



Applications and Advantages of Extrusion Technology for Dry and Wet Pet Food Production with Fresh Meat

Future Pet Food Conference, November 5th & 6th, 2024

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Head of Market Segment Petfood at Bühler

Extrusion Solutions for Dry and Wet Petfood.

Biberach, November 6th, 2024

01

Introduction to Bühler

02

Overview of Extrusion Solutions
Dry and Wet Petfood by Bühler

03

Focus Topic:
Dry and Wet Premium Petfood

04

Conclusion and Q&A



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6:30 a.m.

7:15 a.m.

10:00 a.m.

3:00 p.m.

7:00 p.m.

Bühler is part of the everyday life of billions of people

7:00 a.m.

7:30 a.m.

12:00 p.m.

6:00 p.m.

8:00 p.m.






Food

- Grain / pulses / rice / maize processing
- Sorting and weighing
- Malting and brewing
- Cereals / pasta / noodles
- Meat and milk analogues
- Snacks, biscuits, wafers
- Chocolate
- Baked goods
- Coffee
- Pet food



Feed

- Swine
- Poultry
- Cattle
- Aqua
- Insects

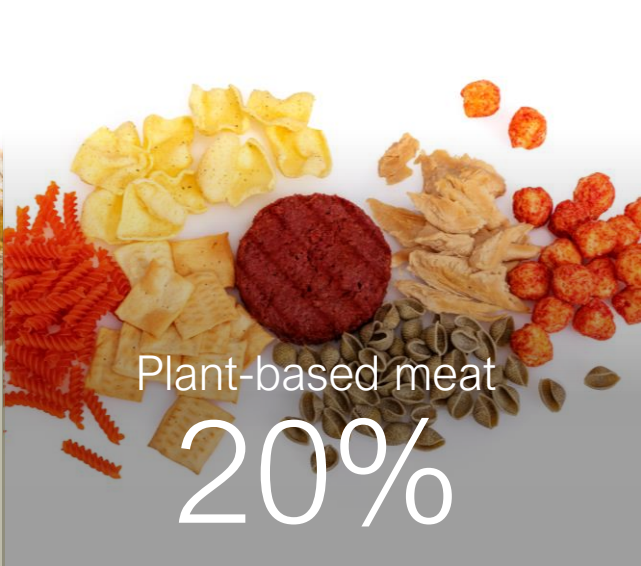


Advanced Materials

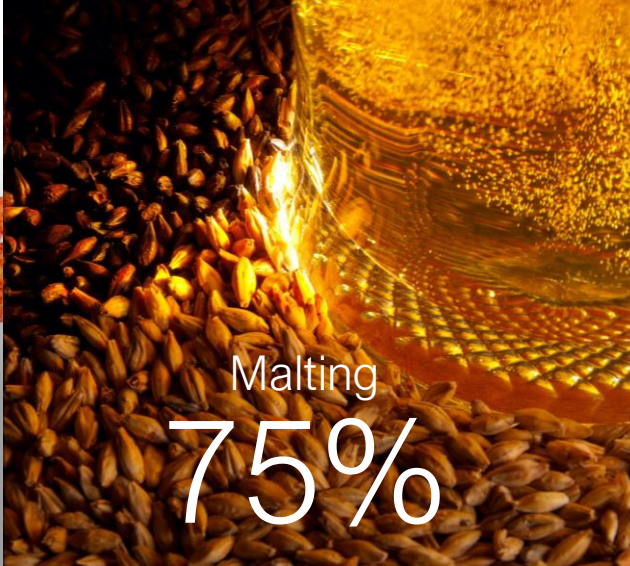
- Die-cast aluminum
- Thin-film coatings
- Inks and paints
- Batteries
- Energy



Milling solutions
65%



Plant-based meat
20%



Malting
75%



Glass coating
50%

Market leadership in the industries we are active in



Chocolate processing
60%



Wafer
50%



Die-cast parts in cars
25%



Packaging inks
20%

Close to customers

Global network

Family owned

Innovation and education



12,500
FTE employees



140
Countries



CHF 3.0 bn
Turnover



5%
of turnover for innovation



51.1%
Equity ratio

Food Extrusion at Bühler.

Cooking Extrusion



Wet and dry textured
Proteins



Reconstituted and
fortified rice



Breadcrumbs



Modified flour and starch



Pasta and couscous



Direct expanded cereals
and snacks



Indirect expanded
snacks and traditionally
cooked flakes



Co-extrusion



Pet food



Asian Noodles

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Dry, Premium and Wet Pet Food with Bühler Extrusion Solutions, A huge variety of shapes, textures, densities, colors and formulations.



Direct-expanded kibbles & kibbles with *fresh meat inclusion*

Dog and cat foods with moisture contents below 8%.



Multicolored products.

Continuous process solution with low- and high-pressure dosing systems for addition of color



“Wet Tex” Petfood products.

Plant-based or hybrid (animal & plant protein) Wet Petfood products of different shapes, textures, colors, thicknesses made with texturizing extrusion technology.



Filled Pillows

Dry or semi-moist. The filling is added at the end of the extrusion process. The filled strands are pinched apart by a downstream separating system.



Semi-moist Pet Food & Dental Sticks

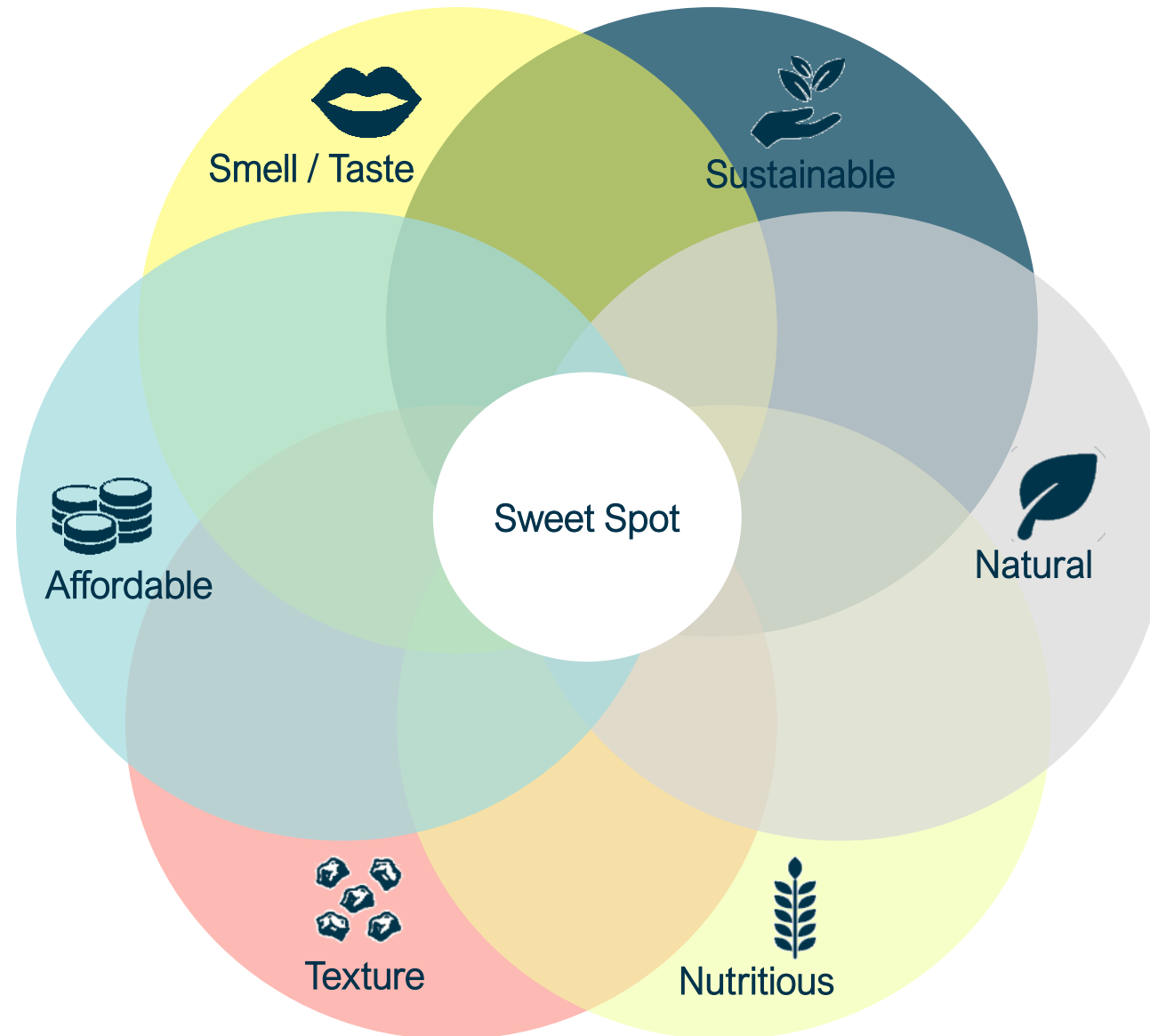
Soft dog and cat foods with moisture contents above 13% and a bulk density of 400–600 g/l.



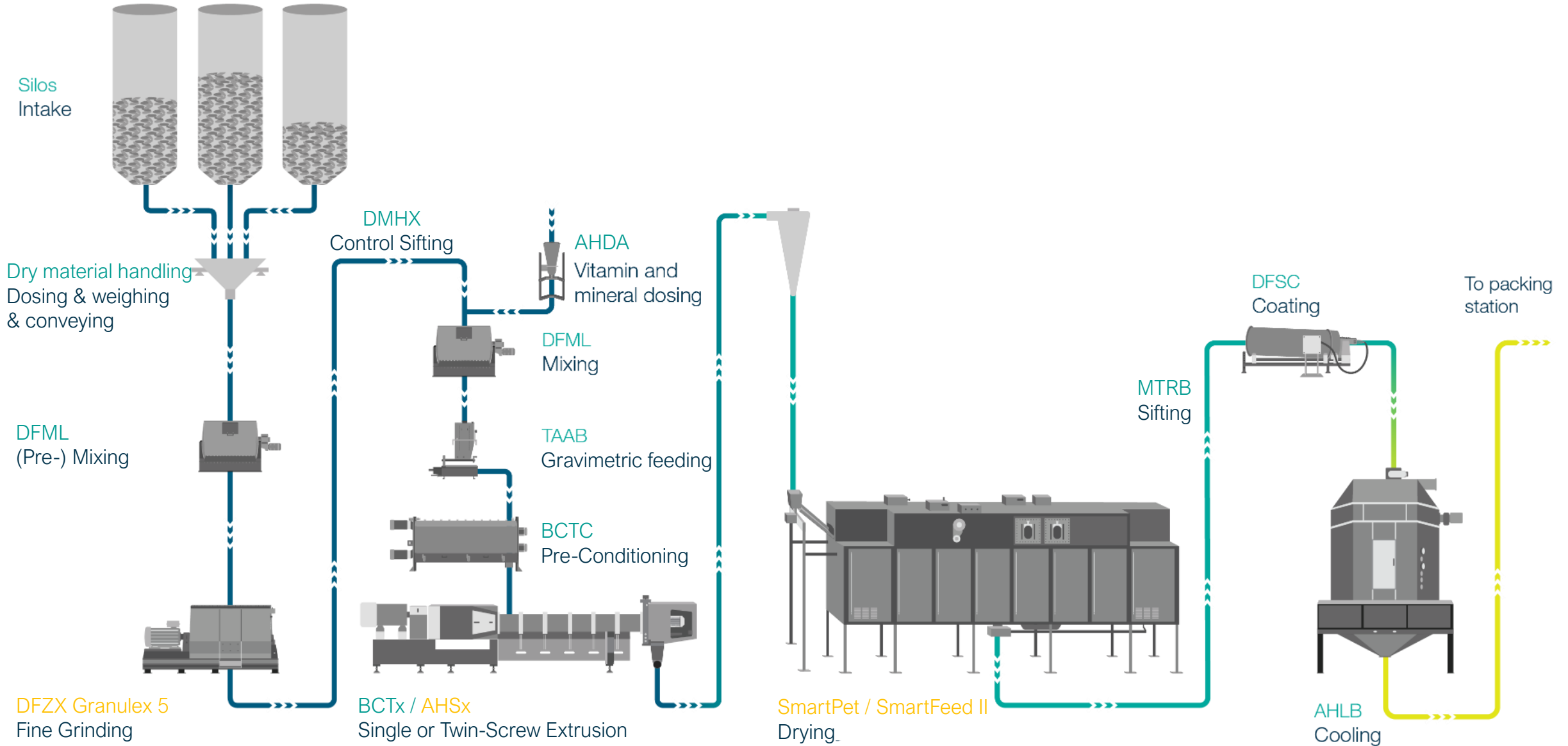
Baked Pet Food.

