Many packaged food products have a “sell-by” date or a “refrigerate after opening” label, but these both serve as vague indicators of the product's longevity. In fact, roughly 1 in 6 Americans contract a foodborne illness every year, leading to 56,000 hospitalizations and 1,300 deaths.¹

Our product simultaneously tests for the 3 most common foodborne illness-causing bacteria: salmonella, clostridium perfringens, and campylobacter with a lateral flow assay.² The strip consists of one plastic card holder with 3 different test strips each labeled with bacteria-specific antibodies that indicate the presence of said bacteria within the sample.

Introduction

The total food pathogen food pathogen market is expected to grow to over $5.5 billion by 2024.¹ This overall market can be broken down by pathogen, technology landscape, and region. Salmonella and E. coli make up $1.2 billion and $1.1 billion of the market, respectively.² The rapid food pathogen testing technology makes up $3.5 billion of the total market, and the North American is about $2 billion.³

Current competitors such as UltraKlean sell salmonella and E. coli 2-in-1 tests for $30 and individual antigen tests for $6.⁴ There is also SMART-II Salmonella Detection Tests, but these are marketed for commercial purposes.

We expect to sell a set of 5 units for $12 in one box. Our revenue stream is anticipated at $72 million based on selling 6 million units a year by selling to 6% of the 100 million people who care about food pathogens.⁵

Scientific Principles

We use a lateral flow assay as the basis for each pathogen strip (Figure 2). Each strip consists of a sample pad, nitrocellulose matrix, an antibody test and control line, and an absorbent waste pad. The sample is absorbed and follows Fick's 2nd Law allowing us to predict elution time (Table 1). The antibodies having specific binding kinetics that allowed us to accurately assess the quantity of antibodies needed for proper pathogen indication (Table 1). These antibodies are gold-plated and serve as indicators of the pathogen.

Manufacturing Plan

Our manufacturing plan consists of two steps: preparing the gold-plated antibodies and the assembly of the device itself. To tag the antibodies, we plan on using an EDC/NHS covalent reaction (Figure 3). This step requires a mixer, centrifuges, and incubators for successful manufacture. Once the antibodies are generated, they get added to the nitrocellulose membrane of the strip.

Financial Analysis

For developmental timeline estimations, we expect the legal and engineering pre-production tasks to take about a year and half with total costs of $12 million before production of any units. Cost per unit will be $7.74 with a price of $12.

Assuming an annual growth in operating and business costs of 5% and an annual growth in revenue of 20%, it is expected for the net present value to become positive within the next 8 years (Figure 4).

Market


References

2. https://www.who.int/health-topics/foodborne-diseases#tab-1