Regional food as driver of a sustainable diet

May 9th 2019

Reframe Conference

university of groningen

Gemeente Groningen

Interreg North Sea Region

REFRAME

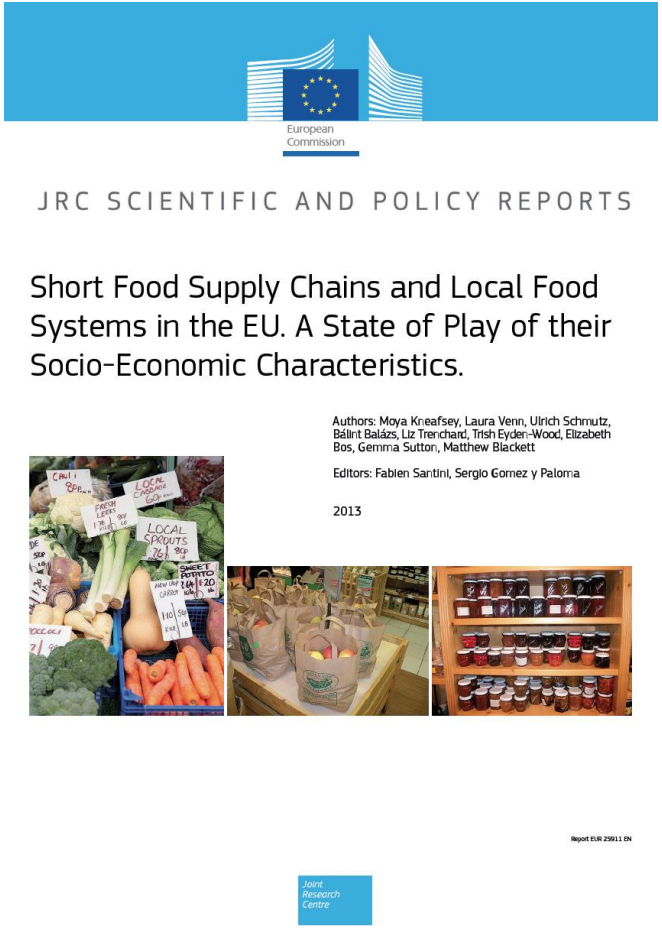
European Regional Development Fund

EUROPEAN UNION

Setting the scene

- “Regional food”, “Short food supply chains”, “Local farming systems”, “Alternative food networks”

- Innovative re-organisations of food supply chains aiming at re-connecting producers and consumers and re-localising agricultural and food production



European Commission

JRC SCIENTIFIC AND POLICY REPORTS

Short Food Supply Chains and Local Food Systems in the EU. A State of Play of their Socio-Economic Characteristics.

Authors: Moya Kneafsey, Laura Venn, Ulrich Schmutz, Bálint Balázs, Liz Trenchard, Trish Eyden-Wood, Elizabeth Bos, Gemma Sutton, Matthew Blackett

