Global Trends in Feed Industry

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Innovations for a **better world**.

BÜHLER

Serving the Feed and Oil industries.

Poultry Feed

Aqua Feed

Oilseed Preparation

- **Technology leadership**
- **Reliable machinery**
- **Vast engineering experience**
- **Extensive customer service**
- **Full automation control**
- **Training and support**

Cattle Feed

Premix & Concentrates

Main drivers of the global feed market.

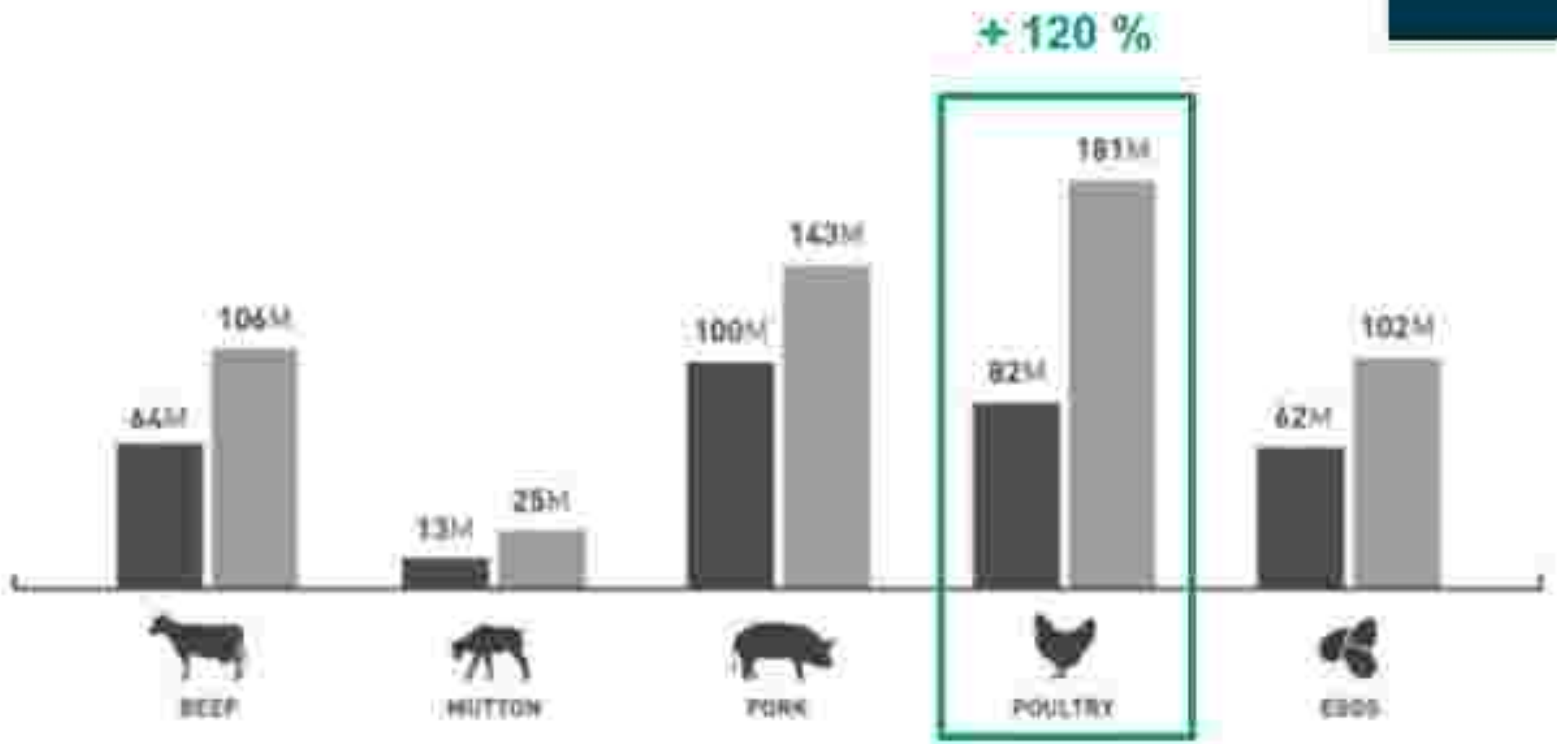
35% world population growth 2015 – 2030

40% per capita meat consumption 2000 – 2030

… are the power fuel for our business.

The world's excessive appetite for meat and other animal proteins fuels our business.

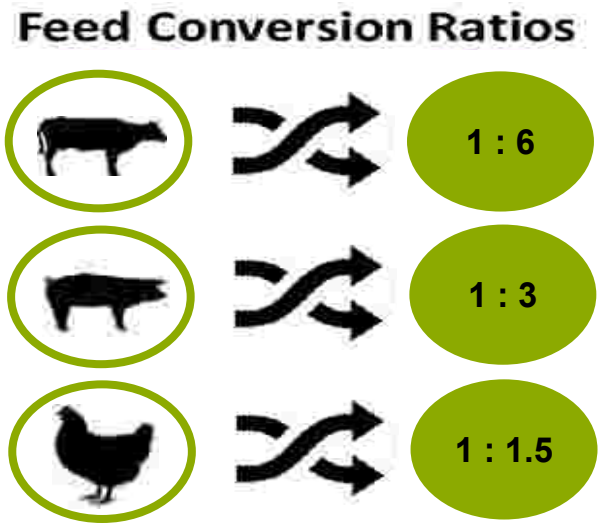
Global demand for meat per animal type (in tons, 2005-50)



Growth in all animal segments

Three major trends transforming the industry.

