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PROCESSING AND QUALITY OF FOODS

VOLUME 1
HIGH TEMPERATURE/
SHORT TIME (HTST)
PROCESSING:
GUARANTEE FOR
HIGH QUALITY FOOD
WITH LONG SHELF LIFE

Edited by
P. ZEUTHEN, J.C. CHEFTEL
C. ERIKSSON, T.R. GORMLEY
P. LINKO, K. PAULUS

ELSEVIER APPLIED SCIENCE

PROCESSING AND QUALITY OF FOODS

Volume 1

High Temperature/Short Time (HTST) Processing:
Guarantee for High Quality Food with Long Shelflife

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PROCESSING AND QUALITY OF FOODS

Volume 1

High Temperature/Short Time (HTST) Processing:
Guarantee for High Quality Food with Long Shelflife

Proceedings of the COST 91 bis Final Seminar held in Gothenburg, Sweden, 2-5 October 1989, prepared under the auspices of the European COST (Cooperation in Science and Technology) 91 bis programme on the processing and quality of foods.

Preface

Since its introduction in 1971, COST (Cooperation in Science and Technology) has become for nineteen European countries a very useful tool for scientific and technological collaboration in which to carry out 'à la carte' research projects on the basis of multilateral participation.

Based on the success and the experience of its predecessor, COST 91, entitled 'The effect of thermal (heat and cold) processing and distribution on the quality and nutritive value of foods', which took place from 1980 to the end of 1983, it was decided to continue the collaborative work on food quality aspects. The result of this decision was COST 91 bis, which became operative in 1985, and has now terminated with the Final Seminar on 2-5 October 1989, in Gothenburg, and publication of the proceedings.

The States participating in this Concerted Action, COST 91 bis, are—besides all the EEC countries—Finland, Sweden and Switzerland.

The concept of COST 91 bis is the same as was the case with COST 91. However, whereas COST 91 in practice was concerned throughout with the behaviour of foods subjected to various temperatures, food biotechnology became an additional issue in COST 91 bis.

The nutritive value of foods and retention of nutrients in industrially processed foods are topics which should be of major concern to any person dealing with food science and technology. In COST 91 bis, nutritional questions were dealt with by a specific sub-group. It therefore carried out a programme of its own as well as participating in the professional work of the other sub-groups. In COST 91 bis, it was decided that all work on nutritive issues should be implemented directly in the sub-groups.

The purpose of the Final Seminar and the present publication is to draw up a balance sheet regarding what has been accomplished through the studies on novel heat treatments, food biotechnology and chilled foods. Hopefully, besides all the information presented here, the proceedings will also indicate what is missing, so as to encourage work in these fields in the future.

In collaborative studies such as these, the importance of establishing a network which already existed demonstrated this very clearly. The bonds have been strengthened during the past four years and will certainly become useful for the purpose of future research collaboration.

To be meaningful, applied food research should in principle always involve industry and the consumer. After all, the ultimate goal is to produce results

which will be of benefit for the quality and nutritive value of the industrially prepared foods which consumers accept and buy. We hope that this concept is reflected in the text of these proceedings.

PETER ZEUTHEN

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SWEDISH VIEWS ON COST

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Ladies and Gentlemen,

I am honoured that I am invited since I am certainly one of the few people here who know very little about food technology - but I am willing to learn! What I know is that here today you are the European experts who together have worked in COST-projects in the research area of food technology. The Swedish Government has taken a great interest in your work and is glad to have you here.

Since COST (European Cooperation in the field of Scientific and Technical Research) was set up in 1971, by the first member states of the EEC, Sweden has taken a very active part in the cooperation. Sweden has been involved in more than 90 projects, of which the food projects are listed among the most successful ones.

For a small country as Sweden it is necessary to have an international outlook and to cooperate with other countries in scientific research. Sweden is also a non-member state of the European Communities. Therefore the Swedish Government underlines the importance for Sweden to take an active part in European research

activities and specially in COST where all member-countries are equal. The COST-projects have also shown to be keys for opening doors to the expanding Community research programmes for example RACE and ESPRIT (telecommunication), DRIVE (transport) and now FLAIR (food).

In my position as the Swedish National Project Coordinator for COST I have the opportunity to follow the projects and be a member of the Senior Official Committee, the steering body in COST.

