World Organisation for Animal Health

Sylvie L. Benestad - - NORWAY

WOAH Reference Laboratory Reports Activities 2024

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LABORATORY INFORMATION

***Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:**	Chronic wasting disease
***Address of laboratory:**	Postboks 64, 1431 ÅS, Norway
***Tel:**	+47-23 21.60.00
***E-mail address:**	sylvie.benestad@vetinst.no
Website:	www.vetinst.no
***Name (including Title) of Head of Laboratory (Responsible Official):**	Dr Gunn Peggy Strømstad Knudsen
***Name (including Title and Position) of WOAH Reference Expert:**	Dr Sylvie L. Benestad
***Which of the following defines your laboratory? Check all that apply:**	Governmental

TOR1: DIAGNOSTIC METHODS

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in WOAH Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
PrP ELISA	Yes	36188	10
PrP WB	Yes	240	0
PrP IHC	Yes	120	0
Direct diagnostic tests		Nationally	Internationally

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TOR2: REFERENCE MATERIAL

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOAH?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOAH Members?

No

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAH Members?

No

TOR3: NEW PROCEDURES

6. Did your laboratory develop new diagnostic methods for the designated pathogen or disease?

No

7. Did your laboratory validate diagnostic methods according to WOAH Standards for the designated pathogen or disease?

No

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

No

9. Did your laboratory validate vaccines according to WOAH Standards for the designated pathogen or disease?

No

TOR4: DIAGNOSTIC TESTING FACILITIES

10. Did your laboratory carry out diagnostic testing for other WOAH Members?

No

11. Did your laboratory provide expert advice in technical consultancies on the request of an WOAH Member?

No

TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

12. Did your laboratory participate in international scientific studies in collaboration with WOAH Members other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	WOAH Member Countries involved other than your country
Tackling CWD in Europe	2021-2024	Study host/pathogen interactions relevant to disease transmission in wildlife, livestock and people	Roslin Institute Edinburgh	UNITED KINGDOM
		Study host/pathogen		

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Tackling CWD in Europe	2021-2024	interactions relevant to disease transmission in wildlife, livestock and people	INIA CISA Madrid	SPAIN
Tackling CWD in Europe	2021-2024	Study host/pathogen interactions relevant to disease transmission in wildlife, livestock and people	INRAE Toulouse and Jouy en Josas	FRANCE
Tackling CWD in Europe	2021-2024	Study host/pathogen interactions relevant to disease transmission in wildlife, livestock and people	FLI Riems	GERMANY
CWD strain characterization	Several years	Bioassay in bank voles	ISS, Rome	ITALY
CWD strain characterization	Several years	Bioassay in transgenic mice	Colorado University, Fort Collins	UNITED STATES OF AMERICA
CWD strain characterization	Several years	Comparison between CWD in Europe and North America	Canadian Food Inspection Agency, Ottawa	CANADA
CWD strain characterization	Several years	Bioassay in transgenic mice	Alberta University, Calgary	CANADA
CWD strain characterization	Several years	Bioassay in transgenic mice	UCL London	UNITED KINGDOM
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	Canadian Food Inspection Agency, Ottawa	CANADA
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	INRAE ENVT Toulouse	FRANCE
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	Besta Institute Milano	ITALY
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	Colorado State University, Fort Collins	UNITED STATES OF AMERICA
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	INIA CISA Madrid	SPAIN
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	ISS, Roma	ITALY
Emerging CWD, Norwegian Research Council	2024-2029	Reindeer transmission study	University Minnesota	UNITED STATES OF AMERICA

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

Yes

Research need : 1

Please type the Research need: Transmission studies to assess zoonotic potential of CWD strains

Relevance for WOAH Disease Control, Capacity Building, Animal Welfare, Facilitation of international collaboration,

Relevance for the Code or Manual

Field Epidemiology and Surveillance,

Animal Category Terrestrial,

Disease:

Chronic wasting disease

Kind of disease (Zoonosis, Transboundary diseases)

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:

Notes:

Answer:

TOR6: EPIZOOLOGICAL DATA

14. Did your Laboratory collect epidemiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
The Norwegian Veterinary Institute analyzed 10971 cervids in 2024 through the National surveillance program on CWD

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:
The samples and results are daily published on the Institute web site http://apps.vetinst.no/skrantesykestatistikk/NO/#omrade

16. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by category and list the details in the box)

a) Articles published in peer-reviewed journals:

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-Barrio T, Benestad SL, Douet JY, Huor A, Lugan S, Aron N, Cassard H, Espinosa JC, Otero A, Bolea R, Torres JM, Andréoletti O. Zoonotic Potential of Chronic Wasting Disease after Adaptation in Intermediate Species. Emerg Infect Dis. 2024 Dec;30(12):2691-2694. doi: 10.3201/eid3012.240536. PMID: 39592566; PMCID: PMC11616668.

-Benestad SL, Tran L, Malzahn AM, Liland NS, Belghit I, Hagemann A. Retention of prions in the polychaete Hediste diversicolor and black soldier fly, a Hermetia illucens, larvae after short-term experimental immersion and feeding with brain homogenate from scrapie infected sheep. Heliyon. 2024 Jul 20;10(15):e34848. doi: 10.1016/j.heliyon.2024.e34848. PMID: 39170463; PMCID: PMC11336280.

-Harpaz E, Cazzaniga FA, Tran, L, Vuong TT, Bufano G, Salvesen Ø, Gravdal M, Aldaz D, Sun J, Kim S, Celauro L, Legname G, Telling GC, Tranulis MA, Benestad SL, Espenes A, Moda F and Ersdal C. Transmission of Norwegian reindeer CWD to sheep by intracerebral inoculation results in an unusual phenotype and prion distribution. Vet Res 2024, 55, 94. https://doi.org/10.1186/s13567-024-01350-6

-Thackray AM, McNulty EE, Nalls AV, Smith A, Comoy E, Telling G, Benestad SL, Andréoletti O, Mathiason CK, Bujdoso R, Lack of prion transmission barrier in human PrP transgenic Drosophila, Journal of Biological Chemistry 2024, doi: https://doi.org/10.1016/j.jbc.2024.107617.

-Baron JN, Mysterud A, Hopp P, Rosendal T, Frössling J, Benestad SL, Våge J, Nöremark M, Viljugrein H. Assessing freedom from chronic wasting disease in semi-domesticated reindeer in Norway and Sweden. Prev Vet Med. 2024 Aug;229:106242. doi: 10.1016/j.prevetmed.2024.106242. Epub 2024 Jun 14. PMID: 38924869.

-Arifin MI, Hannaoui S, Ng RA, Zeng D, Zemlyankina I, Ahmed-Hassan H, Schatzl HM, Kaczmarczyk L, Jackson WS, Benestad SL, Gilch S. Norwegian moose CWD induces clinical disease and neuroinvasion in gene-targeted mice expressing cervid S138N prion protein. PLoS Pathog. 2024 Jul 1;20(7):e1012350. doi: 10.1371/journal.ppat.1012350. PMID: 38950080; PMCID: PMC11244775.

-Marín-Moreno A, Benestad SL, Barrio T, Pirisinu L, Espinosa JC, Tran L, Huor A, Di Bari MA, Eraña H, Maddison BC, D'Agostino C, Fernández-Borges N, Canoyra S, Jerez-Garrido N, Castilla J, Spiropoulos J, Bishop K, Gough KC, Nonno R, Våge J, Andréoletti O, Torres JM. Classical BSE dismissed as the cause of CWD in Norwegian red deer despite strain similarities between both prion agents. Vet Res. 2024 May 15;55(1):62. doi: 10.1186/s13567-024-01320-y. PMID: 38750594; PMCID: PMC11097568.