Animal Nutrition & Sustainability



Changes in genetics of species

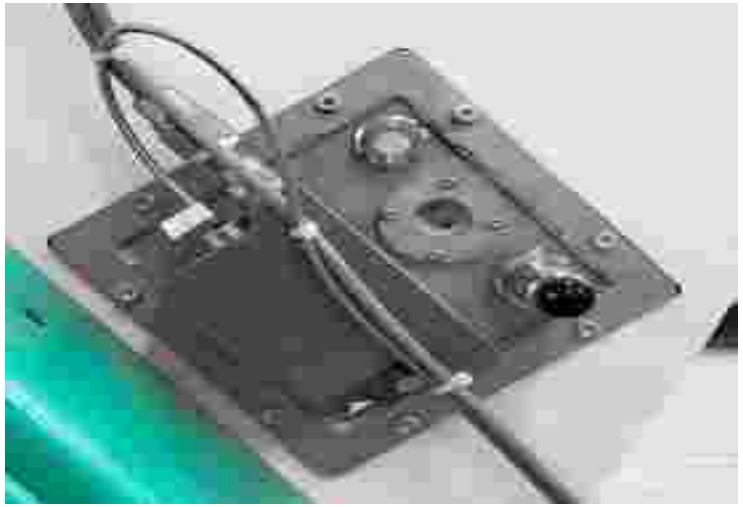
- Nutritional advice
- Particle granulation, etc.
- Less antibiotics needed

Feed Safety

Anti microbial resistance

- Validated hygienization
- Mycotoxin reduction
- Feed safe design

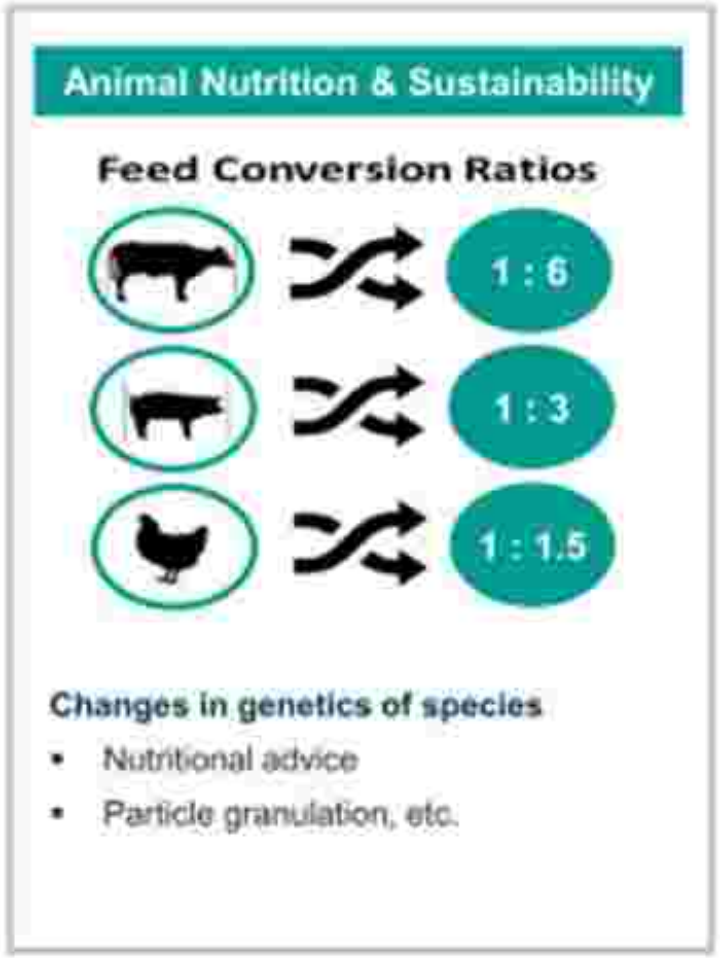
Internet of Things



Master efficiency and quality

- Traceability
- Online data clustering
- Self regulating production

Animal Nutrition & Sustainability.



- Two Stage Grinding
- Particle Size Measurement
- Multi-NIR Inline System

Two stage grinding.
Influencing particle size to increase FCR.

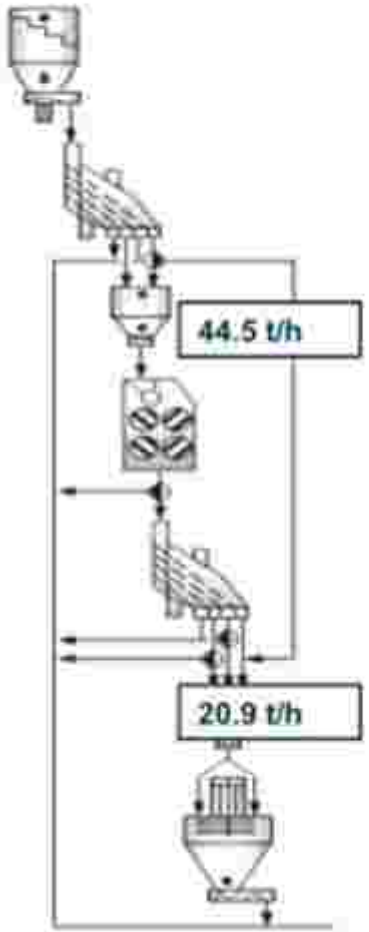
Example parameters

- Broiler feed, corn/wheat base
- Plant capacity: 50 t/h
- d50 = 630 micron

Energy consumption

- Direct grinding hammer mill:
  296 kW = 5.92 kWh/t
- 2-stage grinding
  213 kW = 4.26 kWh/t

28 % energy savings
(1.66 kWh per ton)



1 Pre-screening, fraction 2.0 mm, overs 89%

2 1st grinding stage, 89% of 50 t/h = 44,5 t/h
Roller mill, 1. gap: 2.0 mm, 2. gap: 1.5 mm
Energy at JKW 50: 74 kW (2x 37)

3 Sizing, fraction 2.0 mm, overs 47%

4 2nd grinding stage, 47% of 44.5 t/h = 20.9 t/h
Hammer mill, screen 3.0 mm, 90 m/s
Energy at JKW 50: 139 kW

Energy total = 4.26 kWh/t

Source: Experiential test of Swiss SFT institute in feed lab.

Impact of particle size distribution on animal health and performance.

Pilot test conducted on three poultry farms / USA

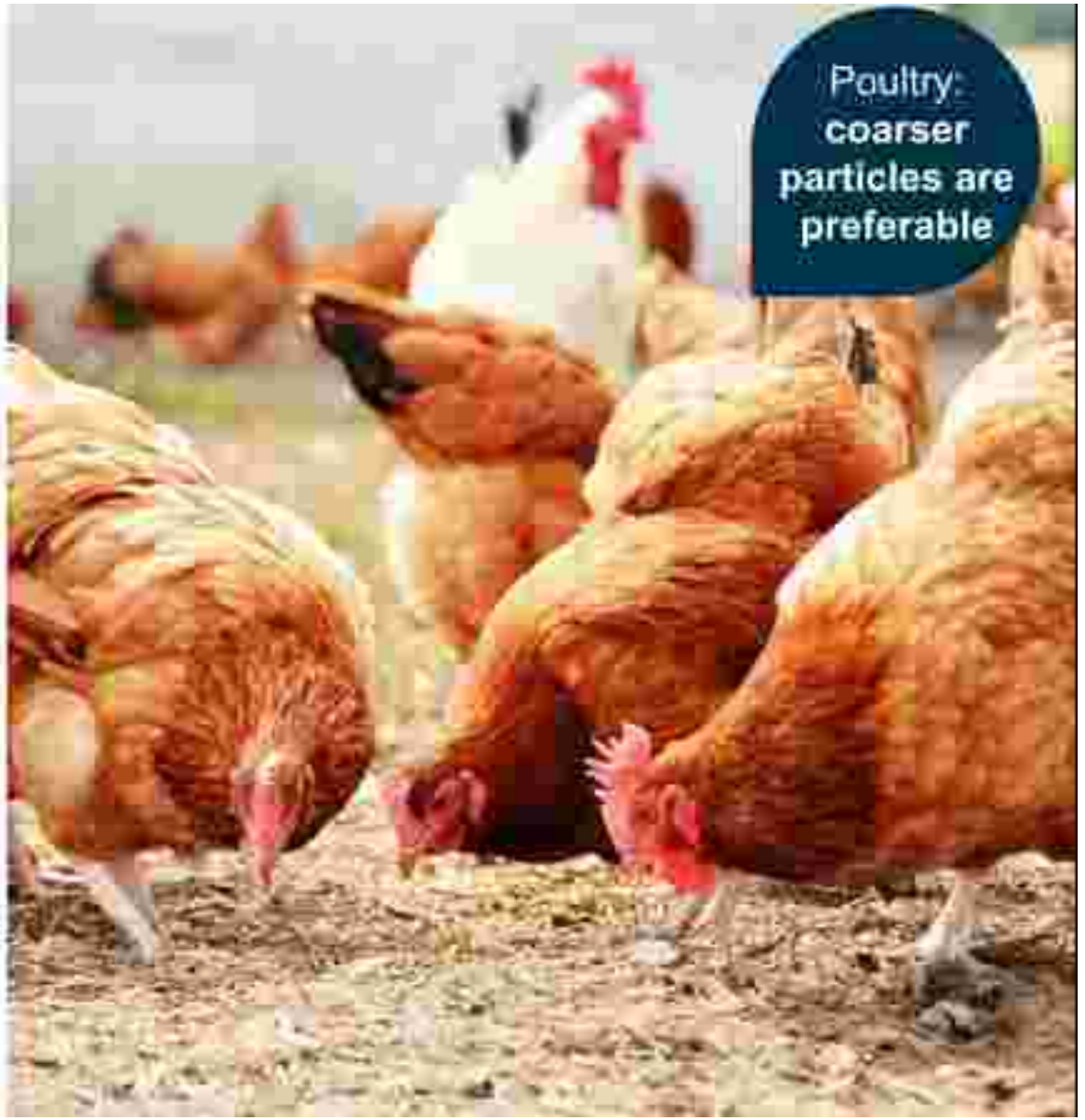
Goal: determine optimal particle size distribution for poultry

Feed given to the animals:

- Coarse/textured feed (roller mill)
- Fine/non-textured feed (hammer mill)

Results for coarse/textured feed

- 20 % higher weight of the muscular stomach (indicator of animal health)
- Lower mortality rate
- Slightly higher animal performance

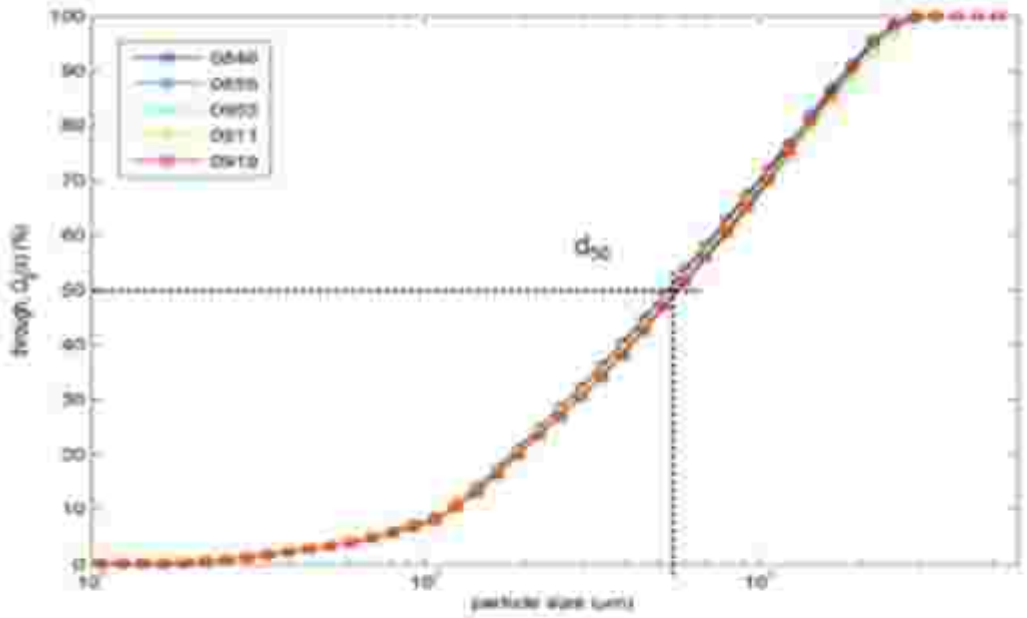


Particle Size Measurement

Ensuring consistent quality & best utilization of raw materials.

→ Sampling at the mixer (homogeneous product)

→ Precise measurement (50 particle classes, high- and low-resolution channel)



