High pressure assisted meat tenderisation by papain and ficin

Identification

Key words
meat tenderisation, papain, high pressure

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How does it work?

Primary objective
Injection of papain into meat to enhance structure and increase tenderness after high pressure processing. This technique can also be used without high pressure treatment.

Working principle
Papain and ficin are general non-specific plant thiol proteases applied in food processing [1]. These enzymes have high thermal and pressure stability requiring intense process conditions for adequate inactivation. Injection of papain and pressurization to 100 MPa leads to significant increase of meat tenderness [2]. The amount of enzymes relative to the mass of the meat and used pressure are the important parameters that can affect the meat tenderness [3].

Images

Additional effects
Color changes during high pressure treatment are not under control.

Important process parameters
level of the high pressure, holding time on pressure, processing temperature

Important product parameters
dose of papain and ficin

What can it be used for?

Products
Meat

Operations
pressurization

Solutions for short comings
Tenderization of the meat.

What can it NOT be used for?

Products
Not sufficient quality of the meat slice due to tenderization of meat is out of the requested range tenderization.

Operations
Low pressure level operations (pressure below 100 MPa).

Other limitations
Quality of papain and ficin, temperature of the processing. Low value of the tenderization due to low dose of papain or insufficient high pressure treatment. However, to high doses or to long resting times gives over-tenderization.
Risks or hazards
Preliminary experiments of the processing are necessary to predict the optimum enzyme doses and processing parameters (mainly pressure and holding time on pressure).

Implementation

Maturity
The know how is currently in research area. High pressure units are applied in industry but not for tenderization of meat slices.

Modularity
It can be easily applied in modern high pressure unit. Producers have to invest high level of currency into the high pressure unit.

Consumer aspects
The quality of high pressure treated meat is excellent and safety is also guaranteed under control of chilled storage temperatures.

Legal aspects
'Novel Foods Regulation' (Regulation (EC) No 258/97)

Environmental aspects
Lower consumption of energy during high pressure treatment compared to heat treatment.

Facilities that might be interesting for you

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Further Information

Institutes
FRIP, NTU Athens, Institute of Chemical Technology Prague, University of Reading, AFRC Institute of Food Research

Companies
Hiperbaric

References