



Innovation by nature
since 1919

Avebe

100
YEARS

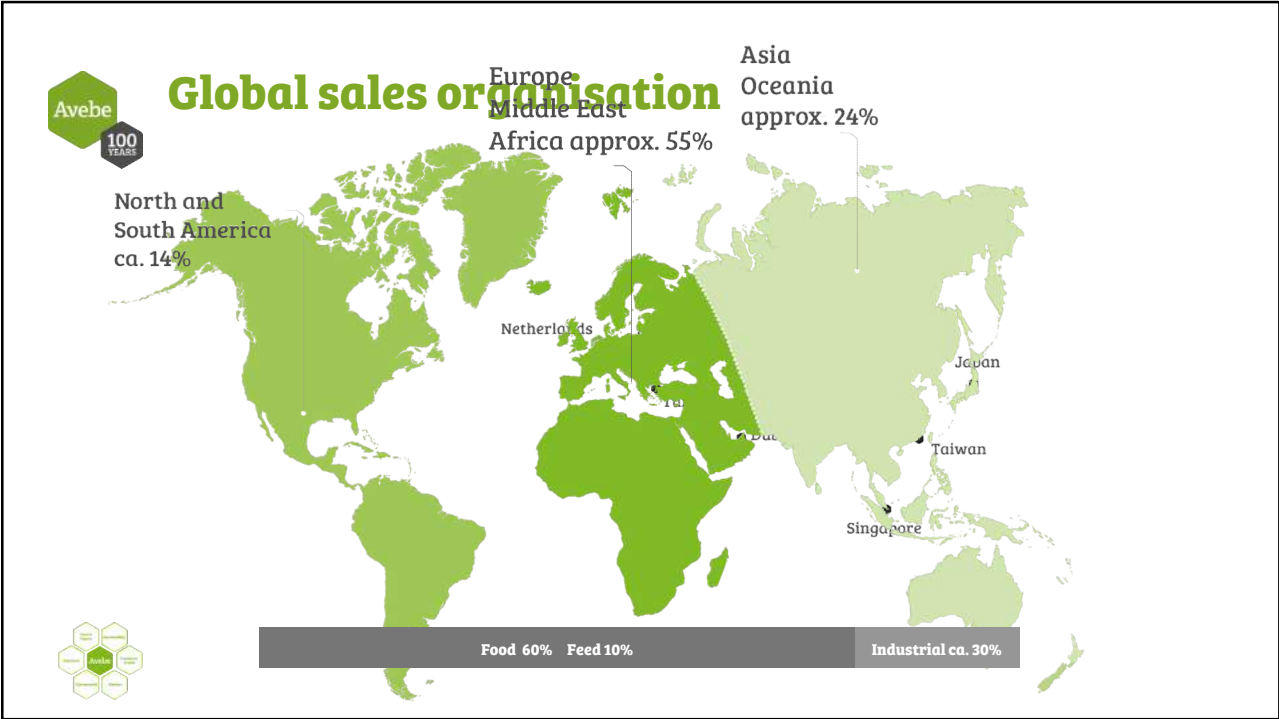
**Biobased since 1919:
Potato starch and potato protein cooperative Avebe
Dr. P.M. Bruinenberg**

