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EVALUATION REPORT

on the Lectures and Discussions of the Workshops held in
August 1985 in Budapest, Hungary
organized by the UNESCO
Regional Office for Science
Division within Budapest

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1. Introduction

- Scope and circumstances of the Workshops. The summer of the Year 1985 offered a pleasant possibility to convocate groups of specialists working or interested or have influence on agriculture and/or food industries. In the second half of August 1985 the following events took place in the capital of Hungary, in Budapest:

- OMÉK 85 /Country's 70th Exhibition on Agriculture and Food Industries/ Budapest is well known as place of international and national Fairs and Exhibitions with either general or specialized technical and commercial spectra, as per the two Budapest International Fairs, the first one in May of each year showing investment goods, industrial products etc. and the second one in September of each year exhibiting products of direct consumption.

  The OMÉK is in measure and importance more interesting, because it is held regularly in 5 year periods only and provides opportunity to learn in one very extended exhibition area the whole Hungarian agriculture and food sector, which constitutes one of the largest branches of the Hungarian national economy.

  These quinquennial national and international Budapest Fairs open each time a broad window through which the visitor gets a clear and up-to-date view of and about the food from the fields to the ready to serve products. The significant participation of developed and developing countries helps to get a broad Skyline /Area 107.000 m2 Visitors: 1 million/. It is also important to know that Hungary's agricultural and food sector has a powerful cash-crop character and its share in the national export is higher than 1/3 of the total value.

- AGROMASEXPO Hungarian Exhibition of Agricultural and Food Machinery, with broad international participation. Regularly organised in every second year. /Area: 35000 m2, Visitors: 60.000/

- 4th International Technology and Licensing Fair organized by Technology For The People. /TFTP/ which one is an Organisation sponsored regularly by the UNDP and UNIDO.

Making use of the opportunity and the coincidences in location nearest Vienna and the goodwill of the Hungarian authorities and organisations UNIDO with the help of UNDP has invited experts of the food industries of developing countries. From 16 to 25 August 20 participants from 13 developing countries were present in Budapest, visited the exhibition, participated on the Workshops and study tours. This Hungarian - UNIDO project was directed by leading officials of UNIDO from Vienna and the Hungarian organisations HUNGEXPO and KOMPLEX.

The two Workshops held in the premises of KOMPLEX during a period of two days dealt with three main chapters of food development:

Food Processing	with some addicives as per
Quality Control	the role of water in food
Dairy Equipment	processing.

On the third day on 23th August 1985 the participants visited the Food Preservation Faculty of the University of Horticulture, especially the Chair of Food Chemistry, the Chair of Food Microbiology and the ICP Laboratory /Inductively Coupled Plasma/. That was followed by study visit to the Agricultural and Food Processing Co-operative "DUNA" of Csepel, nearby Budapest.

In addition the participants also had the possibility of acquainting themselves with the achievement of the different countries exhibiting at the Fairs in the subject technologies.

In the followings the Author of the Report makes an effort to describe the content of the lectures and the main points of the sometimes longlasting plenary meetings and personal discussions.

2. Some important aspects of food engineering

- The selection of appropriate constructional materials for production and maintenance has been widely discussed. The good quality of this is important from many reasons. The long durability of the machines, vessels, plants etc. is only one of the reasons, but the badly choosen materials can have a bad or dangerous influence on the products quality and its sanitary-hygienic condition.

Anybody often does not take into consideration the agressive chemical effect of the necessary cleaning procedures, utilising different chemicals and temperatures. Many of the participants accepted the importance of materials of first class quality however many of them expressed the opinion, that this kind of equipment is too expensive for developing countries. Probably further investigations can be made concerning properties and prices of stainless steels, high quality alloys, plastics, ceramic parts further the influence of the above mentioned materials on the sale price of the processing equipment.

- The role of the sanitary design of the food processing equipment seems nowadays incontestable. The lectures and discussions held on the food science underlined this experience. It is very important never to forget that an equipment designed as fully corresponding to high sanitary standards can be transformed through improper use and/or repairs, maintenance to a dangerous system with short durability.

  Sanitary and high level of hygiene in the processing belong to the knowledge of food technology and engineering. The use of some new operations and methods enables the processor to significantly increase the microbial level of the process and of the product. These aspects should be proposed, too, as regards the transport, general services, buildings, stores etc.

  The philosophy of hygienic and sanitary design helps to solve many of the problems regarding protection of environment and in reverse to avert the dangerous effects of it on the input side of the processing.

- The selection of technology, to final "a p p r o p - r i a t e" technology has been found to be very difficult. The equations and some of the views have been expressed, as follows:

  appropriate = simple? ≠ sophisticated?
  appropriate = sophisticated, up to date?
  appropriate = hand operated? ≠ fully automated?
  appropriate = direct computer controlled? /DCC/
  appropriate = labour intensive? ≠ fully mechanised

Everything can be made and everything can happen. The spectra of answers is very extended, from the sun sterilized preserved jars of the Middle East Center for the Transfer of Appropriate Technology /MECTAT/ in Beirut to the fully controlled aseptic dairy and fruit juice factories in Pakistan or the DCC animal fodder mills in Algeria.

The right decision depends on a lot of parameters and only some of them can be mentioned here:

raw material
product
packaging
scope of production
- export market: cash crop
- home market: Food crop.
  to install working paces

labour force /price, skill etc./
feasibility
agricultural relations
infrastructural level
environment
laws, standards, regulations: internal and international
financing in stage of investment
financing during operation
currency problems of financing
management

The Workshops and the Fairs offered a broad and rich picture to help the participants in their next actual decision in the subject, utilising the experience of the Hungarian food story, the food engineering of the developed countries and the exchange of ideas of the countries in development.

3. Food science and its important role in assurance of the quality of food products

3.1 Microbiological assurance of food quality

Microbiological quality loss of foods may result in food-borne infections and toxic diseases, or in spoilage.

Numerous microbiological agents of food-borne disease have been identified. The epidemology of many food-borne disease causing agents have been established and ecological factors that influence the occurence, development and control of hazardous number of these agents in foods have also been described.

With regard to food spoilage, the nature, causes and factors of microbiological spoilage or deterioration of many food commodities have been described, the specific spoilage problems have been identified and the ecological principles on which control programmes can be based have been established.

Nevertheless, the incidence of food-borne disease remains high, even in the developed countries that apply microbiological quality control measures. The situation in the less developed countries are even more serious, because there less attention is to food microbiology and epidemiology of food-borne disease. Moreover, enormous amount of food is lost every year all over the world as a consequence of microbiological spoilage and deterioration.

Based on the well-established microbiological and ecological principles, both of the above mentioned problems can be controlled by elaborating, applying and verifying integrated preventive system throughout the whole food processing and distribution line.

Aiming at assuring the microbiological quality of foods the WHO and FAO in collaboration with the International Committee on Microbiological Specification of Foods of the International Union of Microbiological Societies, have organized coordinated research on food microbiology and prevention of food-borne diseases and have convened several expert consultations to discuss the most important problems in these fields.

One of these was held in Budapest in 1983, simultaneously with the 12th International Symposium on Microbiological Association and Interaction on Food.

Thanks to these international efforts under the auspices of WHO/FAO recommendations have been elaborated to guide the establishment and application of microbiological criteria aiming at protecting the health of the consumer by providing safe, sound and wholesome food products. Moreover, practical guidelines have also been elaborated by international expert committees, whose work has led to the development of a rational and up-to-date approach to control microbiological hazard of foods. It is called the Hazard Analysis Critical Point System.

3.1.1 Microbiological hazards

Microbiological hazards may result in human illness or food spoilage.

Food-borne diseases of microbial origin are usually divided into two main categories: infections and intoxications.

Infectious diseases are caused by infective microorganisms that were present in the food and got via the mouth into the intestinal tract where they proliferated.

Intoxication, on the other hand, results from the absorption from the intestinal tract of toxins, which have been preformed in a food by the metabolism of certain microbes.

Salmonella and Campylobacter cause most cases of food-borne infections. Of the two, Salmonella is the most dangerous for its growth is supported by the food so that it attains high number, increasing the likelihood of infection of the consumer often resulting in outbreaks in larger groups.

Other food-borne pathogens that cause infections in relatively high number are Shigella species, Cl. perfringens, certain sterotypes of Yersinia enterocolitica, enteropathogenis E. coli, Vibrio parahaemolytious. In rare instances food infections may be caused by pathogenic microorganisms which do not ordinarily grow in the food but are merely carried by it. Pathogens of this kind are those causing tuberculosis, typhoid fever, diphtheria, cholera, brucellosis etc.

By far the majority of the most frequently involved aetiological agents are aquired from food of animal origin, in particular poultry, pork, raw milk and eggs.

There are two chief kinds of food poisoning caused by bacteria:

1/ botulism, caused by the presence in food of toxin produced by Cl. botulinum, and

2/ staphyloenterotoxicosis, caused by a toxin in the food by Staphylococcus aureus.

The first is more serious because the botulinum toxin is one of the most potent known, and the spores of the producing organism are highly resistant. However, the second is the most commonly occuring food-borne disease, as the producing organism is very widely distributed in human and animal sources, and the toxin itself is unusually heat-stable, whithstanding boiling for 20-60 min. Hence, usual COOKING will not destroy the toxin formed in the food prior to the heat process. Such food might cause poisoning, although it containe no living staphylococci.

There are several other kinds of toxigenic bacteria, like Bacillus cereus, pseudomonads and streptococci. In the last 20 years serious attention has been raised by the chronic toxicity caused by the metabolic products of molds called mycotoxins.

Mention should be made also to some viral, protozoan and helminthic diseases transmitted or spread by food. The former, like hepatitis a virus, is mainly concerned in developed countries, while the latters are often confined to tropic areas and often have restricted local significance.

3.1.2 The second large group of microorganism to be concerned is the spoilage microbes.

A great variety of bacteria, yeasts and molds may be involved in the deterioration, spoilage and decay of various food commodities. Their metabolic activity, the comounds produced, the bicchemical changes caused that are responsible for spoilage are very different and depend also on the prevailing circumstances of processing, storage, transportation or trade.

Food spoilage bacteria are in general characterized by a higher growth rate, hence a greater spoilage potential than molds. According to their particular physiological attributes, certain special groups can be distinguished among them, like acid tolerant, proteolytic, thermophilic and other.

Some microorganisms are able both to spoil and to cause food disease, for example Cl. perfringens, B. cereus, E. coli, Unfortunately, however, spoilage cannot always be observed before the food initiates poisoning. Mention should be made to those microbes and microbial groups whose presence in a food indicates lack of safety. These organism collectively called marker organisms. Amongst them distinction can be made between index and indicator organisms.

The presence of index organisms in numbers exceeding given limit values indicates the possible occurrence of ecologically related pathogenic organisms. E.g. the detection in a food of large numbers of E. coli may indicate the possibility of salmonellae, campylobacters and other enteral pathogens.

Indicator organisms in specified numbers convey information concerning the microbiological and hygienic condition of a food in general. E.g. the total number of Enterobacteriacese may be regarded as appropriate indicator of inadequate raw material, processing or distribution, though it does not necessarily provide evidence for pathogens being present. In this sense, the high numbers of total viable microorganisms /often called plate counts or cfu/ may be often a good indicator of hazard in certain food, while in other cases counts of streptoccci, spore-formers and other groups are useful indicators.

