



# ***Packaging of food products***

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## ***Kinds of queries we deal with***

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*“I have the raw material – what will I make”?*

*“I found this French product, can I make something similar”?*

*“Where can I source these trays/film”?*

*“How do I package it”?*

*“I’m only getting 6 days shelf-life, I want 12...21...”*

*“What kind of packaging equipment will I buy”?*

*“I’ve already bought a packaging machine – do you think its suitable”?!*

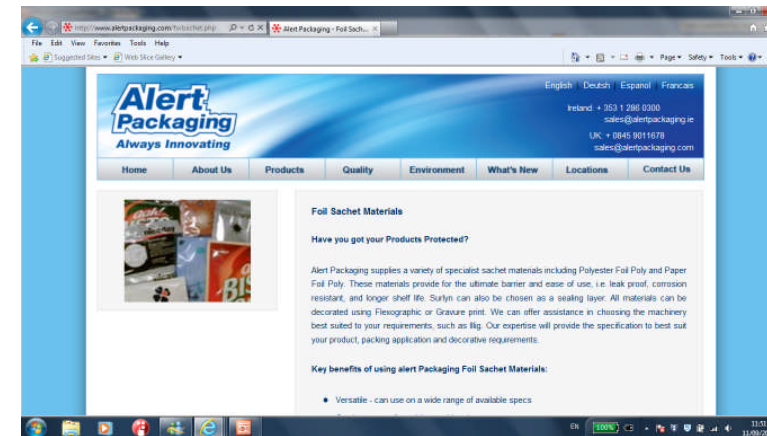
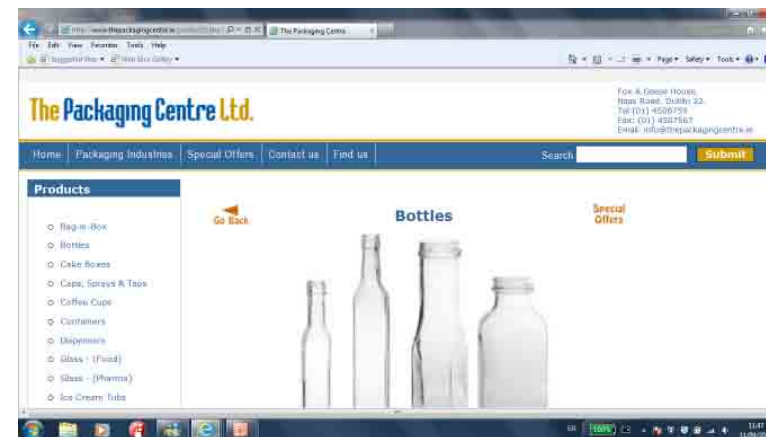


## **We deal with numerous Irish and International packaging companies**

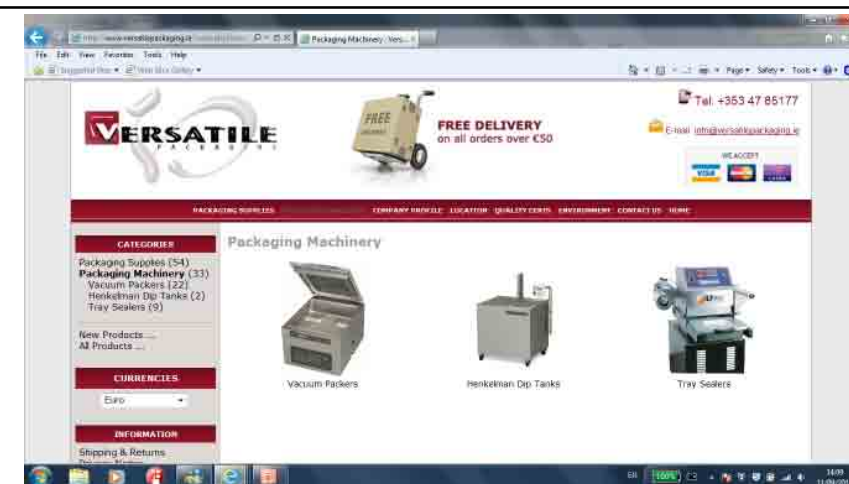
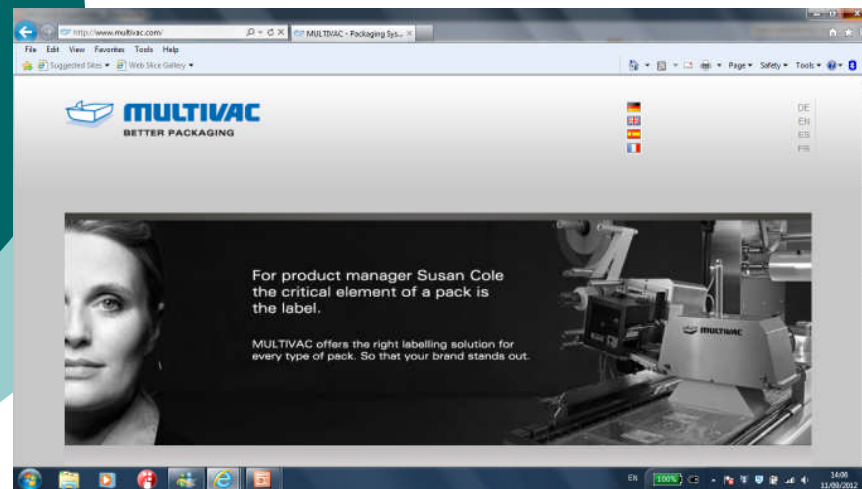
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- Equipment suppliers
- Trays
- Film
- Bottles
- Cans
- Pouch
- Bag etc

