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**«Effect of High Pressure in Combination with Low Salt Content for the
Improvement of Texture and Palatability of Meat Gels»**

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Global Challenges

- With a projected world population of 10 billion people by 2050, there's a demand for sustainable and healthy nutrition
- Processed meat products are one of the main sources of sodium intake
- High dietary sodium (NaCl) intake is associated with cardiovascular diseases and strokes
- In 2010, global mean sodium chloride (NaCl) intake was 10.06 g/day, while in Japan NaCl intake was 12.5 g/day, in the Russian Federation – from 11.0 to 14.0 g/day
- Consequently, WHO recommended limit of 5.0 g/day NaCl
- High phosphate intake (inorganic phosphate) has a potential health risk, especially with regard to bone metabolism, cardiovascular, and kidney diseases

Task of the Present Study:

- to consider high pressure technology as one of the successful methods for reducing sodium content in processed meat and fish products
- to study the effects of high pressure on texture and sensory properties of low salt and low phosphate meat gels
- to develop pressurized meat products with reduced content of food additives for a healthy diet



Application of High Hydrostatic Pressure Technology for Healthier Foods

High-pressure technology is one of the methods for enhancing the functional properties of myofibrillar proteins and development of texture-modified products with low salt, low phosphate or low fat content for a healthy diet

High Pressure Effects

- Inactivation of microorganisms
- Protein denaturation, conformation, aggregation, and gelation
- Starch gelatinization
- Enzyme activity control

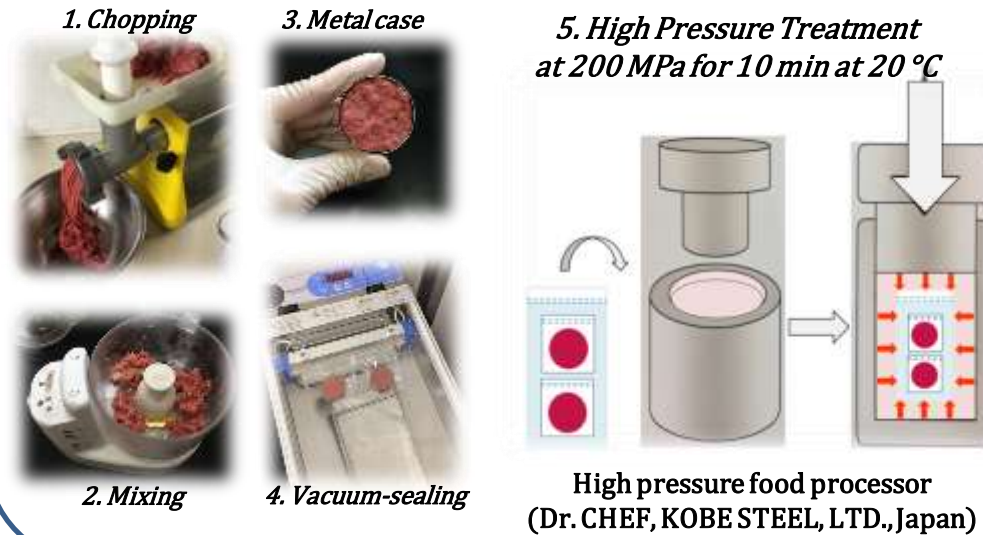
Innovative Healthier Food Products

- Food preservation
- **Low salt, low phosphate, and/or low fat products**
- Clean label products
- Texture-modified foods for elderly
- Hypoallergenic products
- Products with improved digestibility and bioavailability
- Value-added products



Materials and Methods

Preparation of Beef Gels

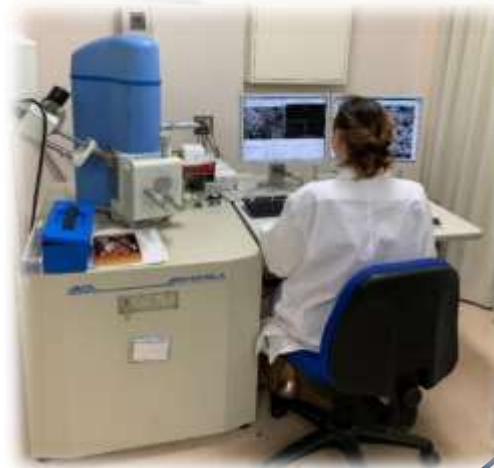


Sensory Evaluation

Sensory evaluation was involving students and staff from Niigata University (not trained panel of 11 to 13 men and women, 20-30 age) using Scheffe's paired comparison method with grade. Panellists were asked to assess softness, juiciness, no residual taste, easy to swallow, cohesiveness, moistness, elasticity, pleasant odor, and pleasant taste of thermal beef gels

Observation of Gel Microstructure

Scanning electron
microscope
(JSM-6510LA, JEOL LTD.,
Japan) 12 kV, SS30



Measurement of Free Amino Acid Content

Amino acid analyzer
(JLC-500/V, JEOL LTD.,
Japan)



Results

Gel microstructure

- The dense, homogeneous networked structure with small cavities for water retention was produced in low salt beef gels by HPP treatment at 200 MPa

Sensory evaluation

- The sensory characteristics of low salt and low phosphate beef gels were improved by HPP treatment at 200 MPa
- The pressurized beef gels were firmer, cohesive, elastic, with a more appealing bite
- The cohesiveness and springiness (elasticity) of low salt and low phosphate beef gels was increased by high pressure at 200 MPa
- The softness of low salt and low phosphate beef gels was decreased by high pressure at 200 MPa

Free amino acid content

- The free amino acid content of low salt and low phosphate beef gels was increased by HPP treatment at 200 MPa

Conclusions

- These results are consistent with the physicochemical parameters in our previous study
- The moderate high pressure treatment at 200 MPa for 10 min at 20°C is effective in producing thermal low salt and/or low phosphate beef gels together with high quality textural and organoleptic properties
- The poor texture of low salt and/or low phosphate meat gels can be improved by high pressure treatment at 150-200 MPa
- The high pressure technology can be used to produce healthier, emulsified meat products with low content of food additives