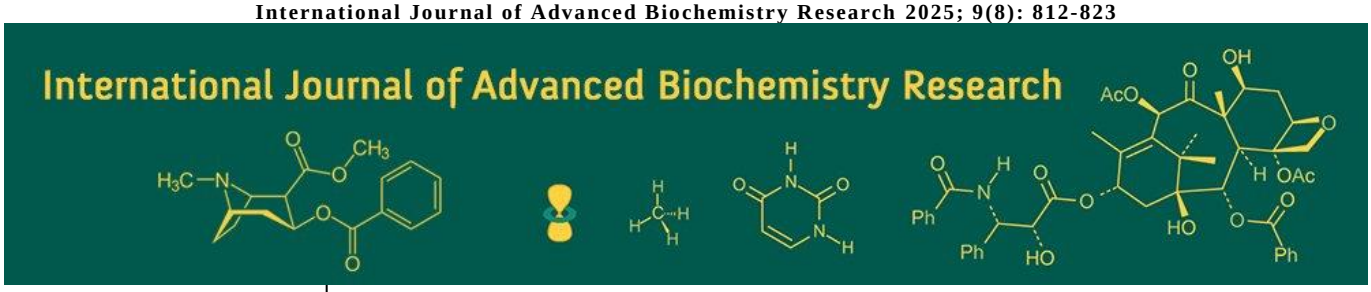

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Relevance of important parasitic zoonosis and its impact in public health

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Abstract
Any disease or condition that can naturally spread from vertebrate animals to humans or from humans to animals is categorized as zoonoses by the World Health Organization (WHO). India ranks first among nations with high zoonotic disease occurrences and is the 7th largest country in the world. Numerous helminthic illnesses have emerged in both human and animal populations, including paragonimiasis, fasciolopsis, taeniasis and cysticercosis, echinococcosis and hydatidosis, toxoplasmosis, cryptosporidiosis, gnathostomiasis, dirofilariasis and others. More than 70 species of protozoa and approximately 300 species of parasitic helminths, which are derived from both nonhuman primates and other animals, infect humans. Animal health and productivity are adversely affected by a variety of parasites, which results in large global economic losses. Helminths and protozoan intestinal parasite infections are among the most common infections in the globe. Measures and procedures for infection prevention and control can lessen the public's exposure to parasites. The adoption of evidence-based infection prevention and control strategies should be encouraged by surveillance programs in order to lower the prevalence of these illnesses, slow spread and eventually enhance public health. This paper describes the epidemiology, transmission, clinical signs, and treatment of important parasitic zoonoses from the latest literature in this field.

Keywords: Animals, diseases, impact, parasites, helminth, protozoan, treatment, zoonoses

1. Introduction
The phrase zoonoses originated from two Greek terms "zoon" which means animal, and "nosos" which indicates disease. Any disease or condition that can naturally spread from vertebrate animals to humans or from humans to animals is categorized as zoonoses by the World Health Organization (WHO) (Hossain *et al*., 2023) [30]. Zoonotic diseases can be fatal and it is a concern in middle income and low income countries, with an estimated 2.4 million cases and yearly 2.7 million human deaths. The majority of these illnesses has an impact on animal health and reduces livestock productivity (Rahman *et al*., 2020) [46].
According to a report by the International Livestock Research Institute (ILRI), Kenya, India ranks first among nations with high zoonotic disease occurrences and is the 7th largest country in the world. Poor livestock keepers, protein energy deficiency, the burden of zoonoses, and lastly the prevalence of endemic zoonoses are the causes. The survey estimates that approximately 1 billion poor people rely on livestock. Livestock production is impacted by parasitic zoonoses because they have a direct impact on both human and animal health. The increasing incidence of zoonoses is caused by a number of factors, including excessive population density, a lack of personal hygiene, feces in public areas, poverty, a lack of drinkable water, a large number of stray animals, and certain eating patterns. These variables directly affect the incidence of parasitic infections and infection prevalence differs between Indian states (Figure 1). Numerous significant helminthic illnesses have emerged in both human and animal populations, including paragonimiasis, fasciolopsis, taeniasis or cysticercosis, echinococcosis or hydatidosis, toxoplasmosis, cryptosporidiosis, gnathostomiasis, dirofilariasis and others (Rajendrane *et al*., 2019) [47].
Trypanosomosis in humans was first reported in Maharashtra. According to a serologic survey conducted in the impacted area, the condition's prevalence was 4.5%.

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In Kerala, Cutaneous Leishmaniasis (CL) was first reported in 1988 as an imported case from Saudi Arabia. The Nilambur division of Malappuram district, Kerala, has a prevalence of 2.7% for CL, according to the first indigenous case from Kerala. CL was recently recorded from Kerala's Kasargode district as well. There were numerous reports of subcutaneous dirofilariosis from various south Indian states, including Tamil Nadu, Karnataka, Maharashtra, and Kerala, following the first case reported from Mumbai. The earliest reports of ocular dirofilariosis cases came from Kerala. India's northeastern states were thought to be endemic for the disease because a large number of human paragonimosis cases were reported and second report from Maharashtra in 1984 followed the first human case from Manipur in 1981. These accounts all attest to the endemicity of paragonimosis in India's northeastern states (Jyothimol and Ravindran, 2015) [32].