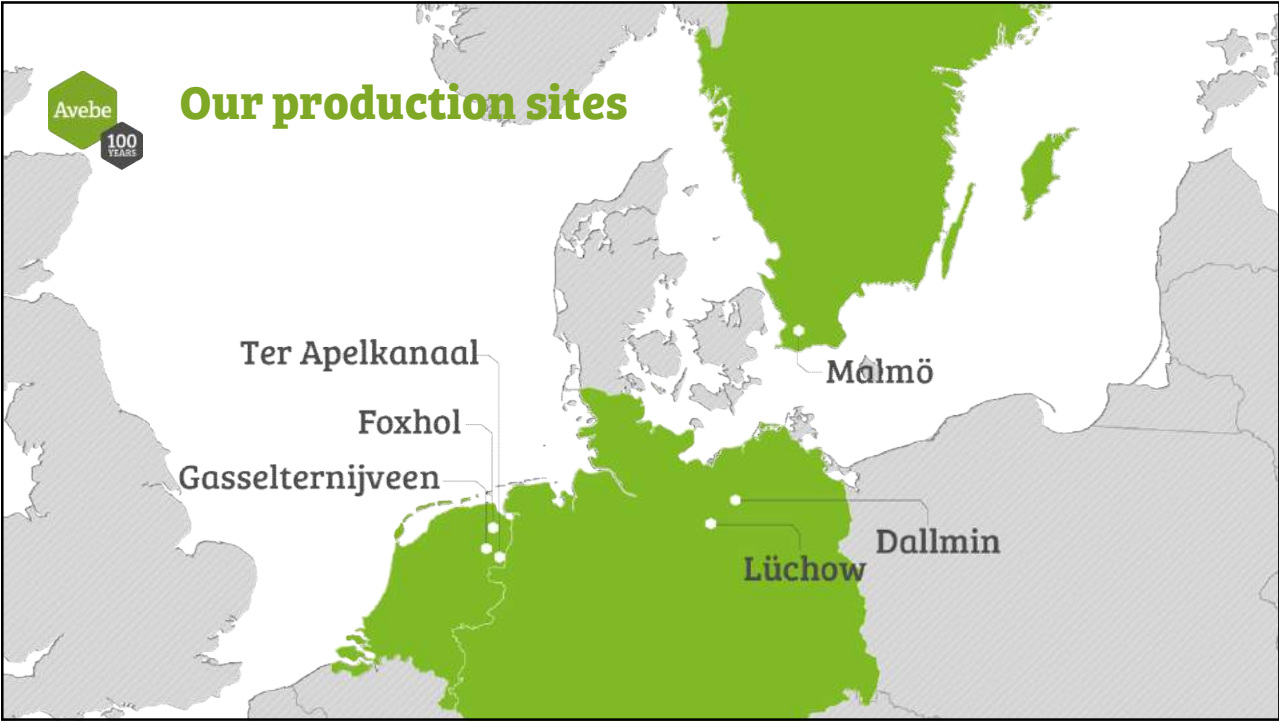


About us

- An international cooperative of starch potato growers established in 1919 to strengthen their position against private industry.
 - Avebe= Cooperative sales office
 - Takeover of private industry in 1979
- Approximately 2300 members and 1300 employees
- Production facilities in Northwest Europe
- Global sales organisation







Ter Apelkanaal

- Largest facility for food ingredients
- Processing potatoes into:
 - Potato starch
 - Food ingredients
 - Proteins for animal feed
 - Dextrins



Gasselternijveen

- Focus on new, innovative products
- Processing potatoes into:
 - Potato starch
 - **Proteins for human food**
 - Proteins for animal feed

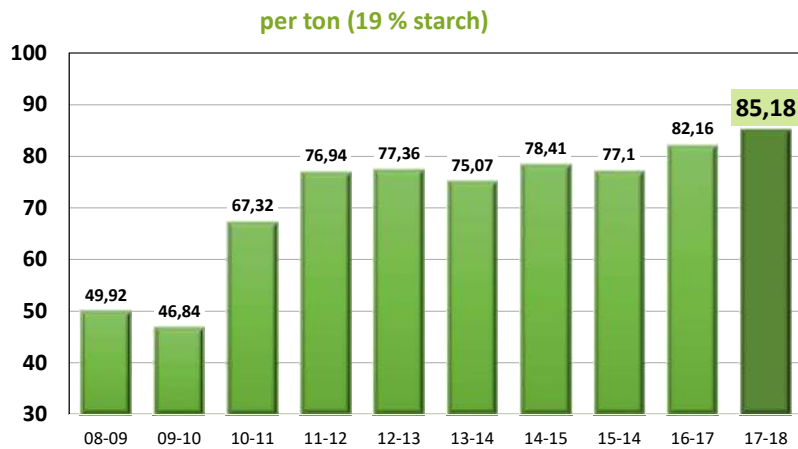


Value creation for owner-farmers

- 2012: Specific CAP support to potato starch sector stopped in Netherlands and Germany
 - Before 2012: potato price ~45 €/t
- Cooperative Avebe aims at paying the highest price for the raw material
- Avebe strategy: volume for market needs
 - A-B-C price system introduced to assure the access to wright amount of raw materials
 - A: contract volume&price agreed in advance
 - B: price depending on market prices
 - C: surplus volume



Performance price Avebe: €/ton (19 % starch)



Performance price = payment + transport potatoes + Cooperative result



Oppertunities & challenges

Challenges:

- Sustainable production of potatoes

Oppertunities:

- Add value to all potato components e.g potato protein

Climate:

- need to reduce GHG emision



Breeding and seeding company Averis

Breeding of new varieties and providing healthy seed materials

- Starch content Avebe's varieties ca. double of standard potatoes
- Improving disease resistance to reduce pesticides
- Development of potato varieties with new functionalities



