# NOTE ON THE STATUS OF INDUSTRIAL REFRIGERATION IN MOROCCO

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Training course on:

***Refrigeration and Preservation of Fruit and Vegetables***

Held on October 16-19, 2003, in Agadir

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## INTRODUCTION

Refrigeration is relatively recent in Morocco: the first industrial cold-storage facility was built in 1945 (in Fès). Few other facilities were set up until 1970 as most of them were state-funded. However, in 1975, following state incentives and media coverage implemented by the relevant authorities, the private sector started to show an interest in the refrigeration sector. From then on, the private sector and government authorities combined forces to drive the sector towards exponential growth.

The current status of the Moroccan refrigeration sector is examined below, taking into account valuable studies carried out on the subject.

## I - THE IMPORTANCE OF REFRIGERATION IN MAINTAINING QUALITY

Many perishable foodstuffs are produced on a seasonal basis, meaning that they are only available for part of the year. During this short period, the rate of production is higher than the market's absorption capacity and it is therefore necessary to process or preserve the surplus in order to prevent wastage and loss of earnings.

According to a FAO survey on postharvest losses in developing countries, 25% of food cereals are wasted due to negligence. In other words, one quarter of the production never reaches the consumer and the effort and money invested are therefore lost. Fruit and vegetables are less resistant and can be very perishable. If appropriate precautions are not taken during harvest, handling and transport, fruit and vegetables are likely to spoil very rapidly and become unsuitable for consumption. It is difficult to give an estimate of losses in developing countries, but some organizations claim that for certain products, up to half the crop can be lost.

Physiological deterioration is one of the causes of postharvest losses of fresh produce. Physiological processes occurring inside living organisms continue after picking, but in another form. As the plant no longer has access to water and nutrients, it draws on its reserves; when these are exhausted, the plant ages rapidly ageing and starts to spoil. If the product is not damaged or attacked by spoilage organisms, it will become unsuitable for consumption because of natural decay. The main natural physiological processes that cause ageing are respiration and transpiration.

Fresh produce also deteriorates and decays after harvest because of chemical reactions involving enzymes and catalysts and because of microbial infections. If infections are not eradicated or inactivated, they can constitute a risk for consumers because of the toxins produced.

The success of refrigeration lies in its capacity to prolong the period during which perishable foodstuffs remain in an acceptable state, by slowing down decay or physiological changes. Refrigeration makes it possible to market safe foodstuffs, while maintaining their nutritional and organoleptic characteristics for some time, depending on the method used (chilling or freezing). Refrigeration also makes it possible to supply foodstuffs to non-producing regions and to provide high-quality products to importing countries.

Refrigeration plays a dual role: it guarantees steady supplies to the domestic market and makes it possible to meet the quantity and quality requirements of foreign markets. An efficient cold chain is an absolute prerequisite to the expansion of production.

This cold chain should comprise:

- fixed industrial equipment, cold rooms, cold stores comprising several cold rooms and specialized systems (industrial freezers, tunnels, order picking stations), and ice production plants;
- mobile equipment, i.e. road, rail or sea transport equipment designed to maintain the same temperature conditions as those present in industrial cold rooms;
- commercial equipment for preserving and displaying perishable foodstuffs (small cold rooms annexed to stores, horizontal and vertical open and closed display cabinets for chilled, frozen or quick-frozen products);
- domestic refrigerators and freezers.

## II - THE INDUSTRIAL REFRIGERATION SECTOR IN MOROCCO

### 1. General characteristics of the sector

The overall industrial and commercial cold-storage capacity, excluding refrigerated display cabinets which could not be taken into account because of a lack of data on the subject, is currently estimated as being 1 700 000 $m^3$, this being the equivalent of 370 000 tonnes divided into 495 units.

In Morocco, the average capacity of a refrigerated facility is 750 tonnes, this being the equivalent of a storage volume of just under 3500 $m^3$. There are 1980 cold rooms, with an average unit capacity of 189 tonnes and an average net volume of 850 $m^3$.

In the industrial sector, the average storage capacity ranges from 10 000 $m^3$ to 12 000 $m^3$ (2000 to 2400 t) and in the commercial sector from 600 to 800 $m^3$, i.e. from 120 to 160 tonnes.

The industrial sector also has a freezing or quick-freezing capacity of approximately 2200 t per day and a water ice making capacity of 2000 t per day.

