



INTERNATIONAL STOCK FOOD

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TO ALL ISF REPRESENTATIVES

RE: YEAST CULTURE versus Live Yeast

When the new ISF product line was being developed last year, ISF chose to use **all yeast culture in** our line of products instead of using live yeast products. Our concern was the Stability of live yeast products under different storage management conditions.

Kansas State University recently completed some interesting research showing that heat is very detrimental to live yeast. Here is a summary of their research findings: (Source: Miranda, J. and B.J. Bradford. 2008. Viability of commercial active dry yeast products decreases with high-temperature storage. J. Dairy Sci. 91 (Suppl. 1):262 (Abstr.)). (Article from FEEDstuffs magazine attached)

LIVE YEAST PRODUCTS:

- **Regardless of the live yeast product**, the counts were almost completely **depleted when heated**
- If using live yeast products they should be stored in a cool dry location, if possible in a refrigerated location.
- **Storing in commodity sheds** where temperature fluctuates as outside weather changes **is not a good option**

YEAST CULTURE PRODUCTS:

- Yeast culture is a fermented product designed to provide nutritional metabolites.
- Due to **yeast cultures** being fermented, they **are unaffected** when stored **at hot or cold temperatures** and maintain their viability

THE BOTTOM LINE

ISF has made the right choice for our clients. That is why Yeastpro sales continue to rise. **Research has shown that bacterial silage inoculants products have the same problem.**

We know Silo Guard II does not have these issues. The only issue is **DO NOT FREEZE Silo Guard II Liquid.**

KSU studies variability, viability of yeast

Formulating dairy rations with yeast products has multiple benefits to cow health, but harnessing these benefits may require optimal storage conditions.

By **BILL SANCHEZ***

RESearchers from Kansas State University (KSU) may have unraveled some of the reasons for variable results from feeding active dried yeast (ADY) products.

A recent trial by Miranda and Bradford (2008) found that variability in the colony-forming unit (CFU) counts and the viability of the yeast are possible causes.

When ADY is stored on a dairy prior to feedout, it's often in a commodity shed or feed barn that experiences temperature fluctuations throughout the year. As temperatures rise during summer months, the effect on yeast cell viability is unknown.

This study was conducted to investigate the consistency of commercially available live yeast products and to examine how they are affected by storage at elevated temperatures.

Study design

Six commercial live yeast products were used in this study:

- (1) Company A blended ADY-1;
- (2) Company A blended ADY-2;
- (3) Company B ADY;
- (4) Company C ADY;
- (5) Company D ADY, and
- (6) Company E blended ADY.

*Dr. Bill Sanchez is director of technical services, western U.S., for Diamond V.

Three samples of each product were obtained from two distributors in their original containers. Repeat purchases for products from both of those locations took place at least three months apart to represent different batches of product. Products were acquired either in the spring (March-April) or summer (July-August).

Once samples were obtained from the distributor, they were stored at 4°C (39.2°F) until analyzed. The Table shows the initial cell counts for products used in the study.

After the initial analysis for yeast viability, samples were placed in an incubator for storage at 40°C (104°F). Samples were analyzed for yeast viability after one, two and three months of high-temperature storage.

Yeast cell enumeration was conducted using the 997.02 method of the Association of Official Agricultural Chemists, with minor modifications to enhance the hydration of ADY. The modifications included dilution in 100 mL of 0.31 millimolar phosphate buffer and homogenization for five minutes with a magnetic stirrer. Appropriate serial dilutions were inoculated onto Petrifilm plates.

Plates were then incubated at 35°C (77°F) for five days before counting.

Study results

The researchers found that initial CFUs were highly variable and varied as much as 4,000-fold. Also, regardless of product,

cell viability was significantly decreased when exposed to high temperatures. Yeast cell numbers decreased an average of 90% with each month of storage at 40°C (104°F).

Implications

Because yeast viability was almost completely degraded by the end of the third month, quality control procedures in sampling and storing yeast products are critical.

Here are general recommendations when using yeast in the diet:

- **Maintain product integrity with superior management.** This study shows that regardless of product, manufacturer or company, all ADY products are highly variable in CFU counts. These counts were almost completely depleted when heated.

