Assessment of Lab Performance and Analytical Equivalence in Milk Testing in North America

ICAR, June 16, 2008
Niagara Falls, New York

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Canadian Lab Services
Capital Laboratory Services
Ottawa, Ontario, CA
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• 55 official (accredited/certified) DHI laboratories in North America
DHI Testing in North America - Facts and Figures

- 55 official (accredited/certified) DHI laboratories in North America
- 44 in USA (including 1 in Puerto Rico), 8 in Canada, 1 in Mexico *

- approximately 115 infrared analyzers (fat, protein, MUN)
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- approximately 130 somatic cell counters

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• approximately 70,000,000 samples tested annually *

• several DHI labs offering additional services
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- approximately 130 somatic cell counters
- approximately 40 MUN analyzers (IR, differential pH, FIA, etc.)
- approximately 70,000,000 samples tested annually *
- several DHI labs offering additional services
  (forage analysis, Johnes screening, water analysis, component payment testing, drug residues, bacteria, added water, vet services, nutritional consulting, etc.)
Accreditation / Certification

Canada

• DHI labs are accredited under ISO 17025.
Accreditation / Certification

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• Accreditation is delivered by the Standards Council of Canada and coordinated by CLS.
• On-site assessments are conducted every two years.
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USA and Mexico
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• Certification is delivered and coordinated by QCS.
Proficiency Testing Programs

Canada

• Analytical performance is assessed monthly using samples provided by Canadian Lab Services.

• Data analysis and reporting is coordinated by CLS.
Proficiency Testing Programs

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Proficiency Testing Programs

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• Data analysis and reporting is coordinated by *CLS*.

USA and Mexico
• Analytical performance is assessed monthly using samples provided by *Eastern Lab Services*.
• Data analysis and reporting is coordinated by *QCS* with involvement of an outside contractor.

Proficiency Testing - Schedules and Samples
Canada

• Six times annually sets of 20 blind duplicate samples are circulated according to a pre-arranged schedule.
Proficiency Testing - Schedules and Samples

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• Six times annually sets of 20 blind duplicate samples are circulated according to a pre-arranged schedule.
• Six times annually sets of 16 individual samples are circulated unannounced. *

• Samples are sent by overnight courier.
Proficiency Testing - Schedules and Samples

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USA and Mexico

• Every month sets of 24 duplicate samples are circulated according to a pre-arranged schedule.
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Proficiency Testing - Data submission and Reporting
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• Test results are submitted electronically and performance reports are returned electronically.
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• Test results are submitted electronically and performance reports are returned electronically.
• Reports include coded data from all participating labs.

• Turn around time from deadline to circulation of reports < 3 days.
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Proficiency Testing - Data submission and Reporting

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• Test results are submitted electronically and performance reports are returned electronically.
• Reports include coded data from all participating labs.
• Turn around time from deadline to circulation of reports < 3 days.

USA and Mexico
• Test results are submitted and reports are returned via a secure web site.
• Reports include individual data and summary graphs from all labs.
• Turn around time < 3 days.
Proficiency Testing - Components included

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- 6 times annually: fat, protein, lactose, total solids, MUN, SCC

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• A program for Johnes screening is under development.
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Proficiency Testing - Tolerances (fat and protein)
Proficiency Testing - Tolerances (fat and protein)

Canada

• MD < +/- .04% and SDD < .04% in three of the last four trials
Proficiency Testing - Tolerances (fat and protein)

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• MD < +/- .04% and SDD < .04% in three of the last four trials
• RMD (rolling mean difference) < .02% across the last six trials

USA and Mexico
Proficiency Testing - Tolerances (fat and protein)

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Proficiency Testing - Tolerances (SCC)

Canada
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• M%D < +/- 10% and SD%D < 10% in three of the last four trials

• RM%D (rolling mean difference) < 5% across the last six trials
Proficiency Testing - Tolerances (SCC)

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Proficiency testing - Example

<table>
<thead>
<tr>
<th>Sample</th>
<th>Fat (ref)</th>
<th>Fat (IR)</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.685</td>
<td>3.715</td>
<td>0.030</td>
</tr>
<tr>
<td>2</td>
<td>3.790</td>
<td>3.820</td>
<td>0.030</td>
</tr>
<tr>
<td>3</td>
<td>3.882</td>
<td>3.910</td>
<td>0.028</td>
</tr>
<tr>
<td>4</td>
<td>3.898</td>
<td>3.910</td>
<td>0.012</td>
</tr>
<tr>
<td>5</td>
<td>3.998</td>
<td>4.035</td>
<td>0.037</td>
</tr>
<tr>
<td>6</td>
<td>4.006</td>
<td>4.040</td>
<td>0.034</td>
</tr>
<tr>
<td>7</td>
<td>4.063</td>
<td>4.105</td>
<td>0.042</td>
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<tr>
<td>8</td>
<td>4.157</td>
<td>4.170</td>
<td>0.013</td>
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<tr>
<td>9</td>
<td>4.286</td>
<td>4.300</td>
<td>0.014</td>
</tr>
<tr>
<td>10</td>
<td>4.368</td>
<td>4.395</td>
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MD  0.027
SDD .0010
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MD < +/- 0.04% in three of the last four trials
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**MD** 0.027  
**SDD** < .04% in three of the last four trials

---

**Proficiency Testing - Example**
Proficiency Testing - Example

• The rolling mean difference (RMD) must be less than .02 percent across the last six trials.

Date | MD
--- | ---
Jan 2008 | -0.020
Feb 2008 | 0.015
Mar 2008 | 0.022
Apr 2008 | -0.031
May 2008 | 0.024
Jun 2008 | 0.011

RMD
Proficiency Testing - Example

• The rolling mean difference (RMD) must be less than .02 percent across the last six trials.

