VETERINARY ASPECTS OF PUBLIC HEALTH

By

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VETERINARIANS are intimately concerned with some aspects of the health of the human population for on them falls all the work on the control of diseases of animals which may also infect human beings and, in many countries, for ensuring that the supplies of meat and meat products are safe for human consumption. A further responsibility is the certification of live animals and products of animal origin for export as being free from infections likely to cause disease in man or animals. These duties are given to veterinarians because the training they receive fits them for such work. In some countries, however, there is still some hesitation on the part of the authorities to give veterinarians responsibility for the meat and meat products part of these duties : and although veterinarians may be employed in the necessary work involved, the final responsibility lies with others.

Diseases, common to both man and animals, occupy an important place in both human and animal health. They are the cause of suffering in the human population as well as interfering with the work capacity of individuals and groups of people : they have an important bearing on the economic of animal production. While many excellent results follow the activities of the medical authorities in the treatment and prevention of such diseases, it is probably true to say that so long as animals remain reservoirs of the different infectious agents, so will there be an important source of infection for the human population. The association of man and animals, directly and indirectly, is so close that many opportunities exist for the transference of infections common to both and it must also be pointed out that, although we are concerned primarily in this article with the transmission of infections from animals to man, susceptible animals may also receive specific infections from human beings. This has been well illustrated, for example, in the operation of extensive schemes for the eradication

of bovine tuberculosis in cattle when, following total eradication of the disease from the cattle population in a country, sporadic, limited outbreaks occur and can sometimes be traced to transmission of the infection from human beings.

There is an extensive list of infectious diseases which may be transmitted from animals to man : the risk concerning some is small and the ultimate effect is often confined to one infected individual without spread. On the other hand, there are some which are a menace to the human population. Reference need be made only to a few of them to show the importance of the group.

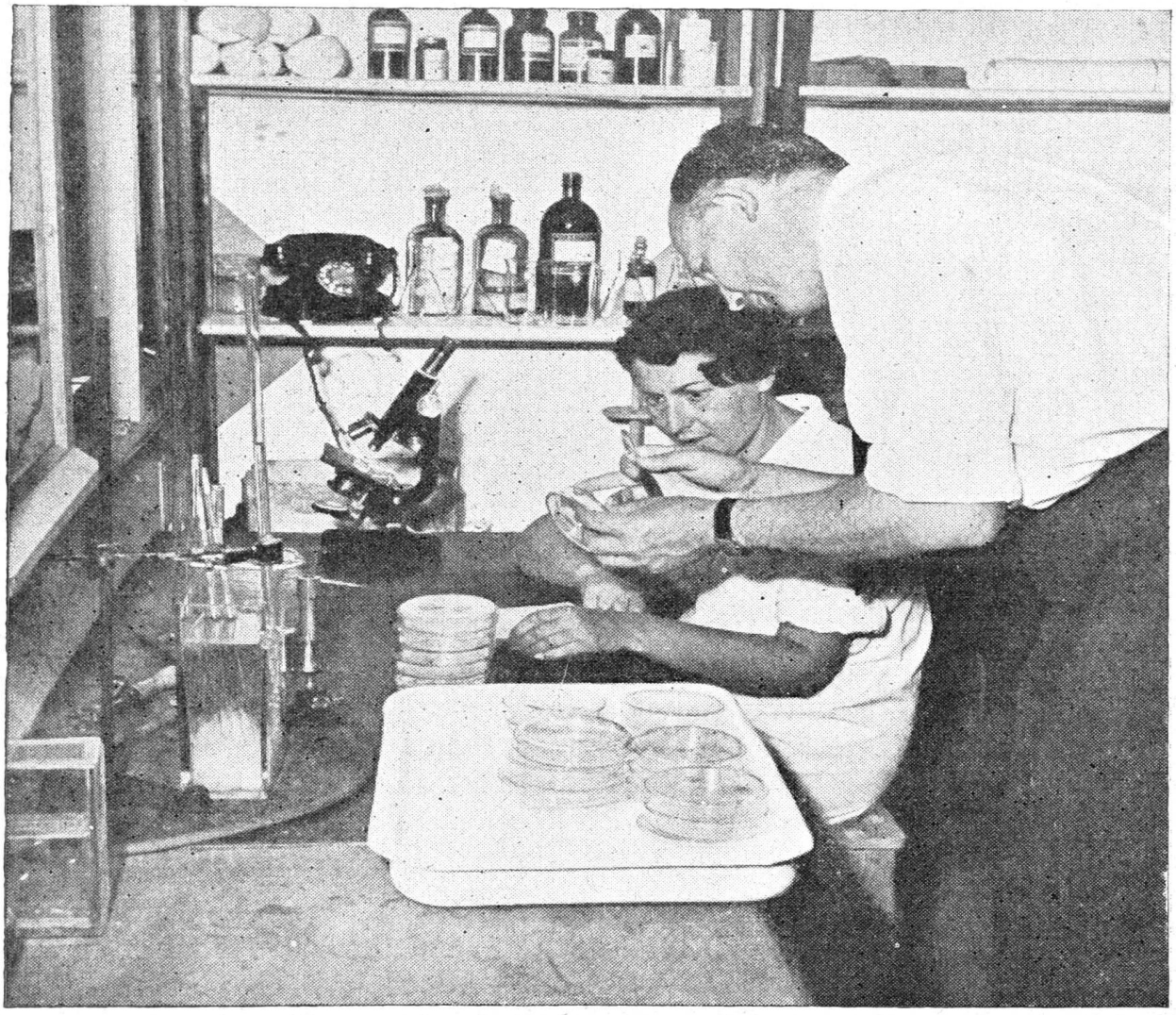
Two of the types of encephalomyelitis in horses, transmitted from horse to horse by blood-sucking arthropods and insects may also infect man : outbreaks in human beings have occurred in several parts of America and have usually been traced to infected animals or recovered " reservoir " animals, the transmission being by mosquitoes. The causal virus has also been found in some of the external parasites of chickens.

