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CONSOLIDATION OF THE FOOD PACKAGING CENTRE CETEA WITHIN ITAL
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FEDERAL REPUBLIC OF BRAZIL

Technical report: Shelf life of food products*

Prepared for the Government of Brazil
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of S.H. Rizvi,
expert in shelf life of food products

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Vienna

* This document has not been edited.

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RECOMMENDATIONS

- . Packaging studies in general and those related to shelf life of food products invariably require statistical approaches for which the existing arrangement at CETEA is inadequate. At least a half-time if not a full-time statistician should be added to its technical staff.
- . Addition of a chemist and a microbiologist to the current technical staff of CETEA to conduct and coordinate the analytical work should be planned.
- . The technical staff of CETEA should be encouraged and supported to participate in international conferences on foods in addition to those on packaging.
- . The existing practice to permit and support staff members to pursue higher degrees should be continued and strengthened.
- . Plans should be developed to incorporate other user industries of packaging within CETEA's fold.

INTRODUCTION

The Brazilian food industry represents over 23% of the industrial sector of the nation in numbers and employs around 13% the workforce. Food products account for 11% of the manufactured goods in the country with nearly 50 thousand processing plants. The industry as a whole is basically directed at domestic market which accounts for about 80% of the total processed food consumption. However, the export of foods has been accelerating in recent years. The major share of export earnings come from soybean, orange juice, coffee, bovine meat, fish, sugar, cocoa products, flours, vegetables and fruits.

The food processing sector is composed of mainly small and medium-size companies, representing 94% the total number of the food plants while contributing only 30% to the total production. These manufacturing plants are heavily populated in the north and northeast regions of the country. The food industry as a whole is working hard to narrow the technological gap that exists between Brazil and the more advanced nations of the world. Creation of CETEA within ITAL has definitely enhanced the momentum in terms of addressing the packaging needs of the industry. Increasing agricultural production without concomitant developments in processing and packaging technologies often becomes a selfdefeating proposition and Brazilian government has avoided this pitfall by establishing CETEA just about at the right time.

Prolonging the shelf life of foods products is one of the benefits of packaging. However, the vectors of quality loss are complex and necessitate a very thorough understanding of their interactions. By initiating projects on shelf-life studies of food products, CETEA has paved the way for continued support to the food industry in this very critical area of its needs. Training of the technical staff in this important area was not only very timely but rather essential.

THE FOOD PACKAGING TECHNOLOGY CENTER (CETEA)

The centre currently works in the four basic areas of packaging materials: plastics, paper and paper board, glass and metal. It has a total technical staff of research scientists and one Director. The technical staff is very qualified and experienced in various areas of packaging. Their familiarity with the state-of-the-art packaging innovations around the world is extremely good and awareness with the technical literature is high. The center is blessed with a very competent and dynamic director who has a goal and mission, well defined for continued success of the program.

The physical facilities are adequate for the work being done. Addition of a laboratory on distribution and a packaging information and documentation wing will enhance the capabilities of the center. Work is in progress to complete these additions within a year.

ACTIVITIES ON SHELF-LIFE OF FOODS

In view of the globalization of industrial activities, separation of the consumers from the producers of foods demands processing and packaging technologies that would provide shelf stability to ensure that the food consumed is safe to eat and provides the nutritional needs of the consumer. In accordance with the UNIDO's mission on shelf-life of food products, work was undertaken on the subject and a training program was designed for the technical staff of CETEA. The basic thrust of the program was to impart current knowledge on the subject matter to the staff members with interest in this area and to individually discuss their on-going work related to the shelf-life studies. A copy of the program is shown in Appedix I.

The program essentially consisted of two hours of in-class instructions per day for eight days with a total contact hours. Another three hour per day slot was ear-marked for discussion with individuals and groups working on specific projects related to shelf-life extension in various packaging systems. The remainder of the time was dedicated to laboratory and library visits. Effort was also expended to establish contact with other pertinent sections of ITAL and UNICAMP through short visits. An external seminar for the industry was also organized and conducted, as shown in Appendix II. About 50 persons attended this one day seminar.

OBSERVATIONS AND RECOMMENDATIONS

After two weeks of direct contact with the staff members of CETEA, it became apparent that the strength of its technical staff, indeed appropriately, lies in the area of their expertise which is essentially packaging material types and their properties. They are equally conversant with the real problems to be solved in terms of shelf-life extension of food products. However, since solution of such intricate problems more often than not require statistical approaches, their efforts are hampered by lack of full time support in this area. While some support in this area is available through other units of ITAL, the arrangements appears to be less than optimum. If not a full-time, a half-time statistician dedicated to CETEA would alleviate this problem.

Another area that needs some improvement is that of food analysis. Analysis of food for its chemical and microbiological properties is essential for evaluation of shelf-life. At present such services come from other units of ITAL. Addition of a food chemist and a food microbiologist to CETEA staff to conduct and coordinate analytical work would be conducive to the overall performance of CETEA. Although this need does not appear to be too critical at this time, future plans for growth should consider this option.

