reducing the amount - and impacts of - energy and water consumed.

ACTIONS AREAS

The industry has made significant gains to maximise the yield of products that can be sold for consumption, or other purposes – along the following hierarchy.

A ‘best case’ carcase balance for different species is shown in Table 2.

Table 2: Example benchmark for dead weight KPIs

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<th>Beef (^1)</th>
<th>Sheep (^1)</th>
<th>Pork (^2)</th>
<th>Poultry (^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% saleable product / throughput</td>
<td>71%</td>
<td>90%</td>
<td>85%</td>
<td>79%</td>
</tr>
<tr>
<td>% Cat 1 or 2 / throughput</td>
<td>10%</td>
<td>&lt;1%</td>
<td>7%</td>
<td>15%</td>
</tr>
<tr>
<td>% Cat 3 / throughput</td>
<td>20%</td>
<td>10%</td>
<td>8%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Sources:

From both a financial and environmental perspective, the aim is to maximise the proportion of saleable product and decrease the amount of material downgraded as either category 1 or 2 by-products, as less value can be extracted from these materials and disposal costs are higher.

However, there can be instances in which the most efficient balance of products is not achieved. Reasons why this can occur are:

- Limited access to available markets (e.g. for co-products) or services (e.g. cat 3 collections);
- Waste contracts – e.g. minimum volumes for viable cat 1 collections;
- Human error - mis-classifications, floor waste, etc.;
- Machine waste – e.g. non-saleable trim, residues from product changeovers;
- Waste from product trials; and
- Wash downs – and lack of visibility of ‘food waste’ losses to sewer.

Leading meat processing businesses have committed to adopt actions within the WRAP and IGD Food Waste Reduction Roadmap, which calls on businesses to set an ambitious food waste reduction target, report on progress and take action to reduce food waste.

As earlier noted, as well as intake of animals, the processing sector uses other resources – e.g. water and energy / fuel. Leading businesses have been focusing effort on improving energy efficiency, switching to renewables, reducing water consumption and improving water quality.

**OUR COMMITMENT TO ACTION**

We are aiming for more than 75% of the UK’s meat processing capacity to be taking action to:

- Reduce food waste in processing operations by 50% by 2030, in line with the best practice outlined in the Food Waste Reduction Roadmap.
- Reduce GHG emissions from processing operations. Best practice is to set a science-based target, in line with the criteria set by the Science Based Targets Initiative.
- Improve the efficiency of water use in processing operations and actively support wider water stewardship in key sourcing areas, through the Courtauld 2025 Water Ambition.

**PROGRESS TO DATE**

- 14 of the largest meat processors have committed to the Food Waste Reduction Roadmap and to reduce food waste in processing operations by 50% by 2030\(^6\). Between 2017 and 2018 they collectively reported c.10,000 tonnes of food waste reduction, including more than 1,000 tonnes (c. 5 million meal portions) redistributed to local communities. Case studies of the action taken are available [here](#).
- GHG emissions from meat processing decreased by c.10% between 2015 and 2018\(^7\).
- Many major meat processors were also reported to be taking action to help protect water resources in key sourcing areas, through the Courtauld 2025 Water Ambition.

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\(^6\) Food Waste Reduction Roadmap Progress Report 2019

\(^7\) Based on time-series energy consumption data from the Office for National Statistics
3.3 Point of Sale – Retail

Around 10,000 tonnes of meat were estimated to have been discarded at retail outlets in 2015\(^8\). This represented 0.3% of reported meat purchases\(^9\).

Whilst only a small proportion of meat items are discarded at this stage, meat is a high-value category and has been the focus for continuous improvement and innovation.

**ACTION AREAS**

There has been significant investment to reduce waste in-store, notably through:

- **Packaging innovations** – such as skin packs and modified atmosphere packaging to extend shelf life, prevent browning, etc. These innovations help reduce waste at home; and one retailer has also quantified how new packaging to extend shelf life on steaks has reduced waste in-store by 8%\(^10\). The benefit of this reduction in waste; as well as extending the life for consumers at home far outweighs the resources used in additional packaging\(^11\).

- **Continuous improvements in forecasting and stock control systems.**

- **Developing systems and processes to divert more food surplus to redistribution organisations and to animal feed**, instead of general waste management.

The way that products are packaged and sold can also help reduce wastage at home. This has been a further area of focus, for example by:

- Helping citizens to buy the right amount (e.g. by providing smaller packs for individuals; or providing individual portions on counters, or as individual quick frozen items);
- Giving consumers as long as possible to use items (shelf life and open life);
- Making it clear when products can be frozen – and making it easier to defrost, or cook them from frozen;
- Giving advice on serving sizes / cooking the right amount; and
- Providing tips and advice on what to do with leftovers.

The most important areas for action to help reduce the waste of meat products are outlined in Section 3.5.

In the distribution and storage of meat products, the retail sector also uses other resources – e.g. water and energy / fuel. Whilst total use of these is relatively small in comparison with other

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\(^9\) Defra’s Family Foods Survey

\(^10\) Food Waste Reduction Roadmap Progress Report 2019

\(^11\) e.g. as reported in [http://www.wrap.org.uk/sites/files/wrap-packaging_design_to_reduce.pdf](http://www.wrap.org.uk/sites/files/wrap-packaging_design_to_reduce.pdf) and [BPF%20brochure%20WEB2.pdf](http://www.wrap.org.uk/sites/files/wrap-packaging_design_to_reduce.pdf)
stages in the supply chain, leading businesses have been focusing effort on improving energy efficiency, switching to renewables, reducing water consumption, etc.

**OUR COMMITMENT TO ACTION**

All UK retailers have already committed to reduce food waste in their own operations by 50% by 2030, in line with the best practice outlined in the [Food Waste Reduction Roadmap](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf).

As part of this, our commitment is to:

- Continue to invest in innovations to reduce waste occurring at point of sale.
- Where waste is unavoidable, increase the amount sent to redistribution organisations.
- Adopt known best practice to help consumers get the most from their meat purchases and throw less meat away (measured via the KPIs in Section 3.5).

We also commit to:

- Reduce GHG emissions from retail operations (e.g. by adopting a GHG reduction target in line with the principles of the [Science Based Targets Initiative](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf)).
- Improve the efficiency of water use in retail operations and actively support wider water stewardship in key sourcing areas, through the [Courtauld 2025 Water Ambition](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf).

**PROGRESS TO DATE**

- Six retailers have now published time-series data on food waste from their operations, and five have reported absolute reductions ranging from 15% to 27% compared to their baselines (which range from 2013 to 2017/18) – across all food types (not just meat). Overall retail food waste in 2018 showed a 4.6% reduction compared to the 2007 SDG12.3 baseline, but a 6% increase between 2015 and 2018\(^2\). Individual retailer food waste is subject to fluctuations over time.

- GHG emissions from retail (across all grocery products) operations decreased by 34% between 2015 and 2018\(^3\).

- Many major retailers were reported to be taking action to help protect water resources in key sourcing areas, through the [Courtauld 2025 Water Ambition](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf).

- WRAP’s most recent survey of products on-shelf\(^4\) found improvements in adoption of best practices to help reduce food waste at home across a number of areas. For example, wide availability of small packs for many meat items, some increases in average available shelf life; and more products carrying a snowflake logo to indicate they can be frozen (see Section 3.5).

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\(^{12}\) [https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf)

\(^{13}\) [https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf)

3.4 Point of Sale – Hospitality and Food Service

Around 50,000 tonnes of meat were estimated to have been discarded at hospitality and food service (HaFS) outlets / sites in 2012\(^\text{15}\). Further research is being undertaken to update this estimate.

Being predominantly comprised of multiple small outlets and sites, a key challenge for this sector is to be able to accurately measure the amount of food wasted in kitchens and by customers, understand why it occurs, and target reduction efforts to best effect.

**ACTION AREAS**

Food waste occurs in hospitality and food service operations for three main reasons:

- **Spoilage** – food that is not used in time (e.g. goes out of date)
- **Preparation** - food that is thrown away during preparation (e.g. offcuts)
- **Plate** – food that is left on customers' plates

WRAP is undertaking further work to understand the relative scale of waste across these for meat products – including the principle causes and potential solutions. Some known challenges are:

- **The ‘10 day rule’** - which sets a maximum shelf life on vacuum packed meat products which cannot be guaranteed to be kept below 3°C with customers. This limits the extent to which shelf life can be extended. It is significant challenge in both retail and hospitality and food service supply chains; but particularly affects the latter, as vacuum-packed supply is common in the industry. The British Meat Processors Association (BMPA) has undertaken research to demonstrate that food safety is not compromised up to 14-21 days for beef and lamb vacuum pack/tray skin packs and 15 days for pork vacuum packs; and is in discussion with the Food Standards Agency (FSA) and others.

