Centigrade Refrigeration

Refrigeration in the Meat Industry

"As a contribution to the availability of food for a constantly growing population demanding quality products from the meat industry, Centigrade Refrigeration provides solutions in refrigeration focusing on energy efficiency and food safety."

Meat and meat products are easily susceptible to microbial contamination and chemical spoilage. Meat becomes an ideal medium for the growth of almost any micro-organism. This is due to its nutritional qualities, neutral post-mortem pH (6.5), high water activity (0.98), and external factors such as temperature and oxygen concentration. Certain processes cause unwanted changes in quality, alter colour, texture and flavour. This poses a health risk to consumers, but can also lead to economic loss.

Over recent years, the demand for quality foods, with high nutritional value, but free of chemical preservatives has increased due to the changing lifestyle and eating habits of increasingly demanding consumers.

Refrigeration has an important role to play during the meat preservation process as it prevents the growth of pathogenic micro-organisms such as Salmonella, Listeria, or Enterobacteriaceae (such as E. coli). For this reason, hygiene and control measures must be taken in cold storage rooms, taking the product to low temperatures in order to slow down or stop microbiological activity and biochemical reaction.

Depending on the type of meat, temperatures below approximately -2 °C lead to the formation of ice crystals in the intercellular spaces, causing water to escape from the cells to compensate for the increased osmotic pressure, which leads to drying out of the product and thus to weight loss, as well as alteration of the cell structure.

The Red Meat Regulations within the Meat Safety Act (Act 40 of 2000) requires that:

- The air temperature of a room where meat is cut and packed must be maintained at or below 12°C.
- During cutting, wrapping, portioning and packing the core temperature of unfrozen meat must be maintained at or below 7°C.
- Meat that is packed for freezing must be placed in a freezer within one hour of being packed. The freezer must be capable of reducing the temperature of the meat to at least -12°C within 24 hours and must thereafter be maintained at or below that temperature.
- Frozen meat may not be dispatched at core temperatures higher than -12°C.

012 758 7899 **info@centigrade.co.za**

Complying with HACCP (Hazard Analysis Critical Control Point) requirements also guides butcheries in terms of the refrigeration and freezing standards. HACCP requires that critical hazard points are identified along every stage of food production, processing or preparation, and that the related risks are assessed, and effective control procedures are implemented.

Of course, meat that is not kept at the right temperature is a significant hazard, and there are several control points where the risk of not maintaining the correct temperature is significantly increased. These include delivery, storage, processing, packaging and display.

As just one brief example, when receiving fresh meat, it should be checked that the food products comply with the required temperatures, using a temperature probe. These temperatures should be recorded on a HACCP Temperature Control Sheet, along with the time of delivery and the time of storage. The meat should be stored at 3 – 5ºC within 10 minutes of removal from the delivery vehicle. The same applies to frozen goods, but these must be stored at-18ºC within 10 minutes of removal from the delivery vehicle.

In terms of the storage, the temperature of the products, as well as efficiency of the refrigeration equipment, should be monitored continuously, whether a cold room, a processing room or a display cabinet. In addition, monitoring the shelf life of products is critical – for example, in a frozen state, hamburger patties have a shelf life of three months, but bacon has a shelf life of just one month.

Cutting or processing rooms are among the areas with the highest risk of contamination.

The SANS 10049 (SABS 10049: 2019) code of practice covers provisions for the hygienic handling of food. Complying with the requirements of this code will go a long way in complying with the prerequisite programs required by HACCP. The SANS 10330 : 2020 –Hazard Analysis and Critical Control Point (HACCP) Systems contains the requirements for a HACCP system for the development, implementation and effective management of a functional process hazard control program.

Recommendations that exceed the regulatory requirements:

- Refrigerate trimmings immediately and bring temperature down to 0-2°C
- Processed products should be handled as quickly as possible and refrigerated without delay
- Temperatures in cutting areas should not exceed 10°C
- Refrigerator temperatures should never exceed 3°C
- Always arrange the cold rooms on a “first in-first out” basis

Mature meat presents an economic opportunity as it allows the product to be revalued in response to new consumer habits, their interest in quality and their concern for safety. The two main lines of matured meat are:

1. Wet maturation of meat. The aim here is to control the microbiological activity of aerobic mesophilic and lactic acid bacteria. The meat must have a pH lower than 5.8, a temperature between 1 degree C and 4 degree C and an oxygen-free atmosphere. For this type of maturation, the product is vacuum-packed (or hermetically sealed.)

Dry-aged meat maturation is based on the breaking down of myofibrillar proteins by the action of the enzymes present in the meat, thus softening the muscle fibers. Industry recommends keeping the temperature below 2 degrees C, discarding meat with a pH lower than 5.6 and that surface water activity does not reach values below 0.95.

The meat curing process provides quality, safety and shelf life to the product. It consists of a salting phase followed by subsequent control in a chamber where the humidity is progressively reduced. In this final stage, chemical and enzymatic reactions take place which will give rise to the target organoleptic compounds.

In addition to the quality and easy installation of our products, Centigrade stands out for our capacity for advice and design of refrigeration projects.

"Our goal is to offer the best solution, analyzing all the alternatives and proposing the most efficient, reliable and sustainable to the client."