

Figure 2: Percentage of consumption and nutritional value

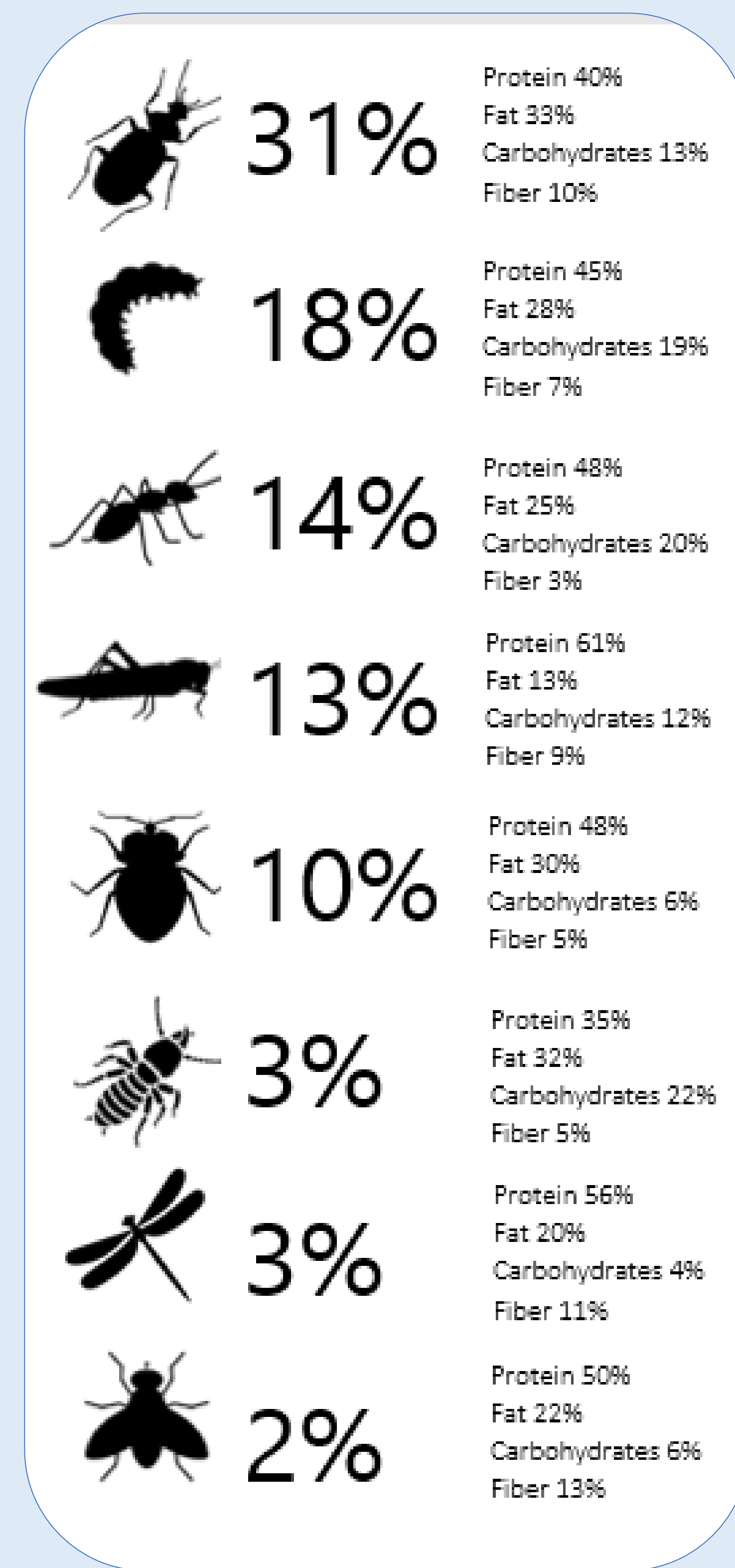


Table 1: Average amino acid content of *Tenebrio molitor* and beef (amounts in g/kg dry matter unless stated otherwise)

Amino acid	<i>T. molitor</i> g/kg dry matter	Beef g/kg dry matter
Essential		
Isoleucine	24.7	16
Leucine	52.2	42
Lysine	26.8	45
Methionine	6.3	16
Phenylalanine	17.3	24
Threonine	20.2	25
Tryptophan	3.9	-
Valine	28.9	20
Semi-essential		
Arginine	25.5	33
Histidine	15.5	20
Methionine + cysteine	10.5	22
Tyrosine	36.0	22
Non-essential		
Alanine	40.4	30
Aspartic acid	40.0	52
Cysteine	4.2	5.9
Glycine	27.3	24
Glutamic acid	55.4	90
Proline	34.1	28
Serine	25.2	27
Taurine (mg/kg)	210	-

AVALUACIÓ DELS INSECTES COM A FONT D'ALIMENTACIÓ

Figure 1: Registered number of species of edible insects per country



Graphic 1: Greenhouse gas production (global warming potential), energy use and land use due to the production of 1 kg of protein from mealworms, milk, pork, chicken and beef

