Pakistan Veterinary Journal

ISSN: 0253-8318 (PRINT), 2074-7764 (ONLINE)
DOI: 10.29261/pakvetj/2026.141

RESEARCH ARTICLE

First Report on Serological Evidence of *Trichinella* spp. Exposure in Hunting Dogs and Knowledge–Attitude–Practice Assessment among Hunters in West Pasaman Regency: A One Health Approach

Yasir Hamdani Dalimunthe[1], Fadjar Satrija[1,2]*, Yusuf Ridwan[1,2,3], Etih Sudarnika[1,4], Sri Murtini[1,5] and Ridi Arif [1,2]

[1]Animal Biomedicine Study Program, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, 16680, Indonesia; [2]Division of Parasitology and Medical Entomology, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, 16680, Indonesia; [3]Faculty of Medicine, IPB University, Bogor, 16680, Indonesia; [4]Division of Veterinary Public Health and Epidemiology, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, 16680, Indonesia; [5]Division of Medical Microbiology, School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor, 16680, Indonesia.
*Corresponding author: fadjar_s@apps.ipb.ac.id

ARTICLE HISTORY (26-132)

Received: February 12, 2026
Revised: April 01, 2026
Accepted: April 05, 2026
Published online: April 25, 2026

Key words:
Baburu kandiak
Seroprevalence
Trichinellosis
Wild boar hunters
Zoonosis

ABSTRACT

Trichinellosis is a foodborne zoonosis transmitted through the consumption of raw or undercooked meat containing *Trichinella* spp. larvae and maintained by complex transmission cycles linking wildlife, domestic animals, and humans. This study estimated the seroprevalence of *Trichinella* spp. in hunting dogs and assessed hunters' knowledge, attitudes, and practices (KAP) related to trichinellosis in West Pasaman Regency, using a cross-sectional study. Blood serum samples were collected from 112 hunting dogs in West Pasaman Regency, West Sumatra Province, Indonesia, and tested for *Trichinella* antibodies using a commercial indirect ELISA. Sociodemographic characteristics and KAP related to trichinellosis and hunting dog management were collected through structured, validated interviews with 30 hunters involved in traditional hunting practices. Descriptive and inferential statistics (Fisher's exact tests) were used to analyze the data and evaluate the correlation between seropositivity and the dogs' sex and age. Overall, *Trichinella* antibodies were detected in 14.29% (n = 16/112; 95% CI: 9.0%-22.0%) with no significant correlation against sex (P=0.689) or age (P=0.649). KAP assessment revealed very limited awareness of trichinellosis among hunters, predominantly neutral attitudes, and widespread misconceptions regarding zoonotic risk, transmission routes, and disease severity. Hunting practices, including frequent hunting, direct contact between dogs and wild boars, and routine feeding of raw wild boar meat or offal to dogs were identified as potential risk pathways for parasite transmission. These findings suggest that *Trichinella* spp. may be circulating, indicating that *Trichinella* spp. is established in the local sylvatic cycle. This highlights the need for integrated surveillance by relevant authorities, hunter education, safe meat-handling practices, improved feeding practices for hunting dogs (avoiding raw wild boar meat or offal), and strengthened cross-sector collaboration.

To Cite This Article: Dalimunthe YH, Satrija F, Ridwan Y, Sudarnika E, Murtini S and Arif R, 2026. First report on serological evidence of *Trichinella* spp. exposure in hunting dogs and knowledge–attitude–practice assessment among hunters in West Pasaman Regency: a one health approach. Pak Vet J, 46(6): 1485-1494. http://dx.doi.org/10.29261/pakvetj/2026.141

INTRODUCTION

Trichinellosis is a globally distributed foodborne zoonotic disease that affects wildlife and domestic animals and is caused by nematodes of the genus *Trichinella*, with transmission occurring through the consumption of raw or undercooked meat containing infective larvae (Răcășanu *et al.,* 2024; Tammone Santos *et al.,* 2024; Guzmán-Faúndez *et al.,* 2025). To date, ten *Trichinella* species and three genotypes have been characterized, each exhibiting distinct biological, epidemiological, and genetic features (Zarlenga *et al.,* 2020; Pozio and Zarlenga, 2021). Hunting activities heighten the risk of *Trichinella* transmission, as infected

carcass remnants serve as a source of viable larvae for wild carnivores, free-ranging pigs, and dogs. This continual exposure reinforces the sylvatic transmission cycle and increases the likelihood of zoonotic spillovers to humans (Pozio and Murrell, 2006).

Trichinella infection in domestic animals has been documented globally. In central and southern Italy, *Trichinella* infection has been detected in hunting dogs with seroprevalence rates of 14.6 and 20.7%, respectively (Gómez-Morales *et al.,* 2016; Ricci *et al.,* 2025). Other studies assessing *Trichinella* exposure in domestic and wild canines reported prevalence ranging from 0.011 to 16% across Kosovo, Slovakia, Algeria, Bosnia and Herzegovina and Italy (Watier-Grillot *et al.,* 2011; Miterp´akov´a *et al.,* 2017; Mechouk *et al.,* 2024; Omeragić *et al.*, 2024; Torreggiani *et al.,* 2025). Reports on *Trichinella* exposure in Indonesia remain limited. *Trichinella* infection in domestic animals was recorded in pigs from Kupang City, with seroprevalence of 0.9% and 0.8% (Angi *et al.,* 2014; Angi *et al.,* 2015). A notably high seroprevalence of *Trichinella* infection (68.2%) has been reported in wild boars from Central Bengkulu Regency (Lestari *et al.,* 2018). More recently, a prevalence of 45.28% was reported in wild boars from West Pasaman Regency (Dalimunthe *et al.,* 2025). *Trichinella* infection also identified in captive Bengal tigers fed wild boar meat, with 25% (1/4) testing seropositive, highlighting the risk of cross-species transmission from wildlife prey to vulnerable carnivores (Satrija *et al.,* 2025).

The Knowledge, Attitudes, and Practices (KAP) framework is a widely established approach in public health research, with KAP surveys serving as an essential instrument for assessing population-level understanding of specific health issues (Zarei *et al.,* 2024). Moreover, KAP surveys help identify prevailing misconceptions and sociocultural factors that influence health-related behaviors. By elucidating these barriers, the findings provide an evidence base for designing targeted interventions to foster sustainable behavioral change (Gumucio *et al.,* 2011). Integrating serological testing with dog owner-completed questionnaires offers a practical approach to assessing the circulation of *Trichinella* spp. within a specific area and time period, while routine serosurveillance of dogs can provide valuable insights into the dynamics of parasite transmission in wildlife (Gómez-Morales *et al.,* 2016).

In West Pasaman Regency, West Sumatra Province, wild boar hunting, locally termed "*Baburu Kandiak*" is a longstanding cultural tradition for control agricultural pests and protect community plantations, with trained hunting dogs serving as the primary hunting tool. Owing to their scavenging behavior and frequent interactions with wildlife, hunting dogs are particularly susceptible to exposure to *Trichinella* through multiple ecological transmission pathways (Malone *et al.,* 2024), including ingesting wild boar meat containing encysted larvae and offal during hunting activities (Pozio, 2000; Dalimunthe *et al.,* 2025). To date, no data is available on the seroprevalence of *Trichinella* spp. infection in hunting dogs and no studies have assessed the knowledge, attitude and practices related to trichinellosis among wild boar hunters in West Pasaman Regency. Thus, this study aimed to estimate the seroprevalence of *Trichinella* spp. in hunting dogs, characterize hunters' knowledge, attitudes, and practices (KAP) concerning trichinellosis, and examine whether patterns of canine seropositivity were associated with human behavioral risk factors from a One Health perspective.

MATERIALS AND METHODS

Study area overview: Sample collection and questionnaire interviews were carried out in West Pasaman Regency (Fig. 1). West Pasaman Regency spans an area of 3887.77km^2. Geographically, it is located between 0°33´north latitude and 0°11´ south latitude, and between 99º10'-100º 04' east longitude, positioning it along the equatorial line 0° latitude. It borders North Sumatra Province to the north, Pasaman Regency to the east, Agam and Pasaman Regencies to the south, and the Indonesian Ocean to the west (BPS Statistics West Pasaman Regency, 2025). Sample analysis and data processing were conducted at the Helminthology Laboratory, Division of Parasitology and Medical Entomology, and the Animal Disease Laboratory, Division of Medical Microbiology, at the School of Veterinary Medicine and Biomedical Sciences, IPB University, Bogor.

Sampling methodology: The hunting dogs were selected using purposive sampling, with the specific inclusion criterion that dogs needed to be actively involved in hunting activities (Fig. 2). The sample size estimation was based on the guidelines provided by Thrusfield and Christley (2018), with an assumed prevalence of 50%, a 95% confidence interval, and a precision level of 10%. Blood samples were collected from hunting dogs (n=112) during the years 2024 and 2025. Blood samples (2ml) were obtained from each hunting dog via the cephalic vein and allowed to stand at room temperature until the serum separated. Serum samples were stored at -20°C until analyzed serologically for *Trichinella* spp. At the time of sampling, data regarding the sex and age of the hunting dogs were recorded. Each dog's sex and age were documented during the process.

Enzyme-linked immunosorbent assay (ELISA): All serum samples were tested for antibodies to *Trichinella* spp. using a commercial ELISA kit (ID Screen® *Trichinella* Indirect multi-species) from ID-VET, France. This diagnostic kit identifies interactions between excretory/secretory (E/S) antigens provided in the kit and specific antibodies targeting *Trichinella* spp. within the sample. The ELISA test was performed only once and was not duplicated. The assay was performed according to the manufacturer's protocol, and optical density (OD) was measured at 450nm using a BioTek® 800TS microplate reader (BioTek Instruments Inc., USA). Antibody titers were calculated from the measured OD values using the following S/P ratio (S/P %) formula:

$$\frac{S}{P}\% = \frac{(OD_{Sample} - OD_{NC})}{(OD_{PC} - OD_{NC})} X100$$

Fig. 1: Map showing sampling location.

Fig. 2: Wild boar hunting dogs in West Pasaman Regency.

Description: S/P (*Sample/Positive*), S/P% (*Sample/ Positive %*), OD (*Optical Density*), NC (Negative Control), PC (*Positive Control*).

The resulting S/P% values were compared against a set threshold to determine the antibody titers of the samples. A sample was considered seropositive when S/P% ≥60%, negative when S/P% ≤50%, and doubtful/dubious when 50% <S/P% <60%.

Questionnaire interview: A minimum of 30 respondents were targeted for the KAP survey, based on the assumption that this number provides sufficient statistical reliability for preliminary analysis under the Central Limit Theorem. Questionnaire interviews were conducted to assess the characteristics and evaluate the level of knowledge, attitudes, and practices (KAP) of wild boar hunters in West Pasaman Regency regarding trichinellosis. The characteristics examined include age, education level, occupation, and dog ownership. The KAP of hunters regarding trichinellosis encompassed understanding the causative agent, transmission routes, susceptible hosts, clinical manifestations, prevention and control measures, and the management practices for hunting dogs. The KAP questionnaire was pilot tested to 30 respondents to obtain the necessary validity and reliability metrics. It demonstrated sufficient validity and reliability, with all items showing "r values" greater than 0.3 and Cronbach's Alpha of 0.893 for the knowledge domain and 0.802 for the attitude domain.

Data was gathered using a structured questionnaire through direct interviews. Written informed consent was obtained from all respondents prior to the interview, following explanation of the questionnaire and data confidentiality. The questionnaire designed to assess knowledge levels consists of 15 statements, each with three response options: true, false, and do not know. A value of 1 was assigned for correct answers, while incorrect or unknown responses were assigned 0. The

knowledge was categorized as "good" when respondents achieved a score >10, "sufficient" when the score ranged from 5 to 10, and "less" for scores below 5 (Wicaksono *et al.,* 2017; Suherman *et al.,* 2023).

The attitude questionnaire used a 4-point Likert scale comprising 15 statements. Positive statements were scored as 4, 3, 2 or 1 when respondents selected "strongly agree", "agree", "disagree" or "strongly disagree" respectively. Meanwhile, for negative statements, the scoring system was reversed. The attitude category was "negative" for scores <30, "neutral" for scores between 30 and 45, and "positive" for scores >45 (Wicaksono *et al.,* 2017; Suherman *et al.,* 2023). The questionnaire of hunters' practices was measured using the questions describing the conditions of the practices carried out. The questionnaire also included questions related to wild boar hunting practices and the management of hunting dogs. The percentage of respondents' answers is presented descriptively.

Data analysis: Results from the immunoassay and interviews were organized into a digital database utilizing Microsoft Excel. This database was subsequently analyzed using both descriptive and inferential statistics in Microsoft Excel and Epitools. The serological test outcomes are presented in tabular format and analyzed descriptively. Inferential statistics employed include the Fisher's exact test to compare the ELISA results by sex and age. Confidence intervals were calculated using the Wilson score method. Additionally, data from interviews with wild boar hunters were analyzed descriptively and presented in frequency tables or charts, highlighting respondent's characteristics, knowledge, attitudes and practice related to wild boar hunting.

