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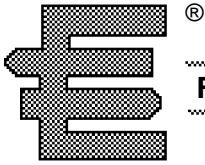
Subject: Whey Pretreatment

Because the UF operation is used to recover and concentrate whey proteins, it is imperative to maintain the quality of the whey ie: stop the bacteriological growth which uses and depletes these same proteins that you wish to concentrate. Another concern to be address are the starter cultures and coagulants used in the cheese making operation. These products carry over with the whey solids and if not deactivated, can lead to serious functionality problems when the finished whey products are rewetted and used.

It is our recommendation that you manage the pasteurization-required to deactivate the unwanted carry over ingredients from the cheese operation-and clarification-to minimize fines prior to UF. This will give you complete control over the results that will impact your process, as well as your final product. The only other requirement will be the fat removal, to less than .05% Majonier, which is probable done now, and immediate cooling to 10 deg. C or less, immediately after pasteurization, to maintain the quality of the whey.

The clarifier as indicated in the illustration, must be after any heating to protect the product stream from any fouling materials associated to heating. It must have the ability to assure clarification to a maximum level of 100 ppm fines or suspended solids. I will include a copy of a procedure that is acceptable to test for suspended solids. From this point on the product must again be held and run at 10 deg. C. This assures keeping quality as the product is very stable from this point on, and at the UF it also addresses the concerns about calcium insolubility. This procedure should provide for a very stable and uniform performance of the UF.

Several other points to be aware of involve the performance of the UF membrane relevant to pH and the effect of "anti-foam" silicon defoamer. The better conditions to run under are around 6.0 pH which should be typical to sweet cheddar whey. In the case of sweet cheddar whey, it should be maintained above 5.8 pH and not accepted if it is less that this or more than 18 ml tritratable acid (Dornic). At this point, the micro organisms are growing at an explosive rate and rapidly using the food sources resulting in less as well as



lower quality proteins as well as developing polysaccharides which leads to cleaning problems and premature fouling during production. This condition is of

concern in whey that is allowed to develop acid in an uncontrolled environment away from the cheese making process. If the cheese operation leads to this acid development, it is in most cases a controlled development and the micro organisms are surviving on nutrients in the milk not leading to whey protein losses.

Regarding the concerns for anti-foam agents, the use of silicone defoamers in the whey stream beyond the draining tables can not be tolerated. The problem here is that the silicon base of this product stays with the whey solids and ends up blinding the membrane. Worse yet, it is an inert substance and very near impossible to remove once it is on the membrane. The enclosed tech data sheet refers to this problem.

The following pretreatment steps are recommended:

1. Whey Draining
2. Pasteurize  
    Separate  
    Clarify
3. Cool to 10 degrees C
4. Store in minimum 30,000 tank
5. Transfer to UF System