



Food and Agriculture Organization
of the United Nations



Introduction to Lumpy Skin Disease

Tsviatko Alexandrov

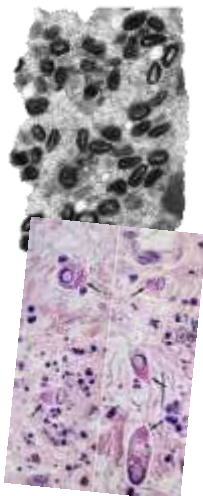
DVM, PhD, FAO International consultant



Food and Agriculture Organization
of the United Nations

Introduction

2



- ✓ 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)

3

- ✓ 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)

4

- ✓ 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



Epidemiology in nutshell

5

- ✓ 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



Host range

6

- ✓ **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

7

- ✓ 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

8

- ✓ 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 sheepox/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

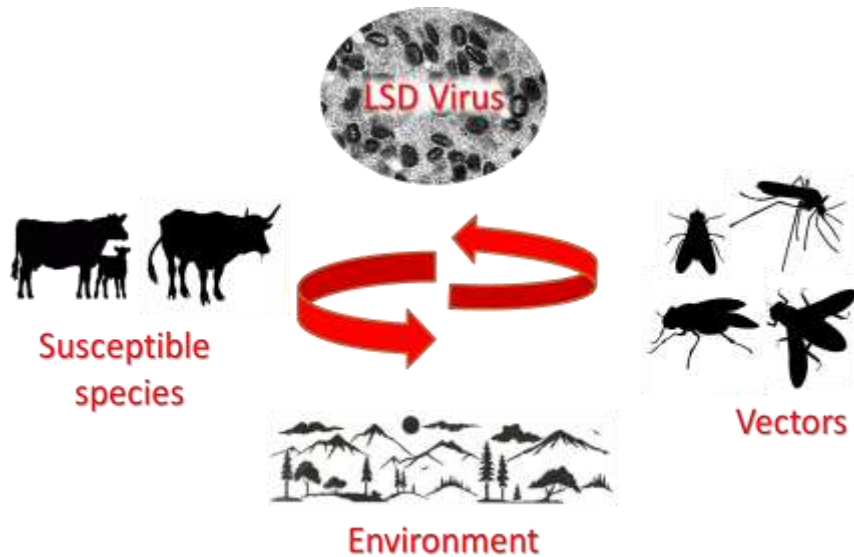
Bulgaria 2016: LSDV found in

- ✓ *Hyalomma marginatum* - females
- ✓ *Rhipicephalus bursa* - males + females

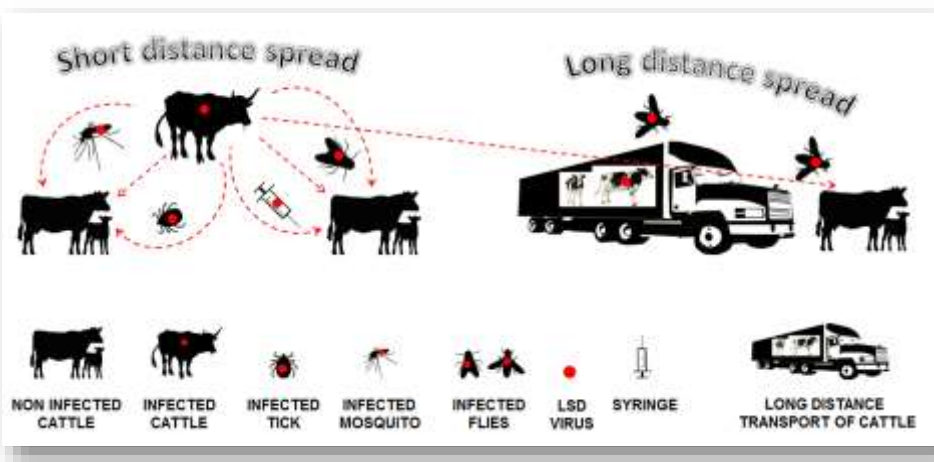


What is needed for LSD?

11



12



Clinical signs (1)

13

- ✓ Incubation time varies from 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)