- **Regulations related to labelling meat for freezing / longer storage.**

- **Customer returns** - e.g. as result of eating quality. Whilst all supply chains are strive to produce the quality demanded by their customers (and specifications based on blueprints originally produced by the Meat and Livestock Commission are widely used), the Beef Eating Quality and Lamb Eating Quality projects in Wales are testing an enhanced carcase grading system based on eating quality – which helps tackle this challenge earlier on in the supply chain.

In the preparation and storage of meat, and other, products, the hospitality and food service sector also uses other resources – e.g. water and energy / fuel. Whilst total use of these is relatively small in comparison with other stages in the supply chain, leading businesses have been

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\(^{\text{15}}\) Overview of Waste in the UK Hospitality and Food Service Sector, WRAP 2013. Latest dataset available. ‘Avoidable’ meat waste only (not including bones, skin). Adjusted to meat vs fish based on relative purchase data from Defra's Family Foods Survey.
focusing efforts on improving energy efficiency, switching to renewables, reducing water consumption, etc.

**OUR COMMITMENT TO ACTION**

The hospitality and food service sector has already set itself some challenging targets to reduce food waste, within a [Hospitality and Food Service Action Plan](#). This action plan has targets (by 2030) for all large hospitality and food service businesses to:

- Set an ambitious food waste reduction target (e.g. to halve food waste by 2030).
- Robustly measure food waste and report on their progress towards reducing food waste.
- Actively engage with their staff and consumers on food waste reduction.
- Have food waste reduction plans in place with suppliers.

As part of this, we commit to working with WRAP, the Sustainable Restaurant Association (SRA), and others, to understand the principal reasons why meat items are wasted in hospitality and food service operations; and support the development of a playbook of interventions to help reduce meat waste.

We also commit to:

- Reduce GHG emissions from hospitality and food service operations (e.g. by adopting a GHG reduction target in line with the principles of the [Science Based Targets Initiative](#)).
- Improve the efficiency of water use in hospitality and food service operations and actively support wider water stewardship in key sourcing areas, through the [Courtauld 2025 Water Ambition](#).

**PROGRESS TO DATE**

- 24 hospitality and food service businesses (c. 20% of the sector by turnover) have committed to the [Food Waste Reduction Roadmap](#). Around 50% of these businesses have measured and reported their food waste, and – as a result – have achieved significant reductions (in some cases up to 50% reduction (across all food types). Case studies of the action taken are available [here](#).
- WRAP's [Guardians of Grub](#) campaign was launched in May 2019, to empower professionals from across the sector to reduce the amount of food thrown away. Resources are designed around the practical task of food waste measurement. September 2019 saw the first Guardians of Grub ‘Stand Up For Food’ month of action, with partners (influencers and operators) encouraging the sector to measure the food they waste in order to reduce it.
- GHG emissions from hospitality and food service operations decreased by 8% between 2015 and 2018\(^\text{16}\).  

\(^{16}\) [https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf](https://wrap.org.uk/sites/files/wrap/Progress_against_Courtauld_2025_targets_and_UN_SDG_123.pdf)
3.5 Waste at Home

WRAP's evidence suggests that – once purchased and at home – more than 200,000 tonnes of meat that could have been eaten (>10% of purchases) are discarded every year (latest dataset: 2012).

This is an enormous waste of the precious resources that have been invested in their production. The reasons why food is a thrown away at home are many and complex. Available evidence from householder diaries and compositional analysis is shown Figure 2. Notable, in particular, is the 80,000 tonnes/year that is thrown away because it is 'not used in time' (e.g. the 'Use By' date, or the 'once opened use within...' date had expired).

Figure 2: Scale and reasons for meat waste at home

- 280,000 tonnes (34% purchases) of poultry are thrown away each year
- 110,000 tonnes (13% purchases) of it is wasted food – not, skin, bones, etc.
- Majority is chicken carcass meat (i.e. meat left on whole birds)

- 146,000 tonnes of pork products are thrown away each year
- This includes sausages (34,000t), sliced ham (22,000t), bacon (21,000t) and carcase meat (21,000t)
- 99,000 tonnes (12% of purchases) of it is wasted food that could have been eaten
- 20% was thrown away unopened, or in nearly full packs

- 56,000 tonnes of beef products are thrown away each year
- 34,000 tonnes (8% purchases) of it is wasted food – not, skin, bones, etc.
- 17% was packaged when thrown away
- Most was thrown away in larger instances (>400g)

Source: https://www.wrap.org.uk/content/household-food-drink-waste-%E2%80%93-product-focus
ACTION AREAS

The way products are packaged, labelled and priced can make a significant difference on waste levels at home. There is also a huge role for more education / awareness-raising on the actions householders can take to reduce waste (e.g. when it’s safe to freeze/defrost, use of leftovers).

