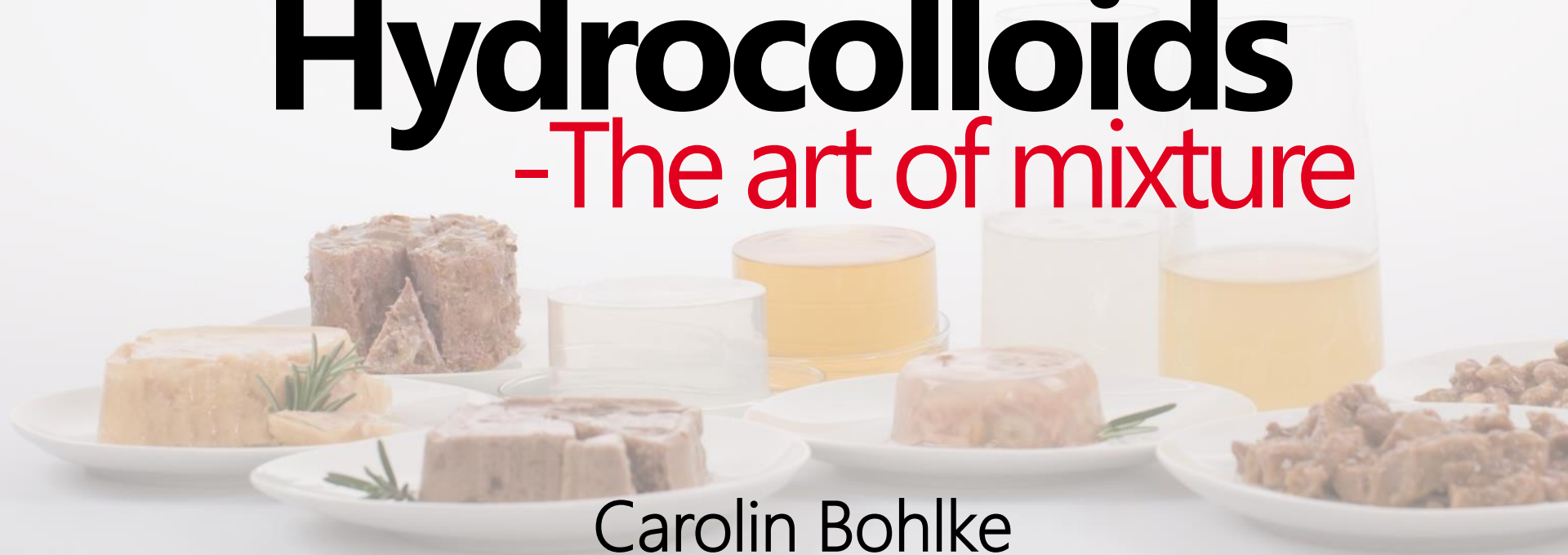
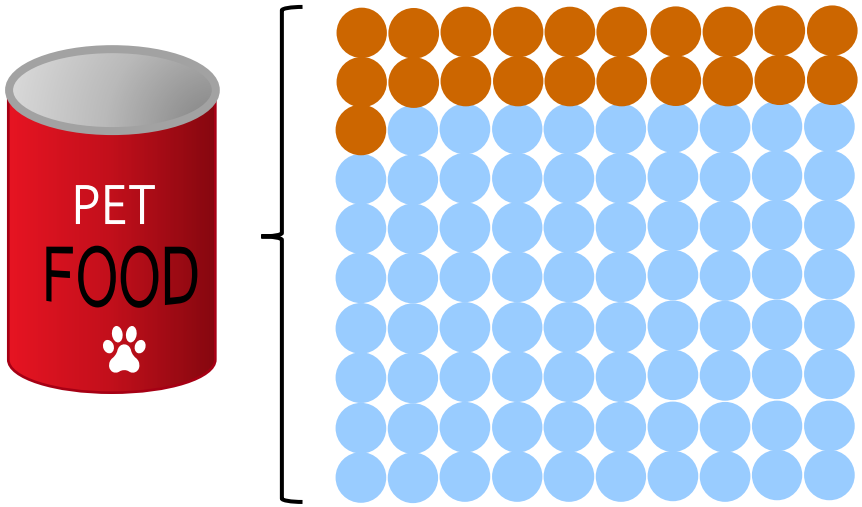
Hydrocolloids

