Vet. Med. J., Giza. Vol. 57, No.3. (2009):279-294.

BURDENS OF ANIMAL ENVIRONMENT ON HUMAN HEALTH

Zakia.A.M.Ahmed

Dept . of Animal Hygiene and Management Faculty of Vet. Medicine Cairo Uni.

Received: 27/08//2009

SUMMARY

Our environment is affected by a great variety of pollutants and emerging infectious diseases. The public health threats are affected by the relationship between people and the physical, chemical, and biological nature of our natural environments .Vector-borne and zoonotic diseases, water contamination, airborne contaminants, bioaccumulative contaminants in the food chain, and environment threat to public health. Workers, area residents, and the communities located downstream or down-wind of the animals may find themselves with a lot of problems on their hands. Zoo animals, backyard wildlife, pets, and livestock, all serve the public as valuable "First Alert" systems for emerging infectious diseases. Animal symptoms and responses to conditions around them can serve as an early warning system for potential threats to human health .Arthropods, such as fleas, ticks, or mosquitos, are common vectors that transfer disease from an infected individual to others, be they wild or domestic animals or people. Ticks can carry pathogens that are the causes of Lyme disease, ehrlichiosis or babesiosis. Earthworms, swallows, bats, other wildlife, and even our pets are all animal sentinels alerting us to disease, allergens, and contaminants in our environment. Bats have long served informally as public health surveillance systems for rabies. Prairie dogs are also valuable wildlife informants, alerting us to the occurrence and spread of plague. Rodents ,commercially bred or trapped in the wild, may be infected with a number of zoonotic infections, including Salmonella, lymphocytic choriomeningitis virus (LCMV) , Machupo virus hemorrhagic fevers , murine typhus, tularemia, and plague . Free-living amoebae are natural reservoirs of many types of bacteria such as Legionella spp.,

Burkholderia pickettii, Vibrio cholerae, Myobacterium avium and Listeria monocytogenes. Amoebae in cooling towers and water treatment facility biofilms are considered the primary reservoir for pathogenic legionellae.

The greatest environmental and health challenges are odor, air pollution, surface and ground water pollution, and antibiotic resistance. Widespread pool of antibiotic-resistant microbes from which resistance could be transferred back into human and animal disease organisms. Developing countries might suffer the worst consequences because of the poor state of their health services and their inability to pay for alternatives to cheap antibiotics.

Most industrial operations store waste in massive lagoons that can hold millions of gallons of liquid manure. They may spread or spray some of the manure on available land. Hog; are often cited as the most problematic with respect to waste storage and removal, but there are numerous examples of pollution problems originating in cattle feedlots, industrial dairies, and poultry operations.

The three primary sources of odour and air contaminants from poultry production are barns, manure storages and land application of manure. Air contaminants released from these sources include micro-organisms, particulate matter (dust), endotoxins and gases. Gases include ammonia, hydrogen sulphide, methan, sulphur and nitrogen compounds .Poultry manure considered as the largest source of excess phosphorus and nitrogen. One-third of all wells in Maryland's chicken. High nitrate concentrations in drinking water can cause blue baby syndrome and may contribute to developmental defects in fetuses or miscarriages in pregnant women.

The impact of odour on health and well-being causes concern, the Psychological effects of odour, Include irritation and the Physiological effects can occur through exposure to specific compounds that make up odour, as asphyxiation from exposure to elevated levels of hydrogen sulphide (H2S) in a confined space. Odour from poultry manure is made up of about 160 compounds. Gases emitted from livestock operations can impact climate change, acid rain, nuisance, odour and water quality.

Total dust emitted from poultry facilities includes all airborne particles, while respirable dust is less than 10 microns in size and can cause eye and throat irritation and potentially contribute to respiratory conditions such as asthma or chronic bronchitis. Organic dust may react in the respiratory tract of humans and poultry. Airborne organic particles in poultry barns generally have high protein content and

CamScanner الممسوحة ضوئيا بـ

have been associated with allergic reactions. Dust concentrations in poultry houses usually vary between 0.02 and 81 mg/m3 for inhalable dust and between 0.01 and 6.5 mg/m3 for respirable dust.

Intensive swine production generates odorous emissions which flow from the buildings housing the animals. High ventilation rates bring in fresh air, remove heat and moisture and enhance pork productivity. Numerous compounds contribute to the uniquely offensive odors from swine facilities, including fatty acids, amines, aromatics and sulfur compounds. Dust particles, which originate predominantly from feces and feed, can adsorb and concentrate odorants in swine facilities. Organic particles can decay and generate odorous compounds. Odorants can exist in much higher concentrations in the dust particles than in equivalent volumes of air. Thus, inhalation of odorous dust and deposition of the dust particles in the mucus overlying the olfactory mucosa are likely responsible for some odor-related complaints by swine farm neighbors. Accurate prediction of odor transport and dispersion downwind from swine farms may require models of dust dispersion and correlation between dust and odorant levels.

Pesticides include insecticides, herbicides, fungicides and rodenticides, if handled or applied improperly threat human health. Airborne spray droplets, mists or vapours arise from these sources. Storing large amounts of pesticides increases the potential for a significant pesticide spill to occur.

Integrated livestock-fish production has been the possible connection between such practices and the emergence of influenza pandemics. Recently, livestock and fish have been implicated in the irregular occurrence of influenza pandemics. Poultry-cum fish integrated aquaculture system showed contamination of water and fish by fecal contamination, streptococci and coliforms. Livestock and fish are involved in both passive and active transfer of a range of parasites and diseases to humans. Consumption of raw, certain types of processed, or undercooked fish should be avoided. Molluscan shellfish have been implicated in numerous outbreaks of food-borne disease when they are consumed raw as Salmonella and Vibrio cholerae. Food-borne parasitic hazards are associated with the consumption of raw (sushi) or insufficiently heated, marinated and salted seafood. Mussels and oysters, in particular, are implicated more than any other marine animal in seafood illnesses. They bioaccumulate both metal and organic contaminants, as well as concentrate microbial organisms including human pathogens as Streptococcus sp. Increasingly found in cultured tilapias, S. iniae and other

Streptococci that infect fish may also infect humans. Infections have been contracted when people market live fish, or consumers are cut or spined during handling or preparation of the fish. The disease appears most prevalent in intensive tilapia production systems. Legionella are widespread in natural aquatic environments. They are prevalent in anthropogenic water such as drinking water, whirlpools, and cooling tower reservoirs. Aerosol-generating systems aid in the transmission of Legionella from water to the air. Human inhalation of contaminated aerosols leads to Legionella infection and disease outbreaks as Legionnaires' an acute, self-limiting, non-pneumonic condition known as Pontiac fever. Extrapulmonary infection, especially in immunosuppressed patients. Wet fish in storage associated with spoilage gases including carbon dioxide, sulphur dioxide, and ammonia. A fatal case of methane and cyanide poisoning.

Chemicals may accumulate more in slow-growing, carnivorous species than well-fed, short-lived farmed fish. Chemical hazards may arise from the use of agrochemicals, chemotheropeutants, metals, feed ingredients and organic pollutants. Drug residues that risk human health are of key interest. Exposure to metals, from chronic or acute pollution of aquatic systems, their use as anti-foulants and molluscides or through their inclusion as growth promoters in livestock diets. The risk of accumulation of both drug residues and heavy metals in tissues of fish raised in semi-intensive systems is probably lower than fish raised intensively because direct use of feed additives and chemotheropeutants is very limited. Micro-algae and detrital bacteria that serve as food for cultured finfish and crustaceans produce most toxic compounds affecting aquaculture. The toxins produced by blue-green algae (cyanobacteria), microcystins, are particularly potent and widespread in fertilized freshwaters. The microbial activities in aquatic environments significantly influence arsenic cycles such as the turnover between inorganic arsenic and organoarsenic compounds. We should follow the passed county planning or zoning regulations to keep large-scale livestock facilities out. Set limits on the number of animals allowed in a facility or set average requirements; dictate "setback" regulations that require facilities to be a certain number of feet from a road, waterway, or property line. The Clean Water Act and the Clean Air Act must be strengthened to better address pollution and odor .Permitting requirements should be more strict, and the public review process must be through. Proper sanitation.، Reducing the dust originating from feed.، Managing relative humidity inside poultry farms. Dust masks are essential. Dispose of the dead animal within 48 hours of death, by: Burial. , Incineration and Transportation to a rendering plant for disposal. Scavenging (under very restricted circumstances)

BACKGROUND

Our environment is affected by a great variety of pollutants and emerging infectious diseases which are growing concern worldwide .The Public health problems and risk arising from environmental contaminants depends on many factors including absorption and toxicity of the substances , its level in food, the quantity of contaminated food consumed , duration of exposure and the toxicity of contaminants must be frequently extrapolated from animal studies .These public health threats are affected by the relationship between people and the physical , chemical, and biological nature of our natural environments . Vector-borne and zoonotic diseases, water contamination, airborne contaminants, bioaccumulative contaminants in the food chain, and environmental threats to public health.

At the current rate of increase in livestock production, urgent international action to counteract the predicted environmental crisis is required. Animal symptoms and responses to conditions around them can serve as an early warning system for potential threats to human health. Workers, area residents, and the communities located downstream or down-wind of the animals may find themselves with a lot of problems on their hands. Factory farms threaten our health by incubating infectious diseases that can spread to the human population and transferred directly from animals to humans. Zoo animals, backyard wildlife, pets, and livestock, all serve the public as valuable "First Alert" systems for emerging infectious diseases. A crow dying outside the gates of the Bronx Zoo was the first known case of West Nile virus in the United States. Sick raccoons or foxes seen in your backyard can be sentinels, warning of an outbreak of rabies. Arthropods, such as fleas, ticks, or mosquitos, are common vectors that transfer disease from an infected individual to others, be they wild or domestic animals or people. In cases of direct transmission, a worker who comes in contact with a diseased animal or its manure can contract the disease and pass it on to their family and community. Earthworms, swallows, bats, other wildlife, and even our pets are all animal sentinels alerting us to disease, allergens, and contaminants in our environment. Swallows serve as sentinels for toxic substances in the food web. Insect-feeding swallows can warn of soil and water impurities such as PCBs and arsenic that may sit below the surface of our soils, lakes, and harbors disease agents.

Amphibians, such as frogs and toads, can be good sentinels of air quality, because they breath through their skin and live at the air-water interface. Bats have long served informally as public health surveillance systems for rabies. Prairie dogs are also valuable wildlife informants, alerting us to the occurrence and spread of plague. The bacteria that causes plague persists in the environment at low levels, and are carried from prairie dog to prairie dog by fleas. Periodically the disease escalates into epidemics/epizootics when humans are bitten by fleas that carry the disease. Rodents; are becoming increasingly popular as pets for families. Rodents commercially bred or trapped in the wild, may be infected with a number of zoonotic infections, including Salmonella, lymphocytic choriomeningitis virus (LCMV), Machupo virus hemorrhagic fevers , murine typhus, tularemia, and plague. S. intermedius in humans has been associated with dog bite wounds, bacteraemia, pneumonia and ear infections .Ticks can carry pathogens that are the causes of Lyme disease, ehrlichiosis or babesiosis. Both pets and people are afflicted with these neurological or blood diseases. Another potential source of non-enteric pathogens are free-living amoebae which are natural reservoirs of many types of bacteria such as Legionella spp., Burkholderia pickettii, Vibrio cholerae, Myobacterium avium and Listeria monocytogenes. It is known that Acanthamoeba species are natural aquatic reservoirs of several intracellular pathogens such as Legionella, Chlamydia and Mycobacterium .Amoebae in cooling towers and water treatment facility biofilms are considered the primary reservoir for pathogenic legionellae.

The greatest environmental and health challenges are odor, air pollution, surface and ground water pollution, and antibiotic resistance. A 2002 study found antibiotics in 1/3 of ground and surface water samples taken near hog facilities and in 2/3 of samples near poultry facilities. Heavy use of antibiotics in people and animals, encouraged by commercial pressures, risks causing significant antibiotic contamination of the natural environment and consequent development of resistance in communities of non-disease organisms. Such contamination of microbial communities in septic tanks, sewers, soil, receiving waters and other environmental compartments could create a widespread pool of antibiotic-resistant microbes from which resistance could be transferred back into human and animal disease organisms. The risk from widespread use of antibiotics as growth promoters in livestock is being widely debated. Developing countries might thus suffer the worst consequences because of the poor state of their health services and their inability to pay for alternatives to cheap antibiotics. High significant health and economic impacts, as shown by the resurgence of tuberculosis and malaria, and multiple resistance is easily developed. Manure lagoons can leach antibiotic resistant bacteria along with other contaminants. There is no evidence that drug residues in poultry manure affect human or animal health in Canada.

Animals generate waste. While many traditional crop and livestock operations use manure as a fertilizer, letting animals roam on land after harvest to build up organic matter . Most industrial operations store waste in massive lagoons that can hold millions of gallons of liquid manure. They may spread or spray some of the manure on available land. When it is spread in excessive quantities, or when the lagoons leak, problems result. Hog, are often cited as the most problematic with respect to waste storage and removal, but there are numerous examples of pollution problems originating in cattle feedlots, industrial dairies, and poultry operations.

The three primary sources of odour and air contaminants from poultry production are barns, manure storages and land application of manure. Dust and fumes from traffic associated with livestock production sites can also reduce air quality.

Air contaminants released from these sources include micro-organisms, particulate matter (dust), endotoxins and gases. Gases include ammonia, hydrogen sulphide, methane, sulphide, and nitrogen compounds. Broiler's, Maryland's eastern shore, 6,000 broiler houses turn out 750,000 tons of chicken manure each year, more waste than is produced by a city of 4 million people. Poultry manure as the largest source of excess phosphorus and nitrogen. One-third of all wells in Maryland's chicken-producing areas have been found to have concentrations of nitrate, which is created by the breakdown of nitrogen by microbes that exceed EPA standards for drinking water. Nitrates were responsible for contamination in 3/4 of all wells surveyed in central and western Kansas. High nitrate concentrations in drinking water can cause blue baby syndrome and may contribute to developmental defects in fetuses or miscarriages in pregnant women.

The primary complaint about livestock operations is odour. The impact of odour on health and well-being causes concern, especially when odours are disagreeable and persistent. Odour is generally considered a nuisance rather than a health risk to neighbours because of the degree of dilution and dispersion that occurs within short distances from the odour source. Psychological effects, such as irritation, can result from exposure to odour and often occur at levels well below those that can harm human health. Physiological effects can occur through exposure to specific compounds that make up odour, for example, asphyxiation from exposure to elevated levels of hydrogen sulphide (H2S) in a confined space. Odour from poultry manure is made up of about 160 compounds. Humans have many and varied responses to these compounds. Gases emitted from livestock operations can impact climate change, acid rain, nuisance, odour and water quality. These gases can be generated in the barn and during manure storage and land application. They include ammonia, hydrogen sulphide, methane, sulphur, nitrogen compounds and several trace gases associated with odour. Organic dust may react in the respiratory tract of humans and poultry, includes dandruff, dried manure and urine, feed, mold, fungi, bacteria, and endotoxins produced by bacteria and viruses. Between 70 and 90 percent of the dust in animal housing is organic. Inorganic dust is composed of aerosols from building materials and the environment (concrete, insulation, soil). Occupational Health and Safety Association (OHSA) recommends that total dust should not exceed 10 mg/m3 and respirable dust should not exceed 5 mg/m3. Total dust includes all airborne particles, while respirable dust is less than 10 microns in size. Exposure to fine particles in respirable dust can cause eye and throat irritation and can potentially contribute to respiratory conditions such as asthma or chronic bronchitis. Airborne organic particles in poultry barns generally have high protein content and have been associated with allergic reactions. Dust concentrations in poultry houses usually vary between 0.02 and 81 mg/m3 for inhalable dust and between 0.01 and 6.5 mg/m3 for respirable dust.

Pesticides include insecticides, herbicides, fungicides and rodenticides. Pesticides represent a potential risk to non-target organisms, applicators and workers, if handled or applied improperly. Airborne spray droplets, mists or vapours may form and drift. These can contaminate adjoining properties and water sources. Soil pollution can occur when pesticides are applied using improper application methods or rates, when disposal protocols are not followed and during spills. Storing large amounts of pesticides increases the potential for a significant pesticide spill to occur.

Each dairy cow produces almost 44,000 pounds of manure per year. The careful management and removal of this amount of waste is crucial to preserving environmental and human health. Raw manure can contain up to 100 million fecal coliform bacteria per gram, as well as ammonia, phosphorus, and other nutrients and microbes that can contaminate soil and water in high concentrations. E. Coli bacteria have been found in the manure of a quarter of the beef cattle on large feedlots. Manure contamination can spread in groundwater aquifers or on products washed with contaminated water. Dispose of waste by the spray application of large quantity of liquefied manure to fields surrounding the operation sends dust particles into the air that can penetrate the lungs of humans nearby. These particles carry toxic gases such as ammonia, which can impede the lungs from clearing dust particles, and hydrogen sulfide, which can prevent cells from using oxygen and causes loss of consciousness, coma, or death at high exposure levels. Emitting hydrogen sulfide at fairly low levels were suffering from permanent nervous system impairment 20 Exposure to persistent low levels of hydrogen sulfide can cause fatigue, short-term memory loss, headaches, and other symptoms.

A major issue regarding the promotion of integrated livestock-fish production has been the possible connection between such practices and the emergence of influenza pandemics. Recently, livestock and fish have been implicated in the irregular occurrence of influenza pandemics; the role of cultured fish in the possible transfer of pathogens between livestock and humans is important, particularly in less developed countries. It has been claimed that the farming of pigs, poultry and fish together on the same farm is predisposing Asia, and the world, to the emergence of new virulent strains of influenza virus. Poultry-cum fish integrated aquaculture system showed contamination of water and fish by fecal contamination and streptococci and coliforms. Little accumulation of enteric microorganisms and pathogens on, or penetration into, edible fish tissue occurs when the faecal coliform concentration in the pond water is below 10^3 per 100 ml. Livestock and fish are involved in both passive and active transfer of a range of parasites and diseases to humans, broadening the need for risk assessment. Consumption of raw, certain types of processed, or undercooked fish should be avoided.

Hazards can enter an aquaculture product at any time during production and processing. Molluscan shellfish have been implicated in numerous outbreaks of food-borne disease when they are consumed raw. Salmonella and Vibrio cholerae were found to be present as part of the natural flora of brackish cultured shrimp, and pose a major concern for processors and exporters .Once pathogens enter the marine environment, they can be further concentrated by the action of filter feeding organisms such as mussels, clams and oysters. Mussels and oysters, in particular, are implicated more than any other marine animal in seafood illnesses. They bioaccumulate both metal and organic contaminants, as well as concentrate microbial organisms including human pathogens. Streptococcus sp. infections of fish are a relatively newly identified threat to humans. Increasingly found in cultured tilapias, S. iniae and other Streptococci that infect fish may also infect humans. Infections have been contracted when people market live fish or consumers are cut or spined during handling or preparation of the fish. The disease appears most prevalent in intensive tilapia production systems, in which water quality is marginal and/or there is environmental stress or trauma to the fish. It has not yet been associated with fish from integrated culture systems. Hazards associated with intensive aquaculture, particularly of carnivorous fish, are likely to be greater than less intensive culture of herbivorous and omnivorous species because of the greater likelihood of bioaccumulation and exposure through the higher levels of water exchange required.

Chemicals may accumulate more in slow-growing, carnivorous species than well-fed, short-lived farmed fish. Exposure to chemicals can be accidental or purposeful. Contamination of the surrounding environment, water or feed source for fish or livestock integrated with fish can be either acute or chronic in nature. Chemicals are also often used as part of disease control, general husbandry or to require treatment for disease, intensive disinfection or specialized feed additives. Chemical hazards may arise from the use of agrochemicals, chemotheropeutants, metals, feed ingredients and organic pollutants . Agrochemicals i.e. chemical fertilizers, water treatment compounds, pesticides and disinfectants are widely used in both commercial and smallholder food production. Chemotherapeutants include a range of compounds used to control the impact of disease on both livestock and fish i.e. antimicrobials, parasiticides and hormones. The issue of bacterial resistance induced through prophylactic use of antimicrobials and drug residues that risk human health are of key interest. Exposure to metals, from chronic or acute pollution of aquatic systems, their use as anti-foulants and molluscides or through their inclusion as growth promoters in livestock diets. There are two major risks of resistant strains being a hazard to human health: those associated with transmission of resistant strains from aquaculture to humans; and the possibility of non-pathogenic bacteria containing antimicrobial resistance genes being transferred to human pathogens. In the tropics, fish pathogens such Aeromonas hydophila and Edwardsiella spp. can cause human disease and the first risk, although not quantified, does exist. The risk of accumulation of both drug residues and heavy metals in tissues of fish raised in semi-intensive systems is probably lower than fish raised intensively because direct use of feed additives and chemotheropeutants is very limited. Organic pollutants, may potentially concentrate in rainfed fish ponds within watersheds receiving runoff from agricultural land in which insecticides are used, pond sediments, especially in fertilized ponds, act as a sink for these compounds, reducing losses to the wider environment with consequent effects on natural systems. Micro-algae and detrital bacteria that serve as food for cultured finfish and crustaceans produce most toxic compounds affecting aquaculture. The toxins produced by blue-green algae (cyanobacteria), microcystins, are particularly potent and widespread in fertilized freshwaters.

Fish grown in excreta-fertilized or wastewater ponds may become contaminated with bacteria and viruses and serve as a potential source of transmission of infection if the fish are eaten raw or undercooked. Wastewater discharged from a wastewater treatment plant (WWTP) was continuously pumped through the aquariums for 28 days. Several chemicals known to be potential endocrine disruptors were found, such as surfactant (detergent) compounds and their degradation products and bisphenol A (a chemical used in the production of plastics).Although an endocrine disrupting response was observed in the fish exposed to wastewater, determining the exact causative factors or which chemicals within the mixture of chemicals were responsible for the response is very difficult. This difficulty arises because of continual changes in the presence and levels of chemicals and nutrients in the wastewater and the corresponding changes in the multiple biological responses of the fish.

Aquaculture production of finfish, crustaceans, and molluscs may present a threat to public health if they are not grown and harvested under strictly hygienic conditions. Food-borne parasitic hazards are associated with the consumption of raw (sushi) or insufficiently heated, marinated and salted seafood.

Streptococcus iniae is a serious public health threat associated with commercially raised fish; rather, it represents a limited risk for older or immunocompromised people who incur puncture wounds while handling and preparing fish.Some pathogenic microorganisms are naturally present in freshwater environments (Aeromonas hydrophila, Naegleria fowleri, Legionella pneumophila), while other human pathogenic species are indigenous to marine and brackish waters (V. cholerae, V. vulnificus, V. parahaemolyticus, V. alginolyticus). Pathogens naturally present in water may be transmitted to humans via inhalation, contact or ingestion of water or contaminated food. Examples of sources of non-enteric pathogens in environmental waters include animal urine for Leptospira spp. and shedding from human skin for S. aureus.

Marine organisms, particularly marine mammals, can also be sensitive sentinel species to warn of impending human health problems from ocean-borne pathogens. In addition to being useful for detecting zoonotic diseases that can affect human health. Marine mammals including pinnipeds, dolphins, cetaceans and otters are to be useful sentinel species for assessing health risks from natural toxins (i.e. algal toxins) and persistent chemical contaminants (e.g. polybrominated diphenyl ethers (PBDEs) and other organochlorines) . Bacteria such as Brucella, Leptospira and Mycobacterium have been shown to infect humans handling marine mammals, while others such as Clostridium, Burkholderia (formerly Pseudomonas), Salmonella and Staphylococcus have the potential to be transmitted to humans. Calicivirus and influenza A have been documented to occur in pinnipeds, and Blastomyces have been detected in dolphins. California sea lions and ringed seals have been found to harbor G. lamblia and Cryptosporidium spp. and Giardia cysts have been found in fecal material from harp seals (Phoca groenlandica), grey seals (Halichoerus grypus), and harbour seals (Phoca vitulina) from the St. Lawrence estuary in eastern Canada . Pinnipeds have been shown to harbor Salmonella and Campylobacter species, including strains that are resistant to multiple antibiotics. Shorebirds are potentially able to transmit parasites to humans. Canada geese carry several enteric human pathogens including G. lamblia, Camplyobacter jejuni and C. parvum . Therefore, it seems possible that shorebirds feeding in an area that is contaminated by a sewer outfall may be yet another source of concentrated pathogen input to either shellfishing areas or recreational areas.

Legionella are widespread in natural aquatic environments and are able to exist in water of different temperatures, pH level, and nutrient and oxygen content. Their occurrence in nature can be attributed to their relationships with other microorganisms. When Legionella co-exist with algae and other bacteria, especially in biofilms, the availability of nutrients increases .They are able to infect protozoa and subsequently reproduce within these organisms. They are prevalent in anthropogenic water such as drinking water, whirlpools, and cooling tower reservoirs. Aerosol-generating systems aid in the transmission of Legionella from water to the air. Human inhalation of contaminated aerosols leads to Legionella infection and disease outbreaks. Legionellosis in humans has typically been characterized as either a potentially fatal pneumonic condition, known as Legionnaires' disease, or an acute, self-limiting, non-pneumonic condition known as Pontiac fever. Legionella spp. cause extrapulmonary infection, especially in immunosuppressed patients. Although 52 species of Legionella are known, Legionella pneumophila serogroup 1 is responsible for more than 80% of hospital- and community-acquired cases of Legionnaires' disease.

The potential health hazards of handling industrial fish are well documented. Wet fish in storage consume oxygen and produce poisonous gases as they spoil. In addition to oxygen depletion, various noxious agents have been demonstrated in association with spoilage including carbon dioxide , sulphur dioxide, and ammonia . A fatal case of methane and cyanide poisoning among a group of deep sea trawler men is described. Cyanides is potential noxious agent and a potentially fatal complication of handling spoiled fish . The microbial activities in aquatic environments significantly influence arsenic cycles such as the turnover between inorganic arsenic and organoarsenic compounds. In Lake Kahokugata, inorganic arsenic was detected at concentrations ranging from 2.8 to 23 nM in all seasons, while the concentrations of dimethylarsinic acid (DMA) produced by microorganisms such as phytoplankton changed seasonally and showed a peak in winter. DMA-biodegradation activities are mainly controlled by changes in the water temperature in Lake Kahokugata, where the arsenic concentrations change seasonally.

The hormone like effects of many xenobiotics in fish, wildlife, and humans include the endocrine and reproductive effects are believed to be due to their a) mimicking effects of endogenous hormones such as estrogens and androgens; b) antagonizing the effects of normal, endogenous hormones; c) altering the pattern of synthesis and metabolism of natural hormones; and d) modifying hormone receptor levels. Since xenoestrogens are postulated to be a risk factor for breast cancer, measuring a single xenoestrogen may not be a reliable indicator of exposure because different persons eating different diets may be exposed to different xenoestrogens. Therefore, measuring total xenoestrogen burden represents a more reliable approach to assess the link between xenoestrogens and breast cancer.

Mitigation of the Health Impact of Environmental Pollution on Human Health

The world over require marshalling of all our scientific knowledge and know-how to develop new solutions for environmental pollution impact on human health. USGS scientists use swallows as sentinels to assess heavy metals, dioxins, PCB, and other soil contaminants. USGS scientists are studying the effects of environmental pollutants, air-borne disease, and other contaminants on frogs at monitoring sites across the nation.

Management practices that can greatly reduce the amount of dust in poultry buildings include:• Proper sanitation.•Reducing the dust originating from feed.•Managing relative humidity. For instance, if the air in a broiler or turkey house is too dry (i.e., low relative humidity) the amount of dust in the exhaust ventilation air will be excessive. Dust masks are essential to protect the health of barn workers. Manure must be incorporated into the soil within 48 hours of being applied to the land .The Regulation allows exceptions where the manure is being used on a forage or direct seeded Crop. If a producer uses earthen storage for liquid manure, the earthen storage must be able to hold nine months of storage and must be constructed of such compaction to achieve a hydraulic conductivity of not more than 1 x 10-6cm/sec. In addition, the construction of side slopes must be appropriate for the stability of the soil.

The Livestock Diseases Act, through its regulations, requires that the owner of a dead animal dispose of the dead animal within 48 hours of death, by burial, incineration, transportation to a rendering plant for disposal and scavenging (under very restricted circumstances).

Attention to minimise the risk of cross-contamination during fish processing should be avoided, as the digestive tract is the major source of pathogens.

Risks of passive transfer of pathogens through handling of live fish during production, harvest and processing can be reduced if physical exposure is minimized through use of appropriate clothing, especially gloves. Depuration, the holding of fish in clean water without feeding, facilitates this task by reducing the amount of digestive tract contents. Depuration may not always be an effective method to remove micro-organisms from fish. When common carp was cultured in heavily polluted water, depuration in clean water for a six week period was ineffective because the micro-organisms had already entered the muscle tissue. The process was more effective with tilapia raised in optimal growth conditions in wastewater-fed ponds as they contained initially lower concentrations of bacteria, and not present in organs or muscle.

Removal of visera and major organs, in addition to the digestive tract, prior to marketing 'whole fish' would also reduce risk. Pre-treatment or processing of livestock waste prior to its use as a fishpond fertilizer or feed ingredient also reduces risks associated with transfer of pathogens.

Removal of surface and emergent vegetation, as a part of intensified aquaculture, reduces shelter for mosquito larvae.

REFERENCES

Evaluation of a possible association of urban air toxics and asthma.Leikauf GD, Kline S, Albert RE, Baxter CS, Bernstein DI and.Buncher CR. 1995. Environ Health Perspect; 103 Suppl 6:253-71.

Public Health and Livestock–Fish.Integrated livestock fish-Farming Systems .FAO Corporative Document Repository, 1999. http://www.fao.org/fishery/.

An Environmental Nuisance: Odor Concentrated and Transported by Dust .Robert W. Bottcher. (2001): SYMPOSIUM: A Chem S XXI Symposium. Chem. Senses 26: 327-331.

Hazardous air pollutants and asthma. Leikauf, G.D. 2002.Eviron Health Perspect. 110 Suppl 4:505-26.

Guidelines to Beneficial Management Practices: Environmental Manual for Poultry Producers in Alberta. Alberta Agriculture, Food and Rural Development Canadian Adaptation and Rural Development Fund Alberta Environmentally Sustainable Agriculture. Alberta Agriculture, Food and Rural Development.2003.

Epidemiology of environmental and occupational cancer.Boffeta, P. 2004. Oncogene 23; 23(38):6392-403.

Tracing Wastewater - Using Unique Compounds to Identify Sources of Contamination. Toxic substances Hydrology programe. USGS. 2005.

The effect of cadmium and lead pollution on human and animal health Smirjdkova, S., Ondra SoviCovdO, KaSkov, A., Laktiiovd, K. 2005. FOLIA VETERINARIA, 49, 3: Supplementum S31-532,

Persistent Bioaccumulative Toxic (PBT) Organic Pollutants .Human Health.USGS, 2006.

Bioaccumulative Contaminants. Human Health.USGS, 2006.

Sentinels of Health Threats from Human Consumption .Human Health. USGS, 2006.

Animal Sentinels of Human Health. Human Health. USGS, 2006.

The role of wastewater treatment in protecting water supplies against emerging pathogens. Crockett, C.S. 2007.Water Environ Res ; 79(3):221-32.

Chemical and Pathgogen Exposure through Recreational Waters .Human Health.USGS, 2007.

Impacts of Manufactured Nanomaterials on Human Health and the Environment - A Focus on Nanoparticulate Aerosol and Atmospherically Processed Nanoparticulate Aerosol. National Center for Environmental Research.2007.US.EPA.

Chemical and Pathogen Exposure through Recreational Waters: Pathogen Analysis.

Human Health. US Geological Survey USGS, 2007.

Potential contaminants and pathogens in air, dusts, and soils .Human Health . US Geological Survey, USGS,2007.

Endocrine Disruption Found in Fish Exposed to Municipal Wastewater. Toxic substances Hydrology programe. US Geological Survey, USGS, 2007.

Veterinary Medicines in the Environment .Toxic substances Hydrology programe. US Geological Survey, USGS, 2008.

Household Chemicals and Drugs Found in Biosolids from Wastewater Treatment Plants. Toxic substances Hydrology programe.USGS, 2008.

The Impact of Livestock Farming: Solutions for Animals, People and the Planet. Compassion In world farming. 2008. Compassion in World Farming. Website: ciwf.org.

Vector-borne Diseases and Zoonotic (transmitted between animals and humans) Diseases.Human Health.USGS, 2008.

Sentinels of Health Threats from Vector Borne and Zoonotic (animal to human) Disease. Human Health. US Geological Survey, USGS, 2008.

Occurrence and pathogenicity of the family of Legionellaceae. Palusinska-Szysz M, Cendrowska-Pinkosz M.2008. Postepy Hig Med Dosw. 10; 62:337-53.

Human Health. US Geological Survey, USGS, 2009.

Progestagens for human use, exposure and hazard assessment for the aquatic environment. Jean-Philippe Besse, Jeanne Garric. 2009. Environmental Pollution, In Press, Corrected Proof.