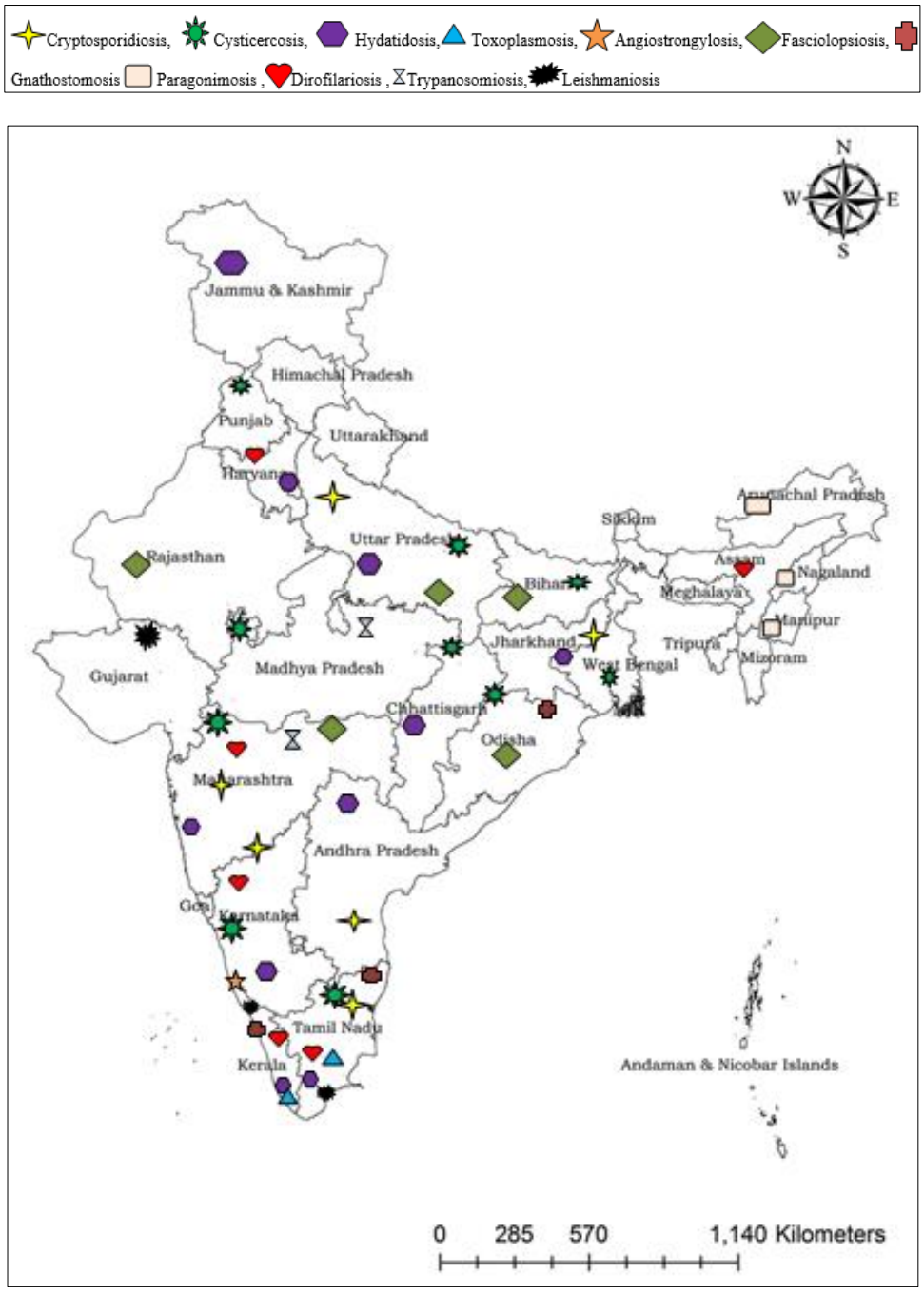

Fig 1. Map showing distribution of zoonotic parasitic diseases in India

Parasitic zoonoses play a prominent role in the context of emerging diseases, undoubtedly due to the shifting interactions between humans and other animals. With more than 60% of the approximately 400 infectious diseases that have been found since 1940 being zoonotic, the use of "prominently" is undoubtedly accounted for in relation to the sheer number of newly developing infectious diseases. Some zoonotic parasites, like toxoplasmosis, can infect humans as incidental hosts and rely on human interaction with the definite hosts, other zoonotic parasites are more easily spread through environmental modes like rain runoff, flooding, vectors, and aerosol spread (Pisarski, 2019) [44].

1.1 Impact of parasitic zoonoses

The effects of neglected zoonotic diseases (NZDs) are particularly more severe in low-income households, where

both people and their animals bear a double burden. The main issue is the stark discrepancy between veterinarian duties and public health demands. Furthermore, it is known that NZDs pose a health danger to people. A new paradigm to stop the expansion of these groups should arise as the number of diseases and socioeconomic health issues among NZDs increases. As far as public and animal health are concerned, proper surveillance, diagnostics, interventions, staff training, program delivery, and integrated health planning should all remain isolated and rigorous. Furthermore, an integrated "One Health" approach and plan ought to be put into practice since it will improve the welfare of both humans and animals in addition to aiding in the diagnosis and prevention of diseases (Prasad *et al*., 2020) [45].

The main global public health concerns are parasitic infections. More than 70 species of protozoa and approximately 300 species of parasitic helminths, which are derived from both nonhuman primates and other animals, infect humans. Human infections called zoonoses, which are brought on by animal parasites, are very common in tropical and subtropical nations. Nearly 75% of newly emerging infectious diseases in humans and over 60% of recognized infectious diseases in humans are thought to be spread by animals. Worldwide economic losses are linked to the spread of zoonotic parasites from vertebrates to humans. The epidemiology of parasite infections that are new or reemerging is significantly influenced by human behavior. The development and spread of parasitic illnesses are facilitated by changes in the environment. The three fundamental ideas of epidemiology are *viz*., the agent, the host, and the environment. The broad concepts of surveillance, prevention, and control as well as the worldwide burden of infection (Nag and Kalita, 2022) [41].

With intestinal parasite infections in 21% of dogs in the United States, especially with the protozoan Giardia, pathogenic hookworms (*Ancylostoma caninum*) and whipworms (*Trichuris vulpis*), the effects of parasites on pets are equally serious (Stafford *et al*., 2020) [54]. 29.6% of cats had ectoparasites such as fleas, ticks, or mites; the most common species discovered was the mite *Otodectes cynotis* (17.4%), which was followed by fleas (15.5%). *Toxocara cati* reported in 19.7% cases in cats and intestinal worms were found in 35.1% of the cats. Over 200 parasite species and the illnesses they cause are zoonotic, meaning they can spread to humans and have a detrimental impact on both human and household health. Visceral leishmaniasis, commonly referred to as kala-azar, is one instance of a zoonotic illness that can be spread from dogs to people (Kaminsky and Mäser, 2025) [33]. Visceral leishmaniasis reported more from Sudan, India, Brazil and other African countries. It is also present on a sub-national level in endemic nations like Italy, Greece, and Spain (Scarpini *et al*., 2022) [50].

2. Parasitic diseases

Protozoan parasites

2.1.1 Babessiosis (Al-Nazal, 2020 [4]; Maharana *et al*., 2016) [38]

A) Causative agent: *Babesia microti* complex, *B. duncani. B. bovis, B. bigemina*

- **Animal involved:** Lagomorphs, insectivores, rats, and a few other mammals.
- **Distribution:** *Babesia* spp. is found in animals all throughout the world, including several agents that are not species-specific. North America, Asia, Europe and Australia reported human diseases caused by the *B. microti* complex.
  Transmission: Mostly spread *via* the bite of an infected ixodid tick from animal to human.
- **Clinical presentation:** Lethargy, weakness, depression, and fever are the initial clinical symptoms that last the longest. Inappetence, anemia, jaundice, and weight loss follow; in the latter stages, hemoglobinemia and hemoglobinuria appear. With *B. bovis* infections, the central nervous system may become involved as a result of parasitized erythrocytes adhering to brain capillaries. It can cause temporary sterility in bulls and abortion in cows.
- **Treatment:** Diminazene (3.5 mg/kg, IM) and Imidocarb (1.2 mg/kg, SC) are effective (both once). Imidocarb, when administered at a dose of 3 mg/kg, protects against babesiosis for around 4 weeks and may also eradicate *B. bovis* and *B. bigemina* from carrier animals. Corticosteroids, hydration therapy, and anti-inflammatory medications are recommended forms of supportive treatment. For extremely anemic animals, blood transfusions may save their lives.

2.1.2 Balantidiasis: (Singhal *et al*., 2019 [52]; Ahmed *et al*., 2020) [3]

A) Causative agents: *Balantidium coli*

- **Animal involved:** Pigs, rats, camels, ruminants, horses, nonhuman primates, and others.
- **Distribution:** Globally
- **Transmission:** Being a zoonotic parasite, *B. coli* can spread from animals to people. The main method of transmission is the fecal-oral pathway, through contaminated food or drink that contains the parasite's cyst stage.
- **Clinical presentation:** Balantidium primarily affects the host animals colon, resulting in clinical manifestations ranging from mild to severe dysenteric forms. The production and release of hyaluronidase by *B. coli* facilitates the parasite's invasion of the intestinal mucosa, potentially leading to intestinal bleeding and perforation; symptoms range from bloody to mucoid or watery diarrhea. Significant hemoglobin and erythrocyte decrease and an increase in haematocrit have been linked to balantidiasis in afflicted sheep and goats.
- **Treatment:** The infected animals were given a single dosage of oral metronidazole at 10 mg/kg body weight and oral secnidazole at 10 mg/kg body weight. The results of the therapeutic experiment showed that the two medications were 72% and 100% effective, respectively.

2.1.3 Chagas disease: (American trypanosomiasis) (Gomes *et al*., 2023) [27]

A) Causative agent: *Trypanosoma cruzi*

- **Animal involved:** Dogs, cats, opossums, lagomorphs, and rodents.
- **Distribution:** Central and South America, Mexico, California, and the southern United States.

- **Transmission:** The majority of transmissions to humans and other domestic and wild animals are vector-borne (90%) percent.
- **Non-vector-borne:** Oral, vertical route, blood transfusions and organ transplants.
- **Clinical manifestatio**n: Anemia, weight loss, and occasional fever are the main clinical symptoms. Typically, cattle have a long lifespan and a high death rate.
- **Treatment:** The preferred medication for treating Chagas disease is benznidazole, however nifurtimox is also an option. Dogs are treated with benznidazole (5-10 mg/kg/day PO) for two months.