-The art of mixture



Carolin Bohlke

Wet pet food composition

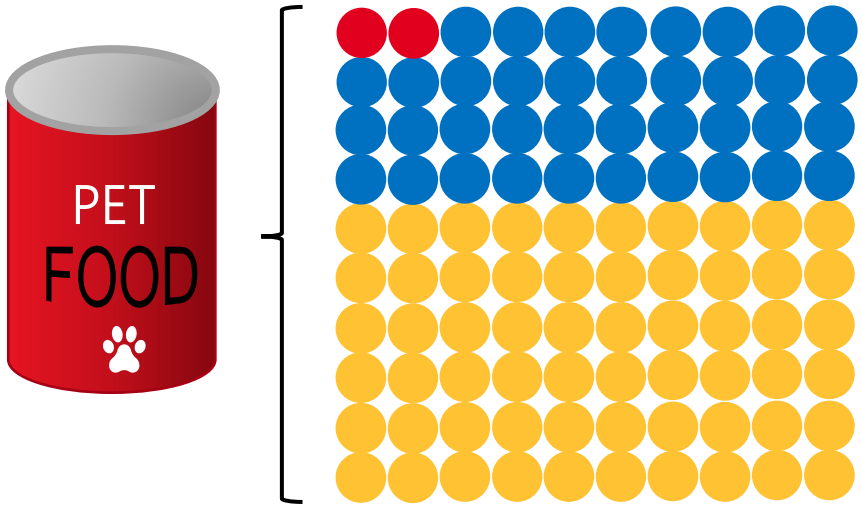


Final Feed

18-25 % Dry matter

75-82 % Moisture

Wet pet food composition



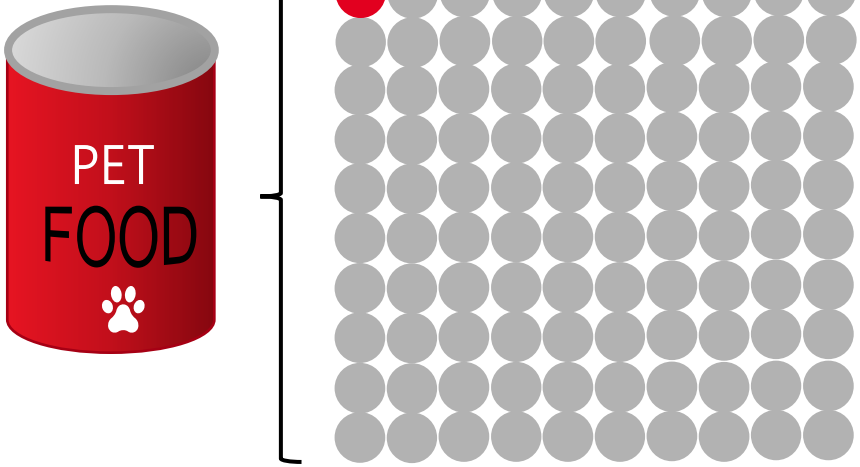
Recipe

1-2 % Hydrocolloids and premix

30-50 % Water

50-70 % Meat

Wet pet food composition



Simplified

~1 % Hydrocolloid blend

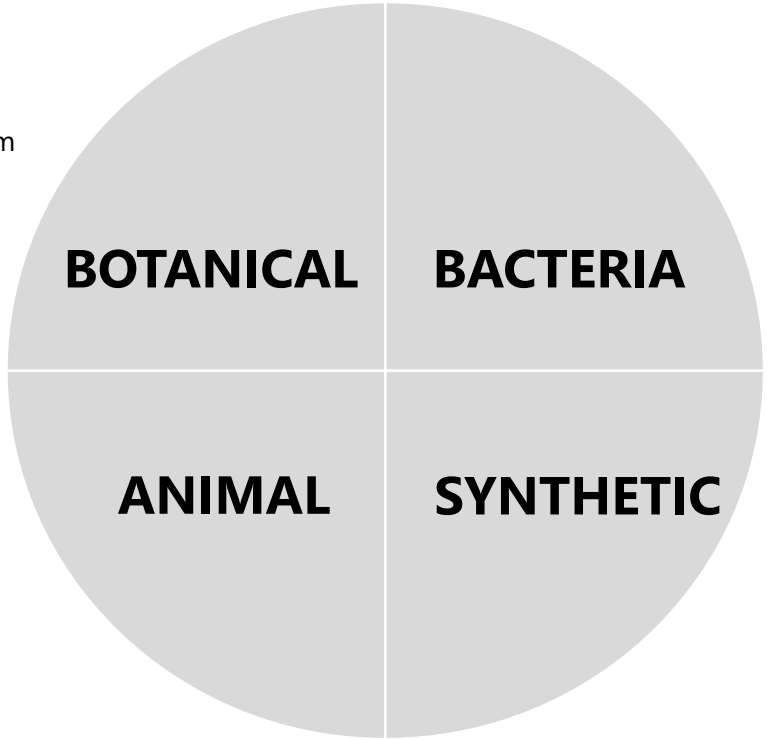
→ "A small leak will sink a great ship"

