BOOK REVIEWS

CONTAMINATION OF ANIMAL PRODUCTS: PREVENTION AND RISKS FOR PUBLIC HEALTH

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Gabriel Mbassa, Department of Veterinary Anatomy, Faculty of Veterinary Medicine, Sokoine University of Agriculture, P.O. Box 3016, Morogoro, Tanzania.

This is multiauthored book which has been published by Office International des Epizooties, Paris France, written in English, French and Spanish all in one volume. It serves as source of information about sources of contamination of animal products, how to prevent them and warns of the risks for public health. It is organized in ten sections each with several papers. Each paper is written by a specialist in that area.

The first section introduces the concepts of public health risks from food and products of animal origin. Its first two papers cover the aspects of food quality and safety standards for international trade, risk and food safety chain including animal health, public health and the environment. The third and fourth papers discuss epidemiological role in public health and the long term sequale to food borne diseases.

The introduction on food quality and safety standards reviews and describes the role of the Codex Alimentarius Commission of the Food and Agricultural Organization/World Health Organization responsible for standards, guidelines and recommendations on the quality and safety of food in order to protect consumers, at all stages of productions, consumption and at trading level. In addition to this the paper offers some responses to challenges posed by new approaches in different countries, impact of changes, approaches to quality control, primary influences and future aspects, particularly involving regulations to sanitary and phytosanitary food standards,

regulations based on sound scientific evidence and acceptable risk analysis procedures that involve consumers, industry, scientists and academicians.

The risk and food safety chain described in the second paper with animal health, public health and the environment as main components cover the hazards and history, risk analysis, hazard types and identification, the environment and improvement of animal health and public health systems.

The third paper gives some concepts in epidemiology, kinds of epidemiological studies, production environment, food borne outbreak investigations and control of bias.

The long term sequale to food borne disease is provided in the last paper. In this discussion it is noted that the emphasis on food borne diseases has always been on acute cases. The long term and cummulative diseases are least described. Evidence is apparent that many food borne diseases have serious health effects in the long term with significant economic impact. A few of diseases of this nature are described including reactive arthritis from enteric pathogens, Guillain Borre symptome *Campylobacter jejuni* infection and Johne's disease in humans and cattle.

The second section describes concepts for prevention of public health risks. Organized in two papers the first of which covering hazard analysis and critical control point systems in the USA and the second on the same aspects on sea food. The main thrusts of these papers are on pathogen reduction and hazards analysis, sanitation standards procedures, testing of microorganisms such as *Escherichia coli*, Salmonella and a variety of bacteria from sea foods.

The third section is a series of six papers on beef, describing the risks and prevention of contamination in the USA covering microbial risks, cattle feeding management, risk assessment and management and health maintenance and provides a table listing quality assurance critical management points for feed lot feed stuffs, ingredients and additives. This table first gives

wilderbeast (*Conochaeta taurinus*), elephant (*Loxodota africana*), lion (*Ponthera leo*), leopard (*Panthera pardus*) and jackal (*Canis mesomelas*). This section provides an extensive table with the list of diseases detected for each species. The species of animals listed is however very little compared to the numerous antelopes and wild ungulates consumed in Africa, thus the information is very far from complete.

The wild and feral swine are incriminated to be resorvoirs of infection to domestic swine. They are not considered to pose a major public health concern. The most important of the threats are due to trichnellosis and *Brucella suis* infections. Others include *Salmonella* and *Esherichia coli* infections and *Mycobacterium bovis*.

There is increasing consumption of ostrich and corocodile meat in the world and several infectious agents and chemical substances potentially capable of contaminating the meat thus posing a danger to human handlers and consumers are described. It is reported that there is no danger in ostrich meat for Crimean - Congo haemorrhagic fever or spongiform encephalopathy. However contamination of ostrich meat with *Salmonella, Chlamydia, Pateurella, Mycobacterium* and Erysipelas is possible. Furthermore residues from growth hormones, antibiotics and acaricides are potential public health hazards.

As far as crocodile meat is concerned there is a possibility of contamination with *Salmonella* and *Chlamydial* agents, *Mycobacterium* spp (though very rarely), tape worm cysts, trichnellosis, coccidiosis in tissues and organs. In crocodile meat sparganosis has been found to be of public health concern. This results from infection of the crocodile with the tape worm *Spirometra erinacei,* which produces an infective stage (spargana) in the muscle. The infection causes inflammation of the skin, swellings and muscle pain in people who consume infected meat.

Contaminated bee products have been found to pose risks for human health. Contamination comes from bees collecting honey, honey-dew, pollen and water from

the process or step where quality of beef is compromised, then the potential problem, following by criteria or critical limits, procedure for monitoring frequency, corrective measures, recording and verification. This is a very useful component of this paper as a source of education for public, government, scientists, academicians and beef industry management. The hygienic conditions for beef in Argentina, New Zealand are provided in the second and third papers, whereas an outbreak of *Escherichia coli* 0157:H7 in livestock in Japan is given in paper that follows serving as an example of importance of food contamination inspection particularly beef hygiene.

In the fifth paper on the section on beef, the risks and prevention of contamination of beef carcasses during slaughter and subsequent processes are covered substantially for the USA, with main components of abattoirs, supply of cattle, live animal examination, slaughter pathogen prevalence, location sanitation and contamination and numerous others. The risk reduction measures described include microbial monitoring, carcass treatment, use of antimicrobial agents and regulation any measures.

The possibility of hazards due to microbial agents in dairy cows, used for meat following culling is described in the last paper of beef section. Included in this are *Salmonella, Escherichia coli, Clostridium perfringes, Listeria monocytogens, Staphylococcus aureus,* and *Campylobacter jejuni.*

The fourth section contains three papers dealing with meat from small ruminants covering the public health hazards in Europe, the Caribbean and Australia. The main subjects discussed in these papers are the pathogens transmitted by meat from small ruminants including *Toxoplasma gondii, Clostridium perfringes, Staphylococcus aureus, Campylobacter jejuni; Escherichia coli, Yersinia enterocolitica, Listeria monocytegenes, Brucella spp, Salmonella spp, Bacillus anthracis, Cryptosporidium parvum, Echnococcus granulosus, Giadia duodenalis, Fasciola spp, Chlamydia psittaci,*

Scrapie, Leptospirae, *Coxiella burnetti*, and other miscellaneous agents such as *Corynebacterium pseudotuberculosis*. Other components covered for meat from small ruminants are meat production, animal trade, animal health states, laboratory examinations, risk analysis of meat consumption, production environment, management procedures, zoonotic diseases, chemical residues and assessment of meat tissues, bone and blood for microoganisms.

Section five of the book describes milk and dairy products in four papers covering milk pasteurization and safety, pathogenic microorganisms in milk and dairy products, risks and prevention of contamination of dairy products, and public health and safety of milk and milk products from sheep and goats. The main diseases considered in this section are *Mycobacterium tuberculosis* complex, and other bacteria such as *Salmonella, Listeria monocytogenes, Bacillus cereus, Campylobacter jejuni, Yersinia enterocolitica, Escherichia coli, Staphylococcus aureus Enterobacter sakazakii* and *Brucella spp*. The description covers France and Europe in general. The risks and prevention of contamination include general and point out specifically for each target microorganism. The section councludes with hygiene controls for milk and milk products from sheep and goats, potential contaminants and pasteurization procedures.

Section six deals with pork and pork products. The first two of its four papers discuss the public health and pork pre-harvest safety and slaughter perspectives, parasites associated with pork products. The third and fourth papers are on public health and pork and pork products first in the USA and the second in Denmark, concluding with producer perspectives. This section offers knowledge on indications for improvement of food safety; deaths from food borne diseases, drug resistant pathogens, consumer demands, aesthetics, emerging pathogens. Others include quality checks and quality assurance, hazard analysis and critical control point systems, pre-harvest intervention measures and increase of consumer

confidence. The parasites associated with pork and pork products included are *Trichaella spiralis, Taenia solium* (Cysticercosis), *Toxoplasma gondii.* A brief epidemiology, clinical signs and control for each of these parasites follow. The control measures involve slaughter inspection, processing, cooking, irradiation, freezing and curing. Specific description of public health of pork and pork products for the USA and Denmark included in this section describes pathogens such as *Salmonella, Trichnella spiralis, Yersinia enterocolitica,* Enterohaemorrhagic *Escherichia coli, Campylobacter jejuni, Campylobacter coli, Listeria monovytogenes, Toxoplasma gondii, Mycobacterium bovis, Erysipelothrix rhusiopathiae, Brucella abortus* and *Brucella melitensis.* A brief description of the control measures tests and phases are indicated for each.

Section seven of the book deals with public health of poultry products in its two papers. The first is on strategies to control Salmonella and Complobacter in raw poultry products, the second on epidemiology and control of egg - associated *Salmonella Enteritidis* in the USA. The section begins with introduction of morbidity and mortality in humans, clinical manifestations, sources of infection of specific macroorganisms such as *Salmonella* and *Camplobacter jejuni,* giving a description of colonization of live chickens with these agents and during processing. Control strategies for the infections cover the steps from hatchery, feed and water management, litter management, rodent and pest control, preslaughter preparation, operating standards such as disinfection of water systems and food handling.

The last paper describes the epidemiology and control of egg associated *Salmonella Enteritidis* in the USA.; human illness, serotypes, DNA comparisons and egg quality assurance and its goals.

The eight section deals with public health of meat and products from other species. The nine papers in the section are specifically on risks related to consumptions of horse meat, cervid production in the USA, European perspectives on Public health

risks by consumption of game mammals, Wild game meat and Public health in Europe, Public health and Risks of game meat in Africa, risks associated with consumption of wild and feral swine, Public health and risks of crocodile and ostrich, meat flesh of farmed crocodiles and Contamination of bee products and risk to humans.

Specific animals of interest in this section are bovidae, porcidae, ovidae, caprine and horses (equidae). The principal agents of disease mentioned are *Salmonella, Trichnella, Bacillus anthracis, mycobacteria* complex, *Pseudomonas, Pasteurela, Rhabdovirus,* and Divers arbovirus, and chemical agents such as cadmium.

It is reported that there is high risk of tuberculosis exposure through consumption of infected cervids for hunters but little for non-hunters. This paper also compares the situation with cattle industry in the USA.

The largest industry on game farming is described to be of deers in New Zealand, and the American bison. The paper provides the approximate numbers of farmed game in the world, farmed deer and the risks posed to the human populations. Specific agents of diseases in this source of meat include bovine spongiform encephalitis, tuberculosis, brucellosis, Salmonelloses, Leptospirosis, Yersiniosis, *Fusobacterium necrophorum* infections. Among the diseases transmitted to domestic animals are foot and mouth disease, classical swine fever, malignant catarrhal fever, and parasitic diseases such as cryptosporidiosis.

In Africa the diseases from consumption of wild meat include Crimean - Congo haemorrhagic fever, Ebola virus infection, encephalomyocarditis, rabies, rift valley fever, anthrax, bovine brucellosis, bovine tuberculosis, *Erysipelothrix* infections, Nocardiosis, Salmonella infections, Chlamydiosis, Q fever, cysticercosis, Echinococcus/hydatidosis, pentastomiasis (linguatuliasis), trichnellosis and toxoplasmosis. Game and other animals said to pose threats for these diseases are Impala (*Aepyceros melampus*), buffalo (*Syncerus cafer*), blue

environments contaminated with bacterial and chemical contaminants from environmental pollution. The section on bee products provides some tests for various pollutants.

Section nine of the book deals with fish, molluscs and crustaceans. The first paper on this section is on the role of sea food component in food borne diseases in the USA. Covered in this are the magnitude, microbial agents, which include bacterial, viruses and toxins, and provides monitoring information and risk assesment for use with hazard analysis and critical control points. The bacteriological pathogens are Salmonella spp, *Campylobacter jejuni, Shigella sp, Vibro vulnificus, Vibro hollisae, Vibro cholera, Vibro parahaemolyticus, Clostridium spp, Listeria monocytogenes, Clostridium botulinum* and *Staphylococcus spp.*

The second paper deals with public health issues on aquaculture. The third is on parasites of fish and risks to public health, the fourth on sea food associated diseases in Canada and the last on risks of transmitting cholera through fishery products in South America. The human pathogenic virus included are Enteroviruses (poliovirus, Coxsackievirus, A and B echovirus), Hepatitis - A virus (HAV) (epidemic non A, non B or Hepatitis E virus), Adenovirus, Rotavirus, Nowalk virus (calicivirus, astrovirus, snow/Mountain agent, small round structured virus). There are several natural toxins associated with sea foods (shell fish and fish) namely; paralytic shellfish poisoning, Puffer fish poisoning, Ciguatera, diarrhoetic-shell fish poisoning, neurotoxic - shell fish poisoning and amnesic shell fish poisoning. The detail on the types of poisons and the occurrences is provided, including the methods of detection of the poisons.

The public health hazards in aquaculture include environmental chemical contaminants, heavy metals, drug residues, bacterial, viral and parasitic diseases, feed additives and marine biotoxins. Hazard analysis and critial control approaches are provided in this section. The paper on parasites of fish and risk to public health describes the nematodes,

cestodes, trematodes and acanthocephalans of sea food, followed by risk mitigation and prevention measures, specifically on harvesting and processing.

The paper that fallows on this section provides examples of cases and their control in Canada, particularly paralytic shell fish poisoning, diarrhoetic shellfish poisoning, amnesic shellfish poisoning, tetramine poisoning, ciguatera poisoning, histamine (scrombroid poisoning) and illnesses due to unknown seafood toxins. A table provides the dates of occurrences and types of fish poisoning and the costs of illnesses associated with seafood toxins including control programmes.

The last paper on fish, molluscs and crustacean section provides perspectives of South America on risks of transmitting Cholera through fishery products. Epidemiological and laboratory findings have confirmed the transmission of Cholera via these products, thus risks involved and the measures recommended to prevent cholera transmission through fishery products are described.

Section ten, the last on this book deals with contaminants of non biological origin within three papers, the first of which describes contaminants of non biological origin in food from animals, the second on problems associated with drug residues in beef from feeds and therapy and the third on therapeutic antibiotics in animal feeds and antibiotic resistance. After introducing the contaminants of non biological origin the first paper describes risks of chemical residues in foods (of industrial chemical and environmental pollutants, agricultural pesticides, exogenous hormones and antimicrobials) and control of non biological contaminants.

Problems associated with drug residues in beef from feeds and therapy described in the second paper provides the types of residues and frequencies. It gives factors associated with residue problems as type of animal, age, feeding, disease status, poor management, extra label drug use, withdraw times, route of administration and factors affecting the residue

after slaughter. Furthermore briefly the need for testing residues, health safety aspects and determination of safe levels of residues are discussed.

The last paper on the book includes information on therapeutic antibiotics in animal feeds and antibiotic resistance, describing the animal drug approval process, medicated feeds (drugs in animal feeds) and public health concerns.

Overall this is a very good book, a source of comprehensive knowledge on contamination of animal products. It offers prevention methods and risk, including risk assessment for public health. Its arrangement of chapters is very relevant, because it groups the contaminants sytematically for related groups of animals. It is an excellent source of data for researchers, academicians, public health officials, hospital advisers, government policy makers, students and other interested personel.

It has however, some short falls. Although it covers subjects of very wide geographical distribution the source of information is narrow, because its mostly from Europe and United States of America and to some extent Canada. Very little information is provided for Asia, Africa and South America. In view of the expansion and changing food habits as affected by economic states more and more public health issues will appear also in countries not described in this book, such as Africa and Asia. The African and Asian modes of production of beef and milk is very different from those of Europe and North America. This pastoral production may be affected by different contaminants, thus inclusion of paper/chapter on pastoral system in this book may be needed. This short full may, however serve on advantage because the knowledge provided in the book will serve as a starting point for researchers, government, academicians and public health officials in African and Asian region which are not included in the book.

The inclusion of wildlife section on game, fish molluscs, crustaceans, ostriches and crocodiles is

very important. This sector is growing very fast, particularly in Africa, Europe, Asia and the World faces new challenges on public health. In addition to these the consumption of various types of invertebrates such as grass hopers and other seasonal insects is also increasing.

Finally we can solidly say that the book is very good reference and meets the quality and intention of informing the world on diseases and risks of diseases through contamination of food from animals as specifically mentioned in the preface by Dr. Blancou, the Director General of Office International des Epi zooties.