Milk Fat Diagnostics & Understanding Milk Fat Output

Heather Dann, Rick Grant, & Dave Barbano
2018 GPS Dairy Leaders Forum
Milkfat drives milk checks

BY COREY GEIGER, MANAGING EDITOR
Federal Milk Order Component Prices

USDAs ESMIS, Oct 2018
Milk Fat and Protein Yield are Key Drivers of Profitability

- Return to assets (ROA) highest correlation with net milk income over feed costs (IOFC)/cow
  - Cost/cow/d; cost/cwt; IOFC/cwt

- Factors impacting IOFC
  - Milk price
  - Pounds of milk
  - Pound of components
  - Feed conversion
  - Feed costs

Howland and Karszes, 2015 Pro-Dairy
## Pounds of Fat and Protein: A Combination of Milk Yield and Fat and Protein Content

<table>
<thead>
<tr>
<th>Fat % + Protein %</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3.0</td>
<td>3.6</td>
<td>4.2</td>
<td>4.8</td>
<td>5.4</td>
<td>6.0</td>
<td>6.6</td>
</tr>
<tr>
<td>6.25</td>
<td>3.1</td>
<td>3.8</td>
<td>4.4</td>
<td>5.0</td>
<td>5.6</td>
<td>6.3</td>
<td>6.9</td>
</tr>
<tr>
<td>6.5</td>
<td>3.3</td>
<td>3.9</td>
<td>4.6</td>
<td>5.2</td>
<td>5.9</td>
<td>6.5</td>
<td>7.2</td>
</tr>
<tr>
<td>6.75</td>
<td>3.4</td>
<td>4.1</td>
<td>4.7</td>
<td>5.4</td>
<td>6.1</td>
<td>6.8</td>
<td>7.4</td>
</tr>
<tr>
<td>7</td>
<td>3.5</td>
<td>4.2</td>
<td>4.9</td>
<td>5.6</td>
<td>6.3</td>
<td>7.0</td>
<td>7.7</td>
</tr>
<tr>
<td>7.25</td>
<td>3.6</td>
<td>4.4</td>
<td>5.1</td>
<td>5.8</td>
<td>6.5</td>
<td>7.3</td>
<td>8.0</td>
</tr>
<tr>
<td>7.5</td>
<td>3.8</td>
<td>4.5</td>
<td>5.3</td>
<td>6.0</td>
<td>6.8</td>
<td>7.5</td>
<td>8.3</td>
</tr>
<tr>
<td>7.75</td>
<td>3.9</td>
<td>4.7</td>
<td>5.4</td>
<td>6.2</td>
<td>7.0</td>
<td>7.8</td>
<td>8.5</td>
</tr>
<tr>
<td>8</td>
<td>4.0</td>
<td>4.8</td>
<td>5.6</td>
<td>6.4</td>
<td>7.2</td>
<td>8.0</td>
<td>8.8</td>
</tr>
</tbody>
</table>
Milk Fat Composition
Most Variable Component of Milk

- 98% triglycerides
- More than 400 unique fatty acids (FA) in milk (GC analysis)
- About 20 FA make up the majority
  - Broadly grouped into 3 subcategories

Jensen et al., 2002; Palmquist, 2006; Moate et al., 2007
Milk Fatty Acid (FA) Groups

- **De novo FA - < C16**
  - Made in the mammary gland
  - Influenced by rumen fermentation/function
  - 18-30 relative % (21-26)

- **Preformed FA - > C16**
  - From fat the diet
  - From body fat mobilization
  - 32-42 relative % (35-42)

- **Mixed origin FA - C16**
  - From fat the diet (preformed)
  - Made in the mammary gland (de novo)
  - 30-40 relative % (35-42)

![Venn Diagram](image)
Fat and Fatty Acid Groups – Relationship in Bulk Tank Milk

Fat, %

4.10

~94.5% of fat test

Preformed FA 1.31
Mixed FA 1.62
De Novo FA 0.94

Glycerol

g/100 g milk
A Christmas Wish...