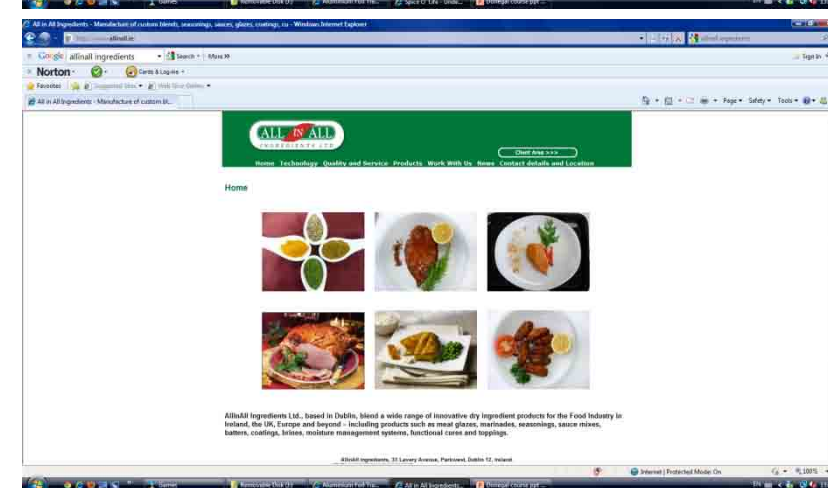
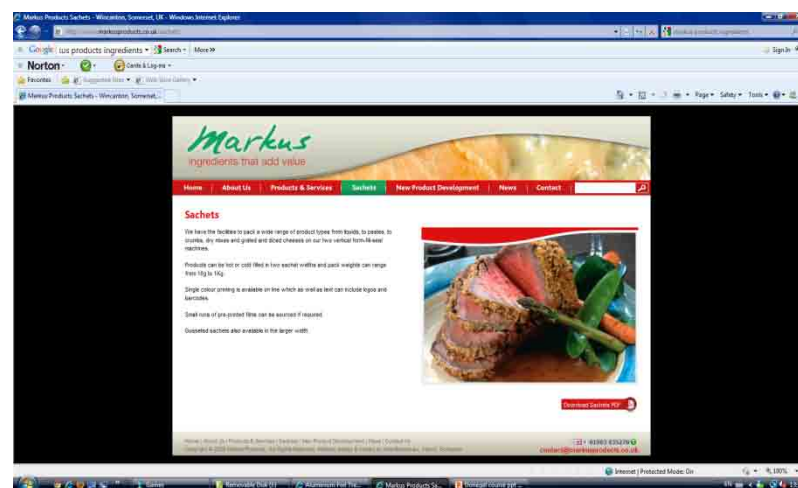
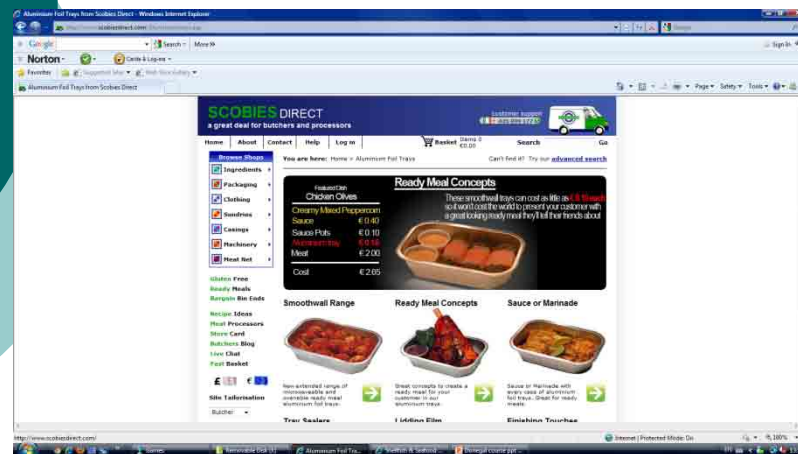
## We deal with numerous National and International packaging suppliers



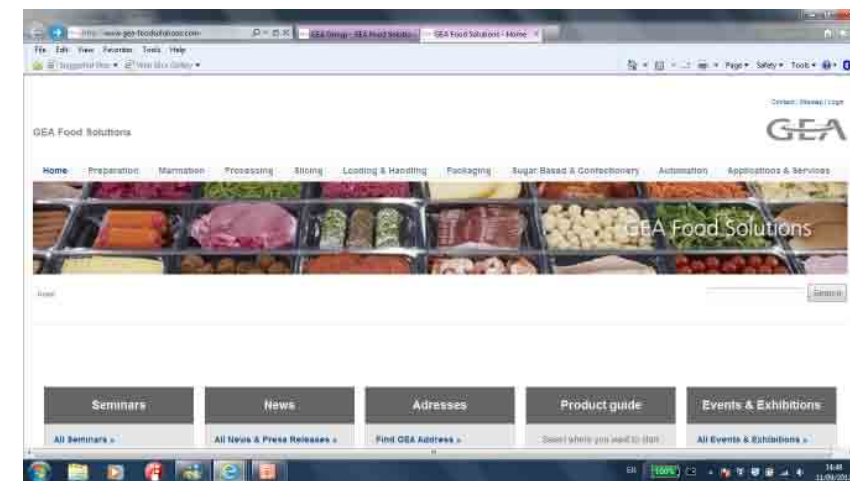
# We deal with numerous National and International equipment suppliers