Hydrocolloids:

Small amounts

Big impact

Sources of Hydrocolloids



Gummi arabicum
Modified Guar Gum
Pectine
Alginate
Konjac
Starches
Cassia Gum
Carrageenan
Guar Gum
Locust Bean Gum

Xanthan
Cellulose
Dextran
Gellan Gum

Gelantine
Caseine
Chitosan

CMC (Carboxymethylcellulose)
HPMC
(Hydroxypropylmethylcellulose)

Functionalities

Emulsifying

Thickening

Everything at the right time!

Stabilizing

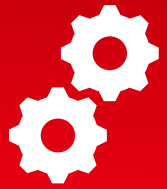
Gelling

What is the challenge?

Challenges?

Raw materials

Recipe design

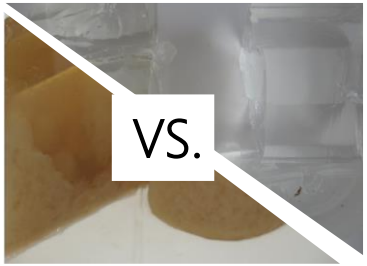


Application

Raw materials

Raw materials

- Requirements of the finished product ?



- Reliability of natural ingredients

  (Harvest, weather, availability, concurrence food industry)

  → Quality control essential

  → Feed legislation

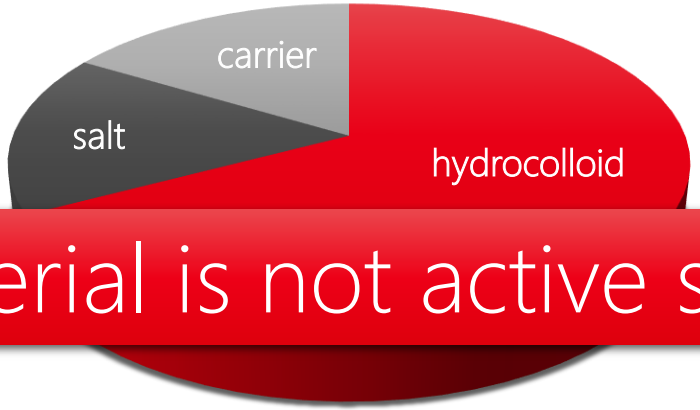
  → Research always ongoing

Example: Carrageenan

Carrageenan A

→ 260 g/cm²

→ Ash 28%



Carrageenan B

→ 245 g/cm²

→ Ash 20%

Raw material is not active substance!

More salt in A !!

→ Effectivity & quality is lower!

Data Sheets?!

Exchange raw materials/products based on data sheets?

→ No!

Results depending on:

- Measuring method (Temperature, time, pH, added salts, buffer)
- Instruments (Texture analyser, mixer, beaker!)
- Water quality

→ Practical raw material validation and comparison is needed!

