LUMPY SKIN DISEASE
JORDANIAN EXPERIENCES WITH CONTROL/VACCINATION

Dr. Sameeh M. Abutarbush, D.V.M., M.Vet.Sc., D.A.B.V.P., D.A.C.V.I.M.
National American & Canadian Board and License
Diplomate, American College of Veterinary Practitioners & Diplomate, American College of Veterinary Internal Medicine

Chairman, Veterinary Medicine Department, CFA, United Arab Emirates University, UAE
AND
Moderator (Animal Infectious Diseases and Zoonosis), Middle East and North Africa (MENA). The Program for Monitoring Emerging Diseases (ProMED).
AND
Associate Professor, Large Animal Internal Medicine and Infectious Diseases
Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
Lumpy Skin Disease in Jordan: Disease Emergence, Clinical Signs, Complications and Preliminary-associated Economic Losses

S. M. Abutarbush¹, M. M. Ababneh², I. G. Al Zoubi¹, O. M. Al Sheyab¹, M. G. Al Zoubi³, M. O. Alekish¹ and R. J. Al Gharabat⁴

¹ Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
² Department of Veterinary Basic Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
³ Northern Aghwar Veterinary Services, Ministry of Agriculture, Irbid, Jordan
⁴ Triple for Drug and Trade, Madaba, Jordan

Keywords:
lumpy skin disease; cattle; Jordan; emerging diseases; Middle East

Summary

The objectives of this study are to report the emergence of lumpy skin disease (LSD) in Jordan and associated clinical signs, complications and preliminary economic losses. In mid-April, 2013, two adult dairy cattle developed clinical signs suggestive of LSD and were confirmed as positive by RCP. The two cases were in
Fig. 1. Map of the Northern part of Jordan; Irbid governorate with the nine districts. Note the approximate location of the two initial locations of the first cases of lumpy skin disease (black circles). Modified from http://mapsof.net/map/irbid-nahias#.UYEOEKJTCSr.
Paper

Efficacy of vaccination against lumpy skin disease in Jordanian cattle

S. M. Abutarbush

The objective of this study was to assess the value and efficacy of vaccination against a natural outbreak of lumpy skin disease (LSD). Epidemiological data were collected from 101 vaccinated and unvaccinated farms in Jordan. In the unvaccinated holdings, the overall morbidity rate was 42.6 per cent, mortality rate 10.2 per cent and case fatality rate 23.9 per cent. Decreased feed intake, decreased milk production and fever were seen in 100 per cent, 76.9 per cent and 92.3 per cent of the cattle farms, respectively. The percentage reduction in milk production ranged from 0 to 100 per cent (mean=38.5 per cent, SE±9.6 per cent). The total loss/animal in the farm ranged from £27 to £2210 (mean=486, SE±162). In the vaccinated holdings, the overall morbidity rate was 4.7 per cent, mortality rate 1 per cent and case fatality rate 22.9 per cent. Decreased feed intake, decreased milk production and fever were seen in 23.8 per cent, 21.4 per cent and 23.8 per cent of the cattle farms, respectively. Percentage of decrease in milk production ranged from 0 to 100 per cent (mean=6 per cent, SE±1.8 per cent). The total loss/animal in the farm ranged from 0 to £2210 (mean=78, SE±29). Vaccination against LSD remains a viable method of control. Although it does not provide complete protection against the disease, it appears to reduce morbidity and mortality rates, production loss and treatment cost.
FIG 2: Percentage of vaccinated and unvaccinated farms showing decreased feed intake, decreased milk production and fever against lumpy skin disease
FIG 1: The overall percentage of morbidity/mortality/case fatality in cattle on the vaccinated/non-vaccinated and vaccinated after infection farms against lumpy skin disease.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Non-vaccinated</th>
<th>Vaccinated</th>
<th>Vaccinated after infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of holdings</td>
<td>13</td>
<td>84</td>
<td>4</td>
</tr>
<tr>
<td>Total number of cattle</td>
<td>108</td>
<td>1014</td>
<td>36</td>
</tr>
<tr>
<td>Number of cattle in each holding</td>
<td>1–30 animals (mean=8, SE±2)</td>
<td>1–85 (mean=12, SE±2)</td>
<td>3–18 animals (mean=9, SE±3.7)</td>
</tr>
<tr>
<td>Morbidity rate</td>
<td>20–100% (mean=63.8%, SE±9.1%)</td>
<td>0–100% (mean=9.5%, SE±2.4%)</td>
<td>10–30% (mean=22.5%, SE±4.7%)</td>
</tr>
<tr>
<td>Mortality rate</td>
<td>0–100% (mean=31.8%, SE±7.6%)</td>
<td>0–100% (mean=2.4%, SE±1.3%)</td>
<td>0–30% (mean=7.5%, SE±7.5%)</td>
</tr>
<tr>
<td>Case fatality rate</td>
<td>0–100% (mean=24.6%, SE±10.1%)</td>
<td>0–100% (mean=4.8%, SE±2%)</td>
<td>0–100% (mean=25%, SE±25%)</td>
</tr>
<tr>
<td>Percentage of decrease in milk production</td>
<td>0–100% (mean=38.5%, SE±9.6%)</td>
<td>0–100% (mean=6%, SE±1.8%)</td>
<td>0–50% (mean=18.8%, SE±11%)</td>
</tr>
<tr>
<td>ranged from abortion rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abortion rate</td>
<td>0–25% (mean=1.9%, SE±1.9%)</td>
<td>0–50% (mean=1.4%, SE±0.7%)</td>
<td>0–30% (mean=12.5%, SE±6.2%)</td>
</tr>
<tr>
<td>Duration of illness (days)</td>
<td>3–80 (mean=39, SE±6.8)</td>
<td>0–76 (mean=7.8 day, SE±1.8)</td>
<td>14–66 (mean=31, SE±12)</td>
</tr>
<tr>
<td>The total cost of treatment and losses per animal in the holding (£)</td>
<td>27–2210 (mean=486, SE±162)</td>
<td>0–2210 (mean=78, SE±29)</td>
<td>25–737 (mean=310, SE±146)</td>
</tr>
</tbody>
</table>
Adverse Reactions to Field Vaccination Against Lumpy Skin Disease in Jordan

