World Organisation for Animal Health

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WOAH Collaborative Centre Reports Activities 2024

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CENTRE INFORMATION

***Title of WOAH Collaborating Centre**	Food-Borne Zoonotic Parasites Europa
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***Name of the writer:**	Dr Isabelle Vallée

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 WOAH

Category	Title of activity	Scope
	1/ Activity of confirmation regarding	

Disease control (true)	official control of meat for Trichinella spp muscle larvae 2/ Scientists provide advices or expertise at the request of : - the Ministry of Agriculture for regulatory aspects; - Anses for drafting of opinions; - Accreditation body for quality assurance; - routine labs for their accreditation; - EFSA , for writing annual reports on foodborne parasitic zoonosis such as Trichinella and Toxoplasma.	Trichinella spp, Toxocara spp, Anisakidae, Cryptosporidium, Toxoplasma gondii
Epidemiology, surveillance, risk assessment, (true)	1/ Surveillance of Trichinella circulation within livestock, domestic animals, wildlife. Official tests by artificial digestion of meat allows the monitoring of the parasite circulation in pigs, horses and wildboars. A passive surveillance is also performed through the control of some wild animals. 2/ Participation in Risk assessment analysis for Toxoplasmosis prevention 3/ Ongoing research programs for detection of foodborne zoonotic parasites in animals, food (mainly animal products and fresh vegetables)	Trichinella spp., Toxoplasma gondii, Cryptosporidium, Giardia duodenalis.
Training, capacity building (true)	1/ Ongoing training courses for trichinella detection in meat; 2/ Organisation of Ring trials for Trichinella detection in meat in French labs and EU & non-EU countries; 3/ Organisation of a Ring trial for Toxoplasma detection by serology in small ruminants; 4/ Provision of Reference samples in France and foreigner countries. 5/ Ongoing training and supervision of students (future Technicians, Ingeneers, PhD) on research studies aiming to develop new tools for foodborne parasite control and/or monitoring.	1/ Training for technician from veterinary services and successfull results of laboratories to Ring Trial are necessary for laboratories to maintain their accreditation (ISO 17025; ISO 18743) and agreement delivered by competent authority. 2/ and 3/ Laboratories' performance was successfully evaluated for Trichinella detection in meat and serological detection of toxoplasmosis in small ruminants, allowing staff qualification. 4/ Proficiency samples for Trichinella detection were provided at national, EU and International level for evaluation of individual performance of analysts, training of new analysts and maintenance of their habilitation. 5/ Trichinella spp, Toxoplasma gondii, Cryptosporidium spp, Giardia duodenalis, Anisakidae.
	Research programs for : - improvement of foodborne parasites detection in	

Zoonoses (true)	different matrices such as meat, fish/seafood, animal products, serum, environmental sources (vegetables); - development of new therapeutic approaches to control Cryptosporidium spp or Giardia in animals.	Trichinella spp, Toxocara spp, Anisakidae, Cryptosporidium, Toxoplasma gondii
Wildlife (true)	Epidemiological investigations: Passive collection of data regarding the circulation of Trichinella spp, Toxoplasma gondii, Toxocara spp in wildlife such as as wild boars, foxes, raccoon dogs.	Trichinella spp, Toxoplasma gondii, Toxocara spp
Diagnosis, biotechnology and laboratory (true)	Ongoing diagnosis confirmation for Foodborne zoonotic parasites in animals, animal products (meat, fish) for animal health (Toxoplasma gonddi), Food safety purpose (Trichinella, Toxoplasma, Toxocara, Anisakidae), by direct methods, serology (ELISA, Western Blot), molecular typing for species identification, or isolate genotyping.	Trichinella spp, Toxocara spp, Toxoplasma gondii, Cryptosporidium spp, Giardia duodenalis, Anisakidae.
Vaccines (true)	Ongoing research programs to develop vaccines against Trichinella in pigs and Toxoplasma gondii in cats	Trichinella spp, Toxoplasma gondii
Food security (true)	Ongoing research fot improvement of protozoan detection on food matrices such as fresh vegetables.	Toxoplasma gondii, Cryptosporidium spp, Giardia duodenalis.