Inline measurement of moisture, fat and protein

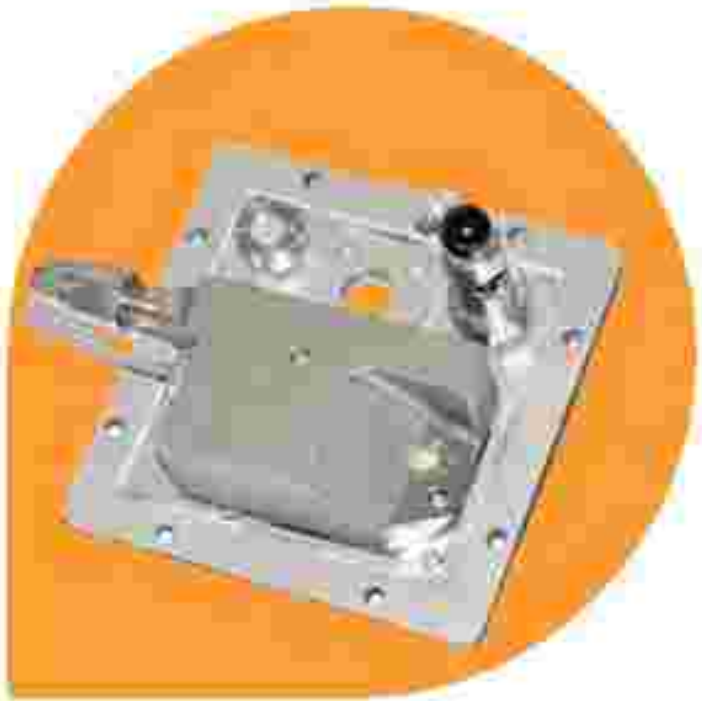
A Raw material intake

B Mixer

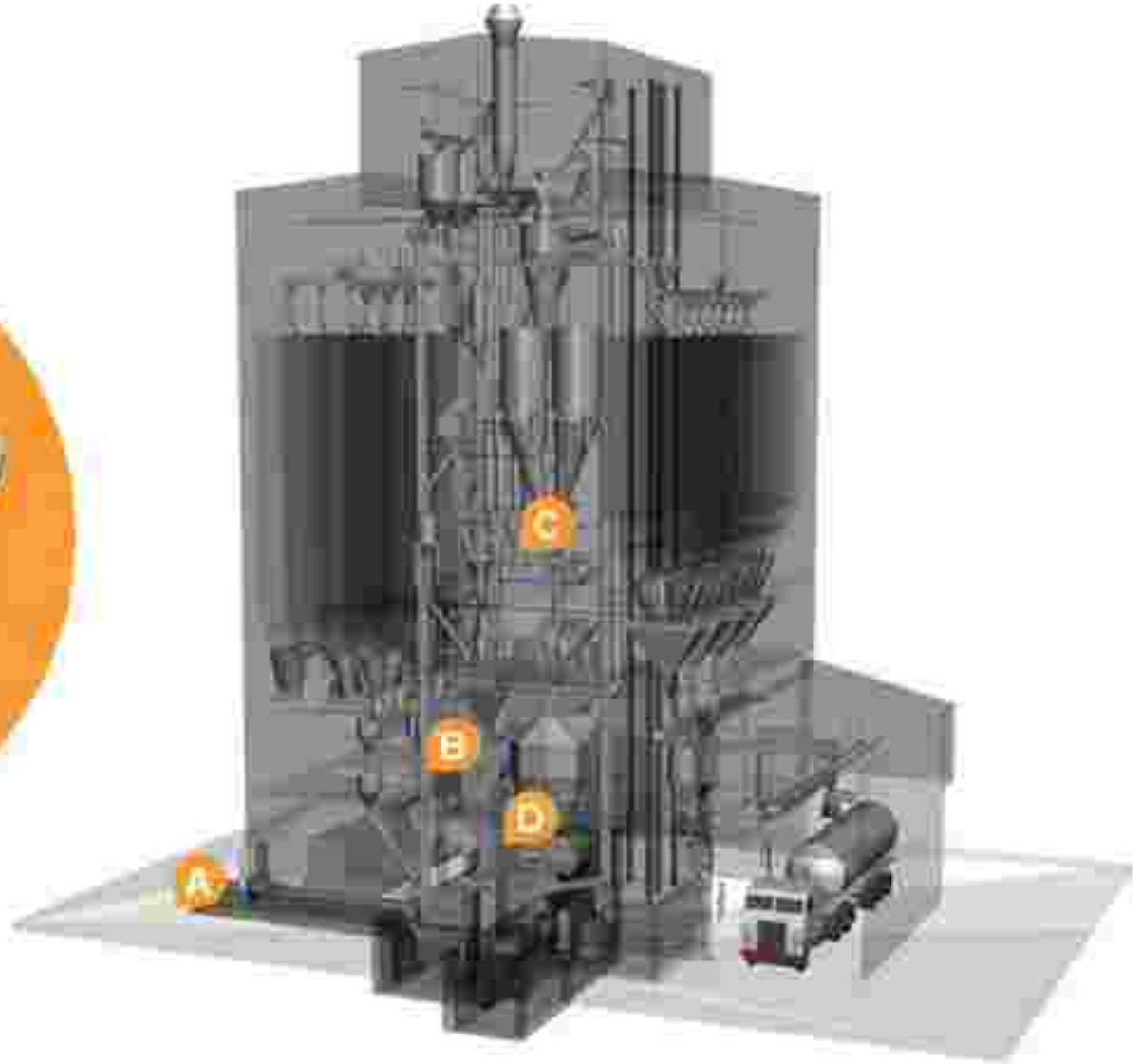
C Conditioner

D

Cooler



Bühler Multi-NIR Inline



Benefits of moisture regulation alone…

- **Lean cost formulations**
  - Reduced “safety margin” of moisture content in formulation due to consistent measurements (± 0.3%)

- **Constant product quality, app. 5 % more line availability**
  - Continuous product quality, even in case of moisture fluctuations of raw materials
  - Increased line availability due to reduction of fines

- **Energy savings in pelleting process**
  - Reduction of Pellet-Mill SME by up to 10 % due to optimized moisture content

- **Product safety and traceability**
  - Continuous monitoring of moisture and fat content
  - Reporting function of stored data / Traceability

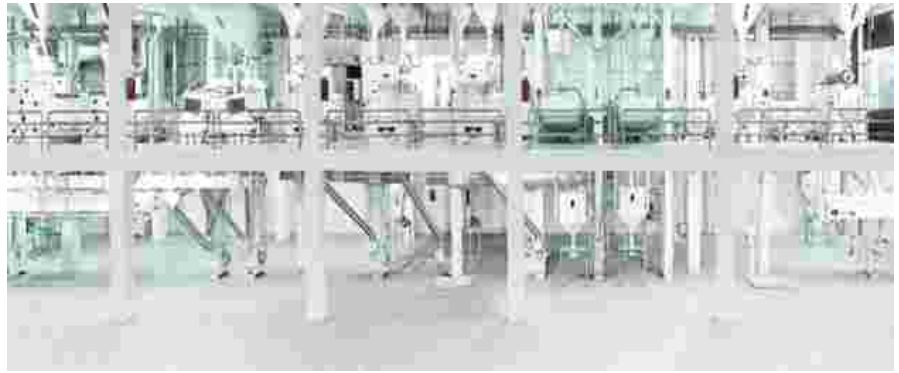
Typical ROI conservative assumptions

Line capacity:	100’000 tons/year
Moisture increase:	0.5%
Sales price feed:	300 €/ton

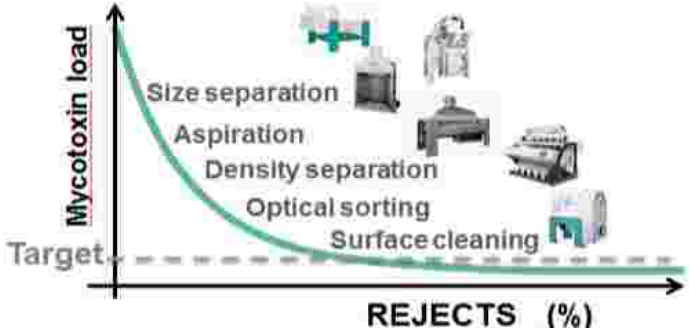
Annual savings:	**150’000 €**
Return on investment:	**< 1 year**