S. M. Abutarbush¹,², W. M. Hananeh³, W. Ramadan¹, O. M. Al Sheyab¹, A. R. Alnajjar¹, I. G. Al Zoubi¹, N. J. Knowles⁴, K. Bachanek-Bankowska⁴ and E. S. M. Tuppurainen⁴

¹ Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
² Veterinary Medicine Department, College of Food and Agriculture, United Arab Emirates University, Al Ain, UAE
³ Department of Veterinary Pathology and Public Health, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
⁴ The Pirbright Institute, Pirbright, Surrey, UK

Keywords:
lumpy skin disease; cattle; Jordan; emerging diseases; Middle East

Summary

Lumpy skin disease (LSD) is an emerging disease in the Middle East region and has been recently reported in Jordan. The aim of this study was to investigate the adverse reactions that were reported after vaccine administration. Geographical areas enrolled in the study were free of the disease and away from the outbreak governorate. Sixty-three dairy cattle farms, with a total of 19,539 animals, were included in the study. Of those, 56 farms reported adverse clinical signs after vac-
Questionnaire (63 Farms)
19,539 Animal
No. of Vaccinated Cows

- Affected: 89% (16369)
- Not Affected: 11% (3170)
No of Affected Farms

- 11% (7 Farms) Affected
- 89% (56 Farms) Not Affected

April 2015 S.M. Abutarbush LSD On Line Meeting
Results

• Disease free areas (away from the outbreak governorate).
• Clinical signs (similar to natural LSD infection):
  – Fever,
  – Decreased feed intake
  – Decreased milk production
  – Variable sized cutaneous nodules (a few millimeters to around 2 cm in diameter)
  – Some cattle had swollen lymph nodes,
  – A few pregnant animals aborted.
  – No mortalities were reported
Fig. 2. Percentages of adverse signs seen after administration of live attenuated vaccines against lumpy skin disease in cattle.
Fig. 3. Daily milk yield in a farm that was affected by adverse signs after administration of live attenuated vaccines against lumpy skin disease in cattle (D0 is the day of vaccination).
## Results

<table>
<thead>
<tr>
<th>Observation</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>The duration between vaccine administration and appearance of adverse clinical signs</td>
<td>1 to 20 days (Mean = 10.3, SD 3.9).</td>
</tr>
<tr>
<td>The percentage of affected cattle</td>
<td>0.3 to 25% (Mean = 8, SD 5.1).</td>
</tr>
<tr>
<td>Duration (course) of clinical signs</td>
<td>3 to 20 days (Mean = 13.7, SD 4.1).</td>
</tr>
</tbody>
</table>
Results

