Goat’s Milk Derived Probiotics

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GOAL, OBJECTIVES, AND IMPACT

**Goal:** To create *L. rhamnosus* probiotic supplement with viability of 10^7 cfu/pill.

**Objectives:**
- Grow *L. rhamnosus* with alternative media to 10^7 cfu/mL.
- Concentrate and purify *L. rhamnosus* to 10^7 cfu/g.
- Reduce fixed and variable cost of operation in order to develop and grow a profitable business.

**Impact:** Development of high viability, low price probiotic capsule as a nutritional and preventative dietary supplement.

MARKET AND MARKET ANALYSIS

- Open global market, projected to grow at 43% of population.
- Fragmented market with top 5 competitors producing less than 40% revenue.

MORPHOLOGICAL ANALYSIS

EXPERIMENTAL RESULTS

- Vary fermentation media and times to maximize cell counts (while maintaining pH above 4.6).
- Investigate enteric coating, encapsulation techniques, and excipients to elongate cell viability.

FERMENTATION TIME COURSE

- Investigate spray drying media and times to maximize cell counts (while maintaining pH above 4.6).
- Experiment with *L. acidophilus* and *L. casei* to optimize fermentation results.

BREAKEVEN CHART

- Incorporate alternative unit operations (i.e. spray drying and ultrafiltration).
- Determine optimal location based off manufacturing and distribution costs.
- Investigate potential for future growth in the Food & Beverages and animal feed sectors.

ASSESSMENT AND FUTURE RECOMMENDATIONS

- Limited FDA regulation in supplement industry (i.e. lower cost).
- High profit margins relative to food industry.

SWOT ANALYSIS

- High cost of downstream processing (93% of total equipment cost).
- Reliance on robustness of single strain *L. rhamnosus*.

ECONOMIC SUMMARY

- Expanding global probiotic market ($46.6 billion in 2020).
- Large future product pool, including other probiotic strains and prebiotics.

- Improved FDA regulation in the future.

CAPSTONE/SENIOR DESIGN EXPERIENCE 2018

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References: