Food Safety & Quality Considerations in Meat Analogue Foods

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IFSH Annual Meeting
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Total U.S. Market for Plant-Based Food (2018-2019)

Source: WSJ, 2019

- 33% Germany
- 22% United Kingdom
- 21% United States

Consumers eating meat once a week or less (2017)  

- 53% Germany
- 44% United Kingdom
- 44% United States

Source: IFT Food Technology
2% of all packaged ‘meat’ sales
$800 million in U.S. sales (2018-2019)

Source: WSJ, 2019
Growth not driven by non-meat eaters
And the category is populating the headlines

**Impossible Foods Describes Plant-Based Fish As A 'High Priority'**
The meat-free company says it ‘has never been burger-specific’ despite the success of its plant-based patty
LIAM GILLIVER - JUN 16, 2019

**California Startups Are Growing Meat From Animal Cells**
July 14, 2019 | PBS NewsHour

**McDonald’s Germany Launches Vegan Burger For The First Time**
The fast food chain says the burger has a ‘meaty taste’

**Beyond Meat comes to Subway in the form of a meatball**
Eat fresh without eating real meat.
COMING SOON
PLANT-BASED BURGERS GETTING REAL!

AWESOME BURGER®

TOTALLY JUICY
GROOVY FOR GRILLING
*PLANT BASED PROTEIN

INcredible Burger
CAN'T BELIEVE IT'S VEGGIE
HIGHLY JUICY

Perfect voor op de BBQ!
General Processing Steps of Meat Analogue Products

**Finished product:**
- pH: almost neutral
- Aw: High
- Protein and moisture content: high
- Highly susceptible to spoilage (microbial and enzymatic)

**Dry / powdered raw materials**

**Liquid raw materials**

<table>
<thead>
<tr>
<th>Mix</th>
<th>Form</th>
<th>Freeze</th>
<th>Package</th>
<th>Frozen or thawed at retail / food service</th>
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</thead>
</table>

Dry / powdered raw materials

Liquid raw materials
Factory Hygiene Considerations

New vs existing factory
Factory culture
Other products produced in the same facility
  Meat products
  Cooked products
Raw material sourcing and testing
Shelf Life Considerations

- Thaw in refrigerator and consume within 10 days
- Should consumers treat this like ‘real’ meat?
- Is this supported by the level of microbial risk?
- Thaw completely in the fridge before cooking. Consume within 21 days of thawing
- What are the pathogens of concern over this extended shelf life?
- Will the product spoil before a safety risk is observed?
Ensuring Extended Refrigerated Shelf Life

- Bioflavonoids
- Organic acids
- Sorbates
- Lactate
- Cultured dextrose
- Polyphenols
- Fermented sugar, Vinegar
## Temperature Control Considerations – E.U. Regulatory Limits

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Country/Region</th>
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<tbody>
<tr>
<td>4°C</td>
<td>U.K., France</td>
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<tr>
<td>7°C</td>
<td>Germany, Belgium, Austria, Netherlands</td>
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<tr>
<td>8°C</td>
<td>Sweden</td>
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</table>
Temperature Control Considerations – E.U. Consumers

Domestic refrigerator studies once temperatures were fitted with the normal distribution: comparison between northern and southern European countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean</th>
<th>SD</th>
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<tr>
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Roccato et al., 2017
Cooking Instructions

RECOMMENDED COOKING INSTRUCTIONS

**SKILLET**
**GRILL**

**PERISHABLE** – KEEP REFRIGERATED AND COOK THOROUGHLY BEFORE SERVING. USE WITHIN 3 DAYS OF OPENING. DO NOT REFREEZE IF PURCHASED FROZEN, THAW IN THE REFRIGERATOR BEFORE COOKING AND CONSUME WITHIN 10 DAYS.

Pre-heat grill or pan to high heat and cook for 4 minutes per side.

Do not overcook. Interior of patty will still be red or pink when fully cooked.

Fully cooked when internal temperature is 165°F.

“Gently place patties on a pre-heated surface and cook for 2-3 minutes per side or until a slight sear has formed. Cook to desired internal temperature and serve.”
Vegan Steak Tartare? Yeah, you heard us right. New magic from the kitchen on the way soon...stay tuned. #welcomehomelosangeles
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