

Contact: Melanie Preve
203-389-5223
melanie@bigvoicecomm.com



Study Reveals That Modifying Display Case Airflow and Domestic Refrigerator Temperature Minimizes Environmental Impact of Food Refrigeration

Herndon, Va. (Feb. 4, 2019) - Refrigeration is an essential component of the food supply chain, extending the shelf life of perishable food and ensuring that consumers receive safe food that does not pose a threat to their health. It is estimated that 40 percent of food products require refrigeration and that nine percent of losses of perishable foods are due to lack of refrigeration in developed countries. However, this level of refrigeration has an environmental cost; refrigeration accounts for 15 percent of the electricity consumed and the food cold chain represents one percent of CO₂ emissions worldwide.

Companies and consumers have become increasingly aware of the environmental impact of electricity consumed by refrigeration. However, this process is essential during transport, storage and distribution for extending the shelf life of perishable foods and for providing consumers with safe, high quality food. A new study published in *Risk Analysis: An International Journal* tested eight interventions and evaluated their impact on health risks and environmental impacts. Health risks and environmental impacts were quantified by the amount of food wasted due to the growth of spoilage bacteria and the electrical consumption needed to maintain product temperature throughout the cold chain. The research identifies the best way to ensure safe food while also minimizing electricity and food waste in two different places: store display cases and home refrigerators.

Steven Duret, Hoang Hong-Minh, Derens-Bertheau, Anthony Delahaye, Onrawee Laguerre and Laurent Guillier, from Irstea and ANSES conducted a study focused on the cold chain of ham, including refrigerated transportation, storage in a supermarket cold room, open display cabinet, transport by consumer and domestic refrigerator. The study, "Combining quantitative risk assessment of human health, food waste and energy consumption: The next step in the development of the food cold chain?" examined three criteria: food safety, food waste and environmental impact, as illustrated by three factors: (1) the risk to human health associated with *Listeria monocytogenes*, (2) product alteration due to the growth of lactic acid bacteria, and (3) the energy consumption of the refrigerated equipment.

When the average thermostat temperature of the domestic refrigerator was decreased from six to four degrees Celsius, the number of listeriosis cases, the disability-adjusted life years (DALY), and the proportion of wasted products were the lowest compared to other interventions (0.8 listeriosis cases, 1.94 DALY and 3.92 percent of food wasted). However, the energy consumption increased from 0.044 to 0.048 kWh per pack. When the average thermostat temperature of the domestic refrigerator was increased from six to seven degrees Celsius, the opposite trends were observed. When the thermal insulation of the domestic refrigerator was

increased, all the measured criteria decreased from the baseline, with 5.66 years lost, 7.33 percent of food wasted and electricity consumption of 0.038 kWh per pack.

Decreasing the airflow rate in the display cabinet at the store by 25 percent increased health risk and food waste by one percent and reduced energy consumption by 14 percent. Increasing the airflow rate by 25 percent increased energy consumption by 16 percent and decreased the health risk by one percent with no change in food wasted.

The results show that the thermostat setting of the domestic refrigerator has a high impact on food safety and food waste, but previous studies have shown that even when consumers are aware of the recommended temperature, they tend not to be aware of the temperature of their own refrigerator, which is often higher than recommended. Consumers should take cognizant action to set their refrigerators to four degrees Celsius. The results also show that reducing the airflow rate in the display cabinet by 50 percent would allow an energy savings of 30 percent for less than a two percent increase in health risk and food waste. However, the efficiency of the measure would be guaranteed only if the air curtain operates properly with a reduced airflow and more study would have to be conducted on its stability. A Cost-Benefit Analysis and two Multi-Criteria Decision Analysis methods confirmed that these two actions were most effective.

###

Risk Analysis: An International Journal is published by the nonprofit Society for Risk Analysis (SRA), an interdisciplinary, scholarly, international society that provides an open forum for all who are interested in risk analysis, a critical function in complex modern societies. Risk analysis includes risk assessment, risk characterization, risk communication, risk management, and risk policy affecting individuals, public- and private-sector organizations, and societies at a local, regional, national, or global level. To learn more, visit www.sra.org.