

WOAH Collaborative Centre Reports Activities 2024

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CENTRE INFORMATION

*Title of WOAHCollaborating Centre	Surveillance and Control of Animal Protozoan Diseases
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TOR 1 AND 2: SERVICES PROVIDED

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by WOAHC

Category	Title of activity	Scope
		1. The following compounds were

<p>Disease control (true)</p>	<p>1. Identification and evaluation of anti-protozoan compounds as potential chemotherapeutic agents 2. Novel therapeutic approach 3. Understanding immunology and pathogenesis of protozoan diseases. 4. Biology and protozoa development in vectors and their control</p>	<p>evaluated as anti-protozoan agents. [Anti-piroplasms agents] 6,7-dimethoxyquinazoline-2,4-diamines, Tafenoquine-based combinations, aquiluscidin, a cathelicidin from <i>Crotalus aquilus</i>, Vcn-23 derivative peptide, and sitamaquine. [Trypanocidal agents] oligomeric ethylene glycol-tethered nitrofurantoin derivatives, synthetic nitrofurantoin-triazole hybrids, dry-heat-sterilized <i>Acremonium egyptiacum</i>, synthetic isatinylhydantoin derivatives, and 5-nitroindolylazines. [Anti-leishmanial agents] Aurantoside L from the marine sponge <i>Siliquariaspongia japonica</i>, and synthetic isatinylhydantoin derivatives. [Anti-plasmodial agents] Synthetic 2,5-diphenyloxazole analogs from <i>Oxytropis lanata</i>, and Indonesian medicinal plant extracts. 2. <i>Inonotus obliquus</i> polysaccharide was evaluated for its protective effect against neosporosis. 3. <i>Neospora caninum</i> surface antigen 1 was investigated for its role in the pathogenesis. The role IFN-γ in regulating uterine pathogenesis and placental inflammation in cattle infected with <i>Neospora caninum</i> was investigated. Anemia development in cattle infected with <i>Theileria</i> sp. Yokoyama was investigated. 4. <i>Plasmodium</i> genes involved in its development in mosquitoes were investigated. Extracts from <i>Erigeron acer</i> L. root and Egyptian medicinal plants were evaluated for their acaricidal activity. Potential vertical transmission of <i>Sarcocystis</i> Spp. in sika deer was elucidated.</p>
		<p>1. Prevalence of <i>Trypanosoma evansi</i> was assessed in goats in Philippines. <i>Babesia</i> infections were investigated in ticks collected from dogs in Malawi and Bangladesh. Prevalence of <i>Babesia</i> and <i>Theileria</i> infections was investigated in several livestock in China and cattle in Malawi. Epidemiology and genetic diversity of <i>Theileria equi</i> and <i>Babesia caballi</i> in horses in Mongolia and Kyrgyzstan were assessed. Prevalence of</p>

<p>Epidemiology, surveillance, risk assessment, (true)</p>	<p>1. Surveillance of protozoan parasites 2. Vector surveillance 3. Risk factor identification</p>	<p>Babesia bigemina in cattle in Iran was investigated. Babesia and Theileria species were surveyed in questing ticks in Bangladesh. Babesia, Theileria and Trypanosoma evansi infections were surveyed in camels in Egypt. Prevalence of Babesia vogeli in dogs and Rhipicephalus sanguineus in Vietnam was assessed. Theileria ovis was surveyed in Rhipicephalus turanicus and Hyalomma anatolicum collected from sheep in China. 2. Tick species infesting dogs in Malawi and Bangladesh, and cattle in China were identified. Tick species prevalent in pastures in Bangladesh were identified. Tabanus chrysurus was investigated as a potential biological vector of Trypanosoma (Megatrypanum) theileri. 3. Risk factors for Babesia bigemina infection in cattle in Iran were identified.</p>
<p>Training, capacity building (true)</p>	<p>Training on diagnosis, surveillance, and control of animal protozoan diseases</p>	<p>Scientists from China, Indonesia, Mongolia, Kyrgyzstan, Philippines, Japan, Argentina, Thailand, South Africa, Sri Lanka, Uganda, Ethiopia, Congo, Zambia, Nigeria, Paraguay, Palestine, Bhutan, Botswana, and Liberia were trained on on diagnosis, surveillance, and control of animal protozoan diseases via technical visits, seminars, hands-on practice, and internships.</p>
<p>Diagnosis, biotechnology and laboratory (true)</p>	<p>1. Development and evaluation of diagnostic assays 2. Development of transgenic protozoa</p>	<p>1. Peroxiredoxin 2 (NcPrx2), Microneme 4 (NcMIC4), and Surface Antigen 1 (NcSAG1) were evaluated as sero-diagnostic antigens for bovine neosporosis. A cytochrome-b gene-based PCR assay was developed for the specific detection of Theileria sp. Yokoyama. 2. Red fluorescent protein-blasticidin deaminase fusion gene was expressed and evaluated as a selectable marker for DNA transfection in Babesia ovata.</p>
<p>Vaccines (true)</p>	<p>Characterization of protozoan antigens as vaccine candidates</p>	<p>Toxoplasma gondii dense granule protein 15 was evaluated as a vaccine candidate in mouse model.</p>