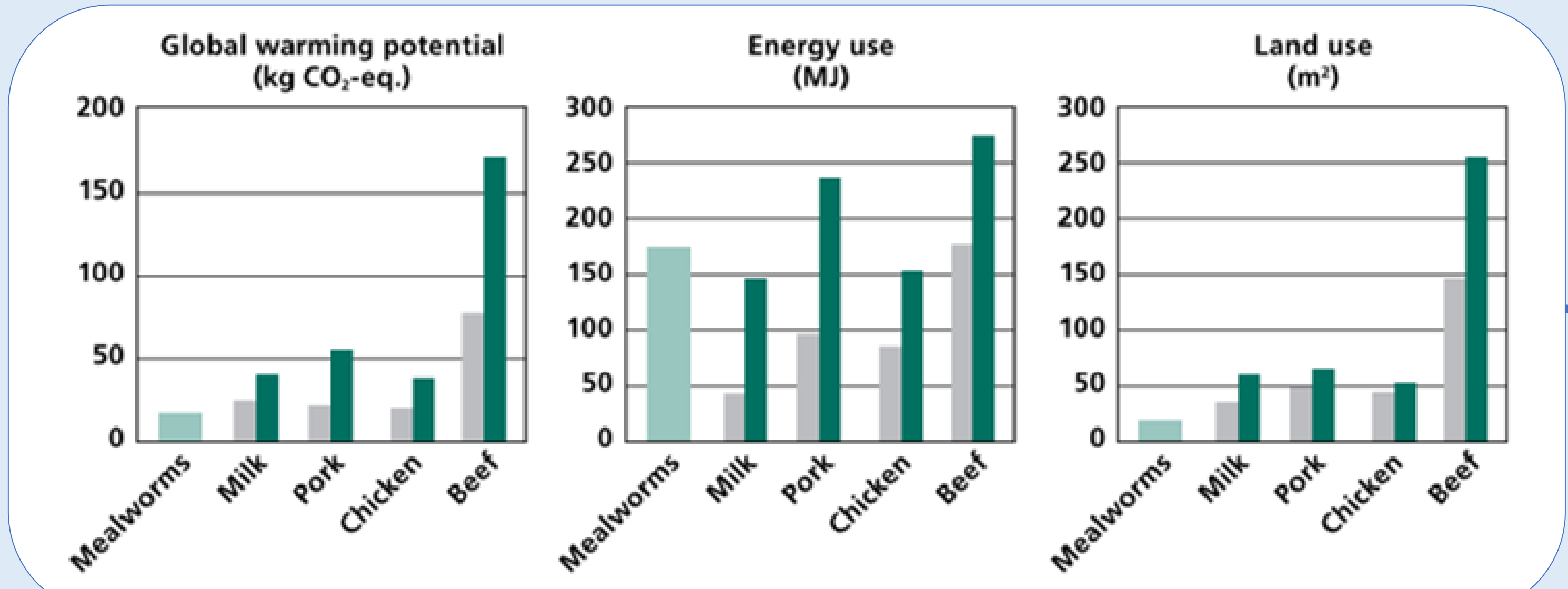


Table 2: Fatty acid content of *Tenebrio molitor* and beef on a dry matter basis

Fatty acid	<i>T. molitor</i> ¹	Beef
Essential		
Linoleic	91.3	10.2
Linolenic	3.7	3.9
Arachidonic	-	0.63
Non-essential		
Capric	-	1.05
Lauric	< 0.5	1.05
Myristic	7.6	13
Pentadecanoic	< 0.5	-
Palmitic	60.1	99
Palmitoleic	9.2	17
Heptadecanoic	< 0.5	-
Heptadecenoic	0.8	-
Stearic	10.2	48
Oleic	141.5	159
Arachidic	0.8	-
Eiconenoic	-	0.63
Others	0.5	-

Table 3: Recommended intake of essential minerals per day compared with the mopane caterpillar (*Imbrasia belina*)

Mineral	Intake recommendation for 25-year-old males (mg per day)*	Mopane caterpillar (mg per 100 g dry weight)
Potassium	4 700	1 032
Chloride	2 300	-
Sodium	1 500	1 024
Calcium	1 000	174
Phosphorus	700	543
Magnesium	400	160
Zinc	11	14
Iron	8	31
Manganese	2.3	3.95
Copper	0.9	0.91
Iodine	0.15	-
Selenium	0.055	-
Molybdenum	0.045	-

AIMS

The aim of this project is to do a bibliographic research to discover everything behind the entomophagy and to show its advantages and disadvantages from a scientific and technological point of view applying the knowledge acquired during the degree in Food Science and Technology and focus on nutrition assessment, legislation and market research.

Graphic 2: Efficiencies of production of conventional meat and crickets.