Using a Bühler’s mixing, forming and oven-baking process solution to produce pet biscuits, semi moist products, soft & chewy textured pet food and other Snacks.

Consumer requirements for petfood.



Perfect interaction of several process steps to reach the *Sweet Spot*. Complete dry, treats & wet tex petfood plants by Bühler.



The route to a top quality extruded petfood product.

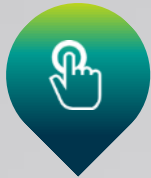
Most important process steps.

- **Fine-Grinding:** reaching a consistent, narrow particle size distribution of the ground raw materials is key for a well digestible and premium petfood kibble quality
- **Pre-Conditioning:** reaching a homogenous cooked, highly gelatinized dough before the extruder
 - reduces required mechanical energy and wear in the extruder and
 - increases capacity and cooking degree of the raw materials
- **Extrusion:**
 - key to properly cook the raw materials, to give the desired shape, color and density to the kibbles
 - Kill-step in the production process
- **Drying & (Pre-)Cooling:**
 - key to receive a safe, storable and uniform moist kibble to achieve a long shelf life
 - Pre-cooling key to achieve a top vacuum coating quality

Optimal fine grinding is key for high final product quality. New Granulex® 5 Series Hammer Mill.

No overs in fine grinding.

Less fines in coarse grinding.



Conventional Hammer Mill

Granulex® 5 Series Hammer Mill

Adjustable grinding curve thanks to modular configuration.



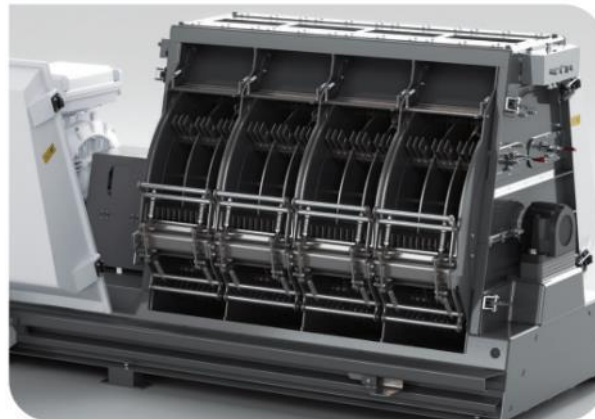
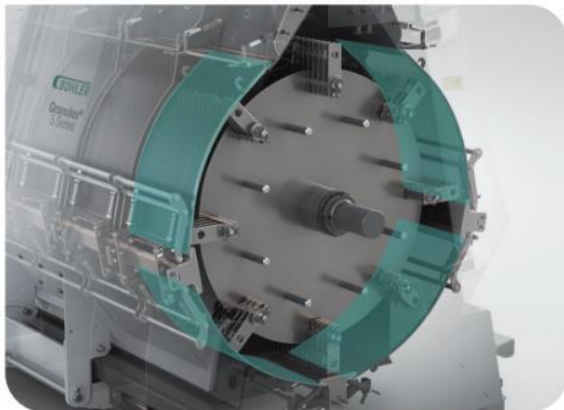
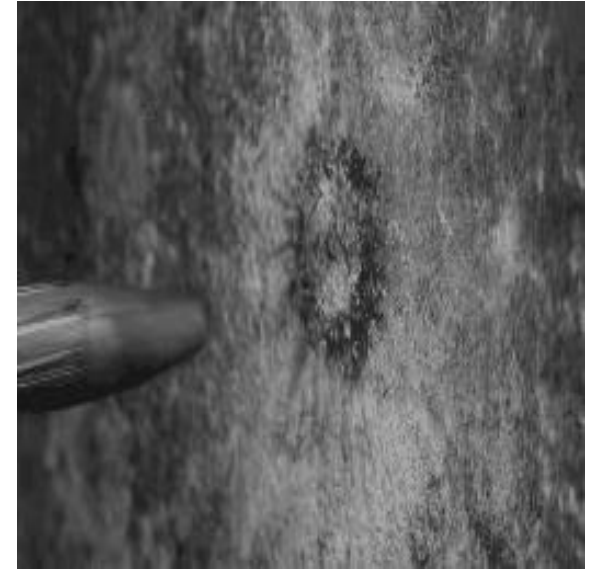
What happens in a hammer mill

