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the whey-tank and all used as food. The dilution would be negligible. The extra amount of dirt is only the slightest since most has been washed in by the first flood of whey. In some factories the whey is carried away in barrels, in others it is carried back to the farm in the milk cans. This is the only legitimate reason for separating the washings from the whey. A far more serious objection to using the cans is the carrying of infections, of bitter yeasts, objectionable bacteria, and pathogenic ones from the mixture in the common tank to all of the farms, for it is very rare that the washing of the cans themselves is very efficient, not to speak of sterilization of them before putting the new milk in. The factory then runs the risk of turning out defective cheese, and the disease of one farm is carried to the others. All of these objections could be quite easily overcome, as has been done at the Innerkip factory, by heating the whey in the tank up to about 175° F. with exhaust steam from the engine or by steam directly from the boiler. Not much is required, and a few perforated pipes in whey tanks to let the steam into the whey is all that is needed. The advantages are these: The spread of infection is checked, the whey is brought home hot (an advantage in feeding), the hogs are saved the possibility of developing tuberculosis until such times as the formidable machinery that will be necessary to fight tuberculosis in cattle can be got going.

COLBORNE ONT SEDIMENTATION PURIFICATION TANK.



In those factories using much water the case is different. If the waste is not to become a nuisance it must be treated.

The proteid material in it is not difficult to handle; the sugars are not, but the fat which is in a finely divided emulsion presents a good deal of difficulty. Retention in storage for 48 or 72 hours, and the putrefaction that takes place will separate much of the fat, allowing it to rise to the surface. But this longer time even is not wholly sufficient, for putrefaction takes place slowly.

Longer retention means expensive tankage. In both of these factories we have tried a 48-hours retention, and to favor the reactions as much as possible, we have taken ad-Vantage of as many of the possible favoring conditions that we could. The tanks are divided into several communicating compartments by baffle boards, so that everything that will fall to the bottom will remain there and all that will float will

be held, the outlet being so placed that it will empty from the fluid between the sediment and the scum.

Sandy land was available in both places (one made, the other natural). This was used for intermittent land treatment, but by subsurface irrigation so as to avoid the encouragement of flies, the unsightly appearance and the odors of putrefaction.

Both plants have given satisfaction. There have been no nuisances about either factory. That specific cheese factory odor has disappeared from both localities. During the last two years the flies have been a considerable nuisance in other localities. In these two factories they have practically been absent, and whereas before very legitimate complaint was made about the streams below, no nuisance exists in this regard.

The same type of plant has been installed at each of the factories selected.

These plants consist each of a concrete elongated compartmental retention reservoir or tank of a size sufficient to hold two average days' discharge. From the retention tank the now partially-treated whey passes to a discharge reservoir (or flush chamber). This "flush chamber" is of a capacity sufficient to hold one-half day's quantity of sewage. It is provided with a float indicating when this level is reached. A hand valve is provided to liberate the fluid. The next part of the plant is an "Intermittent land filtration bed." (The land in both cases is of a very porous sandy character, through which fluid drains away quickly). This is of a size corresponding to the quantity of sewage to be treated, taking such land to be able to treat such tank effluent at the rate of approximately 25,000 gallons per acre per day. The sewage is not poured onto the surface of this area, for of necessity the areas are within a hundred feet of the factories. If the discharge was made on the surface, odors and unsightliness would obtain, and besides flies would probably be attracted in large numbers. To avoid all this we have placed garden tile subsurfacelly in rows some two feet apart over the whole area. We have used four-inch tile (ordinary field tile). These approximately hold one-half gallon each. The number then required for one half day's supply is easily calculated out. Now whatever is left of the sewage after going through

this plant into the nearby stream is practically pure water. The long retention adopted in these plants in the sedi-

mentation tanks, was done with the idea of encouraging all the sedimentation possible and all the separation of floating material, especially fat that could be done within practicability. Whey, when undergoing putrefaction gives rise to a considerable quantity of acid, especially if it is so confined that the acid does not get away. This acid is a considerable inhibitor of ordinary putrefactive bacterial activity, so that time must be called upon to help out. But the putrefaction which takes place, the emulsion sustaining nitrogenous material is decomposed, thus liberating the fat. This then floats to the surface. With larger tank capacity and dilution much could be done to encourage this process, but then one gets into expensive tank construction, and cheese factories cannot go to the expense this would entail.

## Detailed Description of the Innerkip Plant.

The daily discharge of waste at this plant averages 1,000

The tank proper is 12 feet by 5 feet 6 inches by 5 feet in gallons. depth and calculated to hold approximately 2,000 gallons, so as to give a two days' retention.

The flush tank or chamber at the end of the former tank is of a size sufficient to hold 500 gallons. To indicate this to the factory operators a float is provided. A hand value is