-Hopp P, Rolandsen CM, Korpenfelt SL, Våge J, Sörén K, Solberg EJ, Averhed G, Pusenius J, Rosendal T, Ericsson G, Bakka HC, Mysterud A, Gavier-Widén D, Hautaniemi M, Ågren E, Isomursu M, Madslien K, Benestad SL, Nöremark M. Sporadic cases of chronic wasting disease in old moose - an epidemiological study. J Gen Virol. 2024 Jan;105(1). doi: 10.1099/jgv.0.001952. PMID: 38265285.

b) International conferences:

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-Jerez-Garrido N, Fernández-Borges N, Canoyra S, Marín Moreno A, Benestad SL, Andreoletti O, Mitchell G, Balachandran A, Villa-Díaz A, Torres JM and Espinosa JC. Oral presentation: Chronic Wasting Disease in Bovine-PrP Transgenic Mice Propagates with Different Prion Strain Features. 12th Iberian Congress on Prions. Santiago de Compostella, 23-24th May 2024, Spain.

-Tomás Barrio T, Douet JY, Huor A, Lugan S, Aron N, Cassard H, Benestad SL, Espinosa JC, Torres JM, O. Poster Zoonotic potential of moose-derived chronic wasting disease prions after adaptation in intermediate species. Oral presentation: 12th Iberian Congress on Prions. Santiago de Compostella, 23-24th May 2024, Spain.

-Canoyra S, Espinosa JC, Marín-Moreno A, Di Bari M, Fernández-Borges N, Jerez-Garrido N, Nonno R, Bruno R, Pirisinu L, Benestad SL, Vidal E, Orge L, Andreoletti O and Torres JM. Evolution of Nor98/Atypical scrapie through transmission in a heterologous and homologous PrPC context. Oral presentation: 12th Iberian Congress on Prions. Santiago de Compostella, 23-24th May 2024, Spain.

-Osnes MN, Mysterud A, Dean K, Widgren S, Viljugrein H. Modelling the effect of genotype (PRNP) on chronic wasting disease transmission and population dynamics of reindeer. Modelling in Animal Health conference – ModAH 2024, 27.-29th August 2024, Nantes, France

c) National conferences:

1

-Våge J med flere: Webinar about CWD- Hva er en prionsykdom og hvordan smitter den (What is a prion disease and how is it transmitted- Norwegian reindeer health service, 15th April 2024.

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

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAH Members?

No

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
NS-EN ISO/IEC 17025 (2017)	Accreditation documents 2024	Accreditation document CWD Norway 2025.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
PrP HerdChek ELISA (IDEXX)	Norwegian accreditation (NA)
PrP TeSeE Western Blot (Bio-Rad)	Norwegian accreditation (NA)

20. Does your laboratory maintain a "biorisk management system" for the pathogen and the disease concerned?

Yes

Work with TSE takes place in BSL3 laboratories in accordance with guidelines for work with infection risk group 3 agents, we have carried out risk assessments and implemented procedures to ensure biosafety for employees and the environment.

TOR9: SCIENTIFIC MEETINGS

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOAH?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOAH?

No

TOR10: NETWORK WITH WOAH REFERENCE LABORATORIES

23. Did your laboratory exchange information with other WOAH Reference Laboratories designated for the same pathogen or disease?

Yes

24. Do you network (collaborate or share information) with other WOAH Reference Laboratories designated for the same pathogen?

No

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH Reference Laboratories designated for the same pathogen during the past 2 years?

No

None

26. Did your laboratory collaborate with other WOAH Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

Title of the project or contract	Scope	Name(s) of relevant WOAH Reference Laboratories
Collaborative framework concerning CWD reference laboratories	Advancing strategies to detect, control and characterize CWD	Canadian Food Inspection Agency, Ottawa, Canada
Project on CWD transmission in Reindeer, Emerging CWD project	Study about shedding of prions in excretas	Canadian Food Inspection Agency Ottawa, Canada

TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOAH Reference Laboratories for the same pathogen during the past 2 years?

Yes

Purpose for inter-laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
Ring trial on rapid tests (ELISA) for detection of PrPSc	Participant	25	IDEXX HerdCheck	ITALY,
Ring trial on confirmatory test (WB) for detection of PrPSc	Participant	23	Bio-Rad TeSeE WB	ITALY,

TOR12: EXPERT CONSULTANTS

28. Did your laboratory place expert consultants at the disposal of WOAH?

No

29. Additional comments regarding your report:

No