A SURVEY OF BRUCELLOSIS AND TUBERCULOSIS SURVEILLANCE AMONG SHEEP AND GOATS IN THE UNITED STATES

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The occurrence of bovine tuberculosis in sheep and goats is generally considered rare and sporadic, however Mycobacterium bovis infections have been reported in both species1. Current programs in the United States detect tuberculosis through a slaughter inspection system that has the potential to trace back infected animals to the farm of origin. In theory, any suspicious lesions from red meat species are submitted to the laboratory2. In addition, regulations for pasteurized milk from sheep and goat dairies require a whole herd tuberculosis test yearly3.

Bovine brucellosis (Brucella bovis) is a debilitating and possibly life threatening human health condition that can be contracted through exposure to infected cattle, sheep and goats or through consumption of contaminated raw milk from these species4. In the United States, a whole-herd yearly brucellosis test is required on every Grade A sheep and goat dairy3.

In 1998, all USDA:APHIS:VS Area Veterinarians in Charge (AVIC’s) were surveyed concerning brucellosis and tuberculosis surveillance activities in sheep and goats. The purpose of this survey was threefold: 1) to determine the existing levels of surveillance for bovine tuberculosis and brucellosis in the sheep and goat populations of the United States; 2) to determine if the current levels of testing provide a representative sample of the sheep and goat population of the United States; and 3) to determine whether the records of USDA:APHIS:VS headquarters accurately reflect testing reported by officials at the state level.

Materials and Methods

Records were obtained from surveillance databases located at USDA:APHIS:VS headquarters in Riverdale, MD. A survey, containing questions about the state’s use of the Tuberculosis Information and Monitoring System (TIMS) and Brucellosis Recording and Reporting System (BRRS), the amount of testing performed in sheep and goats as well as the potential for seasonality in testing, was faxed to the AVIC for each state. The survey requested state level data from the years 1993-1998 for bovine tuberculosis and brucellosis testing in both sheep and goats. AVIC’s were also asked to compare state data with the records from VS Headquarters. In many cases AVIC’s passed the survey to other individuals such as state veterinarians or Area
Epidemiology Officers. Responses were obtained from all fifty states and follow-up contact was made with 25 states to obtain clarification of some responses. At this time, opinions on the level and adequacy of testing were also solicited.

Baseline data for sheep, goat and cattle populations were obtained from the USDA:National Agricultural Statistics Service (NASS). Data from January 1, 1998 were available for sheep and cattle, however, the most recent data available for goats were from 1992.

A one-tailed t-test of paired (dependent) samples (alpha 0.05, df 51) was conducted to determine whether or not there was a significant difference between the level of testing reported by the BRRS system and the level of testing reported by individual state officials.

**Results**

Not all states provided all of the data requested. While responses reported that both BRRS and TIMS are widely used, the numbers of brucellosis tested goats reported by state officials differed significantly ($t = 2.435$) from numbers documented at USDA:APHIS:VS headquarters. Despite survey reports of use, information from only six states was obtained from the national TIMS database, and no information was available for sheep from either TIMS or BRRS.

The results of the survey show that less than one-tenth of one percent of the total sheep population and less that one percent of the total goat population nationwide were tested for bovine tuberculosis or brucellosis in 1997. Tuberculosis testing at the state level varied from 0-0.14% in sheep and 0-63.2% in goats. State level testing for Brucellosis ranged from 0-6.95% of a state’s sheep population and 0-68.2% of a state’s goat population.

In response to questions on seasonality, most states reported that testing was performed throughout the year as needed, but that in many cases there were seasonal peaks coinciding with fair and show seasons. Some states reported that testing was more sporadic than seasonal, due in part to small numbers of sheep and goats in the state and few testing requirements.

Of the 25 states in which follow-up was conducted in November of 1998, no state or federal officials could recall any serious problems with either tuberculosis or bovine brucellosis in the sheep and goat populations of their state. Few officials mentioned finding either animals that were tuberculosis reactors or had a brucellosis titer and none of these cases were confirmed on follow-up testing by comparative cervical (for tuberculosis) or re-titering on a separate serum sample (for brucellosis).

**Discussion**

While we do not know the reason for the difference between the numbers reported by state officials and the numbers obtained from USDA:APHIS:VS databases, it could be attributed to many things including duplicate reporting or multiple sources for the
data. Regardless of the cause of this discrepancy, the adequacy of this database as an indicator for the actual numbers of sheep and goats tested should be considered with caution.

It should be noted that most of the sheep tested in a given year represent sheep from only a few flocks. Many of the state reports included both number of animals tested and the number of flocks that this represented. It does appear that goats are tested more frequently, and that the data are entered in the databases more often as well. In many states, although larger numbers of goats than sheep were tested, the tested goats also seemed to be confined to a small number of herds. The small number of herds being tested, with large numbers of animals being tested per herd, may be due to whole herd testing of animals used for dairy purposes.

Although the TIMS and BRRS systems were originally developed for use in the cattle industry, these systems both allow states to record information on sheep and goat testing. As eradication efforts in cattle near completion, surveillance to detect the presence of bovine brucellosis and tuberculosis in all potentially affected livestock species will increase in importance.

Bovine brucellosis and tuberculosis are diseases of great veterinary, public health and economic importance throughout the world. In the United States, both diseases have nearly been eliminated from cattle through cooperation between members of the cattle industry, veterinarians, state and local governments as well as the USDA. As the last few infected cattle are eliminated, the importance of extraneous sources of these diseases increases. Surveillance must be maintained at adequate levels to prevent the importation and spread of brucellosis and tuberculosis, and to manage other potential reservoirs that exist in the United States. The most immediate need is to continue to evaluate and improve existing surveillance methods for the reliable detection of these diseases in all potential reservoirs: sheep, goats, cattle and wildlife.

References
3 Food and Drug Administration. Pasteurized Milk Ordinance.