Editors: Fabien Santini, Sergio Gomez y Paloma

2013

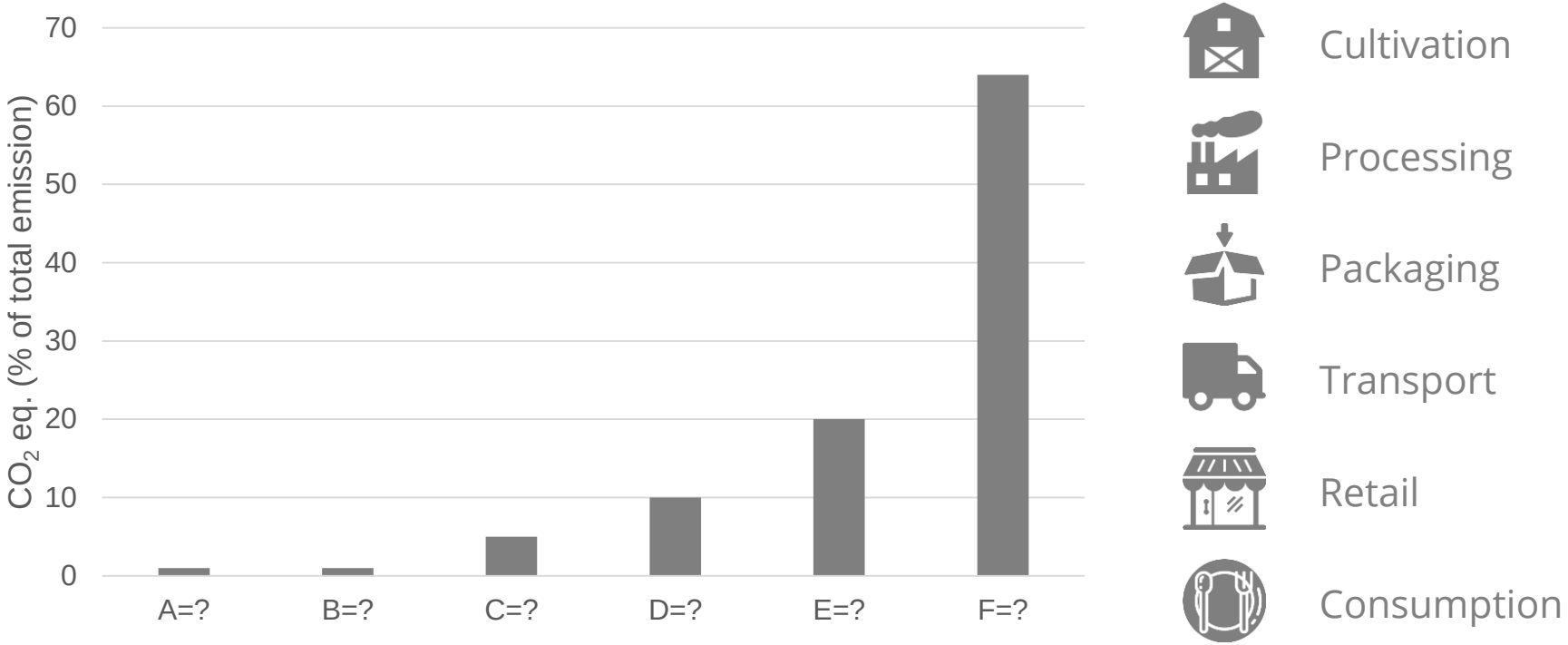
Report EUR 25911 EN

Joint Research Centre

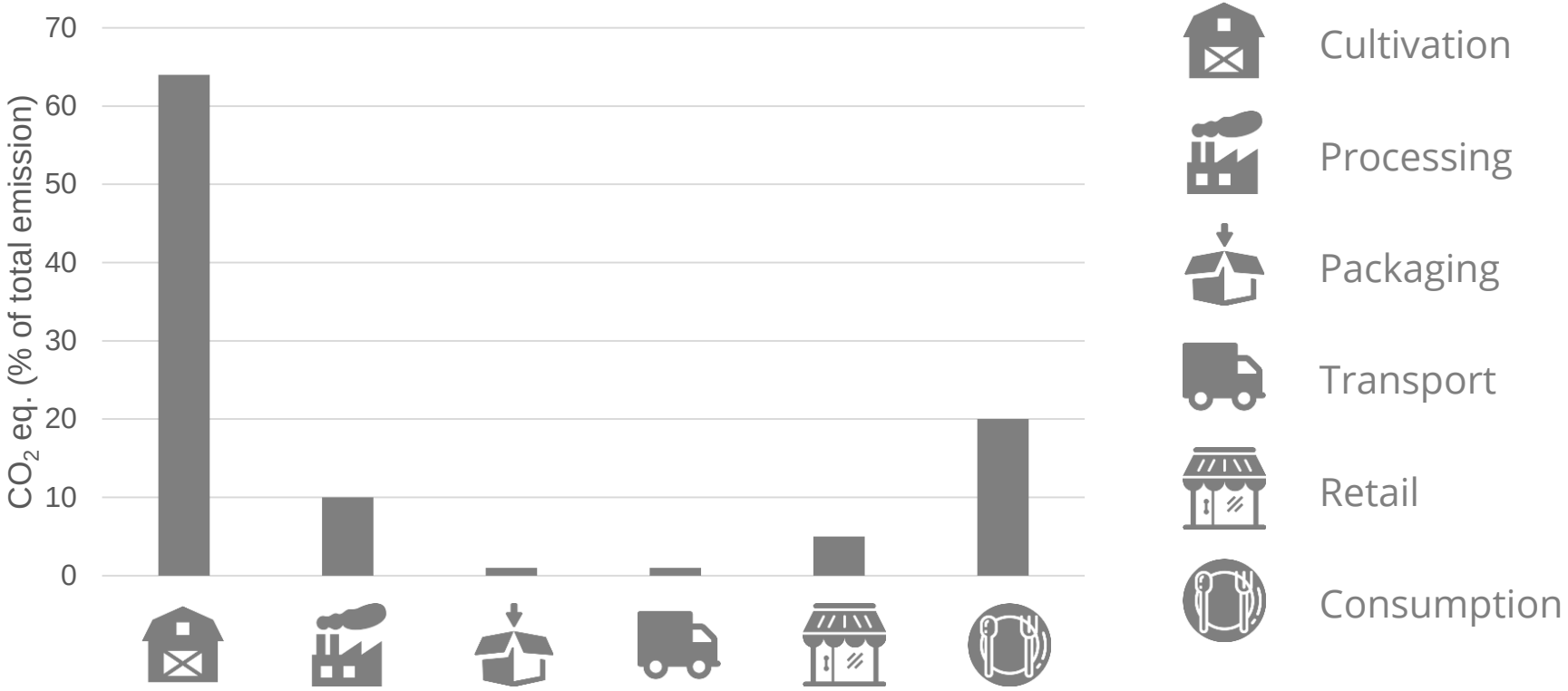
Setting the scene

- Motivation behind short food supply chain initiatives based on “triple bottom line”:
  - People (social impact): Sense of community, increased knowledge on food, interaction between producer and consumer
  - Profit: Rural development (economic regeneration), increased income for farmer
  - Planet: Reduced “food miles” and carbon footprint

