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# Session 1

## Basic requirements for fresh food packaging and its value chain



# In this lesson you will learn about



**BASIC FUNCTIONS OF  
FOOD PACKAGING**



**BASIC TYPES OF FOOD  
PACKAGING**

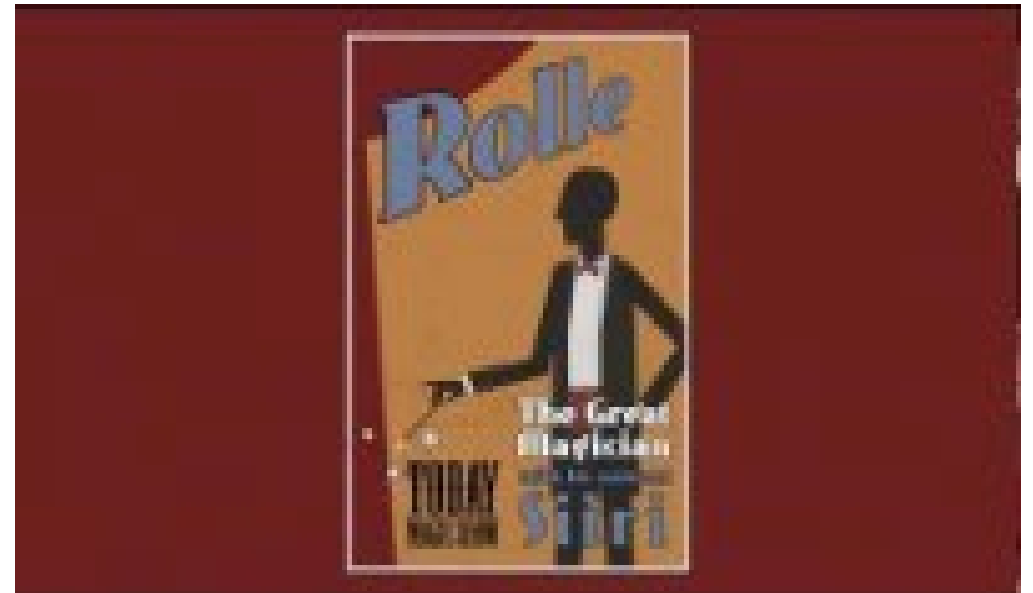


**BASIC MATERIALS OF  
FOOD PACKAGING**

# Basic functions of food packaging

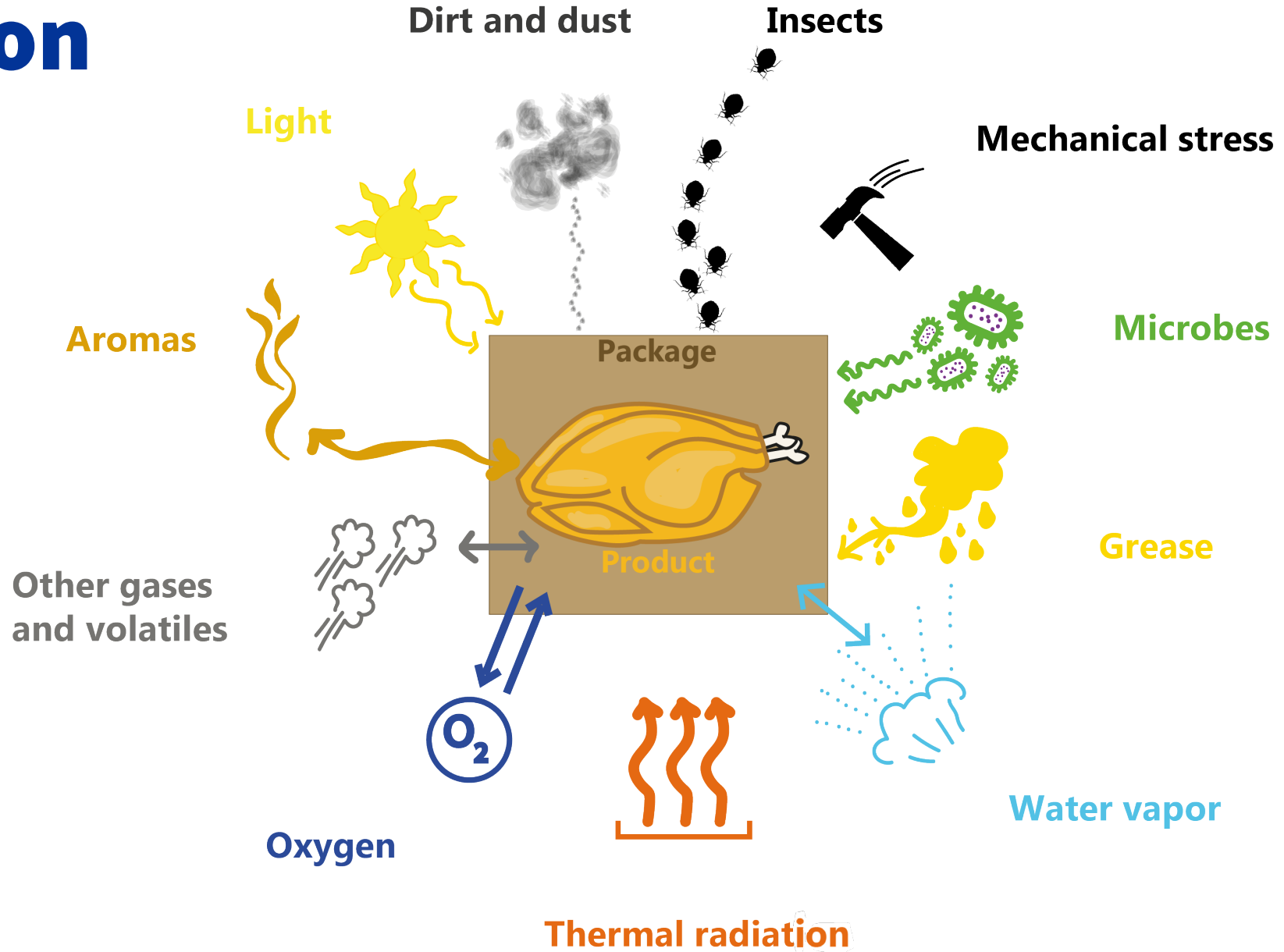
# Basic functions of packaging

- Protection of fresh food & prevention of food loss
- Preservation of the product
- Communication about the product
- Facilitation of efficient production and logistics
- Adds convenience



[https://www.youtube.com/watch?v=SmcOP9EHZN\\_o&ab\\_channel=Quiteapack](https://www.youtube.com/watch?v=SmcOP9EHZN_o&ab_channel=Quiteapack)

# Protection of fresh food



# Prevention of food loss

- Food production consumes resources – food is valuable and should be eaten, not wasted

**Example 1. Transportation of peaches using foam nets significantly decreases food losses; smaller crops needed**



Sasaki, Y. et al. (2021) The international journal of life cycle assessment. [Online] 26 (4), 822–837.

**Example 2. A slice of ham forgotten in the back of the fridge has a higher environmental impact than a plastic packaging & its disposal**



Williams, H. & Wikström, F. (2011) Journal of cleaner production. [Online] 19 (1), 43–48.

**Example 3. A slice of bread gone mouldy has a higher environmental impact than a plastic bread bag & its disposal**



Silvenius, F., Grönman, K., Katajajuuri, J.-M., Soukka, R., Koivupuro, H.-K. and Virtanen, Y. (2014), The Role of Household Food Waste in Comparing Environmental Impacts of Packaging Alternatives. Packag. Technol. Sci., 27: 277-292.

# Preservation of the product

- Preventing product spoilage, contamination, physical damage, drying and pests.

**Example 1:** A plastic wrap of 1.5 grams keeps a cucumber fresh for at least 14 days. Without packaging, it dries quickly (96% water).



**Example 2:** A vacuum pack slows down the spoilage of fresh fish because aerobic microbes do not multiply in the absence of oxygen.



**Example 3:** A modified atmosphere slows down the spoilage of the product, e.g., pre-packaged salads.



# Communication about the product

Labeling is required by legislation if a fresh food product is packed outside a grocery store or restaurant.