TOR 3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main focus area for which you were designated

Proposal title	Scope/Content	Applicable Area
Validation of diagnostic assays	A cytochrome b gene-based PCR assay for detecting <i>Theileria</i> sp. Yokoyama was developed and validated.	Health Management

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOA?H?

No

4. Did your Collaborating Centre maintain a network with other WOA?H Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same speciality, to coordinate scientific and technical studies?

Yes

Name of WOA?H CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
1) RL for Dourine, ANSES, France, 2) RL for Surra, Institute of Tropical Medicine Antwerp, Belgium, 3) RL for Surra, National Research Center for Protozoan Diseases, Obihiro University of Agriculture and Veterinary Medicine, Japan, and 4) RL for trypanosomoses (tsetse-transmitted), CIRAD-IRD, France	France Belgium Japan	Asia y el Pacífico Europa	To create awareness on NTTAT as high impact neglected veterinary diseases, develop tools to enhance the surveillance capacity, foster collaborative research, and fill gaps in knowledge on disease epidemiology, pathogenesis, drug efficacy, vaccines, modes of transmission, reservoir hosts, and vector control.

TOR 4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOA?H Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of WOA?H CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose

College of Veterinary Medicine and Biomedical Sciences, Cavite State University	Philippines	Asia and Pacific	To determine the prevalence and genetic diversity of <i>Trypanosoma evansi</i> in goats.
1) Centre of Excellence for Pharmaceutical Sciences, North-West University, 2) Unit for Environmental Sciences and Management, North-West University, 3) Department of Zoology and Entomology, University of the Free State	South Africa	Africa	To discover novel trypanocidal agents.
Department of Animal Health and Livestock Development, Ministry of Agriculture, Irrigation and Water Development	Malawi	Africa	To survey ticks and vector-borne pathogens in cattle and dogs.
Department of Microbiology and Parasitology, Sher-e-Bangla Agricultural University	Bangladesh	Asia and Pacific	To survey ticks and vector-borne pathogens in livestock and other domestic animals.
Qinghai Academy of Animal Sciences and Veterinary Medicine, Centre for Biomedicine and Infectious Diseases, Qinghai University	China	Asia and Pacific	To survey ticks and tick-borne pathogens in livestock.
Institute of Veterinary Medicine, Mongolian University of Life Sciences	Mongolia	Asia and Pacific	To determine the prevalence and genetic diversity of equine piroplasms, and discover novel anti-tick compounds.
Faculty of Tropical Medicine, Mahidol University Medicine	Thailand	Asia and Pacific	To develop sero-diagnostic assays for detecting <i>Neospora caninum</i> .
Faculty of Veterinary Medicine, University of Zabol	Iran	Middle East	To determine the prevalence, genetic diversity, and risk factors of tick-borne