3.1.3 Ecology

Initially a great variety of microorganisms occur on the surface as in the interior of fresh foods both of animal and plant origin. However, only a fraction of this original microflora takes part in spoilage. Only that part of the microorganisms contaminating a food which posses the physiological attributes that allow their survival and proliferation under the conditions encountered will predominate in the spoilage association. The ecologically determined selective meechanisms that result in colonization of food by pathogenic microorganisms and the formation of toxins in food are identical with those govern colonization and attack by spoilage organisms.

In practice, four groups of ecological parameters are significant determining this selection, that is limiting or allowing microbial proliferation in food.

1/ abiotic intrinsic factors, which are the expression of the physical properties, the chemical composition and the biological structure of the food itself /e.g. water activity, pH, presence of nutrients/

2/ abiotic extrinsic factors, such as the temperature, humidity and oxigen partial pressure of the environment in which the food is stored and transported

3/ biotic implicit determinants, particularly the physiological attributes of the microorganisms themselves /e.g. growth rate, nutrient requirement/ and the antagonistic and synergistic effects of the microorganisme on each others

4/ processing of food, which results in a drastic modification in the composition of the initial microflora, often eliminating more or less completely the unwanted organisms, mostly by applying heat treatment of variable lethality or by chemical means resulting in changes of chemical composition of a food.

The whole strategy of production of microbiologically safe food is based on these ecological principles.

3.1.4 Hazard analysis

As it comes from the above, microbiological hazards include contamination of food with unacceptable levels of food-borne disease causing organisms and/or contamination with spoilage microorganisms. A hazard analysis consist of an evaluation of all procedures concerned with the production, distribution and use of raw materials and food products

1/ to identify potentially hazardous raw materials, ingredients and foods that may contain poisonous substances, pathogens or large numbers of food spoilage microorganisms

2/ to find sources and specific points of contamination by observing each step in the food chain

3/ to identify ecological factors in the food chain that can support microbial growth

4/ to determine the potential for microorganisms to survive or multiply during production, processing, distribution, storage and preparation for consumption.

3.1.5 Critical Control Points

Hazard analysis results in the determination of critical control points. A critical point is a location or a process which, if not correctly controlled, could lead to unacceptable contamination, survival or growth of food-borne pathogens or spoilage microorganisms.

Such critical points are often the incoming raw materials or ingredients as raw spices, which may be heavily contaminated. Processing time-temperature combinations are frequently the most critical points. Improper sanitation in the plant also adversely affects safety and quality. These critical points are obvious, others are to be established by more extensive research on the food processing line.

Visual inspection is the usual approach to determine critical points. Others can be selected by checking and testing by physical and chemical method the important parameters /temperature, pressure, concentration, time etc/. Microbiological investigations usually form a vital part of the procedure of selecting critical points and include investigation of raw materials, products, line samples from the surface of equipments etc.

3.1.6 Control

Based on the information available concerning the most likely hazards and selecting the critical control points a protocol can be developed for an effective and economical approach ensuring the safety and quality of food produced. Assurance of the microbiological safety and quality of foods relies on the control of the fate of microorganisms in their ecological niche, that comprise the food and its environment. In other words, based on the principles of microbial ecology efforts should be made to elaborate, apply and verify good manufacturing practices.

The approach to control therefore encompasses

1/ the choice of ecologically relevant criteria

2/ the limitations of contamination by the application of measures of hygiene

3/ arresting of multiplication by the applying of proper extrinsic and intrinsic factors

4/ processing for safety to eliminate unwanted organisms while avoiding subsequent recontamination.

Once GMP has been adopted the level of microbial contamination and the fluctuations in microbial quality becomes greatly reduced. The microbial profiles will approach the smallest level attainable for the respective product /General microbial profiles/

The maintenance of GMP through production, processing, storage and distribution serve not only the control of microbial quality but also the prevention of microbial hazards.

Essentially the whole food processing and distribution line should be integrated into a preventive system aiming at assuring the microbial quality of foods both with regard to protection of the consumer from health risk and in protecting foods from deterioration.

This approach is often summarized as "The five P-principle" as it is relies on a prevention programme including a constant attention being paid to

1/ premises /plant construction, process design, sanitary engineering, CIP etc./

2/ procurement of raw materials of the best available microbial quality

3/ personnel being adequately trained and motivated

4/ processing for safety according to the results of hazard analysis and critical control point system

5/ preservetion of microbial quality and safety of the final products during transportation, storage and marketing.

Having surveyed the principles and most important elements of microbial quality assurance programmes, one more point only will be considered, i.e. monitoring.

3.1.7 Monitoring

Monitoring means the checking or verifying that the processing and handling procedure at the critical control points is properly carried out, that the GMP has been maintained throughout the whole food producing and distribution line.

Experience has shown that the HACCP system will be effective only if it is regurarly checked and tested.

Monitoring should be applied through manufacturing and distribution and should include all critical control points to ensure that these points are under control.

Such monitoring may involve only visual inspection, but may be best achieved by rapid physical and chemical tests. Routine microbiological tests are commonly used for monitoring. Detection of pathogens in routine monitoring is only rarely required in the case of certain commodities frequently involved in food poisoning. The use of marker organisms may in many instances be adequate.

The monitoring system is based on line samples and end product investigations. Microbiological examination of end products alone is less effective in protecting the consumer than monitoring the complete food chain. In some situations, e.g. when importing food, it may not be possible to check GMP at all points. Under these circumstances it may be necessary to rely upon microbiological examination of representative end product samples.

In the microbiological monitoring of foods it is required to have clear-cut criteria that are to be met by a safe, sound and wholesome product. However, there are many difficulties in defining and quantifying of microbiological results and standardizing the methods of analysis. In wiew of the importance of meaningful microbiological criteria for foods joint FAO/WHO expert committees were convened to elaborate these criteria and to make recommendations. The conclusions reached during a five year program was summarized in a WHO document published in 1983.

3.2 Food chemistry and its role in assurance of the quality of food products

Physical and chemical parameters are the markers of a food or of a raw material to be processed Most of these parameters are of simple characters, but very important properties have of highly sophisticated characters, as per rheological parameters or flavor.

The chemistry and its analytical methods of anorganic and organic analysis must be strictly utilized before, during and after the processing, the storage and marketing of the products included. Quality control begins at arrival of the raw materials determining the characteristic parameters of it. The experience of the always expanding food industries suggests not only the appropriate analysis on the input side of the factory but a singificant correlation between the physicochemical - chemical - microbial parameters of the arriving raw material and the price of it.

Only some exemples:

Fat/meat proportion of animals to be slaughtered.
Sugar content of sugar beets
Water-soluble-materials content of tomatoes and fruits
Fat and water-soluble-materials content of milk.

The importance of the quality and purchasing price correlation shows a significant increase in the eighties and exerts immense influence not only on the profit margins of the food processor but on the development of the agriculture too. The realisation of such complexe systems has been very difficult in the developed areas too, originated from investitional needs, lack of organisatory experience, agropolitical problems etc. The results of the efforts are excellent and such systems and subsystems are operating in many branches and countries.

The correlated threeangular parameter-group contains out of the above mentioned a fourth one, namely the organoleptic parameters. At our times the technical level and the current R+D open the window to the full picture of the properties of the food in each phase of its life, the preservetive, shelf life included. The threeangular /resp fourangular/ system can be fed into the channels of computerised national or international information processing.

The means, methods, instruments of such systems are in the first stage relatively simple and cheap. General laboratory equipment from glassware to analytical balance and Abbe refractometre/. Prefabricated, preselected, sometimes containerised laboratories are offered on the market by general contractors. The more sophicisticated and more expensive analytical instrumentation and technology is already an important segment of the complexe systems of today.

Instrumental analytical methods /mostly used at present/

- electrochemical /electroanalytical/ methods

  polarography, conductometry, potentiometry /ion-selective electrodes/

- optical methods

  atomic absorption spectroscopy /AAS/, spectrophotometry, flame-photometry, refractometry

- thermical analytical methods

- separation methods

  electrophorese, gaschromatography /GC/, liquid chromatography /LC/, amino-acid analysis

- magnetic methods

  mass spectrometry /MS/

- radioanalytical /nuclear/ methods

  activation analysis /AA/, X-ray fluorescence /XRF/

- rheological methods

  penetrometry, plastometry, viscosimetry, tenderometry, maturometry.

Great importance in the near future: NIR-technique /near infrared reflectance/, ICP-technique /inductively coupled plasma/, OPLC, HPLC, NMR, GC-MS, PIXE /particle induced X-ray emission/.

The State Service of Public Health and Epidomology has the similar authorisation with a broad competence including control of employees in food processing, food sale, catering etc. The Service's activity includes the sharp control of the hygiene through the utilisation of the most advanced methods of food microbiology.

Both State Services have a centrally directed and regionally placed network of offices, controlling persons and Laboratories. In some food industries the controlling person works in the processing line, e.g. in slaughterhouses, controlling not only the carcasses but the byproducts, too.
The food products for export are under the obligatory supervision of the State owned Quality Control Corporation which is also ready to check and control on behalf of the Costumer abroad or of a foreign control organisation.

- Some numbers on the statistics

The number of samplings and control examinations of the food producers made by their own staff is unknown. In the following you can see the numerical data characterising the activity of the State Food Control Network in 1983.

Food producers, tested	3917
Control actions on site	8531
Organoleptic and chemical determinations	187172
Microbiological determinations	228268
Toxicological determination	20095
Radiological determinations	2355
Proportion of samples rejected	9 %

4. Processing of fruits and vegetables

The title's meaning can be very broad including the canning industries, deep freezing and cold storage and a lot of related industries, too. The organisers of the Workshops decided to concentrate their efforts on the main points of general interest only having significant importance in an industrial processing area of great extension.

The philosophy of the technical and economic strategy of fruit and vegetable processing is in continuous change, influenced by many factors:

- the immense or satisfactory masses of raw materials and the appropriate quality of the fruits and vegetables
- the need to save the above mentioned agricultural products
- the final scope of processing: it means to utilize it either as food crop or as cash crop
- the increasing costs of manpower, energy and packing materials and the rate of the added value through the processing.
- the changes on the national markets and on the world market.

Meantime the effects of the Scientific and technical revolution have induced an intensive development of the relevant unit operations and generally of the food engineering operations.

4.1 Advanced unit operations and equipment

It is excellent to see, that in the past decade the R + D of the food engineering has offered a lot of possibilities to new, appropriate - not very simple although not very sophisticated - technologies. The Choice of unit operations and the selection of the relevant machinery shows a rich picture from the simple and cheap to the sophisticated and expensive.

The new trends in the processing operations are the utilization of following equipments:

- the high capacity, mechanized receiving hoppers assuring continuous flow of raw materials. This equipment are capable of receiving heavy loads of trucks too, coming from the mobile harvesters.

- the dry cleaners which can very well treat the mechnically harvested goods /for example peas, beans/.
- recycling groups for washing water, incorporating hydrocyclones and membrane filters for the sake of the complete protection of the environment.
- electronic sorters either working with X-rays to eliminate unicoloured extraneous pieces from the mass flow or photoelectronic sorters acting on base of colour differences
- the effective mechnical calibrating machines are always more better but in some cases the need of the processing exceeds their limits
- the calibration according to geometrical parameters, mostly to forms and shapes with the help of computerized videoelectronic systems.
- up-to-date heat exchangers in three fundamental classes:
  - broad choice of plate heaters and coolers
  - coil-double-type equipments
  - scraped surface heaters and coolers
- 3-4-5 stage evaporators and combinations with mechanical vapour recompression
- high capacity continuous membrane filters for reverse osmose to eliminate significant quantities of water before concentration through thermal evaporators
- fully automatised horizontal periodically sorting retorts with classical or computerized control, measuring and recording the Fo values: this are for smaller and medium outputs
- Continuous rigid system can sterilizers or flexible divided or not divided hydrostatic sterilizers: both groups represented by medium or high capacity units.
- high level sanitary type equipments like centrifugal and volumetric /positive/ pumps, electronic pneumatic automatically signalling flow control valves, cleaning in place /CIP/ systems with flexible softwares etc.

The list of the above refered groups does not contain whole sortiment offered by the food machinery producers of the world, however shows the trends of applicable engineering.

4.2 New methods in the technology

Without this above mentioned rich MENU the aseptic processing of juices and/or purees of mango or tomato couldn't be introduced in developing and developed countries. The revolutionary progress of the aseptic technology offers an optimistic view for growers, producers and consumers and opens already some possibilities to increase the production and export of cash crop products. The range of aseptic packages expands from 200 mililitres - to 1000 litre units depending from package systems and marketing relations.

- The aseptic processing of solid food has provided a new set of problems. The research activity has begun in the sixties and only now can we hope to be in the proximity of practiceable processes.

The importance of the microbiology to avoid bacteria to produce aseptic products is commonly accepted, the same tendancy can be expressed concerning the increasing role of the microbial technology or bioengineering. Treatment of fruits with enzimes - one example of it follows later on - influences the technology still at beginnings e.g. by pressing or the combination of enzimatic treatment with filtering and membran process operations open new ways to better juice-yields, higher quality, colour, flavour.

The same stages of processing are now worked out with water-solid diffusion methods using screws or continuous filters or up to date dekanters. It is preferable to examine in each case the role of enzimatic treatment in the different substages.

The cold preservation of vegetal raw materials shoes very up-to-date and perfectioned technical level both for batch and continuous operations, too, as per the flow freezers worldwide used.

The new trends on this field are characterised by the cryogenetic freezing, using liquid nitrogen. Some very small units are already on the market with input of 1-2 hundred Kilos/hour or per batch, in easily transportable forms, adapted to work on the spot, in the gardens.

4.3 Packaging: a heavy package of problems

- The short chronology shows the high importance of the packaging in the field of the fruit and vegetable processing.

  Many old problems and theirs solution are nowadays also on the stage, discussed, abolished, renewed. The tinned plate and the soldered cans produced from it are widely used. Disregarding the form - it means plate or roll- of the raw material used to can production, the old questions are arising always and everywhere. With special emphasis on the circumstances of the developing countries it is preferable to consider the feasible alternatives from case to case, from site to site as concerns the place of can processing, to choose between own production or buying it from inland producer, eventually from abroad.

- It remembers to an old method in developing countries in the time of the fifties. This was characterised by the centralised production of the can-bodies and that of the lids. Then, to cut down transport costs, can-bodies were flattened and supplied to the canning factory along with the end pieces, the lids. These can be made into cans readily at the factory by using a set of machines consisting of a can body reformer, flanger and double seamer. This system in India included the cans with diameter 68-157 mm and height 78-178 mm. The feasibility of such a system depends on many factors beginning with the infrastructure and ending with the demands of marketing.

- The distribution of the can making raw materials or that of the ready to fill cans are under the influence or in the hand of great national or transnational packaging companies. Horse power has already penetrated the sphere of glass jars and bottles.

- The use of glass as packing material is very old, however, to enter into such system begins with the good raw materials to produce glass, needs good technology, energy, skill, high level of technology, uniformity and accuracy of the product.

In possession of all these conditions anybody has to make a choice between the jar closing systems offered on the market. Many of the Hungarian and foreign experiences were mentioned. The crucial factors of the decision are:

breathing closure - non breathing closure
simple closing - vacuum closing
art of the goods filled into the jars
method of sterilising after closing
demanded level of mechnisation
accessibility of lids, covers:
accessibility of know-how to produce by himself
accessibility of closing equipment:
accessibility of paints and sealing materials
demands of the end product market: cash crop-food crop

This short but incomplete list is very convincing to see the difficulties of a packaging decision with the possible consequences of organisational and economical character.

- The aseptic way forms a very important revolutionary chapter of the packaging in our days. Aseptic treatment, storage and marketing have been discussed. Many of the fruits and vegetables grown on moderate and tropical climate can be processed and packed in aseptic way. The aseptic process increases the cash crop potentials of many developing countries offering economical sizes and methods for high quality products to reach easily and on competitive way the international market.

The philosophy of the system includes the up-to-date treatment and/or the storage in sterilised big tanks to 60 cubic meter each. The aseptically stored goods can be packaged into smaller units later on or will be transported to industrial consumers in aseptic tank-lorries. The tanks are made preferably of stainless steel, in sanitary design. The choice of packaging machinery available offers the following alternatives:

aseptic bags	/3-5-20/-100-200-1000 litre	
units		
aseptic bags	in cartons-in cases-indrums	
aseptic drums	200 litre	
aseptic consu-		
mer packages	0.2-1-3 litre	boxes
		pouches
		cups

The usual ways of filling are characterised by the following facts:

The environment of filling is sterile during the process

the container is sterile: either sterilised and packed in sterile way /p.e. bags/ or sterilised in the filler before filling /p.e. drum/; the packaging material will be sterilised in the aseptic filling machine before and during the forming operation of the consumer package /e.g. cup/. It is necessary to know, that the packaging material, the container, the know how of his production is concentrated in few hands, sometimes with the filling know-how added.

This fact impresses the consideration of an eventual packaging decision with elements of hard currency input and output causing the same or more sophisticated system of factors as mentioned above regarding the glass jar-decision.

Additionally attention should be called on the fact, that a well equipped aseptic system needs evidently the high sanitary - microbial level of equipment, the CIP and this all lead to the full exclusion of human errors concluding in a microprocessor control The views and forecasts of many participants verified this ideas, as a measure to increase the competitivness of the producers.

4.4 An ancient fruit and its new complex processing

The shortage of foods for home consumption and the poor situation of many developing countries regarding cash crop need to improve their export and foreign trade balance.

This task can be served through industrial processing of old raw materials through utilisation of new technology. This can be explained showing the palm date story. The date used to be an important food in its natural form during 6000 years of human history. It is easy to store, to preserve and the high yield and the high nutritional value make it to be a very important food crop.

The industrial developments in the developing countries in cooperation with the innovative experience of a small, however in food processing well advanced European country resulted in revolutionary changes in the utilisation of a storical food. The small hills of the harvested mass of dates, with some syrup on the sand was transformed in processing lines, in factories producing a broad range of products, from sugar to fodders and fermented goods.

Hungary has been dealing with the technology of date processing since the middle of the sixties. Although this fruit is not a native of Hungary, the Hungarians keep fulfilling this honourable task since many years - entrusted by UNIDO too.

By way of introduction a few words about the palm date which 6000 years ago was already a valued and cultivated plant. Its importance keeps increasing in our time, too, as the widely spread new methods of cultivation keep increasing the yield.

The ripe fruits are completely utilizable partly for human consumption and partly for feeding animals. Dates suitable for human consumption can be consumed as food, or can be used for production of juice depending on the quality.

The eating dates are ripe, with high sugar content and aesthetically are appetizing, too. Their biological sugar composition is the most valuable. They are much sought sweet all over the world.

Dates not meeting the criteria of sale in original shape are suitable for industrial processing since their high sugar content can be economically utilized.

From juice obtained during extraction and by an appropriate treatment the following end-products can be produced: syrup, liquid sugar, baking-yeast, alcohol, vinegar and fodder-yeast.

From the less valuable dates of inferior quality, as well as from the by-products /stones, fibres/ obtained during the course of extraction a highly nutritive fodder mixture can be produced on an appropriate production line which could be a useful aid to the animal husbandry.

In Hungary the research works were aimed, first of all, at the preparation of juice and its end-products, at the production of fodder, as well as at the elaboration of complete technological lines to produce all those mentioned above. For eccnomic exploitation of the high, averagely 57 p.c. sugar content of the dates a technology elaborated by Messrs. LÁNG GÉPGYÁR and KÖVAC was built-in into several plants supplied by Hungary. The most significant of these is the liquid-sugar factory at Hindiya in Iraq with its internationally admitted outstanding capacity. The field of application of the liquid sugar produced therein is almost in-exhaustible. It was qualified and verified appropriate by the COCA-COLA Co. too, and that is why it is so much wanted basic material from the soft-drinks producing factories up to the canned food and confectionery industry, too.

Beside the above and together with the Austrian firm Vogelbusch alcohol-, vinegar- and fodder-yeast plants, all based on dates as raw material have been installed in Iraq, too.

Further R + D activity was continued then concerning technical development and on basis of the experiences gained during operation of the technological lines built-in in the above mentioned plants.

With this end in view, from 1982 on, the KOMPLEX and INDUSTRIALEXPORT Hungarian companies have jointly elaborated a new research development programme for complex processing of dates. A series of experiments on large scale were launched together with the Central Food Research Institute /KEKI/ and the Research Institute for Growing Vegetable /ZKI/.

The technological phases were elaborated first in laboratory, later on a pilot technological line set up at Kecskemét at the ZKI under pilot plant conditions.

In the course of our work ten different species of dates were tested in a quantity of several tons.

Aim of the development:

1. Production of syrup and liquid sugar resp. from dates by adding enzyme to increase extraction efficiency

2. Reduction or rather omission of auxiliary materials used in large quantities by the former technologies.

3. Reduction of sugar content of by-products.

4. Working out a large scale processing technology for the enzyme method.

The rapid development of enzyme chemistry has naturally involved the wide industrial application of the enzymes. Since long special enzyme preparations have also been used for decomposition of pectine content of different fruit- and vegetable juices and the so prepared juices maintain almost the whole quantity of their nutriments, mineral matters and vitamines.

The content of pectine in dates tested by us was ranked between 0,72 - 1,66 p.c., depending on the type of dates.

This type of pectine was present partly in form of protopectine, a non-water soluble glue of cellular membranes and partly as pectine soluble in the water phase.

Pectine if present in juices promotes the stabilization of materials causing turbidity, increases the viscosity, thus making more difficult the filtration and separation, the result of which is that the fibres retain higher sugar content.

The macerating type pectine-decomposing enzyme preparations /such as the Phylendonase/ by decomposing the pectine-containing matters being present within the vegetable tissues bring about a suspension from individual cells or from small-sized cell agglomerates leaving the cellular membranes intact /Zetelaki-Horváth and Gátai, 1977/.

The clarifying type enzyme preparations decompose the pectine to parts of small molecules and through their effect the physical features of pectine change, too.

From the technological point of view the "enzyme method" makes the juice well responsive to treatments.

