# PROFITABILITY OF YEAST CULTURE IN TODAY'S ENVIRONMENT

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The effects of yeast culture on dairy productivity have been known for many years. It has only been within the last 50 years that a more focused, scientific approach has been taken to measure the response under controlled conditions. The data has allowed us to make more accurate predictions as to the expected change in performance under different environmental and nutritional conditions.

There continues to exist in the industry a misunderstanding about the product group called "yeast culture." True yeast culture is produced from controlled yeast fermentation under strict anaerobic conditions. Yeast culture products are composed of an array of organic compounds produced by yeast during the fermentation (anaerobic conditions), the residual fermentation media, and the spent yeast cells used to produce the metabolites. On the other hand, many people confuse "live yeast products" with "yeast culture." Active dried yeast, or ADY products, consist of dried yeast cells and a diluent. Most people believe that the yeast cells must be "alive" to affect the animal. Yeast culture is the focus of this paper.

Diamond V Mills has conducted more than 200 studies with yeast culture to understand its effect in animals. Effects range from increased milk production to improved health at calving. What causes the response seen while feeding yeast culture? The question is best answered by looking first at the changes in rumen fermentation when yeast culture is fed to dairy cows.

Studies show that yeast culture increases certain bacteria in rumen fluid. In the 1980s, research first showed that the numbers of total bacteria were increased when feeding yeast culture (Table 1). *Selenomonas* and *Megasphaera* have been shown to increase in the presence of yeast culture (Table 2). These lactate utilizers are important for the production of propionate, one of the principle energy sources for ruminants, and contribute to potential lower lactate concentrations in the rumen.

Increased rumen bacteria may or may not result in increased VFA production. Further research showed that propionate, acetate, and total VFA production are increased with yeast culture. While both propionate and acetate are increased, propionate is increased to a greater extent.

Increasing and supporting beneficial bacterial populations in the rumen appears to improve diet digestibility, promote dry mater intake (DMI), and ultimately influence net energy provided by the diet. Many factors determine how the cow will use the additional energy. Increased milk production and improved body condition have been measured in research trials.

The type and extent of the response is dependent on the days in milk (DIM). The majority of our research has focused on the Transition and Early Lactation cow. Around 80% of the controlled studies have shown a positive response in milk production. However, there can be a large amount of variation in the response (Table 3). A summary of 9 published studies showed that feeding 2 oz of yeast culture 14 days before calving and through 134 days post-fresh increased 3.5% FCM by 4.4 pounds per cow per day (Table 4). DMI was also increased compared to controls for the first 94 DIM by around 2 pounds a day (Table 5) or an estimated 1.5 pounds for 134 days post-fresh. The limited amount of data (2 studies) on body weight change during the first several months post-fresh showed that yeast culture-fed cows lost an average of 0.6 pounds less body weight than controls (Table 6). We believe these effects are a result of improved microbial fermentation in the rumen.

The influence on mid to late lactation cows is less clear. When cows are unrestricted in DMI, it would seem unlikely that yeast culture would significantly increase DMI. Our hypothesis has been that yeast culture may improve the efficiency of feed to milk during this period of lactation. Preliminary results from a recently completed study showed a significant improvement ($P < 0.04$) in production efficiency with the use of 2 oz of yeast culture on mid-lactation cows compared to controls (1.49 and 1.38, respectively).

The data shows production increases when feeding yeast culture to cows. But does it pay? The answer to the question is dependent on many factors. On way to evaluate the costs and benefits is to use a Type I and Type II analysis program. The program is able to estimate the benefits of using or not using a product. One unique aspect of this approach is the use of the observed variation in determining the economic risk associated with a product. The information required:

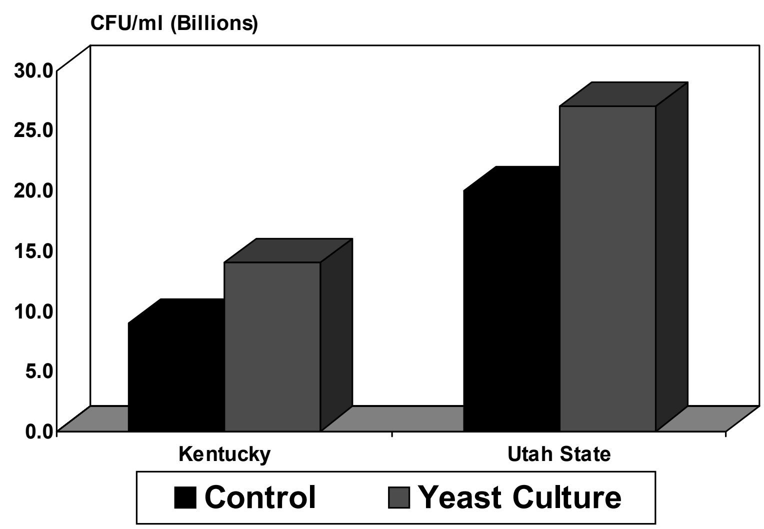
1. Milk Volume Change and Standard Deviation
2. Milk Price and Feed Price
3. Change in DMI
4. Price of Product

