



DAIRY MADE RIGHT
with

AUGMENTAID™ DAIRY

READY-MADE TRANSGLUTAMINASE-BASED FORMULA
FOR CHEESE, YOGUR AND DAIRY PRODUCTS

AUGMENTAID™ is a functional formulation based on the Transglutaminase enzyme specially designed to improve texture, final yield and performance in cheese and yoghurt.

Transglutaminase acts on milk substrates throughout a mechanism of “enlargement and “anchoring” serum proteins to casein. So product can be applied in all types of rennet cheese (fresh, semi-soft, firm, semi-firm, hard and semi-hard), cheese-type quark, kefir, and other dairy derived elaborates as full-fat, semi-skimmed and/or skimmed yoghurts.

Yoghourt

Increases gel strength, facilitating protein meshing.
Homogeneous structure - Reduces syneresis + Higher Viscosity.
Helps to reduce the addition of solids and stabilizers as powdered milk, proteins reducing final costs. Use of less protein maintaining good texture.
Increases creaminess helping to lower cream content.
No residual activity in final product.
No negative impact on taste and/or texture.
Reduce need of evaporation.
Effective to eliminate gums and gelatin.
Effective to increase creaminess and texture in products with a low fat content.
Increases quality perception (expressed as client satisfaction).

Cheese (General)

Increases final cheese production by up to 20%.
Homogeneous structure - Reduces syneresis + Higher viscosity.
Increases and improves texture and mouthfeel.
Reduction and/or elimination the addition of proteins, standardizing elements, so therefore reducing significantly final product cost.
Increases quality perception (expressed as client satisfaction).
Applicable to a high range of cheeses. No impact on whey quality.

Renner & Quark Cheese

Increases final cheese production by up to 20%.
Homogeneous structure - Reduces syneresis + Higher Viscosity.
Increases and improves texture, mouthfeel and cut-behavior.
Reduces the addition of powdered, milk standardizing elements and thus far reducing final product cost.
Increases quality perception (expressed as client satisfaction).

TRANSGLUTAMINASE is ubiquitous in nature, and is present in the vast majority of animal tissues and body fluids as well as in a variety of plants. Involved in a variety of biological processes, this enzyme acts only on proteins by catalyzing reactions in the formation of covalent bonds between a carboxylamide group of the lateral chain on a Glutaminase residue (Gln) and an amino group of the lateral chain of a Lysine (Lys). These bonds may be formed between proteins of distinct types and origin, such as: caseins, myosins, soya globulins, glutens, actins, etc.

AUGMENTAID™ is offered by ND Pharma & Biotech both as ingredient or in a closed formula (customized) for certain applications to industry and food processors.

Packaging 5, 10 and 25 Kg Pack. Full Pallet (1.000 Kg).

AUGMENTAID™ Pure formula
99% Transglutaminase.

AUGMENTAID™ Dairy
Transglutaminase, Sodium Caseinate, Maltodextrine, Glycine.



Transglutaminase activity on milk protein and its effect on acid milk gel strength. Importance of Heat Treatment.

Karsten Bruun Qvist, Zhiwei Zhou, Jeanette Otte & Merete Færgemand

Introduction

Transglutaminase (Tgase, EC 2.3.2.13) is an enzyme capable of forming inter- and intramolecular cross-links in many proteins. The enzyme catalyses an acyl transfer reaction between γ -carboxamide groups of peptide-bound glutamine residues as acyl donors and primary amines as acceptors, releasing one molecule of ammonia per cross-link formed. This cross-link occurs naturally in a number of foods, e.g. raw and processed meat and fish, bread, and processed cheese.

We have previously shown that action of transglutaminase on skim milk before acidification can increase the gel stiffness (modulus) about 5-fold, and decrease the permeability coefficient of the gel 2-3-fold (Færgemand & Qvist, 1997). We have also tested use of transglutaminase in the manufacture of yoghurt with normal and reduced fat content. Sensory profiles of low fat yoghurt without protein enrichment could be made to mimic very closely the profile of products with normal fat content and protein enrichment by optimising the amount of transglutaminase used (Færgemand et al., 1999).

The purpose of the present work was to explore the effect of the heat treatment applied to the milk before cross-linking with transglutaminase on the extent of cross-linking and the stiffness of gels formed subsequently by acidification.