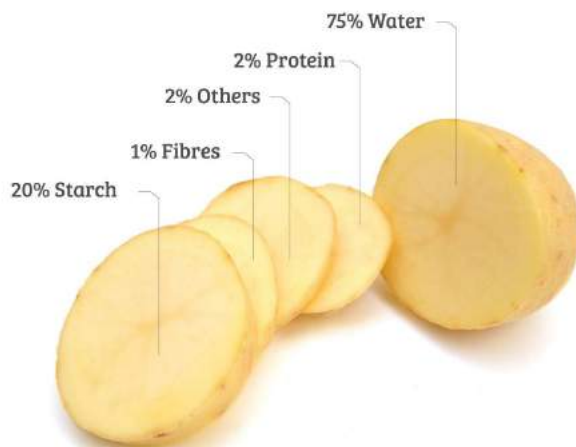


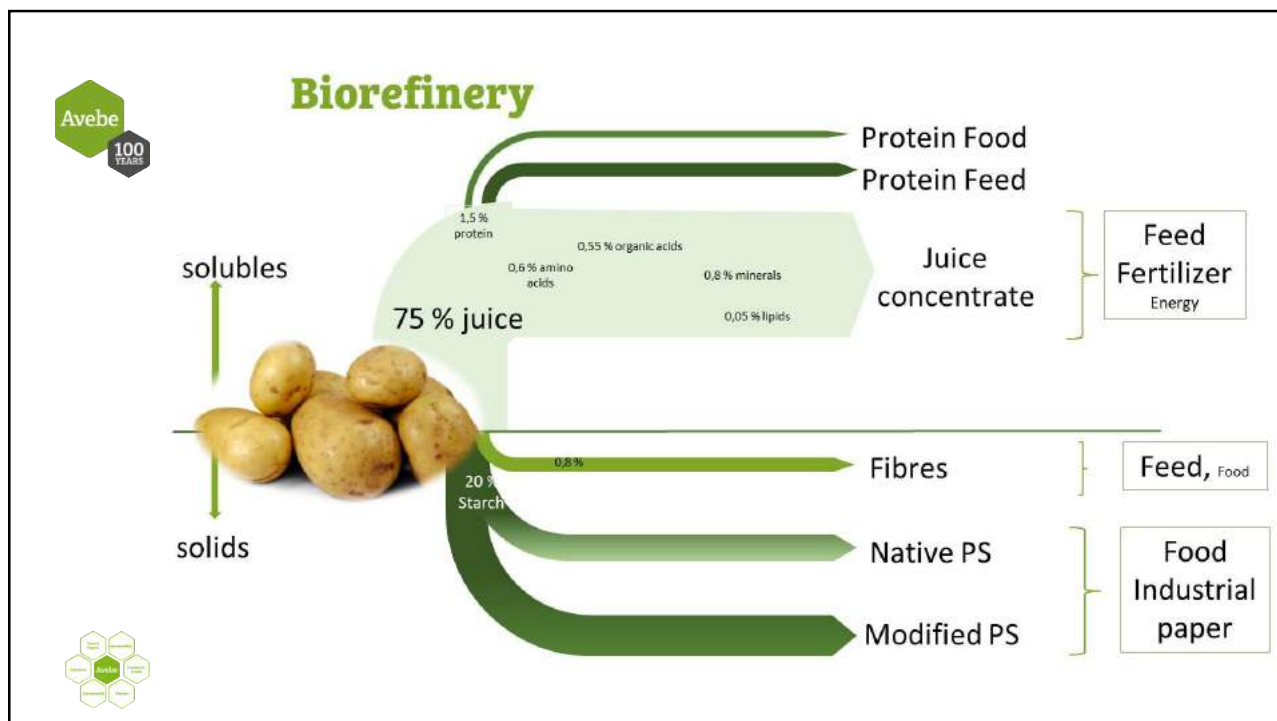
Sustainable agronomy

- More yield from the field using fewer resources
 - Avebe own agronomy department
 - Raising the number of tons of starch per hectare through 'Optimeel':
 - *Study clubs*
 - *Crop registration*
 - *Test and demo fields*
 - *Introduction of new varieties*



We extract everything to be had





Avebe 100 YEARS logo in top left.

Potato protein

Potato:
the only plant protein identical to animal protein
Best of all isolated plant proteins

DIAAS: digestible indispensable amino acid scores
 100 %= meat

DIAAS (%)

| Product | DIAAS (%) | Quality Claim |
|--------------|-----------|------------------|
| Solanic 100 | 100 | excellent |
| Soy isolate | ~80 | good |
| Pea isolate | ~65 | no quality claim |
| Rice isolate | ~55 | no quality claim |
| Wheat gluten | ~25 | no quality claim |

Avebe 100 YEARS logo in bottom left.