RESULTS

The seroprevalence of *Trichinella* spp. infection in wild boar hunting dogs: Out of 112 hunting dog serum samples, 16 (14.29%; 95% CI: 9.0%-22.0%) tested positive for *Trichinella* spp. antibodies using ELISA. The average age of the hunting dog samples was 3.26±1.52 years, with the oldest 10 years old and the youngest 0.75 years old (9 months). The hunting dogs were grouped into age categories according to Creevy *et al.* (2019): puppies (0-1 year), adults (>1 year-8 years), and seniors (>8-13 years). The Fisher's exact test showed no significant correlation between *Trichinella* spp. positive results antibodies and hunting dogs the sex and the age at a 95% CI, as indicated by a P of 0.689 (P>0.05) and P of 0.649 (P>0.05) (Table 1).

Table 1: Seroprevalence of *Trichinella* spp. in hunting dogs in West Pasaman Regency according to gender and age

Risk Factors	Samples (%)	Results (%)		Fisher's exact (p)	Overall Prevalence (95% CI)
		Positive	Negative		
Gender					14.29% (9.0%-22.0%)
Male	99(88.40)	15(15.15)	84(84.85)	0.689	
Female	13(11.60)	1(7.69)	12(92.31)		
Age Category					
Puppies (0-1 years)	6(5.36)	0(0.00)	6(100.00)		
Adults (>1-8years)	105(93.75)	16(15.24)	89(84.76)	0.649	
Seniors (>8-13 years)	1(0.89)	0(0.00)	1(100.00)		

Note: p: Probability value at 5%.

Characteristics of wild boar hunters in West Pasaman Regency: A total of 30 wild boar hunters who voluntarily agreed to participate were interviewed and completed a structured questionnaire, and a subset of the hunting dogs sampled in this study belonged to these respondents. Based on the questionnaire interviews on age, the respondents were divided into young and old groups. In terms of education and occupation, most respondents (20, or 66.7%) were high school graduates, and 18 (60%) were entrepreneurs/traders. Concerning hunting dogs' ownership, most respondents (56.7%) kept to ≤3 hunting dogs. The characteristic data of wild boar hunters in West Pasaman Regency were shown in Table 2.

Characteristics of wild boar hunters in West Pasaman Regency: A total of 30 wild boar hunters who voluntarily agreed to participate were interviewed and completed a structured questionnaire, and a subset of the hunting dogs sampled in this study belonged to these respondents. Based on the questionnaire interviews on age, the respondents were divided into young and old groups. In terms of education and occupation, most respondents (20, or 66.7%) were high school graduates, and 18 (60%) were entrepreneurs/traders. Concerning hunting dogs' ownership, most respondents (56.7%) kept to ≤3 hunting dogs. The characteristic data of wild boar hunters in West Pasaman Regency were shown in Table 2.

Table 2: Characteristics of wild boar hunters in West Pasaman Regency

Characteristics	Frequency	Percentage (%)
Age		
Young (≤40 years old)	15	50
Old (>40 years old)	15	50
Education		
Elementary School	1	3.3
Middle School	5	16.7
High School	20	66.7
Diploma/Bachelor Degree	4	13.3
Job		
Civil Servant	1	3.3
Private-sector Employee	3	10
Farmer	8	26.7
Entrepreneur/Trader	18	60
Number of hunting dogs		
1. ≤3	17	56.7
2. 4 – 6	8	26.7
3. >6	5	16.6

Wild boar hunters' KAP: An assessment of knowledge revealed that all respondents (100%) were unaware of trichinellosis. Key aspects such as the causative agent, transmission routes, clinical manifestations, susceptible hosts, and prevention and control measures were unfamiliar to wild boar hunters in West Pasaman Regency. Several responses regarding the respondents' knowledge of trichinellosis are illustrated in Fig. 3.

The attitude assessment indicated that the vast majority of wild boar hunters exhibited a neutral stance toward trichinellosis. Selected attitude-related responses are presented in Fig. 4. More than half acknowledged the potential for trichinellosis to be fatal in humans (56.7%). At the same time, a substantial proportion (60%) recognized that feeding raw meat to pets or livestock increases the risk of infection. Additionally, most respondents agreed that individuals who consume raw

meat are at high risk of acquiring trichinellosis (83.3%), and that infection in animals or livestock can be mitigated by providing proper feed (80%). A large proportion (80%) believed that trichinellosis affects only animals and poses no risk to humans. Additionally, many respondents incorrectly perceived that the disease is not caused by parasitic nematodes (56.7%), is not transmitted through consumption of meat containing *Trichinella* larvae (60%), is not a dangerous disease (66.7%), and that infected animals would invariably exhibit clinical signs (86.7%).

Information on wild boar hunting practices (Table 3) and the management of hunting dogs (Table 4) was obtained through interviews with wild boar hunters. Most respondents participated in the hunting approximately twice per week (76.7%). All owned hunting dogs were involved in these activities. In West Pasaman Regency, to enhance dog responsiveness, hunters commonly relied on frequent hunting exposure (73.3%) and exposure to wild boar blood to improve scent recognition (70%). Remarkably, all hunting dogs had direct contact with wild boars during hunting (100%). During the hunts, the dogs were exclusively fed wild boar meat or offal.

Hunting dogs owned by wild boar hunters in West Pasaman Regency were primarily housed in kennels, with 100% adherence to this practice. The majority of hunters acquired their dogs through purchase (83.3%), sourcing them both locally within West Sumatra Province or from other regions, particularly West Java, Central Java, and East Java. Most hunting dogs were typically purchased at 1 to 2 years old (42.3%). However, some hunters preferred to acquire them as young as 6 months, believing that earlier acquisition facilitates better training and responsiveness to wild boars. In West Pasaman Regency, the predominant diet for hunting dogs consisted of home-prepared rations (56.7%). Feeding was consistently carried out using designated containers instead of being scattered on the kennel floors. Vaccination coverage among the hunting dogs was notably high, at 93.3%. Additionally, all wild boar hunters reported administering anthelmintic treatments to their hunting dogs. The most commonly administered type of anthelmintic was tablets (93.3%), with the most frequent administration schedule being once a year (46.7%).