The Bühler Feed & Food Safety Initiative

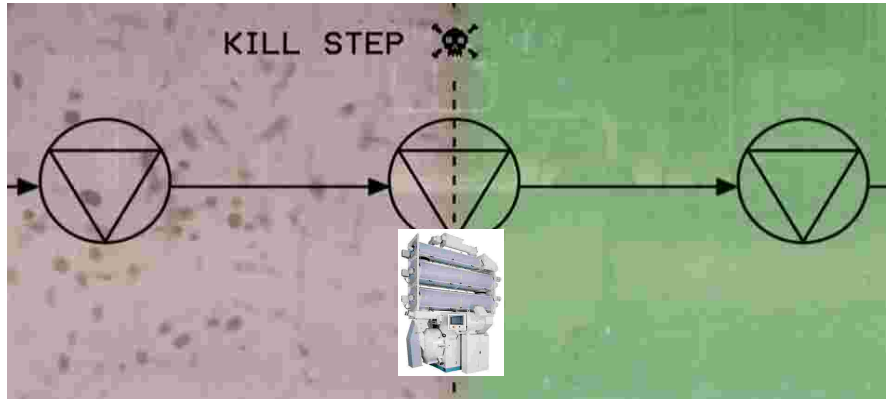
Hygiene from plant, machine to operations



Mycotoxin: prevention & reduction



Process design, validation & monitoring



Know how and training

Examples of Bühler Food and Feed Safety solutions.

From hygienic design ...

Kubex T Pellet Mill

up to 20 % less energy consumption and hygienic design

... over system solutions for mycotoxin control .....

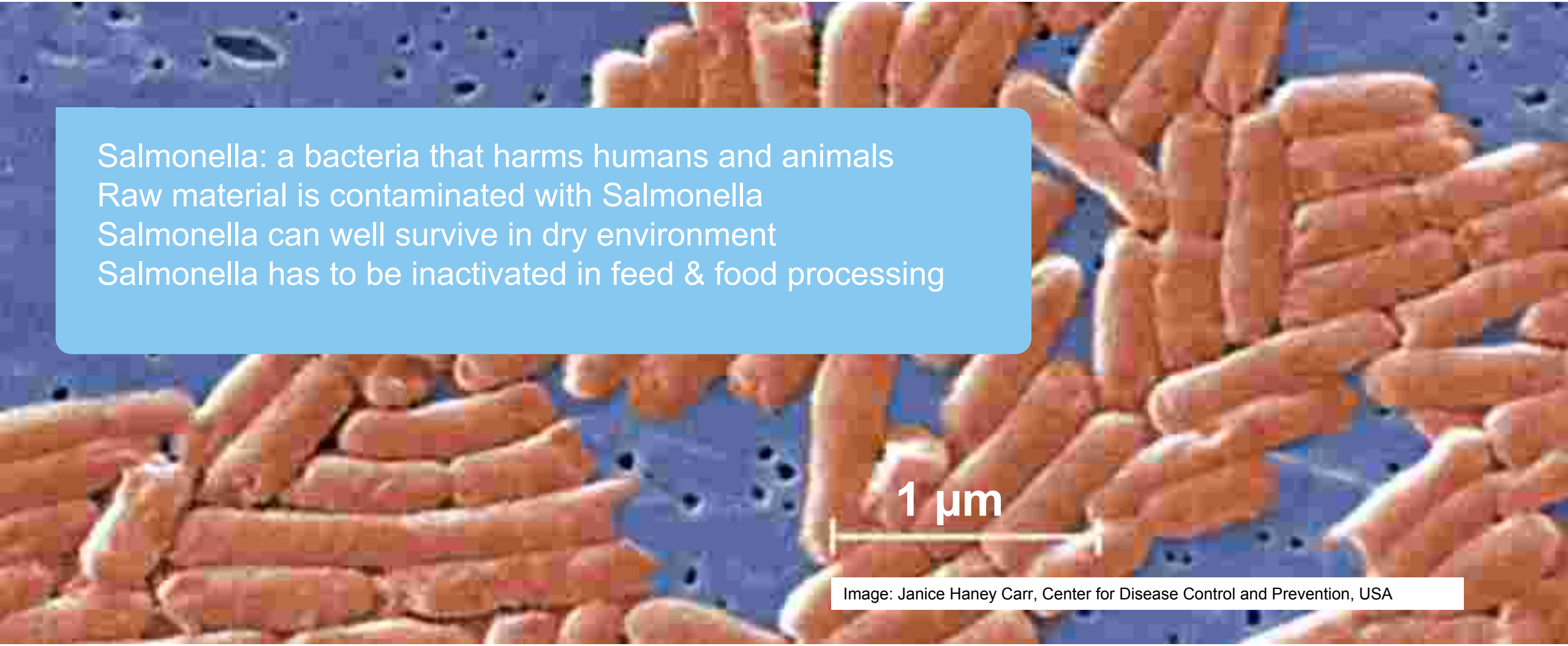
SORTEX Optical Sorting

...to inactivation technologies.

HYMIX Plus Conditioning

100 % of the feed mash is heated to the set temperature prior fed to the pellet mill (salmonella, bacteria and mold reduction)

The challenge with Salmonella in feed and food



Salmonella: a bacteria that harms humans and animals
Raw material is contaminated with Salmonella
Salmonella can well survive in dry environment
Salmonella has to be inactivated in feed & food processing

Image: Janice Haney Carr, Center for Disease Control and Prevention, USA

The HYMIX Plus Conditioner inactivates Salmonella reliable.

- 100% of the feed mash is heated to the set temperature.
- 0% re-conditioning or dumping of insufficiently treated feed mash.

up to 5%

Increased line capacity

up to 50%

Faster start-up of pellet mill

Internet of Things is not a vision, it's reality.

"A network of internet-connected objects able to collect and exchange data using embedded sensors."

