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### Dairy Field Studies

#### One-Year Matrix 10X Performance Review – Osterkamp Dairy

- Osterkamp Dairy, Hereford, Texas; August 2017 – August 2018
- Matrix 10X was fed to 3,800 Holstein cows at 3g/hd/d and replaced both Diamond-V® XP Yeast and Nova-Cell®
- Ration consisted of corn silage, wheat silage, WCS, canola meal, CG feed, GR corn, SF corn, minerals, Megalac, buffer, Rumensin, One Trak and Matrix 10X
- At an average daily cost of 15 cents per head and a milk price of \$15 per cwt, addition of Matrix 10X resulted in a **ROI of a 9:1 based on increased milk yield alone**
- When taking into account the replacement of the other additives with Matrix 10X, the resulting **ROI is over 27:1**

#### *After 1 Year on Matrix, the results were as follows:*

PARAMETER	AUG '17	AUG '18	NET CHANGE	% CHANGE
<i>Herd FCM, lbs</i>	79.0	88.1	<b>+9.1</b>	<b>+11.5</b>
<i>Stnd 150d FCM, lbs</i>	81.4	93.1	<b>+11.7</b>	<b>+14.4</b>
<i>% Milkfat</i>	3.28	3.37	<b>+0.09</b>	<b>+2.7</b>
<i>% Protein</i>	2.97	3.19	<b>+0.22</b>	<b>+7.4</b>
<i>Peak Milk Cows, lbs</i>	108.0	115.0	<b>+7.0</b>	<b>+6.5</b>
<i>Peak Milk 1<sup>st</sup> Calf, lbs</i>	84.0	94.0	<b>+10.0</b>	<b>+11.9</b>
<i>SCC, 1000</i>	216	159	<b>-57</b>	<b>-27.4</b>
<i>Daily DMI, lbs</i>	53	55	<b>+2</b>	<b>+3.8</b>
<i>Gross Effic, lbs FCM/lbs DMI</i>	1.49	1.6	<b>+0.11</b>	<b>+7.4</b>

## Matrix 150 Day Dairy Study

- Aukeman Dairy, Shafter, CA - 2017/2018
- Matrix was fed to 2,800 lactating Holsteins at 1oz/hd/d for 150 days
- Ration consisted of corn silage, alfalfa hay, wheat straw, WCS, canola meal, CG feed, rolled corn, distillers dried grains, wheat millrun, almond hulls, wet brewers grains, wet citrus pulp, vit/min pack, Rumensin, and Matrix
- Weather was typical for the Bakersfield, CA area throughout the trial
- At a cost of 15 cents per head daily and a milk price of \$14.5 per cwt, addition of Matrix resulted in a **ROI of 5.5 to 1 based on increased yield alone**

*After 150 days on Matrix, the results were as follows:*

PARAMETER	DAY 0	DAY 150	NET CHANGE	% CHANGE
<i>Herd FCM, lbs</i>	73.3	79.0	<b>+5.7</b>	<b>+7.8</b>
<i>Days in milk, DIM</i>	160	185	<b>+25</b>	<b>+15.6</b>
<i>Stnd 150d FCM, lbs</i>	75.0	86.5	<b>+11.5</b>	<b>+15.3</b>
<i>Milkfat, lbs</i>	2.81	2.88	<b>+0.07</b>	<b>+2.5</b>
<i>Protein, lbs</i>	2.53	2.60	<b>+0.07</b>	<b>+2.8</b>
<i>Peak milk cows, lbs</i>	91.0	101.0	<b>+10.0</b>	<b>+11.0</b>
<i>Peak milk 1<sup>st</sup> calf, lbs</i>	74.0	77.0	<b>+3.0</b>	<b>+4.1</b>
<i>SCC, 1000</i>	110	83	<b>-27</b>	<b>-24.5</b>

## Matrix 10X 120 Day Dairy Study

- Osterkamp Dairy, Hereford, Texas – Summer 2017
- Matrix 10X was fed to 2,800 Holstein cows at 3g/hd/d and replaced both Diamond-V® XP Yeast and Nova-Cell®
- Ration consisted of corn silage, wheat silage, WCS, canola meal, CG feed, GR corn, SF corn, minerals, Megalac, buffer, Rumensin, One Trak and Matrix 10X
- At an average daily cost of 15 cents per head and a milk price of \$15 per cwt, addition of Matrix 10X resulted in a **ROI of a 4:1 based on increased milk yield alone**
- When taking into account the replacement of the other additives with Matrix 10X, the resulting **ROI is over 8:1**
- Additional economic value was also derived from a downward trend in the incidence of abortions