The particle collides with the hammer – impact grinding

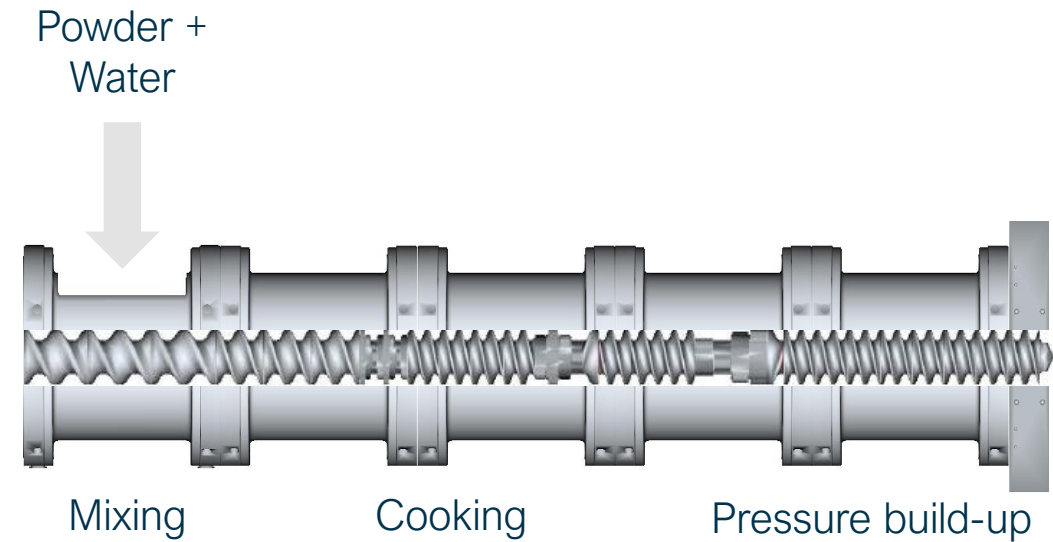
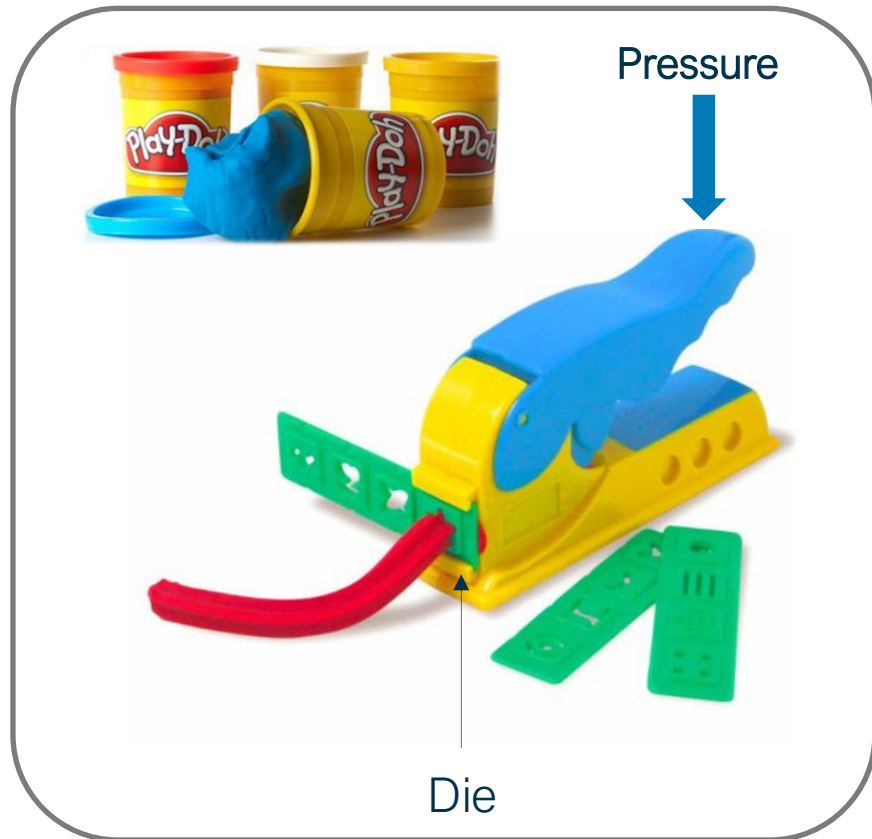
The working principle of a hammer mill grinding is an inelastic collision.

The particles collide with the hammers at speeds between 90-120 m/s

The speed of impact converts in destructive energy, temperature increase and water evaporation.



“A process by which a material is forced through a restricting orifice”
Extrusion technology



Heat for cooking:

- Screws turning: friction
- Inject hot water + steam
- Heat the barrels

Continuous cooking

Processes

- Mixing
- Heating
- Shearing
- Kneading
- Melting
- Pressurizing
- Shaping



Effects

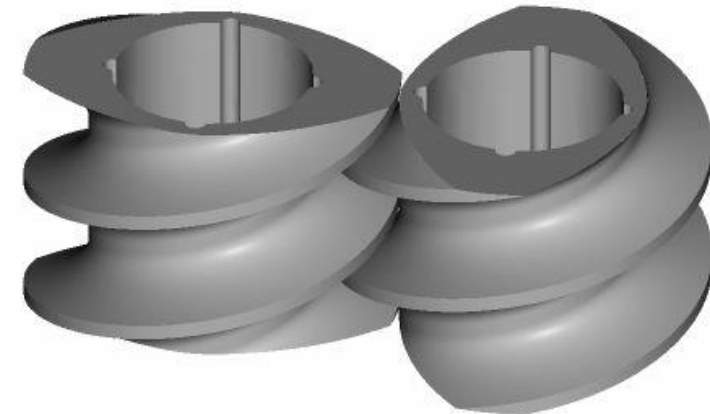
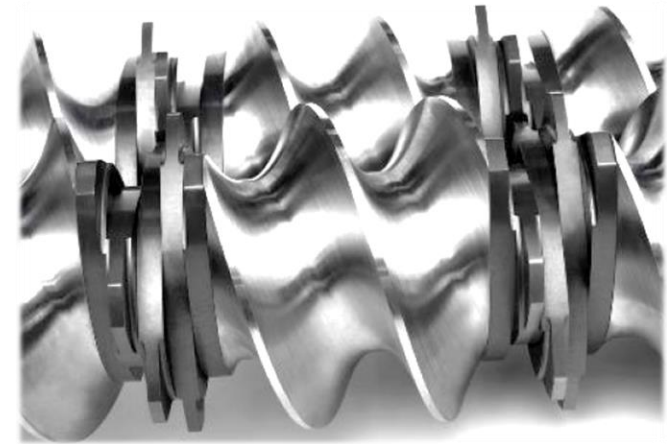
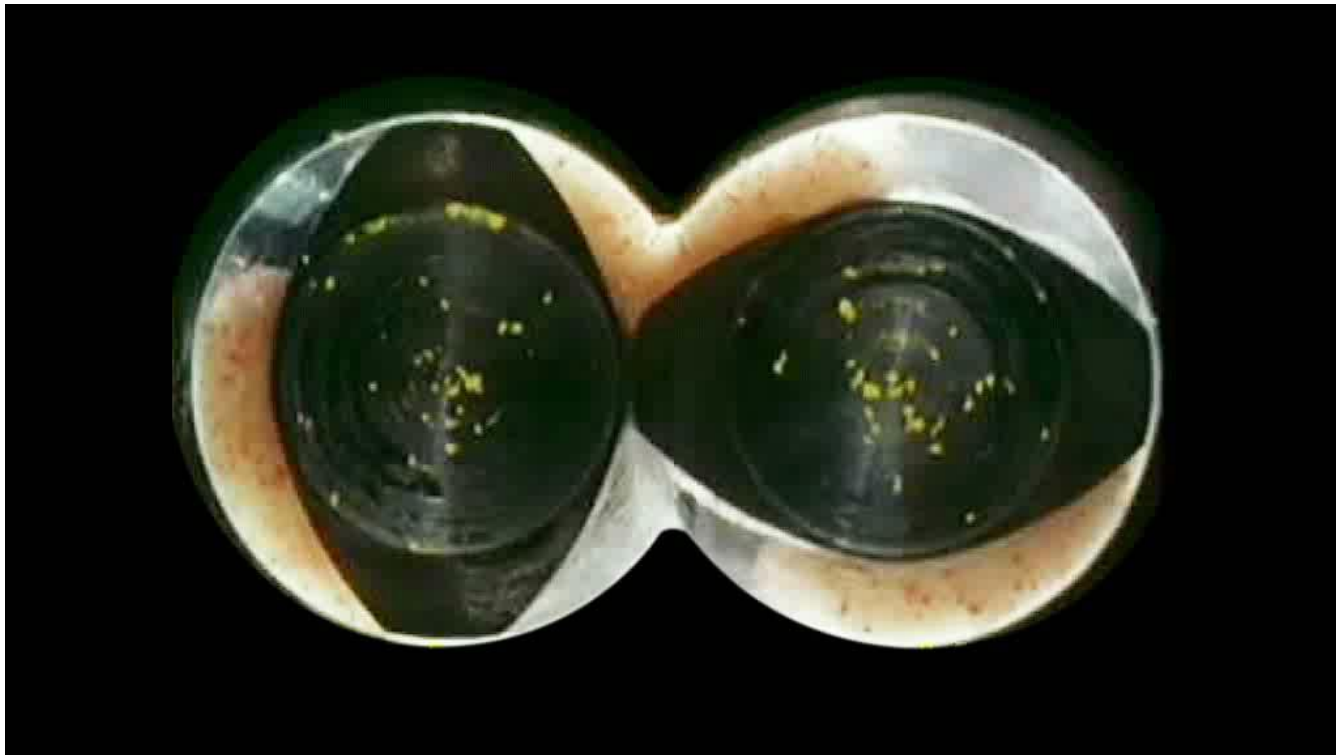
- Protein denaturation
- Starch “gelatinization”
- Enzyme deactivation
- Antinutrient reduction
- Kill step (bacteria)



Twin-Screw Extruders allow flexibility in recipe formulation

Characteristics:

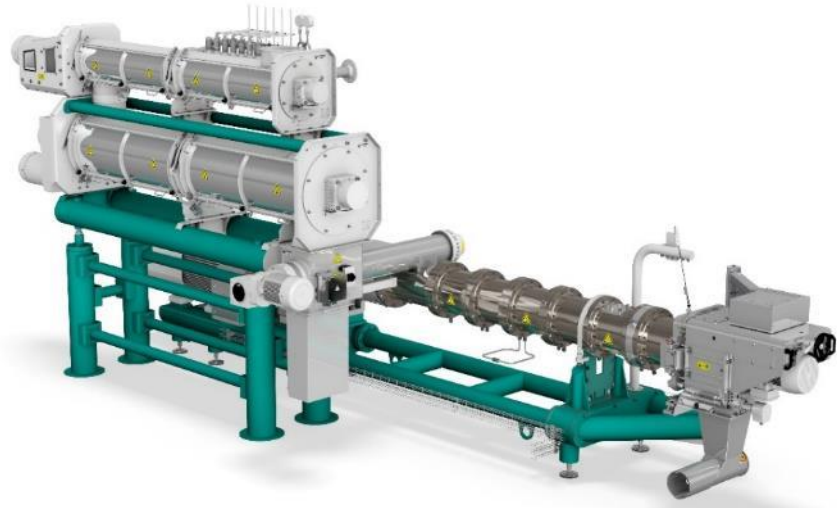
- Co-rotating, intermeshing (“self-cleaning”)
- Both shafts identical



Different Die Shapes leading to different Products



Single or Twin-Screw Extrusion: Workhorse or flexible allrounder



Products:

Dry

Round & Brown

Semi Moist

Fresh Meat

Co-Extruded

Treats

Preferred Solution:

Single Screw Extruder

Twin Screw Extruder



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Pet Food Trends



Humanization & Premiumization

Health & Wellness

Sustainability

Food Safety

Focus Topics



Humanization & Premiumization



High
Fresh Meat
Addition



Wet Tex Petfood

High meat and fresh meat addition

- Due to the humanization of the pets, trends from human diets are highly important in Pet food.
- Growing demand for “fresh” nutritional pet food.
- Trend in the industry is to claim higher quantities of meat or **fresh meat** in its products, e.g. **dry kibbles**.
- Adding meat limits expansion, possible shapes and durability of a dry kibble.



