

BIOLOGICAL TREASURES: BIOBANKS IN SERVICE OF PRION SCIENCE

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Introduction

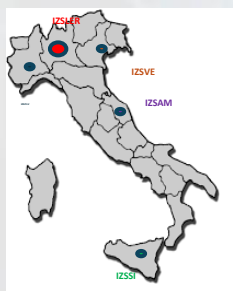
Biobanks are organized collections of biological materials and associated data. They have become crucial for advancing scientific knowledge, as well as for diagnosis, research, and experimentation. The availability of biological specimens plays a central role in modern research. The strategic value of biobanks is reflected in the fact that their creation is increasingly driven by government planning rather than individual research initiatives.

Objective of the Veterinary Biobank

- Ensure **long-term preservation** of valuable biological materials
- Support **national and international research**
- Provide resources for **epidemiological, diagnostic, and preventive studies**

Italian veterinary biobank network and "WOAH Virtual Biobank"

The National Reference Center for the study of animal encephalopathies and comparative neuropathologies (CEA) at the Istituto Zooprofilattico Sperimentale of Piemonte, Liguria, and Valle d'Aosta is part of the Italian veterinary biobank network, coordinated by the Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna.



The CEA also participates in the **WOAH Virtual Biobank** project, which aims to create an international online catalogue of biological resources.

Fig 1. IZ.SS. constituting the Italian veterinary biobank network

Tissues Processing Workflow



Tissues were selected based on:

- Microscopic evaluation of slides
- Presence of **target nuclei**
- Quality and **preservation** of frozen and paraffin-embedded tissue

Histological and Molecular Characterization

- **Histology:** Evaluation of neuropil spongiosis, intensity of spongiosis and neuronal vacuolization
- **Immunohistochemistry:** Detection and intensity of Prion Protein Scrapie (PrPSc) deposits
- **Western Blot:** Selection of frozen tissues based on PrPSc signal
- **Sequencing:** Genotyping of all classical scrapie samples

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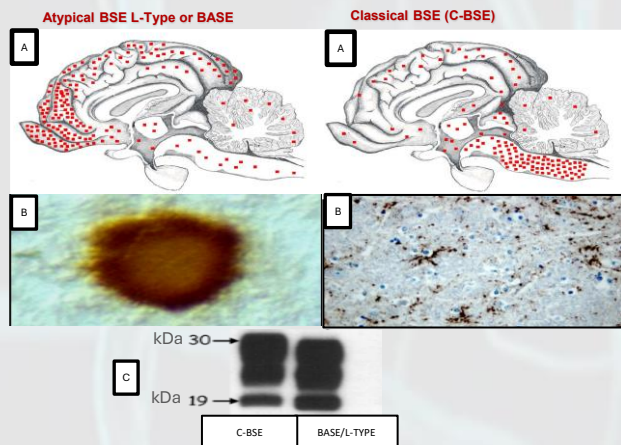


Fig 2. Atypical BSE L-Type or BASE and C- BSE

- A) Distribution of PrPSc in different brain areas in C- BSE and L-type, indicated by red squares
B) Immunohistochemical staining of different PrPSc deposition patterns
C) Western blot profiles of C-BSE and L-type

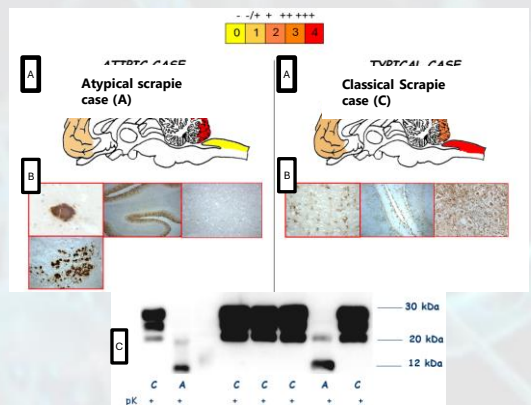


Fig 3. Classical Scrapie and Atypical Scrapie

- A) Distribution of PrPSc in different brain areas in classic and atypical scrapie using a color-coded scale (0-4)
B) Immunohistochemical staining of different PrPSc deposition patterns
C) Western blot profiles (C: Classical Scrapie; A: Atypical Scrapie)

Sample Collection and Storage

Formalin-fixed and frozen **nervous tissues** stored in the CEA biobank:

- **Classical BSE:** 112 samples
- **L-BSE/BASE:** 5 samples
- **Classical scrapie:** 71 samples
- **Atypical scrapie:** 7 samples (only paraffin-embedded tissues from the Animal and Plant Health Agency)

Genotypic characterization of sheep and goats

67 Sheep

- **ARQ/ARQ:** 53 animals
 - 9 with codon 141/143 variation (mostly **141 L/F**)
- **ARQ/AHQ:** 4 animals (1 with **141 L/F**)
- **AHQ/AHQ:** 1 animal

4 Goats

- **WT at codons 146 (N/N) and 222 (Q/Q)**
- **Heterozygous at codon 240 (S/P)**

➤ 7 cases of atypical scrapie were not genotyped due to the presence of only paraffin-embedded tissue