

Pathology of Domestic Animals of Thailand

Principal Investigators: William L. Wooding, MAJ, VC
Vivat Suthivong, DVM¹
Terdpone Tesprateep, DVM²

Assistant Investigators: Sopon Vuthara
Damri Chawalitrujiwong

OBJECTIVE: A study of grossly visible parasites and pathological conditions in animals in Thailand.

DESCRIPTION: Parasites and pathology specimens were collected, photographed and prepared for microscopic examination. Animals from which specimens were taken included water buffalo, cattle, pigs, dogs, wild cats, and domestic cats. Because records of parasite or pathology incidence were not kept, a rough impression of incidence was all that was possible.

PROGRESS: Conditions occurring in pigs, buffalo, and cattle at the abattoir will be listed in decreasing order of incidence according to the records of the Bangkok Municipal Abattoir.

Pigs.

Macracanthorhynchus hirudinaceus, the thorny-headed worm, an acanthocephalid, lodges in the small intestine and often results in enteritis or peritonitis. The incidence of this parasite is 3.7%.

Cysticercus cellulosa, the larval form of the tapeworm, Taenia solium, occurs in about 1.3% of the animals and is commonly seen in pectoral and thigh muscles and the heart.

Stephanurus dentatus, the kidney worm which encysts in the perirenal area and tunnels into the ureter, is seen in about 1% of the pigs. This parasite has not been reported in Thailand according to Segal's comprehensive review¹.

Metastrongylus apri, the lung nematode of swine, occurs in 0.9% of the pigs and will also infect cattle, sheep, dog and man.

Hog cholera, or swine fever, is an acute viral disease of swine with 100% mortality. Although the occurrence in the slaughter house is .01%, one of the animals necropsied came from a neighboring pig farm that had lost 200 pigs in one week.

Cattle And Buffalo.

Paramphistoma, or rumen flukes are not reported in Thailand by Segal⁽¹⁾ or Mohan⁽²⁾. However, according to abattoir records, 100% of the cattle and buffalo are infected with this parasite. These are twenty-four members of the paramphistome but after attempting to classify, we agree with Soulsby who says "classification of the Paramphistomes should be left to the experts"⁽⁴⁾.

Sarcosporidia, a muscle inhabiting protozoal parasite is present in 82% of the buffalo at the Bangkok Abattoir. This unusual parasite has been classified as a fungus and protozoa but current taxonomists place

1 Bangkok Abattoir.

2 School of Veterinary Medicine, Chulalongkorn University.

it in the Protozoa in an order with the toxoplasma. Although the parasite occurs in all warm blooded animals, birds and many poikilothermic animals, it is usually seen only on microscopic examination. However, many of the infected buffaloes contain cysts visibly grossly and up to 2 inches in length.

Elaeophora poeli, a large nematode residing in the wall of the aorta is present in 65% of the buffalo at the abattoir. A record is not kept of this parasite in cattle, but during the past year we have found a member of cattle affected also. Neither Segal⁽¹⁾ or Mohan⁽²⁾ list this as occurring in Thailand. The male of this parasite is embedded in the aorta wall with the head of the female often resulting in a large necrotic mass frequently 1—3 inches in diameter in the intima of the aorta. The rest of the female extends out the lumen of the aorta. The female has been described as varying from 4 inches to 10 feet long, but the ones I have seen are never longer than 2 feet.

Eurytrema pancreaticum, the pancreas fluke, has been described as occurring in many countries of South East Asia including Thailand. In cattle at the Bangkok slaughter house, 25% are infected but less than 1% of the buffalo are affected. This difference may be due to a difference in feeding habits or to a less complete examination of the buffalo on the part of the inspector. The pancreatic ducts appear blocked in the affected animals but no microscopic evidence of atrophy or necrosis has been seen.

Fasciola hepatica, or liver fluke is seen in 23% of the cattle and 17% of the buffalo in Bangkok. As in other parts of the world, the livers are filled with fibrous tracts which marks the migrating parasites. In severe infections, the lining of the bile ducts and gall bladder are lined by a hard gritty crystalline material embedded in the mucosa. We have had a chemical analysis of these crystals and have found that they are pure calcium carbonate.

