

# Taxonomy

• Family: Retroviridae

• Subfamily: Orthoretrovirinae

• Genus: Lentivirus

Species: Small ruminant lentiviruses (SRLVs)

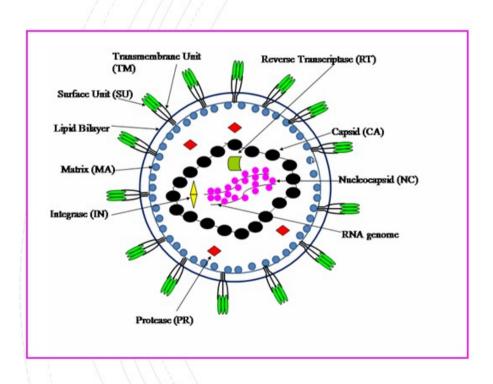
• Maedi-visna virus (MVV)

• Caprine arthritis encephalitis virus (CAEV)

## Groups of SRLVs

- SRLVs are currently classified according to their phylogenetic relationships in five groups: A, B, C, D, and E.
  - Genotype A includes strains of MVV.
    - Genotype A is a heterogeneous group, divided into subtypes A1 to A13
  - Genotype B includes strains of CAEV.
  - Genotype C corresponds to SRLV isolated from Norwegian sheep and Goats.
  - Genotype D has been identified when analyzing pol sequences of SRLV of Spanish and Swiss sheep.
  - Genotype E has been isolated in Italy.

### Morphology



- MVV and CAEV virion 90 and 120 nm in diameter.
- Consist of the envelope and the core.
  - envelope membrane bilayer of host cell derived phospholipids, in which viral-encoded glycoproteins are inserted.
  - core or capsid protein case contains the viral RNA and the enzymes necessary for viral replication.

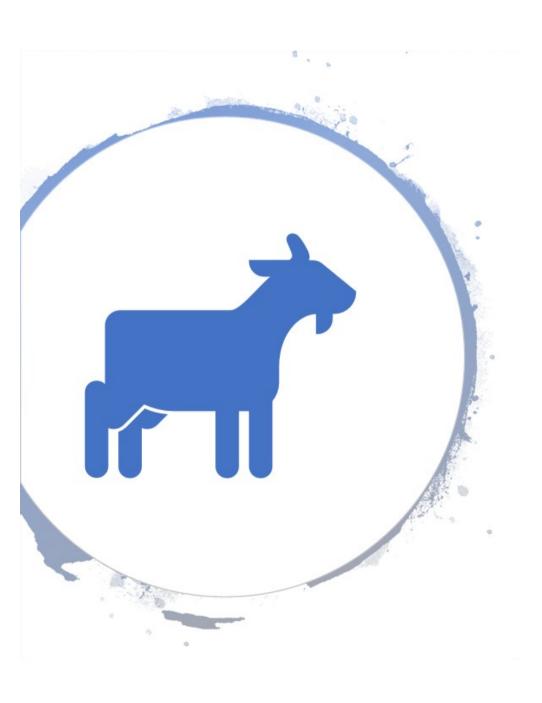
#### Genome

- Virions contain two linear molecules of RNA.
- Single-stranded RNA molecules transforms into double-stranded DNA (dsDNA) using the enzyme reverse transcriptase (RT).
- Genomes 8,400 to 10,000 nucleotides long.
- Consist of three main genes gag, pol, and env & several regulatory genes.
- Proviral DNA is flanked by repeated sequences long terminal repeats (LTRs) containing promoter elements that initiate the transcription of DNA.
  - Plays important role in cellular tropism and pathogenesis



# Maedi (Visna/Maedi)

- Maedi is an important, lifelong, and persistent viral disease of sheep.
- Visna means "wasting" in Icelandic.
- Maedi means "shortness of breath" in the Icelandic language, and it is known as
  - · Graaff-Reinet disease in South Africa
  - · Zwoegerziekte in Netherlands.
  - · La bouhite in France
  - ovine progressive pneumonia (OPP) in the United States.
- the disease has also referred to as
  - ovine lentivirus-induced lymphoid interstitial pneumonia
  - lymphoid interstitial pneumonia (LIP)



# Susceptible host

- The host specificity of SRLVs is not absolute.
- Viruses transmitted from sheep to goats (or vice versa) sometimes adapt to and persist in the new species.

#### Transmission

- Transmission occurs through:
  - · milk or colostrum.
  - · respiratory secretions
  - · faeces.
  - · faecally-contaminated water.
  - Feed and water troughs
  - · aerosolization of infectious milk.
- Route of infection
  - by intranasal or intraconjunctival inoculation
- Once an animal becomes infected, SRLVs are integrated into leukocyte DNA, and the animal carries the virus for life.

# Maedi clinical Signs

- Maedi is the most common form of disease in sheep infected with MVV, and usually occurs in adults.
- characterized by wasting and progressive dyspnea.
- eventually fatal; death results from anoxia or secondary bacterial pneumonia.
- Genotype C viruses can also cause lung lesions (chronic interstitial pneumonia) in sheep

# Visnaclinical Signs

- · Visna also occurs in adult sheep.
- · subtle neurological signs such as
  - · hindlimb weakness
  - trembling of the lips or a head tilt, accompanied by loss of condition.
- · clinical signs gradually progress to
- Ataxia
- Incoordination
- · muscle tremors
- paresis
- paraplegia, usually more prominent in the hindlegs.
- · Unattended animals usually die of inanition

# Arthritis in sheep – clinical signs

- MVV can occasionally cause slowly progressive arthritis with severe lameness in sheep
- · Pain and lameness occurs



Encephalomyelitis in goats

- Encephalomyelitis (progressive paresis) is sometimes seen in goats infected with CAEV.
- · 2-6 month-old kids are affected
- syndrome may occur in younger or older animals.
- · initial clinical signs include
- Lameness
- Ataxia
- · hindlimb placement deficits
- · hypertonia
- · hyperreflexia.

Encephalomyelitis in goats – clinical signs

- Progressive signs include:
  - lameness, ataxia, hindlimb placement deficits, hypertonia and hyperreflexia
  - · signs gradually worsen to
  - Paraparesis
  - · tetraparesis or paralysis.
- Affected kids may
- · Appear depressed
- Exhibit other neurological signs (e.G., Head tilt, circling, blindness, torticollis, facial nerve deficits, dysphagia).

Polyarthritis in goats

- Caused by CAEV
- occur in goats as young as 6 months
- course of disease is slow, it is always progressive
- Early symptoms include
  - distention of the joint capsule
  - · variable degree of lameness.
  - · carpal joints are most often affected
  - symptoms can also occur in other joints

Polyarthritis in goats

- Syndrome include
  - chronic, painful polyarthritis, accompanied by synovitis and bursitis
- In late stages
  - goats may walk with their front legs flexed or become recumbent
  - Body condition deteriorates & tend to have coarse, dull coats.

# Diagnosis of MVV & CAEV









VIRUS ISOLATION.



HISTOLOGICAL EXAMINATION OF TISSUES



# Nucleic acid based diagnosis

- Polymerase chain reaction (PCR) assays
- · nucleic acid sequencing
- Southern blotting
- in situ hybridization

#### Prevention

- Animals should be quarantined and tested before adding them to the herd
- Uninfected herds be segregated from seropositive herds.
- Completely depopulate the herd and replace it with uninfected animals