Efficient use of resources in pet food packaging design

A review of current pet food packaging and new design concepts, to understand good practice and to develop a vision for the future that will deliver significant benefits through optimising the use of resources within the supply chain.
WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.


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Front cover photography: Pet food from packaging to plate.

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Executive summary

This study provides guidance on understanding opportunities which may exist for optimisation of resources in the pet food category. It is aimed at packaging developers, buyers and marketers from brands, retailers and converters within the wet and dry dog and cat food market. The guidance aims to identify benefits to businesses, consumers and the environment, by creating cost savings, improving distribution efficiency and reducing the amount of food and packaging consumers throw away. The good practice identified in this report could also be applied to other areas of the pet food sector, and other grocery sectors, to stimulate new thinking and further dialogue.

The study focuses on the largest segments of the category: wet and dry dog and cat food. It excludes treats and food for other pets (Section 3). Examples of current packaging were analysed, and the sector was thoroughly researched – including desk-based research and interviews with representatives of the sector, and gaining feedback on the concepts.

1,263,000 tonnes of pet food is sold annually in the UK, using around 75,000 tonnes of primary packaging. 9,000 tonnes of uneaten pet food is thrown away in household bins every year (Section 1.3).

Many opportunities were identified to reduce both the amount of packaging used and the food waste produced, which will result in tangible benefits for the businesses involved, including a reduction in the use of raw packaging materials, and improved pallet and vehicle loads. These benefits could result in a reduction in raw material and distribution costs, and an overall reduction in resources wasted throughout the supply chain.

These opportunities centred on the following good practice techniques:

- **Total system**: Consider primary, secondary and tertiary packaging as a total system, avoiding functional overlap between the packaging levels. Remembering that packaging which remains within the supply chain is more likely to be recovered for recycling than at a household level. See Section 4 ‘Techniques for designing out resource waste’, Section 8 ‘Secondary and tertiary packaging’, and Figure A, below.

- **Waste prevention**: Consider the waste hierarchy; prevent, minimise, reuse, recycle, recover, dispose. Favour techniques at the top of the hierarchy, which eliminate valuable materials from entering the waste stream in the first place, for example component rationalisation, lightweighting, volumetric efficiency. See Section 4 ‘Techniques for designing out resource waste’.

- **Food waste**: Less than 1% of pet food sold in 2007 was thrown away uneaten, and this can be attributed to plate leftovers, spoiling or inappropriate storage (Section 1.3). Pet food waste could be addressed by considering pack size in relation to serving size and reclosable packaging – which may inhibit or delay spoilage. This is detailed in Section 2.2 ‘Opportunities to reduce product waste from pet food’.

- **Communication**: Packaging is ideally placed to carry messages to the consumer – both graphically and through text – for example advising on correct packaging disposal, or the brand's stance on related environmental issues. Communication is discussed in Section 9 ‘Communicating with the consumer’ and a semiotic analysis of the sector can be found in Appendix 4.

These techniques were used to generate concepts which are presented in Sections 5, 6, and 7 – moving from wet and dry pet foods in Sections 5 and 6, to collation packaging in Section 7. Figure A shows examples of these concepts. Section 8 ‘Secondary and tertiary packaging’ highlights the opportunities in improving pallet efficiency, and the impact this may have in reducing storage and distribution costs (see Figure B).

The report concludes that there is both a desire and the potential for optimising packaging within the sector through both incremental and radical changes to current packaging formats and that could generate business benefits as well as environmental benefits. A holistic perspective should be maintained; understanding trade-offs between consumer and supply-chain packaging and between packaging and food waste. Finally, product suppliers should always be consulted when considering packaging changes, as they have excellent technical knowledge on both product requirements and production capabilities – which may be unique to each manufacturing site.
**Figure A** Concepts demonstrating potential optimisation of both primary and collation packaging

**Figure B** How primary pack design can affect pallet and distribution efficiencies (see Section 8)
### Contents

1.0 **Introduction** ........................................................................................................................................ 6  
   1.1 Who should read this document ........................................................................................................ 6  
   1.2 Aims .................................................................................................................................................. 6  
   1.3 Packaging and food waste ............................................................................................................... 6  
   1.4 About the authors ............................................................................................................................ 6  

2.0 **Background to packaging and food waste reduction** .......................................................................... 7  
   2.1 Drivers for resource optimisation and waste reduction .................................................................. 7  
   2.2 Opportunities to reduce product waste from pet food ................................................................. 7  

3.0 **Market context** ................................................................................................................................. 8  
   3.1 Types of pet food ............................................................................................................................ 8  
   3.2 Category trends ................................................................................................................................ 8  

4.0 **Techniques for designing out resource waste** .................................................................................. 10  
   4.1 Waste prevention ............................................................................................................................. 10  
   4.2 Reuse ............................................................................................................................................... 11  
   4.3 Recycling ........................................................................................................................................ 11  
   4.4 Techniques summary ..................................................................................................................... 11  

5.0 **Wet pet food** ..................................................................................................................................... 12  
   5.1 Tin cans .......................................................................................................................................... 12  
   5.1.1 Range of standard sizes .............................................................................................................. 12  
   5.1.2 Material lightweighting .............................................................................................................. 12  
   5.2 Foil trays .......................................................................................................................................... 13  
   5.2.1 Material reduction ...................................................................................................................... 13  
   5.2.2 Flexible portioning ...................................................................................................................... 14  
   5.3 Stand-up pouches ............................................................................................................................ 15  
   5.3.1 Material reduction ...................................................................................................................... 15  
   5.3.2 Material choice .......................................................................................................................... 16  
   5.3.3 Flexible portioning and reclose ................................................................................................. 16  
   5.4 Liquid Cartons ............................................................................................................................... 17  

6.0 **Dry, semi-moist and complete pet food** ............................................................................................. 18  
   6.1 Bags and pouches ............................................................................................................................ 18  
   6.1.1 Material choice .......................................................................................................................... 18  
   6.1.2 Material reduction ...................................................................................................................... 19  
   6.1.3 Reclosures .................................................................................................................................. 20  
   6.2 Carton boxes ..................................................................................................................................... 20  
   6.2.1 Joint reduction ............................................................................................................................. 21  
   6.2.2 Material, weight and recycled content ..................................................................................... 21  
   6.2.3 Volumetric efficiency ............................................................................................................... 22  
   6.2.4 Flexible portion control ............................................................................................................. 22  
   6.3 Hybrid and other formats ............................................................................................................... 23  
   6.4 Self-dispensing ................................................................................................................................ 24  

7.0 **Collation packaging for all formats** ................................................................................................. 26  
   7.1.1 Tin cans ........................................................................................................................................ 26  
   7.1.2 Trays ............................................................................................................................................ 28  
   7.1.3 Bags and pouches ....................................................................................................................... 29  

8.0 **Secondary and tertiary packaging** .................................................................................................. 32  
   8.1 Balancing primary and secondary packaging weight ...................................................................... 32  
   8.2 Palletisation ....................................................................................................................................... 33  
   8.3 Reusable transit packaging ............................................................................................................. 34  
   8.4 Secondary and tertiary packaging summary .................................................................................. 34  

9.0 **Communicating with the consumer** ............................................................................................... 35  
   9.1 Consumer misconceptions ............................................................................................................. 35  
   9.2 On-pack communication and consumer behaviour ....................................................................... 35  
   9.3 Semiotic guidelines and trends ...................................................................................................... 36  

10.0 **Summary** ......................................................................................................................................... 37  

Appendix 1 .................................................................................................................................................. 38  

1.0 **Study methodology** ........................................................................................................................... 38
Appendix 2 ......................................................................................................................................... 39
1.0 Packaging requirements ........................................................................................................... 39
  1.1 Industry stakeholder requirements .......................................................................................... 39
  1.2 Consumer demands .............................................................................................................. 39

Appendix 3 ......................................................................................................................................... 41
1.0 Legislative drivers ..................................................................................................................... 41

Appendix 4 ......................................................................................................................................... 42
1.0 Semiotic guidelines and trends - continued from Section 9.3 ................................................. 42
  1.1 Semiotic guidelines .............................................................................................................. 42
    1.1.1 Interesting opportunities ............................................................................................... 42
    1.1.2 Areas to avoid ............................................................................................................... 42
    1.1.3 Semiotic codes in the category ..................................................................................... 44
  1.2 Trends ...................................................................................................................................... 45

