

ZOONOSES AND OCCUPATIONAL HAZARDS ASSOCIATED WITH THE MEAT INDUSTRY

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Agricultural workers are at increased risk of contracting various diseases because of regular contact with domestic livestock, poultry, and their environment. For many of the infectious diseases, infected animals appear to be healthy while harboring the infectious agents that are capable of infecting humans. These diseases can be transmitted to humans from live animals, their carcasses or by-products or the environment they contaminate. Thus farmers, slaughter house workers, animal transporters, workers in processing plants and veterinarians all constitute high risk groups for occupational diseases.

Occupational diseases are those diseases arising out of or in the course of an occupation. These diseases can be broadly grouped under following headings.

1. Diseases due to physical agents: - Heat, cold, light, noise, pressure, radiation and electricity
2. Diseases due to chemical agents:-Gases, dusts, metals and their compounds,chemicals and solvents.
3. Diseases due to mechanical agents: -Injuries, accidents etc.
4. Diseases due to biological agents: -Bacteria, virus, fungus, parasites and rickettsial organisms.
5. Occupational cancers
6. Occupational allergy, dermatosis and asthma
7. Diseases of psychological origin:- Industrial neurosis, hypertension, peptic ulcer etc.

The most common occupational hazards encountered by the people in meat industry are

A. INJURIES :

The most common form of injuries are cuts with sharp knives, abrasions sustained through knocks from equipments, contusions and acute injuries due to falling gambrels and trolleys and deep puncture wounds with bone splinters. In addition, modern meat plant operations entail the use of automatic equipments and monotonous tasks, which on occasion leads to tenosynovitis of the hand. Carelessness and irresponsible behavior may account for some of these accidents. In addition to this, absence of protective equipments and helmets, use of blunt knives and steels, improper use of sharp knives, slippery floors etc. can aggravate the situation.

Control measures:-

Rotation of staffs, Efficient official supervision, Adequate

first-aid facility in the meat plant, proper training of the workers, Immediate treatment of all wounds and abrasions, Administration of tetanus toxoid especially in case of deep penetrating wounds

B. ALLERGIES:

Employees in contact with animals and their environment may have frequent exposure to allergens in the form of dust, fibers and animal by-products such as hair, fur, urinary proteins, faeces and parasites. In susceptible individuals this can lead to various degrees of allergic reactions like rhinitis, watery and itching eyes, running nose, sneezing, coughing, shortness of breathe, skin rashes and asthma. In some cases, faecal bacteria and Gram-negative bacterial endotoxin, in organic dust cause nose and eye irritation, coughing, chest tightness, headache and nausea. Other important reasons include the contact with organic and inorganic chemicals, insects, radiation etc.

Control measures:-

- Provide protective measures to avoid the allergens,
- Immediate treatment of the sick persons,
- Allergic people are not allowed to work in the risk areas
- Use of non-allergic chemicals in the meat industry.

C. OCCUPATIONAL ASTHMA:

Occupational asthma is caused by exposure to gases, vapors or dust encountered in the work place. This is an important and most common form of occupational disease in people working in animal products and by-product industries.

Prevention and control:-

Avoid contact or exposure to known offending agents, Protective measures like facemasks, Periodic medical examination for early diagnosis, Provide adequate ventilation in work place, Health education and training, Encourage smoking program.

D. OCCUPATIONAL ZOONOSES:

Zoonoses are the diseases naturally transmitted between man and lower vertebrate animals. Many of the zoonotic diseases especially the bacterial zoonoses are considered as occupational zoonoses. WHO classified the various occupational groups mainly into seven groups.

1. ANTHRAX / WOOL SORTERS DISEASE

It is a highly infectious and fatal bacterial zoonotic disease. Disease is caused by *Bacillus anthracis* and this organism is seen in vegetative state in man and animals. When exposed

Sl.No	Group	Major Occupations/Groups.	Examples
1	Agricultural	Farmers, Veterinarians, Livestock transporters.	Anthrax, Rabies, Brucellosis, Leptospirosis, T.B, Salmonellosis
2	Animal product manufacturer	Butcher, slaughterhouse worker, animal food handler, handler of wastes and by-products.	Q. fever, Anthrax, Rabies, Brucellosis, Leptospirosis, T.B, Salmonellosis
3	Sylvan and Campestral	Wild life worker, hunter, fisherman, construction worker.	J.E, Plague, Yersiniosis, Brucellosis
4	Recreational	Employee of wildlife parks, pet dealer, veterinarian.	Rabies, Campylobacteriosis, Glanders, Tetanus, Pasteurellosis
5	Laboratory	Scientist, laboratory animal handler, livestock handler.	Anthrax, Glanders, J.E, Brucellosis, Leptospirosis, T.B.
6	Epidemiological/clinical	Physician, veterinarian, field investigator.	J.E, Rabies, Salmonellosis
7	Emergency	Refugee, disaster victim, pilgrim.	Rabies, Plague, Flea-borne typhus

oxygen in the air, it forms spores that are highly resistant to physical and chemical agents. The disease occurs most commonly in wool sorters, knacker man, vets, abattoir workers, persons handling meat and by-products and farm workers.

Prevention and control:-

1. Early diagnosis and prompt chemotherapy.
2. Protective apron, gloves, gumboots, cap, mask, goggle to the workers.
3. Prevention of contact with infected animals and contaminated products.
4. Proper disposal of unopened dead anthrax infected animal.
5. Meat should not be purchased from unauthorized shops.
6. Prompt medical care of cutaneous lesions.
7. Prompt disinfection of animal products.
8. Control of infection in animals by annual vaccination.
9. Immunization of industrial workers with vaccine.
10. Personal and environmental hygiene.
11. Health education to the public.

Disposal of anthrax infected carcass:

- When an anthrax case is detected during the clinical examination of the herd or during slaughter or during post-mortem examination, immediate restrictions are imposed on all activities to prevent the spread of the disease. In slaughterhouse all the slaughter operations should be stopped and affected and in contact animals are disposed off as per the recommended procedure. The buildings and slaughterhouses are completely disinfected before subsequent use.
- It is legally required that no suspected carcass should be opened or incised. The natural orifices should be plugged

with disinfected cotton.

- Contaminated materials along with animal should be collected and carried away in a closed vehicle to the site of disposal.
- If necessary, PMI can be conducted at the site of disposal.
- The animals should not be dragged or left uncovered for birds and wild animals to feed upon.
- It should be protected from human beings and other domestic animals and it should not contaminate farmhouses, water supplies and pastures.
- Best method of disposal is burning or incineration. If it is not possible, burial should be done in a remote area. The area is declared protected from domestic and wild animals. A 2-meter deep pit is suitable for burial of average sized animal. The carcass should be covered with sufficient quantities of quick lime and soil.
- The farm building, slaughter houses, exposed hospital equipment and clothings, boots, gloves etc should be disinfected with 5- 10 % formaldehyde OR Warm sodium carbonate 4 % OR Lye 4-5% OR Phenol 5%

2. BRUCELLOSIS / UNDULANT FEVER

Disease is caused mainly by *Brucella melitensis*, which is the most pathogenic of all other species. Other species included are *B. abortus*, *B. suis*, and *B. canis*. Brucellosis is an important bacterial anthroozoonosis. Population at risk include Veterinarians, farmers, dairymen, meat packers and laboratory workers

Prevention and control:-

1. Care in handling and disposal of foetus, placental membranes and uterine discharge.
2. Proper boiling or pasteurization of milk.
3. Use of protective clothing such as rubber gloves, goggles, face mask, apron and

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Prevention and control:-

1. Care in handling and disposal of foetus, placental membranes and uterine discharge.
2. Proper boiling or pasteurization of milk.
3. Use of protective clothing such as rubber gloves, goggles, face mask, apron and

gumboots.4.Proper disposal of aborted foetus and placenta.5.Good personal and environmental hygiene.6.Immunization in animals and man.7.Health education.

3. CAMPYLO BACTERIOSIS / VIBRIONIC ENTERITIS

Is an important infectious anthroozoonotic disease. Caused by *C. fetus subsp. fetus* and *C. jejuni*.

Control:-

1. Proper cooking of meat and pasteurization of milk before consumption.
2. Immediate isolation of affected animals and treatment should start immediately.
3. Avoid spread of infectious organism on fomites.
4. Sanitary measures in disposal of faeces, fetuses and other body discharges.
5. Good personal hygiene and environmental hygiene.
6. Health education.

4. ERYSIPELOID / SWINE ERYSIPELAS

Is an infectious bacterial zoonosis caused by *Erysipelothrix insidiosa* (*E. rhusiopathiae*). The disease is also called as pork finger, fish finger or Rose disease. Risk group includes people raising or handling swine, sheep or poultry, abattoir workers, and meat cutters and fish processing workers.

Prevention and control:

1. Protective gloves to high risk groups.
2. Chemotherapy of sick animals.
3. Apply rodent control measures.
4. Disinfection of animal sheds.
5. Immediate cleaning of wound and antiseptic bandaging of wound or abrasions.

5. LISTERIOSIS / CIRCLING DISEASE

Is an important bacterial zoonotic disease caused by *Listeria monocytogenes*. Risk groups include Immuno deficient persons, pregnant women in close contact with infected materials and decayed vegetables.