Psittacosis is the name applied to a disease of psittacine birds caused by one of a special group of micro-organisms : the infection also occurs in other birds, including poultry, turkeys and pigeons when it is known as ornithosis. The disease occurs in human beings, sometimes mild and sometimes severe, and can usually be traced to close contact with infected birds. At one time it was thought that the disease was almost entirely confined to psittacine birds, and in some countries their importation was prohibited. The finding of the causal agent in domestic and wild birds in many parts of the world, however, caused a relaxation of the importation restrictions although such restrictions still exist in some countries. It appears that the infection is widespread throughout the world and many infected birds show no evidence of disease but are reservoirs of the infectious agent.

Rabies is one of the most important diseases in the human subject transmitted from infected animals, those most commonly infected being dogs, cats and wild carnivores. In some countries cattle, horses and other domestic animals also suffer from rabies and in parts of South and Central America, the vampire bat transmits the infective agent. The disease has also been recently diagnosed in North American bats. Infection is transmitted largely through the bites of infected animals, the infecting virus being present in the saliva where it may be found even for some days before the animal shows symptoms of the disease. The relatively long time which may elapse between infection in an animal and the appearance of symptoms is characteristic of rabies and, before more modern methods of treatment were introduced for infected human beings, allowed the necessary time in

which to carry out the older and somewhat prolonged treatment. Because of this long incubation period, the time of quarantine of six months for all imported dogs and cats into some countries is fully justified. Although we may be apt to concentrate on the dog and cat as the main vectors of the rabies virus, wild carnivores are also of much importance, and extensive schemes for the control of rabies in some countries present difficulties from the presence of the infection in such animals.

Anthrax is a disease of both human beings and animals, the infection being conveyed to man largely by handling infected animals or their products. In all probability, the incidence of the human disease is greater than that recorded because of the failure to report all cases in some parts of the world. In addition to the direct losses from the disease, it is economically expensive if the cost of its prevention in



Block 20—Laboratory for hygienic examination of foods of animal origin (meat, fish, milk) recently established in Israel with the assistance of FAO.