## Pihamaan kasvikset



Fourteenacre



Net quantity  
**260 g**

RUOKAA  
OMASTA  
MAASTA



# Lounas- salaatti

Lunch sallad

Expiration date **09.04.22**

Food batch number **L-14-659**

## The legal name of the product

**Ingredient list:** here should be listed every ingredient and additives this product contains. Ingredients are listed in a descending order of weight. **Bolded or CAPITAL text indicates ingredients with allergens. If the ingredients are mentioned in the name or picture/graphics, the amount of the ingredient must be marked.**

Mention about the instructions for storage, and the origin of the main ingredient, if necessary.

Depending on the legislation and market, multilingual packaging texts may be required.

**Country of origin:** Country, World

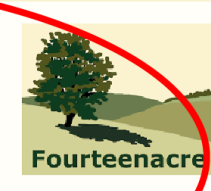
**Manufacturer:** Fourteenacre co.

**Producer (if other than manufacturer):**

Pihamaa Oy, Pihapellontie 2, 17200 Asikkala

**The name and post address of only the main responsible company are only required.**

Nutrition declaration	100g
<b>energy</b>	627 kJ / 150 kcal
<b>fat</b>	2,1 g
-of which saturated	0,9 g
<b>carbohydrates</b>	15 g
-of which sugars	4,2 g
<b>dietary fiber</b>	3,1 g
<b>protein</b>	12 g
<b>salt</b>	0,89 g



Fourteenacre

www.pihamaa.fi

Indication of use of packaging gases, if necessary

Indication of use of sweeteners, if necessary

Indication of high salt content, if necessary ☒



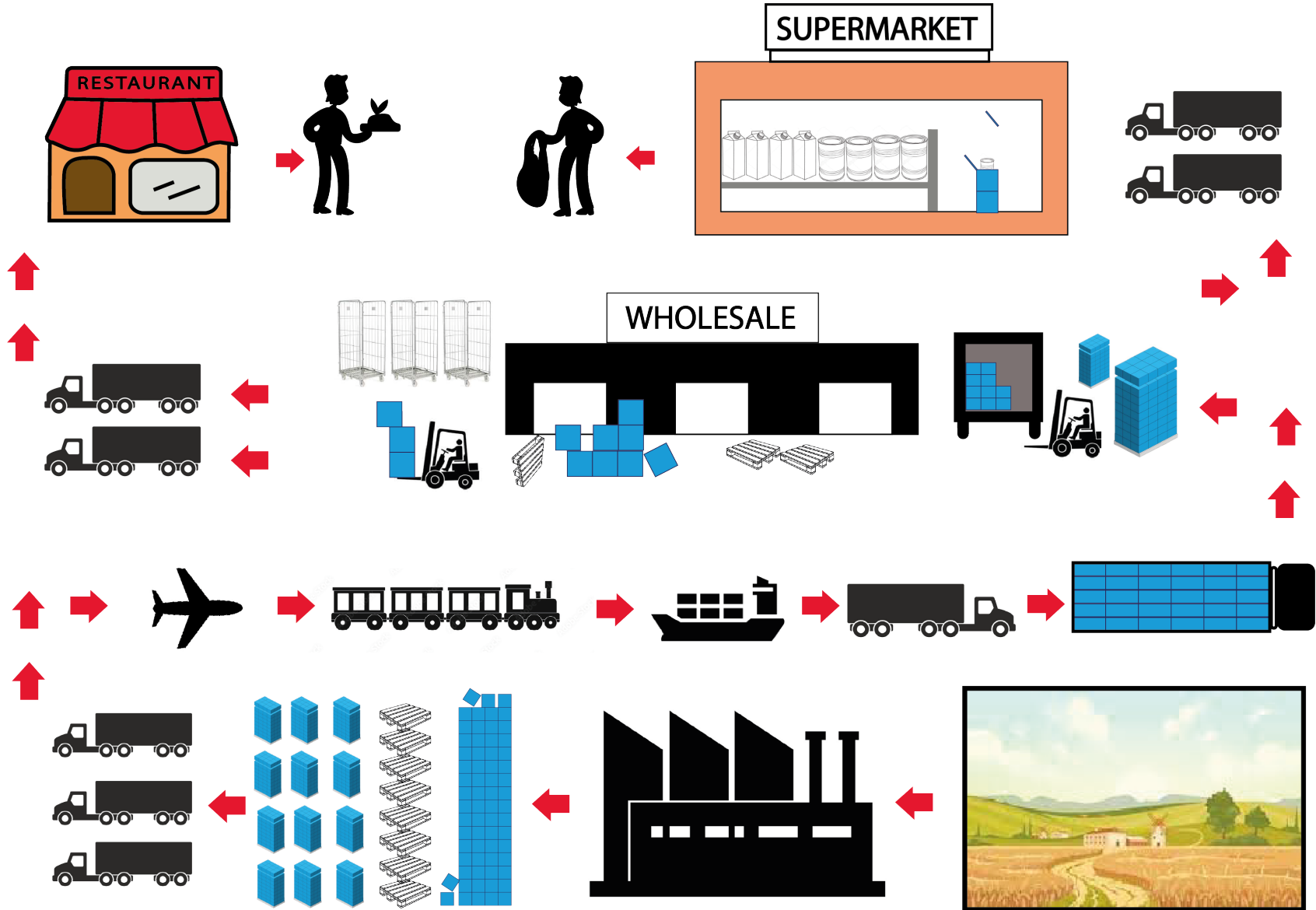
Recycling  
instructions  
(not mandatory)