# Numerous ingredients companies..



# Numerous other processing equipment suppliers





## We advise on...

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- Signposting/Appraisal of equipment
- Appraisal of packaging materials
- Prototype and process development
- Micro, chemical, sensory appraisal
- Scale-up
- Reverse-engineering
- In-factory training
- External resource for NPD
- *(My own speciality is packaging and processing of muscle foods)*





## ***Packaging represents about 70% of queries***

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- Over 300 company NPD projects
- Ranging from small to large
- Raw, chill, frozen, pasteurised, freeze-chill etc
- Consumer foods, baby foods, pet-foods
- Dairy, beverage, meat/muscle foods, cereals etc
- No “One-fits-all approach”
- Each situation is different

## Every company and concept is different

- Size of operation
- Budget available for Capex
- Required shelf-life
- Target market
- Market size/volume
- Level of automation required
- In-house expertise/skills
- Use of ancillary equipment/processes
- Etc





## **However one common factor...**

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The most successful NPD ideas are market-led and packaging-choice is dictated by numerous market factors



# NPD Critical Paths

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1. Marketing Input
2. Concept Research
3. Proposed ingredients and raw material source
4. Initial first product make up
5. Recipe Formulation
6. Sensory Evaluation
7. Process technology
8. Work up costings
9. Shelf life and nutritional testing
10. Customer Presentation
11. Product sign off with customer
12. Photography and pack design
13. Confirm packaging
14. Pre production trials
15. Launch

**Correct market appraisal will fast-track the process and increase success rate**

Ref: Leatherhead UK

# Market Research

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Crucial for identifying packaging options  
and minimum market entry requirements



## Importance of market research

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- First step on the NPD process
- Is there a gap / demand for your product?
- Benchmark your concept against competitor offerings
- See what multiples require in terms of pack size/price-point/plan-o-gram etc
- Opportunity to determine what your competitors are using and try to improve upon this



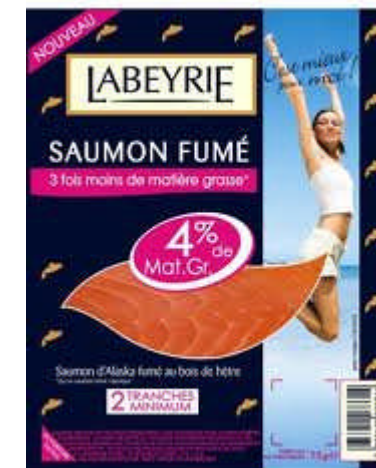
## Identifying interesting packaging formats

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- Numerous ways of identifying trends/best-in-class
- Trade Magazines
- Agencies Teagasc, Bord Bia, BIM, EI etc
- Internet
- Trade Shows – Catex 2013 / Shop etc
- Retailer websites – Asda, Waitrose etc
- <http://www.bim.ie/our-services/grow-your-business/marketinformation/>
- Focus groups
- Store Checks