2.1.4 Cryptosporidiosis (Aboelsoued and Megeed, 2022 [2]; Sparks *et al*., 2015) [53].

A) Causative agent: *Cryptosporidium parvum*, occasionally *C canis, C. felis, C meleagridis*, *C cuniculus*, *C andersoni*, *C Suis, C viatorum*, *C muris* and other species (*C. hominis* and some *C parvum* are maintained in humans)

- **Animal involved:** Dogs, cats, rabbits, other domestic and wild mammals, fish, birds, reptiles, and cattle and other ruminants.
- **Distribution:** Around the world.
- **Transmission:** Transmitted from animals to humans via numerous ways, most frequently the fecal-oral pathway, tainted food, water or direct contact with animal excrement.
- **Clinical Manifestation:** A clinical presentation of diarrhoea in newborn ruminants is known to be mostly caused by cryptosporidiosis. Clinical symptoms in infected animals ranged widely, from no symptoms at all to death. The most common symptoms of the disease in cattle are abrupt, watery, and copious diarrhoea, lethargy, and appetite loss. Neonatal calves have also been known to die from dehydration. For tiny ruminants, diarrhea and weight loss are hallmarks of cryptosporidiosis. Cryptosporidiosis in goats is linked to slower growth, whether or not they have diarrhoea.
- **Treatment:** Few medications regularly work to combat Cryptosporidium. For 14-21 days, cats (10-15 mg/kg of tylosin TID) and dogs (5-10 mg/kg BID for 5-7 days)

2.1.5 Leishmaniasis (Kala-azar), (Damlapinar *et al*., 2025 [17]; Cabezón *et al*., 2024) [13]

A) Causative agents*: Leishmania infantum.*

- **Animal involved:** Dogs and other wild canines serve as the main reservoirs for other mammals.
- **Distribution:** North America, Europe (mostly Mediterranean), the Middle East, South America, and portions of Asia.
- **Transmission:** *Leishmania* are transmitted to humans and other animals through the bite of infected female phlebotomine sandflies.
- **Clinical manifestation:** The most typical clinical manifestations are muscle atrophy, eye lesions, nosebleeds, weight loss, anorexia, lymphadenopathy, and different skin abnormalities. The first and most prevalent symptom in infected dogs is lymphadenopathy. Lymph node enlargement can be seen with the popliteal, submaxillary, and prescapular areas. Skin lesions can be evident, isolated, or widespread, and they may develop later in the course of non-pruritic exfoliative dermatitis. Furthermore, hair loss is also noticeable. Dogs with the infection may exhibit nasal hyperkeratosis and depigmentation, ulcerative dermatitis, nodular or pustular dermatitis, and onychogryphosis, or hyperkeratosis of the nail plates. Leishmaniasis infection in dogs leads to hyperglobulinemia, normocytic normochromic anemia, hypoalbuminemia, and mild-to-moderate azotemia.
- **Treatment:** Dogs with leishmaniosis are treated mostly by inhibiting the metabolism of parasite phosphofructo-kinase with N-methylglucamine antimoniate (50-100 mg/kg, SC, every 24 hours for 4-6 weeks). Allopurinol (10 mg/kg, PO, every 12 hours, for 6-12 months) can be given along with miltefosine (2 mg/kg, PO, every 12 hours for 28 days). One treatment drug, allopurinol (10 mg/kg PO, every 12 hours for 6-12 months, or longer as needed), can be employed. Miltefosine and meglumine antimoniate in combination with allopurinol are unavailable, paromomycin (4 mg/kg SC, every 12 hours for 3 weeks) may be used. Domperidone is the only commercially available immunotherapeutic medication designed especially to treat canine leishmaniosis. Domperidone (0.5 mg/kg, PO every 24 hours for 4 weeks) is an immunotherapeutic medication approved in Europe for the treatment of leishmaniosis in dogs.

2.1.6 Microsporidiosis (Fadhilah *et al*., 2023) [24]

A) Causative agents: Microsporidia of *Enterocytozoon bieneusi*, *Encephalitozoon cuniculi*, *E. intestinalis*, *E. hellem.*

- **Animal involved:** Widespread in both invertebrates and vertebrates, such as fish, birds, cattle, pigs, goats, dogs, cats, rabbits, and primates.
- **Distribution:** Global
- **Transmission:** Microsporidia parasite can infect a wide range of hosts, including all major animal species and humans.Transmission routes for infection include ingestion of contaminated food and water, fecal-oral contamination, inhalation of contaminated aerosols, inoculation into open wounds, inoculation into the eye and sexual transmission
- **Clinical manifestation:** Myositis, diarrhoea, bronchitis and keratitis are frequently observed. But asymptomatic infection is also reported.
- **Treatment:** Frequently administered drugs for treating Microsporidia infection in animals and include albendazole and fumagillin.

2.1.7 Sarcosporidiosis (Betancourt Rossoli *et al*., 2023) [11]

A) Causative agent: *Sarcocystis suihominis*, *S. hominis*, *S. heydorni*

Animal involved: Cattle are intermediate hosts for *S. hominis* and *S. heydorni*, while pigs are intermediate hosts for *S. suihominis*. Humans are definitive hosts.

2.1.8 Distribution-Global

- **Transmission:** Sarcocystosis were probably zoonotic in origin and associated with close contact with definitive hosts (both domestic and wild animals) thus permitting the contamination of food and drink with sporocyst.
- **Clinical manifestation:** *Sarcocystis* spp infections are quite prevalent in farm animals. Most animals are asymptomatic, and the tissue cysts (chronic stage) are

discovered only at slaughter. Cattle may show cachexia, fever, anorexia, low milk yield, muscle spasms, diarrhea, hyperexcitability, abortion, anemia, weakness, and death. Myocarditis, anemia, and hepatitis, were the lesions in sheep. Dogs and cats show asymptomatic infection and rarely diarrhea reported.

- **Treatment:** Amprolium (100 mg/kg/day for 30 days). Pyrimethamine and sulfadiazine (1 mg/kg/day and 20 mg/kg/day, respectively, for 40 days or longer) is the traditional therapy to treat horses. Diclazuril and toltrazuril (5 mg/kg) are potentially useful prophylactic agents against *S. eurona*.

2.1.9 Toxoplasmosis (Calero-Bernal and Gennari, 2019) [14]
A) Causative agent: *Toxoplasma gondii*
Animal involved: Almost all other mammals, including farm animals, and birds are considered to be susceptible as intermediate hosts, while felidae, which includes domestic cats, are definitive hosts.

Distribution: Global

- **Transmission:** The parasite reproduces in the intestinal tracts of cats. Humans become infected by direct or indirect contact with cat faeces or by eating undercooked meat.
- **Clinical manifestation:** More cases were reported in cats than dogs. *Seizures*, *ataxia* and paresis or paralysis are observed. Myositis, necrotizing conjunctivitis, endophthalmitis, anterior uveitis, and chorioretinitis are other symptoms. Lesions seen are epidermal nodules, dermatitis, and panniculitis. In cats, severe clinical toxoplasmosis is seen in transplacentally infected kittens, which frequently develop pneumonia, hepatitis and encephalitis. Such cats may show ascites, dyspnea, and hepatic failure.
- **Treatment:** Trimethoprim-sulfamethoxazole (15 mg/kg, PO, every 12 hours for 4 weeks) is also widely recommended in dogs and cats. Other drugs, like spiramycin, diaminodiphenylsulfone, and atovaquone may be used to treat toxoplasmosis. For dogs and cats, clindamycin (PO every 12 hours for 3-4 weeks at 10-12.5 mg/kg in dogs and 25-50 mg/kg in cats) is the treatment of choice. Toltrazuril, diclazuril and ponazuril may be given to treat acute toxoplasmosis, and to reduce the oocysts shedding.

