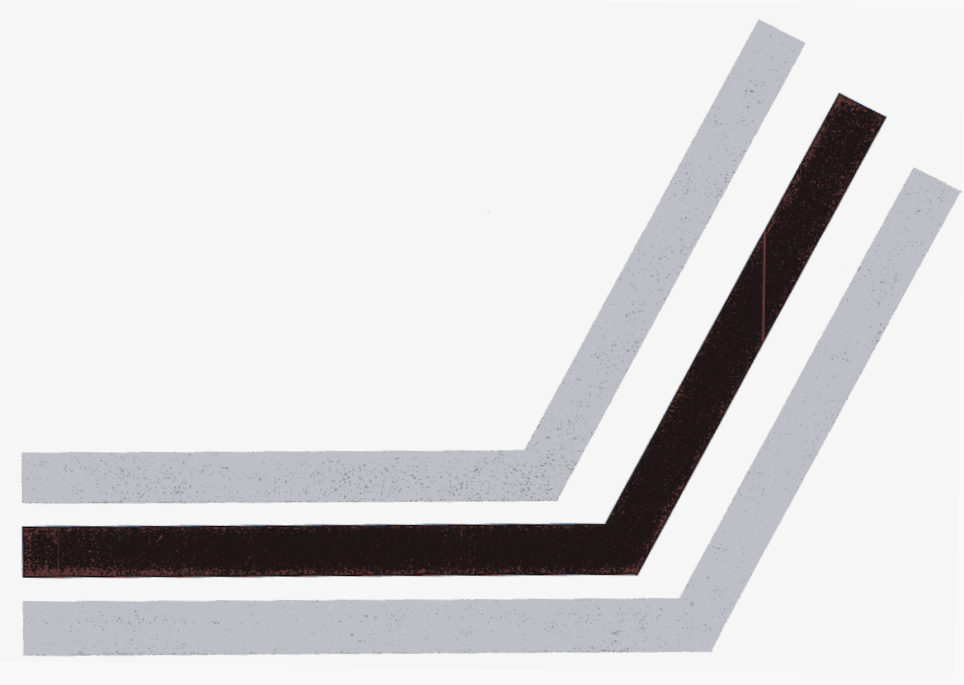
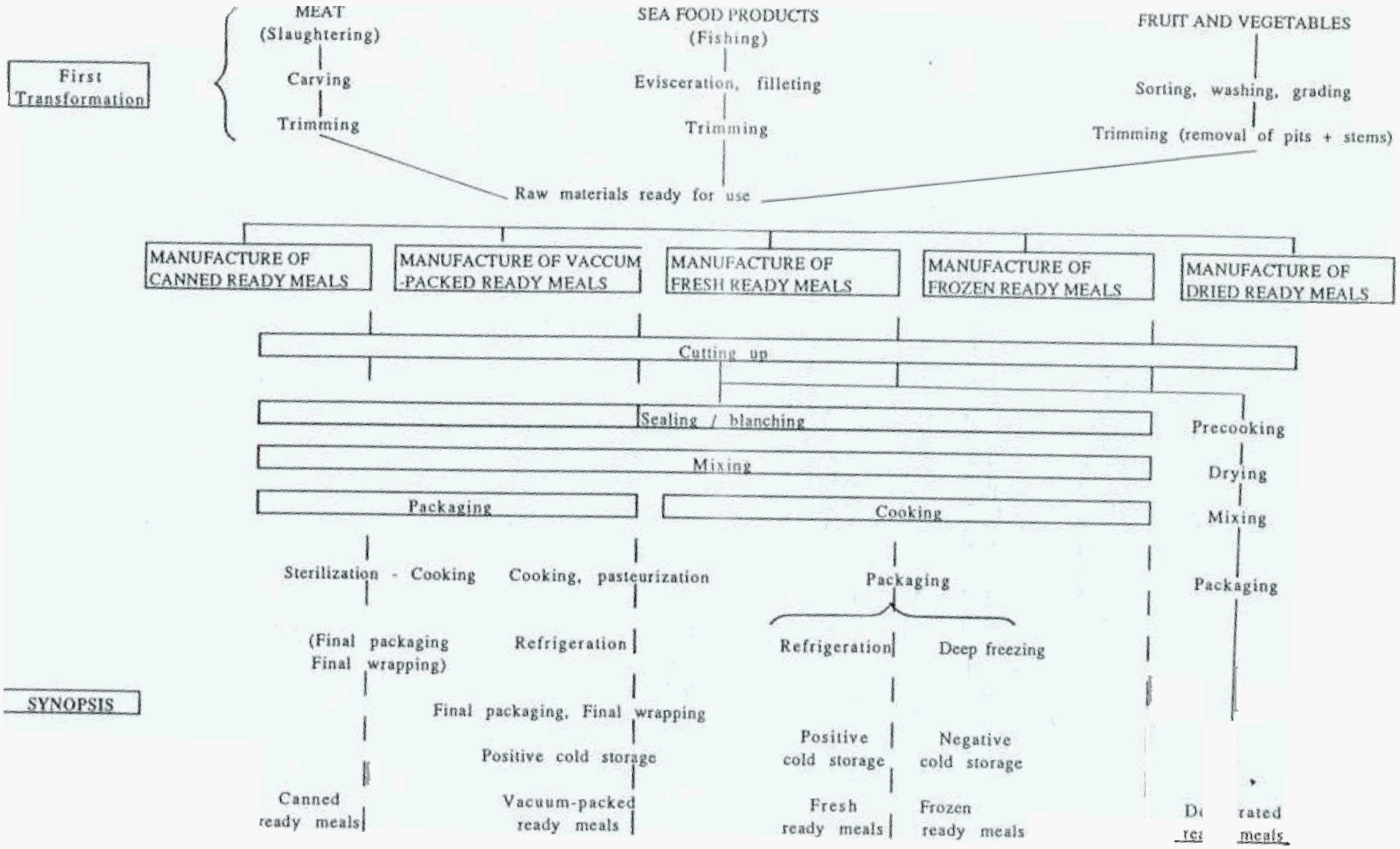
DRAFT

INDUSTRY BRIEFING PAPER

Ready-Made Meals

Small Enterprise Development Programme
RAS/92/306
(A UNDP/UNIDO/ILO Regional Programme for the Pacific)




First Transformation
MEAT (Slaughtering)
Carving
Trimming
SEA FOOD PRODUCTS (Fishing)
Evisceration, filleting
Trimming
FRUIT AND VEGETABLES
Sorting, washing, grading
Trimming (removal of pits + stems)
Raw materials ready for use
MANUFACTURE OF CANNED READY MEALS
MANUFACTURE OF VACCUM -PACKED READY MEALS
MANUFACTURE OF FRESH READY MEALS
MANUFACTURE OF FROZEN READY MEALS
MANUFACTURE OF DRIED READY MEALS
Cutting up
Sealing / blanching
Mixing
Precooking
Drying
Mixing
Packaging
Packaging
Cooking
Sterilization - Cooking
Cooking, pasteurization
Packaging
(Final packaging Final wrapping)
Refrigeration
Refrigeration
Deep freezing
Final packaging, Final wrapping
Positive cold storage
Positive cold storage
Negative cold storage
Canned ready meals
Vacuum-packed ready meals
Fresh ready meals
Frozen ready meals
meals

SYNOPSIS

INDUSTRY BRIEFING PAPER FOR READY MEALS

This activity supplies consumers with prepared food which can be used quickly. These products are well adapted to urban zones with a relatively high level of purchasing power.

