

# Description of an outbreak of cattle intoxication by cyanobacteria (blue-green algae) in the South of Portugal

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## Case description

In 2017, 25 cows from a beef herd consisting of 54 healthy animals, with ages between 1.5 to 4 years old, from Aberdeen Angus breed x Charolais were found dead in Almodôvar, Alentejo, in the South of Portugal. They were grazing on a field of stubble for about 3 weeks when they broke the electric fence that bordered the field and had access to stagnant water from a small stream (Ribeira de Oeiras) that run across the herd.

All the animals were seen healthy, by the keeper, until 12 a.m. of Sunday August 27<sup>th</sup>. When they were last observed before the occurrence, they were resting at the shade of trees and bushes surrounding the Oeiras stream. At this time of the year, this is a normal behaviour due to the high temperatures, and it is common for them to engage in grazing activities in the evening, when the temperature begins to decrease. On the next day (the 28<sup>th</sup> August), at 7 a.m., the keeper encountered 20 cadavers scattered throughout the land and 5 sick cows. The other 29 animals of the group did not show any clinical signs during the following weeks after the occurrence. In the same period, was reported the death of a heron in the Oeiras stream.



Suspension of acute hepatotoxicity caused by cyanotoxins.

## Diagnosis

### Clinical and histopathological examination

Five cows were found sick with clinical signs of ataxia, recumbence, abdominal distension, opisthotonus, paddling and masticatory movements, frothing and salivation at the mouth and bloody diarrhea. Histopathological examination revealed scattered multifocal necrosis lesions in the liver. In the kidney, diffuse tubular necrosis was detected, particularly severe in the cortex.

### Exposure to water from the Ribeira de Oeiras, Almodôvar

Table 1 – Physicochemical characterization of the water sample collected in August 29<sup>th</sup>, 2017

PARAMETER	METHOD	RESULTS
Temperature		26.3°C
pH	Potentiometry	8.4
Conductivity	Electrometry	990 µS/cm
Dissolved Oxygen		128%; 10 mg/L O <sub>2</sub>
Dissolved Organic Carbon	Non-dispersive infrared detector	44 mg/L C
Sulphate	Turbidimetry	34 mg/L SO <sub>4</sub>
Total Organic Carbon	Non-dispersive infrared detector	51 mg/L C
Total Nitrogen	Skalar method	3.5 mg/L N
Hardness	Volumetry	220 mg/L CaCO <sub>3</sub>
Chlorides	Spectrophotometry	140 mg/L
Dissolved Copper	Atomic absorption spectroscopy	< 5.0 µg/L
Dissolved Manganese		< 5.0 µg/L
Dissolved Zinc		< 0.050 mg/L
Dissolved Cadmium		< 0.20 µg/L