• Two types of LSD vaccines were used by the farmers in this study.
• The first one was a sheep pox virus (SPPV) vaccine derived from the RM65 isolate.
• The other was an unlabeled one, which was later identified using PCR as a strain of lumpy skin disease virus (LSDV).
Original Article

Hematological and serum biochemical findings in clinical cases of cattle naturally infected with lumpy skin disease

Sameeh M Abutarbush1,2

1 Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan
2 Veterinary Medicine Department, College of Food and Agriculture, United Arab Emirates; University, Al Ain, UAE

Abstract
Introduction: Lumpy skin disease (LSD) is an acute viral disease of cattle that is currently emerging in the Middle East region and poses a serious threat to Europe and the rest of the world. The objective of this study was to describe hematological and serum biochemical findings associated with natural clinical infection of LSD in cattle.
Methodology: A total of 129 animals clinically infected with LSD were enrolled in the study. Venous blood sample were collected from study animals, and hematological and serum biochemical parameters were measured.
Results: Leukocytopenia was found in 8.7%, while leucocytosis was found in 18.2% of affected cattle. Decreased hematocrit concentration was seen in 18.3%. Most affected cattle had reduced mean corpuscular volume (43.7%), mean corpuscular hemoglobin (14.3%), and mean corpuscular hemoglobin concentration (11.5%). All cattle with abnormal platelets count had thrombocytopenia. Hyperfibrinogenemia, hyperproteinaemia, and hyperalbuminemia were found in 69%, 59.6%, and 37.2% of affected cattle, respectively. Decreased creatinine concentration was seen in 65.8%. Hyperkalemia and hyperchloremia was found in 9.6% and 10.4% of the affected cattle, respectively.
Conclusions: LSD appears to be associated with inflammatory leukogram, anemia, thrombocytopenia, hyperfibrinogenemia, hyperproteinaemia, decreased creatinine concentration, hyperchloremia, and hyperkalemia. These are likely due to the associated severe inflammatory process and disease complications such as anorexia and reduced muscle mass. This is the first study that documents hematological and serum biochemical findings associated with LSD infection. Understanding the blood profile picture may give further insight to the pathogenesis of the disease and help in treatment of individual cattle.

Key words: lumpy skin disease; cattle; emerging infectious diseases; hematology; biochemistry.

(Received 26 March 2014 – Accepted 19 November 2014)
# Results

## Table 1. Haematological findings in cattle clinically affected with lumpy skin disease.

<table>
<thead>
<tr>
<th>Analate</th>
<th>Reference (Radostitis et al, 2000)</th>
<th>Mean</th>
<th>Range</th>
<th>No. of Cattle with Low Abnormal Values</th>
<th>No. of Cattle with High Abnormal Values</th>
<th>Comparison Between the means value of Cattle with High &amp; Low Abnormal Values (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC (×109/L)</td>
<td>4-12</td>
<td>9.0</td>
<td>1.3-29.9</td>
<td>11/126</td>
<td>23/126</td>
<td>0.00</td>
</tr>
<tr>
<td>RBC (×1012/L)</td>
<td>5-10</td>
<td>7.4</td>
<td>3.2-17.3</td>
<td>9/126</td>
<td>10/126</td>
<td>0.00</td>
</tr>
<tr>
<td>HB (g/L)</td>
<td>80-150</td>
<td>90.3</td>
<td>46-223</td>
<td>8/126</td>
<td>3/126</td>
<td>0.00</td>
</tr>
<tr>
<td>HCT (L/L)</td>
<td>0.24-0.46</td>
<td>0.30</td>
<td>0.14-0.66</td>
<td>23/126</td>
<td>6/126</td>
<td>0.00</td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>40-60</td>
<td>40.7</td>
<td>27.6-81.4</td>
<td>55/126</td>
<td>2/126</td>
<td>0.00</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>11-17</td>
<td>12.8</td>
<td>8.3-19.4</td>
<td>18/126</td>
<td>1/126</td>
<td>0.00</td>
</tr>
<tr>
<td>MCHC (g/L)</td>
<td>300-360</td>
<td>315</td>
<td>146-367</td>
<td>14/122</td>
<td>1/122</td>
<td>0.054</td>
</tr>
<tr>
<td>Platelets (×109/L)</td>
<td>100-800</td>
<td>207</td>
<td>35-589</td>
<td>32/126</td>
<td>0/126</td>
<td>N/A</td>
</tr>
</tbody>
</table>

WBC: white blood cell count; RBC: red blood cell count; HB: hemoglobin; HCT: hematocrit; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration
## Results

### Table 2. Serum biochemical findings in cattle clinically affected with lumpy skin disease.

<table>
<thead>
<tr>
<th>Analysate</th>
<th>Reference (Radostitis et al, 2000)</th>
<th>Mean</th>
<th>Range</th>
<th>No. of Cattle with Low Abnormal Values</th>
<th>No. of Cattle with High Abnormal Values</th>
<th>Comparison Between the means value of Cattle with High &amp; Low Abnormal Values (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/L)</td>
<td>67-75</td>
<td>76.6</td>
<td>54-105</td>
<td>14/129</td>
<td>77/129</td>
<td>0.000</td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>30-36</td>
<td>35</td>
<td>20-67</td>
<td>27/129</td>
<td>48/129</td>
<td>0.000</td>
</tr>
<tr>
<td>Fibrinogen (g/L)</td>
<td>200-500</td>
<td>625</td>
<td>400-1000</td>
<td>0/126</td>
<td>87/126</td>
<td>N/A</td>
</tr>
<tr>
<td>ALP (units/L)</td>
<td>0-500</td>
<td>51</td>
<td>0-321</td>
<td>0/128</td>
<td>0/128</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Bilirubin (μmol/L)</td>
<td>0.17-8.55</td>
<td>4.90</td>
<td>0.17-59.90</td>
<td>0/118</td>
<td>13/118</td>
<td>N/A</td>
</tr>
<tr>
<td>Blood urea nitrogen (mmol/L)</td>
<td>2-7.5</td>
<td>4.7</td>
<td>2.1-20.2</td>
<td>0/129</td>
<td>2/129</td>
<td>N/A</td>
</tr>
<tr>
<td>Creatinine (μmol/L)</td>
<td>67-175</td>
<td>65.2</td>
<td>8.8-176.8</td>
<td>79/120</td>
<td>0/120</td>
<td>N/A</td>
</tr>
<tr>
<td>Na (mmol/l)</td>
<td>132-152</td>
<td>138</td>
<td>106-160</td>
<td>16/124</td>
<td>3/124</td>
<td>0.000</td>
</tr>
<tr>
<td>K (mmol/l)</td>
<td>3.9-5.8</td>
<td>4.9</td>
<td>3.6-7.5</td>
<td>9/124</td>
<td>12/124</td>
<td>0.000</td>
</tr>
<tr>
<td>Cl (mmol/l)</td>
<td>95-110</td>
<td>104</td>
<td>82-142</td>
<td>3/124</td>
<td>13/124</td>
<td>0.000</td>
</tr>
</tbody>
</table>

ALP: alkaline phosphatase; Na: sodium; K: potassium; Cl: chloride
Results

- Inflammatory leukogram,
- Anemia
- Thrombocytopenia
- Hyperfibrinogenemia
- Hyperproteinemina
- Decreased creatinine concentration
- Hyperkalemia and hyperchloremia
Results

• These are likely due to the
  – Associated severe inflammatory process
  – Disease complications, such as anorexia and reduced muscle mass.
Differential Diagnosis

• Lumpy skin disease
• Pseudo-lumpy skin disease
• Bovine herpes mammillitis
• Dermatophilosis
• Insect or tick bites
• Urticaria
• *Hypoderma bovis* infestation
• Vesicular/ulcerative mucosal diseases
LSD & BHV

©Dr. Sameeh M. Abutarbush

©Dr. Sameeh M. Abutarbush
LSD Cases

©Dr. Sameeh M. Abutarbush

PLSD Cases

©Dr. Sameeh M. Abutarbush
LSD Cases

PLSD Cases

©Dr. Sameeh M. Abutarbush

©Dr. Sameeh M. Abutarbush
LSD Cases

©Dr. Sameeh M. Abutarbush

BPS

©Dr. Sameeh M. Abutarbush
LSD Cases

©Dr. Sameeh M. Abutarbush

FMD

©Dr. Sameeh M. Abutarbush
LSD Cases

Hypoderma bovis Infestation

©Dr. Sameeh M. Abutarbush

©Dr. Sameeh M. Abutarbush
References

“You make more mistakes not looking than not knowing” Otto Radostits