NYU STERN
Center for Sustainable Business

Anheuser-Busch

The Business Case for Sustainable Beer: Working with Growers to Adopt Nutrient Management Strategies

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Introduction

Anheuser-Busch is the nation's leading brewing company, best known for its portfolio of brands which include America's most loved beer and beyond beer brands including Michelob ULTRA, Cutwater Spirits, Stella Artois, Budweiser, and Bud Light. Their mission brings sustainability to the forefront as it emphasizes moving their industry forward and making a meaningful impact in their communities and the world. The company has ambitious sustainability goals for 2025 which include targets in smart agriculture, water stewardship, carbon emissions reductions, and more across their value chain. The company agreed to participate in the HSBC-funded Food & Agriculture project to use NYU Stern CSB's Return on Sustainability Investment (ROSI™) methodology to measure the benefits of working with barley growers to accelerate the adoption of nutrient management practices.

Anheuser-Busch's Sustainability Programs

The company has a long-standing history of working collaboratively with growers, providing access to quality seeds and inputs, and deploying skilled agronomists to assist growers in the art of producing high quality barley that is suitable for the malting process. To meet this standard, barley is typically graded on moisture content (below 13.5%), protein content (acceptable levels are between 9 -13.5%), plumpness, and level of mycotoxins. This project focuses specifically on how nutrient management practices can improve the reliability of farmers producing quality barley for malting purposes. Nutrient management practices directly impact protein levels - the higher the nitrogen applied, the higher the protein content. The right amount of nitrogen applied depends on factors including existing soil nutrient content and weather conditions. However, following the 4Rs (best practices for nutrient management) can help growers determine an efficient amount of nitrogen to apply to achieve the targeted protein levels, ideal for malt production.

4Rs of Nutrient Management

Right Source - Matches fertilizer type to crop needs

Right Rate - Matches amount of fertilizer to crop needs

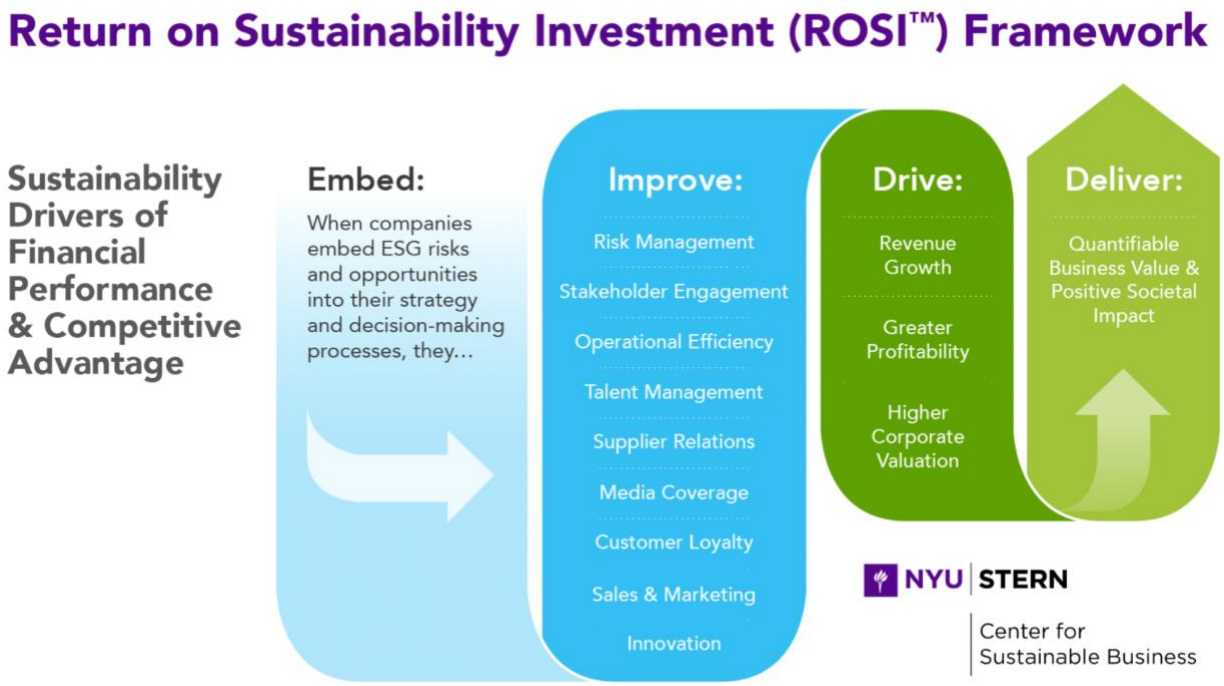
Right Time - Makes nutrients available when crops need them

