may appear as green $\text{Cr}^{3+}$ or $\text{Cr(OH)}_4^-$ in solution.

Based on these results, the following observations and recommendations can be made:

1. Potassium dichromate at 0.08 to 0.80% may be used in milk samples stored at 21 to 27 C without changes in fat percentage, if fat is determined within three days.
2. After five or more days of milk sample storage at 21 to 27 C the fat content will be at least 0.1% lower.
3. To conform with AOAC (2) recommendations, and to obtain 0.5 g active ingredient per tablet for each 8 fluid ounces milk (0.21%), it would be necessary to use 12 to 13 NASCO tablets, each containing 41 mg $\text{K}_2\text{Cr}_2\text{O}_7$ for 8 ounces of milk.
4. A reinvestigation of milk sample preservatives should be initiated to bring actual practice and official recommendation together, to encourage standardization and more encompassing labeling for preservative tablets, and to propose other effective preservatives.
5. Coagulated milk samples and those in which the original yellowish dichromate has changed cannot be accurately analyzed for fat by the Milko-Tester.

Extrapolation of these results to other conditions should not be made. Investigations as to the effects of other preservatives, composite samples, and sample care have begun or are expected to be carried out later.

Acknowledgments

Appreciation is extended to Mrs. Nancy P. Warner for her assistance and to Professor H. C. Gilmore for making available one of the Pennsylvania Dairy Herd Improvement Association’s Milko-Tester Automatic.

References


Simplified Procedure for Determining Fat and Total Solids by Mojonnier Method

TITO LIVIO LUNDER

Analytical Laboratory, Research Laboratories for Nestlé Products
Vevey, Switzerland

Abstract

Following extraction of milk fat with the Mojonnier method, defatted solids may be determined by drying the residue which remain in the extraction flask after the solvents are removed. Different techniques may be used to determine solids and results agree with official methods.

Introduction

Solids-not-fat may be easily determined from the residue which remains in the Mojonnier extraction flask after removing the solvents. Fat may be determined following the traditional procedure. Solids-not-fat may be determined by evaporating the water, ammonia and ether on a steam bath or with another known method for estimation of solids. This technique is useful because it allows two determinations on the same sample. Evaporation of the defatted solids suspension does not present the problems of normal determinations where fat sometimes burns.

Experimental Procedure

It is important that reagents for the Mojonnier method are used in the right amounts to obtain complete fat extraction. The appearance of a gelatinous emulsion in the flask after ether is added indicates insufficient alcohol, then
the ether cannot dissolve the fat and results are erroneous.

Fat extraction. Following the instructions of the original method, milk fat is extracted with ethyl and petroleum ether which are poured into a weighed aluminum dish and evaporated, leaving the fat which is dried and weighed.

Solids-not-fat determination. The residue which remains in the extraction flask after removal of the solvents is the defatted solids maintained in suspension by the water, ammonia, and ethyl alcohol. The solids-not-fat may be determined by the four following techniques.

A. Pour the suspension into a weighed flat-bottom dish not less than 5 cm in diameter. Rinse the extraction tube with 5 ml alcohol, heat for one minute on a steam bath, add the alcohol to the dish and heat on steam bath until dry exposing maximal surface of dish bottom to live steam, then dry for three hours in an air oven at 98 to 100 C. Cool in a desiccator, weigh quickly, and report residue as per cent solids-not-fat.

B. Mojonnier rapid method. Pour the suspended solids into an aluminum dish with a flat bottom. Place the dish on a plate heated at 135 C. Ensure uniform evaporation by frequently moving the dish and pressing it against the plate to get uniform dryness. Weigh the dish before and after evaporation. Avoid the use of Congo red or phenolphthalein sometimes used to show the interface in the extraction flask. Either solution will color the suspension and interfere with the estimation of the interface endpoint.

C. Determination with infrared drying (4). Solids are poured into a nickel dish (75 mm diameter, 25 mm high) and placed under a Sicatherm Osram or Infrared Philips red lamp. The temperature is controlled at 135 C. The distance from the dish to the lamp is 8 cm. A drying time of 9 min is ideal. Dishes may be cooled in the Mojonnier apparatus by a jet of air (6 min) or 15 min in a desiccator.

D. Solids may be determined by pouring the suspension into a nickel dish containing 25 g of sea-sand. Mix well, dry on steam bath and then for two hours in an air oven at 105 C. Cool 30

<table>
<thead>
<tr>
<th>Fat Mojonnier (%)</th>
<th>Solids-not-fat (%)</th>
<th>Total solids C + fat (%)</th>
<th>Total solids Mojonnier (%)</th>
<th>IDF method (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.85</td>
<td>8.87</td>
<td>8.83</td>
<td>8.84</td>
<td>8.86</td>
</tr>
<tr>
<td>3.30</td>
<td>8.64</td>
<td>8.61</td>
<td>8.60</td>
<td>8.65</td>
</tr>
<tr>
<td>4.15</td>
<td>9.23</td>
<td>9.16</td>
<td>9.18</td>
<td>9.21</td>
</tr>
<tr>
<td>3.95</td>
<td>9.09</td>
<td>9.00</td>
<td>9.02</td>
<td>9.07</td>
</tr>
<tr>
<td>3.75</td>
<td>8.62</td>
<td>8.70</td>
<td>8.66</td>
<td>8.83</td>
</tr>
<tr>
<td>3.30</td>
<td>8.55</td>
<td>8.63</td>
<td>8.61</td>
<td>8.59</td>
</tr>
<tr>
<td>3.60</td>
<td>8.77</td>
<td>8.84</td>
<td>8.81</td>
<td>8.84</td>
</tr>
<tr>
<td>3.95</td>
<td>9.39</td>
<td>9.44</td>
<td>9.43</td>
<td>9.48</td>
</tr>
<tr>
<td>3.75</td>
<td>8.85</td>
<td>8.84</td>
<td>8.90</td>
<td>8.88</td>
</tr>
<tr>
<td>3.90</td>
<td>8.91</td>
<td>8.79</td>
<td>8.90</td>
<td>8.93</td>
</tr>
<tr>
<td>3.50</td>
<td>8.85</td>
<td>8.85</td>
<td>8.91</td>
<td>8.89</td>
</tr>
<tr>
<td>3.80</td>
<td>9.40</td>
<td>9.39</td>
<td>9.46</td>
<td>9.43</td>
</tr>
<tr>
<td>3.65</td>
<td>8.99</td>
<td>9.02</td>
<td>9.08</td>
<td>9.12</td>
</tr>
<tr>
<td>3.90</td>
<td>9.00</td>
<td>9.00</td>
<td>9.05</td>
<td>9.03</td>
</tr>
<tr>
<td>3.85</td>
<td>8.90</td>
<td>8.92</td>
<td>8.95</td>
<td>8.98</td>
</tr>
<tr>
<td>4.00</td>
<td>8.90</td>
<td>8.88</td>
<td>8.93</td>
<td>8.95</td>
</tr>
<tr>
<td>3.95</td>
<td>8.97</td>
<td>8.99</td>
<td>9.02</td>
<td>9.11</td>
</tr>
<tr>
<td>3.75</td>
<td>9.18</td>
<td>9.16</td>
<td>9.22</td>
<td>9.18</td>
</tr>
<tr>
<td>3.45</td>
<td>8.67</td>
<td>8.69</td>
<td>8.71</td>
<td>8.71</td>
</tr>
</tbody>
</table>

Average solids-not-fat 8.94 8.94 8.97 8.99 8.97 8.99
Standard deviation 0.171 0.181 0.184 0.195 0.183 0.211
rain in a desiccator, weigh and report as per cent solids-not-fat.

Results and Discussion

The solution left in the Mojonnier extraction flask after removal of the fat was analyzed for solids-not-fat by four techniques (Table 1). Standard deviations of the averaged results agreed with those of the Mojonnier and International Dairy Federation methods and with the lactometric methods (2, 3, 5).

For factory control of product composition we have used the infrared drying technique because results can be obtained quickly. The rate of drying depends on the product composition. Drying times for milk from the different breeds of cattle and from different geographical regions should be determined by preliminary trials.

References


JOSEPH F. STEIN
Associate Director, Cooperative Extension Service
University of Nevada, Reno 89507

Why does this new Memorandum receive such wide agreement by State Extension Directors? Many directors expressed their thoughts, both written and orally, in answer to the question: “How do you view the Dairy Herd Improvement (DHI) program in light of the new Memorandum of Understanding?” The following is an attempt to reflect, as near as possible, their point of view and the reasons.

A number of directors have stated that the new memorandum has caused considerable misunderstanding among dairymen, Extension staff and the administration. Much of this can be traced to a misunderstanding of what the document is to accomplish, and by whom.

Objectives

In its simplest terms, the memorandum indicates that Cooperative Extension Services,