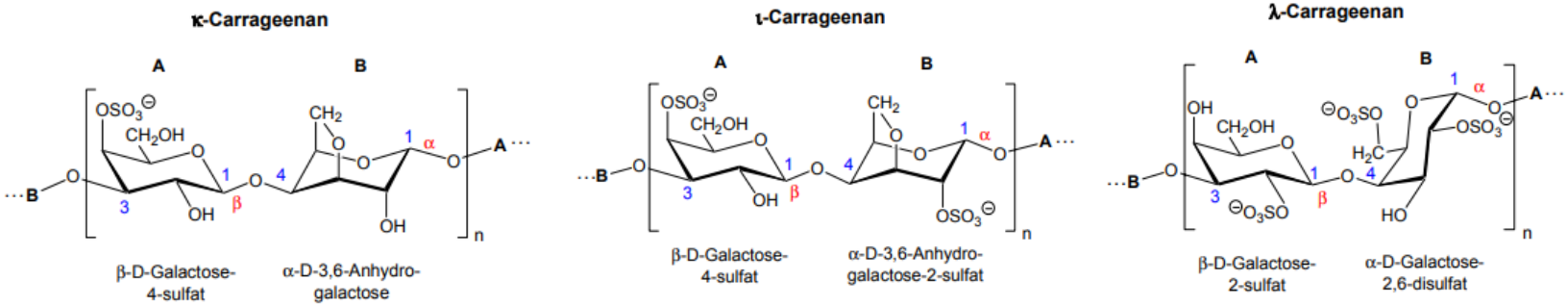
Recipe design

All time favorite **dream team**

Substitute players

Thickener, salt, buffer…

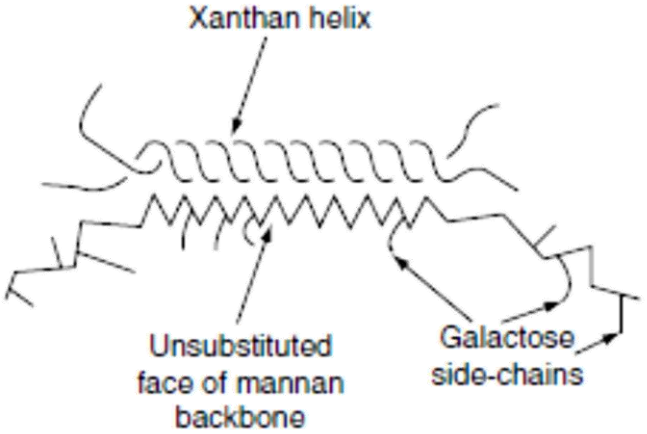
Dream team player No. 1: Carrageenan



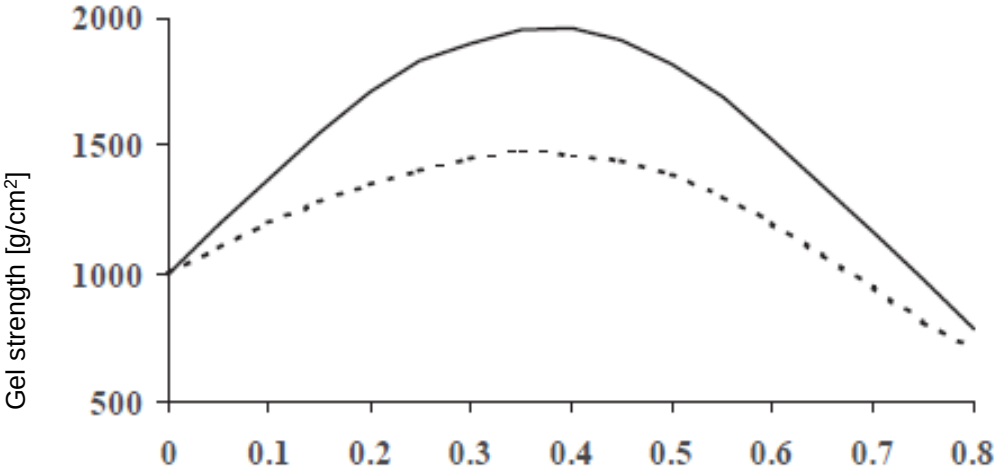
Type	Solubility in H_2O	Gel texture	viscosity
Kappa	Na-salt soluble, K-salt > 60°C	Strong brittle gel with high syneresis, strength increases with $[K^+]$	low
Iota	Na-salt soluble, K-salt > 60°C	Elastic, cohesive, gel without syeresis, strength depending on $[Ca^{2+}]$	high
Lambda	Cold & hot soluble	No gelling	high

