The Fermentation and Distillation of Cheese Whey for Artisanal Creameries

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Presentation Outline

• Reasoning behind work being conducted

• Environmental comparison of spirit production

• Licensing

• Upcoming Work
Why?

Basic Economic Analysis for a Premium Whey Vodka

• Annual whey production: 1,000,000 gallons/year
• Whey fermentation produces a solution which is 2.5% Alcohol By Volume (ABV)
• 25,000 gallons of ethanol/ year
• 750 ml of Premium vodka at 40% ABV can retail for approximately $30
• 25,000 gallons of ethanol is 315,000 bottles of spirit at 40% ABV
• If sold at premium prices; potential annual revenue of $9,450,000/year
Potential Value of Whey

$9.45/ gallon of whey
Goal of Work

Aid Entrepreneur

- Lifecycle Analysis
- Licensing Guide
- Equipment List
- Batch Variability Study
Cheddar Cheese Production

Impact categories:
- Greenhouse gases (kg CO$_2$-eq)
- Energy use
- Land use

Functional unit (kg Cheddar cheese)
Co-products (meat, ethanol, whey)

Crop production → Biofuel production → Dairy farm → Dairy plant

CO$_2$-eq → MJ → m$^2$ → MJ → m$^2$ → MJ → m$^2$ → MJ

Taken from: http://fyi.uwex.edu/greencheese/files/2011/02/image006.png
Process Based Lifecycle Analysis

Goal and Scope

Inventory Analysis

Impact Assessment

Interpretation
Comparison of Clear Spirits

Images taken from: http://f1.wine-searcher.net/images/labels/31/82/house-spirits-white-dog-whiskey-oregon-usa-10443182.jpg and http://i.dailymail.co.uk/i/pix/2015/10/24/02/2DB4CC2300000578-3287187-image-a-1_144564859430.jpg
Process based LCA Results

- Only differences in the processes were considered.

- **Reduced** the CO$_2$e emissions by approximately **17.6 lb. per bottle** and water inputs by **0.11 gallons per bottle**.
Licensing Work

- The Distilled Spirits Plant (DSP) licensing process can take a long time

- A guide for the Alcohol and Tobacco Trade and Tax Bureau (TTB) DSP permit and registration process
Upcoming Work

Development of an equipment list for a new Distilled Spirits Plant interested in the production a whey based spirit

A look into batch to batch variability using gas chromatography and mass spectrometer
Thank you

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