Figures
Figure A Concepts demonstrating potential optimisation of both primary and collation packaging. ....2
Figure B How primary pack design can affect pallet and distribution efficiencies (see Section 8) .......2
Figure 1: Examples of after-market products available for resealing pet food tins and bags ...............7
Figure 2: Market volume between pet foods for dogs, cats and other pets, and breakdown by food type (2007) 8
Figure 3: ‘Premium plus’ sub-brand offerings ..................................................................................9
Figure 4: Honest Kitchen and Lily’s Kitchen ranges .........................................................................9
Figure 5: Priority of techniques for waste reduction .......................................................................10
Figure 6: A range of standard tin can sizes are available (left-right: 85g, 120g, 185g, 300g, 325g) ....12
Figure 7, Concept 1: Small tin multipack with lightweight, peelable end ...........................................13
Figure 8: Cesar foil trays use 7g of packaging for 150g of product .....................................................13
Figure 9: Small portion trays from Fussy Cat in Australia and Yo Cat in Germany .........................14
Figure 10, Concept 2: Split portion trays .........................................................................................14
Figure 11: Felix 100g pouch weighing 3.21g for 100g of food ............................................................15
Figure 12, Concept 3: Ultra lightweight sachets (see also Concept 5) ................................................15
Figure 13, Concept 4: Multi-portion pouch with spout .....................................................................16
Figure 14, Concept 5: Mini sachets (see also Concept 3) ..................................................................16
Figure 15: ‘Mja’ Tetrapak wet food carton (left and centre) with typical opening instructions (right) ....17
Figure 16: Harringtons multiwall bag with PLA liner .......................................................................18
Figure 17: Marks & Spencer salad package, which uses Ceetek’s ‘Integrity Seal System’ ..................19
Figure 18, Concept 6: Lightweight bag with label ..........................................................................19
Figure 19: Reclosures on multiwall and FFS bags ..........................................................................20
Figure 20, Concept 7: Corner bead seal ............................................................................................20
Figure 21: Joint overlap ....................................................................................................................21
Figure 22: How to calculate joint overlap percentage .....................................................................21
Figure 23, Concept 8: Custom portion control ................................................................................22
Figure 24, Concept 9: Hybrid bag and box solutions ......................................................................23
Figure 25, Concept 10: Rigid container with screw-lid measuring scoop .........................................23
Figure 26: Example of in-store self dispensing fitment for a variety of dried goods .........................24
Figure 27, Concept 11: Self-dispensing hoppers ..........................................................................25
Figure 28: Shrink wrap (left), example of skeletal carton sleeve (right) ............................................26
Figure 29, Concept 12: Plastic loop collation ..................................................................................27
Figure 30, Concept 13: Carton carry handle ....................................................................................27
Figure 31, Concept 14: Reusable point of sale dispenser .................................................................28
Figure 32, Concept 15: Alternating inversion ...................................................................................28
Figure 33 Concept 16: Folding cube ..............................................................................................29
Figure 34, Concept 17: Pouch orientation .......................................................................................29
Figure 35, Concept 18: Pouch brick ................................................................................................30
Figure 36, Concept 19: Multipack string ..........................................................................................30
Figure 37, Concept 20: Protective retail ready packaging ..................................................................31
Figure 38, Concept 21: Multi pack triangles................................................................. 31
Figure 39: A flexible stand-up pouch packed in a fully enclosed secondary pack and self stacking milk bottle. .. 32
Figure 40: Shrink wrapped cartons of tea and skeletal secondary packaging for cereal boxes.......................... 32
Figure 41: Primary packaging designed not to need secondary packaging.......................... 32
Figure 42: Minor changes to pack dimensions or layout generate significant storage and distribution benefits .. 33
Figure 43: ‘Lock n Pop’ adhesives being applied manually to cartons. The process can also be automated ...... 34
Figure 44: Reusable tertiary packaging is common at point of sale in fast moving bakery and dairy categories. 34
Figure 45: SPI material identification symbols........................................................................ 35
Figure 46: Example of On-Pack Recycling Label guidance....................................................... 36
Figure 47: Semiotic map (small); pink line shows the ‘push’ of environmental codes. ....................... 36
Figure 48: Semiotic map (large). ......................................................................................... 43

Tables
Table 1: Matrix for packaging performance demands across the supply chain ......................... 39
Table 2: Packaging demand profile by consumer segment ....................................................... 40

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1.0 Introduction

This report aims to identify packaging changes that generate an overall reduction in either packaging use or food waste without compromising product integrity.

1.1 Who should read this document

This study targets packaging developers, buyers and marketers from brands, retailers and converters within the pet food market. However, the analysis and ‘good practice’ examples can be applied to many other grocery sectors to stimulate new thinking and further dialogue on reducing total resource waste through the supply chain.

1.2 Aims

The aim of this study is to:

- Stimulate packaging design innovation; and
- Provide tools, examples and further information to support optimisation in the pet food sector.

With the purpose of:

- Optimising packaging solutions;
- Reducing product waste; and
- Reducing the associated environmental and financial costs.

This can be achieved through identifying good practice, highlighting potential for incremental change, and developing concepts for medium and long-term change.

Considering the role consumers play in recycling and food waste reduction, this study also addresses consumer communication and provides guidelines for pack aesthetics to improve consumer engagement in the waste cycle.

The study does not present fully resolved design solutions. Some design concepts presented in this document may have been considered and not implemented previously, due to timing, or lack of buy-in. Further collaboration across the supply chain will be required to achieve further significant reductions in resource waste, presenting both a challenge and opportunity for the sector.

1.3 Packaging and food waste

Historically, targets for waste reduction have focussed on reducing primary packaging and have helped to achieve significant improvements. For example, under the Courtauld Commitment the grocery sector signatories met objectives to end packaging growth in the sector by 2008 despite an increase in sales\(^1\). The pet food category uses around 75,000 tonnes of primary packaging each year\(^2\). Packaging fulfils important functional and statutory requirements to protect the product and so care must be taken when optimising packaging that product integrity is not compromised.

Focus is now extending to reduce food waste arising and in the UK, households throw away 6.7 million tonnes of food each year\(^3\). In landfill, food waste breaks down anaerobically to produce methane, which is 25 times more significant than carbon dioxide (CO\(_2\)) as a greenhouse gas\(^4\). On average, a tonne of avoidable food waste generates the equivalent of 4.5 tonnes of CO\(_2\). 9,000 tonnes of pet food is thrown away annually\(^5\), equating to less than 1% of the 1,263,000 tonnes of pet food bought in 2007\(^6\).

Packaging fulfils important functional and statutory requirements. Therefore care must be taken when optimising packaging that product integrity is not compromised.

1.4 About the authors

WRAP (Waste & Resources Action Programme) engaged 1HQ to undertake this study on their behalf. 1HQ is a brand, product and packaging agency that specialises in trends and semiotic analyses, user and stakeholder research, brand and product innovation, structural packaging and brand graphics communications.
2.0 Background to packaging and food waste reduction

2.1 Drivers for resource optimisation and waste reduction

Drivers for packaging and food waste reductions include:

- **Financial incentives:**
  - Packaging initiatives such as lightweighting and volumetric efficiency can reduce material, storage and transportation costs, and the cost associated with “Packaging Recovery Note” (PRN) obligations. Reducing product waste within the supply chain prevents financial loss from unsold product.

- **Legislative:**

- **Voluntary agreements:**
  - The Courtauld Commitment, which has been signed up to by all the major UK supermarkets as well as brands and manufacturers, with objectives to reduce packaging and food waste.
  - Food and Drink Federations 5 fold environmental ambition.
  - The Pet Food Manufacturers’ Association (PFMA) supports minimisation of all waste from the manufacturing process, including packaging materials; reducing reliance on raw materials; and ensuring packaging disposal has minimum impact on the environment.

2.2 Opportunities to reduce product waste from pet food

The WRAP report ‘The Food We Waste’ indicates that UK households throw away 9,000 tonnes of pet food per year due to leftovers, spoiling and inappropriate storage, at a cost to the consumer of £21 million. In context, this equates to less than 1% of the total pet food bought in 2007.

Wet food that is not eaten fast enough is susceptible to drying out, therefore packaging that allows consumers to dispense exactly the right amount may reduce the amount of leftover food thrown away. However, variance in size, age, activity levels and number of pets in the home can make the definition of standard serving sizes for dogs and cats challenging. ‘Single serve’ portions, while increasing convenience, may actually lead to increased food waste if animals consistently leave some, which is then thrown away. Single serve products may also have a higher ratio of packaging to product than multi-serve variants, and may not be the best choice for households with more than one pet.

Dry and complete pet foods are less susceptible to spoiling through exposure to air or humidity. However, reclose systems are widely used to address both moisture and odour protection.

Multi-serve packages of both wet and dry pet food generally should reclose to prevent food from drying out between servings or releasing unpleasant odours. Introducing automatic or advanced reclose features could ensure reclosing for consumers who currently don’t bother, or improve reclosing for those who do. Many after-market products exist to aid reclosing of pet food, including can covers, clips, and food storage containers.

See Sections 5, ‘Wet food,’ and 6, ‘Dry and complete food,’ for a range of concepts that incorporate flexible portion control and reclose features to help reduce pet food waste.

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**Figure 1:** Examples of after-market products available for resealing pet food tins and bags. Clip that doubles as portioning scoop (left). Themed covers for tins (right).

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\(^{A}\) Information obtained through interviews with industry experts; February 2009.
3.0 **Market context**
In 2007, the UK pet industry grew by 3% to a value of £1.7 billion. Around 40% of the population own a pet – predominantly cats and dogs – with sales of cat and dog food accounting for 94% of the total domestic pet food market by volume.

**Figure 2:** Market volume between pet foods for dogs, cats and other pets categorised as ‘small animals’, and breakdown by food type (2007)

3.1 **Types of pet food**
Given the market split, this study focuses on dog and cat food only, and excludes treats. Dog and cat food is mostly made up of the following types:

- **Wet food:** has a moisture content of 60-85% and is mostly packed in tins, foil or plastic;
- **Dry food:** has a moisture content of around 10% and includes complete foods; and
- **Semi-moist food:** has a moisture content of 25-30% and includes complete foods.

See Section 5, ‘Wet food,’ and Section 6, ‘Dry and complete food,’ for a range of concepts and techniques organised by food type.

3.2 **Category trends**
- **Humanisation** - owners treating pets like human members of the family. More is spent on the pet and trends in human food are quickly mirrored in the pet food sector, e.g. organics.
- **Premiumisation, organics and provenance** - owners trading up. Introduction of premium sub-brands (Figure 3). Some smaller brands use provenance and sustainability as a differentiator (Figure 4).
- **Health, nutrition and obesity** - medicalisation of pet foods, focussing on animal health and dental hygiene.
- **Convenience** - multiple portion sizes, reclose, easy opening and other convenience features are migrating from human to pet food.
- **Organic, provenance and lifestage-specific foods** - a result of premiumisation. Increasing awareness of changing nutritional needs as pets age; present in value to premium ranges.

