Kristianstad University Sweden

Insects as food

- a review of sustainability, nutrition and consumer attitudes

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Insects
– a culinary and sustainable delicacy

- A project financed by the KK-foundation

KK-stiftelsen

- Participants from academia and industry

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Goal

- **The long term goal** is to respond to the increasing consumer interest and acceptance for the use of insects as foods and as cooking ingredients by providing readily available knowledge about insects to be used in food applications.

Aim

- **The project's objective** is to
- **1.** develop **new knowledge on how to create culinary dishes** with insects as cooking ingredient in order to **increase acceptance** for insects as food.
- **2.** Further to identify solutions for **shelf life and packaging** for maintained **quality.**
- **3.** Moreover, a transdisciplinary **network** with focus on food, climate and sustainability will be built in order to obtain a holistic perspective of these matters.
- **+** COMMUNICATION

Insects as food

- a review of sustainability, nutrition and consumer attitudes

- The aim of this review is to give an overall insight into insects as food from the perspectives of:

- ***sustainability***
- ***nutrition***
- ***consumer attitudes***
- ***European legislation***

https://consumer.healthday.com/vitamins-and-nutrition-information-27/food-and-nutrition-news-316/can-eating-crickets-boost-your-health-736678.html

Insects as food - a review of sustainability, nutrition and consumer attitudes

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Literature search

- **Databases:** Web of Science and Diva
- **Personal communications:** persons engaged in the Swedish insects organisation for guidance regarding useful websites
- **Search terms**: insects, food, sustainability, nutrition, consumer attitudes and European legislation.

http://www.wyrls.com/Kategorier/marknadsforing/page/2/

Total no of references: 44
- 25 research articles
- 3 books
- 4 MSc/BSc thesis
- 4 websites
- 4 others

Themes of the review

- sustainability
- nutrition
- consumer attitudes
- legislation

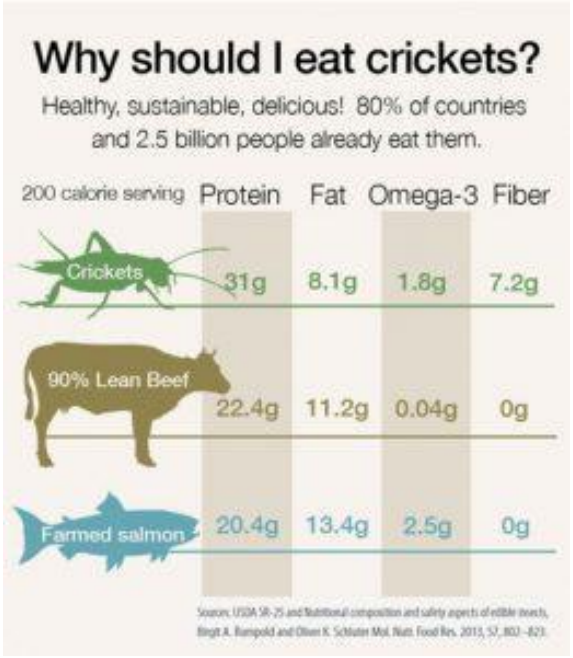
http://www.wyrls.com/Kategorier/marknadsforing/page/2/

Sustainability

- Increasing population - More food needed
- Pressure on food production systems
- New consumption patterns needed
- Rearing insects – low climate impact
- High nutritional yield – alternative protein source
- Environmental impact differs between species
- Ongoing debate on environmental effects

Nutrition

- High nutritional yield
- Comparable to other protein sources
- Contain proteins, fats, vitamins and minerals
- High in essential amino acids
- High in essential fatty acids
- Contain B12
- Large variations between species
- Large variations within species (stage of growth, temp, water, location etc)
- Varitions in references due to analyse methods



https://www.edibleinsects.com/insect-nutrition-information/

Nutrition

Nutritional values in cricket, mealworm and locust

	Cricket (Gryllodes sigillatu) per 100 gram dry matter	Mealworm (Tenebrio molitor) per 100 gram dry matter	Locust (Schistocerca gregaria) per 100 gram dry matter
Macronutrient			
Protein (g)	70	52	76
Fat (g)	18	25	13
Fiber (g)	3,6	2,0	2,5
Ash(g)	4,7	3,6	3,3
Energy (kcal)	1900	1860	1820
Energy (kJ)	452	444	432
Mineraler			
Calcium (mg)	130	41	70
Iron (mg)	4,2	3,3	8,4
Potassium (mg)	1190	840	750
Magnesium (mg)	100	300	80
Sodium (mg)	330	57	173
Zinc (mg)	13	11	19
Fatty acid composition (% fat)			
SFA	34	25	35
MUFA	35	43	38
PUFA	32	31	26

Based on Zielinca et al, 2015

Consumer Attitudes

- Meal worms – nutty, umami, cereals
- Crickets – popcorn
- Locus – shrimp, nut, vegetables

- Even if many insects nutritious….
- Even if many insects are sustainable….
- Even if many insects are tasty….
- Even if insects may be eaten in a variety of ways…

….the acceptance of insects as food is very low, at least in Western societies

Consumer Attitudes

- Easier to accept ”unvisible” insects as food
- Aversions are underlying causes – creeping and crawling
- Aversions due to various sensory signals
- Often connected to feelings of anxiety
- May trigger actions to avoid health risks

- What is classified as food that can be eaten differs between cultures and the same is true for what evokes disgust

- The disgust factor is a serious threat to the introduction of insects into the daily diet in cultures where insects are not normally eaten

European Legislation

- Legislation differ between countries
- In EU insects are considered as novel foods (Regulation (EU) 2015/2283)
- Forbidden to sell for human consumption if they cannot be considered as safe
- Interpretation differs between EU countries
- Less strict countries mean that whole insects cannot be counted as novel foods
- From jan 2018 regulation says that whole animals are new foods
- Special rule: "traditional food from third countries“
- Insects must be examined and approved before being sold for human consumption
- New legislation to come

Conclusion

The aim of this review was to give an insight into the use of insects as food from the perspectives of sustainability, nutrition, consumer attitudes, and European legislation.

It can be concluded that insects have the potential to be part of a sustainable, nutritious and flavourful diet.

Thanks!