Lifestyle foods - investigation of ß-glucan enriched yoghurts

Mikkelsen, Mette Skau; Thompson, Cecilia S.; Jespersen, Birthe P Møller; Engelsen, Søren Balling

Publication date:
2004

Document version
Early version, also known as pre-print

DEPARTMENT OF FOOD SCIENCE
FACULTY OF LIFE SCIENCES
UNIVERSITY OF COPENHAGEN

Lifestyle foods - investigation of β-glucan enriched yoghurts

Mette Skau Nielsen[a†], Cecilia S. Thompson[b], Birthe M. Jespersen[a] and Søren B. Engelsen[a]

[a]Quality & Technology, [b]Dairy Technology
[†] Presenting author. E-mail: skau@life.ku.dk

Aim

The study will contribute to the understanding of soluble barley β-glucan fibres in milk formulations designated to be used as a health promoting functional food.

Background

Health benefits and hydrocolloid functionality of mixed linkage (1→3,1→4)-β-D-glucan (BG) dietary fibres from cereals make them interesting food constituents [(1)].

The texture promoting effect of cereal BG on dairy products have been reported previously [(2)], but problems with phase separation and product instability have to be solved before the possible health beneficial effects from a BG dairy product can be fully utilised.

We have studied the influence of:

- β-glucan concentration
- pH
- storage time
- milk protein content
- an emulsifier

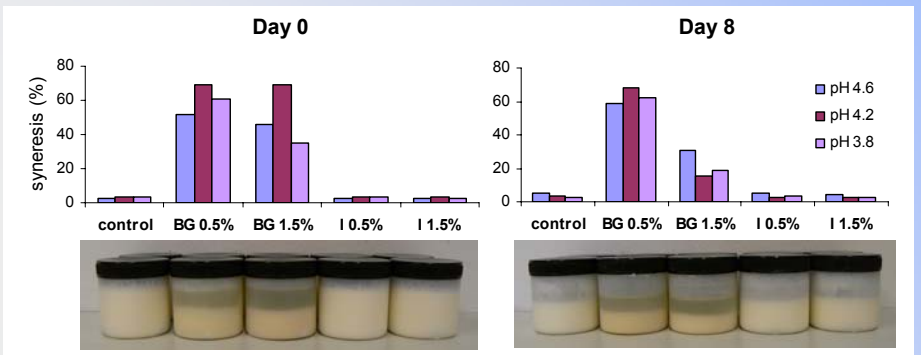
on level of syneresis in yoghurts to evaluate the interaction between BG and milk proteins.

Yoghurt manufacture

To improve gel characteristics and avoid syneresis yoghurts are often stabilised with hydrocolloids e.g. pectin or xanthan gum. Also dry matter content and pH can be modified to improve product stability [(3)].

In this study yoghurts were manufactured from skimmed milk powder, SMP (10%, 15% w/v) and acidified with glucono-δ-lactone, GDL (pH 3.8, 4.2, 4.6). The barley β-glucan, Glucagel® (0.5%, 1.5%) containing yoghurts were compared to non-supplemented and inulin, Orafti® (0.5%, 1.5%) supplemented controls.

Measurements were conducted on fresh yoghurt samples and after 8 days of storage.



Syneresis levels for yoghurts made from 10% skimmed milk powder with addition of β-glucan (BG) or inulin (I) at levels 0.5% or 1.5%. pH is varied at three levels (3.8, 4.2, 4.6) and measurements are conducted on fresh samples (day 0) and one week old samples (day 8).

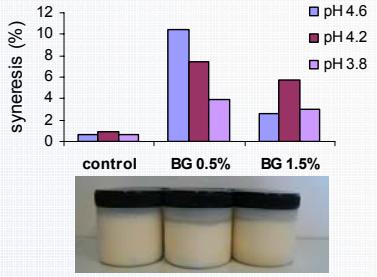
Syrenesis

Yoghurts made with **10% SMP and inulin (I)** showed low, and similar, syneresis levels compared to control samples. Thus, inulin at the studied levels, and under the given conditions does not interfere with the casein gel network.

Yoghurts made with **10% SMP and β-glucan (BG)** showed consequently higher syneresis levels compared to control and inulin samples - the 0.5% BG yoghurt with maximum levels. The decreased levels of syneresis after 8 days of storage for samples with 1.5% BG suggests that increased hydration of the fibres results in increased liquid retention.

Effect of dry matter content

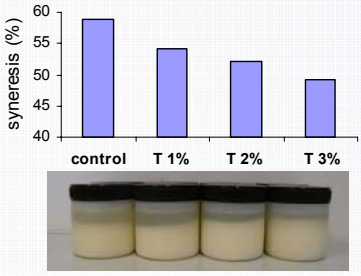
An increase of SMP to 15% rendered improved results for the BG supplemented samples with less syneresis, but values were still not comparable to control samples.



Syneresis levels for fresh yoghurt samples (day 0) made from 15% skimmed milk powder with addition of β-glucan (BG) at levels 0.5% or 1.5%. pH is varied at three levels (3.8, 4.2, 4.6).

Effect of an emulsifier

Measurements of fresh yoghurts with 0.5% BG and addition of Tween®20 showed a decrease in syneresis levels with increasing amount of Tween®20.



Syneresis levels for fresh yoghurt samples (day 0, pH 4.2) made from 10% skimmed milk powder with addition of 0.5% BG and Tween®20 (T) at levels 1%, 2% or 3%.

Conclusions

Beta-glucan at levels 0.5-1.5% in yoghurt interferes with the casein gel network resulting in increased syrenesis. Varying the pH did not improve the stability of the BG yoghurts.

Hydration of the BG fibres and increasing the dry matter content from 10% to 15% SMP improved product stability.

Addition of an emulsifier decreased syrenesis levels suggesting that interactions between the BG and casein gel network is of hydrophobic rather than electrostatic nature.

References

[1] Wood, P.J. (2004), Trends food sci. tech., 15, 313-320; [2] Brennan, C.S. & Tudorica, C.M.(2008), J. food sci. tech., 43, 824-833; [3] Spreer, E. (1998), *Milk & dairy product tech.*, Marcel Dekker Inc., NY, USA