Classic case: Adult sheep; weight loss, incoordination, behavior change, pruritis & wool loss

Presentation:

- Adult sheep, black-faced breeds in US – 96% of cases
- Suffolk, Hampshires and crosses
- Many breeds in other countries
- Moufflon (*Ovis musimon*), a wild sheep breed
- Rare, but is seen in goats

- Usually > 2 years of age, incubation is 2-5 years
- Death within weeks to months once C/S present

Clinical signs may vary:

- Weight loss w/ normal appetite
- **Progressive neurologic signs:**
  - Fine head tremors
  - Ataxia, incoordination-1st seen in hinds; ‘bunny-hopping’. In fores; ‘high-stepping’, prancing.
  - **Intense pruritis** (70% of cases), hypersensitivity- nibble at legs or at air
  - Chewing motions, lip-smacking seen with stimulation

- Behavior changes, separation from flock
- Trembling, hyperexcitable, even convulsions if handled
- **Wool loss**, due to rubbing
- Eventually, recumbency and death

*Pruritis is the classic sign of Scrapie*; seen in ~70%; Sheep rub skin constantly – *scraping* off their wool

**DDx:**

<table>
<thead>
<tr>
<th>Dentition problems</th>
<th>Toxic encephalopathy</th>
<th>Ovine progressive pneumonia (visna)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External parasitism</td>
<td>Johne’s disease</td>
<td>Abomasal emptying disease</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Pseudorabies</td>
<td>Tick borne encephalitis</td>
</tr>
<tr>
<td>Meningitis</td>
<td>Caseous lymphadenitis</td>
<td></td>
</tr>
</tbody>
</table>
Test of choice: Must detect prion proteins in tissue

Post mortem tests – most common

- Histopathology - characteristic changes - vacuoles, plaques - now replaced by:
  - Immunohistochemistry (IHC) - worldwide gold standard
    - Brain tissue, most often the OBEX – post-mortem
    - Cerebellum, cortex for ‘atypical’ Scrapie
    - Lymphoid tissues – PrPsc seen here first in some cases

- ELISA for screening - Brain or lymphoid tissues
- Western Blot when tissues are autolyzed

Antemortem tests: becoming more common, but false negs seen

- Biopsy of lymphoid tissue inside 3rd eyelid – IHC
- Biopsy of tonsils – used in Europe – IHC or ELISA
- Detection of prions in placenta – used as herd screening test

Treatment:

None; Euthanasia

No serology for Scrapie or other TSE’s –
No immune response = No antibodies!

Prognosis:

Grave, always fatal disease

Prevention: See Scrapie Eradication program below

- Purchase and breed only genetically resistant sheep
- Do not feed ruminant proteins to other ruminants
  - Banned in most countries since 90’s

- Maintain closed herds; Euthanize positive sheep
- Test all sheep that die with neurologic disease
- Caesarian section in positive dams – not practical

- Carcasses – Incineration or alkaline digestion
- Sodium hydroxide or other approved disinfectant
- Take GREAT care - handling or transporting tissues

Hair loss over pelvis from rubbing; Image courtesy USDA

Scrapie in a Montedale ewe; Note weight loss w/ obvious dorsal spine; depressed, head down posture; Image courtesy USDA
Scrapie is a transmissible spongiform encephalopathy (TSE)

TSEs are caused by ‘misfolded’ prion proteins - Prions (PrP)

**PRIIONS**
- Altered form of a normal protein
- Same primary a.a. sequence
- Secondary structure – ’misfolded’
- PrPs – very hard to kill
  - Protease & disinfectant resistant
  - Not ‘foreign’ - no immune response
- Prions ‘reproduce’ - convert normal proteins to PrP’s

**SCRAPIE - PrPSC**
- Transmission - contact w/placenta/allantoic fluid
- Usually soon post parturition in lambs
  - Not in utero – amnion is barrier
- Direct contact between sheep
- Fomites, environment - less common
- Genetic susceptibility required in ovine
  - Polymorphism at codons 136,154,171
  - ARR/ARR most resistant genotype
  - VRQ/VRQ most susceptible

USA Mandatory Scrapie Eradication Program – Goal - Scrapie-Free by 2017
- Breeding sheep leaving original home – must be identified – individual and premise origin
- Slaughter surveillance since 2003 – sheep with signs of Scrapie are tested
- Positives - Quarantine farm of origin, test all sheep; all sheep in contact traced & tested
Many US producers also following voluntary guidelines to Eradicate Scrapie

Oldest TSE known – ID over 250 yrs ago
- Worldwide distribution; first reported in US 1947
- Sheep and goats only natural hosts

‘Atypical’ Scrapie – Nor98 - first ID in Norway 1998
- May be a ‘spontaneous’ version of Scrapie
- Not spread via ingestion or contact


**My Notes:**