Die zukünftige Ernährung: Neue Quellen & neue Technologien

Beatrice Conde-Petit

15. September 2016

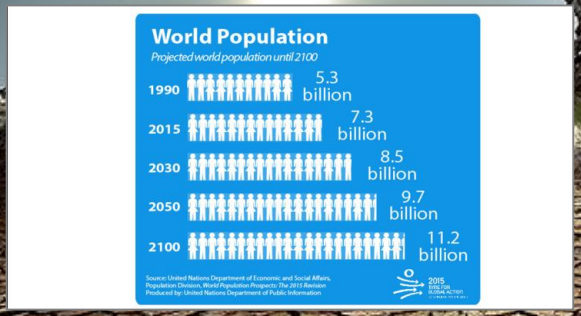
Erschliessung neuer Ernährungsquellen, ETH Zürich

Innovations for a **better world**.

BÜHLER

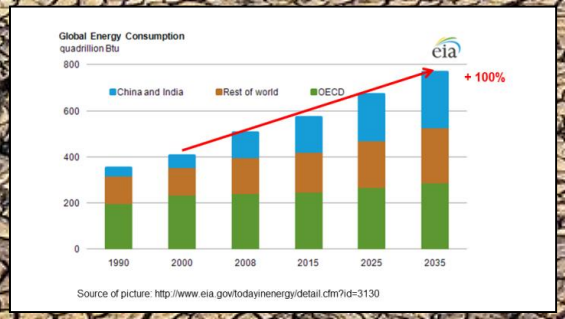
Global Challenges of nourishing a growing population

Growing Population

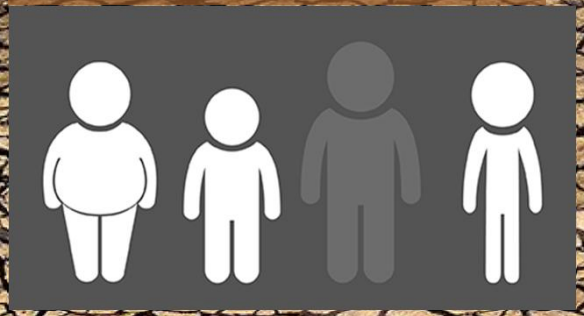


Global footprint

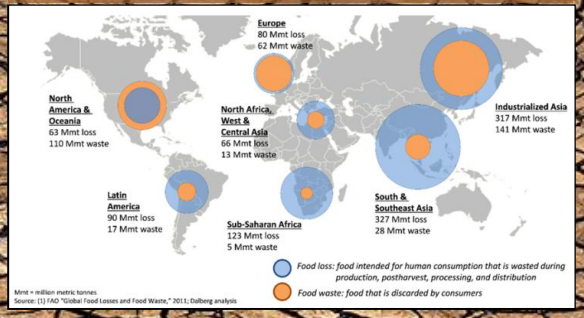
Energy demand



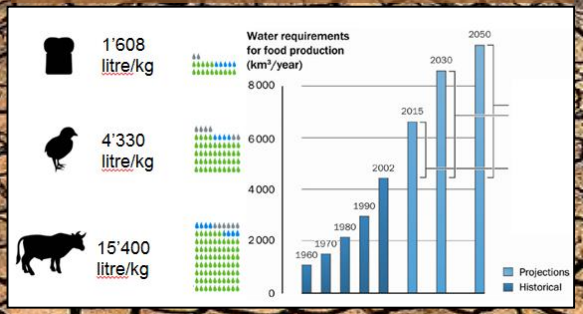
Under and over nutriton



Losses & waste



Water demand



Climat Change

The new consumer

Urban middle class

Changing lifestyle

.

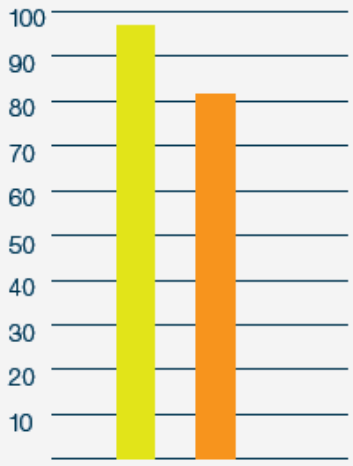
Trust & transparency

Millennials

Strategic focus areas for innovations in the food value chain


Chapatti
New milling for a traditional product
Quinoa
Saving water in quinoa “debittering”
Protein
Technologies for sustainable protein sources
Energy
New energy efficient pasta drying
Food Safety
Controlling Salmonella: today & tomorrow
IoT & the digital world

