



Andy Pearson

# Rattling the Chain

BY ANDY PEARSON, PH.D., C.ENG., MEMBER ASHRAE

One of the nice things about working in refrigeration (as opposed to being a rocket scientist or a brain surgeon) is there are bits of the job that everybody can relate to. I have found over the years that it is the ice rink projects I have worked on that deliver the highest recognition factor with people outside the industry.

You would think the food distribution chain would generate a similar response since we are all regular users, but it is surprising how little people know about what happens to food before it reaches the shelves of the supermarket or the local shop. It still amazes me a distribution center the size of two football fields can be completely filled with chilled produce and empty again within a 24-hour cycle and yet the food temperature does not vary by more than a couple of degrees.

The produce arrived at the center from all over the world, and when it leaves it may travel hundreds of miles before it is sold to a consumer, all within the same tight temperature band. This is an engineering miracle of teamwork, international cooperation and technical skill.

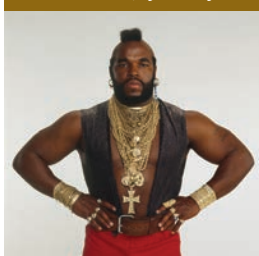
The distribution network for perishable food is commonly called “the cold chain,” and it stretches from the point at which the crop is harvested (or milked, killed or caught) through to the moment that it is taken out of your refrigerator to be eaten. This can be readily divided into two halves; the controlled cold chain and the uncontrolled cold chain. The controlled cold chain is subjected to very strict regulations on food hygiene, temperature control and elapsed time. This may take the food from the field (or dairy, abattoir or sea) through several stages of storage, transport, storage, processing, storage, transport, storage, more transport, more storage and finally display. Then, the produce is picked from the shelf, wheeled round the supermarket for a bit, packed into the trunk of a car, left on the kitchen table for a bit and finally put into the refrigerator. It is easy to

see where the switch from controlled to uncontrolled cold chain happens. I have often met people who prefer to buy fresh meat and freeze it at home in their garage chest freezer because they think fresh quality is better. They look bemused when I ask whether they would prefer their meat frozen by amateurs or professionals.

The level of food waste in the western world is quite staggering, ranging in estimates from 25% to over 50% of what is harvested. Some of that waste is inevitable – not everyone eats their potato skins or apple cores – but in many cases it is avoidable. At first sight it seems that most of the waste occurs in the second half of the chain and there is certainly great scope for waste reduction through good housekeeping.

However, there is also great scope for improvement in the

I said “cold chain,” you crazy fool!



first half through clever use of refrigeration techniques. For example, in some sophisticated markets vegetables are rapidly chilled as soon as they are harvested by placing them inside huge vacuum chambers while still in the field. The evaporation of water sprayed onto the crop pulls the temperature down and gives a significant increase to product shelf life, perceived quality and price. This could have a transformational effect on producers if it were applied in third world fields as well as first world ones, but there is no point incurring this operating expense if the next link in the chain is broken and the product still spoils before it gets to market.

The third world challenge is first to ensure that there is a continuous chain, including the point of sale, and then to extend product life and quality to increase value and reduce wastage. Refrigeration is a critical process throughout that chain. Without refrigeration modern city life would not be possible. As we work through the challenges of global population growth, the increase of mega-cities and shortages of fresh water and electrical power it is imperative that we pay close attention to the science of refrigeration. The changes necessary to get the cold chain working more effectively and more efficiently will not just happen; they need to be carefully planned and properly implemented for long-term success. We need to shout this from the rooftops—loudly and often. Get out there and rattle the chain. ■

Andy Pearson, Ph.D., C.Eng., is group engineering director at Star Refrigeration in Glasgow, U.K.