***After 120 Days on Matrix, the results were as follows:***

PARAMETER	DAY 0	DAY 120	NET CHANGE	% CHANGE
<i>Herd FCM, lbs</i>	79.0	83.0	<b>+4.0</b>	<b>+5.1</b>
<i>Stnd 150d FCM, lbs</i>	81.4	85.6	<b>+4.2</b>	<b>+5.2</b>
<i>% Milkfat</i>	3.28	3.61	<b>+0.33</b>	<b>+10.0</b>
<i>% Protein</i>	2.97	3.19	<b>+0.22</b>	<b>+7.4</b>
<i>FCM 1<sup>st</sup> test cows, lbs</i>	94.0	100.0	<b>+6.0</b>	<b>+6.4</b>
<i>FCM 1<sup>st</sup> test 1<sup>st</sup> calf, lbs</i>	70.0	82.0	<b>+12.0</b>	<b>+17.1</b>
<i>SCC, 1000</i>	216	205	<b>-11</b>	<b>-5.1</b>
<i>Daily DMI, lbs</i>	53	55	<b>+2</b>	<b>+3.8</b>
<i>Gross Effic, lbs FCM/lbs DMI</i>	1.49	1.51	<b>+0.02</b>	<b>+1.3</b>

## **Matrix 30 Day Wisconsin Dairy Study**

- 63 head of high producing Holstein cows were fed 30 grams of Matrix for one month (April 13 – May 13)
- The on-farm study was administered and supervised by Mr. Vern Metcalf of Land O'Lakes Purina Feed
- Milk yield was monitored daily via Dairy Comp 305 dairy software
- Based on the cost of Matrix and the value of both milk and milkfat in the U.S. currently, the economic return of Matrix in this study equated to over a 4 to 1 return on investment

***After 30 days on Matrix, the results were as follows:***

<b>PARAMETER</b>	<b>PRE-MATRIX</b>	<b>POST-MATRIX</b>	<b>NET CHANGE</b>
<i>Milk Yield lbs All Cows</i>	83.6	86.9	<b>+3.3</b>
<i>Peak Milk lbs All Cows</i>	98.7	105.3	<b>+6.6</b>
<i>% Cows &gt;100 lbs Milk</i>	21.7	25.4	<b>+3.7</b>
<i>% Milk Fat All Cows</i>	4.05	4.14	<b>+.09</b>
<i>% Milk Protein All Cows</i>	3.20	3.18	<b>-.02</b>

## Matrix 6 Month Dairy Study

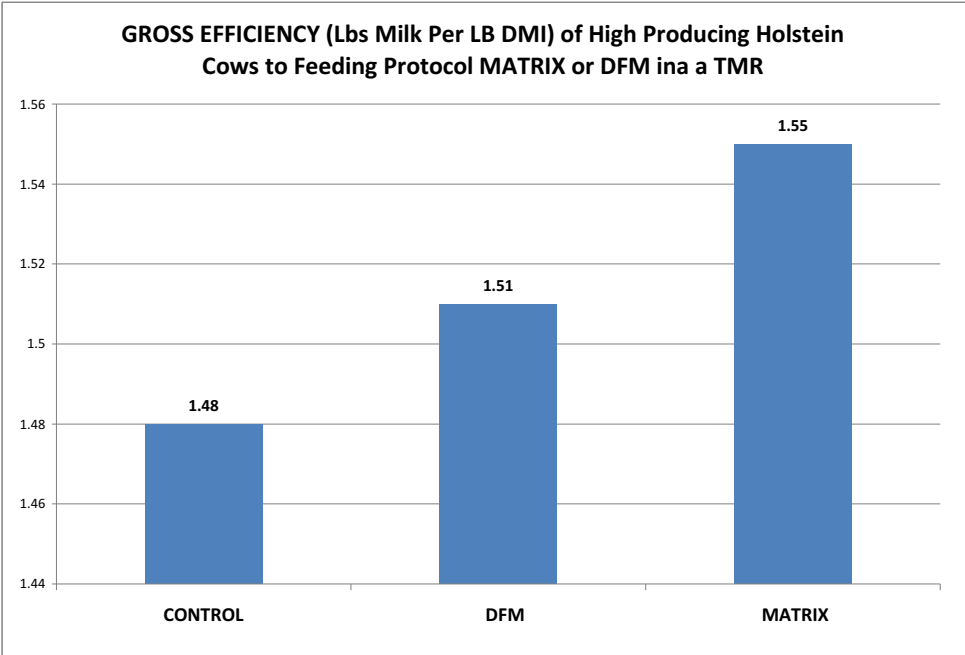
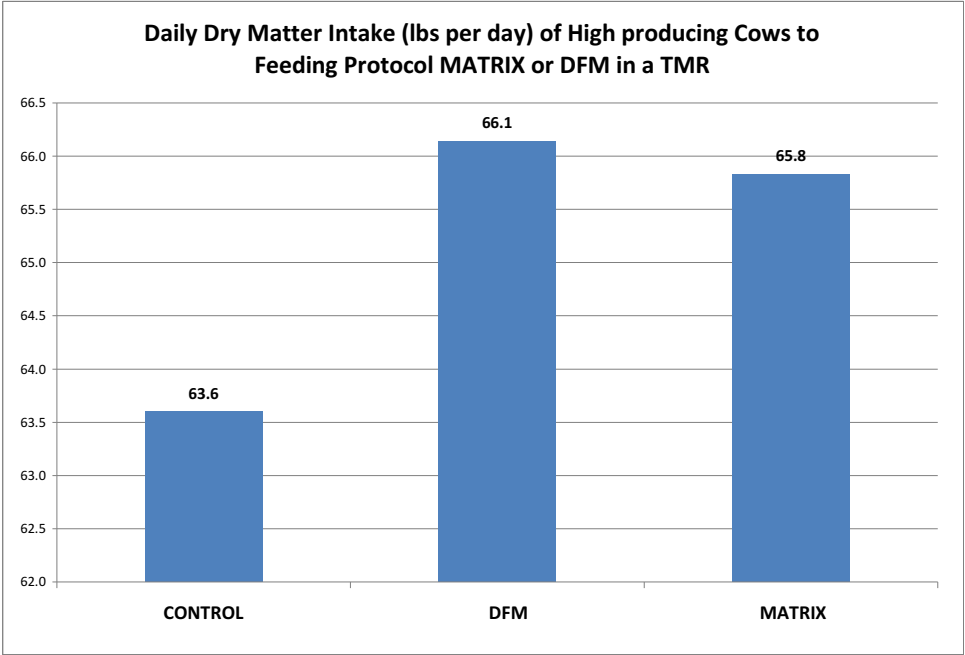
- Creekside Dairy, Escalon, CA
- 500 head of high producing Holstein cows were tested over 6mos
- Cows were housed in adjacent pens in freestall barns with 125 cows per pen
- All cows received the same diet for the duration of the trial
- Treatment groups received an additional 1oz of Matrix blended in a TMR daily
- Data was averaged across 17 weeks with a 60 day pre-test period used as a covariate to adjust for treatment response
- All milk yield data is reported as 150 day standardized milk yield to adjust for DIM

