

Measuring Somatic Cell Counts in DHIA

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Somatic cells, or leucocytes, moving into the dairy cow's mammary gland from the bloodstream are the key defense against mastitis. The presence of 200,000 somatic cells per ml or more in a composite sample of milk produced by all four quarters of a dairy cow generally indicates that the udder is under stress from the invasion of microorganisms. Somatic cell count (SCC) refers to this concentration of somatic cells and is one measure of milk quality.

There is regulation of somatic cell count and the current legal limit is 750,000, although a recent vote to lower this limit to 400,000 in the US failed by only one vote of the National Conference of Interstate Milk Shipments. Already there are milk processors who are requiring milk they receive from dairy farms have fewer than 400,000 cells or even lower. The somatic cell counts from individual shipments from dairy farms are a composite from the milk of all the cows whose milk is included in the shipment. Milk handlers are required to obtain a sample from the bulk tank for each pick-up of milk at the farm before it is transferred to the tanker truck. Dairy farmers usually receive a report of the somatic cell count and other measures of milk quality from their dairy.

DHI Testing of SCC by Mid-South Dairy Records

Dairy producers who are enrolled in the Dairy Herd Improvement Association (DHIA) program have the opportunity to receive somatic cell count information for the individual cows in their dairy herd. To have this information, a sample of milk is drawn at the same milking where the milk yield of the cow is recorded. These samples for Kentucky DHI herds are then shipped to the Mid-South Dairy Records laboratory in Springfield, Missouri.

The samples, once they arrive at the lab, are processed under specific guidelines established by the Quality Certification Services (QCS) which is a branch of National DHIA that establishes minimum standards for DHIA operations across the United States. Annual inspections of DHIA operations ensure that standards are met and that programs meet uniform minimum performance. Mid-South Dairy Records consistently exceeds QCS's standards for accurately determining the concentration of somatic cells, butterfat and protein in "unknown" samples which are part of the QCS program.

Protocols of Mid-South Dairy Records (MSDR) for calibration of lab instruments, analysis of control and water samples with each set of herd samples and inspection of lab analysis and control samples for each herd are designed to ensure that accurate results are obtained for SCC and butterfat and protein of the individual cow samples. Details are given below for these protocols.

MSDR Protocols

Eastern Lab Services in Fairlawn, Ohio prepares calibration samples that are used weekly to verify and adjust for proper calibration of each lab instrument. Their calibration and monthly “unknown” samples are used in all DHIA labs across the US. Eastern Lab Services is affiliated with Dairy Farmers of America.

Control samples are prepared each week for use in the lab. They are used during morning startup and for validation, after each herd, that machines are working properly. After preparation, control samples are analyzed on both lines of instruments and a target value is established for each component analyzed. During morning startup, a random group of 10 control samples with SCC values ranging from 100,000 to 1,250,000 are analyzed and must fall within a range for all samples of 7% for SCC. Water values (with an expected value of 0 for SCC) and sample volume must also meet an acceptable standard before any DHIA samples are analyzed. Normally instruments operate within 4% for SCC.

Two control samples and two water samples are analyzed after each DHIA herd is tested. Control samples with an SCC level of 300,000 must be within 7% for SCC of the target value before the test results for the herd are accepted and the samples are discarded. If control samples do not fall within the acceptable range, lab employees troubleshoot the instrument, resolve any instrument problems and rerun herd samples.

Prior to final acceptance of herd results a lab supervisor also inspects the lab analysis and control samples values for each herd. Only after this last step are samples finally discarded. This lab supervisor also creates and prints the lab hotsheet. This hotsheet is either mailed, e-mailed or is available via the Internet to the DHIA herdowner.

Once each month, Eastern Lab Services distributes two duplicate sets of 12 “unknown” samples for analysis on each instrument. These samples are analyzed just like a regular DHIA herd and results are reported to QCS. Sample results are compared to results determined by chemical analysis. For SCC the mean difference must not exceed 10% and the standard deviation must not exceed 10% in three of the four previous monthly trials. The rolling mean difference over the previous six trials must not exceed 5%. Mid-South consistently exceeds the minimum standards and normally operates within a 4% standard deviation of percent differences for the SCC samples. By being inside these minimum standards the results from Mid-South are more reliable.

Mid-South Dairy Records has exceeded the requirements for lab certification since the inception of the QCS program 21 years ago.

Sample Collection Is Important

How milk samples for SCC analysis are obtained is very important. This is true whether they are the bulk tank sample at the farm for milk handler evaluation or the milk samples from the bulk tank or individual cows for analysis by MSDR of DHIA samples. Accurate results can only be obtained from samples that are properly drawn. For bulk tank samples, the tank contents must be sufficiently agitated and the sample drawn from the body of the tank. These results represent the milk from the milkings and cows added to the tank at the time of sampling. Likewise, individual cow samples must be a representative sample of the milk produced at the milking at which the sample was drawn. Because somatic cells tend to attach to butterfat particles, if the sample does not represent properly dispersed butterfat particles the SCC results are not likely to be accurate. Thus, samples should be properly drawn from a sampling device attached to a milk measuring device such as a weigh jar or in-line meter. If no sampling device is

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used samples should be drawn from individual quarters during the milking process and after the milkers have been attached for at least 2-3 minutes. The samples drawn from all 4 quarters should be pooled and mixed thoroughly and then a single sample drawn.