



Workshop Plant-based food – Taste it!

Introduction plant based food with a focus on legumes

OEYE Workshop 1.9.2022 Luca Müller Bio Suisse, Ivrainna Brändle FiBL, Ursula Kretzschmar FiBL

Program

Time	Subject	Presenter
9:30 – 9:50	Part I: Introduction plant based food with a focus on legumes	Ivraina
9:50 – 10:50	Part II: Degustation and presentation of milk alternatives	Luca
10:50 – 11:20	Coffee break	
11:20 – approx.12:15	Part III: Presentation and discussion of meat alternatives	Ursula

Overview

- Plant based food / Plant based substitutes
- Legumes
- Example lupins

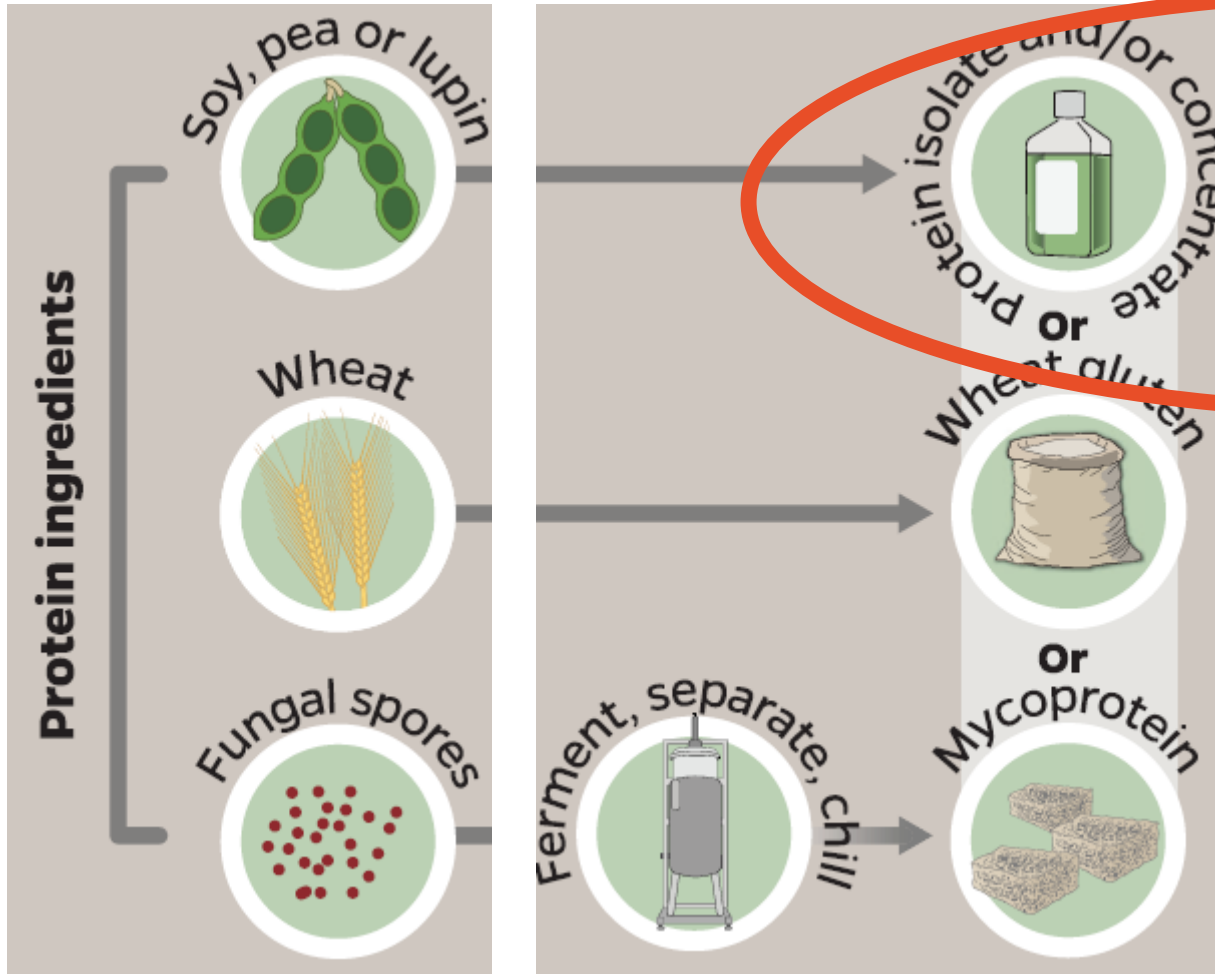
Plant-based food



Plant-based substitutes



Raw material of plant-based substitutes



→ e.g. pea protein isolate

→ Seitan

→ Quorn



Grain legumes, pulses

- Pea (*Pisum sativum*)
- Chickpea (*Cicer arietinum*)
- Field bean (*Vicia faba*)
- Soybean (*Glycine max*)
- White/blue lupin (*Lupinus albus/angustifolius*)
- Lentil (*Lens culinaris*)



www.Wikipedia.com

Legumes = nitrogen collector

Symbiosis with
bradyrhizobia
and other
microorganisms




Legumes - diverse range of products

- Sweet lupin coffee
- Miso (soy or pea or beans plain or with grains)
- Chickpea snack
- Edamame cream (unripe soy)
- Tofu from chickpeas
- Tempeh from lupins



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Agro-economic prospects for expanding soybean production beyond its current northerly limit in Europe

Soybean is one of the five crops that dominate global agriculture, along with maize, wheat, cotton and rice.



Edamame: Soybeans fresh from the garden

For centuries, soy was used exclusively for direct human nutrition. Tofu, miso, tempeh, natto and many other traditional soy dishes form an elementary part of far-eastern cuisine. Another



Soya, soya isoflavones and health effects

Soya foods are very popular not only in Asia but now also in Europe and the USA – not least because of the trend towards vegan and vegetarian diets as well as for sustainability reasons to reduce meat

