Modelling and prediction of quality of meat and meat products packaged in modified atmosphere during storage.

Modelling of quality of meat packaged in MA during storage

Identification

Key words: packaging, meat, modified atmosphere, modelling, prediction, MAP, quality, storage

Latest version: 2010/12/23
Completed by: FRIP

How does it work?

Primary objective: Prediction of changes in packages with meat and/or meat products under modified atmosphere at given storage conditions.

Working principle: Chemical, physical, biological
Packaging of the meat and meat products in modified atmosphere is widely used in practice. The aim of such treatment is to minimize the oxidation changes of packaged products as well as to eliminate the growth of sensitive types of microorganisms. So far the prediction of optimal parameters of such packaging systems is difficult due to very complex nature of processes occurring in packaged meat and meat products. On the other hand the application of suitable predictive models could be useful tool how to reduce the price for the development of such packaging systems in practice.
Application of mathematical modelling in a design of modified atmosphere packaging systems for meat and meat products. Models mostly cover chemical, enzymatic and microbiological changes of packaged product as well as the alteration of the modified atmosphere composition.

Additional effects: Acceleration and cost reduction of the design of modified atmosphere packaging systems for meat and meat products.

Important process parameters: Package permeability, storage conditions like temperature, humidity, composition of MAP.

Important product parameters: Microorganism contamination, modified atmosphere composition, product composition,
What can it be used for?

**Products**
Meat and meat products can be stored longer and higher quality is attained during the shelf life, easier slice separation, lower microbial risk

**Operations**
Packaging, storage of packaged products.

**Solutions for short comings**
Food shelf-life extension, food safety (lower concentration of chemical preservatives used)
The main studied problems with possible utilization in practice:
- Application of microbial models for meat and meat products \([1,2,3,8,11,12,13]\).
- Prediction of gas absorption in packaged meat and meat products at given storage conditions \([5,6,7,16,22]\).
- Gas permeability through the layered barrier packaging films \([18,19,20,23]\).
The main studied problems with potential application in far future:
- Complex modelling of chemical, enzymatic and microbiological changes of packaged product as well as the alteration of the modified atmosphere composition \([4,9,10,14,15,17,21]\).

What can it NOT be used for?

**Products**
No

**Operations**
No

**Other limitations**
Broad ranges of conditions under which meat and meat products are processed e.g. temperature, initial microbial load, water activity, pH, influence of packaging on meat colour, packaging material oxygen permeability

**Risks or hazards**
Pathogen microorganism growth

Implementation

**Maturity**
Application of microbial models for meat and meat products, prediction of gas absorption in packaged meat and meat products at given storage conditions and the gas transport via the layered barrier packaging films seem to be quite mature processes. Complex modelling of chemical, enzymatic and microbiological changes of packaged product as well as the alteration of the modified atmosphere composition is in the stage of laboratory testing.

**Modularity**
Application of MA models for meat and meat product does not claim substantial changes of existing production lines. The models are not capable to work on-line in regime of predictive control, yet. This is the future application, vision.

**Consumer aspects**
Consumer does not care the way of packaging system design but there are some packaging materials that enable limited oxygen permeation that causes the meat surface oxidation. Resulting bright red attracts consumer. He/she perceive this meat as fresh.

**Legal aspects**
No special legislation is necessary

**Environmental aspects**
No

Facilities that might be interesting for you
Further Information

Institutes  Norconserv, NULS, A.U.Th. School of Agriculture, Ghent University - LFMFP, UTFSM, University of Milan, The Royal Veterinary and Agricultural University, Wageningen UR - FBR

Companies