On the farm, manage ADY products by storing them in a cool, dry location. Rather than being stored in open commodity sheds that may fluctuate in temperature as the outside weather changes, rely on relatively cool areas to maintain higher cell viability.

If possible, store in a refrigerated location to maintain the highest viability.

- **Identify possible replacements.** There are other ration alternatives to ADY. Yeast culture products, for example, do not consist solely of yeast cells or yeast biomass.

Instead, yeast culture is a fermented yeast product designed to provide nutritional metabolites. To create these products, a culture media is inoculated with live yeast cells, it is allowed to ferment under a specific set of conditions and then the entire fermented media is dried. The end product contains both residual live yeast cells used in the fermentation and the metabolic byproducts the yeast produced (metabolites).

Initial viability of commercial yeast products

Product	1	2	3	4	5	6
CFU guarantee, CFU/g	5.00 x 10 ⁹	8.82 x 10 ⁸	5.00 x 10 ⁹	2.00 x 10 ⁸	1.50 x 10 ¹⁰	2.21 x 10 ⁹
Viability, CFU/g*	6.04 x 10 ⁸	5.76 x 10 ⁸	3.97 x 10 ⁹	4.26 x 10 ⁷	1.21 x 10 ¹²	2.71 x 10 ⁹
% of guarantee	12	65	79	21	8,052	123
95% confidence interval, CFU/g	2.61 x 10 ⁵ - 1.40 x 10 ¹²	2.65 x 10 ⁵ - 1.25 x 10 ¹²	1.02 x 10 ⁵ - 1.55 x 10 ¹⁴	1.35 x 10 ³ - 1.43 x 10 ¹²	2.88 x 10 ⁹ - 5.06 x 10 ¹⁴	7.15 x 10 ⁸ - 1.03 x 10 ¹⁰

Note: Means and 95% confidence intervals of the means were back-transformed after distribution analysis.

*Mean of three different samples.

Because yeast cultures are fermented, they are unaffected when stored at hot or cold temperatures and maintain their viability.

• **Know your supplier and your products.** As the study reported, the length of storage time and the temperature at distribution were unknown. If these products are stored in a warm building, the product may lose viability before it even reaches the farm.

Work closely with suppliers to ensure that products are of the highest quality and are stored in optimal conditions.

Formulating rations with yeast products has multiple added benefits to cow health, but harnessing these benefits may require additional management on the farm and throughout the distribution chain. As a nutritionist, work with local mills and producers to learn more about how feed is stored to determine its

potential effectiveness once it reaches the cow.

Reference

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Cow samples were obtained from the distribution they were stored at 4°C (40°F) until analyzed. The table shows the initial cell counts for products used in the study.

After the initial analysis for yeast viability, samples were placed in an incubator for 24 hours at 40°C (104°F). Samples were analyzed for yeast viability after one, two and three months at high-temperature storage.

Yeast cell enumeration was conducted using the 58102 method of the Association of Official Agricultural Chemists with minor modifications. To enhance the detection of ADY, the modification included a dilution in 10% methanol solution for 10 minutes and homogenization for 10 minutes with a magnetic stirrer. Approximately 100 µl of the mixture were inoculated onto Petrifilm plates.

Plates were then incubated at 35°C (95°F) for five days before counting.

Study results

The researchers found that initial CFUs were highly variable and varied as much as 1,000-fold. Also, regardless of product

ESPERANZA from Kansas State University (KSU) may have a universal sense of the reasons for variable results from feeding active dried yeast (ADY) products.

A recent trial by Miranda and Bradford (2008) found that variability in the colony-forming unit (CFU) counts and the viability of the yeast are possible causes. When ADY is stored on a dairy prior to feeding, it's often in a commodity shed or feed barn that experiences temperature fluctuations throughout the year. As temperatures rise during summer months, the effect on yeast cell viability is unknown.

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- (3) Company B ADY;
- (4) Company C ADY;
- (5) Company D ADY; and
- (6) Company E blended ADY.

Product	1	2	3	4	5	6
Company A blended ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸
Company A blended ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸
Company B ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸
Company C ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸
Company D ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸
Company E blended ADY	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸	2.0 x 10 ⁸



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