## Store checks quick and convenient

YOUR M&S





**Store checks allow you to buy and reverse-engineer (dismantle) successful products**



**Gastropub: Main For Two** €10.49 per 720g



**Count on us: Low Fat Range** €5.99 per 400g

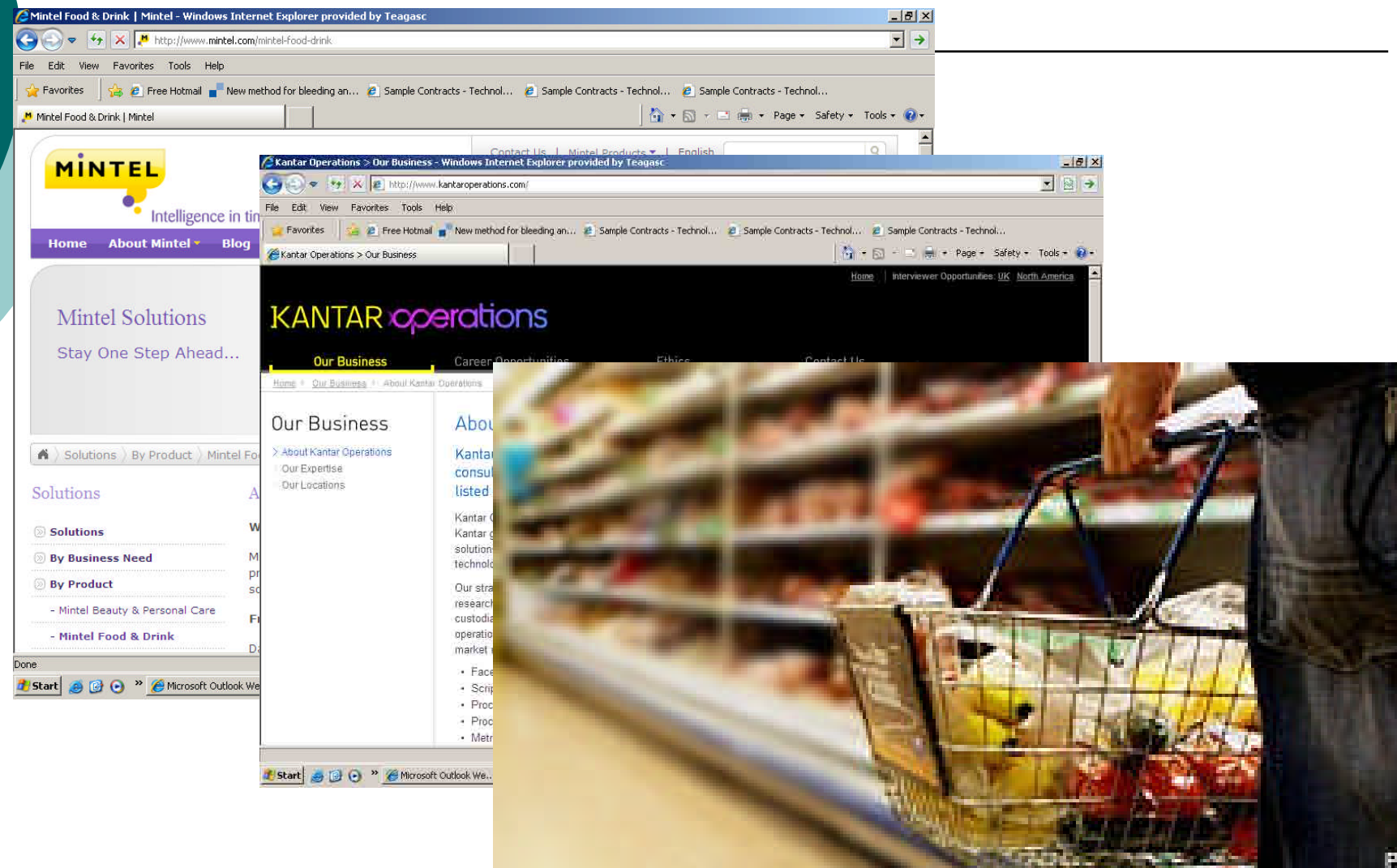


**Haddock Cumberland Pie** €3.39 per 300g

**Ensuring competitor USP's are improved upon**



## *Additional sources of data e.g. Mintel/Kantar*



**Till-receipt based data**

## Recipe formulation/reverse engineering (Mintel)



- Tesco Thai Crab Fish Cakes
- Company: Subcategory:
- Date Published: ID:1592970
- Tesco Fish Products
- 12 Jul 2011
- Tesco Thai Crab Fish Cakes contain Alaska pollack and sweet chilli melt in the middle. The fish cakes are free from artificial preservatives, flavours and colours. This product retails in a
- 290g recyclable pack containing two pieces.
- Country:
- Ireland
- Storage Type:Frozen
- Ingredients: Crab meat (21%) (white crab meat (70%), brown crab meat (30%)), Alaska pollack (15%), wheat flour,
- sweet chilli sauce (12%) (water, red pepper, sugar, fructose, tomato, vinegar, cornflour, fish
- Nutrition: Per 100g: Energy 770kJ/185kcal, Protein 10.2g, Carbohydrate 18.1g (of which Sugars 4.7g), Fat 7.8g

E.g. Mintel data

## Southern Belle Seafood Crab Cakes



**Company:**  
Shaw's Southern Belle  
Frozen Foods

**Subcategory:**  
Fish Products

**Country:**  
USA

**Storage Type:**  
Frozen

**Date Published:**  
10 Aug 2011

**ID:**  
1613396

Southern Belle Seafood Crab Cakes contain 0g trans fat. These crab cakes are ideal to serve with steamed vegetables or salad and are great for party appetizer or as a side dish. This microwavable product is ready to cook in minutes and retails in a 1lb pack containing eight hearty cakes.

[View this product in GNPD](#)

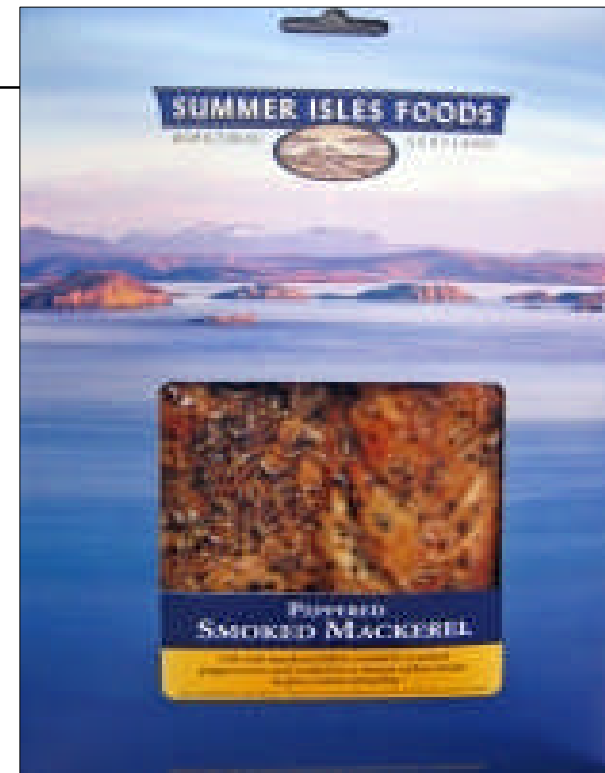
### Ingredients:

Imitation crab (fish protein, water, wheat, corn, tapioca starch, egg whites, soybean oil, crab flavour, natural crab extract, sugar, salt, calcium carbonate), water, bread crumbs (bleached wheat...

### Nutrition:

Per 2oz serving (8 servings per pack): Calories 130kcal (of which Calories from fat 70kcal), Total fat 8g (12% DV) (of which Saturated Fat 1.5g (8% DV), Trans Fat 0g), Cholesterol 50mg (17% DV), ...