DISCUSSION

To date, no studies have documented the seroprevalence of trichinellosis in hunting dogs in Indonesia. This study makes a novel contribution by presenting the first serological evidence of *Trichinella* infection in hunting dogs in Indonesia and a comprehensive Knowledge–Attitude–Practice (KAP) assessment of wild boar hunters regarding the potential for parasite transmission. Study thereby elucidates the interconnected roles of wildlife reservoirs, domestic animal exposure, and human behavior in sustaining transmission within a One Health framework and provides critical baseline data for future surveillance, risk assessment, and control strategies in endemic and emerging settings.

The overall seroprevalence of 14.29% identified in the present study was lower than that obtained in a similar field study conducted in hunting dogs from southern Italy (20.7%) (Ricci *et al.,* 2025), and central Italy (14.6%) (Gómez-Morales *et al.,* 2016). The low seroprevalence in this study may be due to ecological differences. In Italy, *Trichinella* circulates within a well-characterized sylvatic cycle involving wild boars, wolves, and red foxes (Caruso *et al.,* 2019; Scarcelli *et al.,* 2024) under temperate conditions, with seasonal variation influencing carcass decomposition and parasite survival. Whereas in Indonesia, tropical conditions with high humidity and stable temperatures may prolong larval survival, particularly in improperly disposed carcasses.

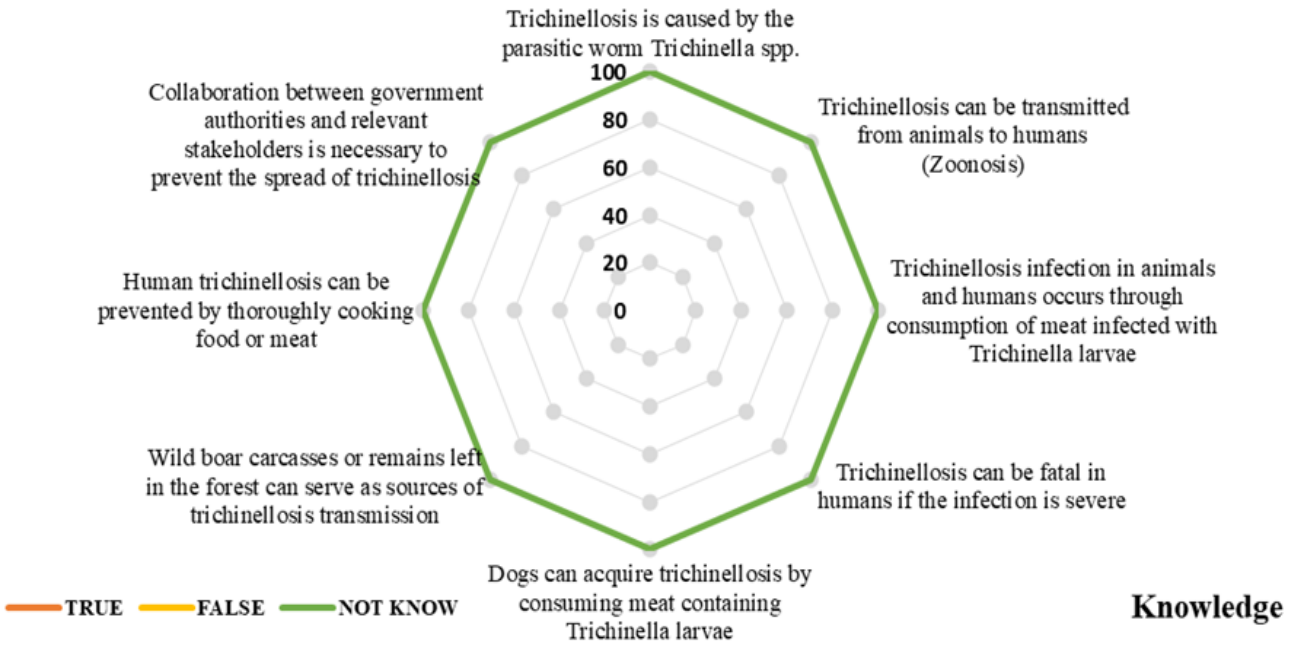

Fig. 3: Percentage of respondents' knowledge to the answer to some of the 15 statements about trichinellosis.

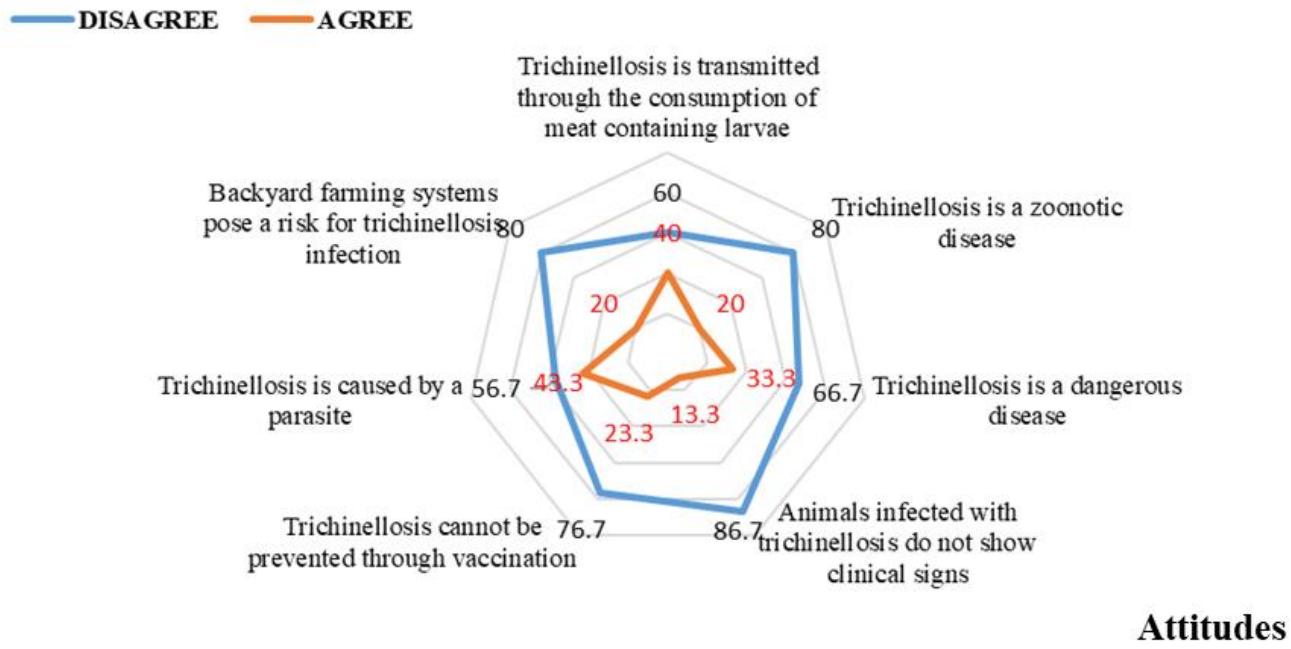

Fig. 4: Percentage of respondents to some statements about attitudes toward trichinellosis.