<table>
<thead>
<tr>
<th>Date</th>
<th>MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2008</td>
<td>-0.020</td>
</tr>
<tr>
<td>Feb 2008</td>
<td>0.015</td>
</tr>
<tr>
<td>Mar 2008</td>
<td>0.022</td>
</tr>
<tr>
<td>Apr 2008</td>
<td>-0.031</td>
</tr>
<tr>
<td>May 2008</td>
<td>0.024</td>
</tr>
<tr>
<td>Jun 2008</td>
<td>0.011</td>
</tr>
<tr>
<td>RMD</td>
<td>0.004</td>
</tr>
</tbody>
</table>
Canadian Program - Individual Data, Graphical Presentation

Fat Infrared Results
IR #22

% Fat (Target)

Canadian Program - Summary Table

<table>
<thead>
<tr>
<th>Protein Infrared Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR #</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>LR #2</td>
</tr>
<tr>
<td>LR #14</td>
</tr>
<tr>
<td>LR #6</td>
</tr>
<tr>
<td>LR #13</td>
</tr>
<tr>
<td>LR #18</td>
</tr>
<tr>
<td>LR #10</td>
</tr>
<tr>
<td>LR #3</td>
</tr>
<tr>
<td>LR #17</td>
</tr>
<tr>
<td>LR #20</td>
</tr>
<tr>
<td>LR #11</td>
</tr>
<tr>
<td>LR #22</td>
</tr>
<tr>
<td>LR #12</td>
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<tr>
<td>LR #10</td>
</tr>
<tr>
<td>LR #4</td>
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<td>LR #5</td>
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<td>LR #1</td>
</tr>
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<td>LR #15</td>
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<td>LR #20</td>
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<td>LR #7</td>
</tr>
<tr>
<td>LR #21</td>
</tr>
<tr>
<td>LR #16</td>
</tr>
<tr>
<td>LR #9</td>
</tr>
</tbody>
</table>

Mean 0.016
QCS Program, Individual Data, Tabular Presentation

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Lab/Instrument Avg</th>
<th>Instr Results</th>
<th>Prec Stats</th>
<th>Accuracy Stats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ref</td>
<td>Inst Diff</td>
<td>Rep1</td>
<td>Rep2</td>
</tr>
<tr>
<td>1</td>
<td>3.557</td>
<td>3.564</td>
<td>0.007</td>
<td>3.56</td>
</tr>
<tr>
<td>2</td>
<td>3.907</td>
<td>3.909</td>
<td>0.002</td>
<td>3.91</td>
</tr>
<tr>
<td>3</td>
<td>2.990</td>
<td>2.990</td>
<td>0.000</td>
<td>3.01</td>
</tr>
<tr>
<td>4</td>
<td>4.153</td>
<td>4.138</td>
<td>-0.015</td>
<td>4.20</td>
</tr>
<tr>
<td>5</td>
<td>3.547</td>
<td>3.550</td>
<td>0.003</td>
<td>3.57</td>
</tr>
<tr>
<td>6</td>
<td>3.797</td>
<td>3.782</td>
<td>-0.015</td>
<td>3.78</td>
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<tr>
<td>7</td>
<td>3.707</td>
<td>3.723</td>
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<td>3.223</td>
<td>3.224</td>
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<tr>
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<td>4.297</td>
<td>4.289</td>
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<tr>
<td>11</td>
<td>4.817</td>
<td>4.800</td>
<td>-0.017</td>
<td>4.75</td>
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<tr>
<td>12</td>
<td>4.370</td>
<td>4.382</td>
<td>0.012</td>
<td>4.40</td>
</tr>
</tbody>
</table>

MD 0.000  SDA 0.006  MD 0.014
SDD 0.011  SDD 0.033
FAT Results

<table>
<thead>
<tr>
<th>Month</th>
<th>MD</th>
<th>SDD</th>
<th>RMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun</td>
<td>-0.011</td>
<td>0.020</td>
<td>0.002</td>
</tr>
<tr>
<td>Jul</td>
<td>0.009</td>
<td>0.015</td>
<td>0.008</td>
</tr>
<tr>
<td>Aug</td>
<td>-0.027</td>
<td>0.023</td>
<td>0.004</td>
</tr>
<tr>
<td>Sep</td>
<td>-0.004</td>
<td>0.011</td>
<td>0.002</td>
</tr>
<tr>
<td>Oct</td>
<td>0.005</td>
<td>0.018</td>
<td>-0.002</td>
</tr>
<tr>
<td>Nov</td>
<td>0.006</td>
<td>0.023</td>
<td>0.004</td>
</tr>
<tr>
<td>Dec</td>
<td>0.022</td>
<td>0.018</td>
<td>0.002</td>
</tr>
<tr>
<td>Jan</td>
<td>-0.015</td>
<td>0.022</td>
<td>0.002</td>
</tr>
<tr>
<td>Feb</td>
<td>-0.037</td>
<td>0.020</td>
<td>0.004</td>
</tr>
<tr>
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<td>0.006</td>
<td>0.020</td>
<td>0.002</td>
</tr>
<tr>
<td>Apr</td>
<td>-0.025</td>
<td>0.018</td>
<td>-0.007</td>
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<td>May</td>
<td>0.014</td>
<td>0.033</td>
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</tbody>
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**QCS Program - Summary Graph**

**QCS Program - Historical Data, Tabular Presentation**

*Changed cell here!*
QCS Program - Historical Data, Graphical Presentation

FAT Results

QCS Program - Historical Data, Graphical Presentation

FAT Results