During the course of the experiments, first of all, the Hungarian made pectine decomposing enzyme preparations, such as Phylendonase and the Pectine-liase preparation originating from the experimental production of KEKI /Central Food Research Institute/ were used but the applicability of preparations of other foreign companies has been tested too.

The main phases of the experiments were as follows:

- preparation of raw materials,
- aquaous extraction by adding enzyme,
- heat treatment,
- separation of liquid and solid phases,
- clearing the juice,
- evaporation.

By adding enzyme Phylendonase the recovery of juice has increased by 10-20 p.c. The dry substance /refraction p.c./ and the sugar content of the extract have increased by increasing the enzyme concentrate and the length of the period of treatment.

The sugar yield of date juices - sugar content expressed in glucose - was higher by 15 p.c. than that in control probes.

The effect of enzyme Phylendonase on the reduction of viscosity /80 p.c. of the date juice/ has facilitated the carrying out of the technological operations such as pumping, fibre separation, and filtration.

The sugar content of by-products was less by 10-15 p.c. than that when control material was used. The dry weight proportion of the residual date fibre has decreased by 11-16 p.c. by increasing the enzyme concentrate and the treating time.

The clearing effect of the enzyme Pectinliase and the degree of decomposition of pectine at extracts obtained from dates were followed on by measuring the specific viscosity of the juice while the quantity of decomposed pectine was concluded from the reduction of quantity of precipitate being strainable.

To the effect of enzyme treatment the specific viscosity of the date juice has decreased by 80 p.c., while the quantity of strainable precipitate - similarly to the viscosity - has also decreased by increasing the enzyme concentrate and the length of the treating time.

Treatment by adding Pectinliase has not reduced the PH value of the date juice, neither its refraction and dry substance content.

Summing-up the results of experiments it can be established that by using pectine decomposing enzymes the efficiency of the aquaous extraction of dates can be increased from the point of view of sugar recovery.

Clarification of the date extract adding enzyme and its treatment by Pectinliase enzyme simplifies the former chemical process of pectine decomposition and clarification to a great extent, and thus reduces the loss of sugar originated during these operations.

Decrease of the specific viscosity made possible the filtration of other solutes, e.g. proteins, causing turbidity and the evaporation of the so obtained cleared juice almost without any loss too.

To the effect of enzyme treatment the auxiliary materials used by the former technology and imported by the end-users could almost be eliminated and thus a number of the former equipment became unnecessary in the processing line, it became simple, consequently the specific operational costs could be reduced.

At the new technology such separating and clearing equipment can be used which simplifies considerably the former complicated technological phases and thus reduce the water content of the by-products.

As a result of R + D done the enzyme-added recovery and clarification - well known at date processing too - were further developed and became suitable for large scale production.

By adding enzymes we have succeeded in eliminating such factors of uncertainty as the changing quality of the raw material as a consequence of which the capacity of the technological line varied.

Beside the above mentioned this kind of treatment protects the material from a lengthy heat treatment which may cause serious deterioration. Significant success was found in increasing considerably the capacity of the separating and clearing equipment, as well as their reliability in service, too.

Further R + D is expected through the introduction of new food engineering methods, unit operations and bioengineering to develop processing technology and to increase the choice of products made of this wonderful storical fruit.

5. Dairy engineering

5.1 Trends of development: new methods in milk processing. /The Hungarian experience/

This chapter is based on the experience and results that have been realized in the Hungarian national practice, and that may command interest in developing countries, too.

The most important items of manufacturing technologies and products have been developed by adopting membrane separation methods. The last decade of Hungarian efforts in R + D is characterised by the introduction of membrane technology. The ultrafiltration has the greatest importance among the membrane separation processes and the ultrafiltration was the first to be applied industrially in Hungary.

The Hungarian institute has been concerned with the possibilities of the ultrafiltration applied in dairy industry since 1974 and a whole range of dairy products and manufacturing processes have been evolved since then.

Cheese manufacturing method based on the combination of ultrafiltration, thermal evaporation and homogenization may be the most important. By its application there is a possibility for producing Feta-like cheese being ripened in brine, which are primarily known on the markets of Middle-East, however, owing to its high elasticity, it can be used for producing a whole series of milk products, as fresh and ripened soft cheese, cottage cheese, desserts, and so on.

This process, compared with the conventional cheese manufacturing methods, can provide the following advantages:

- the yield increases by 20-30 p.c.,
- the rennet savings are up to 80 p.c.,
- it is efficient, having less labour and energy requirement,
- it is environment protective because of its by-products have low biological oxigene demand /B.O.D./.

The process developed in the Hungarian institute is more up-to-date than the earlier cheese making methods using ultrafiltration because

- ensuring the composition of cheese, it takes place in two steps, by ultrafiltration and vacuum evaporation, thus adjusting the solids content can be attained at lower cost,

- selecting the solid matter content is possible between greater limits, thus the possibility of the use widens considerably,
- the higher proportion of the biologically active milk components gets into the cheese material,
- an output being also theoretically maximum becomes possible.

Using the outlined process, two factories having a yearly production capacity of about 8000 tons were established. The factories produce primarily Feta-like cheese having the following major features:

Solid content: 41-43 p.c.
Fat in solid content: 45 or 50 p.c.
according to the requirements of the costumers.

The cheeses are marketed in sealed metal boxes with a weight of 16,8 or 1 kilograms.

The output is characterized by the following data:

100 kilograms of ripened cheese can be produced of 500 l cow milk with 21 kgs milk fat in it.

Using the outlined method, there is a possibility to manufacture also sheep-cheese-like products, from the mixture of cow and sheep-milk.

The two factories deliver mainly for export.

In numerous Middle-East countries where the milk production is on a very low level, the demand is high for cheese rip
ened in brine. Therefore
factories were established for producing cheese from skim-milk powder and anhydrous butterfat. Hungarians developed an ultrafiltration process for producing cheese of the same quality from milk powder and butterfat as that from fresh milk.

The main features of the product comply with those described above with the difference that 100 kg of cheese can be produced from 45 kg of skim-milk powder and 20 kg of anhydrous butterfat.

Based on the presented ultrafiltration method of cheese manufacture, the processes for making also various fresh and post heat-treated cream-cheeses have been developed.

These products can be made with a wide composition range, that is without flavouring or in seasoned, fruity and sweet taste varieties.

These cheeses, utilizing fully the milk proteins, have higher nutrimental values than the conventional ones, and their organoleptic characteristics are very advantageous. The keeping time of the varieties being post heat-treated allows longer shelf life and the flavouring can be formed according to the consuming habits and taste of the customers.

One of these products, a post heat-treated product with seasoned flavouring has the following main features:

Solid content is	47 p.c.
Fat content is	30 p.c.

100 kg of the product can be made of 450 l milk with 31 kg of fat in it.

The Hungarian food industry too, just as that of other countries, uses different protein concentrates for example caseinates, milk protein co-precipitates, and so on in large quantities, primarily for improving the quality and nutritional value of meat and canned food products.

The conventional milk protein concentrates can be produced by means of high energy consumption and, occasionally, with great protein losses, in addition, there is often no possibility for establishing the so called functional properties according to demands.

To resolve these problems, a basically new process was established by means of the combination of ultrafiltration and water withdraval as well, as optimalizing parameters for producing milk protein concentrates.

This process assures that the endproduct will contain entirely all the milk protein fractions as well as the trace elements and vitamines bound to the protein.

The protein content of the product can be specified generally between 60 p.c. and 80 p.c.

Their characterizing properties are as follows:

- the milk protein fractions are included in the original proportions, which indicates nutrition biological advantages,
- their particle size is uniform, which is important for utilization for example preparing water solutions
- their microbiological quality and heavy metal contents are equivalent to the milk powder of good quality,
- their shelf life is one year in a suitable packaging,
- their functional properties are very favourable, their water bounding capacity and fat emulsifying properties are also good. /This latter is about 5 g oil/g protein./.

Owing to their favourable properties, the milk protein concentrates have wide utilizing possibilities:

- to improve the nutritive values of foodstuffs, primarily in bakery and Italian paste products,
- for improving foodstuffs quality,
- for making emulzifiers in meat and canned food products,
- for improving ice-cream and pudding substances,
- to develop such new food-products as butter with reduced fat content, acidified milk products,
- for producing additives, texture improvers and stabilizers
- for producing dietary and diabetic foods.

The utilizing experiments have been closed with favourable results, therefore, at the first step, the Hungarian dairy industry instituted a unit with production capacity of yearly 350 tons.

A considerable research program in Hungary is to develop the manufacturing technologies for diabetic products poor in lactose and energy as well, as to increase the product choice.

According to the national estimations and special literature data, over 10 per cent of the population has low lactase-activity or is lactase intolerant. The milk and milk product consumption of the affected population is very limited. To increase the consumption of the milk products, new products have been developed that can be taken without any complaints and symptoms by people of lowered lactase activity.

Production of such products is carried out by combination of ultrafiltration, vacuum evaporation, spray-drying and the mixing of additives. The flexible producing process allows the manufacture of products with a wide range. Using the process, the following products of low lactase content can be made:

- milk powder with different fat contents,
- pudding-powders, ice-cream powders,
- dessert-like milk protein concentrates being rich in protein.

The products are storable in suitable packaging for a long time, this allows the nation-wide supply provided by one central factory.

Butter creams of low energy content were worked out to serve the up-to-date nutrition.

Utilising the structure forming effects of the fat-protein complexes and texture modifiers, a butter cream group of 40 p.c. fat content, giving butter sense was developed. This is spreadable cold and does not melt warm /at 30-35 °C/.

Natural, seasoned and sweet verieties were established and are marketed in plastic cups with snapping lid. These products are very popular becuase of their good organoleptical properties and relative low prices.

The primary duty of the Hungarian dairy industry is to meet the demands of the Hungarian consumers, but interests are tied up with boosting the export of the milk products. Therefore, on the basis of conventional principles, manufacturing processes were developed for making special quality cheese-sorts with oriental character, being ripened typically in brine, such as Akawi and Feta cheeses

made of sheep- and cow milk. The manufacture and export of these cheeses is continuous at present, too; they are primarily sold on oriental markets.

Finally a few words about making use of the dairy industrial by-products:

The largest amount of by-products being formed in the dairy industry is the whey.

The whey generally is directly used for feeding animals nowadays, but the industrial processing becomes more significant year by year.

A part of whey is processed for whey powder.

The advantages of the whey powder production are:

- there is a possibility for using the whey in human nutrition
- it is well storable transportable cheaply, the pharmaceutical industry and fodder industry attain valuable substance,
- and finally a great advantage: the sewage disposal problems of the factories will decrease.

Together with the Hungarian Baking Industrial Research Institute, a baking industrial ingredient was developed. Its use reduces the energy and time requirements of the bread manufacture and improves the bread quality. This product, named "Citopan" is produced in order of yearly 1000 tons in Hungary.

We have had to solve the utilization of a new by-product, the permeate of ultrafiltration processes.

The permeate is well usable for feeding either directly or concentrated. Being concentrated, it improves the utilization of urea in animal feeding.

A refreshing beverage group on permeate basis was established. Their marketing has recently started in Hungary Trade mark Fauna Fit. According to nutritional analyzes, these beverages have very favourable physiological effects, they are advantageous for providing the mineral salt balance in the human organism. They are healthy beverages for everybody and their consumption is recommended primarily for workers doing hard physical work or living in hot climate.

5.2 Dairy machinery

The trend of the machine development for the milk processing shows the general tendency in food engineering adapted to the special demand of the industry.

The sanitary design improves the use of high level and expensive construction materials which can be used with Cleaning In Place /CIP/ processes. The durability and the industrial value of this special steels /AISI 316, K036 etc./ is undeniable, but in developing countries the production of home made additional resp. spare parts and the maintenance of such equipments cause some difficulties. This was discussed in October 1984 /Second Consultation/ and on the Workshop in August 1985, too. Neither there or here no common opinions were reached. The food factories, dairy companies or food machinery producers of the developing countries and of the more industrialised countries are often in difficult situations in purchasing the best materials in lack of foreign currencies, import restrictions and of similar reasons.

This refers also to different metallic and non metallic elements, as per gaskets, sealings, bearings too.

Though no consensus has been reached at the moment, all parties agreed to induce technical and commercial development and mutual trade serving the availability of the high value, appropriate raw materials and accessories for the food producers and especially for the dairy engineering in every country.

The mechanisation and conformation in the dairy engineering is everywhere a question of technology and not of lack or abundancy of manpower. The appropriate level of automation depends on the unit operation and on the local conditions. It was stated that a HTST plate heat exchanger with very short time factor cannot be controlled by hand but many of operations, transport etc. can be realised using trained and non expensive manpower. This is true for continuous or batch processes too, if choice can be made. During the lectures and discussions great interest has been observed regarding the machinery of UHT and aseptic milk and milk based products and as second branch of equipments the engineering of cheese production.

The UHT and aseptic treatment and packaging demand high level and expensive engineering. From the different views expressed by the participants anybody can not very easily abstract a simple picture. It is true that this methods are in offensive in many developing countries, taking into consideration the controversary situations on existing and needed technical level, existing and needed facilities regarding packing materials, /importation, local production/ infrastructural difficulties in transport and distribution, refrigerated transport and storage, one way or return packaging systems etc.

The special cheesemaking technology and equipment seems to be characterised in one side by the introduction of membrane separation technic and by not very sophisticated batch or continuous cheese machines and production lines, underlining the importancy of this milkproduct of high nutritional and economic value on second side. Regarding this Chapter 5.1 is to be mentioned.

As per non very sophisticated machinery You can read a brief extract of the lecture held on the Workshop by the expert of ÉLGÉP one of the Hungarian food machinery works.

One of ÉLGÉP's major areas of activity is the manufacture of dairy equipments and installations, as well as the supply and assembly of complete dairy plants and cheese factories. Recommended dairies can be used with various producing capacity: 50.000-400.000 l/day. The product varieties can be in a wide range of different dairy goods.

The following types of dairy equipment are manufactured by ÉLGÉP:

- tanks for milk and whey storage
- reception lines for milk
- milk, curd, and whey pumps
- cheese vats, tanks.
- strainer vats
- cheese presses
- process tanks
- CIP washing systems

- elements for the automation
- packing machines
- cheese ripener 500 t
  1,000 t
  2,000 t storage capacities,
- cheese factories with processing capacities of 25 t milk/7 h
  50 t milk/7 h
  100 t milk/7 h

The process lines can be used to produce both smooth and holey naturaliy fermented cheeses and supply of processing line for specialy cheeses is possible too. In the past 15 years over 100 cheese factories and ripeners and milk plants have been delivered to buyers at home and abroad. Most of these factories are in operation in the Soviet Union, and almost all technological installations including the complete laboratories have been supplied by ÉLGÉP.

Together with the researchers of the Hungarian Dairy Research Institute, ÉLGÉP has developed a new and unique cheese manufacturing process which has solved the problem of producing cheese of excellent quality from skimmed, dried milk available on the world market and from anhydrous butterfat or butteroil, or from dried milk and a small quantity of natural milk.

As a result of the development work it is possible to undertake delivery of complete up-to-date cheese factories, that provide - by applying the elaborated method - for producing various kinds of semi-hard and cheddar type cheese of excellent quality upto the customer's demand.

In countries where the natural circumstances do not allow milk production, or only a small quantity of milk is available - our recommended factory can be used with an excellent efficiency.

The modern mechanized cheese producing factory is suitable to manufacture 500-1000 kg of cheese in a shift, either from milk recombined from dried milk or from a small quantity of milk and a larger quantity of recombined milk, instead of natural milk.

The cheese varieties that can be produced are
- semi-hard cheese, e.g. St. Paulin, Port Salut type cheese
- semi-soft cheese, e.g. Tilsit and Cheddar type cheese.

The cheese can be produced with the fat content as to the requirements of the buyer /e.g. semi-fat, or fat cheese/.

The dried milk for the required type of cheese is recombined in suitable quantity of water through a mixer /tri blender/ and is stored in a tank until it is used.

The butterfat in a quantity required for producing cheese with the required fat content is melted then it is emulsified in the recombined milk.

If natural milk is also used, the fat is emulsified in milk, then the fatty raw material is pasteurized and emulsified in a homogenizer so that the fat should be evenly distributed in the raw material.

Cheese is manufactured from the prepared raw material - from recombined milk, or from the mixture of recombined and natural milk.

The production of kashkaval and other cheese made by similar technology /Cacio-cavallo, Provolone, Parenica/ requires heavy manual work.

The quality of cheese made by manual work is however, not uniform. The combined Kashkaval heating and kneading unit was developed by the research workers of the Hungarian Dairy Research Institute. The unit has since been manufactured by ÉLGÉP. Hungary was the first country where fully mechanized Kashkaval production was installed.

The cheddarized cheese slabs are stored on the stainless steel tray accommodated on the frame and are fed into the cheese mill from that tray. The cheese mill cuts slices of 2 to 3 mm uniform thickness.

The design of the cheese mill ensures the cutting of the milled cheese body without crumbling and thus reduces the losses. The slices drop through a hopper directly into the brine within the heating tube and from this point on, the cheese is further conveyed by the brine.

The brine is delivered from the brine tank into the heating tube by a pump, through the pipeline installed. The brine flows in the heating tube at a rather high flow rate to prevent the agglutination of the cheese slices. As a result, the cheese slices are warmed up uniformly, a highly important factor for the quality of the cheese. As the heat transfer from the brine to the cheese is very advantageous in the heater tube, the thermal gradient is considerably smaller than in manual cheesemaking. This is advantageous for the quality of the cheese and also results in steam economy. The brine and the cheese pass from the heater tube into a revolving perforated cylinder. The brine flows out along the initial section of the perforated cylinder and the plastificated cheese collects in one mass. Due to the rotation of the cylinder, the cheese is contorted and the brine within the gaps in thus kneaded out. The time of heating and kneading is defined by the design of the machine in a way as to provide that the cheese should become properly plastic and take the corresponding amount of salt and that the deteterious microbes be destroyed during the period of the heat treatment.

From the perforated cylinder, the cheese is led into the mould filling extruder. From the hopper of the extruder, the plastic cheese is passed on into the mould by the extruder.

While the mould is filled, the cheese is subjected to intensive pressure and as a result, close structure is obtained. The combined heating and molding unit is attended by two operators.

One operator feeds the cheese body into the cheese mill. While the other operator controls the machine and carries out the moulding operation. The output of the unit is upto 900-1200 kg/hour.

6. The Slaughterhouse: Source of white and red meat

- Slaughtering activity is an important factor of the food processing. The biological and microbial characters of the raw material, products and byproducts caused many difficulties in the processing. The small animals with their white and the big animals with their red meat can be slaughtered in our days at any desired degree of mechanisation and automation. Any kind of animal can be slaughtered in mechanised way, including such arts as e.g. camels or rabbits. The factory must be satisfactory clean, hygienic. In case of export production the slaughterhouse must definitely conform to all sanitary prescriptions and regulations, which are valid for the USDA and EEC. This system includes not only the needed level of the technical elements but the appropriate organisatonial solution, the veterinary service, the maintenance too.

  Extremely high attention is proposed to the above mentioned problems in countries with hot tropical climate.

  - In realisation of some projects of the last decade the interesting and hindering effects of traditionalism have been observed. During the talks some relevant questions have been discussed. The religious regulations e.g. that of the Islam can be fulfilled. The religion prohibits the stunning, special boxes can be used, fixing the animals before killing. The boxes can be positioned in the desired geographical direction

  - The Hungarian slaughterhauses and meat producers are able to satisfy all needs producing fresh or canned meat products corresponding to Islamic or Kosher or USDA or EEC regulations. The factories are under control of the competent Hungarian and foreign organisations. Mention has been made about the important role of refrigeration underlining the continuance without interruption of the refrigerated chain of storage and distribution.

- The feasibility of the slaughtering depends significantly on the right utilisation of each byproduct. /intestines, bones, blood, confiscated meat skin etc./ The technology offers environment - friend processes for this activity. Such equipments cost a lot of money but the price of the products is high and have a good market as per gelatine, blood plasma, protein-rich fodders etc. It has been agreed that the infrastructure has a strong correlation with the feasibility of a slaughter-house and meat processing project.

7. Advanced water management in the food industry
Appropriate water to produce food

7.1 The water is a matter of primary importance for the food industries. In many cases it takes part in the technological process directly and together with the basic material /raw material/ it composes the substance of the end-product. In other cases it is used as dissolvent, washing and diluting agent. At the hydraulic transport the water is transporting medium. In the energetics it is used for feeding the steam boilers and for cooling.

The food processing plant requires water in large quantities and the nature of the food products calls for high water purity. The consumed water will be polluted more or less during the production process. The degree of the pollution could be rather different. However the common feature of waste waters in the food industries is that owing to their significant organic compound content they have natural disposition for fermentation and putrefaction /decomposition/. By this reason the waste waters could not be reused or coud not be put on the living water without any treatment.

Nowadays the clean water is a wanted raw material, a requested natural resource, so it is necessary to be treated well, to make a good use of it. The advanced water management consists of two parts: the water supply and the water outlet.

The water supply means the purification and distribution of the water. The water outlet comprehends the treatment, purification and removal of the waste water. Developing the water management of a food processing plant we have to respect the following general ideas:

1. The growing water demands of the industry must be covered from surface waters primarily.

2. The national water management is characterized by the water use in succession and water recycling.

3. The waste water purification constitutes an integral part of the production process and it has to be provided with the food processing plant eliminating the waste water.

7.2 Water make-up in the food processing plants

The natural water forms a complicated dynamic system. It contains different gases, mineral and organic impurities. They can be fined in dissolved, colloidal and suspended form. There are surface and underground waters.

The raw water cannot be used in own natural form, it has to be treated. The method and degree of the making up depends on the subsequent use. The water being contacted with the products of the food industries has to have a quality of drinking water. It is very important to make up the available raw water according to the further use, namely the water of inconvenient quality could highly deteriorate the quality of food products could disturb the producing process and the economy of the production. The water has to be controlled and treated in accordance with the hygenic sanitary and technological prescriptions. The more important operation of the water preparation are: clarification and decolourizing, elimination of agressive and detrimental gases /hydrogene sulfide/, elimination of iron, manganese and calcium; deodorization and deflavouring; desinfection.