2. **Distribution of capacities according to the type of product and the region**

The total amount of food stored is divided up as follows:

- Fruit and vegetables 244 000 tonnes (66%)
- Dairy products and miscellaneous 62 000 tonnes (17%)
- Fish 53 000 tonnes (14%)
- Meat 7 000 tonnes (2%)
- Ice production 4 000 tonnes (1%)

The geographical distribution of storage capacities is as follows:

| REGION | NUMBER OF UNITS | CAPACITY | |
|---|---|---|---|
| | | In tonnes | % |
| **Grand Casablanca** | 126 | 91 000 | 25 |
| **Meknes-Tafilalt** | 53 | 71 000 | 19 |
| **Souss-Massa-Draa** | 87 | 61 500 | 17 |
| **Eastern** | 34 | 26 000 | 7 |
| **Fes-Boulmane** | 17 | 23 500 | 6 |
| **Rabat-Salé-Zemmour-Zair** | 28 | 19 500 | 5 |
| **Tanger-Tetouan** | 34 | 15 500 | 4 |
| **Chaouia-Ourdigha** | 8 | 11 000 | 3 |
| **Doukkala-Abda** | 27 | 10 500 | 2.8 |
| **Oued Eddahab-Lagouira** | 30 | 10 000 | 2.7 |
| **Guelmim-Essmara** | 6 | 8500 | 2.3 |
| **Layoune-Boujdour-Sakia el Hamra** | 7 | 8000 | 2 |
| **Gharb-Chrarda** | 12 | 5500 | 1.5 |
| **Marrakech-Tensift-El Haouz** | 17 | 4500 | 1.2 |
| **Tadla-Azilal** | 4 | 3000 | 1 |
| **Taza-Al Hoceima-Taounate** | 5 | 1000 | 0.5 |
| **TOTAL** | 495 | 370 000 | 100 |

The Grand Casablanca, Meknes-Tafilaltet and Souss-Massa-Draa regions represent 61% of the national cold-storage capacity.

Morocco’s cold-storage capacity covers only 4% of the overall production of perishable foodstuffs, which is estimated as being 9.4 million tonnes.

Morocco's cold-storage capacity per inhabitant is relatively low compared with that of other countries.*****

*** Source: International Institute of Refrigeration**

- Morocco: < 60 litres per inhabitant
- Argentina: 120 litres per inhabitant
- Spain: 250 litres per inhabitant
- France: > 500 litres per inhabitant
- New Zealand: 2000 litres per inhabitant

## III – NEEDS IN TERMS OF THE COLD-STORAGE CAPACITY

The cold-storage capacity required in order to handle the consumption and marketing of perishable foodstuffs (current estimated production: 9 400 000 tonnes) can be assessed by using the average turnover of each type of product.

Results are presented below:

| | **Production (in 1000 t)** | **Production requiring refrigerated storage (in 1000 t)** | **Average turnover** | **Current capacity (in 1000 t)** | **Required capacity (in 1000 t)** |
|---|---|---|---|---|---|
| **Fruit and vegetables** | 7300 | 3650 | 5 | 244 | 730 |
| **Meat** | 500 | 500 | 20 | 7 | 25 |
| **Fish** | 500 | 500 | 8 | 53 | 62 |
| **Miscellaneous** | 1084 | 1084 | 20 | 62 | 54 |
| **Total** | 9384 | 5734 | | 366 | 870 |

An additional storage capacity of 504 000 tonnes is therefore required.

Efforts will have to focus on the storage of fruit and vegetables (486 000 tonnes) and on the meat sector (18 000 tonnes).

## CONCLUSION

The refrigeration sector in Morocco is characterized by the following imbalances:

- Use: 78% in above 0°C capacities, 18% in below 0°C capacities and 4% under controlled atmosphere;
- Geographical distribution: out of the 16 regions studied, three regions stand out clearly with the following capacities: 91 000 tonnes (25%) in Grand Casablanca, 71 000 tonnes (19%) in Meknes-Tafilalt and 61 500 tonnes (17%) in Souss-Massa-Draa;

- Refrigeration is not applied at an early stage (poor on-site pre-cooling treatments);
- The cold chain is not continuous throughout the country;
- Morocco lacks refrigerated transport and distribution equipment.

In order to address the current situation and to overturn the shortage and regional discrepancies of storage capacities in Morocco, the Ministry of Agriculture, Rural Development and Forestry launched financial incentives in 1990 and initiated 5-year investment subsidies in 1999. These measures are aimed at meeting the needs dictated by expanding production by reducing the investment required to build a refrigerated facility and by attracting private investment.