

# Ethanol

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**WISCONSIN PERFORMER:** Badger State Ethanol has invested in extra instrumentation to monitor conditions in the product trials it hosts. Having consistent operations makes it easier to confirm changes from new products.

PHOTO: LBDS

## Testing Research Innovation in Real-Time Plant Environments

Solid partnerships between vendor and producer secures critical evaluation and streamlines new technology introduction.

By Craig Pilgrim

Staying ahead of the curve requires new and step-changing technology introduction and innovation. Suppliers of fermentation products must ensure these new product offerings are the highest quality and perform as advertised. Thus, we need collaborative partnerships with production facilities to be able to test in real time the innovations that

come from our research. For the most part, products that perform well in the laboratory transfer well to the real world. Not every plant runs in exactly the same way, however, so in-plant testing is key to learning how the product is going to perform in an industrial setting.

Lallemand Biofuels & Distilled Spirits has worked closely with Badger State Ethanol the past years to run trials. Badger was a

natural choice as a collaborative partner because it is a consistently performing plant. We know that for any variable we change, we will be able to see its effects quickly and not get caught up in the “noise” of the plant. The development of technology is expensive for the supplier and running a trial can be risky. Both sides need to be in agreement and work as closely as possible to ensure that neither side is hurt financially.

## TRIALS

## Producer View

We asked Erik Huschitt, vice president of operations and general manager at Badger State, to share how his team views the challenge of keeping up with technology. He wrote:

“While BSE prides itself on trying to keep up with all the latest tools in the tool chest, it is a never-ending and very measured process. Anyone who has been in the ethanol industry long enough realizes that there is always another challenge waiting around each corner. In the competitive and volatile commodities world, plants must continue to maximize the value of outputs while managing the value of the inputs, which doesn’t always mean minimizing input costs. As the adage says, you usually get what you pay for. Three areas serve as the foundation of our analysis of new technologies: choosing partners wisely, developing strong trial protocols, and taking a holistic approach to the evaluation to include intrinsic values.

“While it may sound cliché, relationships matter and having a partner that understands your business and is always looking out for your best interests by finding win-win solutions has been a key to BSE’s successes. BSE has been blessed with some of the best partners in the industry who understand that each new technology will have to stand on its own merits. It is not a failure of the relationship when a product doesn’t pass a trial with flying colors but, rather, a testimony to the strength of the partnership in that together we are evaluating and communicating strengths and weaknesses. BSE’s partners also understand that markets change and thus the end goals will need to change along with them. The value of a yield enhancement can be very different in a \$1.25 ethanol environment compared to a \$1.50 one. BSE’s partners understand the need for flexibility when offering product

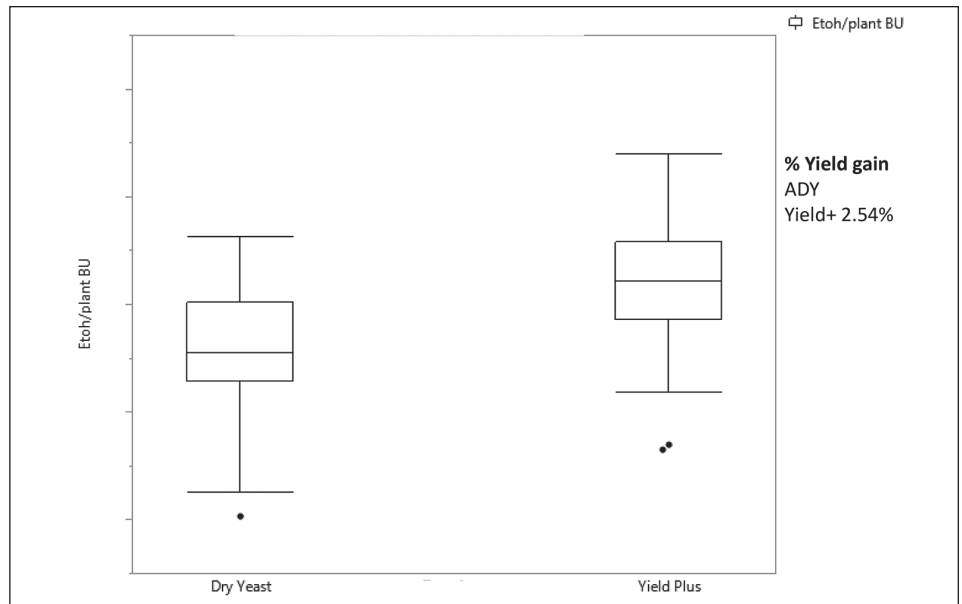


FIGURE 1: Yield increase over baseline.

SOURCE: LBDS

lines. The focus must be on financial viability.

“There are an incredible number of variables that affect every fermenter and a change to any one usually cascades, impacting countless others. It is this dynamic that requires a very strong testing protocol. Understanding normal operations and variability before a single variable is changed is a must when determining the value of a product in a trial. One must be able to account for changes in corn test weights and moistures, backset rates, and ambient temperature and humidity levels. BSE has made significant investments in instrumentation throughout the plant to measure and track countless variables. Establishing baselines and understanding the impacts of any changes, good or bad, lead to the successful evaluation of trials.