Syngamus larygeus, is an unusual nematode that embeds its mouth in the mucosa of the larynx of cattle and buffalo. At the abattoir it is seen in 22% of the cattle and 10% of the buffalo. There seems to be little reaction on the part of the host but on microscopic examination, the mouth parts of the parasites contain laryngeal epithelium. This has not been reported in Thailand according to Segal,⁽¹⁾ Mohan⁽²⁾ and two current parasitology texts, Soulsby⁽⁴⁾ and Levine⁽⁵⁾.

Thelazia rhodesii, the eye worm, is easily missed on cursory examination of the eye. Two different surveys in the last two years at the abattoir have found 20% of the buffalo and 10% of the cattle affected with this parasite. We have found this parasite on many of the buffalo heads by lifting the third eyelid (nictitating membrane) and flushing them out of the medial canthus. A conjunctivitis may result, but the eyes we have examined were not affected.

Onchocerca gibsoni, is a nematode that forms hard nodules consisting of fibrous tissues which frequently become calcified in the muscles and skin of the pectoral region or brisket. This occurs in 20% of the cattle at the slaughter house but only 0.1% of the buffalo. The intermediate host, the midge (culicoides), bites the skin and transfers the microfilaria to the blood where it circulates and lodges in the pectoral region. The predisposition of the buffalo for mud and water probably explains the difference in incidence in these animals. The female has been described up to 20 inches long but the fibrous nodule with fibrous tissues and parasites has made it impossible for us to extract an entire worm to measure.

Setaria digitata is a slender nematode 4—6 cm long that is often seen wandering around in the abdominal cavity. In the abattoir, 20% of the cattle and 9% of the buffalo are affected with this parasite. Microfilaria of this parasite in the blood are ingested by a mosquito and after migrating to the salivary glands are reinjected into other cattle. We have found sheathed microfilaria 180 microns long in peripheral blood of many of these cattle. We believe they are the microfilaria of Setaria. Segal⁽¹⁾ and Mohan⁽²⁾ do not mention this parasite or any Setaria in Thailand.

Tuberculosis seems to be present all over the world and Thailand is no exception. One percent of the cattle at the abattoir are infected but only 0.3% of the buffalo are infected. The organ most commonly involved in cattle infection is the lung. A few of these cases that involved practically the entire lung have been cultured as Mycobacterium bovis.

Hydatid cyst, the larval form of Echinococcus granulosus occurs in 0.25% of the cattle in the abattoir and in none of the buffalo. The cases of this we have seen have been present in the lung.

A number of other parasites and pathological conditions were seen but we have no idea of the incidence because records have not been kept on these conditions. These include:

1. Onchocerca armillata, a small nematode reported by different authors between 2 and 29 inches long. Grossly, the intima of aortas affected with this were thickened, contained multiple tortuous tracts and were often covered with yellow atheromatous plaques. On section, the aorta was seen to contain many parasites lying entirely in the wall, many containing microfilaria. We have not been able to extract an entire parasite to measure its length.

2. A schistosome was seen in several buffalo livers that grossly appeared as white spots through the liver intermingled with congested areas. On microscopic examination, we have found large dilated arteries with massive exuberant proliferation of the vascular intima and media with sections of larva but with no eggs evident. We have not identified this species.

3. A number of tumors were seen, primarily in the buffalo. They were microscopically typical of those seen in other countries. They included: papilloma and rhabdomyosarcoma of the rumen, mesothelioma of the peritoneum and liver capsule and phaeochromocytoma of the adrenal gland. A small white focus in a cow heart was sectioned and was found to consist of glandular tissue. It was surrounded by smooth muscle and fibrous tissue. There were no other foci in the animal and it was diagnosed as a "Choristoma", or normal tissue in an abnormal location. A buffalo liver taken from the abattoir contained multiple diffuse white foci some as large as 4 inches across. Microscopically the cell type and pattern were similar to the argentaffinoma or carcinoid in man. The cells stained weakly for silver in our case, but in man, these tumor cells stain from an intense positive to a negative. According to Smith and Jones,⁽⁶⁾ there is one confirmed case of this tumor in an ox jejunum, but there are no instances of a metastasis as ours evidently was.

