

Technical Case Study

October 2007

LACTROL[®]

LACTROL Antimicrobial allows customer to reduce Antimicrobial dosing by 37.5%.

Benefit

In a study conducted by Phibro's Ethanol Performance Group (EPG), LACTROL antimicrobial treatment was shown to allow an ethanol producer to reduce antimicrobial dosing by 37.5% per fermenter cycle resulting in a 16% cost reduction in overall antimicrobial expenditures.

This is a review of an actual customer situation which demonstrates the benefits of utilizing Phibro's antimicrobial product, LACTROL, in both the yeast propagator and fermenter. The plant being discussed is a batch process and has a nameplate capacity of 40 MM gal/yr of fuel ethanol. It is a dry mill process that recycles backset to the front of the plant.

Problem

This plant had been using an antimicrobial program that included a blended antibiotic (Penicillin G -75%, Virginiamycin -15%, and Streptomycin - 10%) that was added into each yeast propagator at 1 lb. per propagation cycle. LACTROL antimicrobial was added only to each fermenter at 1 lb. per fermenter.

This plant was not experiencing any problems with bacterial infections and Phibro determined it would be possible to maintain the current alcohol yields at a lower cost per dose by using only LACTROL antimicrobial within the plant. Another benefit to using an all LACTROL antimicrobial program was the customer's increased ability to market dried distillers' grains with solubles (DDGs). LACTROL is currently marketed under regulatory discretion from the U.S. FDA.

Plant Operation Data

- 40 MM gal/yr batch ethanol capacity
- pH at fermentation set was 5.8 and reduced to 4.6 at drop
- pH during yeast propagation was 6.0 at set and reduced to 4.5 at drop 7 hours later
- Yeast propagator working volume of 16.4K gallons (82% fill)
- Fermenter working volume of 555K gallons

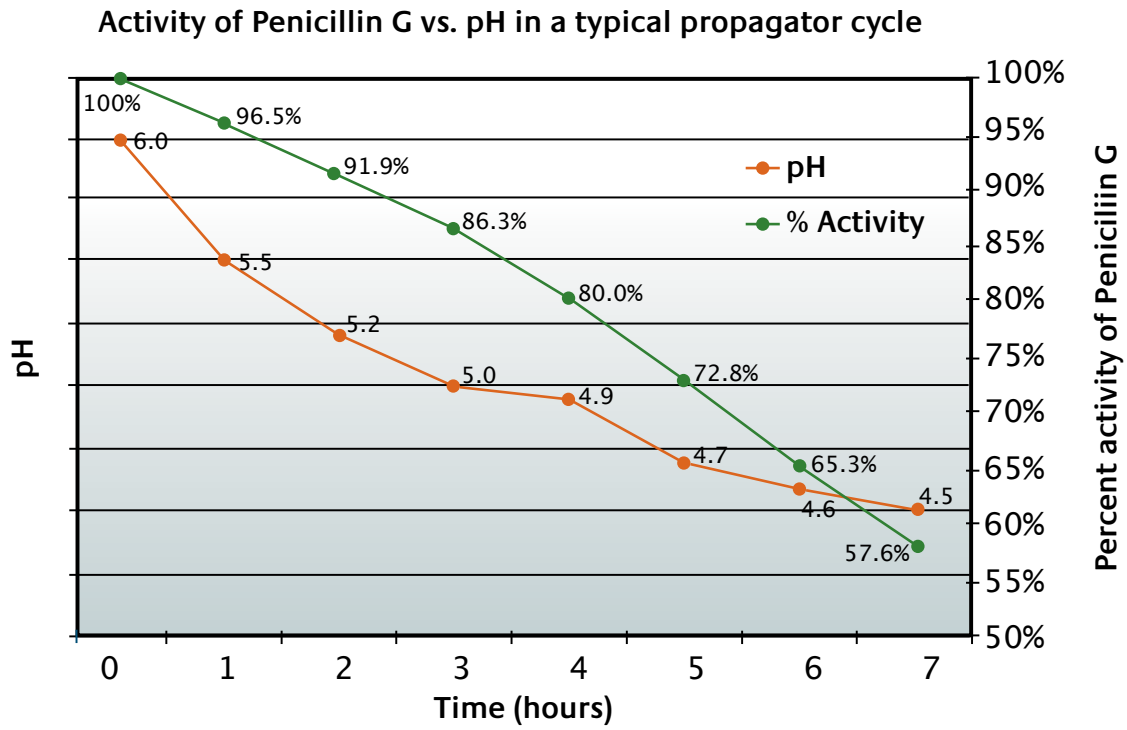
Solution

The customer had utilized an all LACTROL program for more than a year with no change in alcohol yield, but at a lower cost per fermenter cycle. Statistical analysis within 95% confidence limits was performed on the data. The analysis confirmed that there was no meaningful difference in plant performance and ethanol yield after eliminating the blended antibiotic in the propagator.

Because the competitive product has a substantial percentage of penicillin G, it was expected to have a much lower stability at the 4.5 - 6.0 pH environment in the yeast propagator. The graph shows the dramatic impact that pH and time have on the stability of Penicillin G in a plant's propagator. Streptomycin has even less stability than Penicillin G at lower pH. Examining the pH stability for Penicillin G thus provides a reasonable approximation of antimicrobial activity for this product.

Since LACTROL is less impacted by lower pH than Penicillin G, a much lower dose of LACTROL could be applied while still maintaining effective antimicrobial control. The degradation of Penicillin G is further exacerbated in the fermenter since the typical fermentation cycle time is 48 hours.

GRAPH 1



Conclusions

Utilizing an all LACTROL antimicrobial program offers the following benefits:

- Lower antimicrobial costs
- Potential for improved marketability of DDGs co-products



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