How can food safety evaluation methods support the innovation for packaging sustainability?

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Outline

1. Introduction

2. Nestlé Policy on Environmental Sustainability
   - Life Cycle Assessment
   - Ecodesign tool
   - Packaging & sustainability

3. Nestlé Program for Safety and Compliance
   - Presentation of the program
   - Safety & Compliance methods/approaches
   - Examples
While Creating Shared Value Safety and Compliance are the basis

...beyond sustainability, to create value for shareholders and society-integrally linked to our core business...

...meet the needs of the present without compromising future generations...

Comply with the highest standards
Technical (life) Cycle of Packaging

Focus areas for safety evaluation of packaging
Managing safety: the value chain is a challenge

- **Chemicals**
  - Monomers, pigments, antiox., UV-stabil., solvents, ….

- **Base Materials**
  - Adhesives, inks, plastics, glass, cans, papers, boards, ….

- **Finished Packaging**
  - Additional contributions of the different parts

- **Food products**
  - Interaction between food and packaging

Knowledge on chemicals

Complexity
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We apply a product life cycle approach involving our partners from farm to consumer in order to minimise the environmental impact of our products and activities.
Life Cycle Assessment

The entire life cycle is taken into account

Covering a representative set of environmental impact indicators

- Global Warming (kg CO₂ eq)
- Water Consumption (m³)
- Non-renewable Energy Use (MJ)
- Ecotoxicity (PDF × m² × year)
- Acidification (PDF × m² × year)
- Land use (m²)
Nestlé has developed a product ecodesign tool

Key features of EcodEX

- Takes into account the entire life cycle
- Representative set of relevant indicators
  - Greenhouse gas emissions (kg CO₂eq)
  - Water consumption (m³)
  - Non-renewable energy & minerals (kg Sb eq)
  - Impacts on ecosphere (PDF×m²×year)
  - Land use (m²)

For non-expert use, quick results

Harmonized LCA Methodology
(ISO 14'000ff, EU Food SCP Rt, Sustainability Consortium)
4. Packaging

The packaging of our products is crucial to prevent food waste, guarantee our high quality standards and inform our consumers. We:

- optimise the weight and volume of our packaging;
- lead the development and use of materials from sustainably-managed renewable resources considering packaging and product performance requirements;
- support initiatives to recycle or recover energy from used packaging;
- use recycled materials where there is an environmental benefit and it is appropriate.
Packaging Environmental Sustainability Roadmap

Five Focus Areas

- Continue optimization of packaging systems
- Contribute to initiatives to recover used packaging and address littering
- Lead the development and use of renewable materials
- Safety Challenge: New materials
- Use recycled materials where there is an environmental benefit and is appropriate
- Safety Challenge: «Cleaning step»
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Packaging Safety & Compliance Program

A - Supplier Audit focusing on safety aspects

B - Nestlé Specifications including food contact description

C - Certificate of Compliance with adequate information on substances

D - Risk Management of packaging materials

E - Surveillance Plan identifying & assessing the potential risks

F - Technical Supplier Partnership: Aiming to change the mindset of the supply chain
The Nestlé Program for Safety and Compliance: a multilateral approach

At Supplier level
- GMP Guidance
- Technical Partnership
- Safety Audit

At Development level
- Specifications
- Requirements
- Certificate of compliance

At Factory level
- Hazard Analysis
- Certificate of Analysis
- Surveillance

Validation/Investigation
Control
Focus areas for safety evaluation

SOURCING
MANUFACTURE
DISTRIBUTION
USE
END-OF-LIFE
Sourcing

Chemical compounds:
- Evaluated substances
- Listed substances
- Fulfilling Nestlé Standards
- Low migrating chemicals
- Known breakdown chemicals

Safety evaluation:
- Risk assessment
- Toxicological studies
- Assessment of chemical transformation/breakdown

Base materials:
- Weight reduction of packaging materials
- Standard polymers manufactured with chemicals issued from renewable resources
- Bioplastics
- Packaging made of fibers: from trees, waste from plants

Safety validation/investigation:
- Barrier properties evaluation
- Migration studies
- Mathematical modelling
- Biological activity evaluation
- Exposure evaluation
Manufacturing

Base Materials
- Low migration inks
- Adhesives (low migration)
- Low migration coatings
- ...

Safety evaluation:
- Migration studies
- Mathematical modelling
- Biological activity evaluation

Converting
- Good Manufacturing Practices
  - Traceability
  - Converting efficiency
  - Chemicals used on-line
    - Lubricants
    - Cleaning
    - Additives

Control Activities
- Safety & Compliance Assessment
  - Audit
  - Technical visit
- Surveillance Plan
  - Target analysis
  - Chemical screening
Safety challenge for recycled materials

Ready for recycling as FCM
- Metal cans
- Aluminium cans, capsules
- Glass
- PET

Not ready (yet) for recycling as FCM
- PE, PP
- Other thermoplastics
- Cardboard
- Laminates
- Biopolymer

Safety evaluation
- SRL (specific release limit)
- Heavy metals
- Test of residues (challenge test)

Remarks
- Used in other streams; transport, storage,
- Use as secondary packaging, need functional barrier
Example of Sourcing: Hotmelt
In a value chain that looks like this...

Selection of terpenic rosin

Pygas, C9 Resin Oil DCPD
AMS
PIPs
Gum Rosin

Optimization of tackifier mixtures

Resins (tackifiers)
Waxes
Polymers
Additives

Formulated Adhesive Company
Contract packager
Brand owner
Retail
Consumer

Adhesive Delivery Equipment
Packaging Equipment

Collaboration with a Company providing chemicals
Example for Manufacturing: Coating

Biodetection results on migrate of experimental materials.

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<th>Coating 2</th>
<th>Coating 3</th>
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Example for Manufacturing:

Coating Migration

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</thead>
</table>

Coating Migration

| Migration                    | +         | -         |           |           |
Example Safety challenge for recycled materials

Recycling steps for plastics

- Pre-grinding
- Removal of Fe-metals
- Final grinding, Intensive friction washing
- Mechanical and Thermal drying

- Flake refining
- Bunker
- Extrusion, Compounding
- Bunker

PP recycling Test with Nestlé packaging

Variation of flaked products
- Particle size
- Range of colour
- Range of MFR

Pellets, compounds
Target market: plastic converters, producers of end products
Example of Safety challenge for recycled materials: What kind of labelling system generate less chemicals, when PP is recycled?

<table>
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<td>Easier to be removed</td>
<td>Better compatibility</td>
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Promising
Take away

Safety & compliance of a product is the basis for creating shared value

Eco-design tool and life cycle assessment allow to evaluate and improve the environmental performance of packaging materials

Safety and compliance methods/approaches applied at early stage, sourcing, is a corner stone for innovation of sustainable materials

Converted packaging can be evaluated by migration experiments using both chemical profile and biological activities

Safety evaluation to help re-use of recycled material need improvement and alignment, but technical tools available
Thank you