# Mandatory labelling texts by the legislation:

- The legal name of the food product
- List of ingredients with allergens (bolded OR in ALL CAPS Net quantity (= weight OR volume)
- Date of minimum durability ('best before' date OR 'use by' date)
- Food batch number
- Nutrition declaration
- Name, business name OR auxiliary name, and address of the responsible food business operator
- Country of origin, in other words the country of manufacture or production of the food product, OR the product's place of provenance, if necessary
- Actual alcoholic strength by volume, for beverages containing more than 1.2 % by volume of alcohol, and for solid foods exceeding 1.8 vol-%
- Product-specific requirements for certain categories of food
- Instructions for storage, if necessary
- Special labeling for quick-frozen and frozen food
- Conditions of use (including a warning label if necessary)
- Indication of use of packaging gases, if necessary
- Indication of use of sweeteners, if necessary
- Indication of high salt content, if necessary
- Identification mark on foodstuffs of animal origin produced at a food establishment
- Labelling of genetically modified food
- Indication of ionising radiation treatment

# Facilitating efficient production and logistics



# Basic types of packaging



Primary  
= consumer packaging



Secondary  
= sales packaging



Tertiary  
= transportation packaging



# Adds convenience

- Provides a function that is appreciated by the consumer – often quick & easy

Example 1. Top opens to a handy pouring spout



Example 2. Portable, reclosable, non-messy snack for small kids



Example 3. Oven ready meal



# Basic materials of food packaging

# Food contact materials

- Food packaging improves food safety and hygiene - materials must support this
- Materials that come into contact with food are required to be safe
- Proved compliance with legislation
- Lists of allowed raw materials