Table 3: Overview of wild boar hunting practices among hunters in West Pasaman Regency

No.	Question	n	%
Wild boar hunting			
1.	Participation in wild boar hunting activities		
	Yes	30	100
	No	0	0
2.	Frequency of wild boar hunting per week		
	Once per week	7	23.3
	Twice per week	23	76.7
	Three times per week	0	0
	Others	0	0
3.	All hunting dogs participate in hunting activities		
	Yes	30	100
	No	0	0
4.	Methods for enhancing hunting dogs' responsiveness to wild boars		
	Routinely involving hunting dogs in wild boar hunting activities	22	73.3
	Routinely taking dogs hunting and exposing them to dead wild boars	7	23.3
	Routinely taking dogs hunting and providing wild boar meat for sniffing and consumption	7	23.3
	Routinely involving hunting dogs in wild hunting activities and exposing dogs to wild boar blood	21	70
	Purchasing wild boar meat from collectors to be used as feed	3	10
	Others	0	0
5.	Frequency of wild boar meat consumption by hunting dogs		
	At every hunting event	30	100
	At every feeding	0	0
	Rarely provided	0	0
	Never provided	0	0
	Others	0	0
6.	Hunting dogs have been attacked by wild boars.		
	Yes	30	100
	No	0	0

Note: n: Number of respondents; %: Percentage.

The selected hunting area in Italy has about 5000 wild boars hunted per year, organized hunting teams, recording of hunted and *Trichinella* spp.-tested wild boar, and, because of the occurrence of a trichinellosis outbreak caused by consumption of wild boar meat that involved hunters, their friends, and family (Fichi *et al.,* 2015). In West Pasaman Regency, *Trichinella* infection has been documented in wild boars (Dalimunthe *et al.,* 2025); however, data on the annual number of hunted wild boars and on systematic surveillance for *Trichinella* in hunted wild boars remain unavailable.

Table 4: Overview of hunting dogs management practices among hunters in West Pasaman Regency

No.	Question	n	%
Hunting dogs' management practice			
1.	Housing system of hunting dogs		
	Kennelled	30	100
	Tethered outside the house/yard	0	0
	Free-roaming	0	0
	Others	0	0
2.	Source of hunting dogs		
	Purchased	25	83.3
	Given by friends	2	6.7
	Collected from the street	0	0
	Bred from previously owned hunting dogs	4	13.3
	Others	0	0
3.	Age of hunting dogs at purchase		
	3 months (weaning age)	1	3.8
	6 months	5	19.2
	1 year	11	42.3
	2 years	11	42.3
	Others	1	3.8
4.	Feeding method		
	Scatter feeding	0	0
	Provided in feeding containers	30	100
	Others	0	0
5.	Type of feed provided		
	Commercial dog food	3	10
	Home-formulated ration	17	56.7
	Rice and fish	10	33.3
	Chicken meat	0	0
	Others	2	6.7
6.	Vaccination status		
	Yes	28	93.3
	No	2	6.7
7.	Anthelmintic administration		
	Yes	30	100
	No	0	0
8.	Frequency of anthelmintic administration		
	Every 1 month	1	3.3
	Every 3 months	6	20
	Every 6 months	9	30
	Every 12 months	14	46.7
	Others	0	0

Note: n: Number of respondents; %: Percentage.

The presence of seropositive *Trichinella* spp. in hunting dogs within the investigated area may indicate circulation of *Trichinella* spp. within the local sylvatic cycle. The circulation of the parasite in this region is closely associated with reported *Trichinella* infection in wild boars in West Pasaman Regency, where prevalence rates have been documented at 45.28% (Dalimunthe *et al.,* 2025). Additionally, feeding the wild boar meat and offal to the hunting dogs significantly increases their risk of exposure to *Trichinella* (Dalimunthe *et al.,* 2025). Furthermore, post-hunting practices, such as disposing of wild boar heads and offals in nearby streams, puddles, or bushes at the hunting site, may facilitate the persistence and continued circulation of *Trichinella* spp. within the natural environment (Dalimunthe *et al.,* 2025). The scavenging behavior of hunting dogs also contributes to their risk of *Trichinella* infection, given the remarkable adaptability of *Trichinella* spp. parasites to survive in decaying carcasses even at low temperatures, thus increasing their survival and infectivity in the environment (Pozio, 2000; Pozio *et al.,* 2006).

The established transmission potential of *Trichinella* from wildlife to hunting dogs in the study area highlights a significant One Health concern, interlinking wildlife, domestic animals, and human populations. This risk is exacerbated by the documented flow of wild boar meat, which is consumed by minority communities and traded by large-scale collectors for distribution beyond the region. This process facilitates cross-sectoral transmission, posing a significant public health threat (Dalimunthe *et al.,* 2025). Additionally, hunting dogs may act as sensitive sentinels to monitor the presence of this parasite in rural environments, enabling early detection and the prompt implementation of control measures. Furthermore, long-term surveillance programs that incorporate data from wildlife, domestic animals, and human populations can enhance the understanding of *Trichinella* epidemiology and support the development of comprehensive control strategies within a One Health framework (Ricci *et al.,* 2025).

Questionnaire interviews with wild boar hunters in West Pasaman Regency revealed a relatively balanced age distribution between younger and older respondents. This finding suggests that wild boar hunting (*baburu kandiak*) remains widely adopted across different age groups in the study area. The occupational diversity indicates that *baburu kandiak* is not confined to specific professions but is practiced across multiple socioeconomic strata, reflecting its role as a longstanding tradition within the Minangkabau community. Most hunters were high school graduates (66.7%), suggesting the potential value of targeted educational interventions on trichinellosis. Higher educational attainment is associated with improved knowledge acquisition (Suherman *et al.,* 2023) and more positive attitudes (Wicaksono *et al.,* 2017). All hunters owned hunting dogs that were actively used for wild boar hunting. The predominance of small numbers of dogs per hunter reflects the community-based and culturally embedded nature of wild boar hunting in West Pasaman Regency, which emphasizes collective participation rather than commercial exploitation.