Solanic

- Coagulated foodgrade potato protein:
 - Solanic™ 100: the only plant protein identical to animal protein
 - Not soluble, cooked protein, coagulated protein
 - 'No.1 Plant Protein for Nutrition'



Native versus cooked potato protein


solanic
high performance ingredients

- Functional native foodgrade potato protein:
 - Solanic™ 200 & Solanic™ 300
 - Water soluble native protein
 - 'No. 1 'Free From' texturizing protein'







'Free From':
-allergens like, milk, egg
-E-numbers






Starch potatoes are protein crops



| crop | % protein | t/ha | Protein t/ha | Protein isolate t/ha | % protein in isolate | Pure protein t/ha | source |
|--|-----------|------|--------------|----------------------|----------------------|-------------------|-------------------|
|  Soy | 35* | 3,5 | 1,2 | 0,65 | 90% | 0,58 | FAO: crop EU |
|  Lupin | 40* | 2,6 | 1,0 | 0,4 | 57% | 0,22 | FAO: crop Germany |
|  Potato | 2,2 * | 44 | 1,0 | 0,6 | 90% | 0,53 | Avebe |

* total N ~2,6 %





Innovation Center Groningen

- Open in September 2018 on university campus
- Researchers, Product Developers Sales and Marketing Managers are combining forces to develop new concepts from our potato-based ingredients
- R&D fte is ~10 % of total fte of Avebe







Climate

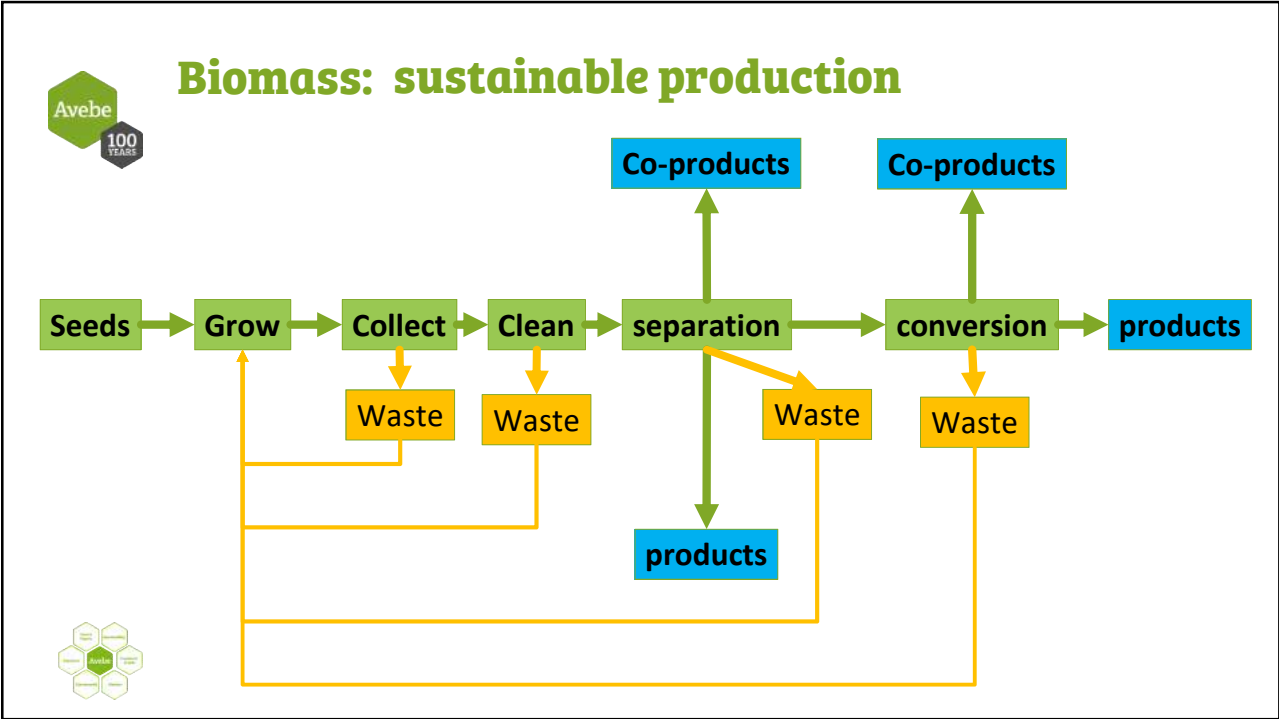


Climate strategy Avebe

CO₂ emission: 360.000 tons/y-~120.000 cars

- Avebe is subject to ETS
- Why: requirement for dry products and our coproducts process (proteins etc.)
 - Since 2012 we have achieved a reduction of 25 % CO₂/ton of product.
- How: continue on the path of energy efficiency and new processes
- Challenge: "low hanging fruit" is harvested. We need a new source(s) of sustainable energy.





Learnings

Avebe's experiences the last 100 years