Differences of dry kibbles containing fresh meat

Conventional
Dry Petfood



Dry Petfood
with low Fresh
Meat Inclusion

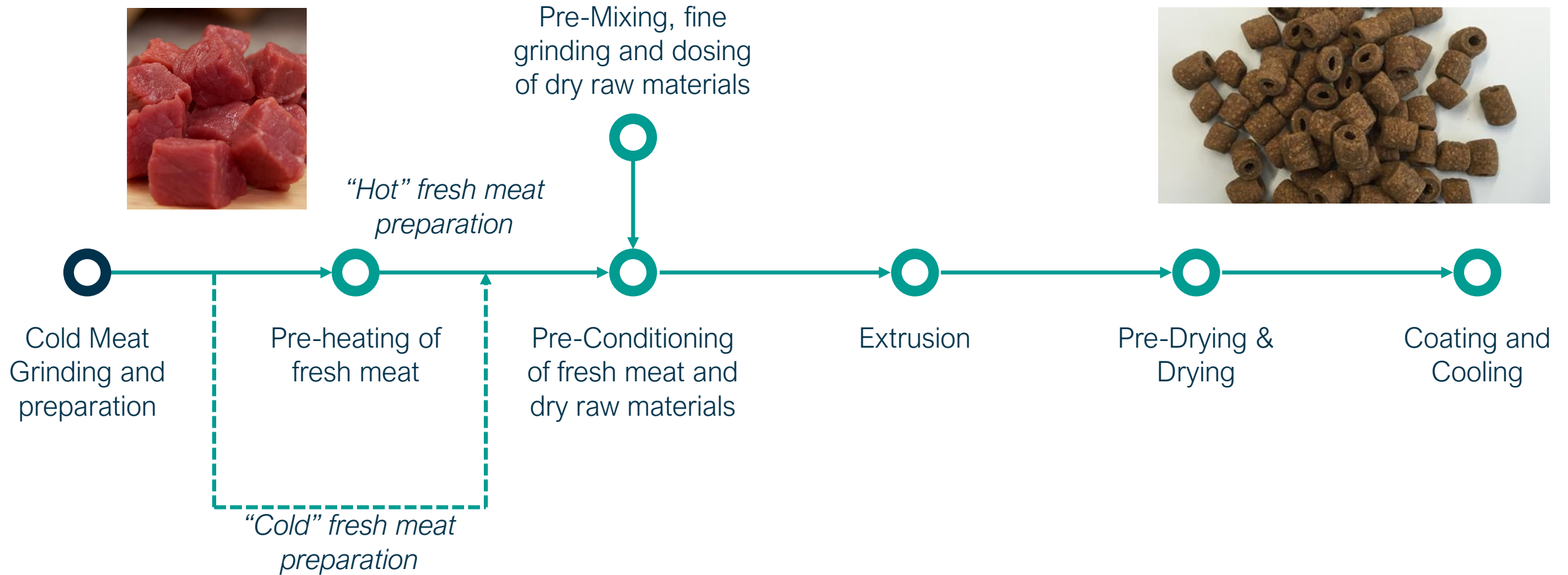


Dry Petfood
with high Fresh
Meat Inclusion



Adding fresh meat limits expansion, possible shapes
and durability of a dry kibble –
but Twin-Screw Extrusion allows to add high volumes.

How to add Fresh Meat to Dry Kibbles with high inclusion rates



Focus Topics



High
Fresh Meat
Addition

Humanization &
Premiumization



Wet Tex
Petfood

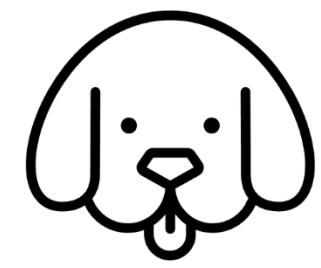
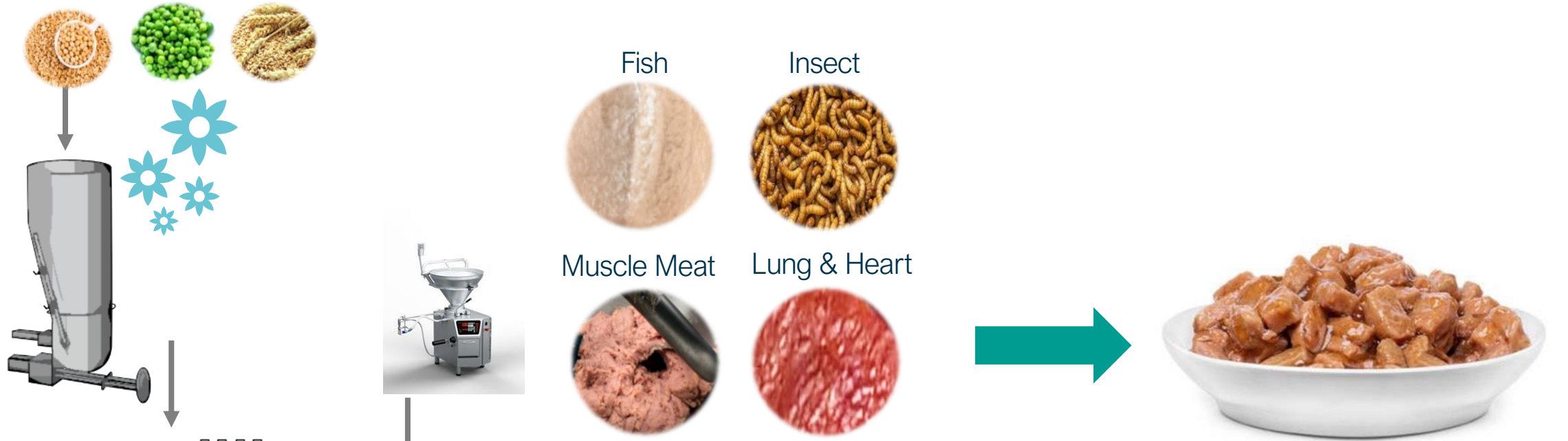
Bühler's Wet Tex Technology to offer new options for **Wet Petfood** creation

- Using Bühler's High Moisture Extrusion (Wet Tex) Technology can offer interesting functions to producers:
 - Creation of different **colors**, **textures**, densities and thicknesses thanks to Extrusion cooking & Aeration
 - **Fish like textures** thanks to the use of breaker plates (and Aeration)
 - **Flexibility in raw material use**, be it in powder form or as a liquid, be it animal, insect or plant protein
 - Textured products can therefore be with a hybrid (meat&veggie) formulation or completely plant-based
 - **High throughputs** of up to 4 t/h possible