The principal alternatives of the project concern:

- finished products:
  - with a meat base (of beef, pork, mutton, poultry, ...) and/or fish.
  - complete ready-to-eat dishes which require reheating, or meat in sauce (the consumer prepares the garnish)
  - range of recipes

- targeted markets:
  - products intended for local market
  - typical products of a region, intended for export

- the technology of preservation: 5 distinct channels are-described (see the production process chart).

the method of raw material supply :

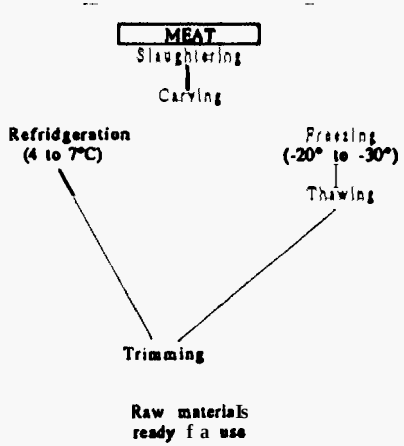
Before beginning the operations of cooking/preservation, raw materials must undergo first transformation which is practically identical in all cases.

Depending on the opportunities for the supply of raw materials (their quality. price, etc...), the manufacturer may choose:

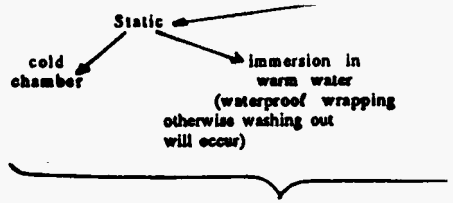
- a supply of unprocessed products: manufacturer must assure first transformation (see corresponding paper)
- a supply of more or less processed products : pre-cut meat. fillets of fish, graded frozen vegetables, etc.

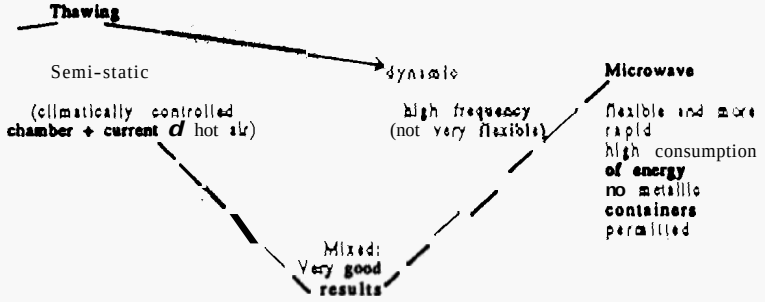
FIRST TRANSFORMATION

The choice of the method of supply naturally depends *on* the local availability of **semi-processed** products
For pretreatment *of* **unprocessed products see Briefing** Papers : **"Meat",** 'FW Processing' **and** "Fruit and Vegetables"

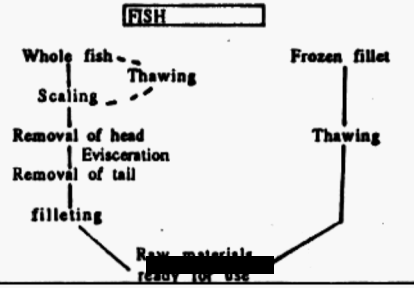


- Supply of living animals is rarely advisable (problem of savings related to scale
+ hygienic guarantees + better valorization of high quality NU)
- The most frequent supply is in frozen cut pieces: specifically adapted to manufacturing needs





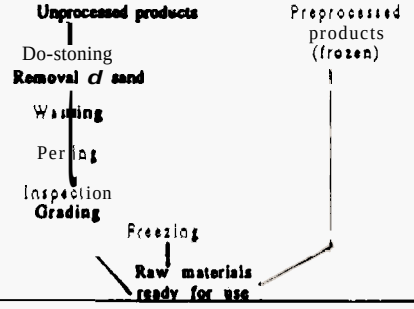
- **Trimming: preferably in the factory for cooked dishes, in order to be adapted to the constraints of of production.**
Manual or mechanical methods (removal of membrane without cutting into the muscle).



- **2 main methods of supply:**
* **whole fish (fresh or frozen):** if the plant is linked to a fish farm or is near a fishing port.

See Industry Briefing Paper : **"Fish Processing".** Extraction of meat by filleting, or for larger fish, by cutting into slices or pieces.
* **fillets:** usually frozen. See above for methods of thawing.