Market-data can help you decide which strategy to go with



*Which in turn will affect your purchasing decision re equipment etc*

## Both commodity and own-brand can make money



## How will my product make an impact?

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## Premium look and feel via branding/outer packaging







## **Packaging has important role to play**

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- In getting your product and brand noticed
- Retailer-push towards packaging formats e.g. MAP versus Skin-pack
- But ultimately, packaging must deliver optimal product quality over duration of shelf-life



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**From the food quality perspective....**

**Packaging materials and equipment  
must deliver maximum quality  
throughout the shelf-life**

**Prototype development must ensure  
commercial conditions**

# *A quick re-cap*



Microbial

Colour

Oxidation

Texture

**SPOILAGE**

Odour

Moisture/ $A_w$

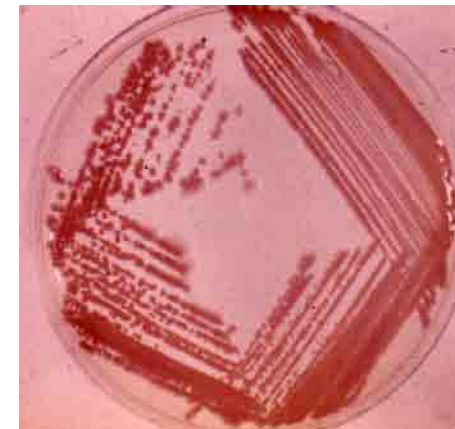
Sensory

Chemical

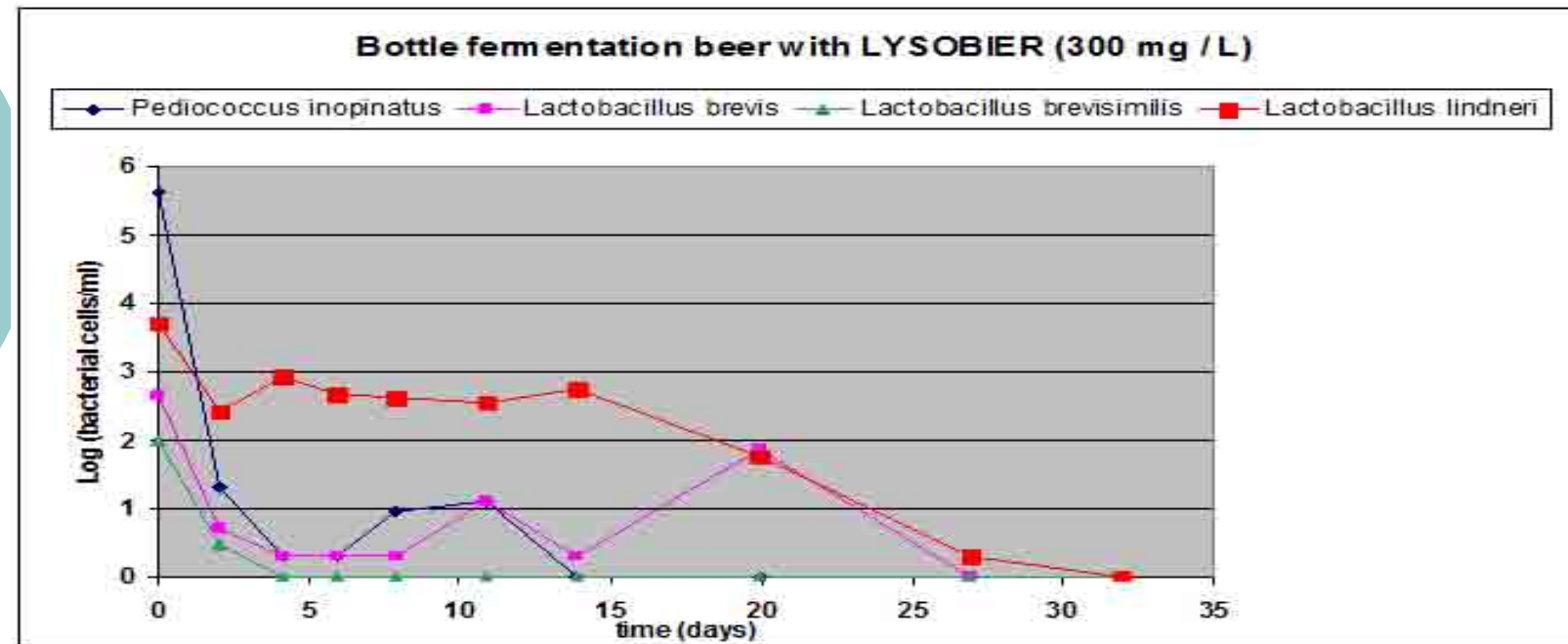
# Spoilage organisms – Fresh meat

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- E.g. Pseudomonas, Acinetobacter, Moraxella, Shewanella, Alcaligenes, Aeromonas, Escherichia, Enterobacter, Serratia, Hafnia, Proteus, Brochothrix, Micrococcus, Enterococcus, Lactobacillus, Leuconostoc, Carnobacterium and Clostridium.
- The predominant spoilage flora in a meat is determined by **nutrient availability**, **oxygen availability**, storage **temperature, pH, storage time** of the product, and generation time of the microorganisms present in a given environment



## Bacterial spoilage beer



- For brewing industry, **beer spoilage** bacteria have been problematic for centuries. They include some lactic acid bacteria such as *Lactobacillus brevis*, ***Lactobacillus lindneri*** and *Pediococcus damnosus*, and some Gram-negative bacteria such as *Pectinatus cerevisiiphilus*, *Pectinatus frisingensis* and *Megasphaera cerevisiae*. They can spoil **beer** by **turbidity, acidity** and the production of **unfavorable smell** such as **diacetyl** or hydrogen **sulfide**