India is the second largest producer & consumer of wheat



Wheat production
96 million tons

Food consumption of wheat
81 million tons

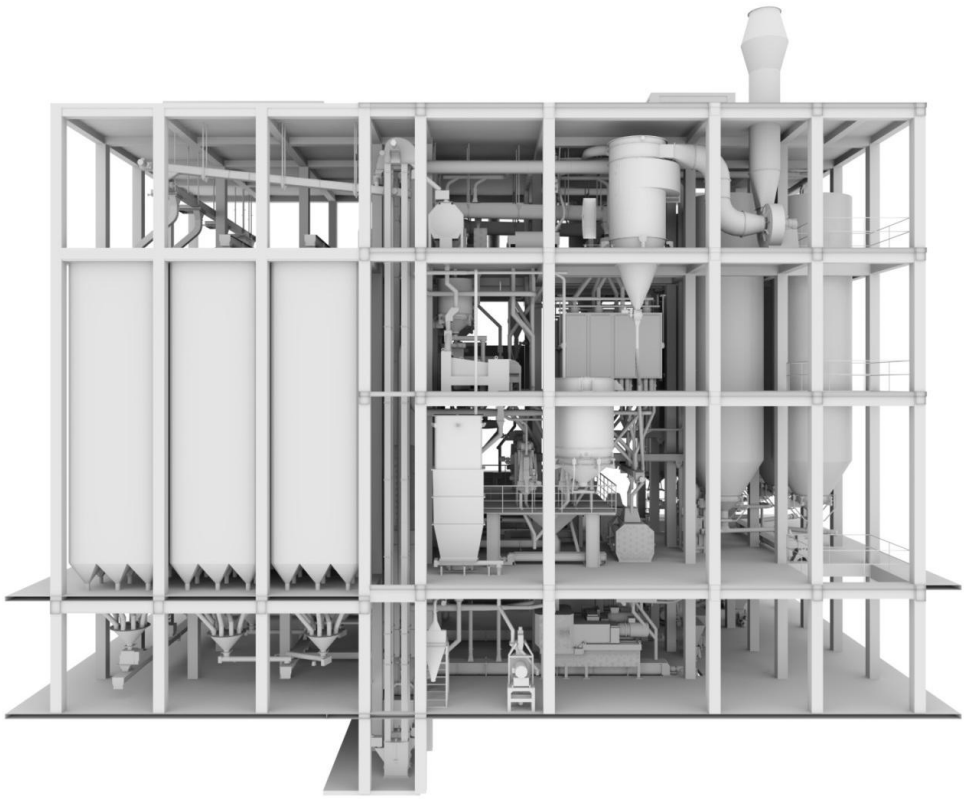
Chapatti bread: a staple in India based on whole wheat Atta flour

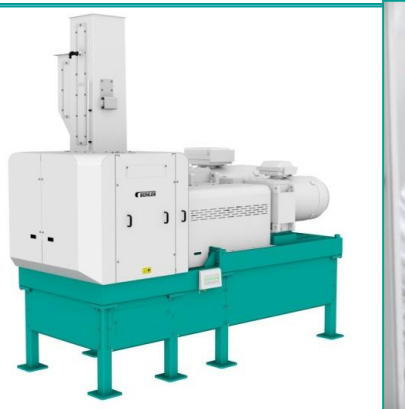
The challenge:

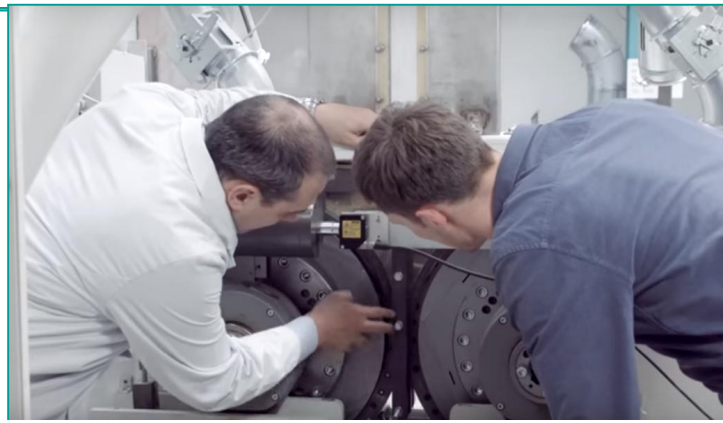
A new way of milling for Atta flour

- ✓ standardized flour **quality**
- ✓ higher **yield** (+ 1.5%)
- ✓ less **energy** (-10 %)
- ✓ lower **maintenance** effort
- ✓ friendly **operation**
- ✓ Fulfils **Food Safety** requirements

