

CHALLENGES IN THE DETECTION OF MEAT BORNE PATHOGENS

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Meat industry in India is waking up. With around 5 million tons of production and an annual growth rate of 4.1%, it is no more a sleeping giant. As 70 plus percent of our population are non-vegetarians, the risk of them getting exposed to different food pathogens cannot be ignored. In the wake of increasing production, increasing global trade, introduction of new meat products and increasing consumption, the food microbiologists in this country is facing a challenge. The main challenge is to cater for the needs of industry, as well as to meet the responsibility towards the customer. The challenge is more like a fight against shadow as the microbial standards for the meat is yet to be defined in the Country. When we talk of problems specific to meat borne food pathogens there are certain frequently asked questions. By answering the following questions, the task of meat hygienist can be discussed in a better way.

Q. There are many pathogen detection methods already in use for food items other than meat. Do we really need to consider meat separately?

Ans: The answer is, yes, we need to. The methods used in other food items may not be successful in meat. Because meat by virtue of its' complicated structure and with the presence of some inhibitory substances need to be addressed separately. Secondly, meat contains a wide range of pathogens compared to a product like canned honey, which may mainly contain Clostridium. Thirdly, as the meat is highly perishable and as the storage involves high cost the test results are needed as early as possible. Next, there is risk of meat originating from an animal having a zoonotic disease, escaping meat inspection and thus reaching the consumer. Finally, as the meat is an excellent medium for microbial growth, even a small initial load of contamination may prove dangerous.

Q. We have lot of traditional culture methods. They are proven too. Aren't they enough?

Ans: No, they are not enough. Most of the traditional methods we follow now are the ones which is originally intended for the isolation of organisms from clinical samples. These methods are time consuming. Moreover they can only detect one organism at a time. That is, if you inoculate a sample for detecting Salmonella, you cannot use the same to detect Listeria.

Q. So we know that we need different microbial detection methods for meat. Then why can't we work on it and bring out certain novel methods?

Ans: We have done a lot. But more is remaining to do. As a result of the efforts by many workers certain microbial quantification and identification methods have been tried and used in meat. Some of them are;

1. Physical methods
 - a. Impedance measurement.
 - b. Micro calorimetry.
2. Chemical methods
 - a. Detecting thermostable nuclease.
 - b. Lux gene luminescence.
 - c. Adenosine triphosphate measurement.
3. Molecular methods
 - a. Polymerase chain reaction.(PCR)
 - b. Direct epifluorescent filter technique.
4. Immunogenic methods
 - a. Radio-immunoassay
 - b. Gel diffusion
 - c. Salmonella 1-2 test
 - d. Enrichment serology

There are many others, which can be added to this list. Other than this, commercial diagnostic kits based on these methods are also available in the market. All these tests are having advantages over the old traditional methods.

Q. So, with all these methods in our hand, is there any need for further research in this area?

Ans: Yes. Although these tests are superior to the old ones, they too have many limitations. Limitations with respect to specificity, sensitivity and time to get the results are yet to be improved. Pursuit, to have tests, which can be used with least technical expertise and equipment support, is always a constant challenge for the food microbiologist. Improvements on new methods need to be explored. For example, multiplex PCR, which can detect more than one pathogen at a time, has been very promising. Many methods developed or exists in the developed countries can be adopted by us. But most of these countries look for very less or specific pathogens as they are eliminating many pathogens during the production itself. (Eg. Salmonella free stock etc.)

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FOOD BORNE INFECTION AND INTOXICATION

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Food safety has become an issue of special importance for the food industry. There are many opportunities for food to be contaminated between production and consumption. Food can be contaminated at the farm, ranch, orchard, or in the sea. Food also can be contaminated at food processing plants and during transport to food establishments. Finally, food can be contaminated during the last stages of production, at retail establishments, and by consumers in their homes. Even when food is purchased from inspected and approved sources, ingredients may be contaminated when they arrive at the food establishment. It is important to know how to handle these ingredients safely and how to prepare food in such manner that reduces the risk of contaminated food being served. Food safety in retail food establishments begins with managers who are knowledgeable about food hazards and who are committed to implementing proper food handling practices in their facility. It continues with properly trained food workers who understands the essentials of food safety and sanitation and who will not take shortcuts when it comes to food safety. In this context, knowledge regarding food borne illness assumes great significance.

Foodborne illness

Foodborne illness is any illness caused by consumption of contaminated food. Symptoms of food borne illness generally include nausea, vomiting, diarrhoea, headache and fever. Food borne illness has been classified into three categories-

1. Food borne infection - When living, disease-causing microorganisms is eaten along with a food cause a food borne infection. Food infection occurs when food contains a large

number of living harmful bacteria which grow in the human intestinal tract. Symptoms usually occur between 4 to 48 hours, lasting from 2 to 4 days (death has even occurred). Common symptoms are an upset stomach with violent diarrhea, cramps, fever, nausea and vomiting.

2. Food intoxication- When living organisms multiplies in or on a food and produces a chemical waste/toxin or, if the food containing toxin is eaten it leads to food borne intoxication. Symptoms are usually severe and occur quickly than food infection (1 to 8 hours after eating). Toxins can also cause tissue damage in the intestinal tract, while some affects the nervous system. Symptoms vary (violent nausea and vomiting, headache, dizziness and cramps). The illness could be one or a combination of these symptoms. The illness may last for several days and could be fatal.

3. Toxin-mediated infection- It is a combination of infection and intoxication, caused when a living organism is consumed with food. The organism inside the human body produces a toxin that causes the illness. It is different from intoxication in that the toxin is produced inside the human body.

Classification of food borne diseases