Device management

- Enable experts to remotely diagnose problems without user intervention.

Better decisions through data analytics

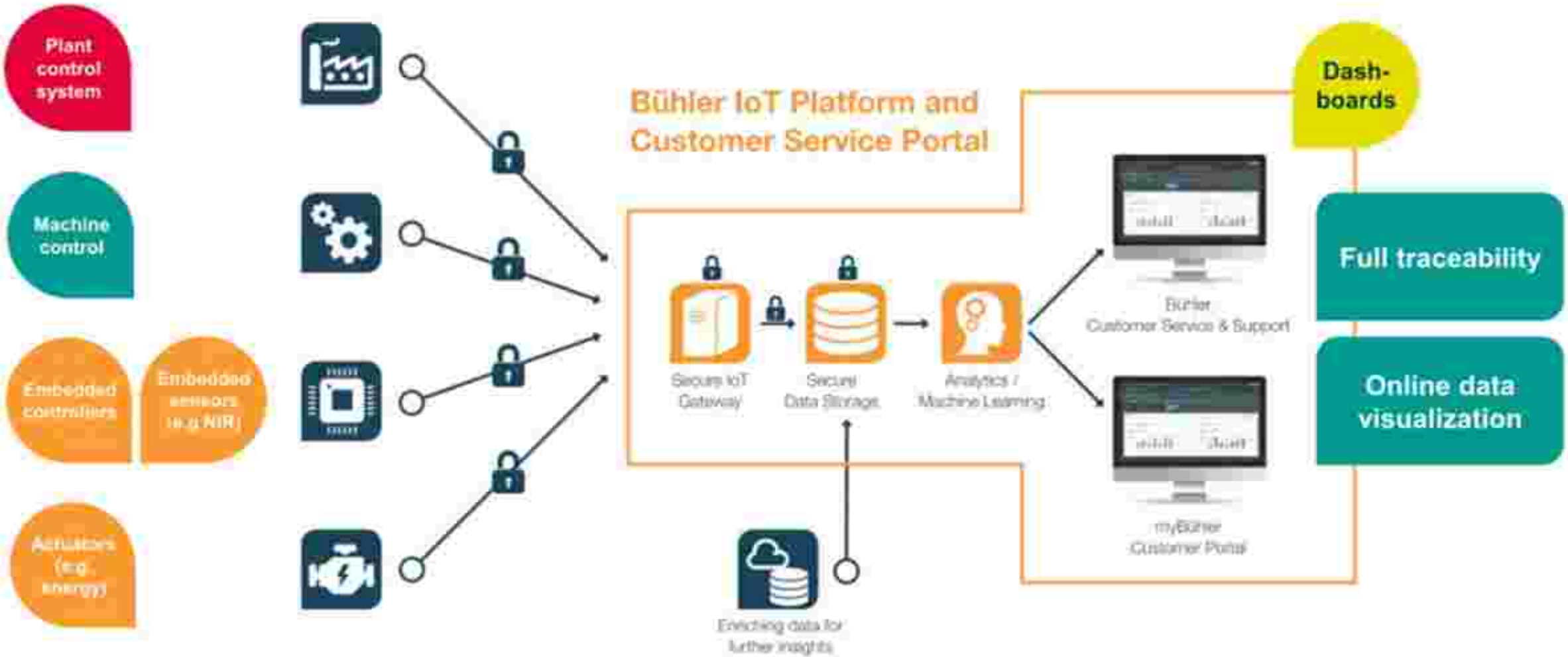
- User behavior data can be used to improve product design.
- Data history helps to predict necessary maintenance.
- Business processes can be optimized.

Self-regulating production

- Individualized products can be produced cost efficient.

Traceability

Everything under control – with Bühler's IoT platform.



Better decisions, powered by smart data.

Dashboards

- Key performance indicators (KPI's)
- Energy consumption
- Quality data
- Downtime

Mobile Applications

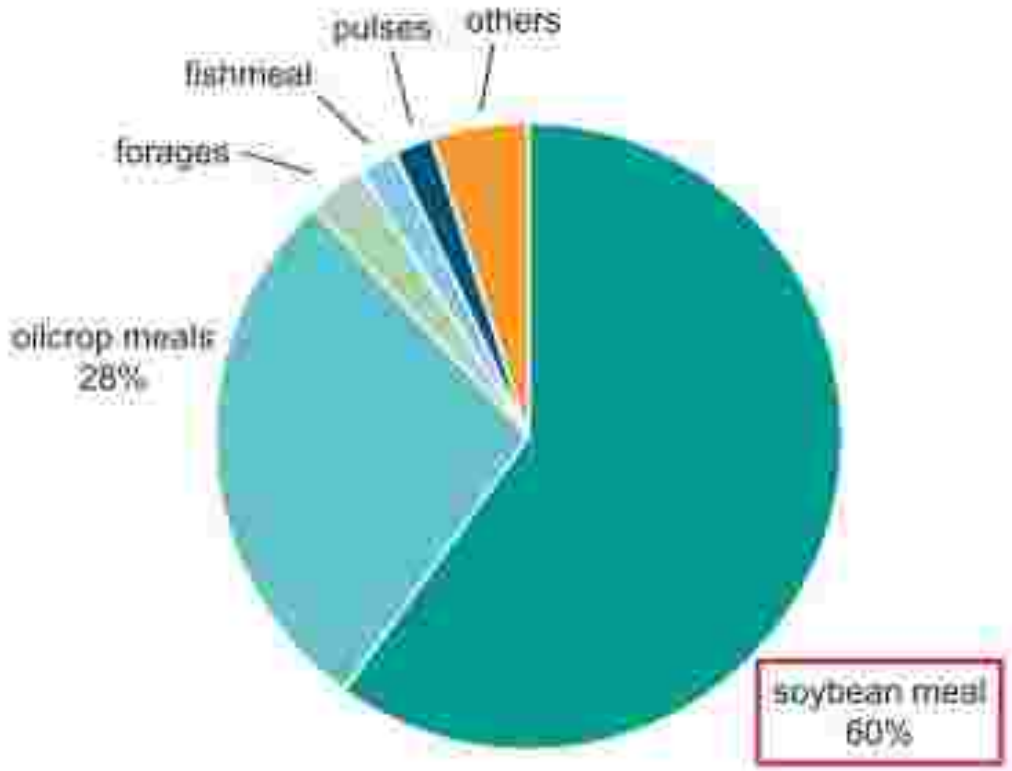
- Management information
- Maintenance support
- Plant operation