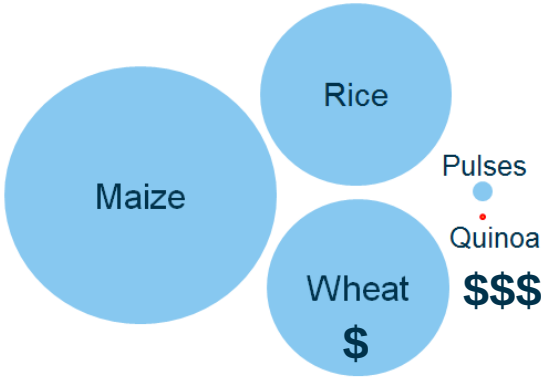
See Video

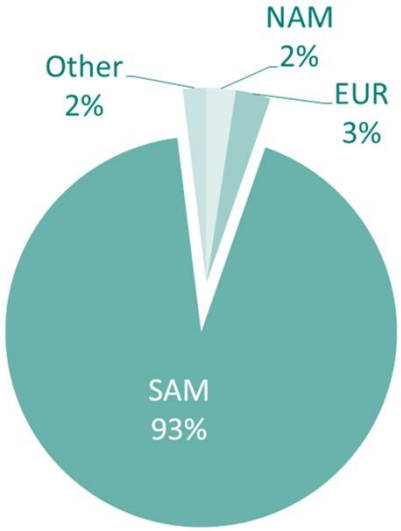






Quinoa: a niche crop that booms as healthy grain





250 000 tones ww in 2015

The Challenge of bitter quinoa: it contains Saponins in the outer layers

Traditional wet processing

Washing to remove Saponins followed by drying

Drawback of wet process

- Water **5,000 to 8,000 litres /ton**
- Energy demanding drying
- Labour intensive
- Hygiene problems

New “dry” processing from Bühler

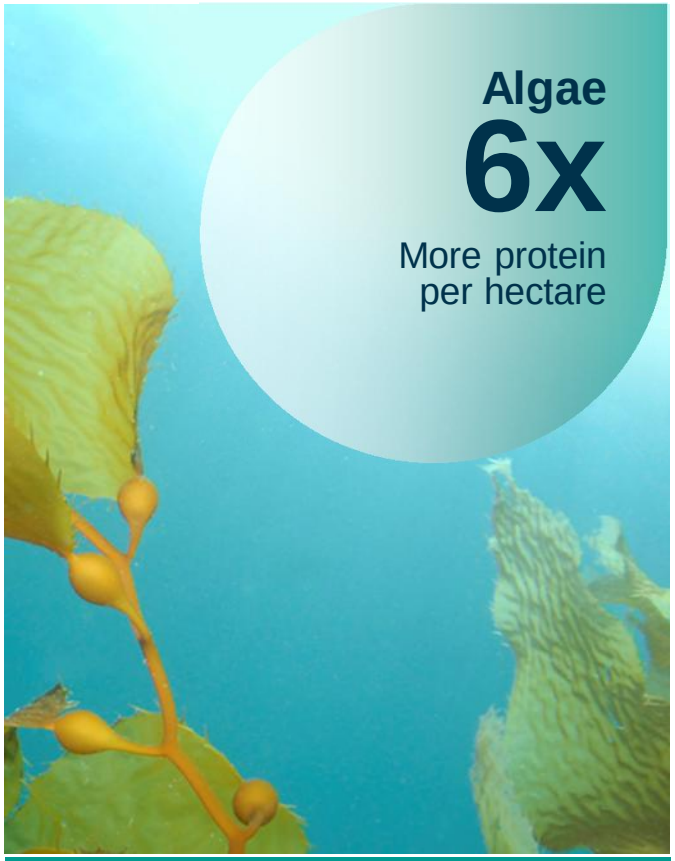
Surface polishing to remove saponin-rich layer

We have a protein challenge.

It needs a systemic change.