# Yeasts and moulds

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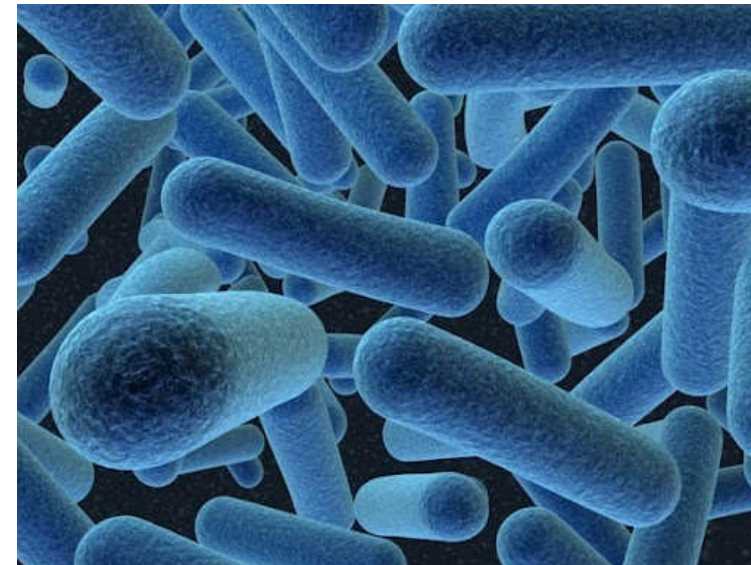
- Yeasts and Moulds are major spoilage organisms predominately in low water activity foods (e.g. jams, syrups, dried foods) and foods with low pH (e.g. 3.8 pickles/marinades). In general, Yeasts will grow in the presence or absence of oxygen while moulds are generally inhibited by oxygen-free environments. However "oxygen-Free" status is dependent on effectiveness and integrity of packaging medium



## *Packaging....*

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- **Is only one Hurdle used in conjunction with others.**
- Temperature (heat and/or cold-chain)
  - pH/Aw
- Air/Modified Atmosphere
  - Heat treatments
- Ingredients/additives
  - Packaging maintains inhospitable environment to spoilage bacteria



# Packaging has numerous functions

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- Physical protection
- Barrier protection – air/water etc
- Or breathability (*Cl. Botulinum*)
- Avoid Cross contamination/security
- Facilitate Transport
- Retard spoilage **(NB \*\*\*)**
- As a processing step e.g. can/jar
- Marketing tool
- Convenience e.g. microwave/oven







## When developing a new product

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- Important to use commercially-available packaging equipment and materials early on in trials
- Ensures commercial simulation of the cold-chain
- Tests seal integrity and associated properties of product
- Allows natural spoilage to occur as per commercial cold-chain/logistics
- Generates usable microbiological data for development of HACCP/FSMS
- Use accredited micro-testing when possible



## Packaging suppliers

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- Understand incremental growth
- Numerous entry-level solutions to help you to get up and running
- Entry-level equipment
- Hire of larger equipment
- Small print runs
- Allows you to test concept at prototype stage before large investment

## Case study 1.

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- Artisan seafood producer who wants to produce ready meal products with min 14 days shelf-life
- Small company with €30k to spend on equipment (combi-ovens)



## Product Limitations

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- Tried Gas flushing but not effective due to physical nature of product
- Company using combi-oven to cook fish, sauce, potato etc
- Followed by cold assembly
- Micro Log 7 after 8 days + high Entero count
- Too short to access UK market (and beyond)
- Plans to distribute throughout EU and needs 14+ days



- **Choice of tray**

# Competitor offerings identified during store check



Foil +  
waxed card



C-pet  
D2/Topfilm



Foil  
D2/Topfilm



## Client was hoping to use...

- Foil oven tray (12c)
- 40-60mm deep tray
- D2/group 6 footprint (200x155)
- Dual oven/microwavable
- Recyclable
- 200-350g portion size (adult serving)
- Cardboard sleeve (22c – 5 colours)



# *Equipment trialled*

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- Ilpra
- Multivac
- Promens
- Hired for 1 month each
- €750-1200/month
- D2 footprint
- 8-12 trays/min



**€27-30k**





## Practical considerations

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- Cold-fill delivered 7-8 days shelf-life
- To achieve 8+ days, necessary to either alter clean-label status (E's) or pasteurise in-tray (e.g. 85 deg C for 30 min chamber temp)
- Foil option twisted during process-cook-step
- Therefore Polypropylene (PP) or High Density Polyethylene (HDPE) material required (C-pet/foil mis-shapen after cook)
- Suppliers products trialled; Promens or Mecapack
- RH Packaging V511 machine





## Deciding factors...

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- MAP not suitable for this application as cooking step (process)
- Polypropylene tray chosen as with-stands high temperatures
- Temps above 85 deg C resulted in distortion of tray/film
- Antifog top film to increase visibility
- Throughput (Promens 511) 6-8 trays per min
- Cost 12-15c each + 5 c top web + 12c cardboard sleeve (volume dependant)
- Machine - €27k
- Final product microwavable but not oven-able (but working on this)

## Other product produced with similar packaging technologies





## Case study 2

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- Smoked meats manufacturer considering upgrading packaging
- €30k spend on equipment.

