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**MEAT PACKAGING TERMINOLOGY & REFERENCE GUIDE**

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| **Purpose** | To provide an easy reference guide of commonly applied packaging related terms used within the red meat industry.  |
| **Definitions** |

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| **Terminology**  | **Definition**  |
| Aseptic packaging | Aseptic food processing is the placement of thermally sterilised food or liquid within a commercially sterilised package. The package is sealed within an aseptic environment free of harmful microorganisms to avoid cross contamination and produce a shelf-stable product. The most well-known aseptic packaging application is a multi-layered film, paperboard and aluminium foil pack structure designed for use in ultra high-temperature (UHT) sterilisation. Aseptic block packs or flexible pouches are sterilised, formed, filled, and sealed in a continuous operation. PET and HDPE bottles are also suitable aseptic packaging1.  |
| Barrier films | Impermeable packaging structure of multiple laminated layers of flexible films. Barrier films are also coated on either side by different lacquers/resins to obtain desired results. The performance of barrier film is measured by its effectiveness in preventing the ingress of oxygen, carbon dioxide and moisture, and its effectiveness in extending shelf life. Barrier films protect meat products from the loss of nutrients and functional properties such as taste, aroma, texture and colour2. |
| BOPP | *Biaxially Oriented Polypropylene*A high clarity food safe film that is extremely versatile and durable. Biaxial orientation results in a low temperature and impact resistance design. It is particularly known for its moisture barrier but does not perform as well for oxygen permeability. Coating or coextrusion increases the barrier properties of BOPP. It is the most common application for packaged salads and snacks as it can be easily coated, printed or laminated.  |
| Circular economy  | A systematic model which aims for the elimination of waste, designed to capture and reuse material waste into resourceful new products. |
| Corrugate fibre board | Corrugated fibre board is typically a three-layer structure; an outer layer of Kraft paper derived from virgin fibres that are strong and easy to print on; an inner layer of fluting which is sandwiched between the outer and inner layers and acts as a strengthener; and an inner double layered recycled test paper. To increase carton strength and integrity, an additional fluting section is often added for heavier items and is referred to as a double walled structure. |
| EVOH | *Ethylene vinyl alcohol* A flexible clear and glossy thermoplastic copolymer that has excellent flex-crack resistance and a high resistance to hydrocarbons, oils and solvents. It is known for having some of the best barrier resistance to gases such as oxygen, nitrogen and carbon dioxide, making it particularly suitable for extending shelf life of packaged meat. EVOH is incorporated into structures through the process of extrusion lamination or multi-layer coextrusion. It’s structure has the benefit of being extruded to a thinner gauge than other films making it competitive as EVOH resins have a higher cost than PVdC or polyolefin resins. It has recently been demonstrated that EVOH does not affect the recycling stream of Polypropylene (PP) and High Density Polyethylene (HDPE). |
| HDPE/rHDPE | *High Density Polyethylene / recycled High Density Polyethylene*Lightweight and durable, with a high chemical and impact/puncture resistance, HDPE is suitable for applications requiring greater tensile and compression strength, and/or rigidity. Joints must be made by welding as it is resistant to many solvents and cannot be glued. HDPE has a maximal service temperature up to ~130°C and a lower service temperature of -40°C. HDPE is often blended with other polymers and/or additives, to alter its basic properties. Clean non-contaminated HDPE is recyclable in Australia. |
| HFFS | *Horizontal Form-Fill Seal,* aka Flow Wrap machines, can be manually fed or configured with an automated infeed. For prints, the film has registration marks that keep the graphics aligned and indicate where to cut between packages. A guided infeed is usually a stainless steel tray with a central lug chain that drives the product into the wrapper. Both ends of the package are sealed by a sealing bar which also cuts the film to separate the filled packs. A pair of sealing wheels create a lengthwise fin seal.  |
| Lidding web | Lidding film can be mono materials, such as PET or Polypropylene or Multi-layer barrier films, suitable as sealable or peelable and used for closing foodstuff containers.  |
| LLDPE | *Linear Low Density Polyethylene*The most common type of flexible sheet film that has high tensile strength, superior impact and puncture resistance. It can be extruded as a thinner film without sacrificing strength saving material and costs. The highest usage of LLDPE is for food and non-food packaging, shrink/stretch film, and silage wrap. |
| MAP | *Modified Atmospheric Packaging*The addition or removal of gases from packages in order to manipulate the levels of gases such as oxygen, carbon dioxide, nitrogen. MAP is mainly used to extend the shelf-life of fresh food products. Polymer blends, laminations and co-extrusions are used for MAP. |
| Packaging | Any form of packaging used within the processing and retailer environment that supports the sale of beef, goat and sheep meat, inclusive of agricultural feed wraps and any other industrial packaging used within the supply chain for red meat. |
| PCR  | *Post-Consumer Recycled*Content of recycled resin added as a granule or flake recovered from curbside waste collection programmes. |
| PET / rPET | *Polyethylene terephthalate* / *recycled Polyethylene terephthalate*The outstanding properties of PET film have tensile strength, chemical resistance, elasticity, are lightweight, and stability over a wide range of temperatures (−60° to 220 °C). PET films are mostly used in the biaxially oriented heat-stabilized form. To further improve the barrier properties of PET, coatings of LDPE and PVdC are often applied. PET film extrusion-coated with LDPE is very easy to seal and very tough. Two-side PVdC copolymer-coated grades provide a high barrier, and a major application in meat packaging. PET is also used to make ‘ovenable’ trays for frozen foods and prepared meals3. Food grade rPET is recycled PET derived mainly from water/drink bottles. |
| PIR | *Post-Industrial Recycled*Content of recycled resin added as a granule or flake recovered from industrial waste collection programmes. Not food grade. |
| PLA | *Polylactic Acid or Polylactide*A polyester derived from renewable biomass, typically from a fermented plant starch such as corn, sugarcane or sugar beet pulp. PLA is made with two possible monomers or building blocks: lactic acid and lactide. The lactic acid is produced by the bacterial fermentation of a carbohydrate source under controlled conditions making the process sustainable and renewable. PLA is gaining interest as a bioplastic rather than a resin derived from petroleum. Recycling PLA is a process of thermal depolymerisation or hydrolysis breaking it down to its original monomer without loss of quality. The recycling infrastructure has not been scaled up yet in Australia and composting is the preferred end-of-life option4. |
| Polyolefin resin | Widely used cost-effective synthetic resins such as polyethylene or polypropylene. Polyolefins are a family of thermoplastics that are produced by polymerising ethylene and propylene obtained from oil and natural gas. It can also be derived from renewable resources such as sugar cane. These resins account for more than half of total plastic consumption5.  |
| PVdC | *Polyvinylidene Chloride* A clear, glossy and flexible synthetic thermoplastic produced by the polymerization of vinylindene chloride. It has outstanding oxygen and moisture barrier properties comparable to metallized films. PVDC is highly resistant to many chemicals including grease, oil or products with a high fat content and strong aromas such as meat. PVDC is easily extruded and laminated but is a high cost product so it is often used as a coating, laminate or is coextruded to cheaper films improving the barrier properties of the base film. It is also microwavable and printable using common ink systems6.PVdC is not recyclable in mechanical or chemical systems as it is highly corrosive. |
| Recycle | Removal of raw material input and redirecting waste output.  |
| Retort pouch  | A multi-layered upright self-supporting plastic gusseted pouch. A common structure consists of a first layer of polypropylene or PET which acts as a heat seal surface and adds strength and flexibility. The second layer is nylon for protection from abrasion. The third layer is aluminum a barrier to UV, gases and odour. The final polypropylene layer provides excellent strength, gloss and is printable. Retort processing is filling non-sterile product in hermetically-sealed non-sterile packaging. The filled package is loaded into a retort pressure vessel and subjected to ultra high-temperature pressurized steam to extend shelf-life7. |
| Silage wrap | Outer LLDPE wrap used to protect hay and livestock food from contaminants and to avoid spoilage during storage.  |
| Skin packaging | Raw meats are placed on a plastic tray and then covered by a plastic film that is thermoformed, thus acquiring exactly the shape of the meat piece. The shrinking of the upper plastic barrier film avoids the formation of air, reducing the exudate and prolonging shelf-life. This technique was developed with the intention of commercializing small portions of raw meat, minced meat, or meat preparations for the retail market8.  |
| Supply chain | Network of all individuals, organisations and resources in the delivery of end-product. |
| Vacuum packaging | Removal of oxygen from meat packaging improves meat quality and colour stability. Vacuum packaging consists of subjecting the meat, inserted in special bags, to a pump that removes the air inside the bag, leading to the extension of its microbiological and oxidative shelf-life. By controlling aerobic spoilage, it favours the growth of lactic acid bacteria (mainly composed of nonspoilage organisms), thus promoting a clear extension of the shelf-life of raw meat. The anaerobic environment is not optimal for meat colour, making this packaging not applicable for retail, but applied for wholesale market primal cuts. The nonperfect adhesion of the packaging to the surface of meat leads to small air pockets that could be filled by the exudate produced from the muscular tissue reducing shelf life9.  |
| VFFS | *Vertical Form Fill Seal*A method of packing where the bag is created during the filling process. It involves feeding the product into a bag vertically as opposed to horizontally. The roll film winds through a series of rollers and is shaped into a tube. The tube is closed at the bottom by clamps creating the bottom of the bag. The raw material is dropped into the half formed bag, then the bag is sealed at the top forming the bottom of the next bag. The bottom seal is cut in the middle separating the bag from the next one10.  |
| Waste | Unwanted by-products created during agricultural activities and operations including single-use discarded consumer and industrial packaging. |