Photo by courtesy F.A.O. Rome

animals by the annual application of vaccines is taken into account. The resistant anthrax spore can persist for very long periods and can remain alive in soil for many years. Animals suffering from anthrax may die or recover spontaneously. The dead animal and its products are the common sources of direct or indirect infection to the human subject. The whole carcase, including the skin and hair or wool is infected. In addition to human infection occurring by handling the infectious parts, the ingestion of insufficiently cooked infected meat may cause the disease. In the transmission of the infection, the importation of hides and skins and feeding stuffs and fertilisers from countries in which the disease is prevallentl has to be taken into account, as well as the possibility of non-infected materials becoming contaminated from them during transportation, Cattle infected with anthrax do not usually excrete the infecting organism in the milk largely because milk secretion ceases in the early period of the infection. Milk may, however, become contaminated, but milk-transmitted anthrax in human beings appears to be very rare. It is highly important that the milk from any animal showing a rise in temperature in a herd in which anthrax is present should be destroyed, and that all the milk from such a herd produced by the apparently normal animals be pasteurised or otherwise adequately heat-treated before being made available for human consumption. Similarly, in milking herds, in which vaccination against anthrax with living spore vaccines is practised, the milk from any animal showing any disturbance of health, including a rise in temperature, should be suitably destroyed and the milk from the other animals heat-treated before being released for human consumption.

Human infection with brucellosis derived from cattle, goats, sheep or pigs is well recognised in many parts of the world. All three types of brucella infect man, the infection being transmitted by handling infected animals as well as by consumption of their milk and some of the types of milk products, especially unripe cheese. In some parts of the world the incidence of brucellosis in the human population is relatively high. Schemes for the control and ultimate eradication of brucellosis in cattle are in operation in some countries and consist either of vaccination of young cattle on an extensive scale or the diagnosis of infected animals by the agglutination test and their elimination from dairy herds. Heat-treatment of milk is also widely practised. The incidence of the human disease becomes considerably reduced as brucellosis in cattle is controlled. On the other hand, although much progress has been made in our knowledge of some of the important factors concerning the infection in goats and sheep and the results of small-scale experiments point the way to control by

vaccination, the incidence of human infection derived from these animals is still a matter of serious public health concern.

Leptospirosis is found all over the world in man and animals, much of the human infection being acquired directly or indirectly from infected animals. Although dogs, cattle, swine, sheep and goats may suffer clinically from the disease caused by different types of leptospirae, they may also harbour the organisms without the occurrence of symptoms and may excrete leptospirae in the urine. Some wild animals, especially rats, are also important disseminators of the infection. Contact with infected animals and with materials contaminated by them are the common sources of human infection. Water and mud become contaminated and human beings brought into contact with them may become infected, the leptospirae entering the body through broken or damaged skin and through the mucous membranes of the eyes, nose or mouth. There are many different types of leptospirae, some of which cause disease in both man and animals : in some animals more than one type may be found. Although domestic animals must be held responsible for some of the human infections and sometimes cause severe outbreaks, the principal spreaders are probably small rodents, particularly rats and mice from which not only human beings but also animals become infected. Control of leptospirosis centres around the destruction of the leptospirae excreted by infected animals both domestic and wild. The organisms are very sensitive to disinfectants and the disinfection of contaminated water and premises must be part of control schemes. The disinfection of large areas of contaminated land, however, presents some difficulties.

Salmonellosis is prevalent throughout the world in both man and animals. Human infection, often arising from food poisoning, may be derived from handling infected animals or their products and by the consumption of infected products of animal origin. Several hundred types of salmonellae are recognised, most of them having been recovered from animals : some are much more commonly found than are others and some are recognised as the most common regular causes of salmonellosis in human beings and in the different animals. Some types appear in groups of animals for only a limited period of time and then seem entirely to disappear. In poultry, in addition to specific salmonellae which cause disease only in poultry—pullorum disease and fowl typhoid—other salmonellae responsible for disease in human beings are found and find their way into the eggs. Duck eggs may be infected in the ovary or oviduct or through the shell and are the source of human infection when consumed raw or insufficiently cooked. It is seldom that hen eggs in the shell cause outbreaks of human salmonellosis : contamination of hen eggs takes place