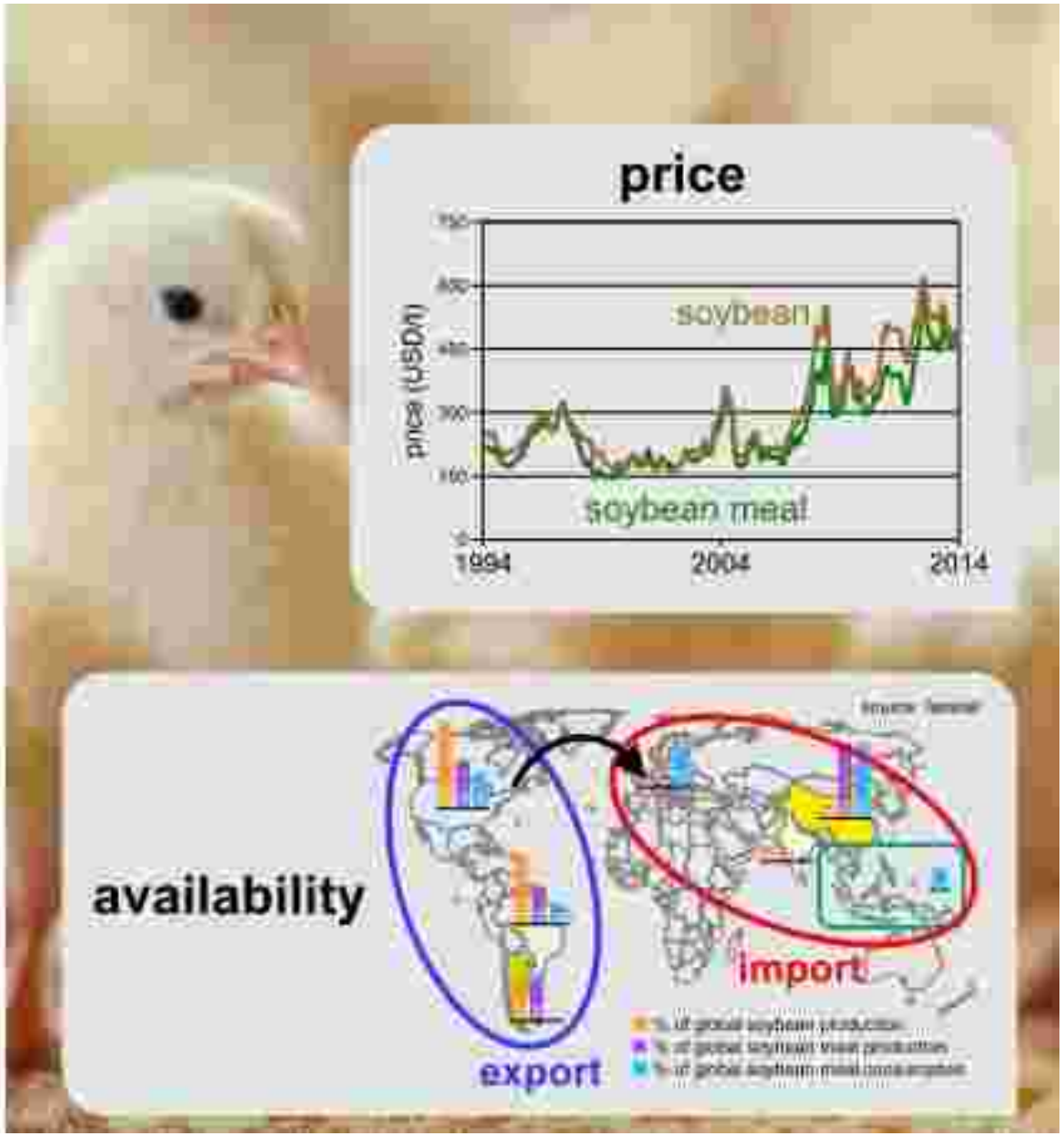
Feed Safety

- Product track and trace
- Logistic support
- CCP monitoring
- System collaboration (ERP / LIMS / Least cost formulation systems)

Resources become scarce as world population grows.

Protein sources in animal feed today





Alternative raw materials will play a fundamental role in the future.

Insects are a promising protein source in feed and food.

- Insects can grow on organic residues, which are available all around the world.
- Farming insects neeeds less space.
- Insects are very nutritious for animals and humans.

The future is not predictable, but can be shaped!

Thank you for your attention!