Creating new Wet Petfood with a variety of ingredients and exciting textures

Dosing of powders or liquids; fibers, starch or proteins; meat or plant-based

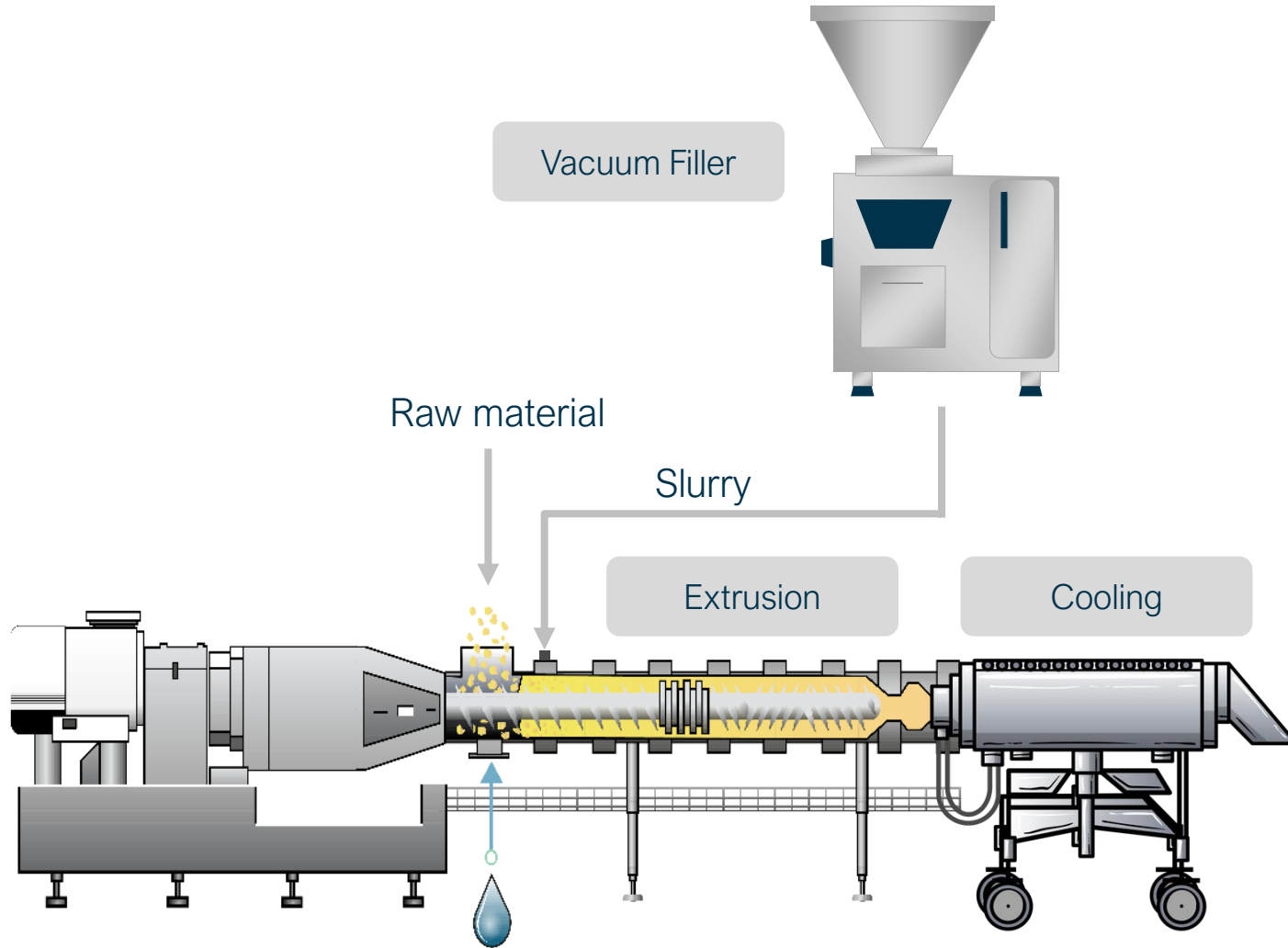


Plant-based only
Vegan formulation



Meat required
Hybrid formulation

(High Moisture) Extrusion with Direct Slurry Injection



Example of hybrid product based on high moisture extrusion - plant protein with meat slurry



Aeration improves texture, color, and «juiciness»

Aeration can be alternative to whitening agents!

