

Food safety: Winning consumer confidence

Today's consumer is more aware and discerning when it comes to buying fresh foods. Afrox's Hendrik Pretorius highlights safety trends and the advantages of involving a food gas expert when preparing perishables for sale to the modern consumer.

Increasingly, the modern consumer is driving packaging OEMs towards change with respect to extending the shelf life of fresh food, and its quality and appearance on supermarket shelves, says Afrox gas mixtures specialist, Hendrik Pretorius.

Consumers want to be able to purchase and prepare fresh produce at any time, as if it came directly from the farm. What they forget, however, is that to get fresh food to the supermarket, it often has to be transported hundreds of kilometres from a farm, food factory or depot, Pretorius points out.

"Keeping products fresh, and meeting the growing consumer demand for healthy, minimally processed and attractively packaged foods, is changing the technologies used by food processors, the food transport industry and supermarkets worldwide," he says.

"And those reluctant to embrace these new technologies are increasingly likely to be punished by rigorous public health and safety legislation and, more significantly, deserted by consumers."

Pillow packaging of fresh ready-to-eat vegetables and other food products, for example, is extending shelf life without the need for freezing or any other preservation technology.

Instead, the product is sealed in a puffed-up plastic bag filled with a purpose-developed gas mix that protects the food from natural spoilage caused by moisture, oxygen, bacteria or other contaminants in the atmosphere.

This is where Modified Atmospheric Packaging (MAP) comes in. It involves the use of different gas mixtures to extend shelf life – typically by up to a week for fresh produce – and to retain the fresh look of the product.

The key to this technology lies in varying the concentration of the different gas mixtures used, explains Pretorius. Typically, carbon dioxide (CO₂), nitrogen (N₂) and oxygen (O₂) are used in a scientifically developed mix to provide the life-extending needs of the product being packaged.

"While the use of quality products, temperature control and hygienic conditions are vital to the process, the use of the right gas mixtures and packaging are central to the optimisation of shelf life," says Pretorius.

For most foodstuffs, the package should



Keeping products fresh, while meeting the growing consumer demand for healthy, minimally processed and attractively packaged foods, is changing the technologies used by food processors.

contain as little oxygen as possible – typically less than 1 to 2% – to retard the growth of aerobic microorganisms and reduce the degree of oxidation. However, there are exceptions. Oxygen helps to preserve the oxygenated form of myoglobin, which gives fresh meat its red colour, for example.

Carbon dioxide, according to Pretorius, is the most important gas in the field of MAP technology. Most microorganisms, such as mould and common aerobic bacteria, are strongly affected by carbon dioxide.

Citing a recent experience of a meat product manufacturer, Pretorius says: "The manufacturer had launched a new sausage in its current range by adding organic constituents, such as onion and herbs to the meat mix."

"However, this changed the dynamics of the reaction with the MAP gas and after a week and a half, an acidic 'white water' was seen coming off the product. Not exactly an enticing sight for any consumer."

Fortunately, Afrox was able to quickly identify the problem and provide a rapid solution. It did take specialist gases knowledge in order to do so, but that specialist knowledge also added real value to the production process of this new product.

While MAP saves money and improves the quality of the food, of far greater importance is that food safety is improved and consumer confidence in the food industry, up and downstream, is protected.

Pretorius advises that instead of employing full time MAP and gas specialists, food processors and packaging companies should rely on the extensive experience and know-how of a gases company such as Afrox to



Oxygen in a MAP mix helps to preserve the oxygenated form of myoglobin, which gives fresh meat its red colour.

provide the right solutions.

"As an added benefit, fresh food manufacturers and producers also have access to the latest in gases technologies emerging out of extensive research by The Linde Group, Afrox's global parent company," says Pretorius.

Liquid nitrogen and cold chain

By volume, dry air contains over 78% nitrogen and nearly 21% oxygen. So in any cryogenic air separation unit (ASU), the largest liquefied gas being produced is nitrogen.

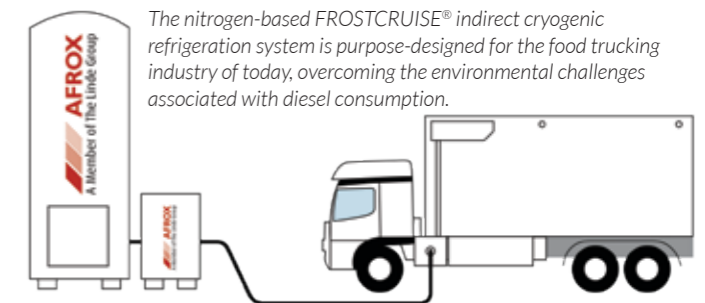
Nitrogen has no taste, colour or odour and it is non-toxic. We breathe it in and out all the time, without any negative effects. It is also mostly inert, making it ideal for use to exclude moisture and oxygen from the likes of pillow packaging for products such as potato crisps.