GHG emissions in the beef supply chain

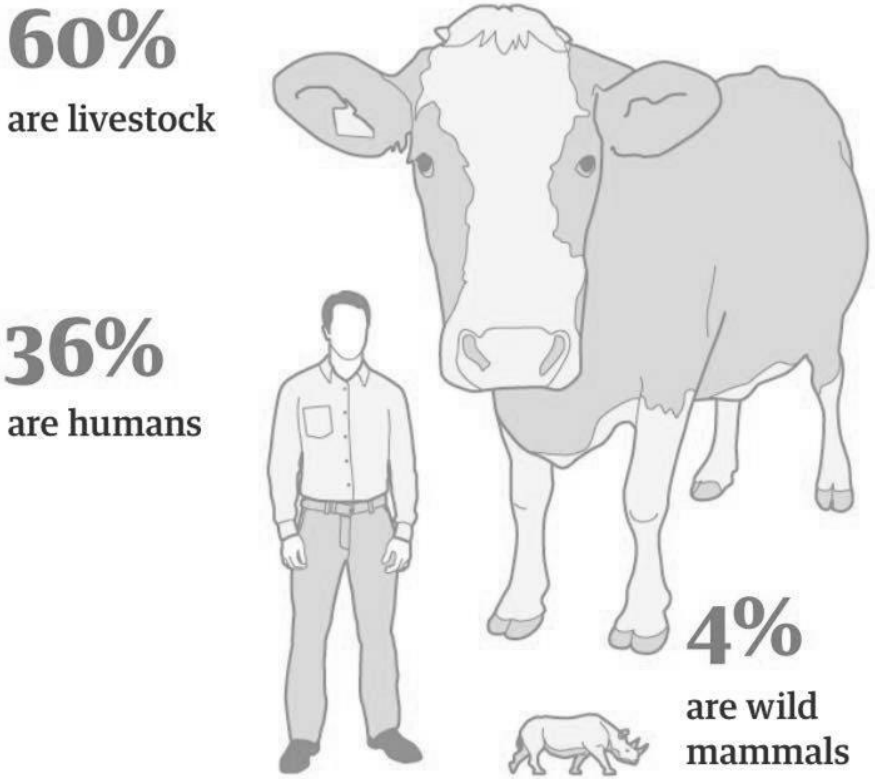


GHG emissions in the beef supply chain

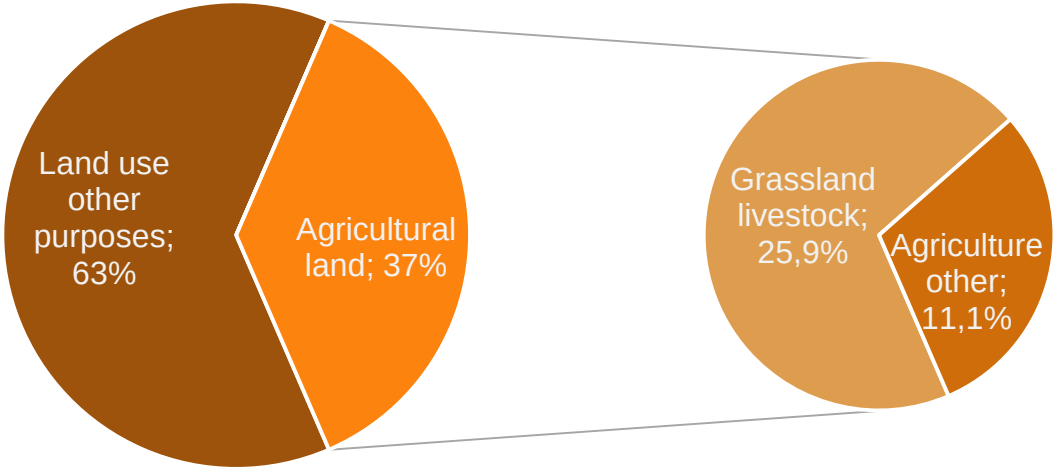


Of all the mammals on Earth…

… 96% are livestock and humans; only 4% are wild mammals



Land use livestock



About a quarter of all ice free land is used as grassland for livestock. A considerable part of remaining land used for feed.

CO_2 equivalents

- Measure for describing how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of CO_2
  - Based on the 'Global Warming Potential' (GWP)

- Green house gases:
  - Carbon dioxide (GWP = 1 kg CO2-eq)
  - Methane (GWP = 25 kg CO2-eq)
  - Nitrogen oxide (GWP = 298 kg CO2-eq)

Carbon dioxide

Nitrogen oxide

Fresh water use

Land use

... others

Setting the scene

- “Food is the single strongest lever to optimize human health and environmental sustainability on Earth” (The EAT-Lancet Commission on Food, Planet, Health)

Field bean = hero bean: Opportunities to replace meat with plant-based product in Groningen

The return of the field bean

- The field bean (Latin: Vicia faba) has a long history (cultivated already 7000 B.C. in the Middle East)
- 25 years ago, cultivation of the field bean had almost completely disappeared

- Re-introduced in Dubbel Drents project as a sustainability driven regional food initiative

Field bean meatballs

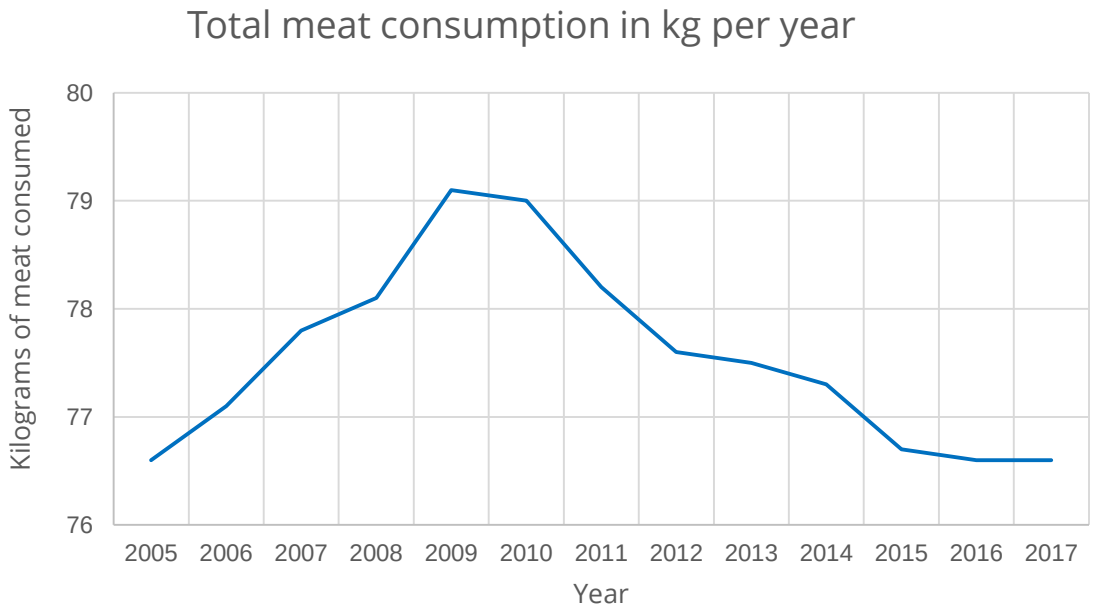
Which one is the meatball with 15% field beans?

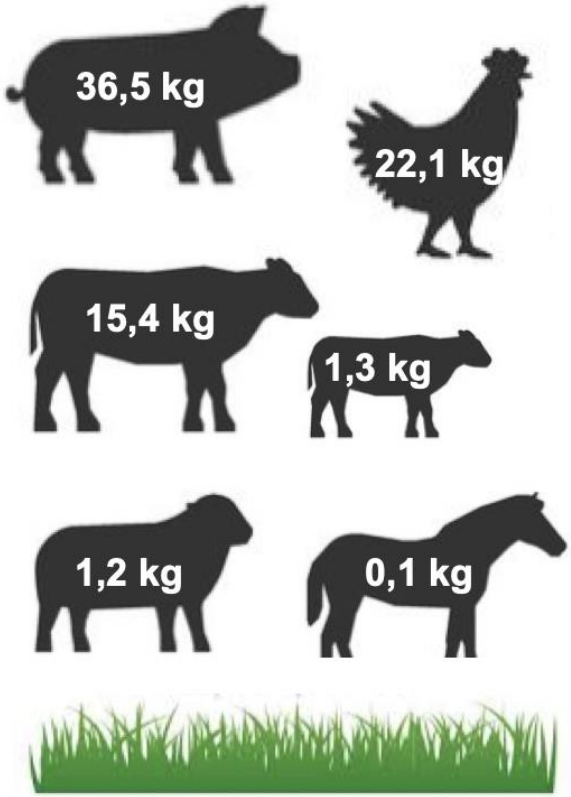
- Meatball consisting of 15% field beans
- Why field beans?
  - Relatively tasteless compared to other beans
  - High protein content (similar to beef)
  - Grow well in the Netherlands
  - Low greenhouse gas emissions
  - No nitrogen fertilizer needed
- Other applications field beans:
  - Dairy substitute
  - Tempé, tofu
  - Canned foods
  - Animal feed
  - Bakery industry

Introduction

- What would be the environmental impact of reducing the consumption of beef in Groningen by 10%?
- How much plant-based produce is needed to replace that beef consumption?
- How much agricultural land would be needed and what processing capabilities are required?

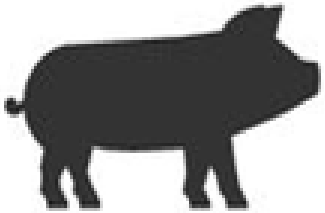
Meat consumption in the Netherlands





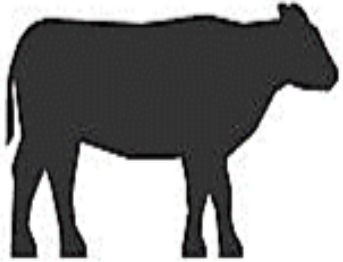
- In 2017 total meat consumption was 76,6 kg per person
- In 1950 total meat consumption was 38 kg per person