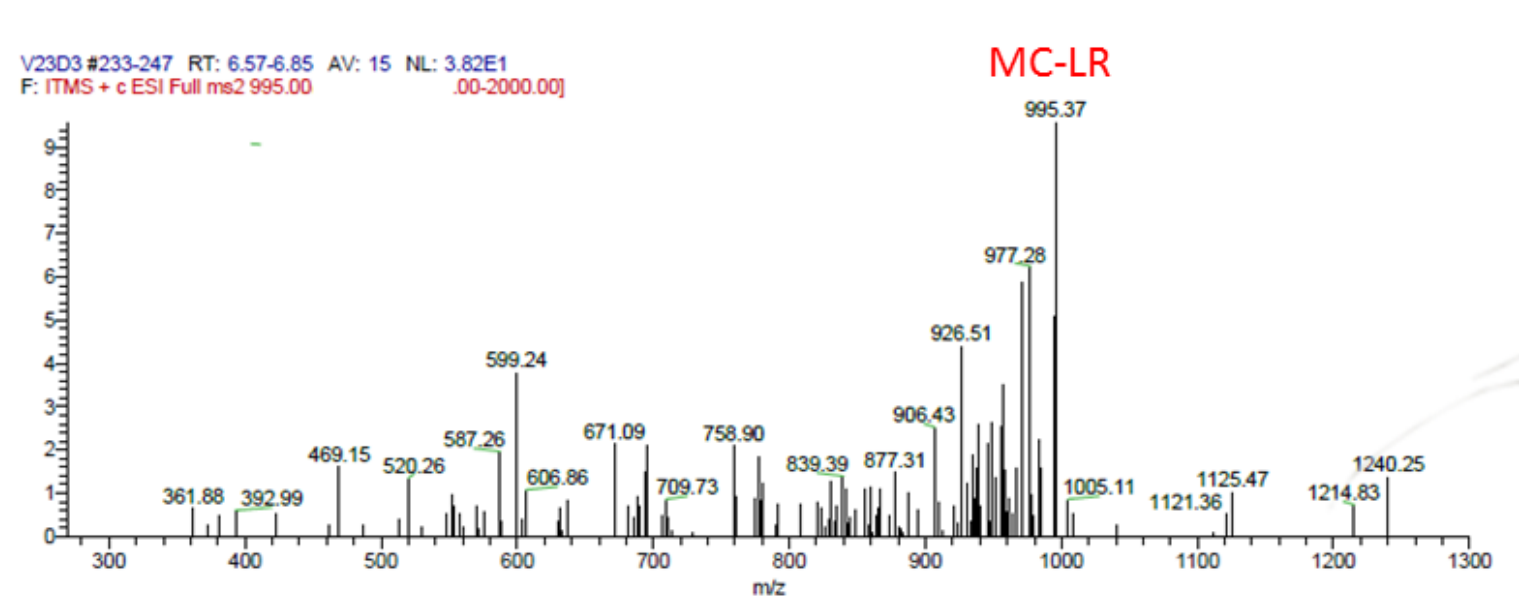
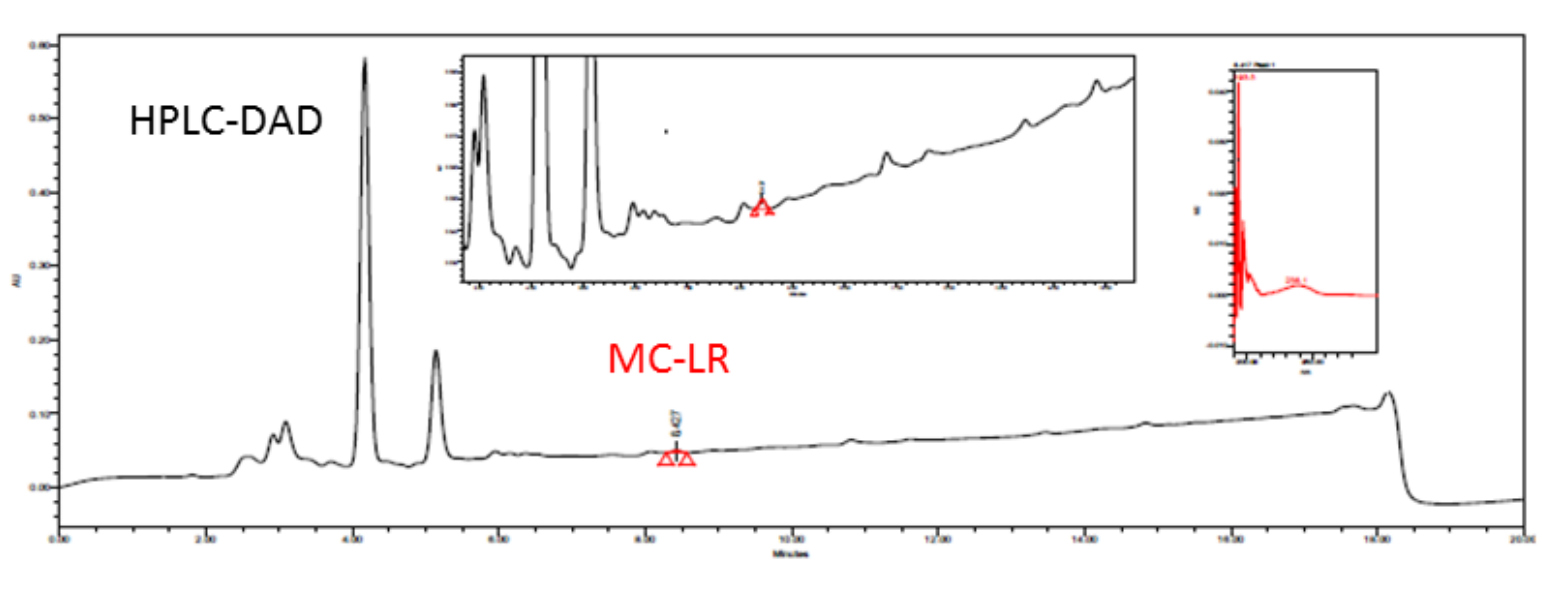
Table 2 – Identification and quantification of phytoplankton and cyanobacteria; quantification of microcystins in the water sample collected in October 24<sup>th</sup>, 2017.

WISER REBECCA	PHYTOPLANKTONIC SPECIES	DENSITY (cells/mL)	%
CYANOBACTERIA		1.094.040	70 (total)
R1491	<i>Microcystis ichthyoblabe</i>	685390	62
R1499	<i>Microcystis wesenbergii</i>	40999	4
R1416	<i>Aphanocapsa incerta</i>	150848	14
R1415	<i>Aphanocapsa holsatica</i>	44564	4
R1475	<i>Merismopedia glauca</i>	8244	1
R1479	<i>Merismopedia tenuissima</i>	155082	14
R1610	<i>Planktolyngbya limnetica</i>	8913	1
EUGLENOPHYTES		10473	
DIATOMS		4680	
CLOROPHYTES		442297	30 (total)
CHAROPHYTES		223	
CRYPTOPHYTES		11586	
HAPTOPHYTES		6462	
TOTAL		1573322	
Microcystins (ELISA kit)		0.16 µg/L	

### Cyanotoxins analysis in the tissues

The liver, kidneys and faeces were analysed by HPLC-DAD and LC-MS and immunoassays for microcystins, saxitoxins and anatoxin-a.

Positive for MCLR in one kidney sample  
0.13 µg MC-LR/g



- The diagnosis of intoxication with microcystins was confirmed by the detection of MC-LR in the kidney.
- The lack of awareness to this issue lead to a time gap between the outbreak (August) and the phytoplankton sampling (October) that could have hindered the association between this episode and the occurrence of microcystins in the Ribeira de Oeiras.
- As far as we know this is the first report of microcystin-LR animal poisoning in Portugal.