Dream team player No. 2: Galactomannans

Combination GM + SRC/RC



Combination GM + SRC/RC: Synergism



(%) Fraction of LBG or konjac gum with κ-Carrageenan with 1% total dosage

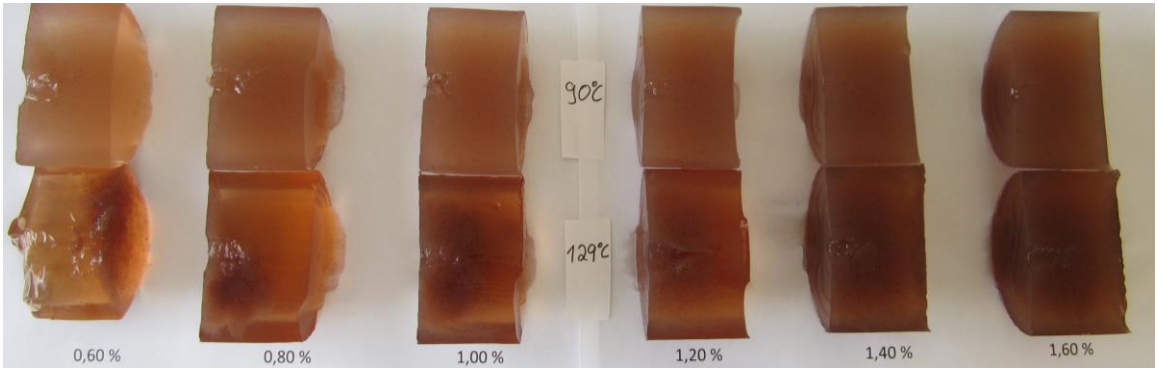
(Handbook of Hydrocolloids; Woodhead Publishing Limited 2009)

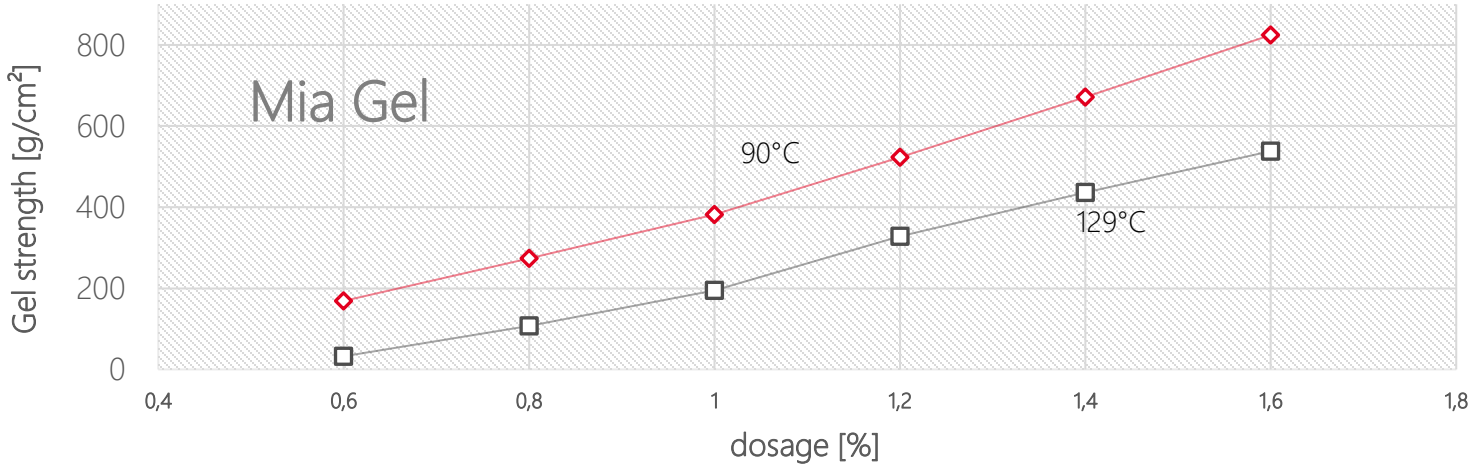
Combination GM + SRC/RC

- Reducing syneresis
- More elastic texture
- More gel strength/$

Optimum at 0.3-0.4% → Depending on type and quality!

The right dosage ?!