GHG emissions different meats



- 5 kg CO_2-eq per kg
- 36,5 kg pork consumed per year per person
- **182,5** kg CO_2-eq per year

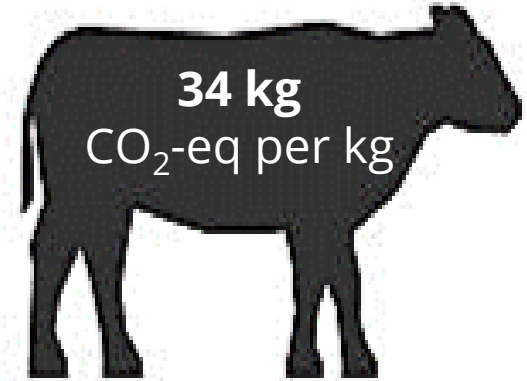
- 3,3 kg CO_2-eq per kg
- 22,1 kg consumed every year per person
- **73 kg** CO_2-eq per year



- 34 kg CO_2-eq per kg
- 15,4 kg consumer per year per person
- **524 kg** CO_2-eq per year

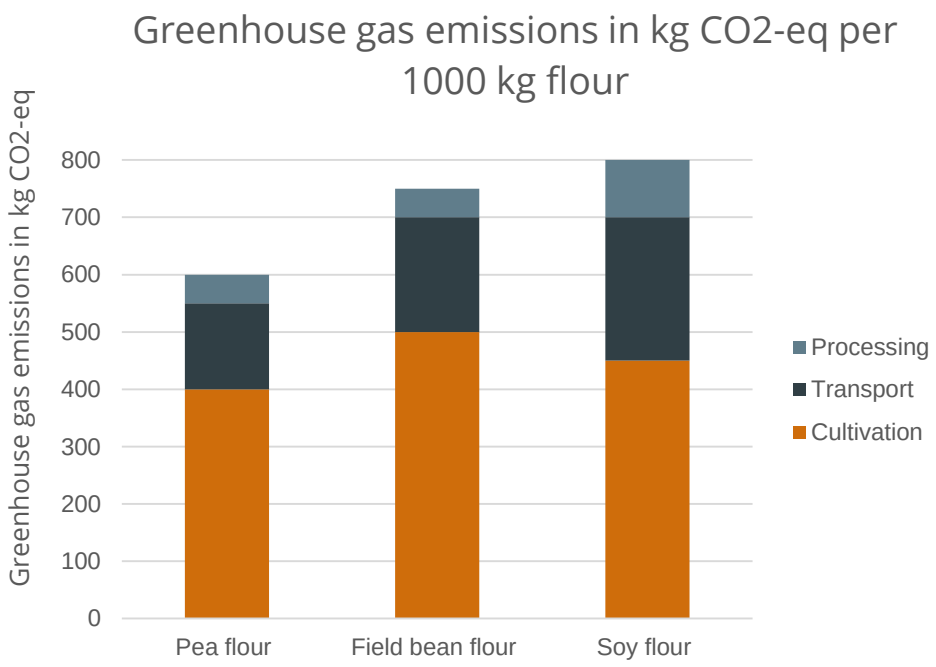
Average GHG emissions beef consumption

- GHG emissions is 524 kg CO_2-eq per person per year



- Comparable to 2 times a round trip from Bremen to Paris

Average GHG emissions field bean flour



- **750** kg CO_2-eq per 1000 kg produced field bean flour
- Versus **34.000** kg CO_2-eq per 1000 kg beef produced

