Frozen Food and Food Security in the UK

Executive Summary

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Research conducted by Cranfield University looks at the role commercially frozen food and the frozen food industry can play in helping to reduce the risk to food security in the UK.

Looking at the four major foods studied in this report, the researchers concluded that frozen food can play a valuable role in meeting the UK government's 2020 and 2050 food security targets.

The report answers the following questions:

Can freezing food help meet increasing global demand for food?

The report highlights the considerable savings in food waste that can be obtained in switching from fresh to frozen supply. These savings could drastically increase the supply of food fit for consumption. Currently 19% percent of food and drink is wasted in the UK (WRAP, 2013c), reducing this will go a considerable distance in meeting increasing demand.

The report suggests that if the frozen market were to grow at the 2012 rate, carrot and potato waste would be reduced by 13% and 8% respectively, increasing consumption of frozen could further reduce this.

Can freezing food help make food more affordable?

Frozen products were less expensive than their fresh equivalents making fish and vegetable products, which can enhance dietary health, more accessible to low budget households.

The supply of frozen food has the ability to make certain products more affordable. If the economic loss to households from food waste is also considered (estimated at £470 a year, WRAP, 2013c), reducing this will also improve the value of the weekly shop.

Can freezing decrease the environmental burden of the UK food supply?

The researchers concluded that frozen food can significantly reduce Greenhouse Gas Emissions (GHGE) production for products not produced in the UK year round. As energy becomes more renewable, and technology improves refrigeration and transport, this reduction is likely to be increased.

Can freezing food increase food safety?

While food safety was not investigated in detail in this report, the literature review showed that freezing can halt the growth of food spoilage organisms and pathogens which cause foodborne illness.

Overview

Introduction

Expectations are that the global population will grow to over 9 billion by 2050 which will inevitably increase pressure on the supply of food.

The Food and Agriculture Organisation estimates a required 70% increase in food production based on current levels to meet the growing demand (FAO, 2009). Earlier in 2014, the government's Department for Environment, Food and Rural Affairs Committee (Defra) launched its report into the food security issue. In launching the report Anne McIntosh, Chair of Environment, Food and Rural Affairs Committee said:

"Complacency is a genuine risk to future UK food security. If we want our food production and supply systems to be secure, Government and food producers must plan to meet the impacts of climate change, population growth and increasing global demand for food."[1]

This research looks at the role commercially frozen food and the frozen food industry can play in helping meet these impacts and reducing the risk to food security in the UK.

What do we mean by food security?

Defra's 2010 Food Strategy Report identifies six priorities in improving food security in the UK:

1. *Enabling and encouraging people to eat a healthy, sustainable diet*
2. *Ensuring a resilient, profitable and competitive food system*
3. *Increasing food production sustainability*
4. *Reducing the food system's greenhouse gas emissions*
5. *Reducing, reusing and reprocessing waste*
6. *Increasing the impact of skills, knowledge, research and technology* (Defra, 2010).

How does frozen meet the requirements?

The research focused on priorities one to five of the Defra definition and the role that increasing the use of frozen food could play in meeting these priorities.

Meeting the increasing demand for food

One method of meeting the increasing demand for food is to reduce food waste at every stage of the production process and in the home.

This research looked at food waste generated in the fresh and frozen production lines, from harvest or slaughter to the retail environment, for Atlantic cod, carrots, potatoes and broccoli.

The report compared at what stage of chain edible waste occurred for each product and identified that in the frozen supply chain, waste was produced much higher up the chain which meant that it could be reused or recycled rather than being sent to landfill with household waste.

[1] http://www.parliament.uk/business/committees/committees-a-z/commons-select/environment-food-and-rural-affairs-committee/news/food-security-report-substantive/

The study found that between 81% and 92% of edible food waste occurs in the frozen supply chain before reaching the retailer. In the fresh supply chain for the same products only between 47% and 72% of waste arises prior to retail.

The study also showed a potential waste saving of between 11% and 101% as a percentage of consumed food for the products analysed.

Providing affordable food

This report looked at market prices of the four products in Tesco, Sainsbury's, ASDA, Morrisons, Waitrose and Ocado. Researchers selected the least expensive variant that was most widely available from fresh and frozen as the food security issue is most likely to impact on low income families.