The COST-organisation runs quite efficient and does not constitute an international organisation. It is a form of loose-knit co-operation which works with flexible pragmatic operating rules agreed on by the COST member states. Participation in each individual COST project is "à la carte", which means that only those interested take part in any particular project.

The COST projects are carried out as concerted actions and financing is provided by national funding of the research works. As representing those who allocate funds, I must admit that COST projects are rather cheap in comparison with the results we get out of them.

COST projects are mostly of a modest size and they are completed within a deadline of three to five years. Besides the food technology area projects are related to the following area of applied research:

- informatics
- transport
- telecommunications
- oceanography
- metallurgy and materials
- environmental protection
- meteorology
- agriculture
- medical research
- social sciences

The main advantages with the COST cooperation can be seen as the following:

- more efficient use of limited resources by avoiding duplication of work
- improved cost/benefit ratio for research partners. They obtain access to the total research results while only providing resources for their individual efforts.
- improved contacts between research groups with common interests
- stimulation of new research activities

Summing up, I would like to say that our experience of the Food Technology Programmes have been very good. Sweden is interested to carry on with the European research activities in food technology. In wishing you all good luck in the future research work I would like to use some words by Winston Churchill taken from an other context:

This is not the end, nor is it the beginning of the end. But, Ladies and Gentlemen, it is the end of the beginning.

COST - NEW IMPACTS FOR FOOD SCIENCE AND FOOD INDUSTRY
- VIEW FROM OUTSIDE

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INTRODUCTION

The 20th century is dominated by principal changes in the social, ecological and economical structure of the world population and its relation to food and nutrition. Besides an extremely positive situation in high quality food production in industrialized countries there are dramatic discrepancies in the world from excessive surplusses to severe hunger. The increase in the production of high-quality food as well as the evaluation of new resources and the use of all the innovative potential of food science and technology are necessary to solve these problems and to satisfy the various demands of the population .

Integrated concepts and concerted actions based on scientific and technological programs are necessary and partially realized in Japan, USA and the EEC for :

- 1) high quality food production
- 2) improvement of the world nutritional situation

Traditional approaches can only partially help to solve todays and future problems. Quality of food and nutrition is a multifactorial system including :

- 1) raw materials, production and environmental aspects
- 2) food processing and technological influences
- 3) sensoric and textural quality
- 4) nutritional and physiological aspects
- 5) safety including microbiology, hygiene, toxicology, contamination, shelf life
- 6) packaging and distribution
- 7) social and ecological influences

Therefore consumer demands and the ability of food science and technology together have to be the basis for the production of a sufficient supply of high quality food including diversification and innovation. Especially new scientific results in nutritional sciences concerning macronutrients e.g. lipids, carbohydrates, proteins and minerals as well as the nutrient density of essential components like vitamins and trace elements are of high relevance for food quality. Safety and other quality parameters are related to improved and controlled food technology.

For these reasons food science and technology affords effective interdisciplinary, concerned approaches involving:

- | | |
|----------------------------------|------------------------|
| a)physiology, toxicology | b)basic research |
| medicine, | application research |
| biochemistry, biotechnology | production technology |
| microbiology, hygiene | distribution, handling |
| chemistry, analytics | consumption |
| technology, process engineering | environmental aspects |
| environmental sciences | |
| sociology, ecology, epidemiology | |
| economics | |
| | c)knowhow transfer |

It is obvious that only by this interdisciplinary approach high quality foods can be realized. On the other hand it clearly demonstrates the difficulties for setting up special programs and concerted actions. Careful evaluation of specific topics and activities is necessary to meet these challenges.

COST PROGRAMS ON FOOD SCIENCE AND TECHNOLOGY

The COST program was an integrated approach created in 1971 for EEC and related countries to develop integration and cooperation in science and technology as well as to transfer knowhow for practical applications.

It was a proposal from Sweden which initiated the COST-90 series of programs for food science and technology, especially for food process engineering and quality. Its main challenge was coordination and integration of the specific national research activities of the participating 19 countries. This included the collection, evaluation and distribution of the available data on physical properties of foods. On this basis innovative research programs on specific topics were created and performed in order to improve the quality and safety of related food products. Specific subjects of the COST-90 series were concerned with the influence of temperature and processing on food pro-