

Good Water For The Farm

By VINCENT J. YAWMANS



IT may be well before we begin the discussion of the farm water supply to note the fact that water anywhere is deceptive stuff. Whether in the farm well or city reservoir, appearance is no guide to potability—that is, drinkability. In fact, "for ways that are dark" water compares not unfavorably with Mr. Bret Harte's famous Heathen. The records of sanitary criminology abound in murderous waters whose personal appearance was everything that could be desired by the most fastidious. Pellucid, clear, sparkling, of delightful taste, quite odorless, these engaging fluids, upon analysis, have proved to be virulent poisons swarming with disease germs.

The sparkle of well and spring water is largely due to its content of carbon dioxide, the gas with which ordinary soda-water is charged. In the case of a natural water this gas is usually derived from the decay of organic matter. Soils soaked with sewage may, therefore, furnish a water clear, sparkling and, nevertheless, highly dangerous. The action of the ordinary household faucet filter well illustrates the deceitfulness of appearances. It produces a clear, sediment-free supply, but is not only quite useless in rendering contaminated water safe to drink, but may actually serve as an artificial hatchery for germs, and further infect the water instead of purifying it.

Even the so-called Pasteur-Chamberland filter, which when clean does remove the bacteria, cannot be depended upon unless it is scrubbed out every day or two, and thoroughly boiled at least once a week. As Professor Conn, a high authority in the bacteriological field, has clearly demonstrated, in default of such constant care (and, as a matter of fact, it rarely or never is so cared for in a family, whatever is done in the laboratory) the water is safer without the use of any filter whatever. In fact, no form of artificial water-filter has been devised that

does not require frequent cleaning. The only certain method of rendering polluted water safe to drink is boiling. Even sewage thoroughly boiled would be a safe, if nauseous, beverage—safe, at least, to the extent that it could not transmit infectious disease.

And this is the treatment to be subjected, against which any suspicion of pollution exists. That witty individual, who upon being advised to boil the drink-water, replied that he would rather drink an aquarium than a cemetery, was a better humorist than he was a bacteriologist. The germ aquarium is a poisonous and lethal thing, the germ cemetery relatively safe and harmless.

Water from the spring, the shallow well, the faucet filter and, under certain conditions of surface contamination, from the deep well, also, which looks, tastes and smells good, may be highly poisonous. "Water drawn from deep wells," says Doctor Bayles, "cool, clear and sparkling," has poisoned many people, and, on the other hand, highly colored, dirty-looking water, such, for instance, as that from the juniper swamps of Virginia, may be quite safe.

The foregoing may seem to the reader an undue amount of fuss over an obvious and unimportant point. Such is far from being the case. The wide-spread existence of this trade in appearances even in high places and among intelligent people, was well illustrated a year or two ago, when, during a trip to Panama, Mr. Roosevelt confounded the critics of the Colon water-supply by announcing that he had never tasted a better or more palatable water—the implication being that this was a certificate of wholesomeness. Hence sanitarians feel very strongly on the subject, because the notion that water may be judged by its appearance has killed and is still killing so many persons every year. Here is a sample of what they say, from the volume of Ellen H. Richards and A. G. Woodman, on "Air, Water and Food," which should be of special interest to the farmer:

"Pioneer settlers dug the well as near the kitchen door or the barn-yard as they could find water, with a blind faith in the protecting power of Mother Earth. . . . So persistent is this confidence in Nature that in the light of this day a majority of intelligent people even will quaff at the wayside well or drink freely at a country hotel or go to live in a city without taking thought of the quality of the water. . . . Water is water, and he who pauses with his glass half-way and asks whence comes the supply is scouted as a weak-minded crank."

A few of the possible pollutions of the farm well are illustrated by the accompanying sketches. No-where probably is there a well so

situated as to be subjected to all these sources of filth, but there are many—thousands of them—subject to infection from one or several. Suppose the man taking a bracing wash in the delightfully cool well-water has some infectious disease of eyes or skin or lungs. It is plain enough that he will, literally have washed his sores in the pitcher of water on the supper table. The washings, of course, are much diluted, and perhaps ninety-nine of the hundred times no harm is done. But, even so, the hundredth or thousandth chance is worth guarding against, even if the family isn't squeamish about drinking from a common wash-basin. Suppose there is infectious or simply dirty material from any source lying about the well or upon the open platform covering it. The chances are at least even that it will be washed in by the diluted steam of kitchen slops, which flows wellward during every rain-storm, or else be scratched in by the hens.

The well when on low ground and in the neighborhood of manure piles, hog-pens, out-door toilets, puddles of kitchen slops, etc., acts as a center for collecting the drainage from these sources, and it makes no discrimination against filthy liquors. The soil, to be sure, at first acts as a filter, especially if it is loam or sand; but in course of time it becomes saturated with filth and then a continuous flow of the latter into the well is maintained. When there are cracks or fault in the ground, connecting cesspool or barn-yard with the well, the flow will be much quicker, and filter action altogether eliminated. Especially in limestone regions there is always a possibility of underground fissures and streams, some of great length.

W. H. S. Bailey records the following remarkable case of underground infection: All the people of Lausen, Switzerland, except those occupying a certain row of six houses, obtained their water from a "splendid spring." In a little farm house on the opposite side of the mountain typhoid fever occurred. The brook running past this farm house was used as a local sewer. Very soon an outbreak of the same fever was noted in Lausen. The six families who did not use the spring escaped infection. This put the latter under suspicion. Tests were made for an underground connection between the farm house brook and the spring (by dissolving large quantities of salt and flour in the brook). It was found that while the passage of the water filtered from it such things as flour, the salt came through, and with it bacteria.

The precautions to be taken are self-evident. The well or spring should be on high ground, higher

than any of the possible sources of pollution if possible, and at least not lower than any of them. It should be provided with a tight covering or platform, and the upper several feet of its walls cased in cement to prevent the inflow of surface water; it should be far enough away from the nearest filth source to provide an ample intervening space of filtering soil. Twenty-five feet is sometimes given as the minimum distance. One hundred is safer because of the lessened liability of contamination along the surface of the ground, if for no other reason. Prof. William P. Mason has shown by actual tests that a cesspool on fairly level ground will spread contamination through the soil over an area of one hundred feet in diameter.

The usual way of making such a test is to dump into the cesspool or other suspected source of infection a large amount of common salt or a substance called fluorescein. If these substances are subsequently detected in the well water the certainty that it is being regularly polluted is manifest. Unfortunately, aside from this crude test, there is no simple method of certainly determining the wholesomeness of a water-supply. Water analysis requires extreme care and skill, and can only be satisfactorily performed in a special laboratory.

The farmer who is so skeptic about these new-fangled sanitary notions will perhaps ask to be "shown," before he spends money digging a new well or moving outhouses. He can try the flour-escein test, but a negative result with it is by no means equivalent to a clean bill of health for the water. He can hunt up the nearest laboratory and have an analysis made. But one satisfactory analysis is no guarantee of continued wholesomeness. It may occur to him—if he is looking for excuses—that, as the water has never caused sickness in his family and has been used by it for, say twenty years, this is a pretty good proof of its purity. This, unfortunately, is also a fallacy. Until the cess-pool which is draining or soaking into the well receives disease germs itself it cannot pass them along with drinking water.