Materials and Methods

Reconstituted skim milk (RSM) was prepared by dissolving ultra-low heat skimmilk powder (made by freeze-drying) in distilled water to 11% (w/w). The milk was stored at 5°C overnight for protein rehydration, and then heated with magnetic stirring in a waterbath at 70 - 90°C for 10 - 25 min. Thermally induced association of whey protein with casein micelles was studied by capillary electrophoresis of the micellar fraction, obtained as the sediment after centrifugation at 78,000 G for 1 h. A Ca^{2+} -dependent microbial Tgase from *Phytolthora cactorum* was kindly supplied by Novo Nordisk A/S (Bagsværd, Denmark) and used at an enzyme:substrate ratio of 0.4% (w/w). Incubation was at 40°C for 1 h, and then the reaction was terminated by addition of NH_4Cl to 10 mM. The extent of cross-linking after 1 h was determined by analysing for ammonia content. After treatment with heat and Tgase the milk was acidified with 2% (w/w) glucono- δ -lactone (GDL) at 40°C in a Bohlin VOR rheometer system. Final storage modulus, G' , was recorded after 3 h as a measure of gel stiffness.

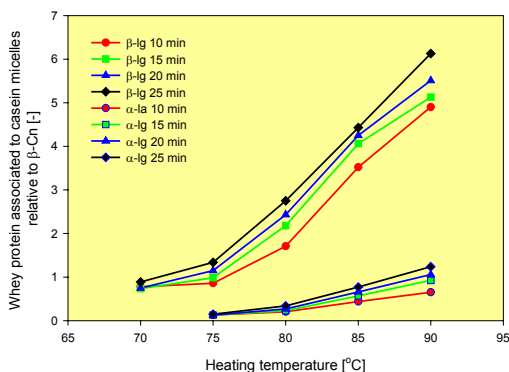


Figure 1. Effect of milk heating on association of whey proteins with casein micelles. Heating time indicated.

Results and Discussion

Increasing amounts of β -lactoglobulin (β -lg) and α -lactalbumin (α -la) were associated with the casein micelles with increasing intensity of heat treatment (Figure 1). The previous finding that Tgase action on heated milk increases the modulus of acid milk gels made from it is confirmed in Figure 2. However, this figure also demonstrates that the effect of Tgase treatment on acid gel modulus is highly dependent on the level of heat treatment and that it is virtually absent in unheated milk.

Figure 3 shows that the extent of cross-linking as measured by liberation of ammonia increases significantly with increasing heat treatment of the milk, meaning that relatively little cross-linking takes place in milk that has not been heat treated.

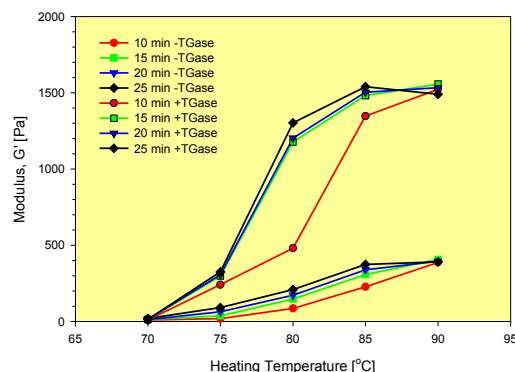


Figure 2. Effect of milk heating and Tgase on stiffness of acid milk gel after incubation with 2% GDL for 3 h. Time for heating of milk indicated.

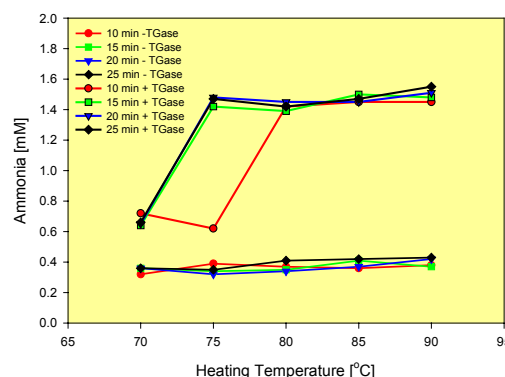


Figure 3. Ammonia content in milk samples after incubation with or without Tgase for 60 min at 40°C. Time for heating of milk indicated.

Since denatured β -lg is known to be a much better substrate for Tgase than native β -lg, a possible explanation is that a large part of the Tgase induced cross-linking happening in heated milk involves denatured β -lg located at the micellar surface.

Conclusion

Cross-linking of milk protein in milk by Tgase increases strongly with increasing association of whey protein to casein micelles, as does the stiffness of acid milk gels made from such milk. This effect, which has potential applications in the production of fermented milk products, appears to involve cross-linking of denatured whey proteins at the surface of casein micelles.

References

- Færgemand, M. & Qvist K.B. (1997) Transglutaminase: effect on rheological properties, microstructure and permeability of set style acid skim milk gel. Food Hydrocoll. 11, 287-292.
- Færgemand, M., Sørensen, M. V., Jørgensen, U., Budolfson, G. & Qvist, K.B. (1999) Transglutaminase: effect on instrumental and sensory texture of set style yoghurt. Milchwissenschaft 54, 563-566.

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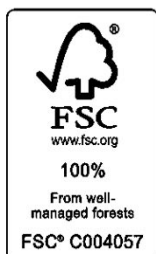
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