Table No. 1

Chemical composition of water utilizable in different food processing industries

Parameter	Unit	Brewery		Canning and food processing	Starch	Sugar	Dairy
		soft	hard				
dry solid	mg/l	50	300	500	400-600	300-500	500-600
Ca-oxide	mg/l	10	100	120	120	200	200
Mg-oxide	mg/l	1	30	30	20	-	-
Fe and Al oxide	mg/l	no	no	no	to 0,5	trace	0,5
Cl	mg/l	2	2	30	60	50	30
SO_4^2	mg/l	4	8	36	70	60	120
NO_3	mg/l	trace	trace	trace	0	trace	0,5
NO_2	mg/l	-	-	-	0	0	0
Hardness	mg-ekv/l	0,5	5,1	6,0-7,0	7,0	7,5	7,5
Alkalinity	mg-ekv/l	0,4	5,0	2,5-4,5	4-5	60	4,5-5,0
Oxidizing /O_2/	mg/l	-	-	2	2,5	2,5	2,5
Amines	mg/l	0	0	0	0	0	trace

Soft drinks

For this purpose the drinking water is suitable sometimes the chlorine is eliminated by active carbon for improving the taste.

Canning and food processing

This industry consumes the water in large quantities. Here the prescriptions regarding the drinking water quality are standard. If the total calcium and magnesium content exceeds the value of 40 mg/l, then the processed products could earn a bitter by-flavour. In hard water blanching of the vegetables, especially the leguminous plants /beans, peas/, and boiling of meat is also more difficult and worse. The water containing iron darkens the colour of preserved fruits.

Bread making industry

For bread making colourless, odourless, by-flavourless water is used

Dairy

A water of max. hardness 7,5 mekv/l and top hygienic grade is suitable only. It could contain magnesium-salts in traces only, because they lend bitter flavour to the butter. Bacteria, especially the B.fluorescens result the souring of butter by the decomposition of butter fat.

7.3 Waste water treatment in the food industries

For the waste water treatment natural and artificial methods are known which are combined together in the practice

Natural methods:

1. Dilution by introducing into a recipient abounding in water
2. Irrigation or soil filtration
3. Purification in fish ponds

Artificial methods

1. mechanical treatment
2. chemical treatment
3. biological treatment

The advancement of the water management in the different branches of food industry are different. Generally speaking it is most advanced in the sugar factories and breweries, is undeveloped in the dairies and canning plants. The main feature of the waste waters in the food processing industries is the high organic content. There are the less polluted waters in the canning factories, the most polluted water in the alcoholic fermentation and yeast factories. In the waste waters of food industries the COD value varies generally between 1300-8000 mg/l, the BOD value varies between 600-5000 mg/l. The waste waters are biodegradable in high degree by aerobic or anaerobic purification processes /COD = Chemical Oxigen Demand; BOD = Biological Oxigen Demand/

For the advanced waste water treatment the food industry has the following possibilities:

1. Waste water purification
2. Recovery of the valuable ingredients from the waste water
3. Successive water use in the technology and recycling the water
4. Decreasing the specific waste water quantity by changing, developing the production process

In many cases the food industry effluents contain much fat and oil. The fat concentration is some thousand mg/l at the waste water of slaughter houses and meat processing factories, and it exceeds a valued 5000 mg/l at vegetable oil factories. However the fat /the oil/ could be separated /fleated/ in a great degree in the food industries. In most of the cases the quantity of the emulsified fats does not exceed a value of 50-1000 mg/l. According to the standard after the purification the fat /oil/ content of the effluent is 10 mg/l at living water recipient and is below 60 mg/l at introducing into municipal channel.

7.4 Common purification of waste water from food industries and municipal waste waters /so called mixed waste water/

It is obvious to eliminate, to discharge the waste water of the factories located inside the town into municipal channel, than municipal waste water treatment plant. Such waste water being in the channel is called as mixed municipal waste water according to the practice the common purification of municipal and industrial waste waters in a central, regional waste water treatment plant is advantageous in both technical and economical aspects /higher capacity, less specific production costs/.

7.5 Industrial waste water treatment in the individual waste water purification plant of a food factory

In many cases the food processing plant has to provide for purification of the waste water. Namely sometimes the food processing plants are located far from the town. The waste waters of the food processing plants are generally polluted in higher degree, than the municipal waste water, so their purification takes more care and costs. For the purification of the waste waters of the food processing the actived sludge treatment is most often used. Its efficiency could not be elevated over 90 p.c., sometimes 70 p.c. is a good result.

In the drawing we show the flow chart of a tipical biological waste water purification plant, which is developed in Hungary by Tatabánya Coal. Mines Co.

The compound sewage treatment plants combine in one engineering structure the aeration /fermentation/ and settling /phase separation/ units of the biological waste water purification by activated sludge.

The model TABSZ E is used for purification of small quantity of waste waters. It is characterized by small area requirement, compact construction, simple operation and minimum service. This model can be used for purification of communal waste waters purified on screen and of other waste waters of this type. The purification is carried out by total oxidation process. The capacity of each kind of plants is tabulated below:

Type	capacity:
TABSZ E1	100-200 population equivalent
TABSZ E2	200-350 population equivalent
TABSZ E3	350-600 population equivalent
TABSZ E4	600-1000 population equivalent

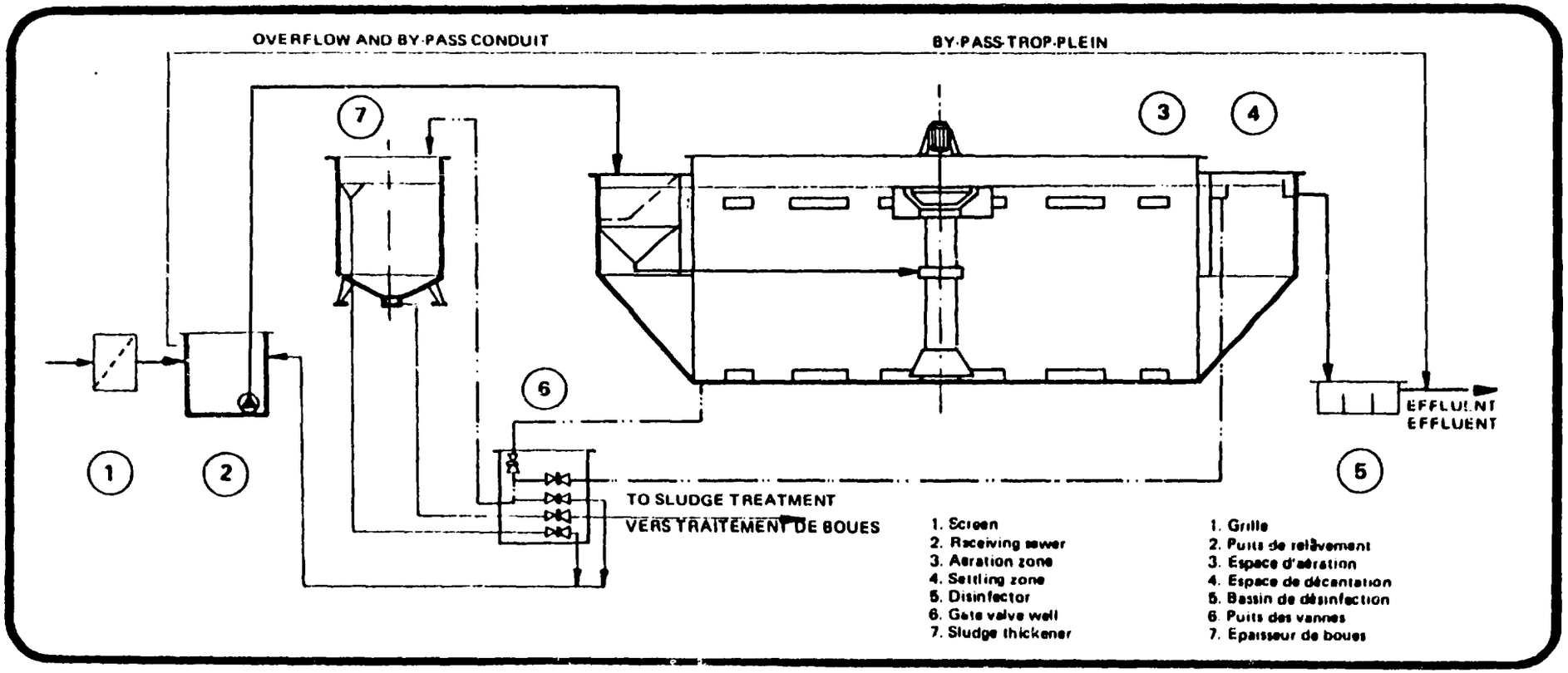
The mechanical purification of the sewage is carried out on a screen at which the distance between bars, elements of screen is max. 10 mm. The mechanically purified sewage gets without preliminary settling to the aeration zone of sewage purification plant where the process of biological oxidation takes place. The oxygenation, homogenization of sludge and recirculation of the activated sludge from the sludge zone are provided by an aerator of type M. - The slurry composed of water and sludge flows from the aeration zone through openings in wall of the tank and through the damping cylinder to the settling zone where it is separated into purified water and sludge. - The settled activated sludge gets to the aeration zone because of suction effect of the aerator. The purified water flows away through the double system of canalization in the settling zone according to the amount of sewage fed to the plant. - The clarified water is conducted in the upper canal of the system of canalization and the floating up sludge is removed - from time to time - from the lower canal of this system. - The sewage purification tanks are constructed with steel cylinder jacket and concrete bottom. The cylinder jacket is fit together on the concrete bottom cost in situ.

Different methods are also used or the combination of more alternatives and operations. The new trends in food industry sewage treatment forecast - as part of the production or separated - the use of the new developments of the membrane technology, which can solve sometimes the complete recycling of water. Probably, in some areas of some developing countries, this is the only, however very expensive way, to realise food industry projects.

The participants of the Workshop are convinced that the water and its technology has equal importance to the so called main technology; to solve it well influences the feasibility of the project decisively.

TECHNOLOGICAL FLOW CHART

Load of TABSZ-E: 100—1000 population equivalent



Annex B.1.