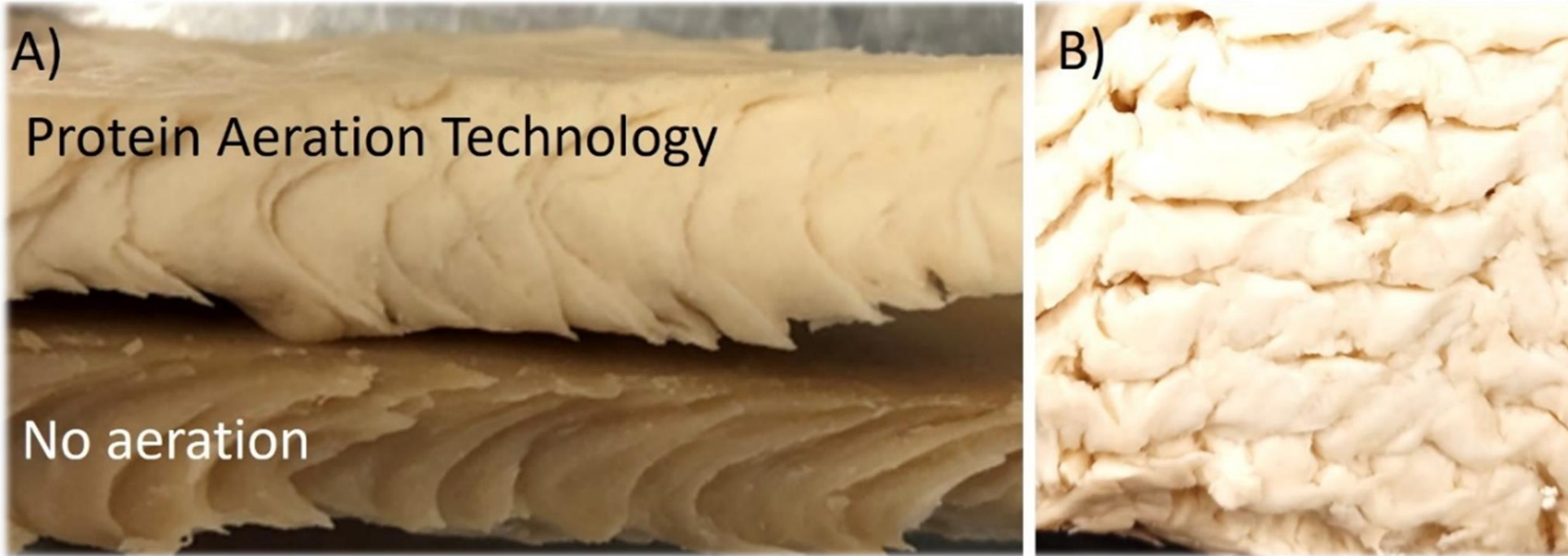


Fig. A Effect of Protein Aeration Technology on texture.

Fig. B Example meat alternative produced by breaker plates and Protein Aeration Technology.



Bühler Application Centers for Petfood Product Trials (CH, USA, CN).

Full industrial grade equipment for process and product development.

Great results depend on **parameter adjustments** tailored to the specific raw material.



Extrusion trials will **ensure** the right end-product properties.



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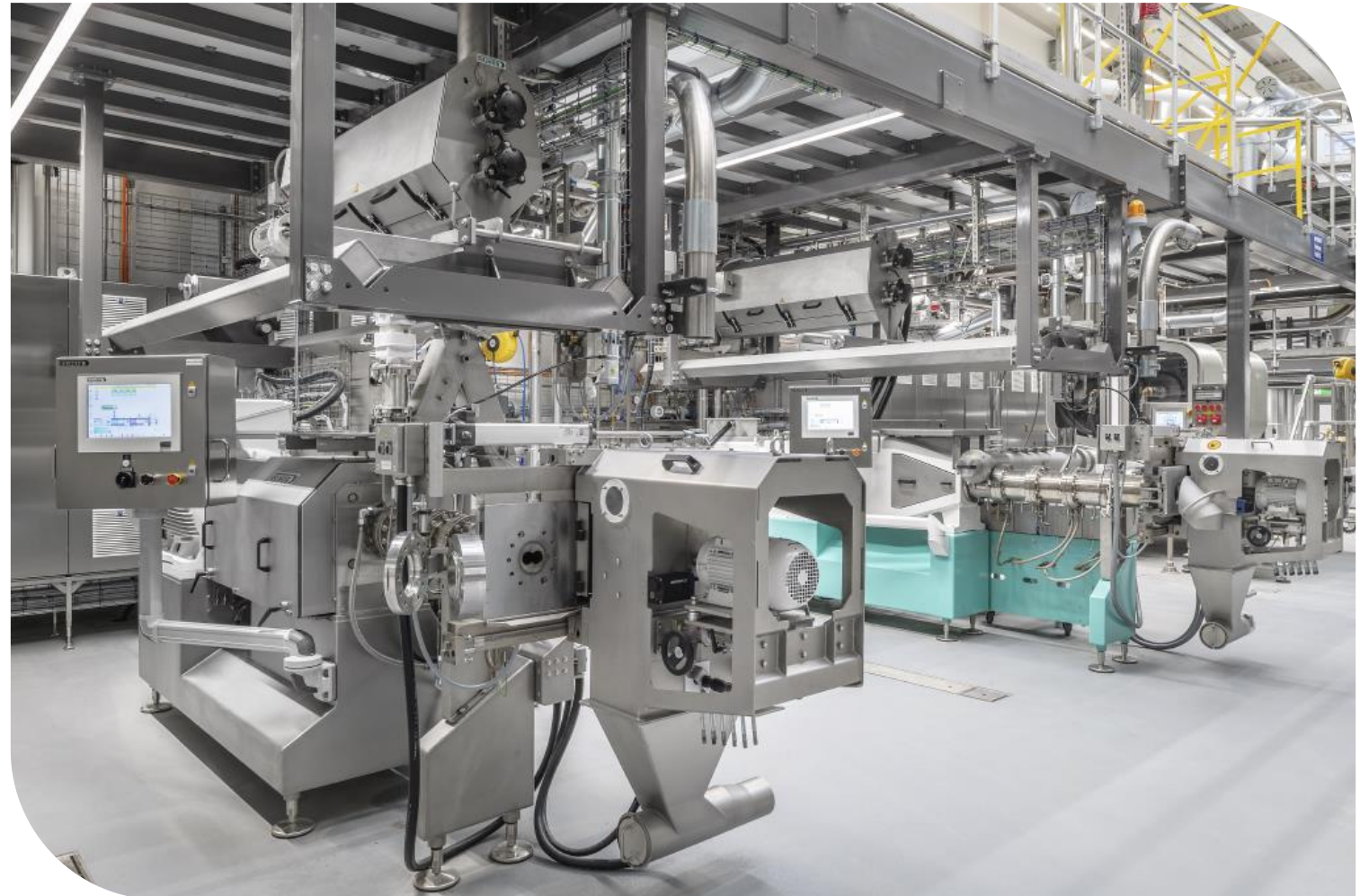
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Conclusion

- Trend of humanization and premiumization can be covered with premium petfood products made with extrusion; examples:
 - High Fresh Meat Addition
 - Wet Tex Petfoods
 - Snacks and Treats
- Bühler offers complete line solutions
- Come and visit us at our booth



THANK YOU FOR YOUR ATTENTION

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Engineering Customer Success.

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