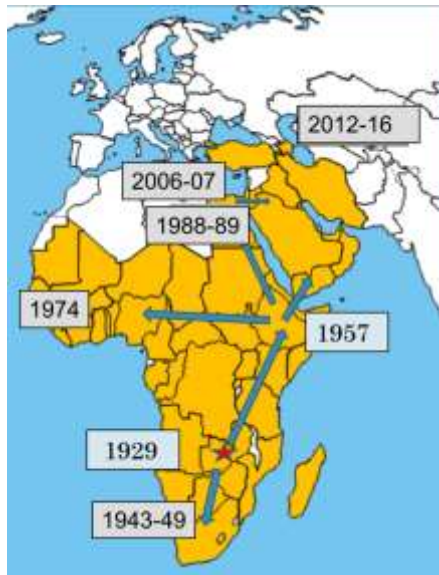
14

- ✓ 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

15

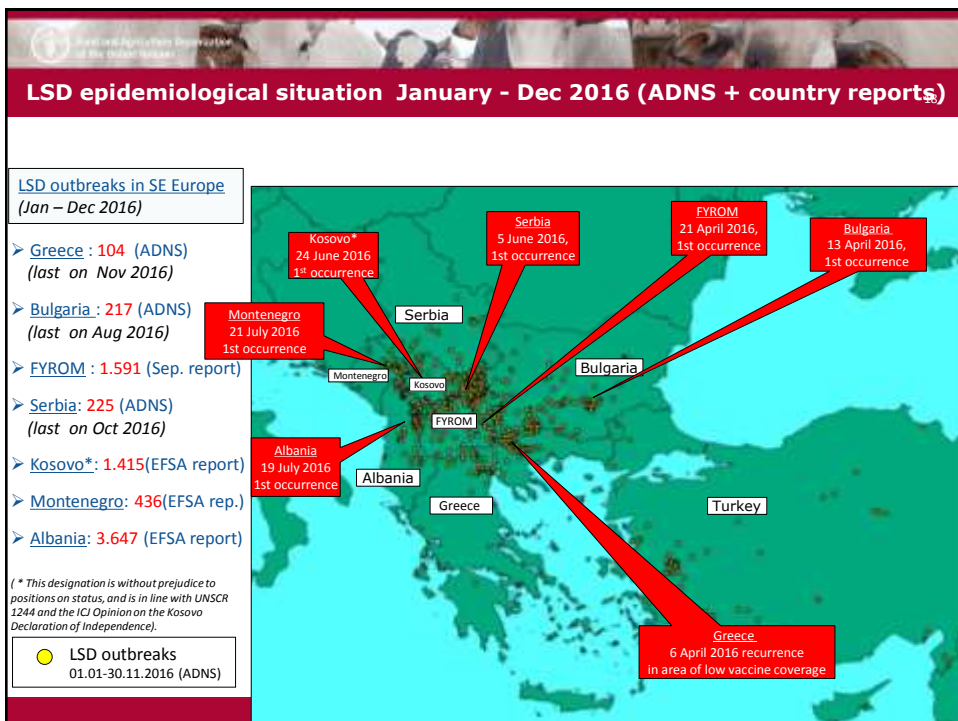


Geographical spread of LSD

16

Year	Countries with new or ongoing outbreaks (OIE WAHIS)
2010	Mozambique
2011	Guinea, Mozambique
2012	Guinea, Israel (232), Lebanon, Mozambique
2013	Egypt, Guinea, Iraq, Israel, Jordan, Lebanon, Mozambique, Palestinian Auton. Territories, Turkey
2014	Azerbaijan, Egypt, Guinea, Iran, Iraq, Israel, Kuwait, Mozambique, Turkey
2015	Armenia, Greece, Iran, Iraq, Kuwait, , Mozambique, Russia, Saudi Arabia, Turkey
2016	Armenia, Bulgaria, Greece, Iraq, Kuwait, FYR Macedonia, Mozambique, Turkey, Serbia, Kosovo, Montenegro, Georgia.
2017	Albania, Greece, FYR Macedonia (a sporadic outbreaks), Turkey, Russian Federation, Iraq, Kazakhstan, Saudi Arabia, Mozambique, Namibia









The wave on the East, 2016

21



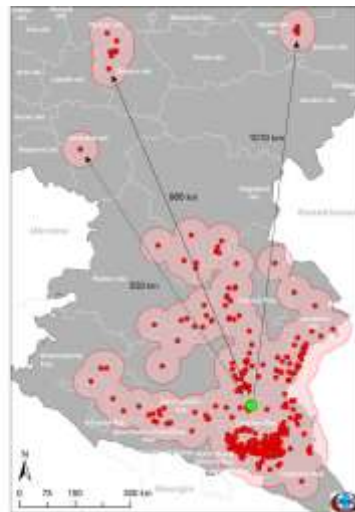
Source OIE WAHIS



22



313 LSD outbreaks in 16
Russian regions in 2016



Sprygin A, Artyuchova E, Babin Y, et al. Epidemiological characterization of lumpy skin disease outbreaks in Russia in 2016. *Transbound Emerg Dis.* 2018;00:1–8. <https://doi.org/10.1111/tbed.12889>



The wave on the East, 2017

23



Source OIE WAHIS



The wave on the East, 2018

24



Source OIE WAHIS



**Not a single country has managed LSD
without vaccination!**



Thank you for the attention!



Thank you for the attention!