Right Place -Keep nutrients where crops can use them

In order to help growers manage these elements, the company deploys agronomists to work with them in the field to provide support and expertise. They also help growers input their farm-level data into Smart Barley, a tool launched in 2013 for growers to benchmark their practices and performance. The tool captures data on field characteristics (acres, soil type and grade), field practices (i.e., date seeds are sown, type of seed variety used, seeding rate, fertilizer type, rate, and application date, technology used, yield goal, etc.) along with harvest results (yields, moisture, and protein content, etc.). Part of this limited scope project included an analysis of 3 years of this data to assess the alignment of the nutrient management practices recorded in this tool and protein outcomes and associated premiums and yields.

ROSI Benefits

The ROSI methodology was used to assess the benefits of working with Anheuser-Busch's North American Barley growers to adopt nutrient management practices on-farm. The project assumes establishing a program to do so would include tracking best practices adoption and measuring environmental outcomes[1]. Select practices lead to lower emissions within the supply chain and can be used to meet Scope 3 target reductions. Additionally, the initiative will enable the company to link sustainable messaging (for instance, carbon avoided or sustainable sourcing) to a new product offering.



[1] Environmental outcomes can include improved water quality as well as lower carbon emissions. The project focus was on carbon impacts - water quality was out of scope.

For this analysis, NYU Stern CSB identified the following benefits:

1. Reducing high protein levels avoids longer processing times *in the malthouses* resulting in lower processing costs and higher amounts of malt extract achieved (less need to procure 3rd party malt extract)
2. Reducing high protein levels avoids additional processing costs and inputs such as water, energy, chemicals, and yeast *in the brewing process*
3. Adopting 4R practices (right rate, source, placement, & timing) and using a nitrogen inhibitor reduces scope 3 carbon emissions
4. Investing in nutrient management practices at the farm-level to support a sustainably sourced product line, reduces the risk of losing large format clients focused on sustainability within their supply chains
5. Introducing a sustainably marketed product line can increase volumes sold and potentially increase prices
6. Research on nutrient management helps develop enhanced seed varieties which may require less fertilizer inputs and/or other costs
7. Reduces the impact of catastrophic weather events given more resilient crop attributes
8. Improves grower engagement and retention due to resources and support provided by the company

Due to the limited scope of the project, only the top 5 benefits were monetized.

Methodology: Applying ROSI

Benefit 1: Malting Operating Efficiency

Engaging with growers to adopt best nutrient management practices minimizes the risk of grain having either too high or too low protein and increases the likelihood of homogeneous grain quality year over year.

Reducing the amount of grain with high protein levels contributes to more homogeneous malt batches. Thus, achieving efficiencies in the malt house related to water and energy consumption. As well as, reducing processing time associated with malt batches and improving overall output capabilities of the malt house. Additionally, it can be noted that the more homogeneous a malt batch is, has a direct correlation to ~~the higher~~ the malt extract percentage (extract = malted grain / raw grain). This can lead to a reduced need to procure 3rd party malt to meet volume amounts required for brewing.

Methodology

Procurement data from three major BUD malt houses was used to compare the historical malt extract ratios to best-case malt extract ratio of 83.3% (100 lbs of extract

for 120 lbs. of barley). The metric compares processing hours per MT for both actual and optimal amounts of malt produced. The average historical variance in hours per MT is multiplied by the average malt produced to quantify the potential amount of avoided energy costs. The amounts are adjusted for the amount of barley impacted by improved nutrient management and by an attribution factor to reflect the estimated impact of nitrogen on protein levels (versus other factors, such as weather events) on processing times.

The average shortfall in malt extract is calculated by subtracting the optimal extraction amount for the actual extraction amount. It is then multiplied by the incremental cost of purchasing third party malt to quantify the potential amount of avoided malt costs. Adjustments are applied for the amount of barley impacted by improved nutrient management and finally an attribution factor is applied to reflect the actual impact of nitrogen on protein (versus other factors).

