Microsystem for Collecting and Shipping Diagnostic Sera

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A system is described for collecting, shipping, and storing serum samples using light-weight plastic microtest plates.

In recent years there has been a move by many clinical and diagnostic laboratories toward test systems that require smaller volumes of reagents. This trend has brought about the refinement of many tests to the point that they can be most readily conducted with microliter volumes of reagents; however, the specimens still have to be shipped to the central laboratory in vials or test tubes required for shipping larger volumes.

For the past 2 years we have been working with the microagglutination test for the detection of salmonella agglutinins in poultry (3, 4), using a modification of the Takatsy method as described by Csizmas (1) and Sever (2). For these microtesting procedures, we employ sera collected from various poultry flocks throughout the United States. In the past these sera have been shipped in vials or stoppered test tubes which often leak because of poor sealing. They are also cumbersome to handle and to ship. For this reason, we sought a better system for shipping avian sera in satisfactory condition.

The system to be described in this report involves the use of microplates which will generally hold 275 μliters (0.275 ml) of reagents per well. There are three basic designs of this size microplate constructed of either flexible vinyl or rigid styrene. The rigid styrene plate having either 96, 110, or 120 wells, depending on the supplier, is recommended. When one serum sample is deposited into each well, 96, 110, or 120 specimens can be shipped in a lightweight, flat, compact container. Plates can be numbered and a key system set up to identify individual sera very quickly.

The blood for serum is collected in the conventional manner and allowed to clot. A volume of approximately 250 μliters (0.200 ml) of serum is then transferred with a Pasteur pipette and deposited into the well or wells that represent that serum sample (Fig. 1). The Pasteur pipette can be rinsed in saline between sera. When all of the serum samples are transferred to the microplate, the room temperature plate is tightly sealed with either the manufacturer's sealer (Fig. 2) or wide Scotch tape and placed in a freezer at −20 C to allow the samples to freeze. If the specimens are to be shipped to a distant laboratory for testing, the plates are wrapped in paper towels and placed in an insulated shipping container along with sufficient dry ice to maintain the frozen state until the shipment can reach its destination. Immediately before testing and while the sera are still frozen, the tape is removed from the plate.

In our testing programs, we dilute 10 μliters of serum in 100 μliters of saline, and, using the multi-microdiluting handle (Cooke Engineering Co., Alexandria, Va.), perform serial two-fold dilutions of the sera. With this shipping system, we can now equip the microdiluter handle with 10-μliter microdiluters and transfer

![Fig. 1. Transfer of serum sample from blood collection tube to microplate well.](image-url)
8 or 12 thawed sera at once (Fig. 3). Before we adopted this method, we had to individually handle each vial or test tube of serum and make single deliveries of the 8 or 12 sera. The system does not require any additional time since the sera would have had to be transferred to vials or test tubes before they could be shipped. There is, however, a great saving of time in performing the initial 1:10 dilution in the microtesting procedure. Conventional test procedures can be conducted with the sera from these microplates using a sampler or pipette for serum transfer. When there is need to keep the sera for extended periods, the microplates offer a convenient way to store large numbers of samples in a very minimum of space (Fig. 4).

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