Even in the case of supply of unprocessed products, freezing permits evening out of the fluctuations in supply.
Complete supply of fresh fish is possible in the case of aquaculture.



- **2 methods of supply:**

* **unprocessed products : necessity** of **pretreatment** by machines with large output, **often** specific to **the** product.
Foreseeable for large - **scale** uniu **for ready meals,** or **mixed units** f a **vegetables - ready meals**
For dependable supply for a unit **for** cooked dishes, pretreated vegetables are often frozen.
* **Preprocessed products which are ready to use** : supply **is costly and** foreseeable **in** multi-purpose uniu.

CANNED READY MEALS

Advantages

- finished products can be stored at room temperature, and have long shelf life. No need for cold chain, nor cold storage for the distributor or consumer.
- limited risk of poisoning: easily controllable scale for sterilization.
- technology adapted to very different capacities. Equipment exists for small capacity (for jars or metal cans).

Disadvantages:

problem of supply of packaging materials (jars or metal cans may be very expensive)

organoleptic qualities are affected by treatment.

OPERATIONS	POSSIBLE CHOICES OF TECHNOLOGY
Preparation of ingredients - mixtures Preparation of packaging (washing)	Choice of Packaging this is the basic choice - Rigid: * opaque: - metal can (tin plate, aluminum) A tin can is the classic method of packaging. Necessitates a nearby can factory (imports are extremely expensive due to the volume of the containers). Easy to put into use. Very resistant. - thermoshaped plastic. Polypropylene. Delicate heat sealing * transparent: - Glass jar with glass cover; very high cost of packaging, mechanization is impossible, but it is possible to recover the jars (foreseeable for artisanal units). Sterilization without risks. - glass jar with a metal cover, screwed or capped on. Possibility of mechanization and recuperation (returnable jars). More adapted to pasturized products. - semi-rigid: small plastic trays or combinations of aluminum-polypropylene or cardboard-plastic film. Heat-sealing of cover is delicat. Sophisticated technology. - Flexible : sachets made of complex materials. Sophisticated heat-sealing technology.
Dosage	Dosage: To place the exact quantity of the product in the package by weight or volume depending on the homogeneity of the product. Simple technology.
Packaging crimping capping	Packaging: To hermetically seal the packaging before sterilization. Depends on the choice of the container. - Crimping: for metal cans - large range of equipment. - Screwing on of the cover: for jars - large range of equipment. - Sealing: for plastic containers.
Cooking - Sterilization Labelling - Final wrapping Placing on palets	Sterilization: to cook and sterilize the product. 2 ways: continuous and discontinuous. - Discontinuous: autoclaves with baskets. Can be developed by addition of more autoclaves. Wide range of adjustments and adapted to all sizes of cans. However, production rate is limited and much labour is needed. - Continuous: vertical or horizontal. - water + steam or direct heating with a flame. - different systems of handling. Heavy investment. Difficult to use with many formats. Especially adapted to large series of tin cans.

VACUUM-PACKED READY MEALS

Advantages
- better technology for preservation of organoleptic and nutritional qualities
- longer shelf life compared to fresh products (from 6 to 40 days according to the process)
- existent equipment for small installations

Disadvantages
- risks in the technology: possibility of poisoning if cold chain is not mastered, expiry date of product not respected or production tables not mastered.
- sophisticated packaging materials.
- problem of homogeneity of treatment for small capacity equipment

OPERATIONS	FUNCTIONS	POSSIBLE CHOICES OF TECHNOLOGY
Preparation of ingredients / Preparation of packaging		- Certain raw materials may be precooked before packaging. - A multitude of packaging materials are available: small trays or film, simple or compound materials
Dosage - mixing		Classic equipment for high-quality cooking or AFI (agro-food industry) (See "Canned Ready Meals")
Packaging in a vacuum or in a modified atmosphere	Placement in a vacuum reduces the occurence of oxidation and the resistance to transfer of heat. Packaging before cooking limits exudation and increases output.	A large range of equipment from the simple bell jar to continuous processing machinery.
Cooking at low temperature (< 100°C)	Cooking according to optimum scale of temperature (no overcooking)	- Traditional materials: covered pot for water bath cooking chest. Low investment. - Specific equipment (especially derivatives of pressure cookers) can cook and cool in the same container.
Cooling	Rapid lowering of the temperature of the product to prevent the proliferation of bacteria.	- Immersion in cold water. - Spraying of cryogenic fluids. - Circulation of cold air.
Final packaging Final wrapping	Protective final wrapping that helps selling (printed cardboard)	Usually cardboard boxes

DEEP FROZEN READY MEALS

Advantages
- finished products have a long shelf life
- preservation of organoleptic and nutritional qualities
- technology can be adapted to very different capacities
- low cost of packaging for simple systems

Disadvantages
- necessity of negative cold chain (storage in plant, transport. storage at the distributors' and consumers')
- risks of poisoning in case of thawing/refreezing

OPERATIONS	POSSIBLE CHOICES OF TECHNOLOGY
Preparation of ingredients mixing / Preparation of packaging	**Choice of packaging** : choice of secondary importance (does not determine the selection of the project) it depends on 3 main criteria: - state of the product (solid or not) - presentation of the final product (packaging) - use by the consumer (reheating in a pan, in a hot water bath, an oven or by microwave) Options * a plastic bag (with cardboard box as final wrapping) the simplest and least expensive solution * small tray (aluminum or polymer/cardboard) + heat-sealed cap. Mechanization. • thermoshaped container and cover: adapted to micro-waves. Simple technology but costly packaging. Mechanization possible.
Dosage - mixing Dosa el - mixin	Dosage - mixing — See "Canned Ready Meals"
Packaging	**Packaging** — Depending on packaging: - bagging - placing in small tray - heat sealing or capping with a cover
Deep-freezing	Deep Freezing — the product is rapidly cooled to -18° in the centre 2 main methods:
	Cryogenic cold The cooling power of compressed gas is used by direct contact: liquid nitrogen, frozen CO2 Advantages: simple installation of freezing equipment **Disadvantages:** - high cost of freezing products - indispensable to be near plants for compressed gas - cryogenic hood Equipment: - cell - tunnel
	Mechanical cold Refrigeration set with com-pressor, evaporator and refrigerant gas (NH3 or freon) Different equipment available: - plate freezer with plates: for small facilities and thin products - deep freezing cells - deep freezing tunnels (the products are placed on carts or conveyors)
Storage Rnal packaging Final wrapping	Prevent dehydrating of surface (risk of freezer burns) Final packaging Cardboard is often used for final wrapping (indispensable in the case of packaging in sachets). --> protection and attractiveness

DEHYDRATED READY MEALS

Advantages
- finished products can be stored at room temperature
- rapidity and ease of preparation for the consumer

Disadvantages
- sophisticated technology
- heavy investments

Alternatives :
- Usually, the manufacturer of dehydrated ready meals only mixes and packages ingredients which are already dehydrated. In fact, the dehydration of the different ingredients can call for different technologies.
- The processes differ in the method of drying which varies according to the raw material.

OPERATIONS	FUNCTIONS	PROCESSING TECHNOLOGIES AND OPTIONS
Unprocessed products Cooking		Most of the products are cooked before drying.
Drying	Elimination of water --> preservation + reduction of product's weight	The process differs according products treated. * Drying by hot air: products placed in carts, in a tunnel oven with circulation of hot air (70°C to 140°C). Time of drying about 5 hours. Used for fruit and vegetables. • *Drying* by atomization: used for liquids and colloidal solutions. Time of drying: several seconds. • Drying by fluidization: the moist product passes on a hot air fluidized bed. Used for cereals, vegetables and pulverized products. * Drying by suspension: *after* mechanical disintegration, the products are *carried* along by a current of hot gas. Used for pulverized moist products. * Drying by drum dryer for puréee-type products - baby food
Grinding	Depends on the desired characteristics of the finished product.	
Mixing	Blending of the ready meals	
Packaring		In a sachet (aluminum or compound), in a small boat, or small cups with heat sealed lids.