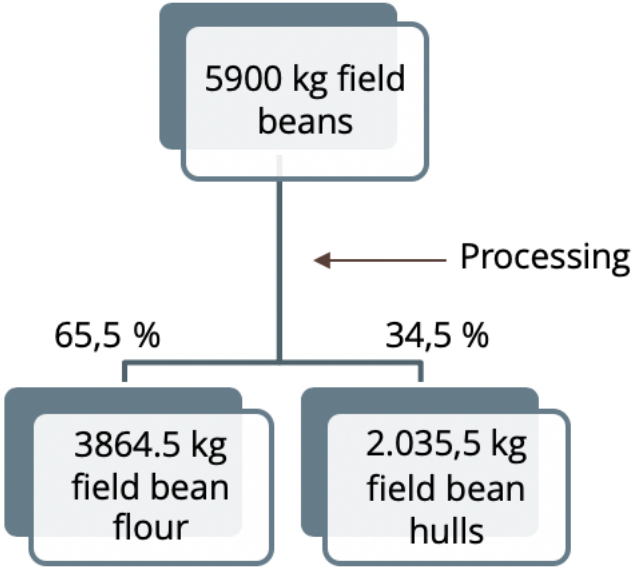
Reduction current meat consumption with 10%

	Proteins per 100 gram
Beef	26-29 gram
Field bean flour	25-32 gram

- 10% less beef = 1.540 gram per person per year
- When those proteins should be replaced by field bean flour 1.540 gram field bean flour is needed per person per year
- The City of Groningen
  - 202.723 inhabitants
  - 1.540 * 202.723 = **312.193.420 gram** of field bean flour is needed per year
- The province of Groningen
  - 583.581 inhabitants
  - 1.540 * 583.581 = **898.714.740 gram** of field bean flour is needed per year

** There is some debate regarding the proteins per 100 gram in field bean flour. To the best of our knowledge, it is about the same as beef.*

What does that mean for production capacity?



- When there is 312.193,420 kg field bean flour needed, then 312.193,420 kg / 3864,5 = 80,78
- = **81 ha** land is needed (city of Groningen).

What does that mean for production capacity?

- The province of Groningen has **295.964 ha** land, of which **187.007** agricultural land.
- The province of Groningen has **583.581** inhabitants → 2,9 as much than in the municipalty.
- When the entire province of Groningen will eat 10 % less meat and replaces this with field bean flour than about 81 * 2,9 = 235 hectare is needed for the production of field bean flour.

→ only 1 % of total agricultural land!

- Project Dubbel Drents → 11 hectare = 60.000 kg field beans.

Impact GHG emissions replacing meat by field bean flour

- **312.193,42 kg** field bean flour needed for reducing 10 % meat production
- Production of 1000 kg field bean flour results in 750 kg CO_2-eq
- 1 ton = 1000 kg, so **312.193,42**/1000 = **312,2 ton field bean flour.**
- **312,2** * 750 = 234.145,065 kg CO_2-eq.

Impact GHG emissions replacing meat by field bean flour

- 10 % less beef means 34 kg CO_2-eq per kg * 1,54 * 202.723 = **10.614.576,28 kg** less CO_2-eq.
- That is a reduction of 10.614.576,28 - 234.145,065 = **10.380.431,215 CO_2-eq**

→ That is **<u>43.250</u>** round trips from Bremen to Paris!!!

Questions and discussion

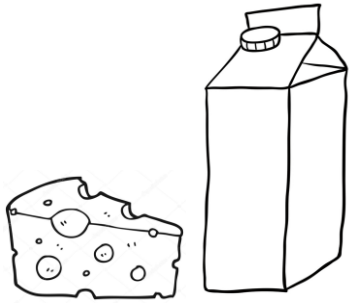
As mild as oat milk: Opportunities to replace dairy with plant-based product in Groningen

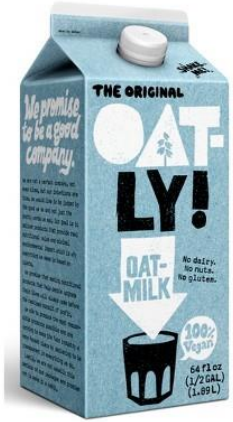
Dairy consumption and GHG impact

- An average a Dutch person consumes about 130 kg of dairy a year
  - 1,4 kg CO_2-eq per kg produced milk
  - Around 10 kg of milk needed for 1 kg cheese

- Dutch dairy consumption produces 7.000.000.000 CO_2-eq per year → **410 kg** CO_2-eq per year per person!

- 83.116.430 CO_2-eq produced by municipality of Groningen by consuming dairy



Planet Oat

- Oat milk as regional plant-based alternative to milk