Using the yeast culture data from Tables 4 and 5, a milk price of $11 per hundredweight, feed price at $0.07 per pound, and a product cost of $0.05 per cow per day, the breakeven milk increase would be 0.5 pounds per day. There is a 90% chance that the product will perform greater than breakeven. If the product was fed and performed less than the breakeven production level it would cost $0.01 per cow per day. If the product was not fed, and the expected response would have occurred, the producer would have lost $0.34 a cow a day. The net return is predicted to be $0.33 per cow per day.

A more conventional method to estimate economic benefits is to compare total costs and returns. The difference between the two is the net benefit. The return on investment is determined by dividing the return by the cost of using the product. Using the data from Tables 4 and 5 shows a net return of $0.33 a cow a day with a ROI of 7.6/1.

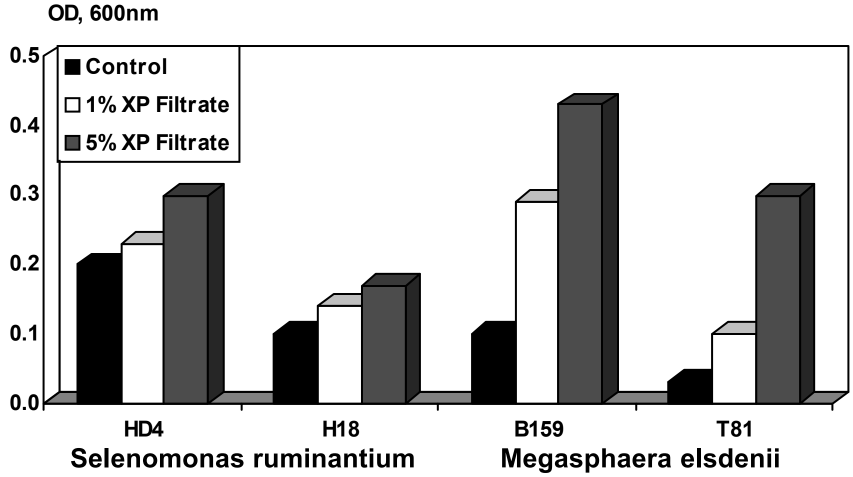
Yeast culture has been shown to affect rumen fermentation by increasing the numbers of bacteria and VFA production. University research has shown that cows tend to produce more milk when fed yeast culture compared to controls. The economic return is dependent on conditions found on the farm.

**Table 1.** Effect of yeast culture on total rumen bacteria.




Harrison *et al*. 1988. J. Dairy Sci. 71:2967-2975.
Wiedmeier *et al*. 1987. J. Dairy Sci. 70:2063-2068.

**Table 2.** The effect of yeast culture on lactate utilizers.




Calaway and Martin. 1997. University of Georgia.