“BSE has a unique process in the co-product mix that requires close monitoring for quality assurance which means we

can see clearly what a reduction of glycerol means on a protein specification in numerous streams. And while a gain may be realized in ethanol yield, a corresponding decrease in oil and protein also need to be quantified and evaluated in the current market environment. Additionally, the value contributed by any technology changes as the market conditions change so this evaluation must be ongoing.

“Understanding intrinsic values can be much more difficult. Some examples would be cleaner streams that provide better separation, products that lead to less fouling and reduce the limp into shutdown or, better yet, lead to significant savings in cleaning costs. While the value associated with the intrinsic dynamics may not be the primary focus of a product evaluation, it can have a major impact on the whole value proposition.” —Erik Huschitt

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## TRIALS

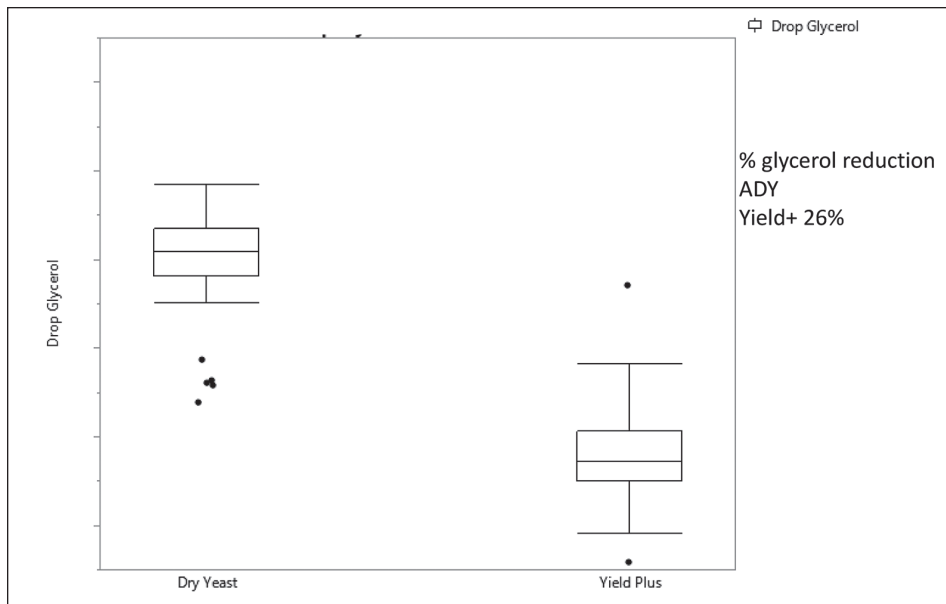


FIGURE 2: Glycerol reduction over baseline.

SOURCE: LBDS

## Trial Design

Erik summarizes well the concerns and goals of all producers considering hosting a product trial. Before the team at Lallemand Biofuels & Distilled Spirits launches a trial at any partnering ethanol facility, we meet with plant personnel and explain the technology, how it works, what we did to get the technology in place, its features and benefits, if there are any regulatory issues or concerns, how we produce the technology, and what can they expect from the product. We work together to come up with a game plan on plant trial implementation, which gets signed off by us as supplier and the producer to ensure that both sides are getting what is needed out of the testing.

When TransForm YieldPlus was in the prelaunch stage, we worked with Badger State to evaluate it at commercial scale. The initial discussion and vetting of possible process implications with BSE staff

was followed by a dialogue to establish the protocol design, getting as much input as possible on the information required to evaluate plant performance pre- and post-trial. Successful implementation of this trial protocol is the biggest part of any product evaluation. The protocol includes a checklist of parameters to establish the baselines for propagation size, mash-to-water ratio, propagation hours and temperature, among other measurements.

During a six-week period, the Lallemand team monitors the trial. The first step is to establish product efficacy followed by process optimization. Once consistency is achieved, the team continues monitoring during weeks five and six to validate the successful integration in the plant process. Constant monitoring is important—you cannot just say to a customer, “Try this, and let us know how it works.” A true partner takes ownership of the trial as well.

General expectations finalized with the plant management and personnel before the TransForm YieldPlus yeast trial began at Badger State included:

- A reduction in glucoamylase use compared with standard dry or liquid yeast.
- A 1.5 to 3 percent increase in ethanol yield over standard dry or liquid yeast.
- A lowering of glycerol fermentation byproducts at the end of fermentation.

The final written report showed the Badger State yeast trial met expectations. The data analysis (summarized in the accompanying figures) showed an increased average daily ethanol yield with TransForm-Plus of 2.54 percent when compared to the standard dry yeast and an average glycerol reduction of 26 percent compared with the baseline.

Implementing technology in one's ethanol plant can be a scary thing. In order to minimize the risks for both sides, an integrated partnership between producer and supplier is crucial to achieve that success. The more that both sides communicate, the less risk that a bad trial will occur.

We need to ensure that technology and innovation continue to occur to move the industry forward. A partnership like that between Lallemand Biofuels & Distilled Spirits and Badger State Ethanol is but one example of how suppliers and production facilities can work together to achieve a successful trial and bring that game-changing innovation to the forefront of the industry.

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