Atlantic cod: The report shows that frozen Atlantic cod is around 30% cheaper than its fresh equivalent. This is likely due to the increased costs of transportation for fresh Atlantic cod.

Carrots: The findings here are more complex. The most commonly available frozen carrots are baby carrots, which represent a higher quality product than the most commonly available standard fresh full size carrot. Chantenay carrots are, however, a smaller, fresh premium product (over twice the price of standard carrots). Frozen baby carrots are about half the price of fresh Chantenay carrots, but a third more expensive than standard fresh carrots. This falls to 20% more expensive than fresh when domestic wastage is factored in.

Broccoli: Frozen broccoli florets were found to be 44% less expensive than florets from fresh whole broccoli heads when stem wastage was factored in. Frozen florets were 57% cheaper than pre-packed fresh florets.

Potatoes: While frozen roast potatoes were 52% more expensive than fresh, uncooked and unpeeled potatoes, once preparation wastage and cooking oil required were factored in, home cooked roast potatoes were 20% more expensive than the same weight of frozen roast potatoes (note, this excludes cooking costs).

Decreasing the environmental burden of food

Aside from waste reduction, this report finds that increasing frozen food production can help to reduce the environmental burden of food production. Some of the products studied showed clear reductions in greenhouse gas emissions (GHGE) for frozen products.

Atlantic cod

The research showed that fresh Atlantic cod is responsible for more CO_2e than frozen Atlantic cod even when frozen Atlantic cod is transported via China for processing. The report found that 3 kg of CO_2e is produced for every kg of fresh Atlantic cod fillet consumed when transported from Iceland. Frozen Atlantic cod transported via China for processing produces less than 2 kg CO_2e per kg, while frozen Atlantic cod transported directly from Iceland to the UK produces less than 1.5 kg CO_2e per kg.

As the extended shelf life of frozen Atlantic cod enables transportation by road and sea, transport emissions can be significantly reduced to as little as 0.11 kg CO_2e per kg. Fresh Atlantic cod requires faster processing and therefore must be transported by air, producing around 1.5 kg CO_2e. It is also worth noting that this extended shelf life of frozen Atlantic cod reduces CO_2e emissions from waste to 0.2 kg CO_2e per kg compared with fresh Atlantic cod which produces 0.7 kg CO_2e per kg.

Broccoli, carrots and potatoes

Results for vegetables are less clear cut due to the differences in production and storage throughout the year and in product varieties.

Broccoli: The report highlighted that fresh broccoli can only be produced in the UK between June and October, for the rest of the year fresh broccoli is imported from Spain. Frozen broccoli on the other hand can be supplied from UK sources year round due to its extended shelf life. Frozen broccoli produces less than 2 kg CO_2e per kg compared with fresh UK grown broccoli which produces less than 1.5 kg CO_2e per kg and fresh Spanish grown broccoli which produces more than 2 kg CO_2e per kg. GHGE for Spanish broccoli is highest due to the additional transportation required.

This report found that by increasing the use of frozen broccoli in winter months, the UK could be 100% self-sufficient in broccoli production. This could reduce GHGE production by 15% for the same production.

Carrots: Although the sources of GHGE production is different across both fresh and frozen supply chains, there is very little difference between the levels of CO_2e produced with fresh carrots producing just under 1.2 kg CO_2e per kg consumed and frozen producing just over 1.2 kg CO_2e per kg.

Potatoes: The typical supply chains measured in this report suggest a slight increase in GHGE for frozen potatoes compared with fresh (1.75 kg CO_2e per kg consumed compared with just under 1.5 kg CO_2e per kg respectively). However it is worth noting that in this study, fresh storage at RDC and retailer is assumed as ambient, where potatoes are stored chilled, for example in many convenience stores, the GHGE produced would increase. Similarly, in the cooking stage, increasing the amount of cooking oil used on fresh potatoes would increase emissions, strict processing control would mean that this is less likely to occur in frozen.

Discussion

This report demonstrates that increasing the use of frozen food in relation to the products studied here can have a significant impact on the amount of edible food that is wasted in the UK.

It also identifies that frozen can be significantly more affordable when comparing like for like products and taking into account the waste and additional ingredients required to create the same end product.

Finally, this report demonstrates that increasing the use of frozen food for foodstuffs that cannot be produced in the UK on a year-round basis, can significantly reduce the GHGE produced by food production in the UK.