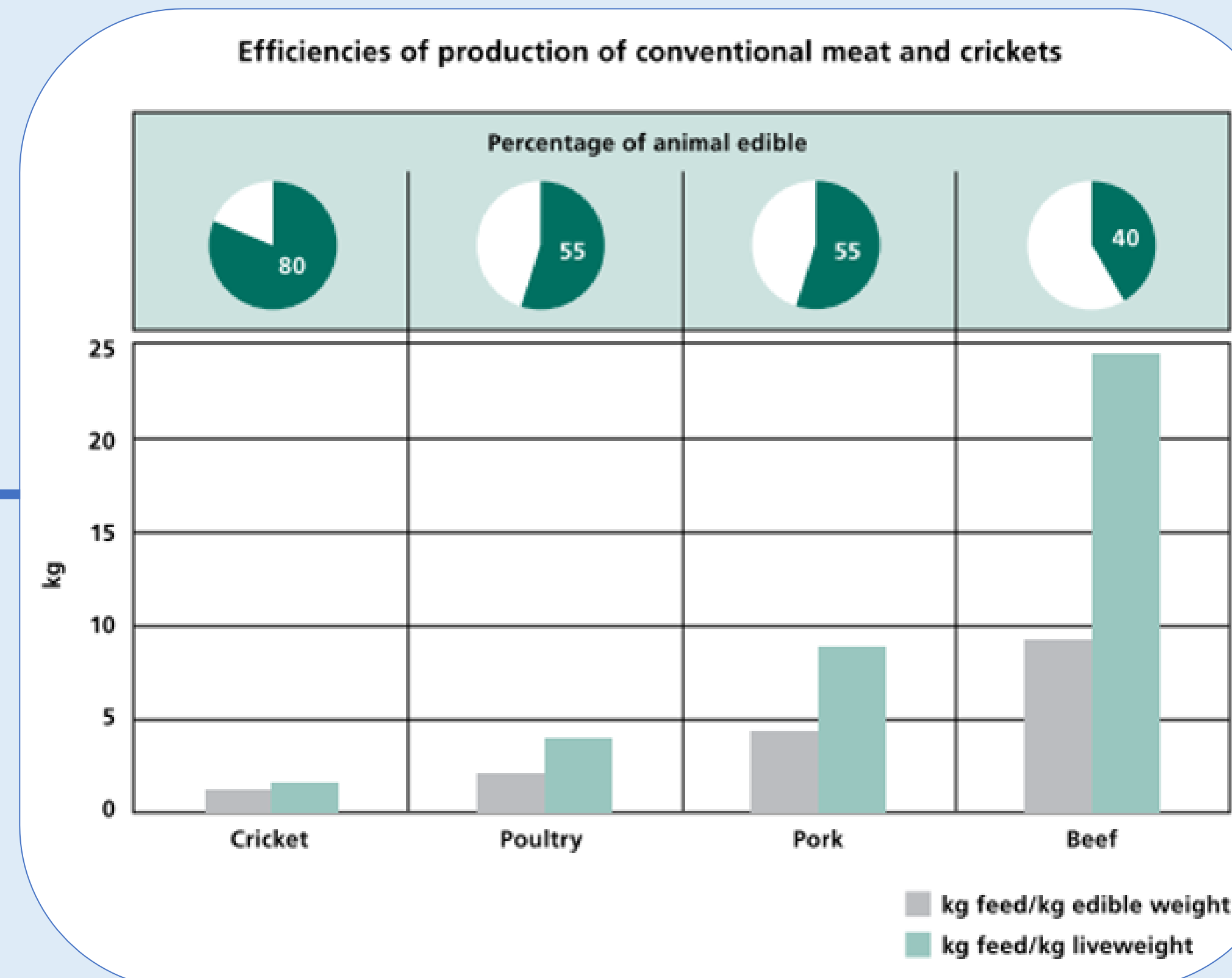


Figure 3: Products that are possible to find in the international market



EU food rules to be considered in the context of food safety aspects of edible insects:

- Regulation (EC) No 178/2002. General principles and requirements of food law
- Regulation (EC) 852/2004. Hygiene of food-stuffs.
- Regulation (EC) 853/2004. Specific hygiene rules for food of animal origin.
- Regulation (EC) 854/2004. Specific rules for the organisation of official controls on products of animal origin intended for human consumption
- Regulation (EC) 2073/2005. Microbiological criteria for foodstuffs.
- Regulation (EC) 1881/2006. Maximum levels for certain contaminants in foodstuffs.
- Regulation (EC) 2283/2015 on novel food.
- Regulation (EC) 1/2005. Protection of animals during transport and related operations.
- Regulation (EC) No 1069/2009. Health rules as regards animal by-products and derived products not intended for human consumption.
- Regulation (EC) 1099/2009. Protection of animals at the time of killing.
- Regulation (EC) 1169/2011. Provision of food information to consumers.
- Regulation (EC) 999/2001. Rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies.
- Regulation (EC) No 206/2009 of 5 March 2009 on the introduction into the Community of personal consignments of products of animal origin and amending
- Regulation (EC) 506/2009. Designation in the register of traditional specialties guaranteed (TSG).
- Directive 97/78/EC. Principles governing the organisation of veterinary checks on products entering the Community from third countries.

CONCLUSIONS:

- High efficiency in the conversion of feed
- Reduced value of environmental pollution
- They emit few GHG and ammonia
- Require less water than breeding livestock
- They have little animal welfare issues
- Diets change quickly due to the movement of the modes
- Nutritional richness → palliate food deficiencies



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