## Artisan Salami and cooked meats



## Issues with current packaging range

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- Competitor offerings more visually appealing
- Manual filling/vacuum packing
- Handling time and cross contamination (Entero)
- RTE product so danger of *Listeria* contamination post-cook/dry
- Manual packaging bottleneck
- Inconsistent look to product range
- No shelf-ready packaging therefore poor product placement on shelves (Plan-o-gram)
- Difficult to Brand current pack



# Competitor Packaging Equipment - Thermoforming



**Costs €75k-220K**

**ILPRA**

**Multivac**

**Ulma**

**Optional gas-flush application**

**Forms its own trays**

**High volume throughput**





## Solutions tested

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- Printed pouch – Alert Packaging and Fosters Packaging
- Multivac T250 – Tray and skinpack (+ 15mm tray)
- Mecapack S1000 Skin packer
- Trays and film supplied by Versatile packaging, Monaghan
- Group 4 PP with skin-pack top film



## Printed Pouch

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- Better visual impact / branding
- Still issue of manual filling
- Option to develop similar style pack on flow-wrapper
- But flow-wrap = 75k ("not a runner")
- Buyer liked the new packaging but manual packaging too expensive



## Multivac T250

- Dual tray sealing and skin-pack (in tray)
- D2 x 4 trays (200x155) (PP)
- 20mm deep tray skin-pack (in-tray)
- Option to gas flush salamis/smoked chorizo in tray (50mm deep) on same machine
- Cost per tray 12c + 5c top-film
- Tray material – optional as reheat/oven/microwave not required (PP chosen)
- Optional printed top-film
- Machine €35k
- Throughput – 4 up die set (4 trays per cycle) – 12 trays per min skinpack/8 per min gas flush (product dependent)



## Mecapack S1000

- Polypropylene 20mm tray
- Skin-pack top-film
- 4-6 trays per min
- S1000 heads fit large machines (trade-up possibility)
- Same supplier manufacturers PP trays
- Cost trays 18-25c (per 5000)/topfilm 6-8c)





## Deciding factors

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- Multivac T250 4-up tool configuration
- Same machine could be used for gas-flush
- Client also sourced wrap around cardboard sleeve from Dollard Packaging (12 each)
- Shelf-life extended by 1 week due to less handling/cross contamination issue (manual packaging – *Entero*)
- Rent-to-buy option with this company
- Will probably scale up to a Thermoformer in near future (greater efficiencies)



These packaging technologies can also be used for

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## Case Study 3

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- **Nut and cereal based snack bar.  
6 bars per box (printed carton).**



# Competitor offerings

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## Packaging used by competitors

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**Large Flow wrappers**  
**€75-200k**





## Conversation with film manufacturer

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- **The size and weight of the bar**
- **Product, Positioning, Price (Premium vs “cheap-as-chips”)**
- **Shelf-life required (this will dictate barrier properties e.g. laminate of barrier Polypropylene)**
- **Throughput per hour**
- **On what type of machine will you pack . (DIY vs. OUTSOURCE)**
- **Packaging machine dimensions**
- **Min print runs (e.g. 5000 linear metres entry level)**
- **Costs per additional colour (gold & metallic ink expensive)**
- **Can they do artwork or bring myself?**
- **Finalise material specs and document (important is unexpected change in product down the line)**
- **Look at products they produced for other companies**
- **Check supplier ISO, BRC, Repack accreditations (important for selling to multiples)**

## Paddy's O' Granola Range



White background and  
"Paddy O's" common

75% common colours  
throughout with distinct  
colouring to indicate  
variations in range

# Trialled during this project

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<http://www.youtube.com/watch?feature=endscreen&NR=1&v=bvwHBIMxUIE>



+



**Flowwrap one (Basic  
packaging Ltd, UK)**



## Machine & material sourcing Flow-wrap

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- Basic Packaging Ltd. (£9995 entry)
- (Also supply VFFS for Crisps) (£7995 entry)
- Print Registration Unit (PRU)
- Acrylic coated outer layer
- Polypropylene inner layer
- Barrier film inner layer
- Gas-flushed with nitrogen (to eliminate air)
- Rental option – rented for 3 months with rental cost deducted from final price
- Throughout 20 packs per min
- Optional extension on carousel line (£3k per m<sup>2</sup>)



## Final product important facts

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- Water activity (Aw) control crucial
- Product discoloured with light
- Foil layer used to omit light
- Client had 3 products
- 5000 linear metres film best utilised with common colour source
- Spot colouring to show variations in product/ingredients
- Client explored Paper : PP material for artisan feel.
- Client also needed to source a printer for BB date etc.

# ANSER U2 PRINTERS

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- 300 DPI Printing
  - Dates, times, counters and logos
  - Handy remote control
  - Available as network version
  - Clean, no mess
  - Up to 5 lines of text
  - Prices from €1,650.00
- Also see CODICO (Ire)



Advanced Coding Solutions Limited

Tel: +353 45 883510

Email: [bob@acsprint.ie](mailto:bob@acsprint.ie) or [philip@acsprint.ie](mailto:philip@acsprint.ie)

Web: [www.acsprint.ie](http://www.acsprint.ie)



## Want to know more about flow-wrapping??

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- **Good site re Flow wrapping and material;**

○ [http://www.boschpackaging.com/doboy/eng/pdf/Bosch\\_Guide-to-Flow-Wrapping.pdf](http://www.boschpackaging.com/doboy/eng/pdf/Bosch_Guide-to-Flow-Wrapping.pdf)

- **But always consult your materials supplier who will discuss cost and shelf-life implications and different materials**

# Flow wrapping has application for







## Case Study 4

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- Chowder producer looking for longer shelf-life
  - (currently 14 days).
- Monies available – €20k “at a push”!!
  - “But I’m not buying new”

## Current process

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- Brat pan
- Brought to boil and fish added for last 20 min
- Ladled and hot-filled into tamper-evident tubs
- Blast chilled
- Sticker/label applied by hand
- Placed into outer cardboard box
- 12 in outer cardboard box (2 x 6 per layer)