As a normal constituent of air, nitrogen also has no global warming potential and so there are neither pollution nor emission problems associated with venting 'used' nitrogen into the atmosphere. In the context of food chilling and freezing, therefore, nitrogen is an ideal clean gas.

Being non-corrosive also means that nitrogen can be used in pressurised systems manufactured from a wide range of cost-effective common materials; the only proviso being that the material can withstand the process pressure and temperature involved.

Flash freezing

Nitrogen liquefies at a temperature of -196 °C, so on contact with an item of food, it freezes it very rapidly. Compared to freezing food using mechanical chillers, cryogenic freezing using nitrogen is up to four times faster. This



The nitrogen-based FROSTCRUISE® indirect cryogenic refrigeration system is purpose-designed for the food trucking industry of today, overcoming the environmental challenges associated with diesel consumption.

results in smaller ice crystallisation, because the water inside and outside the cells of the food all freeze at the same rapid rate, keeping the cells intact and retaining the natural freshness, flavour and texture of the product.

This process is called flash freezing and it better preserves the nutrients, taste and texture of the frozen food, so that when defrosted for cooking, it is nearly indistinguishable from its fresh equivalent.

This technology represents a hi-tech departure from the traditional approaches of mechanically freezing food products on a conveyor belt or immersing them directly into a pool of liquid nitrogen.

Instead, with the flash-freezing process, food on a conveyor is completely surrounded by a stream of high-velocity, extremely cold nitrogen vapour. Food frozen in this way is called individually quick-frozen (IQF) and, through Linde and its Cryoline® CW multi-purpose cryogenic freezing technology, Afrox can offer a variety of IQF poultry, meat and seafood solutions to African markets.

Towards a cleaner cold chain

In Europe, cold food transportation, which includes the mechanical power and refrigeration necessary to keep the cargo chilled

or frozen, is estimated to be responsible for nearly 2.0% of total emissions. Road transport refrigeration equipment, which usually runs off a diesel-powered truck engine, is required to operate reliably in a wide range of operating conditions and temperatures, and it is generally much less energy efficient than the systems in supermarkets or cold storage warehouses.

As an alternative to relatively slow mechanical refrigeration, total loss systems using liquid nitrogen are now available.

Where logistics staff might take some time to load or offload, it is important to have a system that can quickly establish and keep the cold chain temperatures required. The use of nitrogen avoids having to keep the truck engine running while loading and offloading produce. In doing so, instead of diesel exhaust fumes being released into the atmosphere around the area, nitrogen gas is emitted, which is harmless to the environment and to the people loading the vehicle.

Linde's FROSTCRUISE® indirect cryogenic refrigeration system is purpose-designed for the food trucking industry of today, overcoming the environmental challenges associated with diesel consumption and eliminating potentially harmful refrigerants

used in mechanical systems.

Advantages include rapid cooling with very stable temperature control; reduced carbon footprint through diesel savings; the elimination of hazardous refrigerants (eg, R404A); low-noise design for easy deliveries at night time or to residential areas; longer service life compared with mechanical solutions; and cost efficiencies due to ease of service and maintenance.

Using nitrogen-based systems such as FROSTCRUISE® for food transportation enables the food industry to better monitor and control chilled and frozen food safety and quality. It raises the credibility of food and supermarket brands, while protecting the environment.

"As well as its MAP solutions, an abundant supply of nitrogen and its extensive distribution network, Afrox's value proposition in the food arena comprises equipment supply and rental for all of the leading MAP and cryogenic freezing technology being developed by its parent company, The Linde Group," Pretorius notes.

More importantly, however, Afrox offers the expertise necessary to implement customised solutions tailored to the needs of the African food industry. □

tel: JHB: +27 (0) 10 595 1831
sales@instrotech.co.za
www.instrotech.co.za

THE WEIGHT IS OVER

complete industrial weighing solutions

With the ever more stringent regulatory standards required of manufacturers', process instrumentation needs to be increasingly more reliable, accurate and of high quality.

From the load cell transmitter to load cell calibrators, load cells to their mountings Instrotech has your solution.