While the current knowledge base of the technical staff is adequate in the area of packaging materials, their expertise in the food area could benefit from exposure to international activities related to foods. Recognizing that food is the focal point of all the packaging work currently underway at CETEA, it is recommended that selected staff members should be encouraged to participate in international conferences such as those organized by International Union of Food Science and Technology (IUFOST) and Institute of Food Technologists (IFT) each year in addition to those held in Brazil and other South American countries.

The existing practice of CETEA to permit and support staff members to pursue higher studies at UNICAMP should be commended. This has resulted into addition of another dimension to the program. Such endeavors not only help narrow the interaction gap between academia and industry but helps CETEA also get more relevant work done from its participating staff. Many shelf-life related studies are either underway now or being planned for the future. Continuation and encouragement of such practices are highly recommended.

The track record that CETEA has established in the past by helping the food industry well should serve as an example. It is now time that it should be envisioning of other relevant industries such as pharmaceutical, automotive, etc. to be brought under its broad umbrella in the near future.

ACTIVITY		
DATE	NORNING	AFTERNOON
M - 21	Travel	Arrival
T - 22	Discussion about programme	CETEA meeting
W - 23	Internal Seminar - (9:00-11:00) "Shelf-life of package foods"	Group meeting "Electrochemical tests"
T - 24	Internal Seminar - (9:00-11:00) "Shelf-life of package foods"	Group meeting "Shelf-life simulation of oxygen and moisture sensitive foods"
F - 25	Internal Seminar - (9:00-11:00) "Shelf-life of package foods"	Group meeting "Retort pouches and shelf-life of mayonnaise and dressing"
S - 26	--	--
S - 27	--	--
M - 28	Group meeting "Packaging for sugar" and Microwable packages and heat susceptors"	Internal Seminar - (14:00-17:00) "Applied statistics to shelf-life studies."
T - 29	Internal Seminar - (9:00-11:00) "Shelf-life simulation: models and measurement methods"	CETEA meeting
W - 30	Internal Seminar - (9:00-11:00) "Accuracy of shelf-life studies"	Group meeting "Modified atmosphere packaging"
T - 31	Internal Seminar - (9:00-11:00) "Extending shelf-life methods"	Group meeting "Semi-rigid" plastic packaging for thermal processed foods"
F - 01	Internal Seminar - (9:00-11:00) "Extending shelf-life methods"	Group meeting "Shelf-life of vegetal oil and soluble coffee in PET packages and packaging for fruit juice"
S - 02	--	--
S - 03	--	--
M - 04	External Seminar	External Seminar
T - 05	Report	End of mission

Internal Course: SHELF-LIFE OF FOOD PRODUCTS

Professor: Syed Rizvi

Period: May 23 until June 1 1990 (25 h)

Coordinator: Rosa Maria Vercelino Alves

PROGRAMME

1. Shelf-life of packaged foods

a) Definitions

b) Shelf-life of perishable, thermally treated, dehydrated, irradiated, frozen and combined treatments foods

c) Shelf-life measurements, according to types of products/packages

- Principles, methods

- Accelerated tests

- Use of food simulants

- Trends in shelf-life testing

d) Determinate of shelf-life

- Ingredients: types and qualities

- Processes

- Packaging, including secondary packages

- Temperature and relative humidity
 - Storage, distribution and handling
2. Applied statistics to shelf-life studies
 - a) Basic concepts review
 - b) Experimental design
 - c) Data statistical analyses and evaluation of results
 - d) Available softwares
 - e) Applied examples
 3. Shelf-life simulation: models and measurement methods
 - Moisture sensitive foods
 - Oxygen sensitive foods
 - Moisture and oxygen sensitive foods
 - Metal sensitive foods
 - Produces
 4. Accuracy of shelf-life studies: normal tests, accelerated tests, simulation and use of food simulants
 5. Extending shelf-life methods:
 - a) Quality-based methods: ingredients and packages;
 - b) Food processing-based methods: thermal, chemical microwave heating, ionization, radiation and combinations;
 - c) Packaging and handling - based methods: barrier methods; modified/controlled atmosphere; composition methods and handling methods.

EXTERNAL SEMINAR

RECENT ADVANCES IN FOOD PACKAGING & PROCESSING

&

SHELF-LIFE OF FOOD PRODUCTS

Program

- 8:30 - Registration
- 9:00 - Introduction
Luis Madi
- 9:15 - Changes Forecast in The Food Industry
Dr. Syed Rizvi

- 10:30 - New Packaging and Processing Technologies for Food
Products
Dr. Syed Rizvi

- 14:00 - Shelf-life simulation and accuracy of shelf-life studies
Dr. Syed Rizvi

- 15:30 - Extending shelf-life methods
Dr. Syed Rizvi

- 17:00 - Panel Discussion & Closing Remarks