LIST OF PARTICIPANTS ATTENDING THE INTERNATIONAL WORKSHOP ON "FOOD PROCESSING, QUALITY CONTROL AND DAIRY EQUIPMENT", HELD DURING THE TETP FAIR IN BUDAPEST, HUNGARY, FROM 17 - 25 AUGUST 1985

No.	Name	Country	Address	Function
1	Mohammad RAFIQ HOMA	D.R. Afghanistan	Ministry of Commerce, Kabul, Afghanistan	Director of Exhibition
2	Mostefa ALEM	Algeria	Rue Belouizdad 44, Algiers, Algeria	Directeur de la Qualité, Ministère du Commerce
3	Mustapha KERKOUCHE	Algeria	Rue Belouizdad 44, Algiers, Algeria	Directeur du Laboratoire Cent
4	Amar MORSLI	Algeria	Rue Belouizdad 44, Algiers, Algeria	Chef du Département de Microbiologie
5	José GUERREIRO ALVES PRIMO	R.P. Angola	CX.P. 885, Luanda, Angola	Director do Cabinete Juridico Mincex
6	John KASTOGIANNY	Greece	18 Michalakopoulou Stz, Athens 101-10, Greece	Ministry of National Economy
7	Augel DAFYOMILIS	Greece	18 Michalakopoulou Stz, Athens 101-10, Greece	Ministry of National Economy
8	Mrs May S. JURDI	Lebanon	Environmental Health Dept. Faculty of Health Scienc. American University of Beirut, Lebanon	Doctor in Environmental Healt Assistant Prof. of Environmen Health
9	Abdallah AKIB	Morocco	O.D.I., 10 Rue Ghandi, B.P. 211, Rabat, Morocco	Ingénieur Agronome au Dép. Ag Ind. à l'Office pour le Développement Industriel
10	Mahamadou HALILOU	Nigeria	B.P. 11208, Niamey,	Directeur Général OPEN, Offic

Annex 8.1

No.	Name	Country	Address	Function
11	Tauqir Haidar SYED	Pakistan	140 E|I, Gulberg III, Lahore, Pakistan	Asstt.Manager Production (Kabirwala Dairy Ltd.)
12	Emmanuel MUNYANGENDO	Rwanda	B.P. 1002 Kigali, Rwanda	Directeur de l'Office de Valorisation Industrielle des Bananeraies du Rwanda (OVIBAI
13	Cyprien MURENGEZI	Rwanda	B.P. 155, Cyangugu, Rwanda	Directeur de la Société de Traitement des Fruits (SONAFI
	A.J. NYANGARIKA	Tanzania	Box 903, Dar-es-Salaam, Tanzania	National Agr. and Food Corp. (NAFCO)
15	Iman Mahmood NASSER	P.D.R. Yemen	Box 5126, Aden, P.D.R. Yemen	Inspection Section
16	Ahmed YOUSOF BIN YOUSOF	P.D.R. Yemen	Ministry of Industry, Aden, P.D.R. Yemen	Production Manager N.B.O.
17	Mrs Joyce MAPOMA	Zambia	P.O. Box 35500, Lusaka, Zambia	Honorary Chairman of the Vil Industry Service
18	John Geni MWANZA	Zambia	Box 35373, Lusaka, Zambia	Mechanical Engineer
19	Daniel K. MWANSA	Zambia	Ministry of Commerce and Industry, Box 35500, Lusaka, Zambia	Technical Field Officer
20	Luke K. TONGALI	Zimbabwe	Box 4669, Harare, Zimbabwe	Project Coordinator N.P.A.

ANNEX 8.2

List of useful UNIDO documents, studies available at request by UNIDO

- Monographs on Appropriate Industrial Technology No. 7. Appropriate Industrial Technology For Food Storage and Processing UN 1979. New York ID. 232/7.
- First Consultation on the Food-processing Industry 1989 ID 278 CIP/Wg. 345/5 Rev.1./
- Second Consultation on the Food-Processing Industry with special emphasis on Vegetable Oils and Fats 1984. ID/329 /ID/Wg 427/13/
- First global study on the food processing industry ID/Wg 345/Rev.1.
- Problems of development of the dairy industry in developing countries ID/Wg 427/2
- Some aspects of the world white meat sector ID/Wg427/5
- Problems of the red meat industry ID/Wg 427/8

Annexe 8.3

Information on the Hungarian Dairy Research Institute

The Hungarian Dairy Research Institute is the basis institution of the dairy industrial examinations in Hungary and it, as the research institute of the Industry, operates as an independent enterprise under the supervision of the Dairy Trust and the Ministry of Agriculture and Food.

The institute was founded at Mosonmagyaróvár in 1903. At present it has three departments Mosonmagyaróvár /Budapest, Pécs/ and about 100 emloyees. The research and development tasks of each department are distributed primarly according to the product groups as follows:

At Mosonmagyaróvár, the research-developing work is made at the production and qualification of raw milk, cheese manufacturing, the preserved milk products /as milk powder, condensed products/ and preparation of lactic acid bacterial pure cultures.

The Budapest section is engaged in doing the mechanical, packaging, technical and radiological research work.

The task of Pécs section is associated with the research and developing activity in the so called fresh consumed milk products, the acidified milk products, diverse cottage cheeses, butter, and texture modifiers.

Each section works independently under a central Direction.

The function of the institute is based on the research development plans of the industry on the basis of the research and realization program approved by the board of the leaders of the dairy companies.

The most important duty of the institute is the complex improvement of the dairy products and technologies.

ANNEX 8.4

Co-autohors of the report

Mr. Peter Lukács	/2/
Mr. Tibor Petainek	/5/
Mr. Dr. András Szabó	/7.2/
Mr. Dr. Tibor Deák	/7.1/
Mr. Attila Gondar	/1/
Mr. János Jancsó	/8/
Mr. Dr. András Luk	/6/

Chairmen of the Workshops:

Mr. István Varga

Mr. Dr. Ödön Vajda

ANNEX 8.5

List of partecipating Organisations of the Workshops

		Main Organisers:
A.	HUNGEXPO	PO Box 44. H-1441 Budapest, Hungary Telex 22-4684
B.	KOMPLEX	H-1807 Budapest Hungary Telex 22-5957
		Partecipants:
1.	ÉLGÉP Machinery Works	H-1475 Budapest Hungary Telex 22-4427
2.	AGROINVEST- AGROBER	H 1117 Budapest Hungary Telex 22-5868
3.	METRIMPEX	H-1391 Budapest Hungary Telex 22-5451
4.	LABORMIM	H-1450 Budapest Hungary Telex 22-4162
5.	INDUSTRIALEXPORT	H-1251 Budapest Hungary Telex 22-4541
6.	TATABÁNYA COALMINES	H-2803 Tatabány Hungary Telex: 27306
7.	UNIVERSITY OF HORTICULTURE	H-118 Budapest Hungary XI. Villányi ut 35-43.
	7.1 Chair of Food Microbiology	
	7.2 Chair of Food Chemistry	
8.	HUNGARIAN DAIRY RESEARCH INSTITUTE	H Budapest Hungary /IX. Bakats u. 6./
9.	"DUNA" AGROINDUSTRIES COOPERATIVE	Budapest Hungary /Csepel/
10.	APV UNGARO KFT	H-1075 Budapest Hungary Telex 22-7448

Final Report on the Projects
US/UT/GLO/85/061 and RP/GLO/85/002

UNIDO PARTICIPATION IN THE 4TH TECHNOLOGY FOR THE PEOPLE/(TFTP) INTERNATIONAL TECHNOLOGY AND LICENSING FAIR

Budapest 16 - 25 August 1985

The project contained various activities:

1. The Technology for the People Fair (16 - 25 August 1985)

The TFTP Fair itself appeared to be a rather small fair: 58 exhibitors, 30 from Hungary, 19 from industrialized countries, 6 from developing countries and 3 UN stands (UNIDO, UNICEF, UNDP/IUT). Most developing countries exhibiting (Afghanistan, Greece, Lebanon, Rwanda, PDR Yemen, Zambia) received financial assistance from the UNDP. Three other developing countries which were supposed to come, did not (Bangladesh, Egypt and Nigeria).

However, the merits of the Fair are two-fold:

(1) The fact that it was held simultaneously and within 2 other large Hungarian fairs:

a) OMEK '85 70th Exhibition of Agriculture and Food Industry
Area: 107,000m^2; Exhibitors: 250-300 from 20 - 25 countries;
Visitors: 1 million.

b) AGROMASEXPO '85 11th International Exhibition of Agricultural and Food Industry Machinery and Instruments
Area: 30 - 35,000 m^2; Exhibitors: 150-200 from 20-25 countries;
Visitors: 60-65,000.

(2) The fact that the TFTP displayed a range of simple, practical and affordable technologies applicable to conditions prevailing in developing countries, and usually developed by small-scale industries or government agencies willing to sell these technologies (licensing agreements and joint-ventures) at quite favourable terms. These technologies displayed at the Fair include: farm machinery and equipment, food processing machinery and equipment, low-cost housing and building materials, water and sanitation equipment, alternative energy units (solar, wind and bio-mass), education and health materials, special transportation and basic metals industry technology, machine tools, etc.

UNIDO had a 36m^2 information stand, provided by HUNGEXPO and decorated by CPE/INF. At the stand, discussions were held with 34 organizations and enterprises from Hungary, 14 from developing countries and 17 from industrialized countries (65 in total), regarding several aspects of UNIDO activities (T.A., PAC, ICPB, NEG, TECH, IS, IDDA,....). A separate report has been prepared by PAC on the contacts and discussions with various industrial institutions and enterprises for entry into the UNIDO rosters of consultants and equipment suppliers.

The stand also served as a meeting room (the opening ceremony, the initial briefings and the closing round-up session) and as "pièd-à-terre" in the Fair for the participants of the UNIDO international workshop (see 2 below) as well as for other representatives of developing countries visiting the Fair.

Group visits as well as individual meetings with the exhibitors of the TFTP were organized for the representatives of developing countries and continuous assistance was provided to them in establishing professional contacts and initiating direct industrial partnership agreements.

Due to its proximity to Vienna, the TFTP Fair in Budapest was correctly regarded by UNIDO as a unique opportunity to secure the participation of various UNIDO Branches/Sections for the promotion of their activities (INFR, AGRO, ENG, PAC, CPE/INF) at a minimum cost. 1/ In addition, the themes of the main fairs (OMEK and AGROMASEXPO)and the important contribution (facilities, lectures, study tours,...) of the Hungarian organizations involved (HUNGEXPO, KOMPLEX) fully justified the organization of a technical workshop for selected participants from developing countries.

2. The International Workshop on Food Processing, Quality Control and Dairy Equipment (20 - 24 August)

The workshop was jointly organized by UNIDO (AGRO, ENG, INFR) and the Hungarian Trading Company for Factory Equipment (KOMPLEX). It took place from 20 - 24 August 1985. The Hungarian host organization (KOMPLEX) organized with the participation of various other specialized Hungarian institutions and companies, a number of lectures and discussions on new technologies and trends in the Hungarian food and dairy industry, (food processing and quality control). The programme of the workshop is attached as Annex I.

A programme of study visits to the Budapest University of Horticulture, the food laboratories, the Agricultural and Food Processing Co-operative "DUNA" was also organized, as well as group visits and individual meetings with the exhibitors at the TFTP Fair.

Twenty representatives from the following developing countries participated in the workshop: Afghanistan (1), Algeria (3), Angola (1), Greece (2), Lebanon (1), Morocco (1), Niger (1), Pakistan (1), Rwanda (2), Tanzania (1), PDR Yemen (2), Zambia (3) and Zimbabwe (1). The list of participants is attached as Annex II.

3. The identification and assessments of new technologies

A consultant is preparing a report on new technological developments and equipment displayed at the Fair in the sectors covered by the workshop and particularly suitable to developing countries. The detailed report will be disseminated by UNIDO to the interested countries. Naturally, such identification and assessment were made, to a certain extent, by each individual UNIDO professional and participant in his own specific field of interest.

1/ Other UNIDO Branches/Sections (such as ICPB, TECH, NEG,...) could have usefully benefitted from this opportunity as well.