2.1.10 Trypanosomiasis (African sleeping sickness), (Kasozi *et al*., 2021 [34]; Ezeokonkwo *et al*., 2025) [23]

- **Causative agent:** *T. brucei rhodesiense*;
- **Animal involved:** Domestic and wild animals, including cattle, serve as reservoirs.
- **Distribution:** Africa's Sub-Saharan region
- **Transmission:** Blood sucking insect, the tsetse fly (Glossina).
- **Clinical manifestation:** Bovines affected by *T. vivax* present with anemia, lethargy, photophobia, and fluctuating pyrexia. Leukopenia, thrombocytopenia, and degenerative and inflammatory lesions are observed in most organs. Body condition scores deteriorate gradually and animals are dehydrated and debilitated before death. Superficial lymph nodes are enlarged and conspicuous. Corneal opacity may be observed with lacrimation. Animals may show localized or generalized edema.
- **Treatment:** Isometamidium chloride, an aromatic amidine of the phenanthridium class, is infrequently utilized in the treatment of canine African trypanosomosis. With increasing accounts of canine African trypanosomosis and failures of first-line (diminazene aceturate) treatment, the present study sought to evaluate the effectiveness of high dose (1mg/kg) of isometamidium chloride, in the course of therapy of experimental single and mixed infections of *T. congolense* and *T. brucei brucei* in dogs.

2.1.11 Trematodes (Flukes)
1. Clonorchiasis (Locke *et al*., 2018) [37]
A) Causative agent: *Clonorchis sinensis* (Chinese liver fluke)

- **Animal involved:** Definitive hosts are humans and carnivorous mammals. The first and second intermediate hosts are freshwater shrimp, fish or snails.
- **Distribution:** Asia
- **Transmission:** Clonorchiasis is a zoonotic disease mainly caused by eating raw fish and shrimp.
- Clinical manifestations: Jaundice, hepatosplenomegaly, indigestion, nonspecific clinical symptoms, and persistent infections linked to pancreatitis, cirrhosis, or cholangiocarcinoma.
- **Treatment:** Multiple-dose regimens of albendazole produced high predicted cure rates, 300 mg twice a day for 5days and 400 mg twice a day for three days, the two long-term treatment courses against *C. sinensis* infection using 400 mg of albendazole (400 mg twice a day for 5 days and 400 mg twice a day for 7days) produced cure rates of 100%. Cure rate of 98.5 was also demonstrated by the WHO-recommended praziquantel regimen (25 mg/kg three times a day for 2 days). Tribendimidine 400 mg as a single dosage had a high projected cure rate of 89·8%

2.1.12 Fascioliasis (Lalor *et al*., 2021) [35]
A) Causative agent: *Fasciola hepatica, F. gigantica.*

- **Animal involved:** Definitive hosts are sheep, cattle, horses, and other herbivores. Intermediate hosts are snails.
- **Distribution:** Global or almost global; was believed to be primarily found in temperate regions, but possibly more widely dispersed
- **Transmission:** Ingestion of water or raw aquatic plants carrying encysted metacercariae leads to infection in humans and animals. Animals typically become infected when they graze in snail-contaminated areas.
- **Clinical manifestation:** The clinical symptoms of fascioliasis in cattle include weight loss and diarrhea, while dairy cows may also present with reduced milk production and fertility. In high yielding dairy herds, milk production may be reduced by up to 15%. Reduction in milk production, reduction in milk protein and fat content when compared to uninfected herds are observed. Calves born to infected cows may be weak due to receiving of inadequate nutrition from their mothers.
- **Treatment:** Following treatment with triclabendazole (10 mg/kg on day 1 and 2), which is effective against both migratory and bile duct parasites, symptoms and clinical signs generally resolve in 60 days.

2.1.13. Fasciolopsiasis

A) Causative agent: *Fasciolopsis buski*

- **Animal involved:** Snails are intermediate hosts, whereas pigs and humans are definitive hosts.
- **Distribution:** Pig-raising zones in Asia
- **Transmission:** Ingestion of water or raw aquatic plants carrying encysted metacercariae leads to infection in humans and animals.
- **Clinical manifestation:** Gastroenteritis is frequently asymptomatic; intestinal bleeding, blockage, or perforation may occur; oedema may develop in the face, abdomen, or extremities.
- **Treatment:** Niclosamide, areca decoction and tetrachloroethylene are effective. Praziquantel alone, at a dose of 15 mg/kg, proved effective even in cases with severe fasciolosis and can be used as a first-line treatment.

2.1.14. Paragonimiasis: (Lung fluke disease), (Dubey, 2023 [21]; Huang *et al*., 2025) [31]

- **Causative agent:** *Paragonimus westermani*, *P. kellicotti*
- **Animals involved:** Dogs, cats, pigs, and other mammals are definitive hosts; freshwater crabs and snails are intermediate hosts; and wild boars, sheep, goats, rabbits, birds, and other animals are paratenic hosts.
- **Distribution:** Flukes are found worldwide, while the majority of human infections occur in Asia, Africa, and tropical America.
- **Transmission:** Animal and human paragonimiasis is zoonotic and is caused by lung flukes of the genus Paragonimus. At least three hosts are necessary for their life cycle: freshwater snails are the first, followed by crustaceans as the second intermediate host. Eating freshwater crabs or crayfish that contain live lung fluke metacercariae can infect humans and other carnivorous/omnivorous mammals, which serve as definitive hosts.
- **Clinical manifestation:** Infected animals show intermittent cough, weakness and lethargic. Pneumothorax may occur spontaneously due to the formation of lung bullae.
- Treatment: Fenbendazole (50 mg/kg/day, PO, for 10-14 days) or albendazole (25 mg/kg, PO, BID for 14 days). Dogs lung flukes may also be eradicated with praziquantel (25 mg/kg, PO, TID for three days).

2.1.15. Schistosomiasis (Cao *et al*., 2017 [15]; Gui *et al*., 2024) [28]

A) Causative agent: ***Schistosoma japonicum***

- **Animal involved:** Snails are intermediate hosts, while a variety of domestic and wild mammals, such as pigs, dogs, cats, horses, cattle, water buffalo, and rodents, are definitive hosts.
- **Distribution:** Asia
- **Transmission:** Humans contract the infection when they drink water contaminated with cercariae, which is the parasite larval stage expelled by infected freshwater snails. The transmission cycle is continued when these cercariae penetrate the skin, mature, and reproduce in the host's blood vessels. Eggs are excreted in urine or feces. Cattle, buffalo and rats are among the animal species that can become infected and act as reservoirs, contributing to the disease spreading to people by coming into contact with contaminated water.
- **Clinical manifestation:** Weight loss, diarrhoea, rough skin, and pale mucous membrane are indicative of *Schistosoma bovis* infestation. Diseased animals showed unthriftiness, anorexia, intermittent diarrhea mixed with blood or mucus, dehydration, sunken eyes, pallor of mucous membrane, severe emaciation and thirst. Systemic reactions were mild however, pale mucous membrane, polypnoea and nasal discharge
- **Treatment:** Antimonyl potassium tartrate, furpromide, hexachloroparaxylene and metrifonate are used for treatment. However, these drugs were found to have severe lethal side effects, long term treatment and poor efficacy that had to be weighed against the benefits for the infected animals.

2.1.16. Cestodes (Tapeworms)

Coenuriasis: (Coenurosis) (Nzalawahe *et al*., 2024 [42]; Abbas *et al*., 2024) [1]

A) Causative agent: *Taenia multiceps*

- **Animal involved:** Domestic and sylvatic cycles are reported. Definitive hosts are canids and intermediate hosts are sheep, goats, and other domestic and wild herbivores or omnivores, and occasionally humans.
- **Distribution:** Cosmopolitan areas, but certain nations, including the US.
- **Transmission:** The definitive hosts are canids and adult tapeworms are found in the intestines of dogs or foxes. Intermediate hosts such as rabbits, goats, sheep, horses, cattle and humans get the disease by inadvertently ingesting tapeworm eggs that have been passed in the feces of an infected canid. It can happen from ingesting food, water or soil that has been contaminated by dog feces.
- **Clinical manifestation:** *Cerebral coenurosis* is among the major health problems of sheep and goats, causing a neurological syndrome with clinical signs varying from circling to “madness”. The clinical signs for the acute phase are transient pyrexia, relatively mild neurological signs such as listlessness, and a slight head aversion. In severe cases death happens in 4-5 days. Development of a coenurus, or coenuri, can cause chronic disease with neurological signs like tilting of head to one side and turning in a circle toward the cyst’s location, incoordination, paralysis, blindness, seizures, and coma.
- **Treatment:** Regular deworming of dogs with an effective taeniacide (*i.e*., praziquantel at 5 mg/kg body weight) at 2 months intervals and the proper disposal of sheep carcasses. Acute disease can be successfully treated *via* chemotherapy *viz*. Oxfendazole (14.15 mg/kg), single dose of praziquantel (18.75 mg/kg). High rates of recovery documented (up to 100%) in clinically diseased lambs that received much higher doses (50-100 mg/kg) of praziquantel.

2.1.17. Cysticercosis (Deplazes *et al*., 2019 [19]; Arroyo *et al*., 2025) [7]

A) Causative agent: *Taenia solium*

- **Animal involved:** Humans are the ultimate hosts; domestic and wild pigs, as well as occasionally other mammals, are intermediate hosts.

- **Distribution:** Infestation mostly occurs in unhygienic areas of Central and South America and Africa. There are also occasional cases in affluent nations like the US, particularly in areas where human carriers spread the disease to other people.
- **Transmission:** When a person eats under cooked infected pork infection occurs. *T. solium* eggs may also infect humans via the fecal-oral route or by ingesting contaminated food or water.
- **Clinical manifestations:** Seizures, autonomic signs (chewing motions and ear stiffening).
- **Treatment:** Pigs treated with Albendazole (15 mg/kg divided in two doses per day, for 5 days) plus Praziquantel (75 mg/kg divided in three doses per day for 1 day).

2.1.18. Echinococcosis (hydatid disease) (Miller, 2025 [40]; Peralta *et al*., 2023) [43]

A) Causative agent: *Echinococcus granulosus sensu lato* complex: *E. granulosus sensu stricto*, *E. canadensis*, *E. ortleppi*

- **Animal involved:** The definitive hosts are dogs and other canids, hyaenids, and occasionally felids; the intermediate or aberrant hosts include sheep, goats, cattle, water buffalo, swine, camelids, equids, cervids, rodents, other mammals, or marsupials; *Echinococcus* species vary in their host specificity.
- **Distribution:** The distribution of species varies globally.
- **Transmission:** *Echinococcosis* is a parasitic disease transmitted from animals to humans and it is caused by the larval stage of tapeworms. Humans are most commonly infected by the accidental consumption of soil, water, or food that has been contaminated by dog or other animals.
- Clinical manifestation: Abdominal pain and yellowing of the skin and whites of the eyes if cysts form in the liver, coughing up blood or the contents of cysts if cysts form in the lungs.
- **Treatment:** The dogs infected with *E. granulosus* were dewormed with a dose of anthelmintic medication (Praziquantel 5 mg/kg and Pyrantel 15 mg/kg).

2.1.19. Nematodes (Round worms)

1. Ascariasis

A) Causative agent: *Ascaris suum*

- **Animal involved:** Pigs but occasionally observed in cattle, sheep, and nonhuman primates
- **Distribution:** Prevalence varies globally.
- **Transmission:** People can get infected with *Ascaris suum*, which is a roundworm closely related to *Ascaris lumbricoides* that infects pigs. Infection begins when a person swallows fertilized eggs because their hands were contaminated from touching infected pigs or from consuming under cooked vegetables or fruits contaminated with pig feces.
- **Clinical manifestation:** Dyspnoea, hyperpnoea, coughing, diarrhoea and jaundice and the pathology of the disease are mainly due to migrating larvae in the visceral organs. Unthriftiness, coughing, and failure to gain weight are the symptoms noted
- **Treatment:** During the first day of treatment, the fluid and electrolyte loss was corrected with intravenous Inj. Ringers lactate (10 ml/kg body weight) followed by Inj. Metronidazole (20 mg/kg body weight IV), Inj. Chlorpheniramine maleate (0.5 mg/kg body weight IM) and Inj. B complex (1 mL were administered. Susp. Levamisole and Rafoxanide @ 1ml/ 4kg body weight were administered to counteract the parasitic load. Oral amino acid and haematinics were given as supportive therapy to correct anemia. Next day, the animal voided numerous dead Ascarid larvas in diarrhoeic faeces. There was no egg after four days of treatment and the condition of pig improved. The other pigs are treated with appropriate anthelmintic and measures were taken for the proper disposal of faeces to prevent further occurrence in the pig shed area.

2.1.20. Filariasis

1. Dirofilariasis (Badillo-Viloria *et al*., 2023 [8]; Silva *et al*., 2023) [51].

A) Causative agent: *Dirofilaria immitis*

- **Animal involved:** Dogs, cats, and other mammals, particularly predators and mustelids; primates (such as humans, lemurs, and pinnipeds) are incidental hosts; dogs and wild canids are the primary hosts.
- **Distribution:** Global
- **Transmission:** Through mosquitoes
- **Clinical manifestations:** *Dirofilaria immitis* causes canine cardiopulmonary dirofilariasis worldwide. Clinical signs range from almost asymptomatic to serious, even fatal. In dogs, the infection by *D. immitis* may go undetected for months or years or develop gradually and begin with a persistent cough, dyspnea, and exercise intolerance, followed by ascites, anorexia and weight loss. It can also evolve a complex vascular damage with respiratory disorders, including pulmonary hypertension and thromboembolism, causing high morbidity and mortality in this domestic species. *D. repens*, can cause subcutaneous dirofilariasis in dogs and most dogs show an intermittent cough, dyspnea, exercise intolerance, hemoptysis, and syncope. In severe cases heart worm-pulmonary thromboembolism, heart failure, caval syndrome, or death may be noticed.
- **Treatment:** Treatment based on ivermectin was administered at a single oral dose of 0.6 mg/kg. A new treatment was 10% imidacloprid + 2.5% moxidectin (4-10 mg/kg), with one application per month for 6 months, and doxycycline (10 mg/kg, 1 tablet, BID, for 30 days).

2.1.21. Gnathostomiasis (Chikweto *et al*., 2015 [16]; Thiangtrongjit *et al*., 2021) [56]

A) Causative agent: *Gnathostoma spinigerum*, *G. binucleatum* and some other *Gnathostoma* spp

- **Animal involved:** In pigs and wild boars, *G. doloresi* and *G. hispidum* are the definitive hosts, freshwater fish, eels, frogs, snails, chickens, and pigs are the intermediate or paratenic hosts.
- **Distribution:** Human instances worldwide, with a higher frequency in regions with dietary risk factors.
- **Transmission:** Human beings are infected with *Gnathostoma* spp. mainly by consuming raw or under cooked food (fish, frogs, eel, poultry and snakes) that contains the parasite larvae.

- **Clinical manifestations:** Vomiting, anorexia, weakness and chronic weight loss.
- **Treatment:** The recommended treatments rely on surgical removal or treatment with albendazole or ivermectin. When worms are located in accessible location, it can be removed through surgery. For surgery, medications such as albendazole and ivermectin have also been noted for their efficacy in eliminating the parasite. For the treatment of cutaneous gnathostomiasis, Ivermectin (single dose of 150-200 µg/kg) and albendazole (400 mg/day for 21 days) are used.