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8 The expectation is that best practice arising from the recommendations of this report will naturally be disseminated into the broader domestic pet market.
Figure 3: ‘Premium plus’ sub-brand offerings - Whiskas Oh So... (left), Sheba Essence (middle) And Whiskas Organic (right)

Figure 4: Honest Kitchen range (left) uses 100% recycled box, soy-based inks and a reclosable barrier bag. Lily’s Kitchen (right) claims all its packaging is recyclable; the dry food bag is compostable and uses water based inks.
4.0 Techniques for designing out resource waste

The following structural design techniques can be used to optimise packaging and reduce food waste in the pet food sector and are ordered in relation to their impact on the waste hierarchy:

4.1 Waste prevention

- **Lightweighting**: Reducing packaging weight across all materials, using production improvements, finite element analysis and improved quality checking procedures. WRAP has a number of reports on these techniques.

- **Volumetric efficiency**: Enabling units to be packed more compactly, thereby getting more onto a pallet, into a vehicle and onto shelves, generating significant cost and CO₂ savings.

- **Total packaging system reduction**: Rationalising material use by considering primary, secondary and tertiary packaging as a system (including shelf ready packaging). (See Section 8)

- **In-store merchandising fitments**: Can be used to display and communicate product information, enabling primary packaging to be reduced where appropriate.

- **Self-dispensing**: Offering loose product to the consumers, who can choose the quantity to buy and pack directly into their own reusable containers (see Section 6.4).

- **Format selection**: Switching packaging formats to reduce overall waste.

- **Material selection**: Selecting materials that are fit for purpose, and optimising material use.

- **Material technology**: Using new technologies to reduce food waste
  - For example, antimicrobials have been used in food containers, but not yet in food packaging; and
  - Developing smart packaging materials that can absorb oxygen, detect pathogens, and alert consumers to spoiled food. Many of these are expected to be commercially available within a few years.

- **Performance specifications**: Basing specifications on performance rather than material composition ensures that packaging is fit for purpose and not over specified. Performance specifications should be developed in conjunction with suppliers to take advantage of their expertise. See Section 6.2.2.

- **Intelligent portioning**: See Section 2.2. Any increase in packaging as a result of portioning features should generate a greater reduction in food waste.

- **Recloseable packaging**: See section 2.2. Any increase in packaging should be counterbalanced by a greater reduction in food waste due to the potential for there being higher embedded carbon and resource used in the product.
4.2 Reuse

**Primary packaging elements:** Reusing packaging for its original purpose, with no reprocessing:
- In the past, returnable primary packaging used to be more prevalent – for example the doorstep delivery system for milk\(^{17}\) and refillable beer and soft drink bottles\(^{18}\); and
- Reusable packaging / in-store merchandising fixtures creates opportunity to enhance the brand experience, for example through a desirable and robust reusable pack.

**Secondary and tertiary packaging elements:**
- Use of reusable secondary and tertiary packaging is increasing, e.g. pallets, roll-cages, beer kegs, crates, and trays for bread, vegetables and other products\(^{19}\) (see Section 8.4).
- In-store merchandising fixtures may be used to enhance the shopping and brand experience, whilst providing opportunity for primary packaging to be optimised (see concepts in Section 7).

**Alternative reuse:** Providing primary packaging with an alternative and ongoing reuse for consumers:
- For example a dessert packed in a glass ramekin - however, consumers tend to have a limited requirement for such items.

4.3 Recycling

**Recycled content:** This is a complex area where overall carbon impact should be assessed regarding recycled content and the strength-to-weight ratio of the material. See Section 6.2.2.

**Design for recycling:** Creating packaging from materials which have a high recycling recovery rate\(^{20}\) and where possible, from a single material.
- When multiple materials are required, ensuring they are easy to separate for recycling.

The Packaging Recycling Action Group (PRAG) is due to release some generic guidelines on design for recyclability in Autumn 2009 which will be available via a link on the WRAP website.

4.4 Techniques summary

- Consider the waste hierarchy.
- Favour techniques that eliminate packaging or food from entering the waste stream.
- Techniques can be implemented with or without noticeable visible change to the consumer.
- Waste reduction should be viewed as a total system, with the same techniques being applied to primary, secondary and tertiary packaging, remembering that packaging remaining within the supply chain is more likely to be recovered or recycled than that going in to household waste. Use of in-store fitments as part of this system - for example point of sale displays or self-dispensing areas - can create opportunities for packaging waste reduction.
5.0 Wet pet food

Wet food made up one-third of the dog food market and almost three quarters of the cat food market in 2007\(^1\). Wet food is vulnerable to drying out, and the daily amount is often split, being served to the pet twice a day.

This section was informed by interviews with retailers and producers in the sector during February 2009, and by sampling and analysing a selection of existing packaging during the same time period. It demonstrates ways to optimise current wet food packaging formats – primarily (though not exclusively) to achieve a lighter packaging weight – and also illustrates alternative formats. The formats addressed are:

- Tin cans;
- Foil trays;
- Stand up pouches; and
- Liquid cartons.

5.1 Tin cans

The tin can is a popular format for pet food, made from a material that is widely collected for recycling\(^2\). A wide range of standard sizes exist which can be used to facilitate flexible portion control, and both can ends and can walls can be optimised through lightweighting in conjunction with suppliers.

Small serving sizes are often sold as multi-packs or in shelf ready packaging, which must also be considered as part of the total waste reduction plan (see Section 7 ‘Collation packaging for all formats’ and Section 8 ‘Secondary and tertiary packaging’).

5.1.1 Range of standard sizes

A portfolio of standard sizes exist in this well established packaging format.

The 400g tin of wet pet food is popular, and permits flexible multi-serve portion control for one or more pets. However, sales of 400g tins have been in steady decline against single-serve portions\(^1\) – dominated by trays and pouches – creating an opportunity for the development of single-serve portions in 80g or 100g tins, or smaller multi-use tins of 200 or 300g.

**Figure 6:** A range of standard tin can sizes are available (left-right: 85g, 120g, 185g, 300g, 325g)

5.1.2 Material lightweighting

Both the walls and ends of tin cans can be reduced in weight, particularly where the nature of the product adds to the strength of the sealed tin.

The weight of a can is dependent upon material thickness and the can construction – i.e. whether it is two-piece or three-piece, and what type of ends are used e.g. ‘easy open’ ends\(^3\). UK Packaging Benchmark data collected in 2007 showed that the lightest 400g can for pet food weighed only 41.9g\(^2\) – modern pet food cans should aspire to match or improve upon this.

Heinz reduced the thickness of its easy open can ends from 0.2mm to 0.18mm, saving 13% of the can end weight and allowing 18% more can ends to be transported per lorry\(^3\). A new development enables traditional rigid can ends to be replaced with a lightweight, peelable foil lid, generating further weight savings and convenience for the consumer\(^3\).

\(^1\) See the Metal Packaging Manufacturers Association website for information on can construction and design: [http://www.mpma.org.uk/pages/pv.asp?p=mpma96&size=0](http://www.mpma.org.uk/pages/pv.asp?p=mpma96&size=0)

**Figure 7, Concept 1:** Small tin multipack with lightweight, peelable end

This format is currently used for tuna sold in 6x80g multipack (below right).

- Small portion may reduce food waste
- Lightweight peelable foil can end
- Technology already proven in other markets
- A plastic lid could be merchandised alongside the product, e.g. on a ‘clip strip’, or included at product launch.

### 5.2 Foil trays
Foil trays are less universally recycled than aluminium or steel cans, but are lightweight and can be recycled.

When collated into multipacks, the gaps between foil trays can significantly increase volumetric footprint which adds cost to packaging and distribution of the product (see Section 9 ‘Collation packaging for all formats’).

This section discusses foil trays but can also be applied to trays made from other materials.

#### 5.2.1 Material reduction
The lightest foil tray (see Figure 8) weighed during the sample analysis used 7g of packaging for 150g of product.

**Figure 8:** Cesar foil trays use 7g of packaging for 150g of product.

Some industry manufacturers claim to be able to reduce gauge from the current standard of 110 micron to 95 micron, generating a 12% weight reduction, while maintaining rigidity through alterations to the alloy composition and tray shape.

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7 Information obtained through survey of products in the marketplace, February 2009.
5.2.2 Flexible portioning
Trays could be split into smaller or recloseable sections - particularly suitable for small dogs and cats that are fed twice a day.

**Figure 9:** Small portion trays from Fussy Cat in Australia (5x90g-perforated sections)\(^6\) and Yo Cat in Germany (4x62.5g pots).

**Figure 10, Concept 2:** Split portion trays\(^H\)

Split or reclosable trays let people serve just one portion while keeping the rest of the package sealed (top) or reclose the pack with a hot melt adhesive (bottom).

- Flexible portioning to reduce food waste
- Minimal additional packaging required – must be offset by reduction in food waste
- Suitable for use with aluminium or plastic trays
- Currently in use for deli produce such as cold meats and cheeses

\(^6\) Taken from WRAP’s International Packaging Study database: [www.wrap.org.uk/templates/packaging_photo_library_details.rm?id=29064](http://www.wrap.org.uk/templates/packaging_photo_library_details.rm?id=29064)

\(^H\) The WRAP study ‘Survey of packaging with potential to reduce food thrown away at home’ highlights this reclose approach, used for cold meats and cheeses in French retail outlets.
5.3 Stand-up pouches
Stand-up pouches are a lightweight format, but are not currently collected for recycling and typically in this category cannot be reclosed between uses. Pouches are often sold as multi-packs or in shelf-ready packaging, which must also be considered as part of the total waste reduction plan (see Section 7 ‘Collation packaging for all formats’ and Section 8 ‘Secondary and tertiary packaging’).

5.3.1 Material reduction
The lightest of the 100g pouches (See Figure 11) weighed in the sample analysis was 3.21g, an improvement on those weighed in the 2007 WRAP Packaging Benchmarking Study.

Figure 11: Felix 100g pouch weighing 3.21g for 100g of food.

Figure 12, Concept 3: Ultra lightweight sachets (see also Concept 5)

- Ultra lightweight sticks or sachets with reduced barrier properties
- Collation bag provides further barrier properties to work in conjunction with primary packaging
- Long shelf life in store / supply chain
- Reduced shelf life in the home once collation bag seal is broken
- Promotional refill container could be used to store sachets once collation packaging removed
- Trials would be required to assess the implication of reduced shelf life on household food waste

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1 Information obtained through survey of products in the marketplace, February 2009.
5.3.2 Material choice  
For wet food, the pouches have to be retortable. Common flexible retort pouch structures include:
- PET / FOIL / Nylon / CPP;
- PET / Nylon / FOIL / CPP; and
- PET-SiOX or AIOX / Nylon / CPP.

Consultation with suppliers will determine the most appropriate material composition for the application.

5.3.3 Flexible portioning and reclose  
As some pets eat less than a standard ‘single’ serving per meal time, a larger pouch would give the consumer flexibility and control over portion size over multiple servings. This could potentially reduce both packaging and food waste. Conversely, a smaller pouch size or half-serving may suit pets with smaller appetites or a need for variety.

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**Figure 13, Concept 4: Multi-portion pouch with spout**

250g-pouches with wide-neck screw cap (left and middle) and heat-seal spout detail (right) can be used for multiple servings. “Squeezy” interface eliminates the need to dirty a utensil or touch the food.

- Larger pouch size gives consumer control over portion size for their pet – reducing food waste.
- Reclose feature (screw cap) keeps product moist between servings and provides odour barrier.
- Tear-off spout could be used in conjunction with a reusable clip to reclose the pouch.

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**Figure 14, Concept 5: Mini sachets (see also Concept 3)**

For the Japanese market, Mars have developed a multi-pack of single serve sticks (left), similar to single-serve beverage sachets (see also Concept 3).

- Smaller portions for added convenience and reduced leftovers
- Suitable for households with single pet or those with reduced appetites (small, young, old, less active)
- Can be used to increase variety

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1 Retort is a cooking process that uses heat and pressure to cook food in its sealed package. Different retort grade films are laminated together to provide the strength, toughness, puncture and burst resistance that enable flexible retort pouches to withstand the demanding retort process.
5.4 Liquid Cartons
Doggy AB (Sweden) launched the ‘Mjau’ range of wet cat food in liquid carton packaging. The carton claims to be a low-resource and 100% recyclable pack with a 30% to 40% shelf-space saving, and is used in many other food categories.

Weighing 18.8g for a 380g carton, the liquid carton compares favourably with alternative formats, with a similar packaging to product weight ratio as the lightest foil tray (see Section 5.2.1 ‘Material reduction for foil trays’).

Figure 15: ‘Mjau’ Tetrapak wet food carton (left and centre) with typical opening instructions (right)
6.0 Dry, semi-moist and complete pet food

Dry food comprised just over 40% of the dog food market and 20% of the cat food market in 2007\(^6\). This section considers ways to optimise existing formats for dry and semi-moist foods through techniques such as lightweighting, material selection and the use of alternative formats. Formats considered include:

- Bags and pouches;
- cartons;
- hybrid and reusable formats; and
- self-dispense systems.

6.1 Bags and pouches

6.1.1 Material choice

Dry and semi-moist complete pet foods may be packaged in multiwall bags, standalone FFS (fill, form and seal) bags, or stand up pouches.

Multiwall materials

Multiwall packaging is largely paper-based, so is renewable and widely recycled. Given that the product is not overly sensitive to humidity, the primary function of the plastic layer is to provide a heat seal surface for extended shelf life and tamper proofing, and to prevent product fats leaching through the paper.

The natural appearance of multiwall sacks and their high recyclability\(^K\) provide an opportunity to demonstrate environmental credentials\(^27\) (see Section 9.3 ‘Semiotic codes’). Fibre-based multi-wall sacks have traditionally dominated pet food; 83% of US pet food packaging was paper-based in 2003\(^27\). In recent times, multi-wall bags have lost market share to plastic form fill seal bags, but are now experiencing a renaissance for premium ‘natural’ applications.

Figure 16: Harringtons multiwall bag with PLA liner.

Next generation dispersion-coated barrier papers are now under development in the multiwall packaging industry, and are being evaluated for market acceptance. While not yet commercially available, these papers have the potential to offer pet food brand owners excellent barrier protection for oil and grease, a bright white appearance with good printability and dimensional strength\(^27\).

Standalone FFS bags

The physical and barrier properties required for standalone bags can be provided in a lightweight multi-material laminate, and generally include one or more of the following: HDPE, LDPE, OPP, CPP and PVC and coatings such as PVdC\(^L\).

Although flexible materials are not currently widely collected through kerbside recycling schemes\(^21\), were bags to become widely recycled, the preferred options would be monomers or mixed materials based around polyethylene and PET. Some major retailers who collect carrier bags are looking to take back bread bags, cereal

\(^K\) Recyclability is dependent upon the exact material and structural composition of the bag and the risk of product contamination

\(^L\) HDPE: High density polyethylene, LDPE: Low density polyethylene, OPP: Oriented polypropylene, CPP: Cast polypropylene, PVC: Polyvinyl chloride, PVdC: Polyvinylidene chloride
bags and other similar bags which may in the future allow mono layer bags to be more readily recycled. However, given the current lack of kerbside recycling facilities for flexible materials, priority should first be given to lightweighting and material reduction.

Some issues complicate the use of biopolymers such as PLA, including risk of contamination to recycling streams. Detailed information on the implication of biopolymers in packaging can be found on the WRAP website, from which the following excerpt is taken:

“The principal risks arise at end of life. Instead of being composted, biopolymers may find their way into the recyclables stream, which would increase the cost of recycling or prevent it completely. Alternatively biopolymers could be added to the residual waste stream and increase the biodegradable waste sent to landfill... increasing the amounts of methane gases generated.”

Specifying recycled content increases demand for the material and encourages collection from the waste stream. Any application of recycled plastics that come into contact with food must gain approval from the European Food Safety Agency to ensure any risks of contamination or chemical degradation have been resolved.

Stand-up pouches
For non-retort applications such as dry staples and snacks, laminated pouches consist of two to three layers and are commonly made of BOPP, PET, CPP, BOPA, LDPE and aluminium. See also Section 5.3 ‘Stand-up pouches’.

6.1.2 Material reduction
It is possible to reduce some of the material used in the bag by reducing the size of the seal at either end.

Historically, excessive reduction has resulted in an increase of seal failures. However, a new sealing approach – the ‘Integrity seal system’ – has been developed by Ceetek in partnership with WRAP and International Food Partners (IFP), and is capable of reducing the standard seal size of 15mm down to 1.5mm wide. This technology has been used successfully by Marks & Spencer for salad packaging, generating a 10-15% packaging material reduction and is suitable for use with both liner bags and standalone bags.

Figure 17: Marks & Spencer salad package, which uses Ceetek’s ‘Integrity Seal System’

Figure 18, Concept 6: Lightweight bag with label

Lightweight, transparent bags can be paired with a removable label, to provide product visibility and a range of graphical options. Paper labels can give a lightweight standalone bag a more premium feel.

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* In-store promotion, Tesco, February 2009 and on-pack labelling of Sainsbury’s own label cereals

* PLA: Polylactic acid or Polylactide, BOPP: Biaxially oriented polypropylene, PET: Polyethylene terephthalate, CPP: Cast polypropylene, BOPA: Biaxially oriented polyamide, LDPE: Low density polyethylene.

* Information obtained through interviews with industry experts; February 2009.
6.1.3 Reclosures
Pedigree has used the Pactiv Slide-Rite closure system in their multiwall bags in their adult complete range (left and centre). Iams uses a bead seal on their standalone form fill seal bag (right).

Figure 19: Reclosures on multiwall and FFS bags.

Figure 20, Concept 7: Corner bead seal

A bead seal across the corner of the pouch helps controlled pouring (potentially reducing over-portioning) and minimises seal length.

6.2 Carton boxes
Typically, dry pet foods sold in cartons do not use a liner bag. This format is also used for treats and snacks. Options for carton box optimisation include:

- Joint reduction;
- Material weight, content and source;
- Volumetric efficiency; and
- Flexible portion control.
6.2.1 Joint reduction
Carton ends have flaps that overlap to provide surface-to-surface glue joints. Most pet food cartons do not use liner bags, so the joint overlap provides the only sealing area. Reducing flap size whilst maintaining seal integrity reduces primary pack material use by reducing the blank size. This could reduce cost if the change results in greater sheet usage at the converter – which may require cooperation from other brands to ensure that the sheet size is optimised at the converter.

Figure 21: Joint overlap. The box on the right shows quite a large overlapping section, while Tesco’s Marrow Bone 500g (left) had the lowest ratio of joint overlap (29%) of those analysed in this category.

During the sample analysis, the area of flap overlap was measured and expressed as a percentage of the box footprint. Using a ratio allows comparison between different box sizes to identify best practice.

Figure 22: Measure the area of joint that overlaps (shaded area on left) and divide by the total area of that pack face (shaded area on right).

Of the boxes analysed, Tesco's 500g Marrow bone rolls achieved the lowest ratio of joint overlap to box footprint at 29%, with a material weight of 404gsm (grams per square metre). For further information and opportunities around joint reduction, see WRAP's Duchy Originals case study, which details how an 11% reduction in carton material was achieved12.

6.2.2 Material, weight and recycled content
The weight, thickness, recycled content and source (e.g. accredited forests) of cartonboard should be considered holistically, as each can affect another. When optimising primary packaging, remember that secondary packaging can be modified to compensate (see Section 8 'Secondary and tertiary packaging').

Recycled paper, cartonboard and corrugated packaging can be weaker than board made from virgin fibres, and so recycled boards tend to be heavier than virgin equivalents in order to achieve the same strength. However, high quality, lightweight, recycled board grades are available.

Depending on its traceability, virgin board can be used in direct contact with food. However, on average, manufacturing one tonne of virgin paper generates 1.32 tonnes of CO2 equivalent more than manufacturing one tonne of recycled paper32.

Whether choosing virgin or recycled materials, reductions are limited to readily available gauges. Maintaining good communications with material suppliers is critical to understanding the opportunities available. Developing a packaging performance specification is an ideal way of doing this – which focuses on performance requirements rather than material specification; considering the likely conditions the packaging will have to perform under (for example stacking strength, climatic conditions, product interaction, etc) and ensuring it is fit for purpose.

Cost price reductions will be limited to how many more cartons can be cut from each sheet, if any. Resulting trim waste would remain with the supplier / converter and be reprocessed.
6.2.3 Volumetric efficiency
Reducing the overall size of a box not only eliminates material, but can also achieve significant financial and environmental benefits through more efficient palletisation, storage and transport (see Sections 4.1 and 8.2).

For example, according to a study by Pira and the University of Brighton, one pet food company improved the volumetric efficiency of a product by changing its secondary packaging. This change resulted in 48% more units fitting on to a pallet, a 32% reduction in transport requirements, and the elimination of over 2,000 tonnes of packaging per annum (see Figure 41, Section 8 ‘Secondary and tertiary packaging’ for more information).

Headspace in a pack is determined by both machinery capabilities and the extent to which the product ‘settles’ after filling. Reducing headspace improves volumetric efficiency. Opportunities to reduce headspace exist, such as speeding up the settling process by using vibration. Although changes to the processing line and capital expenditure may be required, this may be offset by the cost savings associated with improved storage and distribution efficiency.

6.2.4 Flexible portion control
Portion sizes vary between each animal so standard portioning is difficult, and on-pack guidance is often given, by weight. Consumers may require assistance in portion measuring and repeatability, which can be achieved with a scoop.

Figure 23, Concept 8: Custom portion control

Reusable scoops are often available in pet shops, but a lot of pet food is not bought in pet shops. Single use scoops could be packed in to the head space of cartons, and could be made from an edible material - e.g. a chew to improve the pet’s dental health. Alternatively, a flat ‘scoop’ could be tucked down the side of the pack, and rolled up to create a measuring scoop.

Brands could offer specific portion advice driven by a questionnaire on their website that either identifies the appropriate marking on a standard scoop, or sends the customer a bespoke scoop. Specific guidance about the pet’s health and diet could also be given by the vet during routine vaccinations.
6.3 Hybrid and other formats
Using a combination of a lightweight, flexible material and board presents a range of opportunities for hybrid packaging formats when a bag alone is not sufficient. Structural requirements can be transferred to appropriately designed secondary packaging (see Section 8 ‘Secondary and tertiary packaging’).

Figure 24, Concept 9: Hybrid bag and box solutions.

Alternatively, dry or semi-moist foods could transition to rigid plastic packaging, with inherent structural, reclose and portioning features.

Figure 25, Concept 10: Rigid, refillable container with screw-lid measuring scoop, similar to the Vittles Vault®.

Although significantly heavier than other formats, reusable containers are ideal for re-use in a refillable self-dispensing system (see Section 6.4).

Vittles Vault pet food containers for the storage of dry and semi-moist pet food, available in the USA
6.4 Self-dispensing

Self-dispensing offers consumers the opportunity to choose ‘loose’ product in minimal or refillable packaging (see Section 4.1). Although this is common practice in UK pet shops, it is not common in larger retailers. However, it is well established in the United States, Canada, Australia and New Zealand, and an increasing number of small, independent or premium retailers are using high quality self-dispense fixtures for grocery products in the UK.

**Figure 26:** Example of in-store self dispensing fitment for a variety of dried goods

Self-service retailing offers the following benefits:
- Potential savings for the consumer, retailer and producer;
- Space efficiency;
- Reduced stock handling – gravity-fed hoppers ensure first-in-first-out occurs automatically;
- Improved distribution; and
- Reduced packaging.

Self-serve solutions for dry pet food are commonplace in specialist retail outlets such as pet superstores and garden centres, but are virtually unknown in supermarkets. The WRAP study ‘Self-Dispensing Systems – Commercial Feasibility Study’, available online, indicates that consumers prefer the simplicity of bin and scoop self-dispensing systems, value the ability to select just the quantity they require, and appreciate the reduction in packaging, although they were concerned about hygiene when self dispense systems are used for food for human consumption – pet food is ideally placed to bypass this concern.

For retailers, whilst there are benefits in space efficiency and stock handling, there are some concerns regarding consumer brand perception. Further, self-dispense systems are perceived as messy, with cross-contamination and product liability being a concern – whilst clearly residing with the brand/converter for pre-packaged products, liability becomes uncertain when supplying loose.

Self-dispensing is a big step, and some retailers are currently seeking direction to determine which categories would be best suited to this merchandising technique. As a long-term approach to packaging reduction, larger grocers may trial self-dispensing in some categories before rolling it out more widely. Currently the advantages of self-dispensing systems are most clearly seen at the high end of the market, from boutique stores in London such as ‘Unpackaged’ to the food halls of Kensington’s Whole Foods Market.

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*R Information obtained through interviews with industry experts; February 2009.*
Prefilled hoppers are delivered to store and placed in merchandising unit. A tamper-evident seal (like on ink cartridges) is torn off immediately prior to use. Branded lightweight bags or reusable containers provided for transport and long-term storage at home.
7.0 Collation packaging for all formats

Pet food packs are often collated in multi-packs that must also be considered as part of the total waste reduction plan.

Collation packaging can add significantly to packaging waste, and accounted for 60% of the total packaging weight of the pouches analysed in this study, providing significant opportunity for optimisation, both towards waste reduction and volumetric efficiency. See also Section 8 ‘Secondary and tertiary packaging’.

Food waste can occur when multipacks are bought due to price, but contain a flavour or variant which the pet will not eat - for example a 12-pack of pouches in four different flavours may be cheaper to buy than nine individual pouches, but if one flavour is disliked by the pet, 25% of the pack is wasted. Collation packaging should give flexibility to the consumer where possible and some of the following concepts explore this.

Collation packaging is considered for the following formats:
- Tin cans;
- trays; and
- bags and pouches.

See also Section 8 ‘Secondary and tertiary packaging’ which contains information and advice relevant to collation packaging.

7.1.1 Tin cans

Shrink wrap was the lightest method of tin can collation analysed for this report (Figure 28, left). The Flexible Packaging Association (FPA) estimates that for a multipack containing six cans, around 12.6g of film would be required. This compares favourably to other packaging formats, such as pouches, which are packed in much heavier collation packaging (see Section 7.1.3 ‘Bags and pouches’). This is due to the robust, load bearing qualities of the can, meaning it requires little in the way of structural collation or secondary packaging (see Section 8 ‘Secondary and tertiary packaging’).

Skeletal outer wraps, for example the Whiskas Cat Milk (Figure 28, right), use significantly less material than a fully enclosed card box.

Figure 28: Shrink wrap (left), example of skeletal carton sleeve (right)

Further reductions are possible through more radical approaches, as illustrated in the concepts below.

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Information obtained through survey of products in the marketplace, February 2009.

According to the FPA website: http://www.flexpack.org/MEMONL/mo_sustainable_packaging/sustainable_packaging_toolkit/Final_Case_Story_Brochure200909.pdf?ContactID
A new generation of ‘plastic loop’ collation approaches could be used, like those used in the beverage category (top left and top right).

The design below is a modification of the basic plastic loop design, to avoid the association they have with entrapping wildlife.

Non-stretchy rings snap along a perforation, ensuring that no loop remains after use to trap wildlife. Loops could be made from a biodegradable polymer that would break down if discarded.

A pop-up cartonboard carrying handle and promotion surface collates the cans at the top. Could be paired with SRP, shrink wrap or a reusable transit tray for secondary packaging (See Section 8 ‘Secondary and tertiary packaging”).

Images courtesy of: http://www.hi-cone.com/Hi-Cone/Products/Can/SideLiftCan.html
Figure 31, Concept 14: Reusable point of sale dispenser

The image (left) shows a disposable cartonboard dispenser used by Gourmet Solitaire. The sketch (right) shows how a reusable version might work.

7.1.2 Trays
When collated into multipacks, the gaps between foil trays can significantly increase volumetric footprint, which adds cost to packaging and distribution of the product.

Figure 32, Concept 15: Alternating inversion

Alternate trays to reduce the gap between them, minimising the volumetric footprint with no change to the tray itself.
7.1.3 Bags and pouches
In this study, the carton boxes collating twelve single-serve pouches ranged from 72-89g in weight\(^V\) – in context this is almost double the weight of the pouches themselves (see Section 5.3), and significantly heavier than the collation packaging for other formats, for example cans (see Section 7.1.1 ‘Tin cans’). The orientation of pouches within a collation pack can have a significant effect on volumetric efficiency – see Section 8.2.

\(^V\) Information obtained through survey of products in the marketplace, February 2009.
**Figure 35, Concept 18: Pouch brick**

Linked, perforated wet food pouches create a self-standing multipack unit, which requires minimal collation packaging, e.g. a band. Used in conjunction with SRP tray for transit and display.

**Figure 36, Concept 19: Multipack string**

A string of form fill seal pouches with a minimal card header can be displayed on Euro-hooks or SRP.
- Minimal collation packaging.
- Consumer can mix-and-match variants to prevent food waste from unwanted flavours.
- Retailer can offer promotions making 4 x 3-packs same price point as regular mixed 12-pack.
**Figure 37, Concept 20:** Protective retail ready packaging

Lightweight pouches presented in reusable point of sale display or SRP, which performs structural function during transit. Consumer can mix-and-match variants to prevent food waste from unwanted flavours.

**Figure 38, Concept 21:** Multi pack triangles

A three-pouch multipack is collated into a freestanding presentation using a band (left) or gable (right). SRP (bottom right) automatically self-presents the packs whilst also optimising volumetric footprint.

- Minimal collation packaging.
- Consumer can mix-and-match variants to prevent food waste from unwanted flavours.
- Retailer can offer promotions making 4 x 3-packs same price point as regular mixed 12-pack.
8.0 Secondary and tertiary packaging

Primary, secondary and tertiary packaging work together and should be considered as a total packaging system in order to avoid functional overlap and reduce waste.

8.1 Balancing primary and secondary packaging weight

“It is a generally held view that the weight of primary and secondary packaging is inversely correlated in order to provide ample protection to the product, at a minimum weight”\(^{36}\).

For example, standalone bags and flexible pouches are non load-bearing, and require robust transit packaging (e.g. Figure 39, left), whereas a carton, which is load-bearing, can use minimal secondary packaging such as shrink wrap or a skeletal outer (Figure 40). Some specially designed primary packs eliminate the secondary packaging altogether (Figure 39, right). The information provided here may also be applicable to multi-pack collation packaging.

When optimising the balance between primary and secondary packaging, consider collection and recycling. Supply chain waste is more likely to be recovered than domestic waste, with very high recovery rates for packaging waste at distribution centres and back of store\(^{37}\), compared to only 34.5% of household waste being recovered\(^{37}\).

**Figure 39:** A flexible stand-up pouch containing tea is packed in a fully enclosed secondary pack (left). Milk bottles designed to stack without the use of a crate (right), estimated to improve vehicle loads by 9%\(^{38}\).

**Figure 40:** Cartonboard boxes of tea are shrink-wrapped (left), while many cereal boxes are distributed in skeletal secondary packaging such as the wraparound case for Shreddies (right).

**Figure 41:** A change in secondary packaging format resulted in the elimination of 2,000 tonnes of packaging per year, alongside pallet load improvement of 48% and a 32% reduction in transport requirements\(^{33}\).

\(^{w}\) Information obtained through interviews with industry experts; February 2009.
8.2 Palletisation

Standard ‘best practice’ in palletisation avoids overfill (which can result in product damage) and underfill or voids (which result in inefficiency). According to research, average volume efficiencies are around 50%. Improving pallet volume efficiencies can significantly reduce the costs associated with product storage and distribution. This can be done with or without a noticeable visible change to the primary pack. Figure 42 below illustrates how pallet load can be improved for a cat food pouch multipack, without change to the pouch itself; first by re-orienting the pouches within the collation pack to reduce wasted space, and second by optimising the number of pouches per collation pack (see Figure 34 Concept 17).

Please note, the collation pack style has not been modified in these examples – even more reductions in volume and material use could be made if the style of the collation pack was also addressed (see Section 7.0).

**Figure 42:** Minor changes to pack dimensions or layout can generate significant storage and distribution benefits

![Figure 42: Minor changes to pack dimensions or layout can generate significant storage and distribution benefits](image-url)
A number of options exist for securing a loaded pallet, which include strapping, stretch films, sleeves, adhesives, or by using stackable crates or pallet boxes.

A recent audit of a household brand’s distribution centre found that with simple modifications to existing equipment, stretch film could be reduced by 30%\(^9\). Dramatic reduction or elimination altogether is possible with special non-residue adhesives, such as ‘Lock n Pop’ (Figure 43), an adhesive that temporarily bonds cartons or sacks together to prevent pallet movement\(^{40}\).

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**Figure 43:** ‘Lock n Pop’ adhesives being applied manually to cartons. The process can also be automated.

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8.3 Reusable transit packaging

Returnable transit packaging (RTP) is common in the fast moving bakery, fresh produce and dairy categories (Figure 44). When well-applied, RTP can prevent product damage and divert material from both supply chain and domestic waste streams – see Figure 31, Concept 14. When developing single-trip or reusable transit packaging, factors such as raw material use, energy in manufacture and reconditioning, trip rates, transportation distances, pool size, vehicle utilisation, initial investment, cost benefit, product damage, hygiene, brand value and customer convenience should be considered.

During 2009 WRAP undertook research that reviewed existing life-cycle analyses (LCAs) that covered reusable packaging to examine the benefits of these systems, and factors that need to be considered when deciding whether the adopt reusable packaging. This work will be available on the WRAP website after publication, towards the end of 2009.

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**Figure 44:** Reusable tertiary packaging is common at point of sale in fast moving bakery and dairy categories

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8.4 Secondary and tertiary packaging summary

- Avoid functional overlaps between primary and secondary packaging.
- Supply chain packaging is more likely to be recovered for recycling than domestic waste.
- Improved volumetric efficiency in palletisation can generate significant environmental and cost benefits.
- 30% stretch wrap reduction is possible using pallet wrapping technologies and elimination of stretch wrap can be achieved if pallet adhesives are used; however such technologies should always be tested thoroughly to ensure that they are adequate for the particular needs of a business and its supply chain.
- A research project on reusable transit packaging will be published by WRAP towards the end of 2009.
9.0 Communicating with the consumer
Many techniques discussed in this report achieve significant packaging waste reduction whilst being almost imperceptible to the consumer, leaving the decision with the brand owner as to whether or not to make an environmental statement about the change.

However, given that packaging recycling and food waste reduction relies upon the behaviour of the consumer, a partnership must be created. This involves a greater level of communication to ensure that consumers understand how to play their part.

In this chapter, we explore aspects of communication:
- Consumer misconceptions;
- On pack communication and consumer behaviour; and
- Semiotic (visual signs) guidelines.

9.1 Consumer misconceptions
Currently, consumers are aware of the issues surrounding packaging but are only starting to hear messages about food waste and its implications. Further there is often little understanding of packaging’s role in preserving food and its role in protecting the embedded carbon within the product (the carbon cost of growing/manufacturing/transporting it).

To raise consumer awareness of the issue of food waste, WRAP launched the ‘Love Food, Hate Waste’ campaign which highlights the issue and encourages consumers to adapt their habits by offering simple tips on how to maximise the use of the food they buy. It also encourages brands and retailers to ‘add their voice’ to the campaign.

Mintel suggests that as packaging already plays a role in communication, it is well placed to become the principal educational tool, yet must do so without being over-prescriptive, alienating, or patronising the consumer.

9.2 On-pack communication and consumer behaviour
A Mintel survey suggests that, whilst consumers are environmentally concerned and accept recycling as a social responsibility – three quarters claim to care how much packaging there is on food and drink – packaging recyclability is not a key behavioural or purchase driver. Typically, packaging recyclability is checked at point of disposal rather than point of purchase – and it is only at this stage that the recyclability of the packaging will affect repeat purchases.

To date, communication of packaging recyclability has been characterised by a plethora of symbols that do not give a clear or consistent message, for example, the Society of Plastics Industry (SPI) material identification system (Figure 45).

Figure 45: SPI symbols simply indentify the material, but the mobius loop may appear to suggest recyclability and could confuse consumers about what action should be taken.

New UK-wide packaging symbols from the On-Pack Recycling Label scheme were launched in 2009 to help consumers to differentiate between packaging types that are ‘widely recycled’, ‘check local recycling’ and ‘not currently recycled’.

“Research shows that consumers are often frustrated that they don’t know what packaging can and cannot be recycled and are looking for much clearer on-pack guidance to improve their understanding. The On-Pack Recycling Label scheme aims to deliver a simpler, UK-wide, consistent, recycling message on both retailer private label and brand-owner packaging to help consumers recycle more material, more often.”
To quote the Mintel ‘Food Packaging - Market Intelligence report’, “In future, defining and labelling packaging in the UK should not just be a case of ensuring materials fit certain criteria, but of educating consumers to understand and undertake correct disposal habits.”

9.3 Semiotic guidelines and trends
Semiotics is the study of how cultural meaning gets encoded into everyday objects, through elements such as pack format, material, finish, colours, artwork and iconography. See Appendix 4 for a summary of trends affecting the sector, and a full semiotic analysis of pet food (physical samples and product images) from the UK, plus interesting examples from Europe and the US, which was carried out in addition to this report. Attention was focused on format, materials and finish, but graphic elements were considered when relevant, with specific interest in how eco and ethical meaning is communicated within the category.

