



An effective and ecological cold chain

Once upon a time, there was... refrigeration.

Refrigeration has existed since long before electricity became available. For thousands of years, people have sought out shaded and cool areas, and invented ingenious means to preserve food including buried earthenware, natural ice, wells, caves, etc. The use of refrigeration is common to all human societies around the world.

One hundred years ago, in 1908, the industrial refrigeration associations came into being, namely the AFF (French refrigeration association) and the IIR (International institute of refrigeration).

Since then, refrigeration, via the cold-chain concept, has guaranteed the preservation the goods in the agri-food industry, transportation and health (food safety, vaccines).

Cemagref is a public research institute and an integral part of these associations. It has gained international recognition for its research and studies in the field of refrigeration. For the European City of Science event, Cemagref will present the technological innovations in cold-chain processes, in terms of their effectiveness, but also energy savings, environmental protection and food safety in a manner easily understandable for the general public.

On the Cemagref stand, the citizens and consumers visiting the European City of Science will be able to observe the often unfamiliar components of cold chains. How are refrigerated food and products transported? How are they maintained at the correct temperature? How is cold produced in supermarkets and elsewhere? Which daily habits ensure good refrigeration and optimum preservation of food in the household refrigerator? They will also understand how to reduce the electrical consumption of the refrigerator, what fluids and substances are used for effective refrigeration and to avoid releasing greenhouse gasses, and finally the new challenges facing research.

Four main factors to better understand the cold chain

1. Temperature-controlled vehicles

The exhibited truck makes clear how refrigerated transport is organised ranging from the largest to the smallest containers, i.e. from the truck itself to packages of all sizes. Visitors will learn about their thermal efficiency, in particular for the transport of vaccines at highly controlled temperatures.

The transported food is then sold in large stores that constitute the second link in the cold chain.

2. Large stores

On arriving in supermarkets, the fresh and frozen food is stored in refrigerated display cabinets that everyone is familiar with. An experimental cabinet will serve



for a full-scale test on creating cold air with fine droplets of water around fruit and vegetables to reduce and stabilise the temperature of the food products. In addition, a scale model will present ice and hydrate slurries, a new generation of refrigerants that are not dangerous for the environment.

Once the food has been purchased, it is put in household refrigerators, the third link in the cold chain.

3. The household refrigerator

Everyone has a fridge at home... but do we use it correctly? What happens if we put something hot in the fridge? To understand, we designed a refrigerator with a transparent door and temperature sensors. Changes in temperature may be observed on a screen.

In terms of sustainable development, what are the environmental consequences of the cold chain?

4. Impacts on the environment and consumption

Refrigeration generates greenhouse gasses that contribute to global warming. It should also be noted that refrigeration represents 15% of the electricity consumed in the developed countries.

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