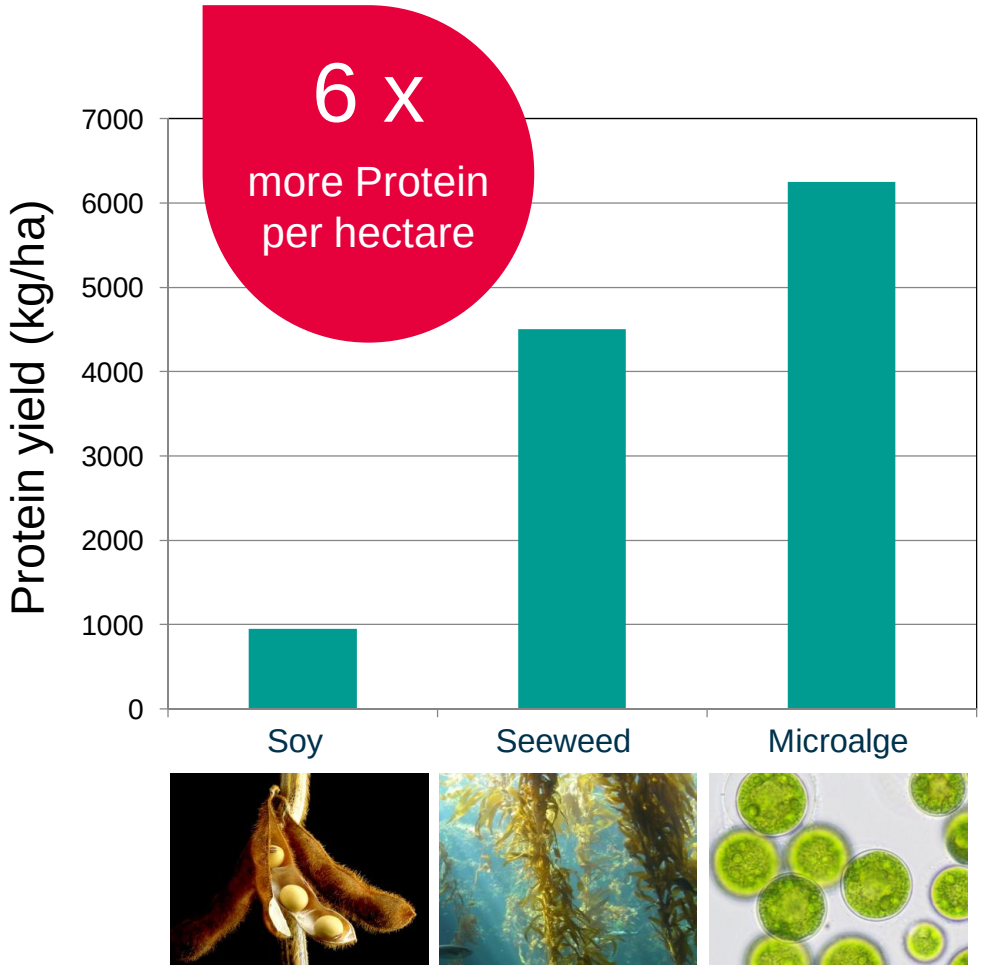
Plant-based diet

Eliminate waste



Sustainable feed

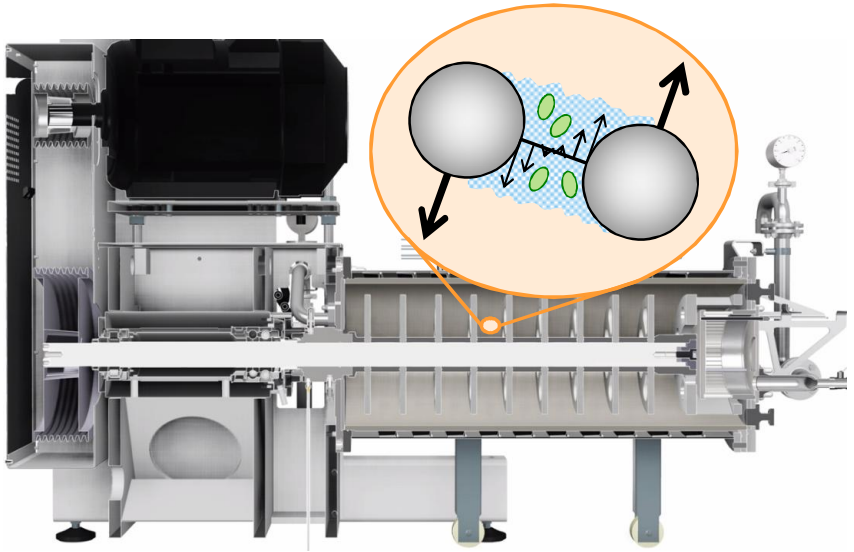
Alge are productive and don’t need arable land.