FiBL Project: LUPINNO SUISSE



FiBL Project: LUPINNO SUISSE

1	Breeding white lupin for anthracnose resistance, Marker development
2	Breeding white lupine for alkaloid poverty, Marker development
3	Develop breeding program for market varieties
4	Variety tests
5	Identify market potential and network partners



Christine
Arncken



Mariateresa
Lazzaro



Monika
Messmer



Miriam Kamp, gzpk



Sebastian Kussmann, gzpk



Ivraina
Brändle



Ursula
Kretzschmar



Bernadette
Oehen

Stakeholder analysis in LUPPINO SUISSE

Quality requirement

- low alkaloid content
- anthracnose resistance
- high protein content
- uniform yields
- conformity of grains, uniform taste
- stability of seeds

Incentives for lupin cultivation

- ✓ attractive for feed as well as for food
- ✓ better hail resistance compared to soybean
- ✓ drought resistance
- ✓ plant-based proteins = food trend

Challenges

- partly poor yields
- wheat pressure
- susceptible to limestone content in soil
- high alkaloid analysis costs

Lupin «milk» as leader product?



Overview

- Tasting
- Review tasting results
- Product description and comparison

Guide tasting

- Preference Test – describe the samples and choose your favorite
- You will receive 3 different samples of oat-drinks
- Describe the odour, taste and texture/mouth feeling
- Sensory vocab – How would you describe cow milk? What are typical attributes?








Tasting






Evaluation of preference test

- what were the attributes that led to your choice?

Product ingredients

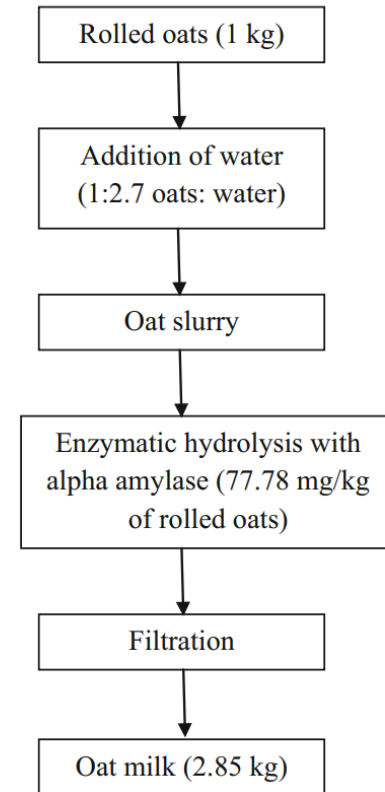
<p>product</p>	<p>1.</p>  	<p>2.</p>  <p>CH-Bio</p>	<p>3.</p>  
<p>Ingredients</p>	<p>Water Oat (11.9%) Sunflower oil Agave fibres Sea salt</p> 	<p>Water Oat (13.6%) Sunflower oil Sea salt</p> 	<p>Water Oat (16%) Sunflower oil Gum arabic locust bean gum pea protein Lecithin natural vanilla flavor</p>

