

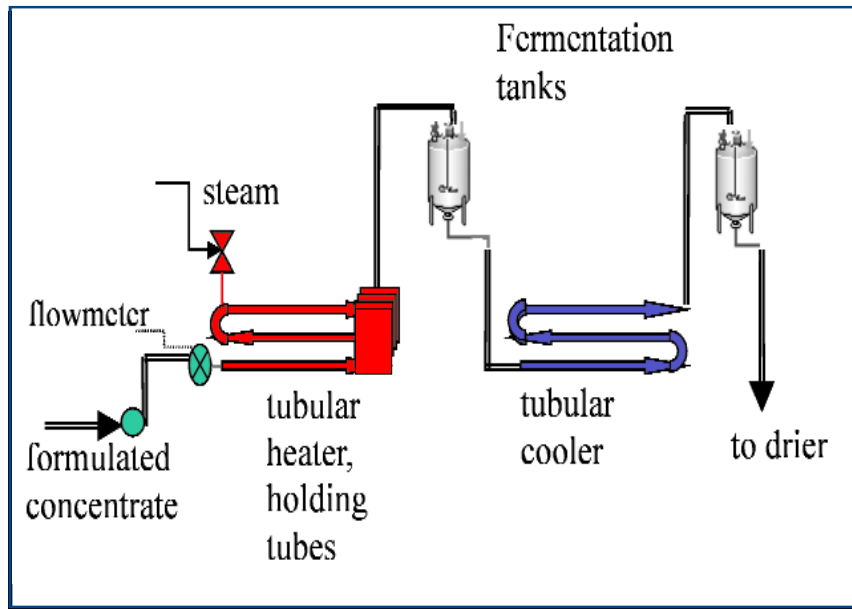
MOOREPARK

END OF PROJECT REPORT 2000 DPRC No. 38

Dehydration of Fermented and Flavour-Sensitive Products

P.M. Kelly, M.K. Keogh and J. Kelly

Yoghurt powders with superior flavour compared to commercially available products were produced using a customised two-stage fermentation process prior to drying. A novel spray-drying technology (Spray Belt Drier) was successful in reducing flavour loss, and minimising the destruction of yoghurt cultures.



Ingredient Dehydration of Fermented and Flavour-Sensitive Products

(Dehydration of Fermented and Flavour-Sensitive Products)

Armis No. 4448

Project Team:

Dr. P.M. Kelly

Dr. M.K. Keogh

Mr. J. Kelly

Mr. B. Kennedy

The Dairy Products Research Center
Moorepark, Fermoy, Co. Cork.

Teagasc acknowledges with gratitude grant aid under the Food Sub-programme (Sub-Measure 3 (ii) - Institutional R&D) of the Operational Programme for Industrial Development. The Programme was managed by the Department of Agriculture and Food supported by EU and national funds.

ISBN 1 84170 178 5

DPRC No. 38

© Teagasc, August 2001



Teagasc 19 Sandymount Avenue
Ballsbridge Dublin 4



EUROPEAN UNION
European Regional Development Fund

Summary and Conclusions

The positive health attributes associated with the consumption of fermented milk products has stimulated considerable market interest in spray-dried dairy ingredients such as yoghurt powder. Natural flavours produced during fermented milk processing are much valued in their own right and also to complement other added flavours, while the inclusion of these novel ingredients in food products such as snack bars creates a healthy food image which may be exploited by means of product labelling and positive marketing messages.

Traditionally, yoghurt is produced in a hydrated form and, thus, possesses a limited shelf-life even when refrigerated. Consumption within a short time of production is advisable, particularly if advantage is to be taken of the putative benefits associated with the ingestion of live yoghurt cultures.

The production of an instant yoghurt powder would, thus, provide benefits of shelf-life extension and convenience of preparation and storage. However, the drying of such products is difficult due to low pH, which causes stickiness in drier chambers and makes powder recovery difficult. Furthermore, key flavour components formed by fermentation such as acetaldehyde and diacetyl which contribute to the unique flavour of natural yoghurt are sensitive to heat and easily lost during spray-drying.

Hence, a major challenge of this project was to investigate the processing technologies and conditions necessary for the minimisation of flavour losses during the spray-drying of acidified/fermented milk bases, to monitor the effects on drier performance such as powder adhesion to drier walls, and to develop functional forms of the spray-dried ingredients.

The main aims of the project were to:

- improve yoghurt powder spray-drying efficiency through optimisation of concentrate solids,
- investigate the effect of spray-drying conditions on flavour losses of sensitive products such as dehydrated yoghurt and fermented creams,

-
-
- apply technological approaches for the reduction of flavour losses: a) ingredient formulation, b) modification of fermentation conditions,
 - investigate the production of agglomerated forms of spray-dried yoghurt powders,
 - study factors affecting the physical properties such as rheological characteristics and powder bulk density, and
 - adapt technology to ensure greater viability of culture cell numbers at the end of the drying process.

Main Conclusions and Achievements

* Yoghurt powders with superior flavour compared to commercially available products were successfully produced using a customised process for pre-treatment and fermentation of yoghurt concentrate prior to drying.

The enhanced flavour was achieved primarily by the addition of whey protein concentrate (WPC) at a critical point (pH 4.6) in a novel two-stage fermentation process. This boosted acetaldehyde content, a major contributor to yoghurt flavour, to a level which more than offset the subsequent losses during spray-drying.

* All experimentally dried yoghurt powders possessed relatively low viscosity, probably due to the combined effects of the shear associated with atomisation during spray-drying and of heat and dehydration on casein under acidic conditions.

The addition of starch did not improve the viscosity of the reconstituted yoghurts.

* The trials undertaken using a novel spray-drying technology (Spray Belt Drier) succeeded in reducing flavour loss, and minimising the destruction of yoghurt cultures.

Exchanges with interested commercial parties resulted in a significant priority being placed on the issue of culture survival to enhance the positive nutritional attributes associated with consuming 'live' yoghurt and other probiotic micro-organisms.

* Fermented creams were successfully dried in a Niro Tall-Form drier. The flavour of the highest fat powder (70%) was preferred.

* A substantial database was established in the course of these studies on formulation adaptations and spray-drying conditions necessary to meet particular specification requirements in the manufacture of dehydrated, fermented and other flavour-sensitive products.



Dr. Phil Kelly



Dr. Kieran Keogh

Publications

Keogh, M.K. (2000). Optimising spray-drying processing and conditions for yoghurt flavour retention in yoghurt powder. *Workshop 'New Developments in Application and Quality of Dairy Ingredients'*. Dairy Products Research Centre, Moorepark, Fermoy, Co. Cork. February 2000.

For further information, please contact:

Dr. Phil Kelly, Dr. Kieran Keogh or Mr. Jim Kelly



DAIRY PRODUCTS RESEARCH CENTRE

Moorepark, Fermoy, Co. Cork, Ireland

Tel: +353 (0) 25 42222 - Fax: +353 (0) 25 42340

E-Mail: reception@moorepark.teagasc.ie