Protein

Pigments

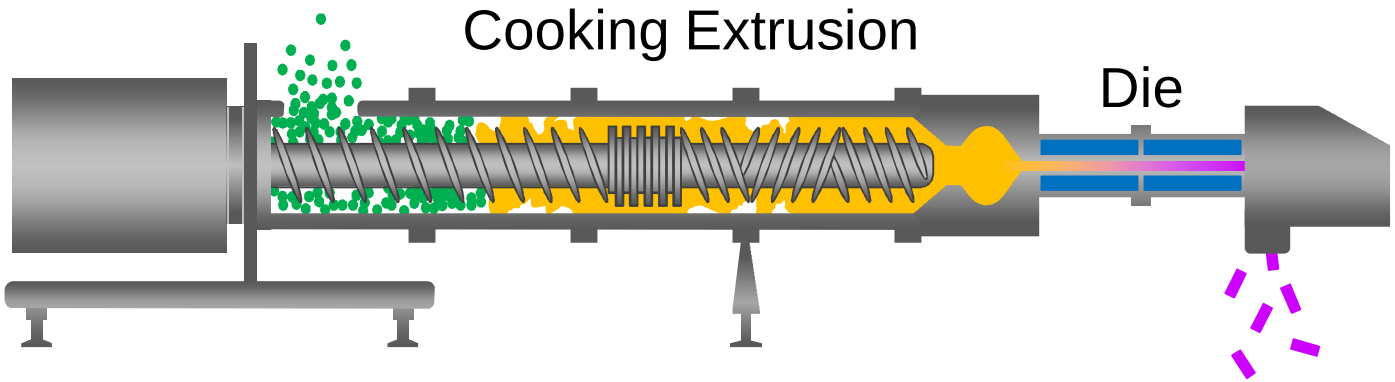
ω-3 Fatty acits



See Valorie video

BÜHLER

Textured protein is becoming a category in its own right

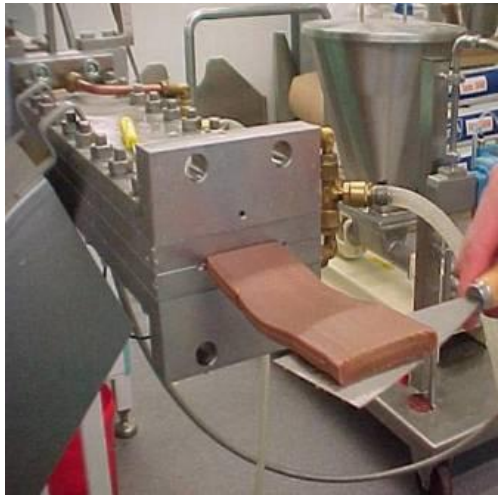


Applications

- 50%
Footprint

Fibrillar texture

Technology



http://foodtechconnect.com/2015/09/29/algae-insects-cultured-meat-startups-pioneering-the-future-of-protein/

Pasta is a popular food that wins with inclusion of new ingredients

Challenge

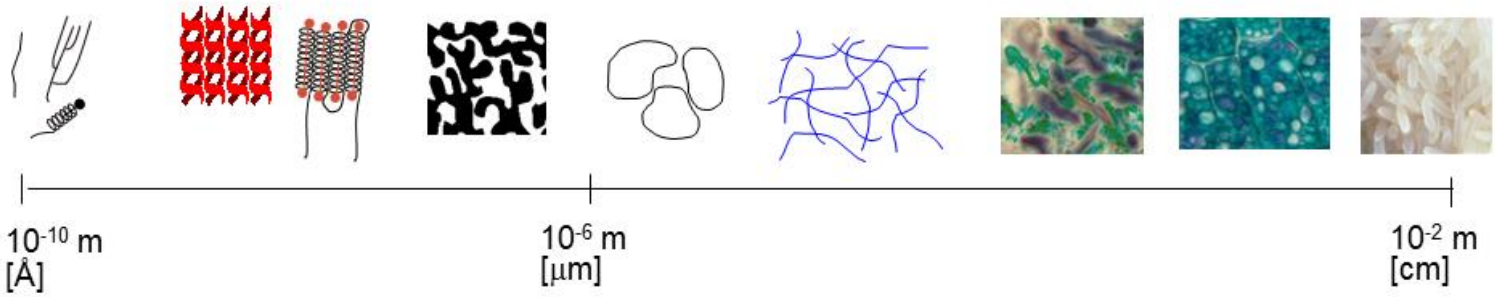
Achieve a step change in drying efficiency

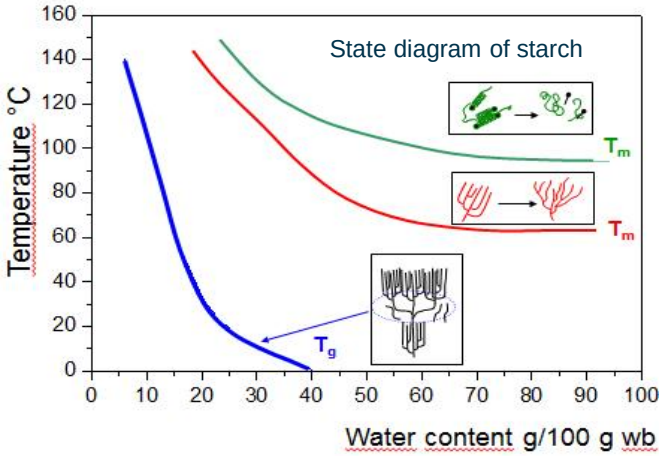
The food material science toolbox for designing cereal processing

Structures

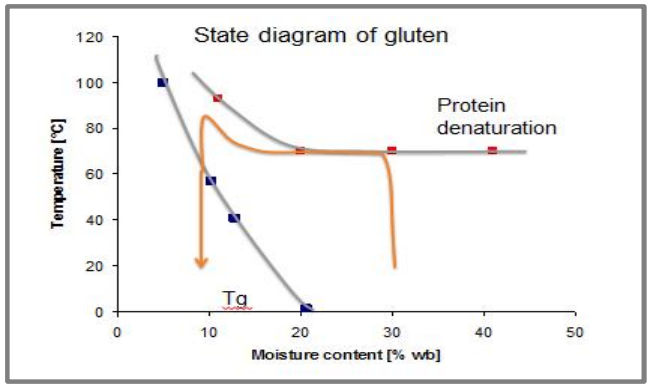
State diagrams

Reaction kinetics

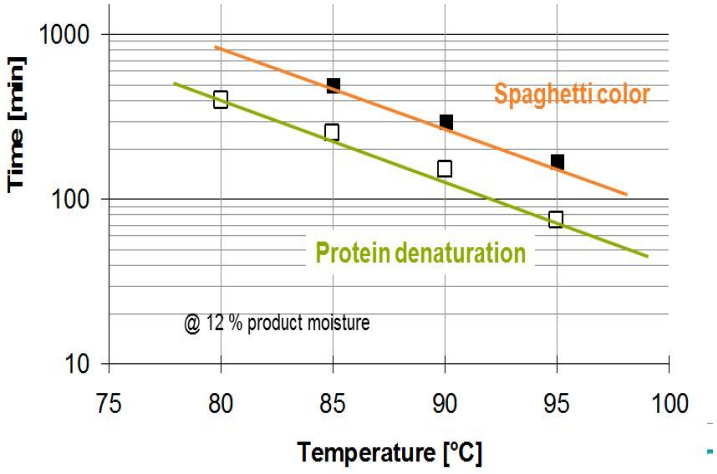




Conde B. & Zweifel C., (2000, unpublished)

