STANDARDIZATION OF CHEESE MILK USING AN IN-LINE DAIRY ANALYZER

APPLICATION NOTE

In-line analysis of cheese milk for standardization of fat and protein levels to maintain fat/protein ratio.

Introduction

In the production of various cheese such as cheddars, mozzarella, Monterey Jack etc., the level of fat in the milk is adjusted to maintain a certain fat to protein ratio. This is done by skimming or partially skimming the fat from the milk, then adding it back in at a certain level to control this ratio. The range of fat varies with the product i.e., "no"-fat cheese, low fat cheese, regular fat cheese. The fat to protein ratio is different for each type and must be maintained. The coagulation to produce the cheese curd takes place in a vat filled with the cheese milk. The typical time to fill a vat is approximately 20 minutes.

Challenge

Production managers and operators must maintain the fat to protein ratio for each cheese types. This could be challenging since production facilities typically produce more than one cheese type which can change throughout the shift. Samples are typically collected and tested manually during start-up and throughout the production run to maintain consistency. This is critical since a vat is filled in a short time and out of specification milk can upset the production.

The overall challenge is to:

- Optimize the protein/fat ratio for cheese milk
- Maintain complete control of the protein and fat blending

ProSpect real time in-line analysis

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CHEESE MILK STANDARDIZATION PROCESS BENEFITS

Solution

The ProSpect In-line Process NIR provides accurate, rapid, continuous analysis of Fat and Protein in the cheese milk. From these results the Fat:Protein ratio are calculated and displayed.

These results can be output to a plant control system or standardizing system to automatically control the process: UF process, fat blending, protein blending.

Results for other constituents such as Total Solids and Lactose can also be determined.

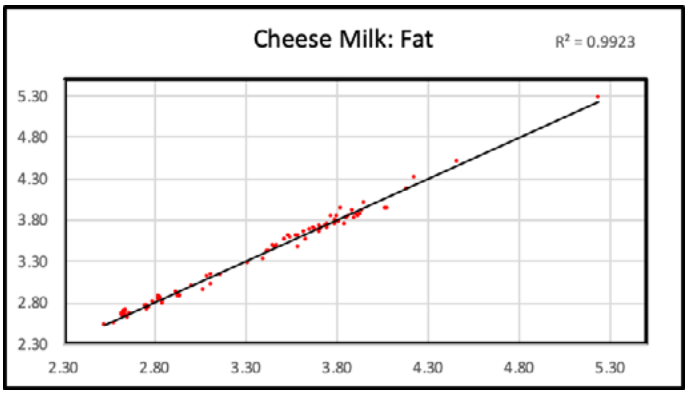
Benefits

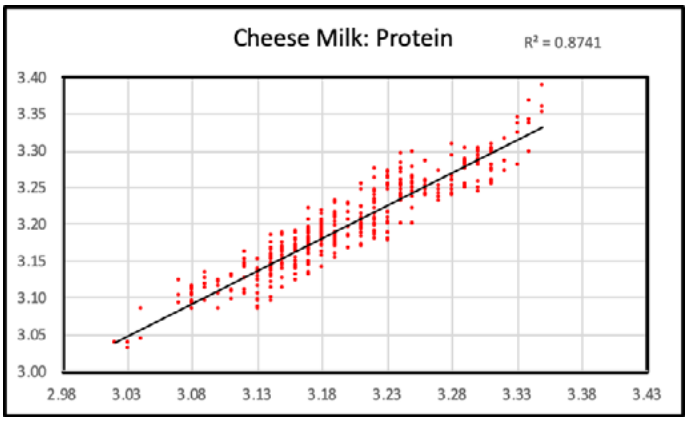
The ProSpect in-line process analyzer's proven performance demonstrates the advantage of real time analysis for quality process control. With this performance, the operator has the ability to move the product constituents closer to specification and realize product uniformity.

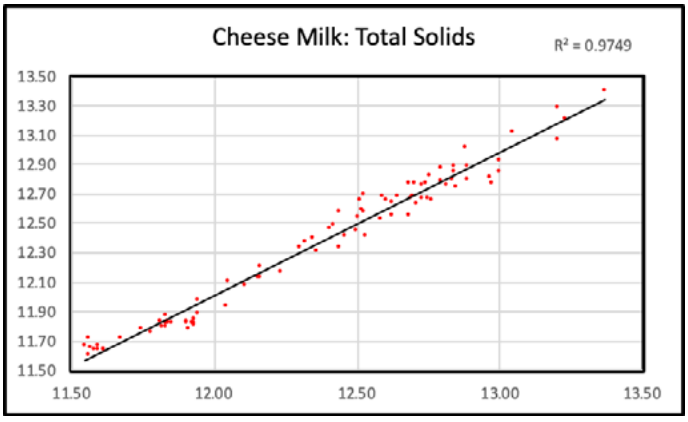
The customer can then realize a rapid return on investment, typically < 12 months and continuing overall profit.

CHEESE MILK CALIBRATION STATISTICS			
	Range	SECV	R^2
Fat	2.5 - 5.3%	0.04%	0.9923
Protein	2.9 - 3.5%	0.05%	0.8741
Total Solids	11.5- 13.5%	0.10%	0.9749

- R^2 = The correlation between the lab reference value and the ProSpect predicted value
- SECV = Standard Error of Cross Validation. This is the Standard Error of differences between ProSpect Predicted and Lab Reference Value







PROSPECT FULLY INTEGRATED SYSTEM

The ProSpect is a fully integrated system with:

- Built-in process computer with touch screen interface
- Built-in PLC which includes bi-lateral communication to the plant PLC.
  - Output of analytical results to the plant PLC via ethernet or analogue
  - Input of production signal from the plant PLC to automatically select the product that is in production
- Built-in power conditioning
- Built-in air-conditioned temperature control
- Insensitive to vibration
- Ethernet ready
- Self-diagnostics
- All housed in a NEMA 4X environmental enclosure
  - Wash down ready
- 3A compliant CIP measurement flow cell with NIR energy transmitted through fiber-optic bundles.

ProSpect In-line Process NIR for measurement of fat and protein in cheese milk.

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