2.1.22. Toxocariasis (Andrea *et al*., 2019; Varum *et al*., 2021) [58]

A) Causative agent: *Toxocara canis, T. cati.*

- **Animal involes:** Dogs and wild canids (*T. canis*) and cats and wild felids (*T. cati*) are the definitive hosts and numerous animals can be paratenic hosts.
- **Distribution:** Global
- **Transmission:** *Toxocara* eggs in the feces get mature in the environment and cause human infection through contaminated dirt or unwashed hands. The larvae hatches in the intestine remain alive in the body for many months (larvae mature to adult in dogs or cats).
- **Clinical manifestation:** In young dogs there will be anorexia, weight loss, diarrhea, nausea, vomiting, mild fever, anaemia and other gastrointestinal signs such as constipation and in severe cases bowel obstruction.
- **Treatment:** Pyrantel pamoate @ 5 mg/kg body weight orally for three days. Supportive therapy included Inj. Ranitidine @ 0.5mg/kg body weight IM. OD for 03 days and haematinic syrup at the rate of 2 mL PO, BID for 15 days. The pup showed marked recovery after 7 days of treatment.

2.1.23. Trichuriasis (Whipworm infection) (Gul and Tak, 2016) [29]

A) Causative agent: *Trichuris suis*, possibly *T. vulpis* and other species; *T. trichiura* (main species in humans) acquired from humans, and rare zoonotic transmission

- **Animal involved:** In nonhuman primates; *T. trichiura* in domestic and wild pigs
- **Distribution:** All across the world, but particularly in warm, humid regions.
- **Transmission:** Humans can get infestation by ingesting soil or water contaminated by the feces of infected animals.
- **Clinical manifestation:** Heamorrhagic typhlitis or typhlocolitis has been rarely seen in cattle. Anorexia, dysentery, weight loss and terminal anaemia are reported. Hemorrhagic faeces reported in severe cases. Cicatricial inflammation of colon and cecum are seen in ruminants along with wasting, and anaemia.
- **Treatment:** Methyridine (200 mg/kg) given orally or subcutaneously is highly effective Fenbendazole (5-20mg/kg) is effective. Oxfendazole (2.5 mg/kg), and Fenbendazole (50 mg/kg) q24h for 3 days (day of diagnosis, 3 weeks after diagnosis, and 3 months after diagnosis) are effective. A dose of praziquantel/pyrantel pamoate/febantel combination also can be tried from diagnosis to 3 months after diagnosis.

2.1.24. Acanthocephalans

Arthropods

Mange (acariasis or scabies) (Thomson *et al*., 2023 [57]; Gilson and Crane, 2023) [26]

A) Causative agent: Mites of *Sarcoptes, Cheyletiella, Dermanyssus* and *Ornithonyssus spp, Notoedres cati, Trixacarus caviae, Liponyssoides sanguineus.*

Animal involved: Birds and mammals

Distribution: Globally

- **Transmission:** Mange mite gets transmitted to humans on close contact with infected domestic animals.
- **Clinical manifestation:** Hypersensitivity to mite eggs and mites leads to intense pruritus/itching. Primary lesions consist of papular eruptions due to self-trauma, develop into thick crusts. This allows secondary bacterial and yeast infections to occur. The initial lesions tend to occur on body parts with less hair such as the ventral abdomen, chest, elbows, hocks ear margin, axillary and inguinal regions. If these are left untreated, lesions rapidly coalesce and become generalised. Dogs with chronic, generalised disease may develop seborrhea.
- **Treatment:** Scabicidal soaps such as Tetmosol soap which has a 5% monosulfirum content, bathing with scabicidal soaps, such as Tetmosol soap, which has 5% monosulfirum. In many nations, the first line of therapy for scabies is 5% permethrin lotion or cream.In addition to topical lindane, 5% precipitated sulfur, malathion, and oral ivermectin, are other choices.

Myiasis (Martinez-Rojano *et al*., 2023 [39]; Bello *et al*., 2022) [10]

A) Causative agent: *Oestrus ovis*, *Rhinoestrus purpureus*

- **Animal involved:** *R. purpureus* primarily affects horses, *O. ovis* primarily affects sheep, goats, and other mammals.
  Distribution: *O. ovis* has a global distribution; *R. purpureus* is found in Asia, Africa, and Europe.
- Transmission: It is the infestation of living beings with larvae that feed on dead or living tissue.
- **Clinical manifestation:** Coughing, sneezing, foreign body sensation and movement, swelling, irritation, ocular secretion, photophobia, and burning.
- **Treatment:** Treated with ivermectin (0.2 mg/kg subcutaneously) and treated with closantel (10 mg/kg orally) treated with closantel (10 mg/kg orally) every 28 days in order to keep the animals as free as possible of *O. ovis* infestation. A combination of levamisole phosphate (9.4 mg/kg), monepantel (2.5 mg/kg), and albendazole (10 mg/kg) were given to all experimental animals for three consecutive days.

Tungiasis (Dos Santos *et al*., 2023) [20]

A) Causative agent: *Tunga penetrans* (Sand fleas)

- **Animal involved:** Dogs, pigs, humans, and other mammals
- **Distribution:** Central and South America, South Asia, and Africa
- **Transmission:** Transmission occurs when skin of the host comes into contact with soil or floor where adult female sand fleas have developed or when the host lives in close contact with infected animals.

- **Clinical manifestation:** Burrowing and skin penetration cause discomfort and itching around isolated lesions, usually on the foot, which may also be secondary infections.
- **Treatment:** Concerning drug treatments used in animal tungiasis, such as the topical application of the organochlorine lindane (gamma-hexachlorocyclohexane) in pigs, the topical use of trichlorphone at 0.2% in infested dogs, trichlorphone solution (dogs and cats), and collars impregnated with propoxur (carbamate) and flumethrin (pyrethroid) in dogs. There are also reports of using ivermectin to treat tungiasis in dogs. Currently, a new perspective has emerged in treating tungiasis in dogs, the use of isoxazolines, which have demonstrated high efficacy. The drug has commercial oral formulation in the form of palatable tablets at a dosage equivalent to 25-56 mg/kg of body weight for dogs.

3. Prevention and Control

Animal health and productivity are adversely affected by a variety of parasites, which results in large global economic losses. Food product residues and drug resistance pose a threat to conventional control methods, such as anthelmintic medications. Each parasite that causes parasitic diseases-protozoa, helminths and ectoparasites are needs to different approach to care and prevention. Parasitic vaccine development and an overview of the main action, difficulties, and prospects for the future are needed to be addressed. Ultimately, the goal is to develop safe, effective and profitable parasite vaccines that improve animal welfare while advancing public health and global food security (Debbarma *et al*., 2025) [18].

Florin-Christensenet *et al*. (2021) [25] indicated that vaccination reduce human susceptibility to animal-borne infections and are a cost-effective and sustainable method of protecting animals from parasite diseases. Through antigen, standardization, quality control, shelf-life studies and manufacturing cost analysis, live vaccines can be produced from animal hosts. In order to eradicate medications used in endemic areas and control vectors or parasites, vaccines must be sufficient, safe, and well-founded. The prevalence of zoonotic diseases in humans has been considerably reduced by vaccines that prevent zoonotic diseases in food animals, companion animals, and even wildlife. In certain situations, infectious disease organisms may pose a threat to economic stability, human health, animal health (Roth and Sandbulte, 2021) [48]. Bhowmick and Han (2020) [12] considering that ticks are ectoparasites that feed on blood and can spread diseases or organisms to humans in many regions of the world through animals. Controlling ticks is essential for preventing zoonotic infections.