4. The Press Conference

A 45 minute press conference was organized by HUNGEXPO with the assistance of CPE/INF on the occasion of the Developing Countries Day (22 August). Messrs. L. Biritz and K. Sepic described UNIDO's overall mandate, its activities, its participation in the Fair, as well as some major problems faced by developing countries in the agro-industrial sector and the related technical assistance activities UNIDO was providing o them.

The Press Conference was attended by some 10 press agencies, including a few international ones, as well as a few Hungarian officials, including Mr. E. Iván, Director, Secretariat for International Economic Relations of the Council of Ministers and Mr. G. Dobos.

Overall assessment of UNIDO participation in the TFTP Fair

UNIDO participation in the 4th TFTP Fair can be regarded as useful and successful for the following reasons:

1. The 20 participants from developing countries UNIDO had invited were able to get acquainted with new technological developments and equipment suitable to their countries and to establish professional contacts and initiate industrial partnership agreements with exhibiting organizations and enterprises at the Fair.

2. The "International Workshop on Food Processing, Quality Control and Dairy Equipment", organized jointly with the specialized Hungarian institutions, allowed the same participants to benefit from the Hungarian experience and capabilities which are strong in these particular sectors, although the lectures appeared to be somewhat too general.

3. The 3 combined Fairs allowed UNIDO professionals and participants to get acquainted with industrial capabilities from Hungary and other industrialized and developing countries and to register them as industrial consultants, equipment suppliers and technology suppliers.

4. The UNIDO stand and the press conference contributed to publicizing UNIDO's purpose and activities as a specialized UN organization covering all sectors and disciplines of manufacturing industry.

Proposals for future UNIDO participation in specialized industrial fairs

1. It is recommended that an annual budget be earmarked from the UNIDF or UNDP Interregional Funds for the programme of UNIDO participation in international industrial fairs. This annual allocation of funds appears to be necessary in order to plan at an early stage UNIDO's participation in the most interesting fairs, to negotiate with the host country and fair authorities, to co-ordinate UNIDO inputs, and to secure an adequate participation from developing countries in the selected fairs.

2. The TFTP Fair highlighted the importance of the contribution and co-operation of the host government, the fair organizers (HUNGEXPO), and other national institutions (KOMPLEX) for a successful UNIDO participation in such fairs. Therefore it is recommended that this be considered as a crucial criterion in selecting industrial fairs in which UNIDO would participate.

3. The organization, jointly with the host country, of technical seminars and study visits on the themes of the fair, for participants from developing countries, should remain the main objective and justification of UNIDO participation in such fairs. Therefore the organization of such seminars, if not a prerequisite, should at least be considered as a general practice and encouraged.

4. It is recommended that in future events of this type in which UNIDO would be involved, the CPE/INF Section should have the entire responsibility for the UNIDO stand, including its erection, decoration, packing and transportation of decoration materials, staffing the information stand during the fair, etc.

****

A. de Crombrugghe/ma
IDO
DIO/INFR

18 September 1985

Cleared: M.H.A. Hamdy, Head, DIO/INFR

INTERNATIONAL WORKSHOP ON "FOOD PROCESSING, QUALITY CONTROL AND DAIRY EQUIPMENT."

Budapest 20 - 24 August 1985

Programme of lectures and discussions

The Hungarian host organization (Komplex) organized and delivered a number of lectures on the new technology and trends in the Hungarian food and dairy industry in the field of processing and quality control as can be seen below:

Tuesday 20 August 1985	Exhibition 10.00 - 19.00 h Opening ceremony, initial briefing of the participants at UNIDO's stand, individual visits and meetings at the Fair. The Workshop was opened by Dr. T. Sümjen, General Secretary of the Hungarian National Committee for UNIDO. Dr. D. Dichter, Director "Technology for the People", Geneva Secretariat, addressed the participants, outlined the purpose of the "Technology for the People" and guided them around selected stands at the Fair, giving a detailed explanation of exhibits. The opening ceremony was attended by Messrs. A. de Crombrugghe, B. Galat, Y. Gladilov and the participants and was chaired by Mr. de Crombrugghe.
Wednesday 21 August 1985	Session No. 1 at KOMPLEX - 09.00 - 17.00 h
A.M.	1. Some new trends in the field of fruit and vegetable processing: Mr. I. Varga. 2. Processing of palm date: Messrs. A. Czellér and R. Somogyi. 3. Slaughtering and meat processing: facts and trends: Mr. P. Lukas. Discussion on lectures 1 to 3.
P.M.	4. Food quality control: Chemistry of Food - appropriate methods of analysis: Mr. S. Szabo and Dr. Maria Varadi. 5. Food quality control: Microbiological aspects of food processing: Mr. T. Deak Discussion on lectures 4 and 5

Participating Institutions:-

LABORMIM, KOMPLEX, INDUSTRIALEXPORT, AGROINVEST, MEZOGEP, KECSKEMET, KOVAC, LANG.

Thursday 22 August 1985	Exhibition, 09.00 - 12.00 h, Developing Countries Day
A.M.	UNIDO Press Conference (09.00 - 10.00h) and individual meetings.
P.M.	Session No. 2 at KOMPLEX - 14.00 - 17.00h

Lectures

1. Dairy engineering and cheese factory equipment: Mr. Salamon.
2. Some aspects of production and maintenance of of dairy equipment.

Discussion on lectures 1 and 2

3. Dairy technology, spray drying - water treatment: Mr. B. Niklos.
4. Trends and new methods of milk processing.

Participating Institutions:-

ELGEP, TATBANYA, APV Ungar Ltd., Milk Trust, Milk Research Institute.

2. Workshop visits

Study visits to the food laboratories of the Budapest University and the Agricultural and Food Processing Co-operative "DUNA" of Csepel were organized, where the participants studied some practical methods of applied technology in food processing and quality control.

Friday 23 August 1985	Visit to the University - 09.00 - 12.00 h
A.M.	Laboratory for Food Chemistry Laboratory for Food Microbiology

Participating Institutions

INDUSTRIALEXPORT, LABORMIM
Messrs. T. Deak, S. Szabo and I. Varga

P.M.	Visit to a Co-operative Farm and the "DUNA" Food Processing Plant around Budapest, Messrs. Varga, J. Juhasz and Milovicz.

Exhibition - Round-up session at UNIDO stand - 17.00 h

Messrs. A. de Crombrugghe and A. Dichter summed-up the Workshop. Messrs. B. Galat and Y. Gladilov and all the participants attended the closing ceremony. In addition, the participants also had the possibility of acquainting themselves with the achievements of the different countries exhibiting at the Fair, in the subject technologies.

Saturday 24 August 1985	Exhibition Individual meetings/contacts at the TFTP Fair.

Annex II

LIST OF PARTICIPANTS ATTENDING THE INTERNATIONAL WORKSHOP ON "FOOD PROCESSING, QUALITY CONTROL AND DAIRY EQUIPMENT", HELD DURING THE TETP FAIR IN BUDAPEST, HUNGARY, FROM 17 - 25 AUGUST 1985

No.	Name	Country	Address	Function
1	Mohammad RAFIQ HOMA	D.R. Afghanistan	Ministry of Commerce, Kabul, Afghanistan	Director of Exhibition
2	Mostefa ALEM	Algeria	Rue Belouizdad 44, Algiers, Algeria	Directeur de la Qualité, Ministère du Commerce
3	Mustapha KERKOUCHE	Algeria	Rue Belouizdad 44, Algiers, Algeria	Directeur du Laboratoire Central
4	Amar MORSLI	Algeria	Rue Belouizdad 44, Algiers, Algeria	Chef du Département de Microbiologie
5	José GUERREIRO ALVES PRIMO	R.P. Angola	CX.P. 885, Luanda, Angola	Director do Cabinete Juridico-Mincex
6	John KASTOGIANNY	Greece	18 Michalakopoulou Stz, Athens 101-10, Greece	Ministry of National Economy
7	Augel DAFYOMILIS	Greece	18 Michalakopoulou Stz, Athens 101-10, Greece	Ministry of National Economy
8	May S. JURDI	Lebanon	Environmental Health Dept. Faculty of Health Scienc. American University of Beirut, Lebanon	Doctor in Environmental Health, Assistant Prof. of Environmental Health
9	Abdallah AKIB	Morocco	O.D.I., 10 Rue Ghandi, B.P. 211, Rabat, Morocco	Ingénieur Agronome au Dép. Agro-Ind. à l'Office pour le Dévcloppement Industriel
10	Mahamadou HALILOU	Nigeria	B.P. 11208, Niamey, Nigeria	Directeur Général OPEN, Office Promotion Entreprise Nigérienne

No.	Name	Country	Address	Function
11	Tauqir Haidar SYED	Pakistan	140 E|I, Gulberg III, Lahore, Pakistan	Asstt.Manager Production (Kabirwala Dairy Ltd.)
12	Emmanuel MUNYANGENDO	Rwanda	B.P. 1002 Kigali, Rwanda	Directeur de l'Office de Valorisation Industrielle des Bananeraies du Rwanda (OVIBAR)
13	Cyprien MURENGEZI	Rwanda	B.P. 155, Cyangugu, Rwanda	Directeur de la Société de Traitement des Fruits (SONAFRUITS
14	A.J. NYANGARIKA	Tanzania	Box 903, Dar-es-Salaam, Tanzania	National Agr. and Food Corp. (NAFCO)
15	Iman Mahmood NASSER	P.D.R. Yemen	Box 5126, Aden, P.D.R. Yemen	Inspection Section
16	Ahmed YOUSOF BIN YOUSOF	P.D.R. Yemen	Ministry of Industry, Aden, P.D.R. Yemen	Production Manager N.B.O.
17	Joyce MAPOMA	Zambia	P.O. Box 35500, Lusaka, Zambia	Honorary Chairman of the Village Industry Service
18	John Geni MWANZA	Zambia	Box 35373, Lusaka, Zambia	Mechanical Engineer
19	Daniel K. MWANSA	Zambia	Ministry of Commerce and Industry, Box 35500, Lusaka, Zambia	Technical Field Officer
20	Luke K. TONGALI	Zimbabwe	Box 4669, Harare, Zimbabwe	Project Coordinator N.P.A.

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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UNIDO AT "TECHNOLOGY FOR THE PEOPLE" FAIR

Vienna, 4 July 1985

The United Nations Industrial Development Organization (UNIDO) will participate in the fourth Technology for the People/International Technology and Licensing Fair in Budapest (17 to 25 August). As part of its programme of participation in international industrial fairs, UNIDO has decided to take part in this Fair because it is considered an excellent opportunity to serve its general mandate to promote the industrialization of developing countries through the transfer of appropriate technologies to the developing countries.

In close co-operation with the Hungarian authorities, during the Fair UNIDO is organizing technical workshops for participants from developing countries on food processing, quality control and dairy equipment. The workshops include lectures as well as visits to exhibitors, to manufacturing units and research institutions. In this respect, UNIDO's programme of product adaptation for exports could further assist the participating developing countries to increase their capabilities for exporting industrial products.

UNIDO will also have an information stand at the Fair, provided by the Hungarian organizers. In view of initiating direct industrial co-operation between potential partners, staff will assist in making professional contacts with specialized institutions and enterprises as well as suppliers of industrial expertise, technology and equipment in order to identify new technological developments suitable to developing countries' conditions and also to initiate possible co-operation with UNIDO.

* * * * *

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