

ASSESSMENT OF THE MICROBIOLOGICAL NEEDS OF THE INDUSTRY

MEETING THE ACADEMIC NEEDS OF
MICROBIOLOGISTS IN THE FOOD AND
PHARMACEUTICAL INDUSTRIES

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Why do we need to make an assessment?

- Microbiology – an indispensable component in many processing industries
 - a dynamic field
- Methods and techniques have to conform with the changes in need and technology
- Are the procedures that we apply updated?

Why should methods be updated?

- Internationalization – commodities that we produce are to be exported and used elsewhere
- Validation of results – for certain verifications, experiments can be replicated in other laboratories

Food and Pharmaceutical Microbiology

- Both are applied branches of microbiology

Food microbiology – study of microorganisms associated with food, their activities and effects on the food and on the consumer

Pharmaceutical microbiology – study of microorganisms associated with the manufacture of pharmaceuticals and medical devices

Importance of microbiology in the food industry

- With the unabated incidence of **foodborne diseases** and frequent occurrence of **food spoilage**, there is an ever-growing concern over **food safety** and **quality** and in **food preservation**
- Production of foods utilizing beneficial microorganisms

Importance of microbiology in the pharmaceutical industry

- Responsible for ensuring that medications and other products do not contain harmful levels of microorganisms and toxins (**product safety**)
- Manufacture of pharmaceuticals using microorganisms
- Role of microbiology on the advances in the healthcare industry have led to great discoveries, from vaccines to devices

Microbiology in the Pharmaceutical Industry

- Understanding the principles of microbiology can lead to the discovery of antimicrobial drugs that would prevent an escalating number of communicable diseases

What are the basic competencies required of a microbiologist

- Aseptic techniques – to prevent contamination and maintain purity of cultures. Accurate characterization and identification of most microorganisms can be made only with pure cultures
- Isolation, detection, enumeration and characterization of both harmful and beneficial microorganisms
- Specific techniques in quality control and toxin detection

Basic Competencies

- Ability to design experiments (amenable to statistical analysis) and interpret results
- Troubleshooting – sometimes there will be a need for modification of procedure to suit particular needs
- Record keeping, documentation including reporting of results
- “Housekeeping”

Important Techniques/Practices

- Culture maintenance and preservation – used as bases for the interpretation of reactions of unknown cultures and for comparative studies

In industry, cultures of strains with special or unique characteristics must necessarily be maintained

Important Techniques/Practices

- Monitoring microbial growth
- Determination of microbial population
- Detection of organisms that are harmful and those that are beneficial
- Microbiological examination of products or materials that are used in manufacture
- Toxin detection

Important Techniques/Practices

- Examination of different molds, yeasts and bacteria that are associated with the products made by the company

Microbiologists should be familiar with the microorganisms of concern so that they will be able to control these

Important Techniques/Practices

- Determination of heat resistance of microorganisms of concern – especially applicable to the food industry
Determination of heat resistance is a very important factor to consider in the production of safe and shelf-stable foods
To be able to understand the heat destruction and resistance of microorganisms, a mathematical expression for the heat treatment required to kill a given number of a pure culture of microorganisms is necessary.

Important Techniques/Practices

- Test for commercial sterility
- Hazard Analysis and Critical Control Point
Industries traditionally rely on random sampling and testing of final products to control the quality of their goods. This practice, being reactive, is less efficient in ensuring safety of products and can lead to profit loss in cases of product rejections or recalls due to contamination or legal cases from complaining customers

Important Techniques/Practices

- HACCP – a preventive tool employed by the industry to protect products against hazards. Involves identification of specific hazards of physical, chemical and biological in origin throughout the entire process involved in the production and focuses in measures for their control
Universally recognized, recommended as the most effective way to prevent food-borne illnesses.

Important Techniques/Practices

- Antimicrobial activity and disinfection
- Validation of disinfectants
- Assessment of cleanrooms and controlled environments
- Risk assessment
- Precise detection of pathogens in samples
- Procedures for containment

Role of the Academe in Meeting the Needs of the Microbiologists

- Retraining/Retooling
- Provision of services – analysis of samples and other specialized tests or procedures
- Consultation
- Offering of specialized subjects, not only for BS, MS, PHD, but even for non-degree students

Role of the Academe

- Publication of manuals which can be used as reference materials in the industry

They contain the techniques, detection protocols and other procedures that are applied in microbiological work.

Principles/basis of the methods are also included.

Role of the Academe

- Offering of short courses, training programs and seminars

The above can be designed to accommodate request of the industry.