The estimated 10-year NPV for this malting operating efficiency metric amounts to ~$9.7 thousand.

Benefit 2: Brewing Operating Efficiency

By supporting grower's adoption of nutrient management practices, Anheuser-Busch can reduce costs associated with having to manage lower or higher than average protein content in the brewing operations. Additional processing costs are associated with increased inputs such as water, energy, and chemicals. The metric is based on the company estimates that:

- A 1.5% deviation from average protein content results in a $2.5M additional processing costs, and
- This has occurred in roughly 1 out of every 5 years (20% of the time) however, a 25% probability of the event occurring was used to reflect the impact of climate change

This metric was developed with inputs from the company.

Methodology

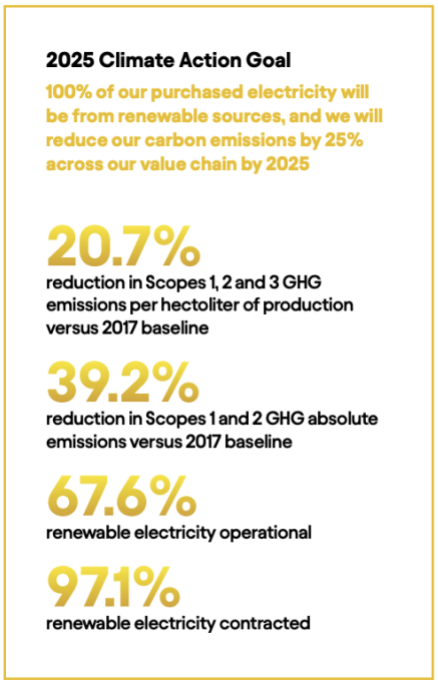
Calculate the amount of processing cost avoidance by multiplying the estimated probability of the event occurring by the additional processing costs due to lower or higher than average protein content.

The estimated 10-year NPV for this malting operating efficiency metric amounts to ~$3.2 million.

Benefit 3: Carbon Efficiency

By encouraging growers to adopt 4R practices (right rate, source, placement, & timing) and to use a nitrogen inhibitor, scope 3 carbon emissions in the supply chain can be avoided

Anheuser-Busch InBev's global goals are to reduce carbon emissions by 25% across its value chain by 2025 and it announced a global ambition to achieve net zero emissions across its value chain by 2040. With agriculture representing 14.3% of their value chain's emissions and barley as the largest emitter out of all the crops they source, identifying opportunities to reduce emissions on barley farms is crucial.



This metric values promoting the adoption of nutrient management practices as means to reduce emissions and as a hedge against the rise of carbon offset prices. Anheuser-Busch estimates carbon prices are likely to increase by 16.3% ($348 by 2040). The Cool Farm Tool was used to estimate carbon emissions for the business-as-usual case versus a scenario of lower emissions assuming targeted adoption of 4Rs combined with the use of a nitrogen inhibitor for the Eastern Idaho and Eastern Midwest regions. The Cool Farm tool allows users to input region-specific field conditions, seed type, input amounts, and others to estimate carbon emission impacts. The company consulted with regional teams to input accurate estimates.

Due to timing limitations, carbon benefits were sized using data from only 2 large regions and only 2 nutrient management practices were considered (4R's and use of a nitrogen inhibitor). Expanding the analysis to a larger group of growers and additional practices (use of low or organic fertilizer for instance) would result in greater benefits.

Methodology

Future carbon prices are calculated by multiplying the current carbon offset price by the expected carbon price increase. These prices are compared to the current cost of offsets to calculate the incremental carbon price. The next step is to calculate *the annual hectares impacted* by multiplying the area sown by the estimated adoption rate for the region and dividing it by the years to achieve. Next, estimate the total carbon avoided per year by multiplying the cumulative hectares impacted by the carbon avoided per acre ~~from~~. Finally, calculate the financial benefit of avoided carbon by multiplying the total carbon avoided by the incremental carbon price of carbon previously calculated.

The estimated 10-year NPV for this carbon efficiency metric amounts to ~$3.6 million.