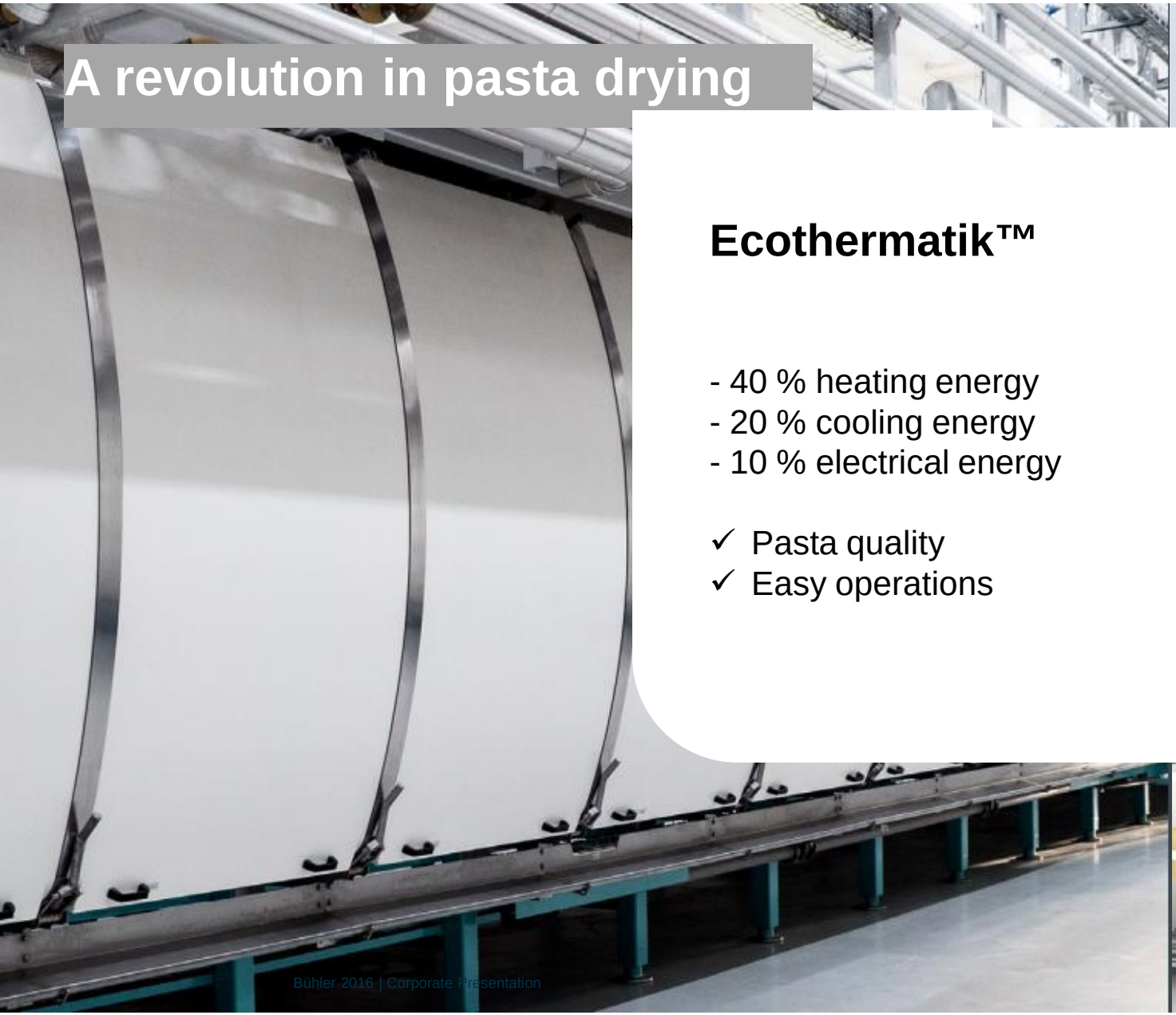


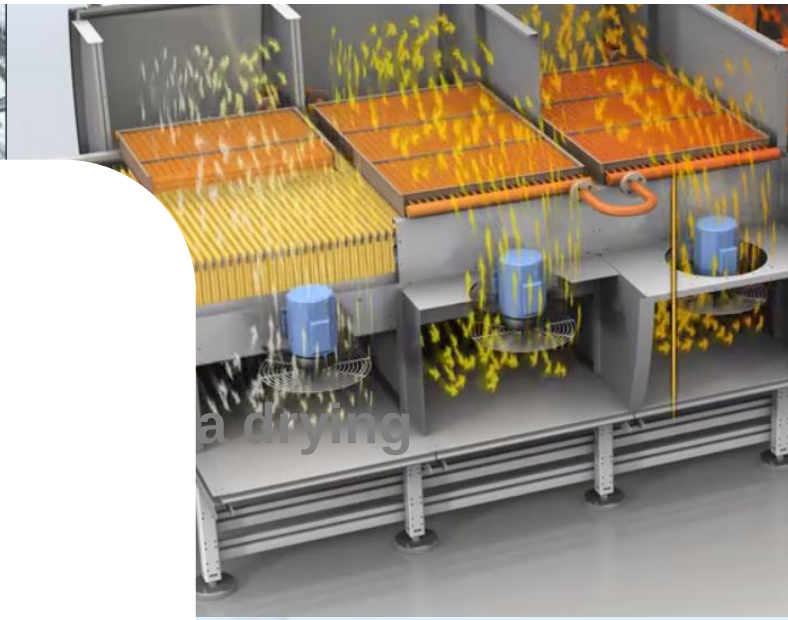
based on data from Kokini (1998) ,
Tg form Conde-Petit B. & Boefer W. (2010, unpublished)