Tick-protective antigens have been discovered to prevent tick-borne illnesses based on new research and information. The most successful intervention method for managing parasite disease in livestock animals is vaccination (Liu *et al*., 2023 [36]; Alzan *et al*., 2024) [5]. Additionally, the advancement of molecular technology presents a favorable environment for the future development of vaccines. To comprehend and apply immunization to prevent parasite infestation, up-to-date and trustworthy scientific data are required.

In the past, intestinal helminth infections were a severe public health burden in Korea and were very common. There was a parasitic diseases control program after the Korean government passed Parasite Diseases Prevention Act. Measures and procedures for infection prevention and control can lessen the public's exposure to parasites. The adoption of evidence-based infection prevention and control strategies should be encouraged by surveillance programs in order to lower the prevalence of these illnesses, slow spread and eventually enhance public health. In addition to aiding in the management of parasitic disorders, infection prevention and control initiatives and surveillance of parasite infections linked to health care would also support general economic growth. Therefore, in order to prevent parasite illnesses, precise surveillance is essential. Additionally, Korea had a high rate of intestinal helminth infections, making it a high risk country for public health (Bahk *et al*., 2018) [9].

Preventing and controlling parasitic zoonoses is a difficult challenge, particularly in low and middle income nations with substandard living circumstances, poor sanitation, poor personal hygiene, and a poor health care system. The mainstay of prevention in the absence of a viable vaccine is the implementation of hygienic measures to ensure the consumption of safe food and beverages, as well as efforts to avoid vector bites and breeding. Without good hygiene, prevention is nearly difficult. This can be accomplished with effective behavior modification communication. Human parasite zoonoses are controlled using immunoprophylaxis, isolation, chemotherapy, and personal prophylaxis. Fortunately the majority of zoonotic diseases have appropriate medications. Effective management of parasitic zoonoses also entails animal related measures, such as surveillance, various animal control methods, and especially management of the livestock and meat market and industry. Programs to combat particular parasite zoonoses have been in place and are effective, with assistance from non-governmental private organizations and international health authorities (Sadhukhan, 2022) [49].

4. Conclusion

Parasitic zoonoses are diseases spread from animals to human beings, and are a serious public health concern with wide-ranging social and economic impacts. The most significant illnesses that are seen all over the world are caused by zoonotic parasites of animals. These parasitic diseases have the potential to increase morbidity and mortality, strain health care systems, and result in financial losses due to lower animal productivity. A multi-sectoral, "One Health" strategy including cooperation between public health, environmental, and veterinary service is necessary for effective control and prevention. Numerous parasites have a negative impact on animal productivity and health, which leads to significant financial losses worldwide. Vaccination of animals plays a major role in decreasing the incidences of zoonotic diseases in human.

Reference

1. Abbas I, Tamponi C, Madau G, Cavallo L, Varcasia A, Scala A. Treatment and management of coenurosis by *Taenia multiceps*: Field data from outbreaks in endemic regions and literature review. Parasit Vectors. 2024;17(1):335.
2. Aboelsoued D, Megeed KN. Diagnosis and control of cryptosporidiosis in farm animals. J Parasit Dis. 2022;46(4):1133-1146.

3. Ahmed A, Ijaz M, Ayyub RM, Ghaffar A, Ghauri HN, Aziz MU, *et al*. *Balantidium coli* in domestic animals: An emerging protozoan pathogen of zoonotic significance. Acta Trop. 2020;203:105298.
4. Al-Nazal HA. Immunity to Babesiosis and Discovery of Next Generation Vaccines; 2020.
5. Alzan HF, Mahmoud MS, Suarez CE. Current vaccines, experimental immunization trials, and new perspectives to control selected vector borne blood parasites of veterinary importance. Front Vet Sci. 2024;11:1484787.
6. Cringoli A, Taddei R, Rinaldi L, Veneziano A, Pallaoro ML, Giongo P, *et al*. Ultrasonography for early diagnosis of *Toxocara canis* infection in puppies. Parasitol Res. 2019;118:873-80.
7. Arroyo G, Baquedano L, Gongora DR, Ccente TL, Castillo E, Bernal E, *et al*. The process of residual calcification following antiparasitic treatment in the pig model of neurocysticercosis is dynamic. PLOS Negl Trop Dis. 2025;19(5):e0013022.
8. Viloria BMA, Bocanegra GI, Galvis DLRJ, Martínez R, Jaramillo DLRS, Castañeda CA, *et al*. *Dirofilaria immitis* in pet dogs from the metropolitan area of the Colombian Caribbean. Comp Immunol Microbiol Infect Dis. 2023;102:102064.
9. Bahk YY, Shin EH, Cho SH, Ju JW, Chai JY, Kim TS. Prevention and control strategies for parasitic infections in the Korea centers for disease control and prevention. Korean J Parasitol. 2018;56(5):401.
10. Bello HJS, Lins JGG, Silva DNMM, Albuquerque DACA, Amarante MRV, Neto VAK, *et al*. Diagnosis of *Oestrus ovis* infestation in sheep by PCR and enzyme-linked immunosorbent assay. Vet Parasitol. 2022;310:109789.
11. Rossoli BJV, Moré G, Cabrera SA, Moore DP, Morrell EL, Pedrana J, *et al*. Identification of *Sarcocystis* spp. in synanthropic (Muridae) and wild (Cricetidae) rodents from Argentina. Parasitol Res. 2023;123(1):31.
12. Bhowmick B, Han Q. Understanding tick biology and its implications in anti-tick and transmission blocking vaccines against tick-borne pathogens. Front Vet Sci. 2020;7:319.
13. Cabezón O, Orellana MP, Ribas MP, Baptista CJ, Gassó D, Velarde R, *et al*. *Leishmania* infection in wild lagomorphs and domestic dogs in North East Spain. Animals. 2024;14(7):1080.
14. Bernal CR, Gennari SM. Clinical toxoplasmosis in dogs and cats: An update. Front Vet Sci. 2019;6:54.
15. Cao Z, Huang Y, Wang T. *Schistosomiasis japonica* control in domestic animals: Progress and experiences in China. Front Microbiol. 2017;8:2464.
16. Chikweto A, Bhaiyat MI, Sharma SMRN. Gnathostomiasis in a dog in Lusaka Zambia. Int J Vet Med Res Rep. 2015;2015:1-4.
17. Damlapinar A, Berberoglu U, Mungan M, Celebi B, Gazyagci AN, Yildiz K. Detection and isolation of *Leishmania infantum* from natural infected dog in Türkiye. Vet Parasitol Reg Stud Rep. 2025;57:101154.
18. Debbarma J, Rajesh JB, Kar P, Christen C, Rose KT, Marwein SC, *et al*. Current trends in vaccines against parasite in domestic animals. J Adv Biol Biotechnol. 2025;28(6):1365-1376.
19. Deplazes P, Eichenberger RM, Grimm F. Wildlife-transmitted *Taenia* and *Versteria* cysticercosis and coenurosis in humans and other primates. Int J Parasitol Parasites Wildl. 2019;9:342-358.
20. Santos DKC, Guedes BPE, Teixeira JBDC, Harvey TV, Carlos RSA. Treatment of animal tungiasis: What's new?. Trop Med Infect Dis. 2023;8(3):142.
21. Dubey JP. Endemic *Paragonimus kellicotti* infections in animals and humans in USA and Canada: Review and personal perspective. Food Waterborne Parasitol. 2023;30:e00184.
22. Oliveira DJ, Marques PJ, Moreno C, Rodrigues A, Monteiro M, Pires AG, *et al*. Chagas disease: A silent threat for dogs and humans. Int J Mol Sci. 2024;25(7):3840.
23. Ezeokonkwo RC, Obi CF, Okpala MI, Iheagwam CN, Ezeh IO. Efficacy of a high dose of isometamidium chloride treatment in single and mixed experimental infections with *T. congolense* and *T. brucei brucei* in dogs. Comp Immunol Microbiol Infect Dis. 2025;117:102303.
24. Fadhilah A, Gabbar A, Bokhari AA. Microsporidium. StatPearls [Internet]; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537166/
25. Christensen FM, Schnittger L, Bastos RG, Rathinasamy VA, Cooke BM, Alzan HF, *et al*. Pursuing effective vaccines against cattle diseases caused by apicomplexan protozoa. CABI Rev; 2021.
26. Gilson RL, Crane JS. Scabies. Stat Pearls [Internet]; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK544306/
27. Gomes DC, Medeiros TS, Pereira AEL, Silva DJFO, Oliveira DFJW, Pedrosa FMD, *et al*. From Benznidazole to new drugs: Nanotechnology contribution in Chagas disease. Int J Mol Sci. 2023;24(18):13778.
28. Gui X, Shao B, Zhong H, Lv R, Li H, Lu K, *et al*. Effect of Praziquantel on Preventing Delayed Infection of *Schistosoma japonicum* in Buffaloes and Goats. Microorganisms. 2024;13(1):17.
29. Gul N, Tak H. Prevalence of *Trichuris* spp. in small ruminants slaughtered in Srinagar District (J&K). J Parasit Dis. 2016;40(3):741-744.
30. Hossain H, Islam MR, Sajib MSI, Hossain MM, Begum M, Islam KBM. Prevalence of zoonotic diseases of small ruminants at Savar upazila of Dhaka district: Prevalence of zoonotic diseases of small ruminants. Bangladesh J Agric. 2023;48(1):81-91.
31. Huang PY, Chen CR, Lin CH, Lo PY, Peng JH, Wang FH, *et al*. Lung ultrasound findings and therapeutic outcome in a cat with recurrent spontaneous pneumothorax caused by paragonimiasis. J Feline Med Surg Open Rep. 2025;11(2):20551169251341545.
32. Jyothimol G, Ravindran R. Emerging and re-emerging parasitic zoonoses in India. Adv Anim Vet Sci. 2015;3(12):617-628.
33. Kaminsky R, Mäser P. Global impact of parasitic infections and the importance of parasite control. Front Parasitol. 2025;4:1546195.
34. Kasozi KI, Zirintunda G, Ssempijja F, Buyinza B, Alzahrani KJ, Matama K, *et al*. Epidemiology of trypanosomiasis in wildlife implications for humans at the wildlife interface in Africa. Front Vet Sci. 2021;8:621699.
35. Lalor R, Cwiklinski K, Calvani NED, Dorey A, Hamon S, Corrales JL, *et al*. Pathogenicity and virulence of the