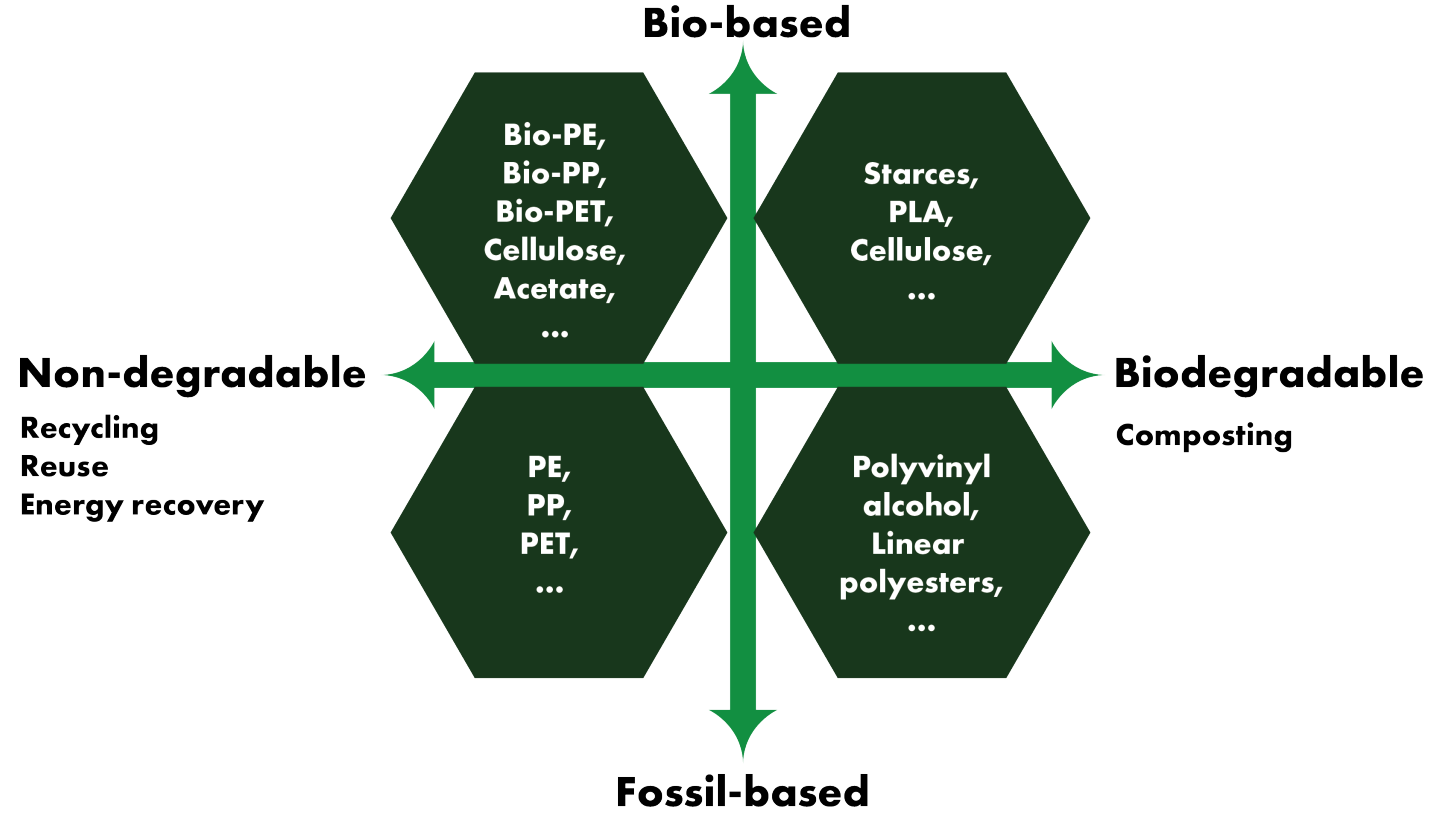


# Plastics

- Benefits: lightweight, protects from moisture, can be breathable, tolerates liquids, cheap, easily formed and sealed, available, large variety
- Drawbacks: often multilayer structures, recycling rates still quite low



# Classification of plastics



Foot print of plastic packaging



Note! Not all biodegradable materials are bio-based.

Note! Composting is not regarded as recycling.

Note! All compostable materials are biodegradable but not all biodegradable materials are compostable.

Then what are bio-materials?

PE: Polyethylene, PLA: Polylactic acid, PP: Polypropylene, PET: Polyethylene terephthalate

# Paper and paperboard

- Paper, paperboard, liquid paperboard, corrugated carton board
- Benefits: Strong, insulating, protects from light, absorptive, breathable, tailorable, renewable, and recyclable
- Drawbacks: Permeable, absorptive, sensitive to moisture/liquids without a coating, opaque, only short or moderate heat treatments



# Glass

- Clear, green, brown
- Benefits: non-reactive, excellent for preservation, strong, tolerates heat treatments
- Drawbacks: Heavy & rigid, sensitive to breaking, needs other materials for closure mechanisms



# Metal

- Aluminium and steel
- Benefits: Excellent protection, strong, durable, tolerates and transfers heat
- Opaque, may need coatings (steel)



# New plant based materials

- Molded pulp packaging
  - Bagasse
  - Grass
  - Agricultural sidestreams (fiber)
- Other sidestreams as raw materials
  - Lignin
  - Peels
  - Hulls
- Edible packaging can reduce the protection needs of other packaging
  - Chocolate coating on ice-cream
  - Ooho edible drink capsules at London marathon



# Key takeaways

- Protection of food is the most important function
- The functions may contradict each other and the package is the best possible compromise to fulfil them
- Materials have different benefits and drawbacks – the optimum is strongly dependent on the food system



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