We have had the opportunity to examine a number of nasal tumors in large animals from farms in the vicinity of Bangkok. Two sheep had nasal tumors which completely blocked the posterior nares and caused suffocation. Although they appeared grossly similar, one was an undifferentiated sarcoma and the other was an adenocarcinoma. A horse with a mild unilateral nasal discharge suddenly died. On opening the turbinates, we found a large mass in the posterior turbinate invading the cribriform plate and extending into the brain. Microscopically this tumor was a squamous cell carcinoma. A number of nasal tumors have been seen from a farm northeast of Bangkok. Microscopically they have consisted of a mosaic of morphologic types. We have seen three olfactory neuroblastoma, a carcinosarcoma, a leiomyosarcoma, a schwannoma, a squamous cell carcinoma, an undifferentiated sarcoma, and an embryonal rhabdomyosarcoma. We have not studied the epidemiology of this outbreak but the etiology and epidemiology warrant further study.

Canine distemper and infectious canine hepatitis are quite common in the street dogs in Bangkok and we have seen many cases of these diseases. As would be expected in an area with many mosquitoes, the heartworm, Dirofilaria immitis, is present in most of the dogs. Although it was surprising to find such a high incidence of Spirocerca lupi in the esophagus and aorta of dogs at the dog pound, on some days as many as 90% of the animals were affected. The cecum of most of the dogs necropsied contained Trichuris vulpis and a few of the blood slides contained Babesia canis.

Many of the domestic and wild cats that we have seen from the Veterinary School and animal handlers in Bangkok have had panleukopenia or "feline infectious enteritis". This disease appears to be prevalent because many of the wild cats were direct from the jungle. An unusual parasite was seen in the heart muscle of the wild cats. Slides were sent to Dr. Beaver of the School of Public Health and Tropical Medicine, Tulane University. He felt that they were protozoal but on study of other wild cats and re-examination of the original cases, we believe that they were sections of migrating lungworm, Aleurostrongylus abstrusus,

A number of conditions were seen in gibbons at SEATO Laboratory. These included: a natural outbreak of lymphosarcoma, fungal (*microsporium canis*) infection of the skin and severe Strongyloides stercoralis of the lung and intestine.

Regional ileitis, similar to that described in the literature, was seen in the colony hamsters. We obtained no better elucidation of the etiology of this condition than have the authors of any of the articles in print.

We have seen chronic respiratory disease in rats and mice similar to that described in the literature. As many authors claim the pathological results seem to be due to more than one agent, but definitive work in our laboratory has not proved this as fact. The dwarf tapeworm, Hymenolepis nana, has been seen in mice in the animal screening project.

BIBLIOGRAPHY:

1. "Parasites of Man and Domestic Animals in Vietnam, Thailand, Laos, and Cambodia." D.B. Segal, J.m. Humphrey, S.J. Edwards, and M.D. Kirby. *Experimental Parasitology* 23, 1968, 412-464.
2. Diseases and Parasites of Buffaloes. Part III, Parasitic and Miscellaneous Diseases. R.N. Mohan, *Veterinary Bulletin*, 38, 1968, 735-756.
3. Parasites of Domesticated animals in Thailand II—Worm Parasites of Cattle, Water Buffalo, Sheep and Goat. Z. de Jesus, J. Waramontri. Report To South East Treaty Organization, 1961.
4. Textbook of Veterinary Clinical Parasitology Vol I. Helminths E.J.L. Soulsby. F.A. Davis Company, Company, Philadelphia Pa. 1965.
5. Nematode Parasites of Domestic Animals and of Man. N.D. Levine, Burgess Publishing Co., Minneapolis, Minnesota, 1968.
6. *Veterinary Pathology*, H.A. Smith, T.C. Jones, Lea and Febiger, Philadelphia, 1968.