USE OF WHEY CREAM IN CHEDDAR CHEESE MANUFACTURE

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Background: Whey cream is the name given to the fat that is lost from the curd during cheesemaking and is subsequently recovered from the whey by running the whey through a mechanical whey cream separator. In contrast sweet cream is the fat recovered from separating milk. Typically, both sweet cream and whey cream contain around 40% fat and 60% skim, with some variation. It's important to note that the skim portion of sweet cream is skim milk which contains caseins and whey proteins, while the skim portion of whey cream is whey which contains no caseins.

History of whey cream handling and use:

Historically whey cream generated in Cheddar cheese operations was manufactured into butter. Going back many decades some Cheddar cheese manufactures had their own small butter operations to churn whey cream into butter right at the cheese factory, as did Alto Dairy back in those years. This practice was largely abandoned in favor of shipping the whey cream to larger butter companies that focused solely on butter manufacture. I learned well during my Alto tenure that proceeds from the sale of whey cream was an important revenue source for Cheddar cheese manufactures, in our case adding up to millions of dollars a year.

Within the last 2 decades in Wisconsin there has been severe consolidation within the butter industry, resulting in much less competition for whey cream supplies. As a result, premiums, also called multipliers, for whey cream fat has dropped precipitously. Formerly

multipliers in the range of 1.20 were common for whey cream fat, but today in Wisconsin the multipliers for whey cream fat according to my cheese plant sources are flat at approximately 1.0 and sometimes even below, which compares to typical multipliers for sweet cream of between 1.20 and 1.25. This decline results in a significant revenue loss for cheese factories. Because of this loss in revenue, factories are more inclined to attempt to put the whey cream back into milk for cheesemaking in an attempt to reap higher revenues for the whey cream fat by boosting cheese yield from the fat from added whey cream.

Problems associated with utilizing whey cream in cheese production:

The practice of adding whey cream to cheese milk is fraught with potential problems. Whey cream is a potent source of bacteriophage, viruses that destroy bacterial cheese cultures with the resultant loss of acid producing capacity. If this happens the result is slow or dead vats where the desired acid production is significantly curtailed resulting in off grade or under grade cheese that must be sold at a heavy discount. If whey cream is to be reused in the cheese making process the bacteriophage need to be inactivated by heating the whey cream to 185F and holding it at or above this temperature for approximately 30 minutes. This practice solves one problem but can create others such as flavor defects.

The fat in whey cream is physically damaged due to the processes employed during cheesemaking. The protective membranes around the fat globules are eroded away, leaving the fat vulnerable to lipase enzymes and development of undesirable rancidity. The fat globules are also shattered and reduced in size. Because of this they are less likely to be retained in the cheese during the cheese making process and subsequently leak right back into the whey again, setting up a vicious

cycle. To break this cycle cheese factories that take the risk to reuse whey cream in cheese making need to 'break the cycle' by periodically, at least once a week, not recycling the whey cream into cheese making but rather shipping it out to butter manufactures to rid the cheese system of an overabundance of small, damaged fat globules. The recycling of whey cream into cheese manufacture will also reduce the fat retention efficiencies of a Cheddar cheese operation, making optimum fat recoveries at coagulum cutting such as 93-94% unachievable.

Reusing whey cream in Cheddar cheese manufacture runs the risk of cheese off flavor development. As previously mentioned, degradation of the damaged fat due to rancidity can occur. Similarly damaged fat globules are more prone to oxidative damage. Because of the severe heating of the whey cream, cooked flavor notes can occur. And given the myriad of steps and processes that occur in the handling of the milkfat from cheesemaking through whey handling and whey cream generation and storage, undesirable microbial contamination can occur which can lead to off flavor development when used in cheese manufacture. Due to all of these factors aged Cheddar cheese manufacturers do not reutilize whey cream in cheese manufacture due to the significant risks of off flavor development as their Cheddar cheeses age. In my 18 years at Alto Dairy we never utilized any whey cream for cheese manufacture, in mild or aged Cheddar, due to the risks involved. So even manufacturers of barrel and mild Cheddar risk whey taint and other flavor defects in their cheese when utilizing whey cream in cheese production, which is why myself and my colleagues at the CDR don't advise this practice.

In summary, for economic reasons some Cheddar manufactures are tempted to reutilize whey cream in Cheddar cheese production. However, there are tremendous risks involved, from bacteriophage

destruction of starter cultures, resulting if off grade cheese, to development of off flavors in the cheese. And the reuse of the damaged fat in whey cream for cheese production sets up a vicious cycle of damaged fat simply recycling through the system, and leading cheese factories to greatly overestimate the value they are getting from reuse of whey cream. While some Cheddar manufacturers are willing to employ reutilizing whey cream in Cheddar cheese production and take these risks, others, especially aged Cheddar makers and makers of the highest quality Cheddar cheese, are not.