## Competitor technology

- Limitech mixer/heating
- Automatic dosing into tubs
- Mondini tray sealer with de-nester
- Pasteurised in steriflow retort
- Shelf-life 1year (ambient) (minimum)
- Printed tubs
- Traceability system
- Already paid for factory & equipment
- Large workforce





## First of all.....

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- REALITY CHECK !!!
- High volume competitor product
- Not main product (ready meals)
- Major supplier to Tesco (UK)
- Use of additives and thickeners
- Contrary to brand values of our client
- Capex investment €2million ++
- Go back and start your market check again
- Compare yourself to more realistic competitor



## Benchmark against similar products

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- Range of products with 1 months max shelf-life
- Small volumes
- Artisan values, provenance, freshness etc
- Start small e.g. local Supervalu
- Focus on freshness, quality and “local”
- Improve upon competitor products
- Allow for growth

## Packaging trialled

- Hand sealer with profile cut (4 up die set – circular tubs) x 2
- HDPE tubs (150ml)
- Wrap around cardboard sleeve (Dollard packaging)
- Second-hand Semi-automated depositor (Riggs autopack, UK)



€1100

€9k



Riggs  
autopack



## Value for money??

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- **Pro's**
- **10 trays per min**
- **Semi-automated dosing into HDPE tubs**
- **Option to use printed top-film and eliminate cardboard sleeve**
- **Dosing machine reduced handling/cross contamination**
  
- **Con's**
- **Still relatively manual operation**
- **Additional investment required for scale-up**
- **Longer shelf-life requires further heat-treatment in-pack**



## However....

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This client needed to produce min 3000 units per week to supply retailer

- Capex would have been too small
- Decided to **OUTSOURCE** (in short-term)
- **Pros**
  - Large-volume possible
  - Can focus on sales
  - You know your capacity
  - Slightly more expensive
  - €1.12/pack)
  - HACCP/FSMS/BRC etc responsibility of another company
- **Cons**
  - Different factory number (FR)
  - Tied in to 6-12 month contract
  - Eventually outsourcer might take business





## Outsourcing production

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- Outsourced to ready meals company
- Did not want to fillet/skin/bone
- Additional costs for outsourcing filleting etc
  
- Outsourcing company wanted to use commercially-available ingredients
- E.g. dried spices, UHT cream, Kibbled onions etc



## Important when outsourcing...

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- **Pre-meeting**

- Confidentiality agreement
- Bring prototypes/competitor products
- Go armed with market data re price-points
- Research outsourcing company product portfolio
- ID positive and negative attributes

- **Meeting**

- Taste your prototype
- Discuss ingredients/shelf-life
- Understand their capabilities/capacity
- Discuss packaging requirements
- Especially min runs (product, process, packaging)
- Ask for contact point on factory floor re product spec/prototype dev
- Agree project plan (Slide 11)

- **Follow-up**

- Finalise product spec/ingredients
- Check/review regularly

**“Remember your brand can be affected by quality issues related to outsourcing”**

## Case Study 5

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- Large seafood processor who bought numerous small tray sealers over 3 years
- Wanted to remove costs from production and become more automated
- Equipment trials & costs analysis/throughput



## Skin-pack/Thermoform Equipment – Raw Pre-pack (Trialled 4 machines)

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€120k++



€135k

## Focus group and buyer feedback re skin-pack

- Increased visual spec
- Less plastic/packaging
- More in box/pallet
- Increased logistics (cheaper transport)
- Tactile – can see underneath of product
- Retailer wanted this in fish section
- Company had to be prepared to do 2 for 1's three times a year





## *Client gathered quotes for equipment*

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- **Multivac**

- R095 Flex
- R105 Semi rigid (MAP+ skin)
- R125/145 Cooked meats
- R175 DARFRESH
- R275 Darfresh MAP + SKIN
- DARFRESH 45mm above tray + 50mm deep

- **ULMA**

- TFS 300
- TFS 500
- TFS 700
- Mondini TRAVE 590 E340
- All MAP and skin-pack
- 100-200k

Client also visited  
other machine demo  
facilities

***We carried out trials re materials/usage/costs with  
film manufacturers***

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Topweb TC201 650m  
long = 2400 trays/roll



**Cryovac, alert packaging etc  
supplying materials to Irish  
companies**

Bottom web EGEV  
200m long = 740  
trays/roll

## Calculating costs



- Throughput per hour
- Dictated by machine size
- E.g. 420mm carousel
- E.g. 3 x 127 x 270mm packs (381mm)
- Rest of film excess/waste
- Approx cost 11-15c per pack
- Plus cardboard sleeve 22c/pack
- Printed top-web – 18-22c per pack
- Potential savings





## Shelf-life analysis

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- Skin/Darfresh versus Tray MAP
- Gas flush = 6 days
- Vaccum = 6 days
- Darfresh = 8 days
- Sensory/odour/chemical/microbiological analysis
- Set up sampling plans
- Labelling requirements
- In-factory prototype development
- Acting in neutral capacity for SME's

# Thermoforming has application for

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## So when choosing packaging...

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- Identify markets and competitor offerings
- Narrow down packaging formats you like
- Link with agencies to define how product is produced (upstream and downstream)
- Hire/trial equipment on site/incubation unit
- Preliminary sensory trials before expensive micro trials
- Ensure micro carried out using commercial conditions
- Teagasc/BIM/Bord Bia/EI/Universities etc can give neutral advice re equipment suitability/selection



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**Thank you**

**John Fagan**

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