Nutritional value in 100ml

product	1. 	2. 	3. 
energy	199kj/47kcal	233kj/56kcal	331kj/79kcal
fat of which saturades	1.3g 0.5g	2.1g 0.2g	3.4g 0.4g
carbohydrates of which sugar	8.1g 3.9g	8.4g 5.7g	9.8g 6.4g
protein	0.3g	0.8g	1.5g
salt	0.09g	0.07g	0.1g

manufacturing process





- Pretreatment (rolled oat)
- Extraction
- Hydrolyse (Alpha- als auch Beta-Amylase)
- Filtration
- Addition of ingredients (sunflower oil, salt)
- Homogenization
- Heat treatment
- Nutrient fortification
- Packaging




Oat drink vs. Cow milk

Benefit	Oat drink	Cow milk
processing	similar to cow milk	similar to oat drink
fibers	β -Glucane	-
source of protein	low but protein have a good amino acid balance	high bioavailability
allergen	lacto free and no milk proteins	gluten free 100%
vitamins (B & A) and minarals	must be added	contains
ecobalance and animal welfare	high	low

Nutritional value in 100ml

product	1. 	2. 	3. 	Cow milk 
energy	199kj/47kcal	233kj/56kcal	331kj/79kcal	282kj/68kcal
fat of which saturades	1.3g 0.5g	2.1g 0.2g	3.4g 0.4g	3.9g 2.3g
carbohydrates of which sugar	8.1g 3.9g	8.4g 5.7g	9.8g 6.4g	4.9g 4.9g
protein	0.3g	0.8g	1.5g	3.2g
salt	0.09g	0.07g	0.1g	0.1g
calcium	-	-	-	120mg

A close-up photograph of a person's hands pouring milk from a glass pitcher into a white ceramic coffee cup. The cup contains coffee with intricate latte art. The scene is dimly lit, with a dark background. The text is overlaid in the center of the image.

**Coffee break
10:50-11:20 Uhr**

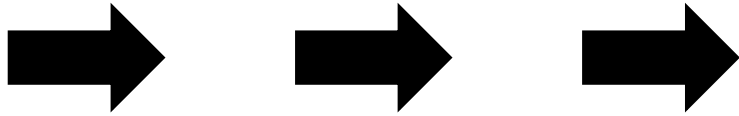
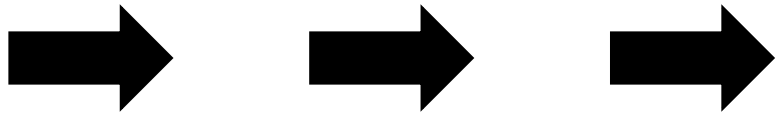


Title

Plant based food – Taste it; meat alternatives

OEYE Workshop 1.9.2022 Luca Müller Bio Suisse, Ivrainna Brändle FiBL, Ursula Kretzschmar FiBL

From organic raw material to organic plant based meat alternatives



FiBL

Meat substitutes unrestricted good?

- What are for you meat substitutes?
- What kind of do you know?
- Is there a need of meat substitutes as protein source?
- If yes, what are the advantages, what is important for you with regard of the quality?
- If no, why not? What are the disadvantages?



Principles of organic processing

- Organic raw materials and a **restricted list of additives and processing aids** can be used.
- **Processing** should be done **with care**, preferably by using biological, mechanical and physical methods.
- Regulation 2018/848 Art. 16 (3): The **Commission** may adopt implementing acts laying down the techniques authorised in the processing of food products -> **the use of processing methods can be restricted if necessary.**
- The overall process must be certified

Let's have a look on different products

- Please discuss with your neighbour the ingredient list (in English see the separate document)
- Do you think this is suitable for organic?
- Is it what you are expecting from a meat substitute?
- How high is the protein content in % per 100g?

What are the technologies behind the meat substitutes; one example: extrusion

Planted



Soy cutlet



How does an extruder work, what types are there?