The KAP assessment indicated that none of the respondents had prior knowledge of trichinellosis (100%). This aligns with findings from a study conducted in Central Bengkulu Regency, which showed that respondents who consumed wild boar meat also had a complete lack of awareness of the disease (Lestari *et al.,* 2018). Low public awareness of trichinellosis, or total ignorance of it, is a potential factor contributing to its prevalence in West Pasaman Regency. This observation is consistent with the sociodemographic profile of the respondents, most of whom had only a secondary education. Individual knowledge levels are influenced by a variety of internal and external factors, including age, educational background, occupation, socioeconomic status, and access to information (Pratama *et al.,* 2022). Efforts to improve knowledge can be initiated through targeted outreach to hunters or through educational campaigns focused on trichinellosis. Individuals with foundational knowledge are more likely to adopt and maintain appropriate behaviors than those without it. Consequently, the limited understanding of trichinellosis among hunters appears to affect their routine practices directly. Strengthening their basic knowledge of the disease is, therefore, expected to positively influence attitudes and promote safer practices, ultimately enhancing prevention and control efforts (Lestari and Hartanti, 2018). In Indonesia, trichinellosis is seldom recognized by the general population and is classified globally as a neglected zoonotic disease.

Overall, the attitude assessment among wild boar hunters indicated predominantly neutral or moderate attitudes. In practice, several responses reflected attitudes that remain unfavorable toward disease transmission risks. Attitude represents an individual's predisposition to act in response to a given object or situation (Muzakar *et al.,* 2023), and the level of knowledge possessed closely influences it. Individuals whose attitudes have not reached a positive level may also be influenced by entrenched practices and a reluctance or inability to translate knowledge into preventive behavior (Fatmawati and Fitriawati, 2017). Limited awareness of the risks associated with trichinellosis among hunters likely contributes to habitual responses that do not adequately reflect disease prevention.

The widespread misconceptions observed among wild boar hunters reflect a critical gap in the One Health framework, particularly in recognizing the interconnectedness of wildlife, domestic animals, humans, and the environment in trichinellosis transmission. The prevailing belief that trichinellosis affects only animals and poses no risk to humans reflects a limited understanding of trichinellosis among hunters appears to affect their routine practices directly. Misinterpretations regarding the etiological role of parasitic nematodes and the foodborne transmission of *Trichinella* larvae further indicate inadequate awareness of the sylvatic cycle maintained by wild boars as primary reservoirs. The assumption that infected animals invariably exhibit clinical signs may also delay recognition of infection, allowing the silent circulation of the parasite within animal populations and the environment. The misunderstanding likely arises from a combination of limited zoonotic disease literacy, deeply entrenched traditional hunting practices, and the absence of routine surveillance feedback at the community level. Human

behavior represents an important contributing factor in the persistence of trichinellosis transmission, even as regulatory frameworks and good meat safety management practices continue to advance (Murrell and Pozio, 2011). In this setting, the lack of visible clinical signs in wild boars and hunting dogs despite seropositive *Trichinella* spp. antibodies, may foster a false perception of safety and normalize high-risk behaviors such as handling raw carcasses, consuming undercooked meat, and feeding uncooked offal to dogs. Cultural traditions in food behavior and practices in the use of domestic and wild animals are not easily altered, and trichinellosis can be expected to remain a food-safety risk in many areas of the world for the foreseeable future (Murrell and Pozio, 2011). These factors are further compounded by fragmented communication between veterinary, public health, and wildlife sectors, limiting the translation of scientific evidence into culturally appropriate risk communication (World Health Organization, 2017). Collectively, these gaps explain the persistence of environmentally mediated transmission of trichinellosis in hunting-associated communities of West Sumatra.

The hunting practices observed in West Pasaman Regency illustrate a high-intensity interface between wildlife, domestic animals, humans, and the environment, which is central to the One Health framework. Frequent hunting activities, combined with universal participation of hunting dogs, substantially increase repeated exposure of domestic animals to wild boar reservoirs known to harbor *Trichinella* spp. Furthermore, the routine feeding of raw wild boar meat and offal to hunting dogs constitutes a likely risk factor for parasite transmission, facilitating spillover from wildlife reservoirs and creating a transmission interface between sylvatic and domestic cycles. From an environmental perspective, repeated hunting events and associated carcass handling may contribute to contamination of hunting sites, thereby sustaining *Trichinella* infectivity in the ecosystem. Within a One Health perspective, these practices not only threaten animal health but also increase the likelihood of zoonotic spillover to humans through indirect exposure, handling of infected carcasses, or informal meat distribution (Dalimunthe *et al.,* 2025).

The management practices of hunting dogs in West Pasaman Regency illustrate both protective and risk-enhancing factors within the One Health framework. Implementing kenneling systems can reduce uncontrolled roaming and limit contact with other domestic animals and wildlife, thereby helping to mitigate the risk of pathogen spillover. The widespread trade and interprovincial movement of hunting dogs in Indonesia may facilitate the geographic spread of *Trichinella* spp., particularly in the absence of routine health screening. Early acquisition of dogs for training, although culturally and functionally beneficial, likely increases cumulative exposure to wildlife reservoirs through prolonged hunting activity. Reliance on home-prepared, non-commercial diets may reduce exposure to contaminated commercial feed but does not eliminate the risk of infection, especially when wild boar meat is provided during hunts. Although high vaccination coverage and routine anthelmintic use reflect good general awareness of animal health, these measures are insufficient to prevent trichinellosis, as no effective vaccine exists (Tang *et al.,* 2022) and anthelmintics have limited efficacy against encysted *Trichinella* larvae. From a One Health perspective, this apparent gap between good general husbandry practices and enduring zoonotic risk underscores the necessity for disease-specific education and integrated surveillance efforts.

Our study indicates the seroprevalence of *Trichinella* spp. antibodies detected through ELISA in hunting dogs suggest possible circulation of *Trichinella* spp. in the local ecosystem. These results align with the high prevalence previously reported in wild boars from the same region (Dalimunthe *et al.,* 2025), highlighting the role of hunting dogs as effective indicators for monitoring environmental transmission dynamics. The serological testing of hunting dogs represents a practical and effective approach for monitoring parasite circulation at regional and national scales, providing valuable epidemiological insight into transmission within wildlife populations while avoiding the logistical and ethical challenges of sampling wild animals (Gómez-Morales *et al.,* 2016; Ricci *et al.,* 2025). Moreover, long-term surveillance programs that integrate data from wildlife, domestic animals, and human populations would substantially enhance our understanding of *Trichinella* epidemiology and support the development of comprehensive control strategies within a One Health framework (Ricci *et al.,* 2025). Strengthening cross-sectoral collaboration among veterinary services, public health authorities, and local communities is essential to improve risk communication, promote safer hunting and feeding practices, and mitigate the zoonotic threat posed by trichinellosis in endemic areas.