Benefit 4: Avoided Sales Loss

By investing in nutrient management practices at the farm-level to support a sustainably-sourced product line, Anheuser-Busch reduces its risk of losing large format clients focused on sustainability within their supply chains

Improving sustainability within the supply chain results in risk management benefits. Consumer demand for sustainable products is rising[2] and large retailers with high sustainability goals are surveying their suppliers on their sustainability commitments and activities. Therefore, promoting sustainable practices on farms can reduce the risk of sales being lost to a more sustainable competitor or due to changing consumer trends.

This metric measures potential sales at risk by comparing the impact of a conservative .02% market share decline over several years (risk-adjusted market share) versus maintaining share of a large format client. More analysis on the likely vulnerability of sales to key customers is necessary to refine the reduced market share estimate.

Methodology

Forecast the sales growth for Anheuser-Busch North America by multiplying annual total sales by expected revenue growth. Then select a large format client focused on sustainability and forecast the expected reduction in market share and time period for share to decline. Calculate the business-as-usual scenario in which large format customer's market share of Anheuser-Busch sales remain constant. Calculate the risk-adjusted sales to this customer by multiplying the forecasted annual total sales by the risk-adjusted market. Then subtract the result from the business-as-usual case to estimate the avoided sales risk. Finally multiply the sales risk by the operating margin to calculate the operating income at risk (avoided loss).

The estimated 10-year NPV for this avoided sales loss metric amounts to ~$6 million.

Benefit 5: Sustainable Product Offering

A sustainably marketed product introduced into Anheuser-Busch's portfolio can be positioned as a premium product and drive growth in both price and volume.

NYU Stern's Sustainable Market Share Index research shows marketing a brand as sustainable can lead to higher growth and price premiums versus conventional brands. For the purposes of this model, trends experienced with an existing sustainable product offering were used as a proxy for performance of a sustainably-marketed

[2] NYU Stern's Sustainable Market Share Index shows that products marketed as sustainable grew 2.7x faster than products not marketed as sustainable and achieved a 6-YR CAGR of 7.3% vs. 2.8% for its conventional counterparts.

brand to a conventionally marketed brand. This metric provides a directional assessment of the value of a sustainably marketed product. More market research and concept testing would help define the messaging and validate the assumptions

Methodology

Price and Volume Growth Proxies

Using data from the experience of an earlier sustainable product launch the following data was gathered:

- Size of the new sustainable product relative to the existing product line
- Sustainable product price compared to existing product pricing
- Current estimates of revenue growth rates for both existing and new sustainable products

Price

Forecast the volumes of the sustainable brand by multiplying by the sustainable brand growth rate. Then multiply the volumes of the sustainable brand by the incremental price premium to calculate the incremental sales. Next, calculate the contribution margin on incremental sales by multiplying the incremental sales by the North America Normalized EBITDA margin (2021).

Volume

Calculate the annual volume growth differential by multiplying the volumes of the sustainable brand by the difference between the growth rates of the base product versus the sustainable product. Then calculate the sales gain or loss due to the differential volume growth by multiplying the cumulative volume growth differential by the average selling price of the base product. Lastly, calculate the contribution margin on this amount using the North America Normalized EBITDA margin (2021).

Calculate the total benefit by adding the contribution margin on incremental sales due to price and the contribution margin sales due to volume. Lastly, subtract any incremental discretionary marketing spend assumed to derive the net benefit of a new sustainable product offering.

The estimated 10-year NPV for this sustainably-marketed product offering metric amounts to ~$25.8 million.

Conclusion

Using ROSI™ to measure the value of an expanded program to encourage and track the adoption of nutrient management best practices, along with being able to message the regenerative agriculture benefits in a product offering, found benefits amounting to ~$40 million in 10-year NPV terms and an average annual operating income improvement of ~$7.5 million. While reasonable estimates of operating efficiencies were identified based on inputs provided by the regional procurement teams, additional benefits may be identified with more data tracking, such as costs related to water usage and administrative cost related to grower retention.

Given the company's ambitious targets, they can use the ROSI monetization developed as a tool for communicating the value of investing in nutrient management practices internally across business functions. The analysis showed significant operational efficiency and risk management cost savings and makes a compelling case for using nutrient management to reduce scope three carbon emissions. As the company aims to preserve and increase their market share, sustainability attributes may help retain large format customers and attract increasingly green conscious consumers.