How extrusion works:

- Extrusion is a shaping process
- Solid to viscous masses are continuously pressed out of a shaping opening (nozzle, mouthpiece or dies) under high pressure and usually also high temperature.
- With the pressure, the water evaporates and thus formed and dried products, so-called extrudates, emerge.
- A distinction is made between
 - Cold extrusion
 - Hot extrusion

How does an extruder work, what types are there?

Plant protein based products have to be produced by **hot** extrusion:

Advantages

- Product diversity:
 - «low moister» such as soy cutlet
 - « high moister» like planted chicken
- Use of the whole bean for human nutrition
 - Ex: soy; soy oil and press cake for soy pulp
 - no by-products

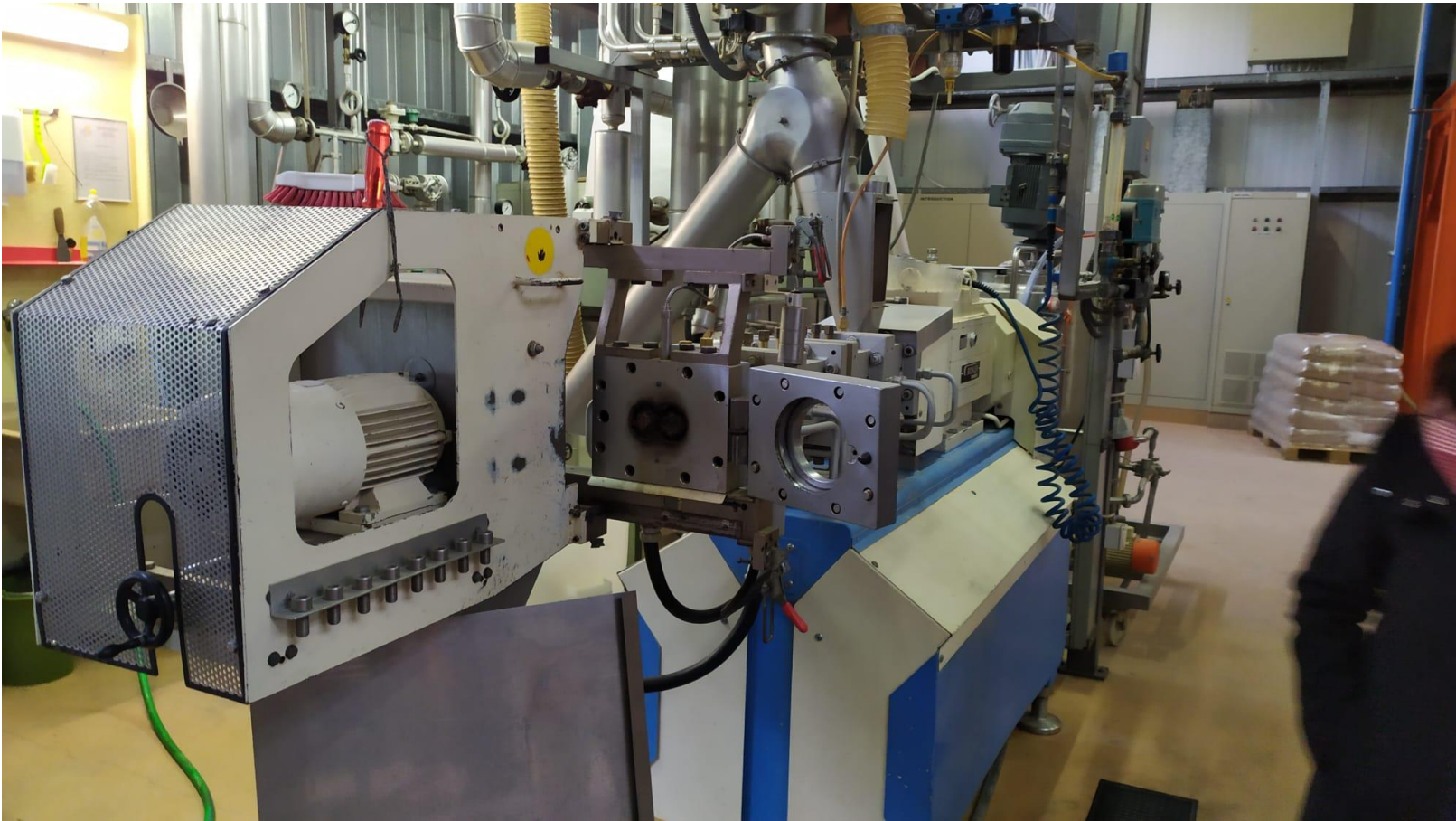
Example extruder screws for dough conveying and pressure build-up



Example Extruder Screws installed



Example extruder nozzle outlet



Is the same the same?

Planted



Ingredients:
water, pea protein (33%),
pea fibre, rapeseed oil and
vitamin B12.

Proteins: 24% cooked

Soy cutlet



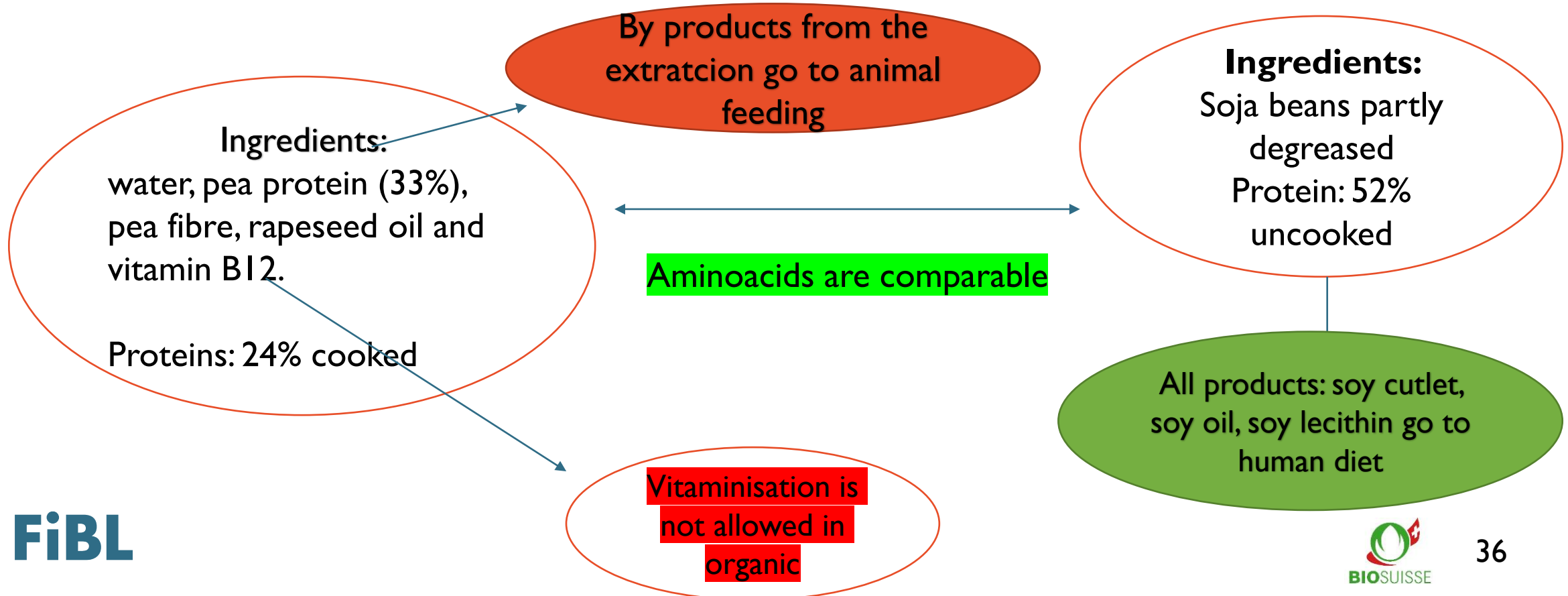
Ingredients:
Soja beans partly
degreased
Protein: 52%
uncooked

Is the same the same?

Planted



Soy cutlet



Is the same the same?

- Discussion are the products made by extrusion still organic?

Conclusion – open for discussion

1. the less processed the meat substitute the better!



2. The less side streams the better!



Conclusion

- There is a high diversity of plant based meat alternatives on the market.
- The nutrient values with regard to the protein content are quite different.
- Only to focus if the ingredient is organic and/or the processing technology suitable for the organic production is insufficient.
- Product development should implement also the production process of the single ingredient to minimize the production of by products.

Contact details



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Thank you for the attention