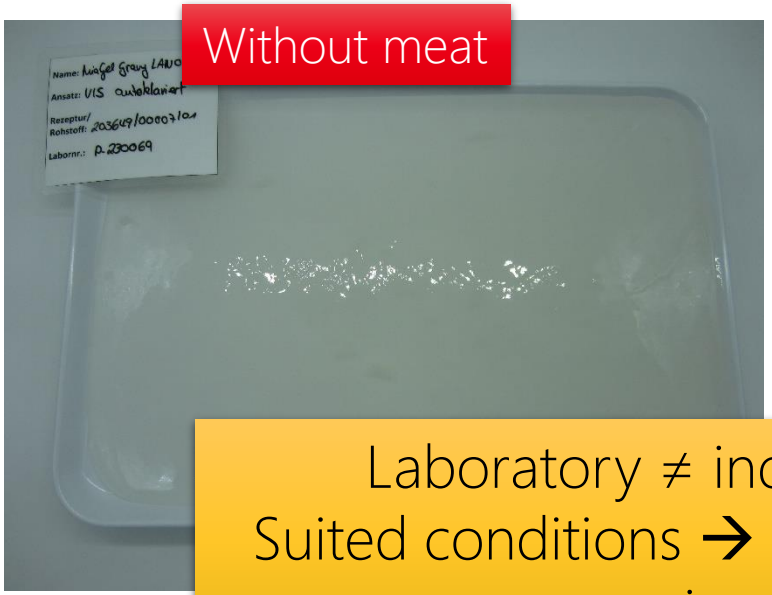


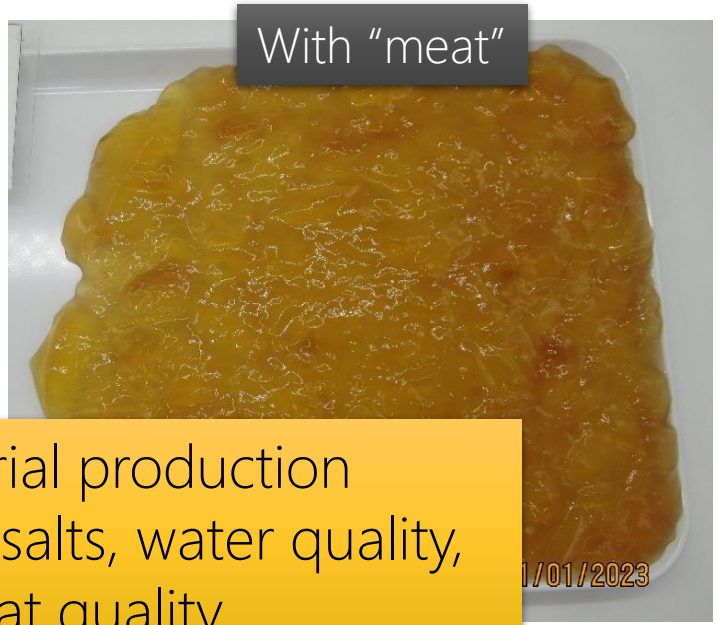


Validation process: Lab vs. industrial test

1. Laboratory test → Without meat
2. Industrial test → With meat

pH!!!
(0,02%) Buffer

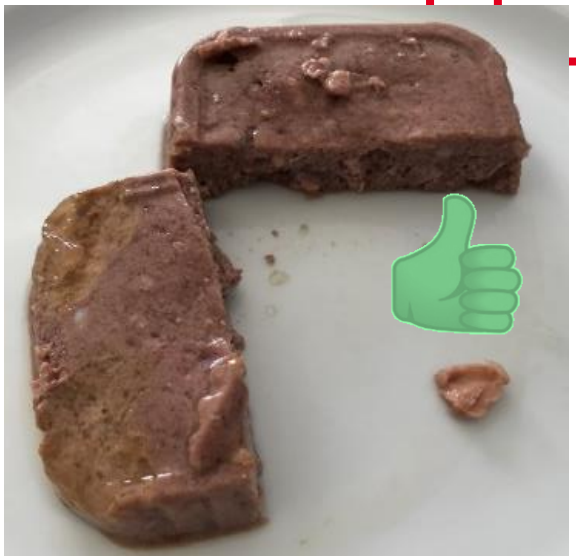




Laboratory ≠ industrial production
Suited conditions → pH, salts, water quality, processing, meat quality

Application

Unique requirements



Meat
Fat
Water
Mixing
Binding
Stabilizing

Insufficient!

Processing

hot o. cold
Frozen or fresh
Mixing technique
Water addition
Autoclaving process

Emulsion ↑
Binding/Texture ↑
Water holding↑
HC

Specialisation needed!

Interaction hydrcolloids and meat

Intrinsic binding is insufficient

Start at 35-45°C

Finished at ca. 80°C

HC and additives can compensate!

After cooling texture is fixed→ Gelling agents

Activity has to be given over WHOLE process → Stabilizer

Proof of concept

Raw material quality

- Much side gel
- Very soft

Change LBG quality

Optimise ratio

Less costs better effect!

Processing order

Same HC mixture and dosage

→ Process update: changed order and longer mixing time

→ Optimization always on ingredients AND process parameter

Trends

Trends

all natural

carrageenan free

alternative proteins

vegan/vegetarian

Take-home message

All about… The art of mixture

→ Good raw materials are essential

→ Optimizing hydrocolloid mixtures to processing

→ Ongoing research … to meet growing challenges

…says thank you!!