



HACCP – A TOOL IN CONTROLLING FOOD BORNE ZOOSES

Dorothy Pushparani* and Rita Narayanan

Food Chemistry and Food processing, Loyola College, Tamilnadu, India.

Corresponding Author

Article Info

Rita Narayanan

Email:- ritanarayanan@gmail.com

Received 26/10/2014

Revised 15/11/2014; Accepted 22/11/2014

ABSTRACT

Zoonoses are infections or diseases that can be transmitted directly or indirectly between animals and humans, for instance by consuming contaminated foodstuffs or through contact with infected animals. The severity of these diseases in humans varies from mild symptoms to life-threatening conditions. Research indicates that between one third and one half of all human infectious diseases have a zoonotic origin, that is, are transmitted from animals. About 75% of the new diseases that have affected humans over the past 10 years (such as the West Nile Virus) have originated from animals or products of animal origin.

Key words: *Zoonoses*, foodstuffs, infected animals .

INTRODUCTION

Zoonoses are transmissible between animals and humans in a variety of ways and an infection can also often be transmitted through multiple ways:

Food-borne zoonotic diseases

- Food-borne zoonotic pathogens are transmitted through consumption of contaminated food or drinking water. Infectious agents in foodstuffs include bacteria such as *Salmonella* and *Campylobacter*, viruses such as norovirus or hepatitis A virus, and parasites such as *Trichinella*.

- The infectious agent which causes Bovine Spongiform Encephalopathy (BSE) in cattle can also be transmitted to humans through consumption of contaminated meat causing variant Creutzfeldt-Jakob disease. Unlike other food-borne diseases which are

spread by microorganisms, BSE is caused by a prion, which is an abnormal form of a protein .

Non-food-borne zoonotic diseases [1]

- By vectors, i.e. living organisms that transmit infectious agents from an infected animal to a human or another animal. Vectors are frequently arthropods, such as mosquitoes, ticks, flies, fleas and lice and can transmit diseases such as malaria, West-Nile virus and Lyme disease.

- Through direct contact or close proximity with infected animals. Diseases that are mainly transmissible to other animals or humans in this way include:

- Avian influenza , which is a viral disease occurring in poultry and other birds. Pigs can also be carriers of this virus as well as of other influenza viruses. Avian influenza primarily affects birds, but there have been cases of viruses being transmitted to humans and other animals through close contact with infected birds.

- Q fever is a disease, caused by the *Coxiella burnetti* bacterium, affecting animals and humans. It has been reported to be present in a wide range of species, including cattle, sheep and goats as well as birds and arthropods. Human infection mainly results from the inhalation of dust contaminated with bacteria from the placenta and birth fluids or faeces from infected animals. Other modes of transmission, such as through contaminated water or the feces of infected arthropods are rare.

- A specific strain of the Meticillin-resistant Staphylococcus aureus (MRSA) bacterium (CC398) which can be transmitted through contact with live animals.



○ *Salmonella* infections can originate from contact with infected reptiles and amphibians such as pet snakes, iguanas and frogs or their environment.

These diseases can also be transmitted through the environment, e.g. Verotoxin-producing *E. coli* in contaminated swimming water.

Many zoonotic diseases, such as rabies or ringworm, have been around for hundreds of years. Others, such as cat scratch disease or leptospirosis, are new or emerging diseases. In fact, reports indicate that over 75% of emerging pathogens in humans are considered zoonotic diseases.

RISK FACTORS INVOLVED IN TRANSMISSION OF ZOONOSIS:

“Risk” implies the probability that harm, injury, or disease will occur among the general public because of accidental release of a competent disease and/or associated agents. In the context risk assessment considers two kinds of effects: direct effects, such as biting, infestations, and myiasis, and indirect morbidity and mortality due to the pathogens transmitted. The latter is by far of higher concern.

How do we determine the risk factors involved?

Some questions that may help in this risk factor assessment include:

1. What is the infectious agent involved?
2. What route of transmission is indicated?
3. Are agents that the animal transmits transferred horizontally?
4. Are there reasons to believe that a novel or unknown agent is present?
5. What epidemiologic data are available?
6. What is the morbidity or mortality rate associated with the agent?

The responses to these questions may identify the risk factors existing and a summary statement can be used to determine a biosafety level [2].

The risk factors are as below:

- People who have close contact with animals, whether it is pet owners, livestock producers, or animal health providers, can be at increased risk for zoonotic diseases.
- Additionally, individuals with weakened immune systems, such as children, the elderly or pregnant women, can also be at increased risk.
- Consuming contaminated food, water.
- High interactions with animals can pose a risk for zoonoses, diseases of animals that can be transferred to humans, leading to infection and disease
- No proper awareness to zoonotic diseases no proper prevention measures
- No proper maintenance of optimum health in animals.

- Veterinary and human healthcare professionals are at a high risk. The hospitals receive and attend more to sick animals and diagnosis is supported by laboratory screening hence records more cases

- Increased risk recorded during the rainy season might be due to the persistent erosion which washes contaminated soil into surface water and streams which serves as sources of drinking water for most communities in developing countries.

- The risk is significantly higher among farmers compared to other occupation examined probably due to the fact that farmer are more exposed to the sources of infection which include exposure to animals and soil which serve as reservoir of infection.

MANAGING THESE RISK FACTORS

Zoonoses can be transmitted directly or indirectly between animals and humans, for instance by consuming contaminated foodstuffs; the management of this can be achieved through a well-defined HACCP SYSTEM.

HACCP is an acronym for the Hazard Analysis and Critical Control Point system.

It provides structure for objective assessment of ‘what can go wrong’ and requires controls to be put in place to prevent problems.

HACCP is a preventative food safety management system and hence can be applied to those Zoonotic diseases transmitted through food.

The HACCP concept is a systematic approach to food safety management based on recognized principles which aim to identify the hazards that are likely to occur at any stage in the food supply chain and put into place controls that will prevent them from happening. HACCP is very logical and covers all stages of food production from the farm stage to the consumer, including all the intermediate processing and distribution activities.

Because it is a step by step approach it is less likely that hazards will be missed. HACCP, therefore, offers increased confidence to the food business and its customers and hence can be adopted to decrease the occurrence of zoonotic infections..

HACCP is cost effective through prevention of waste and incident costs and demonstrate due diligence where required [3].

In brief, HACCP is a structured, logical technique applied by following a few straightforward steps

1. Looking at how the product is made -from start to finish and step by step, identifying possible hazards, deciding at what step in the process they are likely to occur and putting in controls to prevent these hazards from occurring.

2. Deciding which of these controls are absolutely critical to food safety.



3. Setting a limit for safety for the operation of these critical controls.
4. Monitoring these controls to make sure that they do not exceed the safety limit.
5. Identifying the likely corrective action should something go wrong.
6. Documenting the requirements and recording all findings as the products are produced.
7. Ensuring that the system works effectively through regular reviewing of performance and auditing.

What are the seven HACCP principles?

The principles (Codex 1997b) are as follows:

Principle 1: Conduct a hazard analysis.

Principle 2: Determine the critical control points (CCPs).

Principle 3: Establish critical limit(s).

Principle 4: Establish a system to monitor control of the CCPs.

Principle 5: Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

Principle 6: Establish procedures for verification to confirm that the HACCP system is working effectively.

Principle 7: Establish documentation concerning all procedures and records appropriate to these principles and their application.

As well as ensuring good facility design it is important to control hygiene in the other elements of operations such as formulation design, raw materials, processing and packaging [4].

Key areas will include:

- ✓ Time and temperature control
- ✓ Control of incoming materials.
- ✓ Packaging materials control
- ✓ Documentation and record keeping.
- ✓ Cross-contamination control (microbiological, chemical and physical).
- ✓ Water (all areas, i.e. as an ingredient and for sanitation).
- ✓ Waste removal and drains can be ready sources of contamination if not managed.

Proper preparation and planning are fundamentally important to developing a successful HACCP system. It is

essential at the earliest stage of setting up a HACCP system that:

- Senior management commitment is assured.
- The appropriate people are identified and trained.
- The prerequisite support systems already in place are established
- and what needs to be further developed is planned for.
- The most appropriate structure for the HACCP system is selected after careful consideration.
- The entire project for the development and implementation of the HACCP plan is planned.

CONCLUSION

A HACCP system will only achieve its purpose in managing food safety if it is kept up to date, i.e. through continuous maintenance. It needs periodic review, updating and amending if it is to remain current and, therefore, effective. Operations change all the time due to factors such as new materials, new diseases and products, improved methods, updated equipment and structural changes. New scientific information on hazards may lead to a review of existing controls. It is therefore necessary that the information resulting from such changes is used to update and amend the HACCP plan at least annually. 'HACCP maintenance' is not a HACCP principle but it is important. If the HACCP study is carried out on a product or process that no longer exists then it will be of little value in controlling food safety for the current activities of the business. Maintenance of the HACCP system can be achieved by following the steps and the activities considered include regular auditing, hazard data analysis, updating and amending the HACCP plan, all of which should be supported by ongoing training and educational requirements. It is important that refresher training is carried out regularly to ensure that all personnel involved in HACCP system implementation and use are kept aware of changes to the system and the occurrence of new information, particularly with regard to hazards and their control.

REFERENCES

1. Mary Ann Liebert, (2003). Risk Assessment for Arthropod Vectors, *Vector borne and zoonotic diseases*, 3(2), 63-67.
2. Pius Stephen Ekong, Raymond Juryit, Ndahi Mwapu Dika, Patrick Nguku, Monica Musenero. (2012). Prevalence and risk factors for zoonotic helminth infection among humans and animals. *The Pan African Medical Journal*, 12(6).
3. Leslie Pray and Ann Yaktine. (2009). Managing food safety practices from farm to table, Forum Food and Nutrition Board, The National Academies Press .
4. Sara Mortimore and Carol Wallace. (2001). Food Industry briefings HACCP, Blackwell Science.