**Table 3.** Response variation in early lactation cows fed yeast culture.

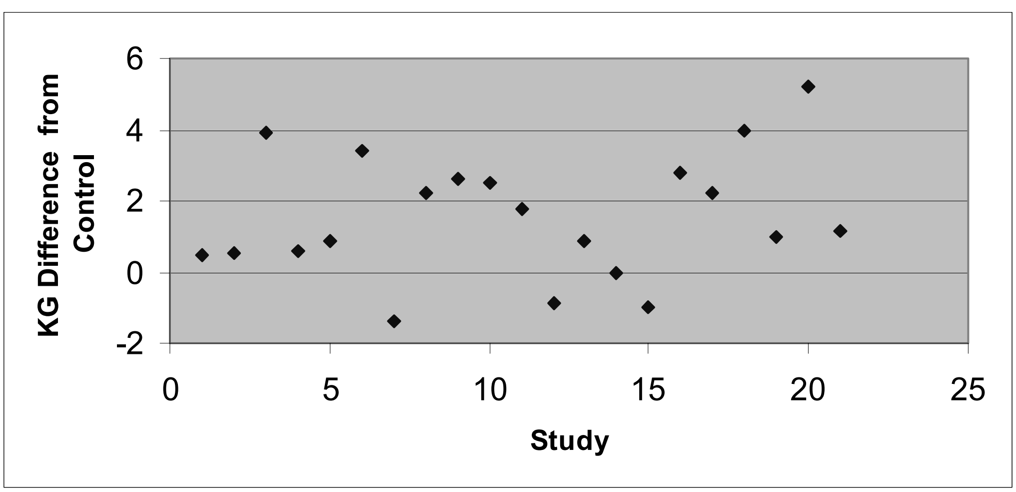


**Table 4.** Effect of yeast culture on 3.5% FCM through 134 days post-fresh.

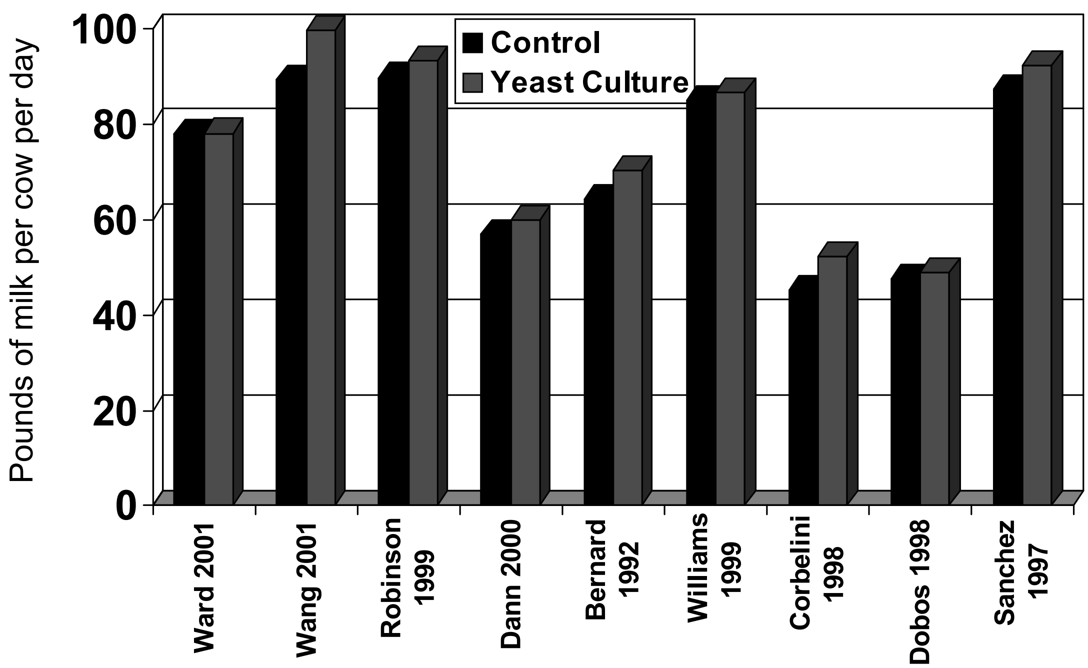



**Table 5.** Effect of yeast culture on DMI through 94 days post-fresh.

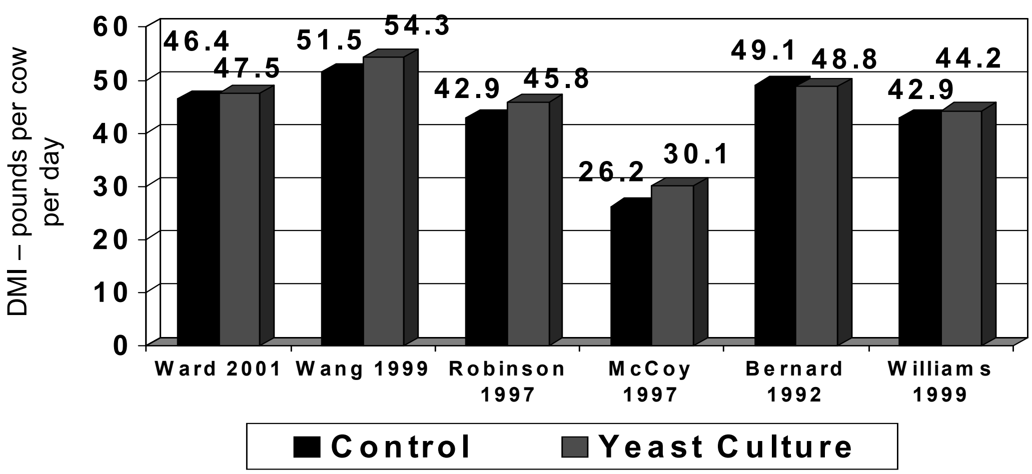


**Table 6.** Effect of yeast culture on body weight in early lactation.


*Robinson. 1996. Canadian Anim.
**McCoy, Drackley, Hutjens, Garrett, 1997, Univ. of Illinois