

**Department of Agriculture, Trade and Consumer Protection**  
**Division of Agricultural Development**  
**Agricultural Development & Diversification Program (ADD)**  
**Grant Project Final Report**  
Contract Number: 19015

Grant Project Title: BioLactose Conversion  
Amount of Funding Awarded: \$29,000  
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The activities for this period were to test the probiotic yeast on the rotary vacuum drum press with a filter aid and take the resulting product and test on a herd. Half the herd was fed with the probiotic and the half without, the control group. The results and data will be in the following paragraph.

1) Original intent of the grant:

Cheese whey disposal has long been a problem for the dairy industry. Technologies became available to split whey into whey protein concentrate and whey permeate. Unfortunately, a profitable process for utilizing the whey permeate residue has not made it to the industry floor. Most small companies still land spread their whey or whey permeate due to the large capital expenditure necessary to set up a drying facility or waste treatment plant. Until now, it has been practice to land spread excess permeate that can't be taken by drying facilities. However, the Department of Natural Resources is implementing stricter land spreading regulations and looking to ban all winter spreading posing a major problem for plants to dispose of the permeate in a feasible manner.

DuBay Ingredients has developed and demonstrated small-scale production of a highly profitable process for the bioconversion of whey permeate into high quality, highly profitable biomass and bioenergy products. Biolactose is the name given to the process by which cheese whey permeate is converted into bio-based products with water condensate as the final residue. The purpose of the Biolactose process will be to take excess permeate from plants and convert to value-added feedstock and renewable energies. The Biolactose process is an all around win/win situation for dairy plants, farmers, as well as the average consumer in the state from a standpoint of a renewable fuel source that will be available.

Cheese plants will be able to create a profit from cheese whey permeate instead of it just being an expensive cost center, therefore generating to the bottom line of the manufacturing plant. Dairy farmers will be getting a high quality low cost probiotic feed that will increase milk production while decreasing somatic cell counts, two items crucial to the success of our small dairy farms in Wisconsin.

The intention of the project is to confirm our small-plant trials and test the system in a larger commercial setting. We will take these results to feed mills, veterinarians, animal nutritionists and dairy farmers to show the benefits as a feed supplement over current products and the low cost high yields it can return.

This project is of significant importance not only for its protein value but its probiotic effects. Our intent is to prove that it will increase the ingestion rate in cattle, therefore increasing milk production while decreasing the somatic cell count thus a healthier cow. These items are crucial to the success of any dairy farmer.

## 2) Steps taken to reach goal:

DuBay purchased a small commercial-scale facility for the purpose of ethanol and yeast production from cheese whey permeate. The fermentation of permeate has been successful in that we have had complete fermentations on a repeated basis. The ethanol was produced as planned and marketed to local stations for blending in gasoline.

DuBay also set out to prove that the specific yeast used along with a specific filter aid would act as a probiotic supplemental for cattle when mixed with the cattle's rations. This would prove beneficial to the Wisconsin agricultural industry as a whole by providing an alternate source of protein and probiotic all in one at a competitive price to that of soybean meal.

The first step was to separate the yeast from the "beer" produced during fermentation process. We opted to go with a rotary drum press vs. the conventional yeast separators. The rotary proved to be less energy intensive and in the long run most beneficial for yeast survival.

The filter aid we used in the first trial was not FDA and USDA approved for use in cattle. We needed more research on other types of filters we could use that we approved by the FDA and USDA and yet met our criteria. We did find a material that in fact met both criteria, however at a slower rate; this problem was resolved with a larger surface area on the drum.

We conducted a brief test trial with family dairy farm and local feed mill nutritionist in the eastern Wisconsin area. The following are the results we obtained from test trial on the herd:

### **Preliminary Data**

Beginning of test:	March 1, 2005
End of Test:	March 30, 2005
Duration:	30 days
Breed:	Holstein

### **Quantity of milk produced in pounds (avg):**

On- March 1	1560.00
On- March 30	1700.40

### **Somatic Cell Counts (SCC)(avg):**

On- March 1	296,000
On- March 30	263,440

Protein (avg):

On- March 1	3.41
On- March 30	3.63

Ingestion intake(avg):

On- March 30 5.94# more feed

All this assuming the control group remained the same and was homogenous with the test group.

24 Holstein cows were given a normal ration provided by the farm nutritionist from the local feed mill. 12 remained on the normal ration (control group) and the other 12 were supplemented with a specific amount of BIO BLAST probiotic. The 12 cows given BIO BLAST ingested approx. 5.9# more feed a day than the control group, with an increase of 3.3# of dry matter. This is an important factor as it relates to the expansion of the cattle's rumen. The increased ingestion also led to an overall increase in milk production of 9% over the control group. Also noted was a significant increase in milk quality by a decrease in somatic cell count (SCC) of 11%

3) What we were able to accomplish:

From preliminary test results we are confident the system will give some cheese plants the ability to convert whey permeate into ethanol and valuable byproducts.

We were able to:

- a) effectively market a small amount of ethanol
- b) create an animal probiotic that we feel may hold considerable market potential
- c) started a joint venture with another company to expand the marketing potential of process byproducts
- d) begin negotiation with a Wisconsin cheesemaker to be the first commercial installation of the Biolactose Process in a cheese plant

4) Conclusions and future plans:

The goal that was set out in the first place was successfully achieved by the above results. We are going to working to market this product nationwide to correlate with the new ethanol plants that will be going up as well across the nation. This will provide a viable and beneficial outlet for our byproduct while also providing the dairy industry with benefits as well, a win/win situation. This test will be the foundation for the larger more comprehensive test that is required by the USDA and FDA for approval.

We will need USDA and FDA approval to market for use on a commercial basis. We are in the process of doing this and hopes are to have it complete within a year.

At that time, the agricultural industry can use these results and forthcoming results to make an economic decision to use BIO BLAST to impact and increase the profits of the farm.