TOR 3: HARMONISATION OF STANDARDS

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

Proposal title	Scope/Content	Applicable Area
Development of tests to detect	Improvement of reliable serological tests to detect infected pigs are needed for surveillance of indoors pigs reared in officially recognised holdings applying controlled housing conditions. Indeed, available tests are not efficient in detection of early	Laboratory Expertise

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Trichinella infected animals (mainly pigs)	infection or low level infection, as there is a lack of detection due to a blind window of few days. New antigenic targets needs to be defined to replace serological tests based on excretory/secretory antigens.	Animal Production
Development of methods for better detection of foodborne parasites (protozoan) on fresh vegetables.	Ongoing work to improve molecular tools for detection of Toxoplasma, Cryptosporidium and Giardia on environmental matrix such as fresh vegetable (salads).	Laboratory Expertise

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

Yes

Research need 1

Please type the Research need: Identify markers/antigens of early Trichinella infection in pigs in order to develop relevant serological tests like "easy to use" in field or slaughterhouse.

Relevance for WOAH Disease Control,

Relevance for the Code or Manual Manual,

Field Epidemiology and Surveillance, Diagnostics,

Animal Category Terrestrial,

Disease:

Trichinellosis

Kind of disease (Zoonosis, Transboundary diseases) Zoonosis,

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer: terrestrial Manual Chapter 3.1.23 - TRICHINELLOSIS (INFECTION WITH TRICHINELLA SPP.)

Notes:

Answer: If new serological tests based on Trichinella early expressed antigens are reliable enough to detect low infected or early infected pigs, they could replace the direct method based on larvae detection in meat. This will facilitate detection of positive pigs in field (before slaughter) and help to monitor / manage pig farms in endemic areas. The current direct detection test (artificial digestion of meat) remains the basic reference, but it is tedious, costly, requires laboratory analyses based on non-automated technical expertise and is difficult to implement reliably in emerging countries that lack robust veterinary infrastructures and quality assurance systems.

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

Yes

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Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
WOAH Collaborating Centre for Foodborne zoonotic parasites & WOAH Reference Laboratory for trichinellosis	Saskatoon, Canada	América	- scientific collaborations and information exchanges; - exchange of proficiency samples (Trichinella) ; - members of the executive committee of the International Commission on Trichinellosis.
WOAH Collaborating Centre for Foodborne zoonotic parasites from Asia-Pacific	Changchun, China	Asia y el Pacífico	- scientific collaborations and information exchanges; - exchange of proficiency samples (Trichinella) ; - members of the executive committee of the International Commission on Trichinellosis.
WOAH Reference Laboratory for trichinellosis	Roma, Italy	Europa	- scientific collaborations; - scientific expertise on Trichinella diagnosis; - sharing expertise for EFSA's annual report on Trichnella

TOR 4 AND 5: NETWORKING AND COLLABORATION

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

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
WHO Collaborating Centre for Host-Schistosoma interactions	Perpignan, France	Europe	Scientific research collaborations on biology of schistosoma hybrides, circulating in Africa and emerging in Corsica (France).

TOR 6: EXPERT CONSULTANTS

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

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 reference materials regarding Trichinella detection to several european countries and non-EU countries : proficiency samples and parasitic antigens.
Provision of trichinella antigens to kit producers.

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

Yes

a) Technical visit : 3

b) Seminars : 1

c) Hands-on training courses: 1

d) Internships (>1 month) : 1

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
D	Training for Toxplasma detection in animal product (meat)	Romania	2
A	Training for detection and genotyping of Cryptosporidum spp	Algeria	1
B	Seminar on the basic curricula for the future veterinary-sanitary inspectors within the French National School of Veterinary Services at Lyon (WOAH collaborative Centre) 3-hour lecture followed by an afternoon roundtable discussion with scientists from French reference centers for these parasites in humans and animals	France	24
C	Training at the WOAH CC for technician performing the official	France	10

	daily analysis on Trichinella larvae detection in meat.		
D	Intership for working on cellular models allowing screening and efficiency evaluation of natural plant products against Cryptosporidium infection.	Côte d'Ivoire	1

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 WOAH?

