

## Pro-Pak Foods Report

### Aim of our visit + why we chose this approach:

We chose to visit a food manufacturing facility as part of our human practices work as we felt it was imperative for our team to gain an understanding of current food safety practices and processes. This allowed us to determine if our project is appropriate in this sort of environment, or if we should target other stakeholders within the food industry.

We also interviewed the Technical Director, David Raine. We determined that an interview with someone in a senior position in a food manufacturing company would provide us with ample opportunity to ask questions regarding practices within the food industry, and how our project compares against them. It also allowed us to delve deeper into more specific types of food industries we should be targeting, as well as the severity of botulism within this industry.

### Arrival:

Upon arrival to Pro-Pak Foods, we had lunch with David Raine. Over lunch, he gave us more of an insight into what Pro-Pak Foods do. They are a ready meals manufacturer and a part of the Tönnies Group, a multi-national food business. Pro-Pak supply ready meals to retailers such as ASDA and Spar, and their products range from retailer branded meals, Quorn, and Ella's Kitchen baby food to name a few. We also spoke with the operational director who suggested that our device may be of use to the cured/cooked meats industry – David elaborated on this during the interview we conducted later in the day.

### Facility tour:

After lunch, David gave us a tour of the Pro-Pak production line and showed us how ready meals are processed and made. They use a machine called a retort for sterilisation and cooking purposes. A retort uses steam and a pressure of 2 bar (200 kPa) to cook/sterilise their products.

For ambient (long shelf-life) foods, they are cooked at 122°C for around 1 hour 30 mins to 2 hours long, and cooling takes around 4 hours. The duration for cooking and cooling varies depending on the product's shelf-life e.g. 10-day or 42-day products. The most important thing about the retorting process is that the core temperature of the product must reach 90°C and maintain that temperature for 10 minutes. David referred to this as a "*C. bot* cook" as it ensures the death of *C. botulinum* and virtually any other bacteria present in the product.

### Interview with David Raine:

After the tour of the production line, we interviewed David and asked him questions including Pro-Pak's quality/safety controls for *C. botulinum*. The interview and a full transcript of it can be found on the wiki.

### Reasons for the questions we asked:

The first couple of questions I asked was regarding the use of GM organisms. I asked these questions as the use of GMOs are part of the foundations of iGEM and our project itself – if

our stakeholders have any objections to using GMOs then it would require us to understand why they are opposed to their use.

I then asked them about their food safety controls that they have in place. This helped us gauge how food manufacturers prevent against botulism and other foodborne diseases, but also how our project compares against the current methods. We learned about their retorting method, the industry standards and legislations that must be upheld to ensure food safety.

I also asked David whether Pro-Pak would be interested in our device/project. He said it would be of interest if it is significantly cheaper than challenge testing (deliberately inoculating food products with the organism of interest and observing when it grows. This is the basis for setting a shelf life). He also stated that our project may be of great interest to the meat industry as they've been put under pressure from the UK government to reduce the salt, nitrite/nitrate content of their products to improve public health. However, these additives are effective against *botulinum* growth. Asking this question enabled us to understand if there was a demand for our project within a food manufacturing setting, but also gave us an insight into more specific stakeholders to target within the food industry too.

In addition to this, I asked if Pro-Pak test for *botulinum* as we weren't sure whether manufacturers conduct food testing themselves. Pro-Pak don't test themselves, which prompted us to investigate food testing companies as opposed to food manufacturers. We originally wanted our device to be used within a factory environment but based on this information we decided to tailor it towards companies which do food testing instead.

To evaluate the impact of a botulism outbreak in a food company, I asked how Pro-Pak would deal with it. I then moved onto questions about whether *botulinum* was a priority when it comes to preventing foodborne diseases, or if they had bigger concerns about other bacteria. This allowed us to determine if there was a demand for a project like ours within the food industry, or if we should be looking at a different organism.

### What we learned from our visit:

- Gained a clearer insight into how the food manufacturing industry works e.g. how it's laid out. This allowed us to see how our device did/didn't fit this setting.
- We learned that food manufacturers don't tend to test for bacteria themselves, they outsource to food testing companies
- We learned how much a challenge test costs, so we can determine how much cheaper/economically viable our device will be compared to this
- Discovered what retorting is and why/how it's used for sterilisation and prevention of pathogenic growth

### How we can integrate our findings:

- Learning that food manufacturers don't test for pathogens themselves means that maybe we should target our project towards companies which do. Our device might not be practical within a factory setting like we originally envisioned. Instead of food

manufacturers, we should instead look towards companies which carry out food testing and evaluate whether our device is more suitable in this kind of setting.

- David Raine mentioned that we should contact people within the cooked meat industry due to the issue of salt reduction. They've been put under pressure to remove salt and nitrites/nitrates in their products to improve the public health. Too much salt and nitrates in your diet can cause:
  - Increased blood pressure
  - Increased stroke risk
  - Carcinogenic risks (for nitrates/nitrites)
  - Increased risks of heart diseases and many more...
- Dropping salt levels reduces shelf-life and allows the proliferation of *Clostridia*. The cooked meat industry may be a potential stakeholder with great interest in our project due to this issue and may be worth contacting.
- David kindly provided us with food samples of ready meals such as lasagne and mashed potatoes – We may be able to use these as real food media to test our mutant strains in