Prevention and control:-

1. Do not allow pregnant women to work with diseased animals.
2. Avoid drinking raw or unpasteurized milk.
3. Use of protective clothing.
4. Proper disposal of infected material.
5. Personal hygiene and environmental hygiene.

6. Health education.

6. LEPTOSPIROSIS / WEIL'S DISEASE

It is a highly contagious disease of all farm livestock and man caused by *Leptospira interrogans*. Important serovars include canicola, gripotyphosa, hardjo, icterohemorrhagiae and pomona. Population at risk include rice field workers, sewage workers, miners, abattoir workers, veterinarians and dairy farmers

Prevention and control:-

1. Rodent control.
2. Prevention of environmental contamination by animal excretions.
3. Protective clothing to occupational workers.4.Avoid swimming in contaminated water.
5. Regular immunization of animals.
6. Thorough disinfection of animal premises.
7. Personal hygiene.8.Health education.

7. SALMONELLOSIS/PARATYHOID FEVER

A contagious zoonotic disease of great economic importance affecting all farm animals, poultry and man caused by genus *Salmonella*. Important species include *Salmonella typhimurium*, *S. enteritidis*, *S. cholerae suis*, *S. arizonae*, *S. dublin*, *S. typhi*, and *S. paratyphi*. The disease is more prevalent where intensive livestock husbandry methods are practiced and where animals are imported into farms.

Control measures:-

- 1.Avoid unpasteurised milk, raw meat, fish, uncleaned vegetables, contaminated water.
2. Strict ante and post-mortem inspection of animals.
3. High standard of personal hygiene.
4. Proper refrigeration of food.
5. Provision for sanitary disposal of faeces.
6. Maintain hygienic condition in food processing plant.
7. Health education.

8. STREPTOCOCCAL MENINGITIS

Streptococcus suis (type 2) infection is a disease of pigs, transmissible to man and characterized by meningitis. Streptococcal meningitis in pigs occurs after weaning and when pigs are mixed, the organism apparently being conveyed by healthy adult carrier animals in the nasopharynx. The population at risk is abattoir workers, meat processing plant operatives, butchers, farmers and veterinarians.

Prevention and control: -

1. Avoid the persons with cuts and injuries from handling pigs.

2. Protective measures like gloves and mask during work.
3. Personal hygiene and health education

9. TETANUS / LOCK JAW

In an industry where the livestock are handled and where wounds, often deep penetrating ones occur, the possibility of occurrence of tetanus is much higher. The disease is caused by *Clostridium tetani* which is an anaerobic organism occurs in soil and dust.

Prevention and Control: -

1. Active immunization with tetanus toxoid.
2. Thorough washing of the wounds with soap and water and proper treatment of cuts and injuries.
3. Administration of tetanus antitoxin in persons with deep wounds.

10. TUBERCULOSIS / PEARL DISEASE

Is a usually chronic debilitating but sometimes acute infectious disease of all vertebrates, birds and man characterized by the development of tubercles in any part of the body. Risk population includes dairy farmer, abattoir workers and poultry processing workers. Three important species of tubercle bacilli are *Mycobacterium tuberculosis*, *M. bovis* and *M. avium*

Control:-

1. Early diagnosis and chemotherapy.
2. Use of face mask and other protective cloths.
3. Screening using tuberculin test.
4. Test and slaughter in case of animals.
5. Proper pasteurization of milk and cooking of meat.
6. BCG vaccination of all individuals.
7. Health education and personal hygiene.

11. TULARAEMIA / RABBIT FEVER

A highly contagious zoonosis affecting mainly wild animals like jackals, rabbits but which may also infect domestic animals like sheep, pigs, horses and less commonly calves, dogs and man. Causative organism is *Francisella tularensis*. Population at risk include ranchers, sheep rearers, sheep handlers, outdoor occupation or recreation where exposure to blood sucking arthropods is common.

Control:-

1. Arthropod and rodent control.
2. Provide protective wears.
3. Thorough cooking of meat and game animals.
4. Immunization of high risk group with live attenuated vaccine.
5. Avoid drinking of contaminated water.

6. Health education.

12. YERSINIOSIS / PSEUDOAPPENDISITIS

It is an emerging bacterial zoonotic disease caused by *Yersinia enterocolitica*, *Y. pseudotuberculosis*.

Control:-

1. Protection of water supply from contamination with faeces.
2. Sanitary disposal of faeces.
3. Thorough pasteurization of milk.
4. Proper handling and cooking of meat.
5. Hygienic preparation of food.
6. Personal hygiene.
7. Health education.

13. PSITTACOSIS AND ORNITHOSIS

The disease is caused by *Chlamydia psittaci*, an obligate intracellular organism. Psittacosis is transmitted from birds of the psittacine order (parrots, parakeets etc) and ornithosis from birds other than psittacines (pigeon, turkeys, ducks, gees etc). People at risk include poultry farmers, pet shop owners and breeders, workers in bird processing plants, zoo workers and veterinarians. The disease is commonly inapparent or latent in birds and may remain for so many years. Thus the birds that appear healthy may shed the agent and transmit the infection for long period.

Prevention and Control: -

1. Proper disposal of the infected materials and disinfection of the premises.
2. Quarantine of imported birds.
3. Use of face mask and other protective measures.
4. Regular screening of the population by serological tests.
5. Chemo prophylaxis with tetracycline.
6. Health education and personal as well as environmental hygiene.

14. Q FEVER / COXIELLOSIS

Is caused by an intracellular rickettsial organism called *Coxilla burnetti*, which is highly resistant to the physical and chemical agents. The organism usually localized in the mammary glands and placental tissues and shed in large numbers during parturition with the placenta, amniotic fluid and milk. Cattle, Sheep, Goat, Rabbit and other domestic animals and wild animals and ticks act as the reservoirs of the disease. Occupational risk groups include slaughterhouse workers, dairy workers, veterinarian, workers in meat processing, hide, fat rendering and fertilizer industries. Laboratory workers also constitute a high risk group.

Prevention and Control: -

1. Proper pasteurization of milk.
2. Avoid handling of contaminated materials.
3. Protective measures like face masks, gloves etc.
4. Early diagnosis and treatment of the sick persons.
5. Proper disposal of aborted fetus, placenta and other contaminated materials.
6. Immunization of high risk groups with formalin inactivated vaccine.
7. Health education and environmental sanitation.

15. DERMATOPHYTOSIS / RING WORM

Dermatophytosis are infections of human and animal epidermal tissues caused by a homogenous group of fungi known as dermatophytes. This group mainly includes several species of Trichophyton [*T. mentagrophytes*, *T. verrucosum*] and Microsporum [*M. canis*, *M. nanum* and *M. equinum*]. These fungi penetrate and parasitize keratinous body tissues like skin, hair, feathers, horns, and nails and cause the disease dermatophytosis.

Prevention and Control: -

1. Isolation of the infected animal and proper treatment.
2. Avoid contact with the infected animal.
3. Use of protective mask to avoid exposure.
4. Proper disinfection of the premises.
5. Vaccination of young animals with Russian live vaccine.
6. Health education.

16. BIRD FLU / INFLUENZA

Influenza is caused by an Orthomyxo virus that attacks mainly the upper respiratory tract, the nose, throat and bronchi and rarely the lungs. Influenza A virus is responsible for regular out breaks of the disease and can also infect domestic animals and birds. Influenza rapidly spreads around the world in seasonal epidemics and imposes a considerable economic burden especially to the poultry industry. The annual epidemics are thought to result in between 3 and 5 million cases of severe illness and 5 lakhs death every year around the world.

Prevention and control

1. Avoid overcrowding in animal and poultry houses.
2. Vaccination of man and animals.
3. Avoid close contact with infected animals.

17. LOUPING ILL / OVINE ENCEPHALOMYELITIS

Louping ill and related tick borne encephalitis (Central European tick borne encephalitis, Russian spring summer encephalitis etc) are viral diseases caused by RNA virus under the genus Flavi virus

Prevention and control: -

1. Lab workers should avoid needle prick and use face mask.
2. Animals should be immunized with oil adjuvant inactivated vaccine.

18. ORF / CONTAGIOUS PAPULAR DERMITITIS

Orf virus infection in sheep and goat is a world wide disease caused by a DNA virus under Parapox virus. Lesions in the lips of lambs and udder of ewes are usually apparent but a more serious form with high mortality may involve the tongue, palate, lungs and digestive tract.

Prevention and control: -

1. Isolation and treatment of animals.
2. Immunization of lambs with an attenuated cell culture vaccine.
3. Avoid the persons with cuts and injuries from work.
4. Protective measures like gloves and mask during work.

Other viral diseases of occupational importance include New castle disease, Foot and mouth disease, Rabies etc. New castle disease is caused by an RNA virus of Paramyxo virus. The disease is common in fowl through out the world. Although not common among man, it occurs primarily in persons who administer vaccines and lab workers. The disease is also seen in poultry farmers and slaughterhouse workers. Foot and mouth disease is an acute, highly contagious viral disease of all cloven footed domestic and wild animals. The population at risk includes animal handlers, veterinarians and slaughterhouse workers. In man there will be mild fever with mouth dryness and small vesicles in the mouth, lips, tongue and fingers at the base of the nail. Rabies is another acute fatal viral infection of all warm-blooded animals and man transmitted by the saliva via the bites of rabid animals and characterized by nervous symptoms and ascending paralysis.