Develop new tools in milk analysis using mid infrared technology to provide information to support decision making for feeding and general management of the herd with a focus towards milk component yield.
Milk Fatty Acid Profiles Provide Insight: Performance and Health of Cow and Herd

• Profile of de novo, mixed, and preformed fatty acids reflect:
  – Diet and dietary changes
    • CHO fermentability, RUFAL, forages...
  – Management environment
    • Physiological state of cow
      – Stage of lactation
      – Energy balance
    • Behavior…rumen pH
    • Risk of milk fat depression
Key Findings from Monitoring 430 Farms over a 15-Month Period with Milk Fatty Acid Metrics

• Milk fat and protein increased when de novo fatty acids in milk increased

• Occurred for both Holstein and Jersey herds

Barbano, 2016
Focus on De Novo Fatty Acids...

• De novo fatty acids reflect rumen function – especially fiber fermentation

• Acetate and butyrate are building blocks

Courtesy of M. Woolpert
Focus on De Novo Fatty Acids...

- Rumen conditions that enhance microbial fermentation stimulate microbial protein production and increase milk protein content
- De novo fatty acids in milk fat tells us how well the cow is being fed and managed for optimal rumen fermentation conditions
Testing Facilities For Milk Fatty Acid Metrics
(MIR Spectroscopy)

- Texas Federal Milk Market Lab
- Sterns County & Zumbrota MN DHIA Labs
- ADM DHIA Lab
- Cornell University Miner Institute
- St. Albans Coop AgriMark Coop Cayuga Marketing Coop

March 2018
Common Ways to Use the Milk Fatty Acid Metrics for Bulk Tank Milk

• Herd “snapshot” and troubleshooting
  – “My milk fat % is too low”

• Monitoring while looking for opportunities and reacting to changes over time

<table>
<thead>
<tr>
<th>TRANS_DATE</th>
<th>TANK</th>
<th>POUNDS</th>
<th>BFAT</th>
<th>PROT</th>
<th>LACT</th>
<th>TSOL</th>
<th>SNF</th>
<th>OSOL</th>
<th>CELL</th>
<th>MUN</th>
<th>DEN</th>
<th>MIX</th>
<th>DRONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-MAR-2017</td>
<td>1</td>
<td>154380</td>
<td>4.17</td>
<td>3.19</td>
<td>4.66</td>
<td>13.12</td>
<td>8.95</td>
<td>5.86</td>
<td>180</td>
<td>11.26</td>
<td>1.00</td>
<td>1.37</td>
<td>1.76</td>
</tr>
<tr>
<td>05-MAR-2017</td>
<td>1</td>
<td>15674</td>
<td>4.27</td>
<td>3.19</td>
<td>4.86</td>
<td>13.25</td>
<td>8.97</td>
<td>5.79</td>
<td>190</td>
<td>11.9</td>
<td>1.03</td>
<td>1.40</td>
<td>1.84</td>
</tr>
<tr>
<td>04-MAR-2017</td>
<td>1</td>
<td>15902</td>
<td>4.19</td>
<td>3.19</td>
<td>4.85</td>
<td>13.13</td>
<td>8.94</td>
<td>5.73</td>
<td>180</td>
<td>12.95</td>
<td>1.00</td>
<td>1.38</td>
<td>1.77</td>
</tr>
<tr>
<td>03-MAR-2017</td>
<td>1</td>
<td>15846</td>
<td>4.04</td>
<td>3.15</td>
<td>4.88</td>
<td>12.97</td>
<td>8.93</td>
<td>5.78</td>
<td>110</td>
<td>13.16</td>
<td>0.98</td>
<td>1.29</td>
<td>1.76</td>
</tr>
<tr>
<td>01-MAR-2017</td>
<td>1</td>
<td>15824</td>
<td>4.13</td>
<td>3.16</td>
<td>4.87</td>
<td>13.03</td>
<td>8.95</td>
<td>5.74</td>
<td>110</td>
<td>12.85</td>
<td>0.96</td>
<td>1.44</td>
<td>1.58</td>
</tr>
<tr>
<td>28-FEB-2017</td>
<td>1</td>
<td>16018</td>
<td>4.13</td>
<td>3.16</td>
<td>4.86</td>
<td>13.12</td>
<td>8.92</td>
<td>5.79</td>
<td>140</td>
<td>13.04</td>
<td>0.97</td>
<td>1.49</td>
<td>1.58</td>
</tr>
<tr>
<td>27-FEB-2017</td>
<td>1</td>
<td>15895</td>
<td>4.1</td>
<td>3.21</td>
<td>4.88</td>
<td>13.12</td>
<td>9.02</td>
<td>5.81</td>
<td>100</td>
<td>13.28</td>
<td>1.04</td>
<td>1.33</td>
<td>1.79</td>
</tr>
<tr>
<td>26-FEB-2017</td>
<td>1</td>
<td>15889</td>
<td>4.16</td>
<td>3.17</td>
<td>4.9</td>
<td>13.12</td>
<td>8.96</td>
<td>5.79</td>
<td>140</td>
<td>13.04</td>
<td>0.97</td>
<td>1.49</td>
<td>1.58</td>
</tr>
<tr>
<td>25-FEB-2017</td>
<td>1</td>
<td>15738</td>
<td>4.2</td>
<td>3.17</td>
<td>4.88</td>
<td>13.13</td>
<td>8.93</td>
<td>5.76</td>
<td>120</td>
<td>13.17</td>
<td>0.94</td>
<td>1.54</td>
<td>1.55</td>
</tr>
<tr>
<td>24-FEB-2017</td>
<td>1</td>
<td>15824</td>
<td>4.16</td>
<td>3.15</td>
<td>4.88</td>
<td>13.08</td>
<td>8.92</td>
<td>5.77</td>
<td>130</td>
<td>13.9</td>
<td>0.94</td>
<td>1.53</td>
<td>1.51</td>
</tr>
<tr>
<td>23-FEB-2017</td>
<td>1</td>
<td>16093</td>
<td>4.12</td>
<td>3.16</td>
<td>4.89</td>
<td>13.04</td>
<td>8.92</td>
<td>5.76</td>
<td>120</td>
<td>13.04</td>
<td>0.92</td>
<td>1.54</td>
<td>1.46</td>
</tr>
<tr>
<td>22-FEB-2017</td>
<td>1</td>
<td>16104</td>
<td>4.22</td>
<td>3.16</td>
<td>4.83</td>
<td>13.11</td>
<td>8.89</td>
<td>5.73</td>
<td>90</td>
<td>13.09</td>
<td>0.92</td>
<td>1.52</td>
<td>1.55</td>
</tr>
<tr>
<td>21-FEB-2017</td>
<td>1</td>
<td>15588</td>
<td>4.28</td>
<td>3.17</td>
<td>4.85</td>
<td>13.17</td>
<td>8.89</td>
<td>5.72</td>
<td>120</td>
<td>13.95</td>
<td>0.94</td>
<td>1.61</td>
<td>1.47</td>
</tr>
<tr>
<td>20-FEB-2017</td>
<td>1</td>
<td>16125</td>
<td>4.2</td>
<td>3.17</td>
<td>4.85</td>
<td>13.08</td>
<td>8.88</td>
<td>5.71</td>
<td>110</td>
<td>13.42</td>
<td>0.92</td>
<td>1.56</td>
<td>1.49</td>
</tr>
</tbody>
</table>
Troubleshooting Herds
Milk Samples over Multiple Days, Herd Average Plotted