Conde-Petit B, Muehlherr C, Kratzer A, (2009, unpublished)

A revolution in pasta drying

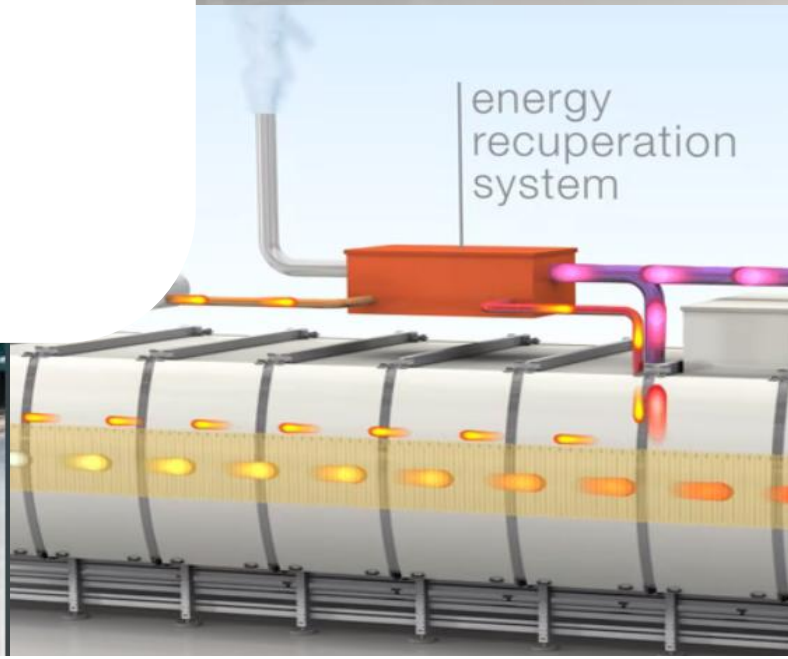




Ecothermatik™

- 40 % heating energy
- 20 % cooling energy
- 10 % electrical energy

✓ Pasta quality
✓ Easy operations



The top 5 Food Safety challenges

Bacteria like **Salmonella**

Mycotoxin contamination

Allergen regulation

Food losses & waste due to **spoilage**

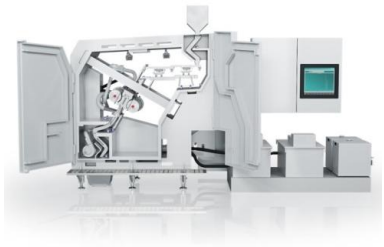
Food **fraud**

Food safety steps to future

GMP/Hygienic Design

Reduce risk and clean efficiently

Validation of processes & Kill Steps



Non-Thermal Processing

Maintain the nutrition

Selective Kill Steps

Maintain the good bacteria

The digital opportunity enables disruptive business models

The internet of Things opportunity

Online sensors

Product & process monitoring

Smart control systems

Self-learning
Predictive models

New service business

From massive connectivity by IoT to new businesses

Collaborative Innovation Model

Up to 5% of our turnover are invested in Research & Development.

Strategic partnerships

PARTNERS IN FOOD SOLUTIONS

MC MASSCHALLENGE

Urs Bühler Innovation Fund

CREATING TOMORROW TOGETHER

BÜHLER INNOVATION CHALLENGE 2016

Integration of customers and suppliers

Entrepreneurial employees

- 4’000 registered
- 2’000 voted
- 50 trained
- 2 new products and 2 services developed

Global academic networks

ETH zürich

UNITECH International

World Food System Center

EPFL ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Can we feed 9 billion people sustainably by 2050?







Agriculture **Storage** **Transportation** **Mill** **Food processor** **Retailer** **Consumer**

New technologies

New business models

High transparency

Collaboration

Engineering Customer Success