Figure 47: Semiotic map; pink line shows the ‘push’ of environmental codes.
10.0 Summary

Around 1,236,000 tonnes of pet food is sold in the UK annually, with pet products using around 75,000 tonnes of packaging each year and generating 9,000 tonnes of pet food waste – both of which have financial implications and environmental costs.

This report has explored the context of the pet food market and relevant trends in order to inspire packaging in the category – to reduce not only packaging, but also food waste, and to present opportunities to engage with consumers in new ways.

Packaging materials have embedded environmental and financial costs. Reducing material usage therefore reduces the associated cost of the material. Recovering the value of these materials after use, through recycling or reuse, ensures that these embedded costs are not lost to landfill. This report has presented concepts and techniques to aid in optimising primary, secondary and tertiary packaging, which illustrate waste reduction opportunities throughout the supply chain.

It is recommended that stakeholders across manufacturing and retail consider the following:

- Take advantage of continued opportunities to reduce packaging material entering the waste stream and the associated cost savings from optimisation, material reduction, volumetric efficiencies and other industry good practice.
- Target the top causes of pet food waste; leftovers and spoiled product.
- Maintain a holistic perspective on waste reduction; understanding trade-offs between consumer and supply-chain packaging and between packaging and food waste.
- Engage with consumers through relevant communication, and assist them in achieving their personal desire to reduce waste.

This report identified significant opportunities across the category to reduce waste through adoption of best practice, incremental changes, and more holistic and revolutionary innovation. These approaches may or may not be visibly obvious to consumers, and the decision whether to use the changes to communicate environmental positioning is left with the brand owner.

Although revolutionary changes could require significant investment and collaboration across the industry, addressing customer and consumer demand will provide business opportunity for companies in the pet food sector and position them for the future in a changing climate.
Appendix 1

1.0 Study methodology

1.1 Initial research
Initial desktop research was undertaken and collated to identify:

- sources of useful data, resources and expertise;
- marketing intelligence to inform the scope of the study;
- key packaging formats in the sector;
- definitions of good practice; and
- established design approaches to waste reduction.

1.2 Initial ideation
This research informed a creative workshop session that generated an initial draught of concept ideas for the revolutionary category. Over the following week, these ideas were worked up into a set of line-drawing sketches.

In parallel to this work, on-going desktop research revealed examples of good practice for the most common packaging formats used in this and analogous market sectors. In the course of this research, images of products were selected to provide examples of good practice for the telephone interview guides.

Further research discovered packaging innovations that address some of the design approaches established in the initial research including innovative closures, portioning solutions, more radical material changes, cube reduction solutions, and alternative approaches to sealing and collation. Again images were sought to represent all of these.

1.3 Development of interview collateral
All of the above were drawn together into a PowerPoint presentation covering incremental, step change and revolutionary approaches and designed to be a focus for a round of telephone interviews each of approximately 1 hour duration held with stakeholders representing retailers, brands and converters.

1.4 Telephone interviews
The interviews were digitally recorded and all significant contributions regarding each image were transcribed.

1.5 Interview analysis
Basic positive/neutral/negative responses were collated onto a master response sheet to develop a picture of consensus. A second creative workshop was held in which all the responses were discussed and a picture built up of those concepts that had received most favour and in which creative directions the concepts should be taken.

1.6 Concept development and finalisation
The selected concepts were developed further visually and a narrative was developed around each concept, drawing on both the feedback from the interviews and from ongoing contextual research into consumer habits, market drivers etc. The images and the text were presented back to the interviewees who were asked to critique the ideas in question and answer tables contained within the documents.

Alongside this work, the feedback on the incremental approaches was added to the body of knowledge available in the public domain and fed into a matrix for each market sector covering all of the common packaging formats in each sector. These were also presented back to the interviewees for review and to offer them the opportunity to fill in gaps in our knowledge.

All of the responses received have been used to augment the desktop research and incorporated into this report.
Appendix 2

1.0 Packaging requirements
The following functions need to be met by food packaging, through a combination of primary, secondary and tertiary packaging:

- protect and secure the contents throughout the product lifecycle;
- preserving the product for a defined time period by providing a barrier between the contents and external environment and preventing contamination;
- communicate relevant information to assist in the handing, choice, use and disposal of the product and the packaging44; and
- promote the product.

Packaging itself must not degrade or taint the food.

1.1 Industry stakeholder requirements
Detailed requirements vary in content and importance amongst stakeholders, as illustrated below.

Table 1: Matrix for packaging performance demands across the supply chain45.

<table>
<thead>
<tr>
<th></th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging manufacturer</td>
<td>Cost</td>
<td>Quality of finish</td>
</tr>
<tr>
<td></td>
<td>Volume/Weight</td>
<td>Runnability on machinery</td>
</tr>
<tr>
<td></td>
<td>Size of design</td>
<td>Printability</td>
</tr>
<tr>
<td>Product manufacturer</td>
<td>Modularity</td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>Size of design</td>
<td>Hygiene</td>
</tr>
<tr>
<td></td>
<td>Strength</td>
<td>Trackable/traceable</td>
</tr>
<tr>
<td></td>
<td>Cost</td>
<td>Compatibility with filling lines</td>
</tr>
<tr>
<td></td>
<td>Protection (e.g. barrier properties)</td>
<td>Storage</td>
</tr>
<tr>
<td></td>
<td>Mechanisation (e.g., filling etc.)</td>
<td>Market trend</td>
</tr>
<tr>
<td>Logistics</td>
<td>Volumes/weight</td>
<td>Anti-counterfeit</td>
</tr>
<tr>
<td></td>
<td>Truckfill/modularity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of energy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modular/non modular</td>
<td></td>
</tr>
<tr>
<td>Retail shops</td>
<td>Protection (e.g., shelf life)</td>
<td></td>
</tr>
<tr>
<td>Consumer</td>
<td>Space/size of unit</td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>Storage</td>
</tr>
<tr>
<td></td>
<td>Modular/non modular</td>
<td>Perfect goods delivery</td>
</tr>
<tr>
<td></td>
<td>Strength</td>
<td>Ease of opening</td>
</tr>
<tr>
<td></td>
<td>Protection (e.g., shelf life)</td>
<td>Ease of disposal</td>
</tr>
<tr>
<td>Waste Manager</td>
<td>Cost</td>
<td>Safety</td>
</tr>
<tr>
<td></td>
<td>Volume</td>
<td>Storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perfect goods delivery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ease of opening/closing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ease of disposal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide product info</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality + homogeneity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Easy access</td>
</tr>
</tbody>
</table>

1.2 Consumer demands
Ultimately, what the consumer values and purchases drives packaging design. These needs vary significantly amongst different consumer segments, resulting in the range of propositions on offer within the category. For example:
Table 2 Packaging demand profile by consumer segment

<table>
<thead>
<tr>
<th>Consumer Segment</th>
<th>Packaging demands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involuntarily poor (lower education level, unemployed, pensioners – low income, price driven buying)</td>
<td>Packaging that contributes to low total cost and price</td>
</tr>
<tr>
<td></td>
<td>Stimulate impulse shopping (add a golden touch to life)</td>
</tr>
<tr>
<td></td>
<td>Small packages for low cash expenditure</td>
</tr>
<tr>
<td></td>
<td>Large packages for lower price</td>
</tr>
<tr>
<td>The thrifty (students, young employees, educated – low income conscience driven buying)</td>
<td>Packaging that contributes to low total cost and price</td>
</tr>
<tr>
<td></td>
<td>Lean on resources and environmentally adapted</td>
</tr>
<tr>
<td></td>
<td>Non pre-packed goods sold by weight</td>
</tr>
<tr>
<td></td>
<td>Small packages for small household needs</td>
</tr>
<tr>
<td></td>
<td>Large packages for lower price</td>
</tr>
<tr>
<td>The estate car/Nuclear family (largest segment, consisting of family units - child driven buying)</td>
<td>Large pack/multi-pack</td>
</tr>
<tr>
<td></td>
<td>Value for money</td>
</tr>
<tr>
<td></td>
<td>Environmentally labelled</td>
</tr>
<tr>
<td></td>
<td>Convenience</td>
</tr>
<tr>
<td></td>
<td>Safety and security through branding</td>
</tr>
<tr>
<td>Dinklot/Sinklot (double/single income, cash rich, time poor and child free – lifestyle driven buying)</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td>Convenience</td>
</tr>
<tr>
<td></td>
<td>Modern &amp; fashionable design</td>
</tr>
<tr>
<td></td>
<td>Small packages</td>
</tr>
<tr>
<td></td>
<td>Insensitive to price for innovative solutions</td>
</tr>
<tr>
<td>The Privileged (cash rich, relatively time rich, retired and working – quality driven buying)</td>
<td>Convenience</td>
</tr>
<tr>
<td></td>
<td>High quality</td>
</tr>
<tr>
<td></td>
<td>Non pre-packed goods sold by weight</td>
</tr>
<tr>
<td></td>
<td>Small packages</td>
</tr>
<tr>
<td></td>
<td>Insensitive to price for high quality solutions</td>
</tr>
</tbody>
</table>

Many retailers have adopted a ‘Good, Better, Best’ (GBB) approach to product differentiation to give consumers choice according to their budget. In the past, “best” quality products tended to use higher-specification packaging to express quality. For example, thicker materials and larger packs for on-shelf impact and multiple layers and material types to enhance the experience. Increasingly, these products use minimal packaging to express authenticity associated with locally sourced and produced foods -- straight from the farm, dairy or bakery.

The perception that more packaging delivers an ‘enhanced value-added customer experience’ is fast disappearing. Recent research by Mintel suggests that consumers are relying less on visual appeal and more on functional attributes to make purchase decisions. These attributes are identified as:

- **Ease of opening.** Of high interest to older consumers, but universally appreciated. People seek convenient, practical solutions that require the least disruption to their primary activities and objective.

- **Freshness and preservation.** Consumers want their products to stay fresh, but often don’t understand the role the packaging plays in this process. This can exacerbate perceptions of over-packaging.

- **Honesty, transparency and integrity.** People scrutinise packaging to understand the product and its source, and on-pack information.

- **Recyclability.** The view that all packaging should be recyclable was held by almost three quarters of the Mintel research respondents. However only two in five actually recycle all the food packaging they buy due, Mintel asserts, to confusion about recycling.

- **Added Value.** People are still looking to “trade up” to products with added value inherent in the product or in the packaging functions.
Appendix 3

Continued from Section 2.1 ‘Drivers for waste reduction’

1.0 Legislative drivers
The European Union framework, Packaging and Packaging Waste Directive 94/62/EC was adopted at the end of 1994 and subsequently amended by Directive 2004/12/EC. In the UK, the following two laws have implemented it:

- **Producer Responsibility Obligations (Packaging Waste) Regulations 2008.** Most EU countries have adopted a ‘Green Dot’ system to implement the Directive’s recovery and recycling targets. The UK has taken a ‘shared approach’ where companies in all parts of the supply chain, from raw material suppliers through to retailers take a share of the financial obligation to meet the targets through the PRN system; and

- **Packaging (Essential Requirements) Regulations 2003 (amended 2006).** These Regulations require companies to ensure that their packaging is designed to be fit for purpose and is the minimum weight and volume needed for safety, hygiene and consumer acceptability. The packaging may be reusable and it must be capable of being recovered through at least one of material recycling, incineration with energy recovery or composting and biodegradation.

The Government set out the UK vision for sustainable waste management in **Waste Strategy for England 2007** on 24 May 2007. This sets a new target to reduce the amount of household waste not reused, recycled or composted from 22.3 million tons in 2000 to 12.2 million tons in 2020, with an interim target of 15.9 million tons by 2010. It also sets higher targets for recycling and composting of household waste – at least 40% by 2010, 45% by 2015 and 50% by 2020.

The **Climate Change Act 2008** introduces the world’s first long-term, legally binding framework to tackle the dangers of climate change. It requires a reduction in greenhouse gas emissions of at least 80% by 2050 and 26% by 2020, against a 1990 baseline. In 2009, the government will issue guidance on the way companies should report their greenhouse gas emissions. The act has also given powers to introduce pilot financial incentive schemes in England for household waste.

More details on DEFRA’s Packaging Strategy 2009 can be found at: [http://www.defra.gov.uk/environment/waste/topics/packaging/strategy.htm](http://www.defra.gov.uk/environment/waste/topics/packaging/strategy.htm)
Appendix 4

1.0 Semiotic guidelines and trends – continued from Section 9.3

1.1 Semiotic guidelines

Currently, ‘green’ messages are whispered rather than shouted in the pet food category, and actively balanced with other messages, such as premium, healthy or pleasurable. These eco and ethical codes are focused on a relatively small niche in the market, with the core and mass market remaining outside of the eco conversation.

Understanding what the consumer sees subconsciously is crucial for creating the right communications – via colour, graphics, materials and form - around packaging to encourage the ‘right’ behaviours. Semiotics is a powerful and cutting edge technique, perfectly honed to deal with questions of how to communicate via any means, understanding the mix of materials, graphics and brand. Hence understanding and controlling these cues can create consumers who are naturally inclined to recycle to migrate towards packing that they can recycle.

1.1.1 Interesting opportunities

Eco and ethical codes in the pet food category remain niche. However, some mass-market brands are beginning to push green messages, in careful balance with their established and trusted brand positioning. In this category, balancing serious and playful codes is crucial.

- Rough cartonboard, soft touch materials, and visually separated components help signify eco messages.
- Colour and finish breaks can help communicate how to deconstruct the package and imply an artisanal simplicity of components.
- The muted palettes of eco messaging compete directly with the bold brights common in the pet food category. Enhanced naturals offer opportunity to balance these codes, as does patchworking and collaging of imagery.
- Packs must appear substantial enough to contain the product, but light in their ecological impact. Satin and sheen finishes achieve this.

1.1.2 Areas to avoid

- Products focused on medical function could be disrupted through the introduction of ethical codes. Be cautious in mixing these messages.
- Avoid impervious blacks, dense lacquers, and metallics – especially foils in large expanses.
Figure 48: Semiotic map; pink line shows the ‘push’ of environmental codes. Care needs to be taken not to push too far too soon. Codes described in following section.
1.1.3 Semiotic codes in the category

- **Code: Lifestyle strength**
  - Squatter, deeper box proportions, to create differentiation.
  - Rough natural materials and light bright hues combine to communicate positive strength.

- **Code: Artisan simplicity**
  - Clear and exposed – everything can be seen and nothing pretends to be what it is not.
  - Riveted and sleeved, like hand-wrapped chocolates.
  - Visual separation of components suggesting material breakdown and disassembly.
  - Black for luxury, counterbalanced by the simplicity of materials, structure and artwork.

- **Code: Enhanced naturals**
  - Natural carton finishes and materials.
  - Peaked top provides performance, along with strong bright shades to suggest ‘animal energy.’

- **Code: Honest organic**
  - Narrow bag links to the honesty of traditional waxed paper bag formats.
  - Mid-sheen finish – natural and functional.
  - Black and white photography supports the natural and authentic messages.

- **Code: Organic ethical**
  - This is the traditional core to the natural and ethical pet food market.
  - Heavy duty printed bag with matt surface finishes and mixed colour-ways.
  - Proportions of the packs talk of functional realities rather than premiumisation.

- **Code: Bargain simplicity**
  - As unpacked, unembellished and simple as possible.
  - About economy, not the natural, but achieves ‘stripping down’ of ethical by default.
  - Some opt for bargain brights – negating any ethical cues, and others hint at ethically with minimised materials and muted colours.

- **Code: Traditional premium**
  - Uses old-fashioned ‘consumer’ codes of traditional luxury through soft golds and thick foils.
  - See premium performance for the contemporary interpretation.

- **Code: Functional basics**
  - Standard pack and box formats suggest multifunctional and standardised use of the product.
  - Simple shape and single material construction suggest ease of disposal.

- **Code: Bright bounce**
  - Bright, primary colours and varnishes and foils for energy and vitality.
  - The denseness of colour and gloss suggests permanence – these materials are not going to degrade or disappear. Instead, they talk of containment and airtight encapsulation.

- **Code: Animal play**
  - Thick, carton finishes and satin sheens suggest strength, permanence.
  - Super bright colours push beyond the energy of ‘Bright Bounce.’
  - Cartoon characterisation of animals pushes to entertainment and play over functionality.

- **Code: Stylised play**
  - Pack forms based on animal features, but with strength and density, not cute-ified.
  - Solid material and colour.

- **Code: Softened premium**
  - Softening of surface finish tones down power to suggest comfort and reassurance – welfare rather than eco concern.
  - Bright hues give just enough animal energy.

- **Code: Captured gloss**
  - Dense glosses and the equal weight balance of the pouch dial down premium codes.
  - Rounded pack corners enhance the sense of encapsulation, containment and longevity.
Code: Humanised consumption
- Replicates human food. If it's good enough for you, it's good enough for them.
- Layering of different materials reinforces suggestion of being beyond pure functionality.

Code: Power performance
- Format and distribution of pack weight suggests power and performance.
- Matt material and bright hues cue performance over premium.
- Black codes performance, balancing out with both the white and bright.

Code: Enhanced performance
- Strong hues for strength and power, while foil sheen pushes towards medical.
- Broader solid form suggests predictable performance.

Code: Premium performance
- Dominance of foil, dense gloss finish and deep inky black cue premium and luxury codes.
- Although black and white imagery tends to signify the authentic, setting it in the proportions and density of foil blacks pushes the premium and performance edge.

Code: Medical function
- Dense foil gloss for sterility and efficiency. Blue, white and silver support medical messages without being too serious.

1.2 Trends
It is important to examine the specialist category of pet food within the broader consumer and trend landscape. Although environmental concerns have become a major issue for consumers in general, some trends areas are more relevant to pet food consumers; therefore we have identified eight macro-trends of relevance to the category. More detail of these trends is given in Appendix 4.

- **Greenwashing** - the suspicion generated as authentic claims are swallowed up amongst bogus or inflated claims. Brands must ensure they are making fair claims.
- **Eco-artisan** - the artisan aesthetic of “real authenticity” would be hard to achieve within the mass pet food market, but has potential at the high-end, and can offer graphic cues to mainstream areas.
- **Carbon negative** - from the next step beyond carbon neutral.
- **Eco-ease** - ease and simplicity have become complementary to ethical issues. Whilst pet food packaging is already simple, materials and recycling can be simplified further.
- **Green metrics** - standardised methods of measuring environmental performance in order to avoid confusion. Similar standardised approaches e.g. nutritional value ‘traffic lights’ simplify messages.
- **Size matters** - size and concentration can be used to convey environmental improvements, a push towards volumetric efficiency in pet food will succeed here.
- **Eco-iconic** - the eco aesthetic has become a style in itself, allowing everyday products to be displayed as green status symbols.
- **Consider everything** - the balance between packaging waste and food waste presents a challenge, as some designs increase packaging in order to reduce food waste. In these cases overall waste must be considered. Consumers are often unaware of all the factors that need to be considered, so companies must consider everything.
- **Communication** - the consumer appreciates clear and honest communication.
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