De Novo
Jersey
Holstein
Troubleshooting Herds
Milk Samples over Multiple Days, Herd Average Plotted
Troubleshooting Herds
Milk Samples over Multiple Days, Herd Average Plotted

- De Novo
- Mixed
- Preformed

Fat, % vs. FA, g/100 g milk
## Prediction of Fat % (Y) From Milk Fatty Acid Metrics (X)

<table>
<thead>
<tr>
<th></th>
<th>De Novo FA, g/100 g milk</th>
<th>Mixed Origin FA, g/100 g milk</th>
<th>Preformed FA, g/100 g milk</th>
<th>Unsaturation, DB/FA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>40 Holstein Herds</strong></td>
<td>$Y = 2.297X + 1.844$</td>
<td>$Y = 1.540X + 1.586$</td>
<td>$Y = 0.793X + 2.774$</td>
<td>$Y = -8.583X + 6.421$</td>
</tr>
<tr>
<td>(St. Albans 2015)</td>
<td>$R^2 = 0.80$</td>
<td>$R^2 = 0.88$</td>
<td>$R^2 = 0.07$</td>
<td>$R^2 = 0.69$</td>
</tr>
<tr>
<td><strong>167 Holstein Herds</strong></td>
<td>$Y = 2.233X + 1.800$</td>
<td>$Y = 1.892X + 1.179$</td>
<td>$Y = 1.289X + 1.911$</td>
<td>$Y = -7.449X + 5.971$</td>
</tr>
<tr>
<td>(US 2016-2017)</td>
<td>$R^2 = 0.61$</td>
<td>$R^2 = 0.79$</td>
<td>$R^2 = 0.35$</td>
<td>$R^2 = 0.31$</td>
</tr>
</tbody>
</table>

