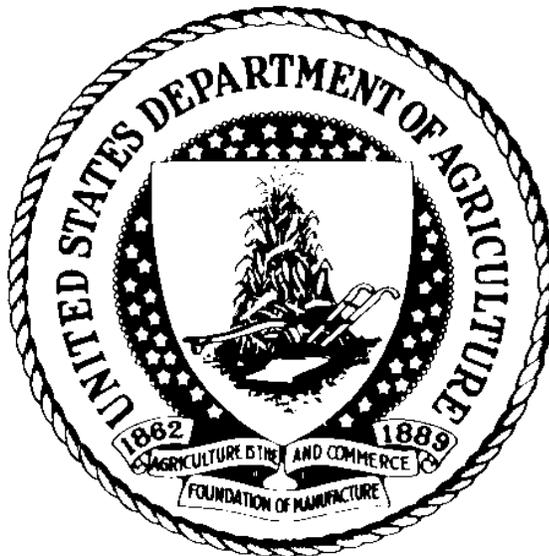


MICROBIOLOGY LABORATORY GUIDEBOOK

UNITED STATES DEPARTMENT OF AGRICULTURE
FOOD SAFETY AND INSPECTION SERVICE
OFFICE OF PUBLIC HEALTH AND SCIENCE
MICROBIOLOGY DIVISION



B. P. DEY, DVM, MS, MPH, Ph.D., Editor
C. P. LATTUADA, Ph.D., Co-Editor

Editorial Board

A. M. McNAMARA, Sc.D., R. P. MAGEAU., Ph.D. and
S. S. GREEN., Ph.D.

3RD EDITION, 1998
VOLUMES 1 & 2

FOREWORD

The 1993 *Escherichia coli* O157:H7 outbreak in the Pacific Northwest focused national attention on food safety. Since then, the number of requests for reprints on analytical methods used by the Microbiology Division, Office of Public Health and Science, Food Safety and Inspection Service, United States Department of Agriculture, has increased dramatically. Scientists within the Division have responded to these requests by completely revising and updating our Microbiology Laboratory Guidebook (MLG) for publication.

This MLG is our laboratory guidebook for the microbiological analysis of meat, poultry, and egg products that fall under the jurisdiction of USDA. It contains methods that FSIS prefers to use for the analysis of these foods. Since USDA does not endorse or approve methods for use by the food industry, inclusion of a particular method in the MLG should not be construed in this manner. Similarly, the mention of specific brand or trade names for a product, medium, chemical or reagent associated with methods contained herein does not constitute endorsement or selectivity by the authors or USDA over similar products that might also be suitable.

The use of the MLG comes with several caveats. This guidebook was written for microbiologists, and its interpretation and use should only be undertaken by trained microbiologists. FSIS assumes no responsibility for any economic, personal injury or other damage that may occur to individuals or organizations because of the use of methods contained in this guidebook. Users should note and pay particular attention to the safety caution symbol (†) and written warnings associated with certain hazardous chemicals or dangerous biological materials used in some of the methods. Users must act in a responsible manner at all times to protect themselves and the environment during performance of these methods. This guidebook must be supplemented with quality assurance and quality control programs as well as chemical, biological, and employee safety hazards management programs in order to operate a microbiology laboratory. These programs are beyond the scope of this guidebook and are the sole responsibility of the user to develop and implement.

This guidebook contains protocols for analytical tests that are required by FSIS regulatory activities. Some protocols, such as the Bioassay procedure for antibiotic residue detection and quantitation, may not be of value to commercial laboratories nor do we expect others to try to commercialize them. They are included here primarily as informational material since they are part of our current analytical methods.

The 1998, 3rd edition MLG publication consists of two separate volumes with a newly revised format utilizing a loose-leaf binder.

This format should make the updating of chapters easier by allowing the substitution of a single chapter or page versus reprinting of the entire MLG. Because we anticipate the addition of new materials, the chapter numbers between volumes are not continuous in order to accommodate all changes.

Publishing this new 3rd edition MLG replaces all previous MLG versions and supersedes all Laboratory Communications, which should be discarded.

Finally, to produce a work of this magnitude requires a team of dedicated scientists and support staff. I would like to thank the following people for their efforts: Larry H. Dillard, Joseph Y. Chiu and James G. Eye for coordinating the FSIS Technical Support Laboratory reviews of the manual; Microbiology Division staff members Bhabani P. Dey, Stanley S. Green, Charles P. Lattuada, Bonnie E. Rose, Richard P. Mageau, and Gerri M. Ransom for composing, editing and proofreading many chapters; and Julie M. Hall for providing secretarial support in typing most of the chapters under trying conditions and meeting the demands of a diverse group of scientists.

Ann Marie McNamara, Sc.D.
Director
Microbiology Division
Office of Public Health and Science
Editorial Board, MLG

January 1998

GENERAL CONSIDERATIONS

Before any analyst attempts to perform the microbiological methods contained within this Microbiology Laboratory Guidebook (MLG), it might be helpful to call attention to the following general considerations in the use of this guidebook.

In order to maximize the achievement of successful results when using the various methods in this MLG, it should be clearly understood that all methods and procedures should be performed at all times in a manner as close as possible to the prescribed directions. Particular attention should be paid to all details provided in a given analytical procedure. Changes or shortcuts should not be attempted in a method simply to accommodate factors, for example, such as processing a large number of similar samples through the method at the same time.

All chemicals, media, immunoreagents and commercial test kits should be within current shelf expiration dates and be subjected to quality control and quality assurance procedures to insure their proper performance for their intended purpose and use within the methods presented in this MLG. All instrumentation should be subjected to continuous maintenance and appropriate quality control procedures to insure unquestionably correct performance during use in all methods. The use of positive and negative test controls at all times, as specified for a given procedure, should be implemented. Adequate documentation and record keeping should be employed for all analytical results, test controls, quality assurance and quality control procedures, instrument maintenance programs, and any observed laboratory deviations to the above or in methods performance.

Although all of the methods described in this guidebook have exact numerical values given for performance parameters such as weight and volume measures, pH, time and temperature to achieve optimum results, it should be clearly understood that an acceptable range exists within which optimum results can still be expected to be achieved without compromising the integrity of the method. For any given method, unless otherwise clearly stated within the text of this MLG, the following allowable ranges for the given parameters are considered to be acceptable and are applicable:

Weight and volume measures: $\pm 1\%$
pH: ± 0.2 units
Time: hours ± 1 hour; minutes $\pm 1\%$
Temperature: $\pm 1.0^{\circ}\text{C}$