Based on WRAP’s available evidence, 5 priority actions to reduce meat waste at home are:

1. **Maximising the shelf life available to consumers (i.e. the amount of time remaining on the ‘Use By date).** Retailers constantly need to strike a balance between on-shelf availability, providing shelf life for consumers and reducing in-store waste. But investigating ways to ensure consumers have more time to eat what they buy is a known priority. WRAP’s most recent survey of products on-shelf found that average available shelf life for a number of high volume meat items had increased slightly between 2011 and 2019 (e.g. chicken breasts, sliced ham), or was already high (e.g. bacon). There are limits on the extent to which shelf life can be feasibly extended, but it remains a focus for innovation and continuous improvement.

2. **Extending, clarifying or removing ‘open life’ statements on-pack.** For example ‘Once opened use within x days’. These statements are only advised when needed for food safety in addition to the date label (i.e. where an opened pack could become harmful before the date code expires). WRAP’s most recent survey of products on-shelf found that some bacon and sausage packs carry no open life statement, for example. If these statements are needed for quality purposes, rather than safety purposes, then the term ‘best within’ is advised. WRAP is undertaking further work to understand how consumers interact with open life statements, but in a recent survey, 55% of respondents reported that they ‘regularly’ or ‘quite often’ refer to these open life statements. On this basis, removing, or extending open life statements is estimated to have the potential to reduce meat waste at home by an additional 10,000 tonnes/year.

3. **Helping customers choose the right pack size for their needs.** WRAP’s evidence suggests that having a wider range of pack-sizes / formats at the right price could help prevent more than 20,000 tonnes/year of meat products going to waste. This is because single person households (and homes in which householders eat as individuals) waste 40% more per capita than other households, with a primary reason cited as not being able to buy packs that are the right size for their needs. These households are growing in number and will continue to do so in the next 20 years, which presents a significant risk to escalating food waste. WRAP’s most recent survey of products on-shelf found that small packs of many meat items were found in the majority of stores sampled, and at a reasonable price point. Individual portions of many meat items are also available through deli/meat counters in some retailers, and as easily-portioned frozen products (e.g. individually frozen chicken breasts). However, further action is needed in some areas to make smaller packs of key items i) more widely available at the right price point; and ii) attractive to consumers. The latter is important because of consumer concerns over additional packaging for smaller items – which do not reflect the

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reality of the unnecessary packaging (and cost) when items are purchased and then thrown away.

4. **Helping to encourage more people to freeze (and then use) meat products instead of throwing them away.** WRAP estimates that increasing freezing (and use) of key meat items could reduce waste from items not used in time by c.15,000 tonnes/year\(^\text{17}\). With fast-paced, time-poor lifestyles and lower levels of food skills, the time taken to defrost items, and consumer nervousness around how to safely defrost is a significant challenge. There is a need for solutions to make it easier for consumers to use their frozen items – with the easiest option being to cook from frozen. Cook from frozen instructions were not found on any of the meat items sampled in WRAP's most recent on-shelf survey\(^\text{17}\). For some meat items, cooking from frozen may not be possible (for food safety reasons). However, this is an area in which further action and innovation is needed. There is also a need for the basics on-pack: a snowflake logo, and clear information on safely freezing and defrosting. On-pack information also needs to be coupled with wider consumer awareness-raising.

5. **Encouraging more creative use of leftovers.** This applies in particular to whole joints / whole birds, or other items which are not individually portioned. For example, nearly 50,000 tonnes of poultry that could have been eaten are reported to be thrown away a year, with the reason given as 'cooked or served too much' (Figure 2). The majority of this is meat on carcases. Changing consumer behaviour in this regard is very challenging, but there is an important role for more recipes and tips - either on pack where space allows, or through other media. On-pack information also needs to be coupled with wider consumer awareness-raising by, for example, supporting Love Food Hate Waste campaigns. As another example, NFU's autumn turkey campaign provides information on using leftovers, through social media, leaflets, etc.

### Awareness Raising

WRAP’s Love Food Hate Waste (LFHW) campaigns provide practical tools and advice to make it as easy as possible to reduce food waste at home.

For example, keeping food at the right temperature is one simple way to make it last as long as possible – but many people don’t know how to set their fridge temperature. WRAP’s LFWH Chill the Fridge Out awareness campaign encourages householders to check and set their fridge temperature. It includes a web-based tool (Chill the Fridge Out) that draws upon information from over 20 of the biggest fridge manufacturers, enables users to select their make of fridge/ type of fridge dial, and provides instructions on how to set it to below 5°C.

A recent survey reported that, of people who has seen Chill the Fridge Out materials, 33% had changed the temperature of their fridge in the last month (twice as likely as someone who hadn’t).

There is a role for everyone in helping increase awareness – by widely sharing and promoting Love Food Hate Waste resources to customers and employees though the range of channels available to them.
OUR COMMITMENT TO ACTION

Recognising the role that we can play in helping to reduce food waste at home, our commitment is to:

- Adopt known best practices for on-pack labelling and guidance across the 5 priority areas identified above.
- Work on new solutions and innovations.
- Support consumer-facing campaigns, such as Love Food Hate Waste, to increase awareness and understanding of ways to reduce waste.

Our overarching ambition is to halve the amount of wasted meat products thrown away at home, which would mean > 100,000 tonnes / year less waste and c. 2 million tonnes avoided GHG emissions.

Progress will be demonstrated via the KPIs set out in Table 3 – evidenced through WRAP’s annual Retail Survey and consumer surveys. WRAP will also repeat its household food waste survey on a periodic basis and generate a UK-level estimate, for comparison with 2007 and 2012 data.
Table 3: KPIs for actions to reduce meat waste at home

<table>
<thead>
<tr>
<th>KPI</th>
<th>Best practice ambition by 2025</th>
<th>Relevant products and current position (WRAP Retail Survey 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average days shelf life found in store</td>
<td>+ 1 day increase from 2019 baseline</td>
<td>Chicken breasts - 5.2 days (9% ≤2 days)</td>
</tr>
<tr>
<td>% products with ≤2 days life</td>
<td>&gt;95% items with more than 2 days life</td>
<td>Whole chicken - 4.7 days (13% ≤2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beef mince - 4.1 days (19% ≤2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beef burgers - 4.1 days (5% ≤2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacon - 21 days (2% ≤2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sausages - 6.6 days (8% ≤2 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ham - 12.8 (2% ≤2 days)</td>
</tr>
<tr>
<td>Presence of open life statements</td>
<td>Where not required for food safety – 100% with no statement, or ‘… best within x days)</td>
<td>Bacon – 4% of products with no statement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sausages – 10% with no statement</td>
</tr>
<tr>
<td>Range of days open life given</td>
<td>Variation in open life statements minimised</td>
<td>Chicken breasts – 1 day or use immediately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beef mince – 1 day or use immediately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beef burgers -1 day or use immediately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacon – 2 or 3 days where present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sausages - 1 day or 2 days where present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ham – all 2 days</td>
</tr>
<tr>
<td>Availability of small packs and price differential between small and larger packs*</td>
<td>100% availability – either packed or on counters. Not more than 35% more expensive per kg</td>
<td>Chicken breasts – small pack found in 78% of stores (35% more expensive per kg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacon – small pack found in 63% of stores (17% more expensive per kg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sausages – small pack in 76% of stores (34% more expensive per kg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ham – small pack found at 1 retailer only (45% more expensive per kg)</td>
</tr>
<tr>
<td>% products marked as suitable for freezing / with snowflake logo</td>
<td>100% of applicable product marked as suitable for freezing and with a snowflake logo</td>
<td>All fresh/processed meat items (except ham/other deli-meats) - 56%</td>
</tr>
<tr>
<td>% products saying “Freeze on Day of Purchase”</td>
<td>0% of products saying Freeze on Day of Purchase. Best practice is to use “Freeze as soon as possible, but always by the date mark shown”</td>
<td>All fresh/processed meat items (except ham/other deli-meats) - 30%</td>
</tr>
<tr>
<td>% products with cook from frozen instructions</td>
<td>Increase in adoption (100% is unlikely as some will not be feasible for food safety)</td>
<td>All fresh/processed meat items (except ham/other deli-meats) – 0%</td>
</tr>
<tr>
<td>% householders reporting they freeze (and subsequently use) key meat items</td>
<td>&gt;75% reporting regular freezing / use</td>
<td>Chicken (all items) – 75% regularly freeze</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other meat items – tbd (not yet sampled – reported in one study as 10% for sausages/bacon; 50% for other meat items)</td>
</tr>
<tr>
<td>% products with leftover recipes / tips</td>
<td>100% products carrying recipes or tips – where space allows</td>
<td>Whole chicken – 7% (one retailer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other meat items – 0%</td>
</tr>
<tr>
<td>% householders reporting they regularly use leftovers</td>
<td>&gt;75% reporting regular freezing / use</td>
<td>No current baseline information</td>
</tr>
</tbody>
</table>

NB – KPIs cover the most important action areas for fresh / chilled products (not frozen products). Provision of deli/meat counters and frozen products are also important ways to help reduce waste at home, but evidence suggest that a proportion of shoppers will always default to pre-packed fresh products, rather than frozen/loose.

* Defined as items that could be consumed by 1 person within the open life. For chicken this included 2-packs and split packs; for bacon this included 4- and 6-packs (including split pack formats); for sausages this included 6-packs; and for ham this included 70g packs. Research has found < 35% to be the level of price difference that presents less of a barrier to purchase.
Appendix 1: Data Sources for GHG and Food Waste Estimates

This appendix outlines the data sources and assumptions made in developing the baseline GHG and food waste values within Figure 1.

**GHG emissions during rearing**
GHG emissions itemised within the [2017 UK GHG inventory](https://www.gov.uk/government/statistics/uk-greenhouse-gas-emissions) were allocated to livestock & poultry rearing for meat in the following proportions:

- 50% of cattle enteric fermentation and waste management (the remainder assumed for dairy)
- 100% of sheep and pigs enteric fermentation and waste management
- 100% of poultry waste management
- One third (33%) of direct and indirect soil emissions – an assumption based on the relative volume of UK crop production used as home-grown feed (Source: Defra statistics)
- 50% of stationary and mobile combustion emissions – an assumption based on likely relative land area for livestock and feed production
- Total emissions from these sources in these proportions = 23 Mt CO₂e

GHG emissions from imported feed were taken from a recent [WRAP report](https://www.wrap.org.uk) and adjusted as follows:

- 90% of imported feed was assumed to be used in animal rearing for meat production – on the basis that 2/3rd of imported feed emissions were associated with soya production overseas, and soya is used more commonly in pigs and poultry diets.
- The WRAP estimate did not include the any approximation of GHG emissions resulting from deforestation in feed supply chains. A 2013 [FAO study](https://www.fao.org) reported an approximate 50-100% increase in GHG emissions associated with land use change for feed imported for use in production systems in Western Europe. Using this as a guide, a 75% increase was assumed, accounting for the mix of species. However, this is noted as an assumption with significant uncertainty.
- Total emissions from overseas feed production for UK meat, based on these assumptions = 7 Mt CO₂e

**Potential for carbon storage during rearing**

This value (9 Mt CO$_2$e) refers to the ongoing annual carbon sequestration in grassland soils as a result of land use change in all UK grasslands that have been converted from another land use since 1970. This annual carbon sequestration as a result of land use change will continue until a new soil carbon equilibrium is reached (100-300 years in England and Wales and 300-750 years in Scotland), or until there is another change in land use. Standard grassland management practices in the UK do not have a significant impact on soil carbon that can be separated from the soil carbon stock change associated with historic land use change.

**GHG emissions and waste from meat processing**: GHG value based on energy consumption data from the Office for National Statistics and converted into GHG emissions using BEIS GHG conversion factors. Waste data from confidential reporting to WRAP.

**GHG emissions and waste from retail**: GHG value taken from 2020 WRAP 2020 report and allocated to meat products based on relative purchasing data from Defra Family Food Survey. Waste value from WRAP 2015 report and adjusted for meat vs fish based on relative purchasing.

**GHG emissions and waste at home**: GHG value taken from 2020 WRAP report and allocated to meat products based on relative purchasing data from Defra Family Food Survey. Food waste data: see Figure 2.

**GHG emissions and waste from hospitality and food service**: GHG value taken from WRAP 2020 report and allocated to meat products based on relative purchasing data from Defra Family Food Survey. Waste value from WRAP 2013 report and adjusted for meat vs fish based on relative purchasing.
‘There has never been a more critical time for action. We are facing a warming world, with more people and less land, water, energy and other resources to go around.

‘As an industry we are committing to work together to ensure that we use these resources efficiently and minimise our impact on the environment, whilst safeguarding the health & welfare of our animals and the livelihoods of our producers.

‘Never has it been more important that we produce food in a sustainable manner, including reducing food waste from farm to fork. By working collectively, we aim to make the UK meat industry a world-leading example of efficient and sustainable meat production and supply.’

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