Introduction to Lumpy Skin Disease

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- Lumpy skin disease virus belongs to the Capripoxvirus-genus within the Poxviridae-family
- Other members of the genus are Sheeppox virus and Goatpox virus
- LSD is characterized by fever, nodules on the skin, and it may lead to severe economic losses, especially when introduced into naive population
- Vector-borne LSD is notoriously difficult to eradicate without vaccination
- Large double-stranded DNA virus with or without an envelope
- Stable virus, survives well in the environment such as wintertime and drought
- Most disinfectants are effective but disinfection of the environment is difficult as the virus remains well protected inside scabs shed by infected animals
Substantial economic impact (1)

✓ Sharp drop in milk yield and secondary mastitis, infertility and abortions, sterility in breeding bulls, reduced weight gain and permanently damaged skins and hides

✓ Long recovery period and severely affected animals may not regain the same level of production as before infection

Substantial economic impact (2)

✓ Restrictions to the trade of live cattle and their products - worse in those countries that export live cattle

✓ Costly control and eradication measures
  - Total or partial culling of infected herds and compensation to farmers
  - Large-scale vaccination campaigns
  - Active clinical/virological/serological surveillance post-outbreak

✓ Indirect costs due to the compulsory movement restrictions of cattle (vaccinated/unvaccinated) from affected regions for trade or slaughter
Morbidity rate varies between 5 to 45% and mortality rate usually remains below 10%

The first (index) case is usually associated with cattle movements

Particularly in Europe, the outbreaks are seasonal - more common (but not limited to) warm and wet seasons with abundance of blood-feeding arthropods

Severe cases are highly characteristic and easy to recognize

Early stages and mild cases difficult to recognize even for the most experienced vets

In dairy cattle versus free-ranging beef cattle

By the time severe cases are detected in the free-ranging herds the virus has already been circulating for weeks

After a quiet winter period outbreaks may start again in spring time when skin lesions are well hidden under a long winter coat – difficult to detect without palpating the skin

Domestic cattle and Asian water buffalo are susceptible

There is no epidemiological evidence/reports on susceptibility of small ruminants for LSD

Wild ruminants as reservoir or susceptibility in Europe or Caucasus is not known

Some evidence from Africa (Springbok, impala and giraffe can show clinical disease. Seropositive African buffaloes, blue wildebeest, eland, giraffe, impala and greater kudu.
Transmission

✓ blood-feeding insects, such as certain species of flies and mosquitoes, or ticks.
✓ direct contact
✓ contaminated feed, water and equipment
✓ trans-placental transmission are reported - calves are known to be born covered by skin lesions
✓ sucking calves may get infected via milk or from skin lesions in the teats (rare due to maternal antibodies)
✓ iatrogenic transmission - by contaminated needles during veterinary treatments or vaccination campaigns
✓ Seminal transmission via natural mating or artificial insemination – real importance in the field needs to be investigated

Mechanical transmission of LSDV by vectors

✓ Vectors are likely to vary between affected regions
✓ Vector must bite/feed frequently and change the host between feedings
✓ Finding PCR positive vectors from the environment indicates that they have been feeding on infected animal

Blood feeding insect vectors
✓ Transmission has been demonstrated by mosquito (*Aedes aegypti*) (Chihota *et al* 2001)
✓ Suspected transmission by stable fly (*Stomoxys calcitrans*) – transmission of sheeppox/goatpox virus was demonstrated by Kitching *et al* 1986
✓ *Tabanus spodopterus* – females (Bulgaria 2016)

The Big Question: Does biological transmission occur?
Transmission by tick vectors

- Mechanical transmission has been experimentally demonstrated
- African tick species: male Rhipicephalus appendiculatus (and Amblyomma hebraeum) ticks
- Rhipicephalus (Boophilus) decoloratus – venereal transmission during the copulation process – more evidence required to demonstrate biological transmissions

Bulgaria 2016: LSDV found in
- Hyalomma marginatum - females
- Rhipicephalus bursa - males + females
What is needed for LSD?

- LSD Virus
- Susceptible species
- Environment
- Vectors

Short distance spread

Long distance spread

- Non infected cattle
- Infected cattle
- Infected tick
- Infected mosquito
- Infected flies
- LSD virus
- Syringe
- Long distance transport of cattle
Clinical signs (1)

- Incubation time varies form 4-7 days up to 5 weeks
- High fever (40-41°C), stop eating and giving milk – start of viraemic stage
- Easily noticed in dairy cattle – not noticed in free-ranging beef cattle
- Markedly enlarged lymph nodes (particularly prescapular and precrural)
- Skin lesions start to develop following days - often in many animals at the same time
- Excessive salivation, eye and nasal discharge due to the ulcerative lesions inside the mouth, also in nasal and ocular mucous membranes
- Later swellings in the leg and lameness may be detected
- Oedema of the dewlap

Clinical signs (2)

- Notice that not all affected animals show clinical signs although majority of them develop at least short-lasting viraemia
- Circular skin lesions of 1 to 5 cm in diameter (sometimes larger)
- Mild cases may show only a few lesions or lesions may cover the entire body in severely infected animals
- Within one to two weeks the top of the lesion forms a scab which then sloughs off, leaving a raw ulcer, prone to fly strike
- In some cases, the lesions remain for long (sitfasts)
Spread of LSD

Geographical spread of LSD

<table>
<thead>
<tr>
<th>Year</th>
<th>Countries with new or ongoing outbreaks (OEI WAHIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Mozambique</td>
</tr>
<tr>
<td>2011</td>
<td>Guinea, Mozambique</td>
</tr>
<tr>
<td>2012</td>
<td>Guinea, Israel (232), Lebanon, Mozambique</td>
</tr>
<tr>
<td>2013</td>
<td>Egypt, Guinea, Iraq, Israel, Jordan, Lebanon, Mozambique, Palestinian Auton. Territories, Turkey</td>
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<tr>
<td>2014</td>
<td>Azerbaijan, Egypt, Guinea, Iran, Iraq, Israel, Kuwait, Mozambique, Turkey</td>
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<tr>
<td>2015</td>
<td>Armenia, Greece, Iran, Iraq, Kuwait, Mozambique, Russia, Saudi Arabia, Turkey</td>
</tr>
<tr>
<td>2016</td>
<td>Armenia, Bulgaria, Greece, Iraq, Kuwait, FYR Macedonia, Mozambique, Turkey, Serbia, Kosovo, Montenegro, Georgia</td>
</tr>
<tr>
<td>2017</td>
<td>Albania, Greece, FYR Macedonia (a sporadic outbreaks), Turkey, Russian Federation, Iraq, Kazakhstan, Saudi Arabia, Mozambique, Namibia</td>
</tr>
</tbody>
</table>
**LSD epidemiological situation January - Dec 2015 (ADNS + country reports)**

- **Greece**: 117 (Aug-Dec 2015)

**LSD outbreaks in SE Europe (Jan – Dec 2015)**

- **Greece**: 117 (Aug-Dec 2015)
- **Bulgaria**: 217 (ADNS) (last on Aug 2016)
- **FYROM**: 1.591 (Sep. report)
- **Serbia**: 225 (ADNS) (last on Oct 2016)
- **Kosovo**: 1.415 (EFSA report)
- **Montenegro**: 436 (EFSA rep.)
- **Albania**: 3.647 (EFSA report)

( * This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence).

- **LSD outbreaks**: 01.01-31.12.2016 (ADNS)

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**LSD epidemiological situation January - Dec 2016 (ADNS + country reports)**

- **Greece**: 104 (ADNS) (last on Nov 2016)
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- **Serbia**: 225 (ADNS) (last on Oct 2016)
- **Kosovo**: 1.415 (EFSA report)
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- **LSD outbreaks**: 01.01-30.11.2016 (ADNS)

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- **LSD outbreaks**: 01.01-31.12.2016 (ADNS)

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LSD epidemiological situation January - 30 Sep 2017 (ADNS + country reports)

LSD outbreaks in SE Europe (Jan – Sep 2017)

- **Albania**: 494 (ADNS, 160 with a suspicion date in 2017)
- **Greece**: 2 (ADNS)
- **FYROM**: 4 (ADNS)

The wave on the East, 2015

Source OIE WAHIS
The wave on the East, 2017

Source OIE WAHIS

The wave on the East, 2018

Source OIE WAHIS
Not a single country has managed LSD without vaccination!

Thank you for the attention!