mostly through the shell. Egg products, on the other hand, have been shown to be an important source of salmonellae. Infected poultry meat may also be a source of infection for human beings. Salmonellae are the causes of disease in cattle, mostly calves, in many parts of the world, and animals which recover may continue to excrete the organisms in their faeces, intermittently or regularly, for long periods or even for life, i.e., they become " carriers " of the infective agents. From them, infection may be directly transmitted to other animals, and their carcases, milk and milk products may prove a source of infection for human beings : in fact, contaminated meat and meat products are probably the main sources of human salmonellosis. In some countries infected pig meat has been shown to be an important source of human infection. Although meat, pork, milk, eggs and other articles of food may be infected because of the disease or organisms in the living animal or bird, they can also become contaminated during handling processes with salmonellae from other sources including human " carriers " of the infective agents, and from soiling by faeces of rodents which may also be " carriers ". Fish may also be a source of infection when eaten in a raw or partly-cooked condition. This is more likely to be the case in warmer climates and with fish obtained from sewage-polluted water. Salmonellae have been recovered from shell-fish and from the waters in which they live. Note must also be made of the contamination of vegetables grown in areas fertilised by sewage and other types of fertilizers which may be contaminated. The spread of salmonellae by contaminated fertilizers or animal feeding stuffs prepared from condemned or inedible materials from slaughterhouses must not be overlooked. There is also recent evidence that some products for animal feeding containing sun-dried fish may be quite heavily contaminated with salmonellae and that even imported concentrates of vegetable origin, e.g., cotton seed cake, sunflower cake, groundnut cakes and alfalfa may contain salmonellae, capable of infecting human beings and animals. The sterilisation of such products by importing countries is being considered.

Bovine tuberculosis in human beings originates mostly from infected animals and animal products : the disease may, of course, be transmitted direct from infected persons. Although cattle are the main sources of human infection, other species of animals may also transmit the causal organism, e.g., dogs, cats, pigs and even horses. Infection may be transmitted by direct contact with infected animals or by the consumption of their products containing the live tubercle bacillus : milk is probably the most important vehicle. Concentrated efforts are being made in some countries to eradicate bovine tuberculosis from the cattle population by use of the tuberculin test and satisfactory

disposal of reacting animals. In some, the disease has already been completely eradicated and, in others, rapid progress towards that objective is being made and total eradication is in sight. Reduction in tuberculosis in the human population following the lowering of the incidence in cattle has already been demonstrated. While vaccination against tuberculosis in human beings is being extensively practised in some parts of the world and chemo-therapy may be a useful asset in dealing with human tuberculosis, it is now the general opinion that neither has a place in veterinary medicine and that the only practical method of freeing herds, areas or countries from bovine tuberculosis is by the use of the tuberculin test, properly applied and interpreted and as often as considered necessary, together with the satisfactory disposal of reactors.

Q fever occurs in both man and animals and, although animals may not show marked clinical evidence of the disease, they are reservoirs of the infective agent, ruminants being the most important. Infection takes place most commonly through the respiratory tract but contaminated milk is also a source and, because the casual of ganism spreads by the blood stream to all parts of infected animals, meat may be infected. Outbreaks have been reported in personnel working in abattoirs in some countries. Although the infection may lie dormant in animals, it may become activated under certain circumstances. An example is the ewe at the time of parturition, when the placenta becomes heavily contaminated, and spread can occur from it. There is evidence that Q fever is spreading into new areas and to new domestic animal hosts.

Veterinary public health is also concerned with the part played by animals in the causation of some human parastic infestation. An example is hydatidosis, a widespread condition caused by the cystic stage of special tapeworms found commonly in the dog. The eggs from these tapeworms, contained in the faeces of infected dogs, swallowed by man and many species of animals, become lodged in different organs, especially the liver and lungs, and forms cysts of various sizes. Following some development in the infected organs the cysts, when eaten by dogs, give rise to new tapeworms and so the life cycle and the cycle of infection goes on. Although the dog is the common host of these special tapeworms and the cystic stage occurs in man and many of the domestic animal species, the adult tapeworm is found in some of the wild carnivores and the cystic stage in some of the wild ruminants and other species. Because of the very important part played by the dog in the life cycle of these parasites, the frequency with which hydatidosis may occur in man can readily be appreciated. Control of hydatidosis must concern the elimination and destruction of the adult

tape-worms in the dog and, wherever possible, in other animal hosts together with prevention of re-infestation by the cystic stage of the parasite.

Many of the activities of veterinarians in matters of public health, as can be seen from these few examples, are carried out in the field and for them close collaboration with medical authorities is essential.

Part of these activities also concerns work in slaughterhouses and abattoirs where diseases of animals transmissible to man may be found in animals for slaughter and in their carcases. Slaughterhouse work includes the general care and inspection of the collected live animals to ensure that they are in a condition suitable for slaughter and are not suffering from any recognizable disease ; the supervision of slaughtering to ensure that the hygiene is such that risks of meat and offal becoming contaminated do not occur ; the inspection of meat and offal for any evidence of disease which may be transmitted to man and of any condition which would render meat unsuitable for human consumption ; attention to the conditions under which meat and offal are kept before distribution for human consumption, including chilling and refrigeration ; satisfactory disposal of all waste materials, including condemned carcases, parts of carcases and offal ; supervision of the preparation of any animal feeding stuffs or fertilizers at abattoirs.

In some countries, the whole of the control of slaughterhouses and the different activities are the responsibility of veterinarians. This applies mainly to large slaughterhouses in which many animals are dealt with each day. In other countries, veterinarians are responsible only for the inspection of the animals for slaughter and their carcases and offals, and act in a general advisory capacity, even in large establishments. In still other countries, although veterinarians may carry out or supervise these duties, the full responsibility for ensuring the provision of safe edible animal products lies with some other authority. It can be readily understood that veterinarians working in slaughterhouses cannot always personally carry out all the necessary duties. In some few slaughterhouses throughout the world the number of veterinarians employed is enough for all the detailed work : on the other hand, however, largely for economic reasons, specially trained lay personnel, working under supervision of veterinarians, do much of the detailed work. This system is found satisfactory, the trained lay personnel becoming highly expert and proficient in their special work and referring all difficulties to the veterinarians. The tendency today is to establish large slaughterhouses, often near or combined with markets : undoubtedly, this is a much better arrangement than having

a series of small slaughterhouses, often privately-owned, where animals are slaughtered at the convenience of the owner or butcher. The larger slaughterhouse arrangement means more economy and better facilities for the various operations including those concerned with safe meat production. In the small slaughterhouse where only occasional slaughtering takes place, it may not always be possible to organise meat and other inspections in an entirely satisfactory state. It is sometimes necessary for laboratory examinations to be carried out on meat and offal. In the larger slaughterhouses the necessary facilities are normally provided and include laboratories, equipment, apparatus and often trained staff : much of this laboratory work is normally carried out by veterinarians or by staff under their supervision.

In some parts of the world extensive slaughter of animals is carried out for purposes of meat export : some slaughterhouses are retained for this specific purpose while in others special arrangements exist whereby only animals concerned with meat export are dealt with at one time. Special precautions are normally taken to ensure that the meat and offal for export are safe not only for human consumption but are not infected with infective agents which might cause disease in animals in the importing country : veterinary responsibilities on this subject are very great.

In addition to the occurrence in animals for slaughter of infectious agents likely to cause disease in human beings, meat and offal in slaughterhouses may become contaminated with such agents from human carriers among the slaughterhouse personnel. In order to reduce this risk to a minimum, many modern slaughtering establishments include medical personnel on the staff and regular medical examinations of the whole staff are carried out.

In some parts of the world, the work of veterinarians and others on safe meat does not end in the slaughterhouse. Regular or intermittent visits are made to the distributor-shops and premises to ensure that the products are maintained in a satisfactory condition. In some countries, inspection of fish for human consumption also is included in the duties of veterinarians.

While, generally speaking, considerable improvement has taken place in slaughterhouse control throughout the world there is still much to be desired in some areas. There are, however, signs that more attention is being given to this important subject, even in the so-called less developed countries. Plans are being made for the construction of new and more extensive slaughterhouses in many towns and areas and veterinary supervision is a major part of the schemes.

Veterinarians are being consulted in greater measure on the construction of the establishments and particular attention is being given to facilities for any religious or other rites which prevail in the area.

Although many of the duties of veterinarians on public health are carried out in cities or towns, they must also extend into rural areas. In some parts of the world veterinarians are regarded by rural populations as their advisers not only on matters pertaining to the health and diseases of their livestock but also on measures which they may adopt to maintain and improve the health of themselves and their families in so far as similar types of human and animal diseases are concerned. It is often by personal contact, especially in rural areas, that veterinarians are able to persuade individuals and groups of people to adopt the necessary public health measures essential for prevention of transmission of such diseases. The public is appreciating more and more throughout the world the part being played by veterinarians in matters concerning their health and the rules they must follow to prevent deterioration of health and the occurrence of disease.