*Barbano et al., 2017; Barbano et al., unpublished*

Every 0.1 g/100 g milk ↑ in de novo FA is a 0.2% ↑ in fat %
Factors Associated with Milk Fat

Diet Factors

• Diet-induced milk fat depression
  – Specific inhibition of milk fat by bioactive fatty acids

• Fermentable carbohydrates
  – Starch
  – Forage fiber (acetate)
  – peNDF

• Fats
  – RUFAL: C18:1 + C18:2 + C18:3
  – Palmitic acid
  – Contribution of forages

• Feed additives
• Wild yeasts/molds

Cow/Environment/Management Factors

• Genetics
• Parity
• Days in milk
• Season
• Time budget (behavior)
  – Stocking density
• Feeding strategy
  – TMR vs. PMR vs. component
  – Frequency of feed delivery/push up

Jenkins, 2013; Harvatine, 2017; Bauman, 2017 AMTS webinar
High de novo herds feed...
Less ether extract (≤3.5%)
More physically effective fiber (≥21%)

Woolpert et al., 2016; Woolpert et al., 2017
High de novo herds tend to be...

5x more likely to deliver feed 2x/d in freestall

11x more likely to deliver feed 5x/d in tiestalls

Woolpert et al., 2016; Woolpert et al., 2017
High de novo herds tend to be...

10x more likely to provide ≥18 in bunk space/cow

5x more likely to stock stalls at ≤110%

Woolpert et al., 2017
Herd Level Risk Factors for Milk Fat Depression

- 79 herds feeding monensin in the NE and MW US

- Several *trans*-C18:1 fatty acids (products of alternate pathways of ruminal biohydrogenation) were negatively related to herd milk fat

McCarthy et al., 2018
Herd Level Risk Factors for Milk Fat Depression: Relationship with Milk Fatty Acid Groups

- Milk fat content of fatty acids synthesized de novo in the mammary gland were positively related to bulk tank milk fat.
- Milk fat content of preformed fatty acids were lower in herds with higher bulk tank milk fat.

<table>
<thead>
<tr>
<th>Milk FA</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>25th Percentile</th>
<th>Median</th>
<th>75th Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total &lt;C16</td>
<td>77</td>
<td>22.5</td>
<td>1.8</td>
<td>22.2</td>
<td>22.3</td>
<td>24.5</td>
<td>17.8–26.1</td>
</tr>
<tr>
<td>Total C16</td>
<td>77</td>
<td>29.5</td>
<td>1.6</td>
<td>28.3</td>
<td>29.5</td>
<td>30.9</td>
<td>26.6–34.0</td>
</tr>
<tr>
<td>Total &gt;C16</td>
<td>77</td>
<td>43.4</td>
<td>2.8</td>
<td>42.2</td>
<td>43.6</td>
<td>45.7</td>
<td>35.8–49.4</td>
</tr>
</tbody>
</table>

McCarthy et al., 2018
Herd Level Risk Factors for Milk Fat Depression: Relationship with TMR Composition

- Univariate relationships of factors commonly thought to be associated with herd fat percentage (TMR content of starch, NDF, fat, and monensin; TMR proportion of particles on PSPS top screen) were not statistically significant

- Dietary content of monounsaturated fatty acids (C16:1 and C18:1) was negatively related to herd milk fat percentage

- Particle size of TMR
  - Herds that had >49.8% of the TMR particles on the middle screen of the Penn State particle separator had higher milk fat percentage than those with ≤49.8%,
  - Herds with >54.0% of TMR particles in the bottom pan had lower milk fat percentage than herds with ≤54.0%

McCarthy et al., 2018
Herd Level Risk Factors for Milk Fat Depression: Relationship with TMR Composition

- No single diet component accounted for more than 11% of the variation in herd level milk fat percentage

- 4 factors together (starch content, monensin, PUFA, and MUFA) only accounted for 32% of the variation in herd milk fat percentage

- Indicates many variables contribute to low milk fat and herds experiencing low milk fat will need to examine many potential risk factors when working to troubleshoot milk fat depression

McCarthy et al., 2018
Need to Get the Diet and the “Dining Experience” Right

Must focus on 
*diet formulation* & 
*management environment*
Expected vs Actual Results – A Holstein Example with a Goal of 3.8% Fat

- Too much fat (RUFAL) or starch?
- Too little peNDF?
- Management affecting feeding behavior?