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| **Identification codes** | Each resin has an identification code. Packaging applications use these codes to advise of the type of plastic resin the application is made from. The number is often found on the bottom of plastics and is used to help with the identification of acceptable recyclable plastics in curbside collection programmes.Resin Identification Code (RIC) | Environmental Claims on Packaging: A  Guide for Alameda County Businesses |
| **Stakeholders** | ACOR Australian Council of RecyclingAIP Australian Institute of PackagingAPCO Australian Packaging CovenantAPPMA Australian Packaging & Processing Machinery Association |
| **References** | 1 N Lumby, J Park, in *Probiotic Beverages*, 2021, https://doi.org/10.1016/C2018-0-04171-72 https://www.cosmofilms.com/blog/barrier-films-in-food-packaging/3 G.L. Robertson, in *Encyclopedia of Agriculture and Food Systems*, 2014, https://doi.org/10.1016/B978-0-444-52512-3.00063-24 https://www.biopak.com/au/resources/5 https://plasticseurope.org/plastics-explained/a-large-family/polyolefins-2/6 https://polymerdatabase.com/Films/PVDC%20Films7 https://primepac.com.au/retort-pouches/8 Erten, H et al, in *Influence of Skin Packaging on Raw Beef Quality: A Review,* 2018*,*https://doi.org/10.1155/2018/74645789 Erten, H et al, in *Influence of Skin Packaging on Raw Beef Quality: A Review,* 2018*,*https://doi.org/10.1155/2018/746457810 https://www.we-pack.co.uk/advice-centre/guides/a-guide-to-vertical-form-fill-seal-vertical-bagging |

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