No

TOR 9: DATA AND INFORMATION DISSEMINATION

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

a) Articles published in peer-reviewed journals:

8

1. Polack B, Mathieu-Bégné E, Vallée I, Rognon A, Fontaine JJ, Toulza E, Thomas M, Boissier J. 2024. Experimental Infections Reveal Acquired Zoonotic Capacity of Human Schistosomiasis Trough Hybridization. Journal of Infectious Diseases. doi: 10.1093/infdis/jiae152. HAL Id : hal-04562390

2. Shi W, Xu Q, Liu Y, Hao Z, Liang Y, Vallée I, You X, Liu M, Liu X, Xu N. 2024. Immunosuppressive Ability of Trichinella spiralis Adults Can Ameliorate Type 2 Inflammation in a Murine Allergy Model. Journal of Infectious Diseases. doi: 10.1093/infdis/jiad518. HAL Id : hal-04505357

3. Healy S. R., Morgan E. R., Prada J. M., Karadjian G., Chevillot A., Betson M. (2024). First use of tissue exudate serology to identify Toxocara spp. infection in food animals. International journal for parasitology, S0020-7519(24)00048-1. Advance online publication. https://doi.org/10.1016/j.ijpara.2024.02.003

4. Thomas M., Polack B., Mammeri M., 2024. Giardia duodenalis in Algeria: a review within a One Health approach. Revue d'élevage et de médecine vétérinaire des pays tropicaux 77, 1–9. https://doi.org/10.19182/remvt.37393; <anses-04604994) https://anses.hal.science/anses-04604994)

5. Bellinzona G., Nardi T., Castelli M., Batisti Biffignandi G., Adjou K.T., Betson M., Blanchard Y., Bujila I., Chalmers R., Davidson R., D'Avino N., Enbom T., Gomes J., Karadjian G., Klotz C., Östlund E., Plutzer J., Rimhanen-Finne R., Robinson G., Sannella A-R., Sroka J., Rune Stensvold C., Troell K., Vatta P., Zalewska B., Bandi C., Sassera D., Cacciò S.M. 2024. Comparative genomics of Cryptosporidium parvum reveals the emergence of an outbreak-associated population in Europe and its spread to the USA. Genome research. doi:10.1101/gr.278830.123. hal-04643965v1

6. Dámek F, Basso W, Joeres M, Thoumire S, Swart A, Silva AD, Gassama I, Škorič M, Smola J, Schares G, Blaga R, Koudela B. Infection dynamics following experimental challenge of pigs orally dosed with different stages of two archetypal genotypes of Toxoplasma gondii. Vet Parasitol. 2024 Aug;330:110222. doi:10.1016/j.vetpar.2024.110222. https://hal.science/hal-04664424v1

7. Györke A., Balea A., Borșan S., Su C., Jiang T., Magdaș C., Mărcuțan D., Blaga R., Mircean V., Villena I., Spano F., Briciu V., Cozma V. Toxoplasma gondii genotypes and frequency in domestic cats from Romania. BMC Vet Res. 2024; 20(1):369. doi: 10.1186/s12917-024-04210-9. https://hal.science/hal-04709526

8. Gérard C., Trochard C., Hervé M.R., Hamel H., Gay M., Barbier M., Trancart T., Barreau T. Communities of metazoan parasites in seven sympatric skate species (Elasmobranchii, Rajidae) from the English Channel and Celtic Sea differing in conservation status. J. Fish Biol. 2024 S; 105(3):975-987. doi: 10.1111/jfb.15845. Epub 2024 Jun 27.