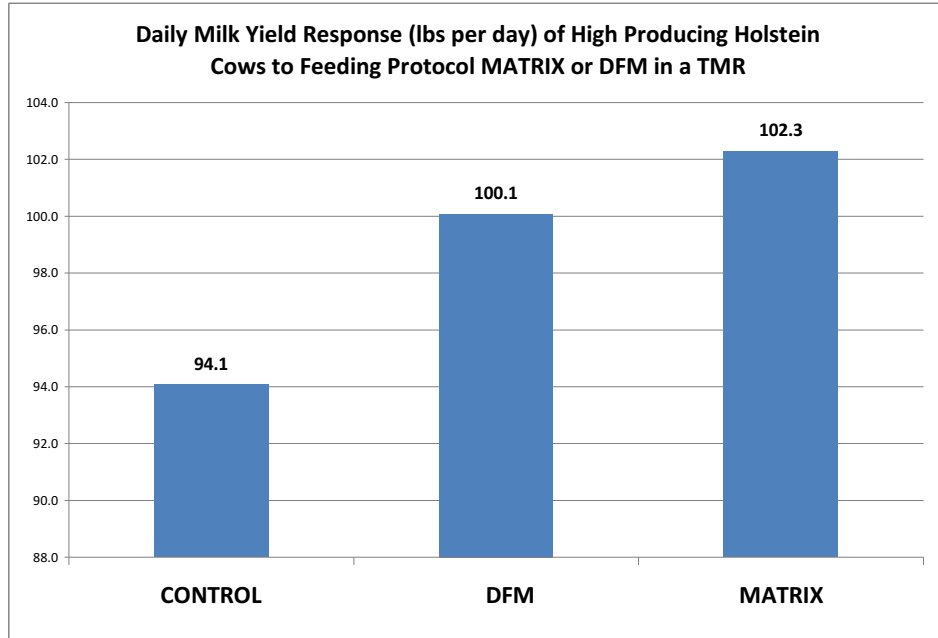
MEASUREMENT	MATRIX	CONTROL	NET CHANGE	% CHANGE
<i>Milk Yield, lbs</i>	102.3 <sup>a</sup>	94.1 <sup>b</sup>	<b>+ 8.2</b>	<b>+8.7</b>
<i>DMI, lbs</i>	65.8 <sup>c</sup>	63.6 <sup>d</sup>	<b>+ 2.2</b>	<b>+3.5</b>
<i>Gross Efficiency (M/DMI)</i>	1.55	1.48	<b>+ .07</b>	<b>+4.7</b>
	20 cents	-		
<i>ROI*</i>			<b>7.9 to 1</b>	

a,b - means with different superscripts are significantly different at P<.03

c,d - means with different superscripts are significantly different at P<.07

\*ROI based on \$25 cwt milk and feed cost of 12.5 cents per lb DM





MATRIX<sup>®</sup> is a registered trademark of Horner Industries, Inc.