			pathogens in cattle.
Research Institute for Microbial Diseases, Osaka University	Japan	Asia and Pacific	To elucidate ancestral links between Far East Asian and American <i>Toxoplasma gondii</i> strains.
Department of Biotechnology, Animal Health Research Institute	Egypt	Africa	To survey vector-borne pathogens in camels.
Faculty of Veterinary Medicine, Vietnam National University of Agriculture	Vietnam	Asia and Pacific	To survey ticks and tick-borne pathogens in dogs.
Kyrgyz Research Institute of Veterinary Named After A. Duisheev	Kyrgyzstan	Asia and Pacific	To determine the prevalence and genetic diversity of equine piroplasms.
Natural Sciences College, Autonomous University of Queretaro	Mexico	Americas	To discover novel anti-babesial agents.
Faculty of Veterinary Medicine, South Valley University	Egypt	Africa	To discover novel anti-tick compounds.
Veterinary College, Xinjiang Agricultural University	China	Asia and Pacific	To survey <i>Theileria</i> species in ticks.
Veterinary Research Institute	Sri Lanka	Asia and Pacific	To develop diagnostic assays for <i>Theileria</i> sp. Yokoyama and determine its clinical significance and risk factors.

TOR 6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOA?H?

No

TOR 7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

Yes

Provision of confirmatory diagnostic services

Horse samples from Kyrgyzstan, USA, UAE, UK, Mongolia, Sri Lanka, and the Netherlands were tested for equine piroplasmosis. Cattle samples from Sri Lanka, Paraguay, Mongolia, and Japan were tested for Babesia and Theileria infections.

Supply of diagnostic and research materials

Theileria equi and Babesia caballi IFAT slides were supplied to institutions in USA, Uruguay, Australia, France, Japan, China, UAE. Theileria equi and Babesia caballi DNA samples were provided to institutions in Australia, Kyrgyzstan, and Japan. Institutions in Japan were provided with Trypanosoma evansi and Trypanosoma theileri DNAs. DNA samples of bovine Babesia species were provided to institutions in Sri Lanka and Japan. Institutions in Japan were provided with tick colonies.

Expert advice on the diagnosis of protozoan diseases and vectors

Expert advice on the diagnosis and control of animal protozoan diseases was provided to institutions in China, Sri Lanka, Japan, Kyrgyzstan, Australia, the Netherlands, UK, USA, Argentina, Mongolia, UAE, and Germany.

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOA?H, to personnel from WOA?H Members?

Yes

a) Technical visit : 8

b) Seminars : 575

c) Hands-on training courses: 35

d) Internships (>1 month) : 4

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
A	Surveillance, in vitro cultivation, drug screening for Babesia and Theileria species	China	3
A	Discovery of novel anti-protozoan agents for equine piroplasmosis	Indonesia	1
A	In vitro cultivation of equine piroplasm and bovine Babesia species	Mongolia	1

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A	Surveillance of equine piroplasms and zoonotic Babesia species	Kyrgyzstan	2
A	Diagnosis of drug discovery for trypanosomiasis	Philippines	1
B	Diagnosis of trypanosomiasis	Japan	80
B	Management of bovine piroplasmosis	Japan	399
B	Epidemiology of zoonotic Babesia species	Japan	20
B	Prevalence of equine piroplasmosis and its management in Argentina	Argentina	5
B	Management of clinical bovine babesiosis	China	70
B	Diagnosis of equine piroplasmosis	Thailand	1
C	Diagnosis and chemotherapy of trypanosomiasis	South Africa	2
C	Diagnosis and chemotherapy of trypanosomiasis	Philippines	1
C	Diagnosis of equine piroplasmosis using WOAHA-recommended	Thailand	1

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	diagnostic assays		
C	Preparation of IFAT slides for diagnosing equine piroplasmosis	Japan	2
C	Collection and preserving blood samples from animals infected with hemoprotozoan parasites for in vitro cultivation	Sri Lanka	10
C	Microscopic diagnosis of equine piroplasmosis	Japan	8
C	Laboratory diagnosis and research for control of animal protozoan diseases	Uganda	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Ethiopia	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Congo	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Zambia	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Thailand	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Nigeria	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Paraguay	1

C	Laboratory diagnosis and research for control of animal protozoan diseases	Palestine	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Bhutan	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Botswana	1
C	Laboratory diagnosis and research for control of animal protozoan diseases	Liberia	1
D	Diagnosis of and drug discovery for trypanosomiasis	Philippines	1
D	Diagnosis of and drug discovery for trypanosomiasis	South Africa	3

TOR 8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOA?H?

No

TOR 9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOA?H that may be useful to Members of WOA?H

a) Articles published in peer-reviewed journals:

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1. El-Sayed El-Alfy, I., Abbas, I., Saleh, S., Elseadawy, R., Fereig, R. M., Rizk, M. A., & Xuan, X. (2024). Tick-borne pathogens in camels: A systematic review and meta-analysis of the prevalence in dromedaries. *Ticks and Tick-borne Diseases*, 15(1), 102268.

2. Ji, S., Rizk, M. A., Galon, E. M., El-Alfy, E. S., Mizukawa, Y., Kojima, M., Ikegami-Kawai, M., Kaya, M., Liu, M., Itoh, I., & Xuan, X. (2024). Anti-babesial activity of a series of 6,7-dimethoxyquinazoline-2,4-diamines (DMQDAs). *Acta Tropica*, 249, 107069.

3. Macalanda, A. M. C., Galon, E. M. S., Morillo, V. A., Wanlop, A., Ona, K. A. L., Xuan, X., Inoue, N., Kawazu, S. I., & Suganuma, K. (2024). Molecular detection and internal transcribed spacer-1 sequence diversity of *Trypanosoma evansi* in goats from Cavite, Philippines. *Journal*

of *Veterinary Medical Science*, 86(1), 35–38.

4. Shinozaki, K., Kirinoki, M., Atcharaphan, W., Watanabe, K. I., Ohari, Y., Suguta, S., Ona, K. A., Ushio, N., Macalanda, A. M. C., Sukanuma, K., Inoue, N., & Kawazu, S. I. (2024). Expression profile analysis of the transient receptor potential (TRPM) channel, a possible target of praziquantel in *Schistosoma japonicum*. *Parasitology International*, 99, 102833.
5. Janse van Rensburg, H. D., N'Da, D. D., & Sukanuma, K. (2024). In vitro trypanocidal potency and in vivo treatment efficacy of oligomeric ethylene glycol-tethered nitrofurantoin derivatives. *European Journal of Pharmaceutical Sciences*, 192, 106668.
6. Chikufenji, B., Chatanga, E., Galon, E. M., Mohanta, U. K., Mdzukulu, G., Ma, Y., Nkhata, M., Umemiya-Shirafuji, R., & Xuan, X. (2024). First report of dog ticks and tick-borne pathogens they are carrying in Malawi. *Journal of Veterinary Medical Science*, 86(2), 150–159.
7. Mohanta, U. K., Marguerite, M. P., Ji, S., Ma, Z., Li, H., El-Sayed, S. A. E., Amer, M. M., Chikufenji, B., Do, T. T., Ceylan, O., Umemiya-Shirafuji, R., & Xuan, X. (2024). Molecular survey of canine tick-borne pathogens in ticks and stray dogs in Dhaka city, Bangladesh. *Parasitology International*, 100, 102860.
8. Van Wyk, C. L., Mtshali, S., Ramatla, T., Lekota, K. E., Xuan, X., & Thekiso, O. (2024). Distribution of *Rhipicephalus sanguineus* and *Haemaphysalis elliptica* dog ticks and pathogens they are carrying: A systematic review. *Veterinary Parasitology: Regional Studies and Reports*, 47, 100969.
9. Abdelbaky, H. H., Rahman, M. M., Shimoda, N., Chen, Y., Hasan, T., Ushio, N., & Nishikawa, Y. (2024). *Neospora caninum* surface antigen 1 is a major determinant of the pathogenesis of neosporosis in nonpregnant and pregnant mice. *Frontiers in Microbiology*, 14, 1334447.
10. Ma, Y., Jian, Y., Wang, G., Zafar, I., Li, X., Wang, G., Hu, Y., Yokoyama, N., Ma, L., & Xuan, X. (2024). Epidemiological investigation of tick-borne bacterial pathogens in domestic animals from the Qinghai-Tibetan Plateau area, China. *Pathogens*, 13(1), 86.
11. Tang, Z., Xie, S., Min, P., Li, H., Zhao, F., Liu, M., Jin, W., Wang, L., Zhao, J., & Jia, L. (2024). Protective effect of *Inonotus obliquus* polysaccharide on mice infected with *Neospora caninum*. *International Journal of Biological Macromolecules*, 261(Pt 2), 129906.
12. Ma, Y., Jian, Y., Wang, G., Li, X., Wang, G., Hu, Y., Yokoyama, N., Ma, L., & Xuan, X. (2024). Molecular identification of *Babesia* and *Theileria* infections in livestock in the Qinghai-Tibetan Plateau area, China. *Animals*, 14(3), 476.
13. Seetsi, A., N'Da, D. D., Nyembe, N., Sukanuma, K., Ramatla, T., & Thekiso, O. (2024). In vitro antitrypanosomal activity of synthesized nitrofurantoin-triazole hybrids against *Trypanosoma* species causing animal African trypanosomiasis. *Experimental Parasitology*, 259, 108711.
14. Otgonsuren, D., Amgalanbaatar, T., Narantsatsral, S., Enkhtaivan, B., Munkhgerel, D., Zoljargal, M., Davkharbayar, B., Myagmarsuren, P., Battur, B., Battsetseg, B., Sivakumar, T., & Yokoyama, N. (2024). Epidemiology and genetic diversity of *Theileria equi* and *Babesia caballi* in Mongolian horses. *Infection, Genetics and Evolution*, 119, 105571.
15. Udonsom, R., Adisakwattana, P., Popruk, S., Reamtong, O., Jirapattharasate, C., Thiangtrongjit, T., Rerkyusuke, S., Chanlun, A., Hasan, T., Kotepui, M., Siri, S., Nishikawa, Y., & Mahittikorn, A. (2024). Evaluation of immunodiagnostic performances of *Neospora caninum* peroxiredoxin 2 (NcPrx2), microneme 4 (NcMIC4), and surface antigen 1 (NcSAG1) recombinant proteins for bovine neosporosis. *Animals*, 14(4), 531.
16. Hasan, T., Shimoda, N., Nakamura, S., Fox, B. A., Bzik, D. J., Ushio-Watanabe, N., & Nishikawa, Y. (2024). Protective efficacy of recombinant *Toxoplasma gondii* dense granule protein 15 against toxoplasmosis in C57BL/6 mice. *Vaccine*, 42(9), 2299–2309.
17. Fathi, A., Nabavi, R., Noaman, V., Sarani, A., Saadati, D., Ben Said, M., Ghafar, A., Jabbar, A., & Sazmand, A. (2024). Molecular identification, risk factor assessment, and phylogenetic analysis of tick-borne pathogens in symptomatic and asymptomatic cattle from South-Eastern Iran. *Experimental and Applied Acarology*, 92(3), 479–506.
18. Liu, M., Galon, E. M., Ji, S., & Xuan, X. (2024). Tafenoquine-based combination therapies: A step toward babesiosis elimination. *The Journal of Infectious Diseases*, 229(5), 1599–1600.
19. Yamazaki, A., Tanaka, Y., Watanabe, K., Sato, M., Kawazu, S. I., Kita, K., Inoue, N., Janse van Rensburg, H. D., N'Da, D. D., & Sukanuma, K. (2024). Prophylactic activity of orally administered dry-heat-sterilized *Acremonium egyptiacum* against *Trypanosoma congolense*-induced animal African trypanosomiasis. *Acta Tropica*, 254, 107185.
20. Sukanuma, K., Anma, E., Elata, A., Macalanda, A. M. C., Kawazu, S. I., & Inoue, N. (2024). *Tabanus chrysurus* is a potential biological vector of *Trypanosoma (Megatrypanum) theileri* in Japan. *Parasitology Research*, 123(4), 174.
21. Haraguchi, A., Takano, M., Fujiwara, K., Hakozaiki, J., Nakayama, K., Nakamura, S., Yoshikawa, Y., Fukumoto, S., Kusakisako, K., & Ikada, H. (2024). Searching for new molecules involved in *Anopheles* mosquitoes' response to *Plasmodium* infection. *Journal of Veterinary Medical Science*, 86(5), 485–492.
22. Sukanuma, K., Mochabo, K. M., Chemuliti, J. K., Kita, K., Inoue, N., & Kawazu, S. I. (2024). Erratum: Ascofuranone antibiotic is a