b) International conferences:
2
1. Lalle M. and Blaga R. : Investigating contamination of ready-to-eat salads with Toxoplasma gondii oocysts in a European-wide multicenter survey. Emerging Risks Exchange Network (EREN), EFSA (on-line) 23 may 2024.
2. Costa D., Favennec L., Razakandrainibe R., Chevillot A., Carvin E., Lucas P., Blanchard Y., Louifi H., Arab R., Mammeri M., Thomas M., Polack B., Karadjian G., Dheilly N.M., Adjou K.T. Epidemiology of cryptosporidiosis in France and new insights on parasitic viruses - importance of one health approach. hal-04690313. 14th European Multicolloqium of Parasitology (EMOP) Wrocław, Poland, August 26-30, 2024.

c) National conferences:
8
1. Adjou K. T., Chevillot A., Carvin E., Lucas P., Blanchard Y., Louifi H., Arab A., Mammeri M., Thomas M., Polack B., Karadjian K., Dheilly N. Découverte du Cryspovirus (CSpV1) dans les oocystes de Cryptosporidium parvum circulant chez les ruminants en France et son intérêt comme traceur épidémiologique du parasite. Journées Nationales des GTV. 15 Mai 2024, Tours, France.
2. Duflot M., Cresson P., Bourgau O., Karadjian G., Gay M. Exploring Cryptocotyle (Trematode) infestation levels in commercial fish species from the English Channel - North Sea ecosystems, and assessment of Cryptocotyle lingua zoonotic potential through in vivo infestation. Annual meeting of French Society for Parasitology, 3-4 June 2024. hal-04634760
3. Thomas M., Srun C. , Polack B., Arné P., Mammeri M., Chevillot A., Adjou K. T., Risco-Castillo V. Première détection et génotypage de Cryptosporidium chez les hérissons européens (Erinaceus europaeus) en région parisienne. Annual meeting of French Society for Parasitology, 3-4 June 2024. hal-04634918
4. Costa D. and Adjou K.T. Epidemiology of cryptosporidiosis in France and new insights on parasitic viruses - importance of one health approach. Annual meeting of French Society for Parasitology, 3-4 June 2024. hal-04630304

5. Rouzet J., Le Dudal M., Huet H., Thoumire S., Blaga R., Le Roux D. Les explants intestinaux félins comme modèle d'étude des interactions hôte/pathogène entre Toxoplasma gondii et la réponse immunitaire de la muqueuse intestinale de son hôte définitif. Journée Scientifique de la Recherche EnvA, Maisons-Alfort, France. 16 September 2024. hal-04707231v1
6. Boucard A.S., Oliveira D., Mariotte T., Polack B., Florent I., Langella P., Bermudez- Humaran L.G. Inhibition de la croissance de Giardia intestinalis in vitro et in vivo par un lactobacille Lactococcus lactis modifié, exprimant une hydrolase de sels biliaires de L. johnsonii CNCM I-4884. Journée Scientifique de la Recherche EnvA, Maisons-Alfort, France. 16 September 2024.
7. Mammeri M., Chevillot A., Julien C., Polack B., Pollet T., Adjou K.T. Cryptosporidium parvum et microbiote intestinal : une piste de recherche de nouvelles thérapies alternatives. . Journée Scientifique de la Recherche EnvA, Maisons-Alfort, France. 16 September 2024. hal-04716177v1
8. Bier N., Berg R., Calero-Bernal R., Betson M., Chaudhry U., Damek F., Thoumire S., Blaga R., Davidson R., Alvarez-Garcia G., Johannessen G.S., López-Ureña N.M., Marucci G., Mayer-Scholl A., Piotrowska W., Possenti A., Sroka J., Waap H., Zalewska B., Jokelainen P., Lalle M. Enquête européenne multicentrique sur la contamination des salades prêtes à l'emploi (ready to eat salads) par les oocystes de Toxoplasma gondii. . Journée Scientifique de la Recherche EnvA, Maisons-Alfort, France. 16 September 2024. https://hal.science/hal-04709588

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

11. What have you done in the past year to advance your area of focus, e.g. updated technology?
Research contracts have been obtained for improving foodborne zoonotic parasite detection tools or control methods (new therapies based

on natural products, vaccination, new approaches through the use of new high-end technologies).
PhD students are involved in these projects, which also contributes to the training of future scientists in the field of parasitic foodborne pathogens.

12. Additional comments regarding your report: