

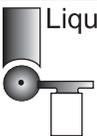
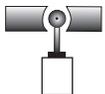
## How much of an effect does residual product left in the line have on line sampler accuracy?

Does high test product (say cream) left in the pipeline change the test of the final composite when a sampler either leaves it out of one sample, or puts it into the next sample?

The answer depends on a number of things, starting with some basics about collecting statistically representative samples. First, when dealing with fluids, it's not just how big the final composite sample is, it's how many samples have gone into making it. Given two samples of identical size, the one made of 1000 discrete samples will be more accurate than the sample made of 300, or 50 discrete samples.

Second, each discrete sample must be collected the same way. This has to do with the design of a sampler and how it collects and discharges each sample. As noted before, pressure discharge samplers (like our Pro-Rata™ Line Samplers) have important accuracy advantages over samplers which rely on gravity to make the discrete samples drip into the collection container (like the Isolok™). This is critical when dealing with multi-viscosity fluids like milk. Cream just doesn't drip the same as skim milk, so drip samplers will not accurately sample stratified loads.

Liquid Sampling Systems, Inc.  
 P.O. Box 165  
 Cedar Rapids, IA 52406  
 (319) 365-2259  
 rob@pro-rata.com  
<http://www.pro-rata.com>

## Calculating carryover effects.

Given a properly designed sampler, Table 1 (on the back) calculates the effect of adding or deleting 1.5 cc samples of varying test from composite samples of different sizes.

Use the chart as follows: With a load of milk that has been held overnight with no agitation, the top milk will possibly test 20%. If it is followed by a load of reasonably well mixed milk testing 4%, the difference would be 16%. Using Table 1 and a 600cc sample, follow the 600cc row to the last column under the 16% heading at the top of the chart. This figure, .040, shows the computed error in butterfat test for both the mixed load and the stratified load.

If a 600cc composite sample is taken from loads which should test 4.0% fat, the result of not adding the last 1.5cc sample of high test milk (left in the line) to the proper composite sample will be: 1.) the sample for the stratified load will under test by .040 (e.g. 3.96 instead of actual 4.0% butterfat) and 2.) the composite sample of the following load will over test by .040 (e.g. 4.04% instead of actual test of 4.0%).

If the high test residual is added to a 100 cc composite sample, the computed error of adding or missing the single high test sample jumps to .240! Example, the addition of 1.5 cc of the 16% to a 100 cc composite will cause it to overtest at 4.24% instead of the actual 4.0% butterfat.

Carryover errors will double if the size of the discrete samples is

doubled. At 3 cc's (the size of the Isolok Sampler's discrete samples), the test error given in the last example with a 100cc composite would rise to .480%, e.g. 4.48% instead of 4.0%!

Carryover errors are also increased when air eliminators (which can hold large amounts of product) are installed between the sampler and pump.

As you can see, errors such as these are highly significant if not taken into account. Our experience has shown that many chronic sampler accuracy problems are due to carryover errors. Sometimes this is due to a mistaken effort to get overly small samples. In other cases, it is due to the inability of some types of line samplers to handle stratified product.

Our newest Pro-Rata Line Sampler, the Type C, virtually eliminates potential carryover problems. With the capability of collecting over 1000 discrete samples from transports, pressure discharge and "hands-off" operation, the Type C offers the highest reliability and accuracy of any sampling method.

**Remember - Your tests are only as good as your samples.** Our Pro-Rata™ Line Samplers and Pro-Rata Strata™ Samplers will give you the best possible samples from pipelines, transports or bulk tanks. Call today for information on upgrading to them. Better yet, order today with complete confidence. Your satisfaction is guaranteed.