- Problems with rumen function?
- Overstocked?
- Feeding lots of inert fat?

- Keep up the good work!
- Good rumen function

- May consider feeding rumen inert fat?
- Thin cows?

St. Albans herds 2015

Courtesy of M. Woolpert
Fat, lb/d

De Novo FA, g/100 g milk

167 Holstein Herds (US 2016-2017)

R² (Fat, lb/d): 0.76
R² (Fat %): 0.01
R² (De Novo FA, g/100 g milk): 0.00
167 Holstein Herds (US 2016-2017)
Milk Solids

- Dec-17: 86 lb milk, 3.85% fat, 2.90% protein
- Jan-18: 90 lb milk, 4.00% fat, 3.00% protein
Seasonal Changes in Milk Composition

40 St. Albans Coop herds
Seasonal Changes in Milk Composition

40 St. Albans Coop herds
Seasonal Changes in Milk Composition

40 St. Albans Coop herds
Monthly Averages for Bulk Tank
Tank 1: 4:30 am, 8:30 pm
Tank 2: 12:30 pm
Monthly Averages for Tank 1 and 2

Tank 1: 4:30 am, 8:30 pm
Tank 2: 12:30 pm
Monthly Averages for Tank 1 and 2

Tank 1: 4:30 am, 8:30 pm
Tank 2: 12:30 pm
Stage of Lactation Affects Milk Components

Holstein herd, ~90-95 lb milk/d, TMR feeding system
Stage of Lactation Affects Milk Fatty Acid Metrics

Holstein herd, ~90-95 lb milk/d, TMR feeding system
Monitor Fatty Acid Metrics in Bulk Tank Milk for Changes Over Time

<table>
<thead>
<tr>
<th>Fatty Acid Metric</th>
<th>Increases</th>
<th>Decreases</th>
</tr>
</thead>
<tbody>
<tr>
<td>De novo FA</td>
<td>• Positive impact on milk fat and/or protein</td>
<td>• Evaluate management and nutrition</td>
</tr>
<tr>
<td></td>
<td>• Response to improved rumen function and/or feed quality</td>
<td>• Did an unexpected change occur?</td>
</tr>
<tr>
<td>Mixed origin FA</td>
<td>• Response to increased dietary fat</td>
<td>• Evaluate management and nutrition</td>
</tr>
<tr>
<td></td>
<td>• Possible response to de novo synthesis</td>
<td>• Did an unexpected change occur?</td>
</tr>
<tr>
<td>Preformed FA</td>
<td>• Response to more body fat mobilization or increased dietary fat</td>
<td>• Milk fat may decrease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Energy partitioning change</td>
</tr>
<tr>
<td>Unsaturation Index</td>
<td>• Greater risk for milk fat depression</td>
<td></td>
</tr>
</tbody>
</table>
Factors Affecting Variation Within & Between Herds

- Management related to feeding, housing, and milking of cows
- Diet and feed quality
- Consistency in day to day routine
  - Affects time budget of cow
- Days off and vacations
- Weather and season changes
- Herd demographics (parity, DIM)
- Filling sequence of multiple tanks
Fat %

Graph showing the mean and ±2 standard deviations of fat percentage over time.
Variation in November... Diet Changed
(More BMR CS and Different Feeder)

[Graph showing variation in fatty acid levels]
Forage Quality Changed Unexpectedly

![Graph showing changes in forage quality over time]
Going Beyond Bulk Tank Sampling...

Bulk Tank/Tanker

Group/Pen/String

Cow

http://qualitru.com
Holstein Herd – Group Example

<table>
<thead>
<tr>
<th></th>
<th>Preformed FA</th>
<th>Mixed FA</th>
<th>De Novo FA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Heifers</td>
<td>0.68</td>
<td>1.05</td>
<td>1.44</td>
</tr>
<tr>
<td>Fresh Cows</td>
<td>0.85</td>
<td>1.40</td>
<td>2.02</td>
</tr>
<tr>
<td>High Group</td>
<td>0.99</td>
<td>1.51</td>
<td>1.38</td>
</tr>
</tbody>
</table>
Commercial Herds – Group Samples
Commercial Herds – Group Samples