- promising trypanocidal drug for nagana. *Onderstepoort Journal of Veterinary Research*, 91(1), 2174.
23. Abdelbaky, H. H., Shimoda, N., Akthar, I., Nakamura, S., Hasan, M. H., Ushio, N., Miyamoto, A., & Nishikawa, Y. (2024). *In vitro* regulation of gene expression of pregnancy-associated proteins and cytokines in bovine endometrial epithelial cells and bovine trophoblastic cells by infection with *Neospora caninum*. *Parasitology International*, 101, 102898.
24. Macalanda, A. M. C., Wanlop, A., Ona, K. A. L., Galon, E. M. S., Khieu, V., Sayasone, S., Yajima, A., Angeles, J. M. M., & Kawazu, S. I. (2024). Current advances in serological and molecular diagnosis of *Schistosoma mekongi* infection. *Tropical Medicine and Health*, 52(1), 32.
25. Oyadomari, Y., Goto, Y., Suganuma, K., Kawazu, S. I., Becking, L. E., Fusetani, N., & Nakao, Y. (2024). Aurantoside L, a new tetramic acid glycoside with anti-leishmanial activity isolated from the marine sponge *Siliquariaspongia japonica*. *Marine Drugs*, 22(4), 171.
26. Chikufenji, B., Mohanta, U. K., Hayashida, K., Chatanga, E., Galon, E. M., Kamanga, N., Ringo, A. E., Ma, Z., & Xuan, X. (2024). Molecular detection and phylogenetic analysis of tick-borne pathogens in cattle from southern Malawi. *Veterinary Research Communications*, 48(4), 2753–2760.
27. Ariefita, N. R., Narita, K., Murata, T., & Nishikawa, Y. (2024). Evaluation of the antiplasmodial efficacy of synthetic 2,5-diphenyloxazole analogs of compounds naturally derived from *Oxytropis lanata*. *International Journal for Parasitology: Drugs and Drug Resistance*, 25, 100540.
28. Ariefita, N. R., Sofian, F. F., Aboshi, T., Kuncoro, H., Dinata, D. I., Shiono, Y., & Nishikawa, Y. (2024). Evaluation of the antiplasmodial and anti-Toxoplasma activities of several Indonesian medicinal plant extracts. *Journal of Ethnopharmacology*, 331, 118269.
29. Arayaskul, N., Asada, M., Fathi, A., Ariefita, N. R., Komatsu, K., Suganuma, K., Inoue, N., & Kawazu, S. I. (2024). Stable expression of red fluorescent protein-blasticidin deaminase fusion gene (*rfp-bsd*) as a selectable marker for DNA transfection in *Babesia ovata*. *Journal of Veterinary Medical Science*, 86(7), 744–747.
30. Mohanta, U. K., Abdullah, S. M., Al-Wasef, B., Chikufenji, B., Ma, Z., Li, H., El-Sayed, S. A. E., Amer, M. M., Do, T. T., Islam, S., Nath, T. C., Li, Y., Umemiya-Shirafuji, R., Guo, Q., & Xuan, X. (2024). First molecular survey of tick-borne protozoan and bacterial pathogens in the questing tick population in Bangladesh. *Acta Tropica*, 256, 107244.
31. Ihara, F., Kyan, H., Takashima, Y., Ono, F., Hayashi, K., Matsuo, T., Igarashi, M., Nishikawa, Y., Hikosaka, K., Sakamoto, H., Nakamura, S., Motooka, D., Yamauchi, K., Ichikawa-Seki, M., Fukumoto, S., Sasaki, M., Ikada, H., Ohari, Y., Yoshida, A., Sasai, M., Grigg, M. E., & Yamamoto, M. (2024). Far-East Asian *Toxoplasma* isolates share ancestry with North and South/Central American recombinant lineages. *Nature Communications*, 15(1), 4278.
32. Amer, M. M., Galon, E. M., Soliman, A. M., Do, T., Zafar, I., Ma, Y., Li, H., Ji, S., Mohanta, U. K., & Xuan, X. (2024). Molecular detection of tick-borne piroplasmids in camel blood samples collected from Cairo and Giza governorates, Egypt. *Acta Tropica*, 256, 107252.
33. Do, T., Bui, L. K., Zafar, I., Inpankaew, T., Galon, E. M., Ta, P. A., Tran, K. T., Hasan, T., Ji, S., Ma, Z., Li, H., Amer, M. M., Ma, Y., Mohanta, U. K., El-Sayed, S. A. E., & Xuan, X. (2024). Molecular detection, risk factors, and phylogenetic analysis of tick-borne pathogens in dogs from northern Vietnam. *Tropical Biomedicine*, 41(1), 52–63.
34. Mizuseki, M., Ikeda, N., Shirozu, T., Yamagishi, M., Oshiro, S., & Fukumoto, S. (2024). Development of a novel rodent model for dog heartworm microfilaremia using the severe-combined immunodeficiency mouse. *Scientific Reports*, 14(1), 13741.
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36. Hernández-Arvizu, E. E., Asada, M., Kawazu, S. I., Vega, C. A., Rodríguez-Torres, A., Morales-García, R., Pavón-Rocha, A. J., León-Ávila, G., Rivas-Santiago, B., & Mosqueda, J. (2024). Antiparasitic evaluation of aquiluscidin, a cathelicidin obtained from *Crotalus aquilus*, and the Vcn-23 derivative peptide against *Babesia bovis*, *B. bigemina*, and *B. ovata*. *Pathogens*, 13(6), 496.
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b) International conferences:

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1. Ahedor B., Sivakumar T., Ngigi N.M.M., Colombo M.S., Polledo G.J., Giorgi M.L., Hébert L., Yokoyama N., Becú T. The seroprevalence of equine piroplasmiasis in Argentine horses and comparative evaluation of diagnostic assays for its detection. 12th International Equine Infectious Diseases Conference, Deauville, France.
2. Kalaichelvan N., Dhananjaya H.M.K., Beligala B.A.L.S., Amarasiri I., Ngigi N.M.M., Kothalawala H., Sivakumar T., Yokoyama N. An epidemiological survey of *Theileria equi* and *Babesia caballi* infections in horses in Sri Lanka. 76th Annual Scientific Sessions of Sri Lanka Veterinary Association, Kandy, Sri Lanka.
3. Amarasiri I., Kalaichelvan N., Ngigi N.M.M., Kothalawala I.S., Kalubowila S., Kothalawala H., Sivakumar T., Yokoyama N. Clinical significance of *Theileria* sp. Yokoyama infection in cattle examined in Polonnaruwa and Kurunegala districts, Sri Lanka. 76th Annual Scientific Sessions of Sri Lanka Veterinary Association, Kandy, Sri Lanka.
4. Sukanuma K., Okuno Y., Acosta T.J., Yamauchi T., Macalanda A.M.C., Kawazu S., Inoue N. An entomological survey of horseflies (Diptera: Tabanidae) in livestock farms in Tokachi, Hokkaido Prefecture, Japan. XXVII International Congress of Entomology, Kyoto, Japan.
5. Sukanuma K., Okuno Y., Acosta T.J., Yamauchi T., Macalanda A.M.C., Kawazu S., Inoue N. A two-year entomological survey of blood-

- sucking insects in livestock farms in Tokachi, Hokkaido Prefecture, Japan. 4th Joint Meeting of Veterinary Science in East Asia, Obihiro, Hokkaido, Japan.
6. Umemiya-Shirafuji R. The roles of vitellogenins and their related molecules in Babesia transmission in Haemaphysalis longicornis ticks. 11th Tick and Tick-Borne Pathogen Conference, Havana, Cuba.
 7. Nishikawa Y. Brain manipulation of mammalian hosts by intracellular parasite Toxoplasma gondii. 27th International Congress of Entomology (ICE2024), Kyoto, Japan.
 8. Komatsu K., Nakazaki-Hasegawa K., Arayasukul N., Ohari Y., Asada M., Suganuma K., Inoue I., Kawazu S. Gene expression profiling in the tick stage of Babesia ovata: a basis for developing transmission-blocking strategies. 4th East Asia Joint Veterinary Conference, Obihiro, Japan.
 9. Yokoyama N. WOAHO-recommended diagnostic assays for equine piroplasmiasis and their limitations. Regional Workshop on Laboratory Expertise for Equine Diseases in Asia and the Pacific, Tokyo, Japan.
 10. Shinozaki S., Kirinoki M., Wanlop A., Watanabe K., Ohari Y., Suguta S., Ona K.A.L., Ushio N., Macalanda A.M.C., Suganuma K., Inoue I., Kawazu S. Expression profile analysis of the transient receptor potential (TRPM) channel, a possible target of praziquantel in Schistosoma japonicum. 24th International Conference on Tropical Medicine and Malaria (ICTM2024), Sarawak, Malaysia.
 11. Macalanda A.M.C., Angeles J.M.M., Moendeg K.J., Dang A.T.M., Higuchi L., Inoue I., Xuan X., Kirinoki M., Chigusa Y., Villacorte E.A., Rivera P.T., Goto Y., Kawazu S. Schistosoma japonicum cathepsin B as a potential diagnostic antigen for Asian zoonotic schistosomiasis. 24th International Conference on Tropical Medicine and Malaria (ICTM2024), Sarawak, Malaysia.
 12. Chen Y., Shimoda N., Nihei C., Ushio-Watanabe N., Nishikawa Y. Mitochondrial damage and IL-1 production in monocytes by Neospora caninum infection is mediated by dense granule protein 7 and prohibitin. ApiCOWplexa 2024, La Plata, Argentina.
 13. Nishikawa Y. Development of the next-generation vaccine against Toxoplasma gondii. ApiCOWplexa 2024, La Plata, Argentina.
 14. Kubota R., Hernández H.O., Nihei C., Igarashi M., Nishikawa Y. Drug discovery against Sarcocystis neurona infection. ApiCOWplexa 2024, La Plata, Argentina.

c) National conferences:

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1. Sechoarua K., Aucampa J., Kannigadua C., van Rensburg H.D.J., Suganuma K., N'Da D.D. Synthesis and in vitro anti-trypanosomal activity of novel isatinylhydantoin derivatives. Proceedings of the 70th Joint Annual Meeting of Northern Branches of the Japanese Society of Parasitology and the Japan Society of Medical Entomology and Zoology, Obihiro, Hokkaido, Japan.
2. Aucamp J., N'Da D., van Rensburg H.J., Suganuma K. Biological screening of novel nitroindolylazines against zoonotic trypanosomatids. Proceedings of the 70th Joint Annual Meeting of Northern Branches of the Japanese Society of Parasitology and the Japan Society of Medical Entomology and Zoology, Obihiro, Hokkaido, Japan.
3. Suganuma K., Yamazaki A., Kita K., Kawazu S., Inoue N. Evaluation of the prophylactic activity of ad libitum feeding of dry-heat-sterilized Acremonium egyptiacum-containing food against Trypanosoma congolense infection. Proceedings of the 70th Joint Annual Meeting of Northern Branches of the Japanese Society of Parasitology and the Japan Society of Medical Entomology and Zoology, Obihiro, Hokkaido, Japan.
4. Kawano M., Komatsu K., Aoki S., Suganuma K., Kawazu S., Inoue N. Search for new trypanocidal compounds. Proceedings of the 70th Joint Annual Meeting of Northern Branches of the Japanese Society of Parasitology and the Japan Society of Medical Entomology and Zoology, Obihiro, Hokkaido, Japan.
5. Aoki S., Suganuma K., Arayasukul N., Watanabe K., Kawazu S., Inoue N. Detection of antibody responses to the saliva antigen of Tabanus nipponicus. The 167th Meeting of the Japanese Society of Veterinary Science, Obihiro, Hokkaido, Japan.
6. Suganuma K., Fujita G., Inoue N., Acosta T.J. Repellent activity of icaridin-impregnated horsecloth against horseflies. The 77th Meeting of the Japan Society of Medical Entomology and Zoology, Sapporo, Hokkaido, Japan.

d) Other (Provide website address or link to appropriate information):

1

<https://www.obihoro.ac.jp/facility/protozoa/en/woah-reference-centres>

11. What have you done in the past year to advance your area of focus, e.g. updated technology?

Through our international collaborative networks, we have conducted surveillance programs in several countries and developed novel diagnostic tools for protozoan diseases. Additionally, we have investigated the pathogenesis and clinical significance of animal protozoan diseases to support the development of effective disease control measures. To further advance research in this field, we have strengthened human resources in several WOA member countries by training young scientists and providing expert guidance.

12. Additional comments regarding your report:

None