liver flukes *Fasciola hepatica* and *Fasciola gigantica* that cause the zoonosis Fasciolosis. Virulence. 2021;12(1):2839-2867.
36. Liu H, Zhang Y, Liu F, Ye L, Liu X, Wang C, *et al*. Progress and challenges for developing vaccines against gastrointestinal nematodes of ruminants. Vet Vaccine. 2023;2(3-4):100041.
37. Locke V, Kusnik A, Richardson MS. *Clonorchis sinensis*. StatPearls [Internet]; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532892/
38. Maharana BR, Tewari AK, Saravanan BC, Sudhakar NR. Important hemoprotozoan diseases of livestock: Challenges in current diagnostics and therapeutics: An update. Vet World. 2016;9(5):487.
39. Martinez-Rojano H, Huerta H, Sámano R, Chico-Barba G, Mier-Cabrera J, Plascencia-Nieto ES. Ophthalmomyiasis externa and importance of risk factors, clinical manifestations, and diagnosis: review of the medical literature. Diseases. 2023;11(4):180.
40. Miller KR. Tapeworms of dogs and cats in North America. [Doctoral dissertation]. Kansas State University; 2025.
41. Nag VL, Kalita JM. Epidemiology of Parasitic Infections. In: Textbook of Parasitic Zoonoses; 2022l, p. 51-58.
42. Nzalawahe JS, Mlanzi DS, Lupindu AM, Ngowi H, Eisler MC. Household economic losses and community knowledge determine control strategies: A case of cerebral coenurosis in small ruminants in Northern Tanzania. Parasitologia. 2024;4(3):259-269.
43. Peralta RDC, Cuntó RAC, Moreta CY, Lapo GEG, Sierra RLV, Villalba LRL, *et al*. Zoonotic transmission of hepatic hydatid cyst from domestic dogs: A case report from an urban-marginal area in Ecuador. Am J Case Rep. 2023;24:e940647-1.
44. Pisarski K. The global burden of disease of zoonotic parasitic diseases: Top 5 contenders for priority consideration. Trop Med Infect Dis. 2019;4(1):44.
45. Prasad CB, Milton A, Das S. Neglected Zoonotic Diseases of India: A Review. J One Health. 2020;8(02):29-38.
46. Rahman MT, Sobur MA, Islam MS, Ievy S, Hossain MJ, El Zowalaty ME, *et al*. Zoonotic diseases: Etiology, impact, and control. Microorganisms. 2020;8(9):1405.
47. Rajendran CA, Satbigea S, Kumar D. Review on zoonotic parasitic diseases of northeast India-epidemiology and clinical features. Int J Curr Microbiol Appl Sci. 2019;8(2):2019.
48. Roth JA, Sandbulte MR. The role of veterinary vaccines in livestock production, animal health, and public health. Vet Vaccines Princ Appl; 2021, p.1-10.
49. Sadhukhan SK. Prevention and control of parasitic zoonoses. In: Textbook of Parasitic Zoonoses; 2022, p. 83-90.
50. Scarpini S, Dondi A, Totaro C, Biagi C, Melchionda F, Zama D, *et al*. Visceral leishmaniasis: Epidemiology, diagnosis, and treatment regimens in different geographical areas with a focus on pediatrics. Microorganisms. 2022;10(10):1887.
51. Silva WID, Gomes ARD, Francisco MCD, Silva JMD, Filho OHSD, Feitosa TF, *et al*. Subcutaneous dirofilariasis due to *Dirofilaria immitis* in a dog in Brazil: First report. Rev Bras Parasitol Vet. 2023;32(2):e001423.
52. Singhal V, Singh R, Yadav A, Agrawal R. Prevalence of balantidiasis among diarrhoeic adult dairy animals of North West Himalayan region and its impact on haemato-biochemical and mineral profile. Haryana Vet. 2019;58(2):261-265.
53. Sparks H, Nair G, Gonzalez CA, White AC Jr. Treatment of *Cryptosporidium*: What we know, gaps, and the way forward. Curr Trop Med Rep. 2015;2(3):181-187.
54. Stafford K, Kollasch TM, Duncan KT, Horr S, Goddu T, Loomer HC, *et al*. Detection of gastrointestinal parasitism at recreational canine sites in the USA: the DOGPARCS study. Parasit Vectors. 2020;13(1):275.
55. Sundar S, Singh J, Singh VK, Agrawal N, Kumar R. Current and emerging therapies for the treatment of leishmaniasis. Expert Opin Orphan Drugs. 2024;12(1):19-32.
56. Thiangtrongjit T, Nogrado K, Ketboonlue T, Malaitong P, Adisakwattana P, Reamtong O. Proteomics of gnathostomiasis: A way forward for diagnosis and treatment development. Pathogens. 2021;10(9):1080.
57. Thomson P, Carreño N, Núñez A. Main mites associated with dermatopathies present in dogs and other members of the Canidae family. Open Vet J. 2023;13(2):131-142.
58. Varum M, John J, Kumar C. Diagnosis and treatment of *Toxocara canis* infection in a dog-A case report. Indian J Vet Med. 2021;41(2):66-68.
59. Wu X, Wang W, Li Q, Xue Q, Li Y, Li S. Case report: Surgical intervention for *Fasciolopsis buski* infection: A literature review. Am J Trop Med Hyg. 2020;103(6):2282.

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