- Fat, %
- Preformed FA, g/100 g milk
  - Fresh
  - High
  - Low

- Fat, %
- Preformed FA, g/100 g FA
  - Fresh
  - High
  - Low
Weekly Variation in Pens - Fat

High 1st Fresh Low, Sick Late

Pen

Fat, %

3 3.5 4 4.5 5 5.5

01 02 03 04 05 14 19 31

Colors:
- 8
- 9
- 10
- 11
- 12
- 13
- 14
Weekly Variation in Pens – De Novo FA

Pen:

- High
- 1st
- Fresh
- Low, Late
- Sick

Variables:

- De Novo FA, g/100 g milk

Pens 01 to 31 are represented with different colors.
Milk Predicted Blood NEFA – Highest in Early Lactation

primiparous (nefa = 1170.7 + 1.5*DIM - 535.9*log10(DIM))
multiparous (nefa = 1510.3 + 2.1*DIM - 776.7*log10(DIM))
Fresh Pen NEFA from NE and MW Herds
Fresh Pen NEFA is Related to Milk Preformed Fatty Acids
Fresh Pen NEFA is Related to Fatty Acids (g/100 g FA)

\[
\begin{align*}
\text{De Novo} & : y = 0.0271x + 36.009, \quad R^2 = 0.9033 \\
\text{Preformed} & : y = -0.0151x + 38.486, \quad R^2 = 0.8344 \\
\text{Mixed} & : y = -0.012x + 25.507, \quad R^2 = 0.8609
\end{align*}
\]
Milk Predicted Blood NEFA for Fresh Cows
(4 to 21 DIM; 1 milking/d)
Milk BHB for Fresh Cows
(4 to 21 DIM; 1 milking/d)
Milk Predicted Blood NEFA: Deviation from Expected Herd Pattern
Milk Composition Changes for a Cow Before and After DA Surgery

- NEFA: Decrease in NEFA levels after DA surgery.
- Fat: Increase in fat content after DA surgery.
- De Novo FA: Increase in de novo fatty acids post DA surgery.
- Preformed FA: Decrease in preformed fatty acids post DA surgery.
Real-Time Predication of Health Issues: Pilot System for Miner Herd

• Objective: provide general-purpose alerts for health issues in fresh cows to farm staff

• Approach:
  – Collect and analyze milk samples (M1) from cows in fresh pen
  – Use machine learning models based on milk composition to predict health issues (e.g. ketosis, DA, metritis, mastitis...)
  – Provide information to farm staff

Alerts based on samples from this morning:
high risk cows:
2114
2491
medium risk cows:
2382
2602
2620
2666
2709
2842
3089
3104
3107
3111
low risk cows:
2683
2886
2911
3070
Mid-Infrared Milk Testing for Evaluation of Health Status in Dairy Cows

H. M. Dann, D. M. Barbano, A. Pape, & R. J. Grant
2018 Cornell Nutrition Conference
https://ansci.cals.cornell.edu/news-events/cornell-nutrition-conference/proceedings/
Milk Fatty Acid Metrics – Another Tool for Your Toolbox

- Milk components are an important part of the milk check
- Knowing the milk fatty acid profile and making decisions based on it can help improve profitability
How Best to Use the Milk Fatty Acid Metrics Information

• In conjunction with
  – Diet information
  – Management information, other systems
  – On-farm assessment
  – *Don’t use the FA information “in a vacuum”*

• Can give you clues as to what is happening
  – More specific than milk fat or protein %
  – Low milk fat can be caused by different factors – MIR FA information may allow you to identify what is wrong
  – May allow more rapid decision making
Some Ways to Improve De Novo Fatty Acid Content and Produce More Milk Fat and Protein

• Feed properly formulated diets – high quality forages and complimentary feeds
  – Balance carbohydrate (fiber, starch, sugar) supply and fermentability
  – Ensure appropriate particle size of diet
  – Feed saturated fatty acids while controlling polyunsaturated fatty acids (RUFAL)
  – Optimize amino acid supply

• Manage to optimize feeding behavior and rumen fermentation and health (SARA)
  – Ensure cow comfort
  – Feed more frequently (smaller, more frequent meals)
  – Minimize feed sorting
  – Control stocking density
  – Minimize heat stress
THE WILLIAM H MINER AGRICULTURAL RESEARCH INSTITUTE

Carrying on William Miner’s vision of science and technology in the service of agriculture and the environment.

LEARN MORE

www.whminer.org
dann@whminer.com