Finally, this study should be interpreted with caution due to methodological limitations, including the use of ELISA without confirmatory assays such as western blot, the lack of direct larval detection, and the limited sample size of hunters. ELISA is widely used for epidemiological surveillance and outbreak monitoring of *Trichinella*, demonstrating high sensitivity, repeatability, and reproducibility, although its specificity remains limited. Therefore, Western blot is often used as a confirmatory test to ensure true-positive results (Gómez-Morales *et al.,* 2008; Barlow *et al.,* 2021). In addition, purposive sampling and self-reported KAP data may limit generalizability and introduce reporting bias.

Conclusions: This study presents the first report of serological evidence of *Trichinella* spp. exposure in hunting dogs in Indonesia. The seroprevalence likely reflects hunting dogs' exposure to infected wildlife, indicating potential transmission at the wildlife-domestic animal interface. No significant association between seropositivity and the sex or age of hunting dogs was detected in this study. The detection of antibodies in hunting dogs reflects previous findings of high prevalence in local wild boar populations and highlights the role of hunting dogs as potential surveillance indicators because surveillance systems were not formally evaluated. Seropositivity detected by ELISA indicates exposure to *Trichinella* spp. antibodies, it does not confirm the establishment of the parasite in the ecosystem or active transmission cycles.

The integration of serological findings with hunters' knowledge, attitudes, and practices reveals significant gaps in awareness and risk perception that are likely contributing to disease transmission. Despite relatively good general dog management practices, widespread high-risk hunting and feeding behaviors, and profound knowledge gaps and persistent misconceptions among hunters, these conditions facilitate parasite maintenance and zoonotic spillover. From a One Health perspective, these findings highlight hunting dogs as a potential biological indicator of transmission pressure while underscoring the critical role of human behavior in sustaining disease risk. Targeted interventions are therefore urgently needed, including community-based education focused on zoonotic risk awareness, safe handling and disposal of carcasses and improved management and monitoring of wild boar meat distribution. In parallel, routine serological surveillance of hunting dogs should be incorporated into regional monitoring systems, supported by strengthened cross-sector collaboration between veterinary, public health, wildlife, and local cultural stakeholders. Such integrated actions are essential to reduce infection risk in animals, protect human health, reduce the risk of environmental transmission of *Trichinella* spp. and develop sustainable control strategies in endemic regions such as West Pasaman Regency.

Ethics approval: All animal procedures were carried out in accordance with the guidelines approved by the Animal Welfare, Ethics, and Experimentation Committee of the School of Veterinary Medicine and Biomedical Sciences at IPB University (Approval No. 213/KEH/SKE/ IV/2024). Furthermore, research involving human participants complied with the standards set forth by the Research Ethics Committee for Human Subjects (KEPMSM) at IPB University (Certificate No. 2035/IT3.KEPMSM-IPB/SK/2025).

Consent for publication: All data in this manuscript have been approved by the respondents, and they have consented to the publication of this study.

Author contributions: FS coordinated the research team. FS, YR, ES, SM and YHD designed the study. YHD, FS, YR, ES, SM and RA conducted the literature review and data extraction. YHD collected and analyzed the data. FS, SM, and YHD performed the laboratory analysis, while YHD and ES carried out the statistical analysis. The manuscript was drafted by YHD, with critical revisions provided by FS, YR, ES, SM and RA. All authors have read and approved the final manuscript.

Funding: This research was financially supported by the Directorate General of Research and Development, Ministry of Higher Education, Science, and Technology of the Republic of Indonesia through the PMDSU research scheme under contract No: 006/C3/ DT.05.00.PL/2025.

Acknowledgments: We would like to express our gratitude to the Wild Boar Hunting Sport Community (PORBBI) of West Sumatra Province for their cooperation and assistance in collecting of hunting dog samples for this study.

Conflicts of interest: All authors declare that there are no conflict of interest.

REFERENCES

Angi AH, Satrija F, Lukman DW, *et al.,* 2014. Prevalence of trichinellosis in pork meat at slaughterhouse in Kupang City, East Nusa Tenggara Province. Global Veteriner 13(4):601-605.

Angi AH, Satrija F, Lukman DW, *et al.,* 2015. Seroprevalensi trichinellosis pada babi di Kota Kupang, Provinsi Nusa Tenggara Timur. Jurnal Veteriner 16(3):320-324.

Barlow A, Roy K, Hawkins K, *et al.,* 2021. A review of testing and assurance methods for *Trichinella* surveillance programs. Food and Waterborne Parasitology 24:e00129.

BPS Statistics West Pasaman Regency, 2025. West Pasaman Regency in figures. https://pasamanbaratkab.bps.go.id/en/publication/2025/02/28/542bf161ac001d2469f75ed8/pasaman-barat-regency-in-figures-2025.html.

Caruso M, Romano AC, Toce M, *et al.,* 2019. Monitoraggio della trichinellosi nella fauna selvatica in Basilicata. Atti XIX Congresso S.I.Di.L.V. Matera 121-122.

Creevy KE, Grady J, Little SE, *et al.,* 2019. AAHA Canine Life Stage Guidelines. Journal of the American Animal Hospital Association 55:267-290.

Dalimunthe YH, Satrija F, Ridwan Y, *et al.,* 2025. Trichinellosis prevalence and distribution flow of wild boar meat in West Pasaman Regency, West Sumatera Province, Indonesia. Iranian Journal of Veterinary Medicine 19(2):169-178.

Fatmawati TY and Fitriawati, 2017. Pengetahuan, sikap, dan perilaku siswa-siswi tentang higiene personal di SD Negeri Kota Jambi. Scientia Journal 6(1):37–47.

Fichi G, Stefanelli S, Pagani A, *et al.,* 2015. Trichinellosis outbreak caused by meat from a wild boar hunted in an Italian region considered to be at negligible risk for *Trichinella*. Zoonoses and Public Health 62:285–91.

Gómez-Morales MA, Ludovisi A, Amati M, *et al.,* 2008. Validation of an enzyme-linked immunosorbent assay for diagnosis of human trichinellosis. Clinical and vaccine immunology 15(11):1723–1729.

Gómez-Morales MA, Selmi M, Ludovisi A, *et al.,* 2016. Hunting dogs as sentinel animals for monitoring infections with *Trichinella* spp. in wildlife. Parasites & Vectors 16(9):154.

Gumucio S, Merica M, Luhmann N, *et al.,* 2011. Data collection quantitative methods, the KAP survey model (knowledge, attitude and practices). Saint-Étienne, France: IGC Communigraphie.

Guzmán-Faúndez J, Crisóstomo-Jorquera V, Landaeta-Aqueveque C, *et al.,* 2025. First assessment of the prevalence of *Trichinella* in backyard-raised pigs in Central-Southern Chile. Veterinary Quarterly 45(1):1-7.

Lestari M, Satrija F and Tiuria R, 2018. Seroprevalensi trichinellosis pada babi hutan di Kabupaten Bengkulu Tengah, Provinsi Bengkulu. Jurnal Ilmu Pertanian Indonesia 23(3):220-226.

Lestari REK and Hartanti LEP, 2018. The effect of internal public relations campaign programme towards employees behavioral changes. Jurnal InterAct 7(2):33–40.

Malone CJ, Oksanen A, Mukaratirwa S, *et al.,* 2024. From wildlife to humans: The global distribution of *Trichinella* species and genotypes in wildlife and wildlife-associated human trichinellosis. International Journal for Parasitology: Parasites and Wildlife 24:100934.

Mechouk N, Deak G, Ionic˘a AM, *et al.,* 2024. First identification of *Trichinella britovi* in a domestic dog (*Canis familiaris*) from Algeria. Veterinary Parasitology: Regional Studies and Reports 56:101135.

Miterp´akov´a M, Antolov´a D, Hurníkov´a Z, *et al.,* 2017. Seroprevalence of *Trichinella* infections in domestic dogs from Slovakia. Journalof Helminthology 91(5):549–554.

Murrell KD, and Pozio E, 2011. Worldwide occurrence and impact of human trichinellosis, 1986-2009. Emerging Infectious Diseases 17(12):2194–2202.

Muzakar A, Azizurrahman A, and Khotmi N, 2023. Psikologi Sosial. Lombok NTB: Univ Hamzanwadi Press, itskesmuspres.

Omeragić J, Kapo N, Škapur V, *et al.,* 2024. Diversity of *Trichinella* species in carnivores from Bosnia and Herzegovina. BMC Veterinary Research 20(1):117.

Pozio E, 2000. Factors affecting the flow among domestic, synanthropic and sylvatic cycles of *Trichinella*. Veterinary Parasitology 93(3–4):241–262.

Pozio E and Murrell KD, 2006. Systematics and epidemiology of *Trichinella*. Advances in Parasitology 63:367-439.

Pozio E, and Zarlenga D, 2021. Chapter 3: Taxonomy of the *Trichinella* genus. In: *Trichinella* and Trichinellosis. (Bruschi F, ed). 395-415. London, UK: Elsevier Academic Press.

Pozio E, Kapel CM, Gajadhar AA, *et al.,* 2006. *Trichinella* in pork: current knowledge on the suitability of freezing as a public health measure. Eurosurveillance 11(11):E061116.1.

Pratama AR, Puspitasari AA, Hidayati IR, *et al.,* 2022. Factors affecting the level of public knowledge about the use of chlorpheniramine maleate in Pesanggrahan village. International Conference of Medicine and Health 383–392.

Răcășanu I, Enea DN, Vlăsceanu LF, *et al.,* 2024. Epidemiology, diagnosis, treatment, control and economic impact of trichinosis. Scientific Papers.Series D.Animal Science 67(1):289-294.

Ricci A, Bezerra-Santos MA, Ludovisi A, *et al.,* 2025. Seroprevalence of *Trichinella* spp. in hunting dogs from southern Italy. Veterinary Parasitology: Regional Studies and Reports 61:101276.

Satrija F, Murtini S, Satrija EC, *et al.,* 2025. Potential spread of *Trichinella* sp. infection due to consumption of wild boar meat among wild carnivores in Ragunan Zoo. Acta Veterinaria Indonesiana 13(2):141-147.

Scarcelli S, Buono F, D'Alessio N, *et al.,* 2024. *Trichinella* spp. in wolves (*Canis lupus*) and red foxes (*Vulpes vulpes*) of southern Italy. Research in Veterinary Science 179:105381.

Suherman, DA, Sudarnika E and Purnawarman T, 2023. Antibiotic resistance: a cross-sectional study on the characteristics, knowledge, attitudes, and practices of dairy farmers' cooperative in North Cianjur (KPSCU), Cianjur District, Indonesia. Veterinary World 16(8):1736–1746.

Tammone Santos A, Riva E, Condorí WE, *et al.,* 2024. *Trichinella* infection in culled wild boar (*sus scrofa*) from El Palmar National Park, Argentina, and exposure risk in humans and dogs consuming wild boar meat. Journal of Wildlife Diseases 60(2):401-412.

Tang B, Li J, Li T, *et al.,* 2022. Vaccines as a strategy to control trichinellosis. Frontiers in Microbiology *13*:857786.

Thrusfield M, and Christley R, 2018. Veterinary Epidemiology. New Jersey: Wiley.

Torreggiani C, Garbarino C, Pupillo G, *et al.,* 2025. Occurrence of *Trichinella* spp. in grey wolves and red foxes: Insights from wild mammal surveillance in Emilia-Romagna (Italy). Animals15:3532.

Watier-Grillot S, Vallee I, Lacour SA, *et al.,* 2011. Strayed dogs sentinels of *Trichinella britovi* infection in Kosovo. Parasite18:281-283.

Wicaksono A, Sudarnika E and Basri C, 2017. Kondisi biosekuriti tempat penjualan burung terkait *Avian Influenza* di wilayah Jakarta. Jurnal Sain Veteriner 35(2):269–278.

World Health Organization, 2017. Integrating neglected tropical diseases into global health and development: fourth WHO report on neglected tropical diseases. Licence: CC BY-NC-SA 3.0 IGO. https://www.who.int/publications/i/item/9789241565448.

Zarei F, Dehghani A, Ratansiri A, *et al.,* 2024. ChecKAP: A Checklist for reporting a Knowledge, Attitude, and Practice (KAP) study. Asian Pacific Journal of Cancer Prevention 25(7):2573–2577.

Zarlenga D, Thompson P and Pozio E, 2020. *Trichinella* species and genotypes. Research in Veterinary Science 133:289–96.