Technical Notes


Casein Dewheying and Dewatering Screens

During the manufacture of casein in New Zealand, the primary separation of curd and whey is generally performed on stationary, inclined, fine-mesh screens, fabricated from stainless steel. Similar screens are used for dewatering curd after each washing stage.

The use of dewheying screens which are poorly designed or inefficiently operated, can reduce the effectiveness of the separation and may influence the manufacturing economics. Such a reduction can be caused by:

(i) Fine curd particles passing through the screen with the whey. This may be due to the production of an excessively fine curd or the use of a torn screen.

(ii) Whey spilling over the front of the screen with the curd. This may occur when the screen is blocked or overloaded or if the curd characteristics are poor, e.g. 'mushy curd'.

Fines which are lost in the whey represent a reduced yield and a consequential loss of revenue, hence their recovery is important. The cost of recovering excessive quantities of fines from the whey, however, may be relatively expensive. A more satisfactory approach, therefore, is to control the casein manufacturing operation, so that the production of fine curd particles is avoided.

If relatively large quantities of whey enter the first washing vat with the dewheyled curd, the efficiency of the washing operation is decreased. This consequently increases both the volume of wash water required for the operation and the associated water-treatment costs. Furthermore, there is an increase in the quantity of effluent from the operation, the treatment or disposal of which can be relatively expensive.

If the whey is to be further processed, (e.g. in the manufacture of lactalbumin), then a loss of whey in the wash waters represents a significant decrease in the potential yield of the whey product and a lower return for this product (on the basis of milkfat or protein in the milk).

Dewheying studies at the New Zealand Dairy Research Institute using pilot scale, stationary, inclined, fine-mesh screens, have shown the dewheying efficiency for acidulated, lactic-acid curd, to be a function of the angle, length and aperture size (in the range 180-350 μm) of the screen; these factors being in decreasing order of significance. The screens have also been found to operate efficiently in the dewheying and dewatering of a wide range of casein curd types, including lactic acid, mineral acid and rennet caseins, coprecipitates, and several high-moisture or ‘sticky’ curds, which are inherently difficult to dewheye or dewater.

Based on the results of the above studies, a commercial-scale screen was designed at the request of a dairy company, to provide the flexibility required to maintain efficient separation for a variety of casein curd types. The screen (Plate 1) incorporates a readily removable screen, the angle of which can be quickly and easily adjusted in the range 20° to 45°, thereby allowing for variations in curd characteristics. To prevent whey from spilling-over the front of the screen following adjustment of the screen angle, a reservoir extending beyond the front of

Plate 1. Dewheying screens in operation.
the screen collects and subsequently discharges the whey (or wash waters). The screening material consists of 80-mesh (180 μm) stainless steel mesh, approximately 0.75 m x 1.20 m, and has a processing capacity of approximately 23 000 l/h of coagulum. When used for dewatering, however, the aperture size of the screen can be increased (to 300 μm for example), since only a minimum quantity of fines is normally produced during washing. Because of the increased aperture size, and since the quantity of liquid and solids (on a volume basis) decrease during washing, due to curd shrinkage, the capacity of the screens can be effectively doubled when used for dewatering.

Dewheying screens such as that described above, have been operating successfully in a commercial lactic acid casein factory for the past season and, combined with other modifications in the design and operation of the manufacturing equipment, have resulted in a more efficient plant.

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