Egg white as structure forming agent

Identification

Key words  egg white, gel strength, foam stability
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Completed by  FRIP

How does it work?

Primary objective  The main goal of the technology is to increase the gel strength of reconstituted egg white when gellified by heat. The process is based on re-structurisation of egg white protein molecules. Due to enhanced quality of this structure forming agent, the dose of such agent can be lowered and raw material saved having the same structure forming (foaming) effect with lower dose.

Working principle  Described technology changes the rheological properties of egg white to increase its water bonding capacity and gel strength of reconstituted egg white. It is done in dry state of egg white by so called dry heat treatment [1,2,3,4]

Images

Additional effects  Cost reduction, microbial decontamination (in case of high temperature dry heat it leads to sterile product)

Important process parameters  temperature before drying lower than 80°C, temperature increase up to 130°C only after drying possible, holding time up to three hours [1].

Important product parameters  Low water content in dry egg white (lower than 2%), pH.

What can it be used for?

Products  Dry heat of egg white can be used for re-structuring of egg white proteins in powder that leads to the better quality of egg white as gelling agent. Technology kills the bacteria during processing as secondary effect. E.g. surimi is made of fish meat pieces joined by the egg white used as the gelling agent, production of egg white based product such as protein slice, meat like products with high satiety effect.

Operations  foaming, gelification

Solutions for short comings  This datasheet can be considered as the answer on industrial need like “how to improve the structure of heat treated foods” or “how to improve the gelling quality of egg white powder or liquid egg white”.


What can it NOT be used for?

**Products**  
Foods with eliminated egg proteins determined for allergic patients sensitized on egg white proteins

**Operations**  
Very high temperatures and pressures can destroy egg white proteins that causes low or no solubility of product (dry heat treatment) or gelling of reconstituted liquid product

**Other limitations**  
Limitation of this operation is keeping solubility of egg white proteins, pH range above the isoelectric point (avoid spontaneous gelling without heating)

**Risks or hazards**  
Microbial risk because liquid egg is ideal growth broth for bacteria and viruses (e.g. Norwalk type living in protein rich foods)

Implementation

**Maturity**  
Dry heat of egg white is done in the lower (pasteurisation) range in industrial conditions in so called hot rooms (hotrooming). In these rooms the product is treated for 3 up to 6 weeks to increase the gel strength sufficiently. FRIP has build pilot unit for 20 kg of dry egg white treatment that enables to use high temperatures for 8 hours providing the same quality. Mature in case of lower temperatures (dry heating pasteurization).

**Modularity**  
The current dry heating of egg white is batch process. Pilot unit with short time is also batch process but enables continuation of the process by installing several units in parallel.

**Consumer aspects**  
Dry heat processing together with high pressure are physical processes that are very well adopted by consumers (no preservatives are necessary for microbial stabilization).

**Legal aspects**  
Egg white is natural structure forming component and represents increase of nutritional value of any product (high quality protein).

**Environmental aspects**  
Both process needs the energy (mostly electrical) and have impact on the environment. Compared with other technologies these are relatively clean.

Facilities that might be interesting for you

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Further Information

**Institutes**  
FRIP, KU Leuven

**Companies**
References


Source: