

## Background Information: HAB Related Pet & Livestock Intoxication Events

The most commonly associated cyanotoxins reported in livestock and animal deaths. The toxins are listed in order of importance (left to right), as determined through frequency in reported intoxications and cyanotoxin levels observed in waterways at harmful levels. Other toxins may be tested that are not listed, including brevetoxins (marine) and guanitoxin (previously known as anatoxin-a(s)), depending on exposure history.

Toxin:	Microcystins/Nodularins MCs/NODs	Anatoxin-a/Homoanatoxin-a ATX/HTX	Saxitoxins STX, PSP toxins, PSTs	Cylindrospermopsin CYN
<b>LD<sub>50</sub> (oral):</b>	> 5,000 µg/kg	> 5,000 µg/kg	≥440 µg/kg	> 4,000 µg/kg
<b>NOAEL:</b>	40 µg/kg per day	98 µg/kg per day	0.5 µg/kg per day	30 µg/kg per day
<b>R-GV:</b>	20 ppb (ng/mL)	59 ppb (ng/mL)	30 ppb (ng/mL)	6 ppb (ng/mL)
<b>Where they are found (for exposure history):</b>	MCs (and NODs) that cause intoxication are found in the water column (planktonic) [1–3] and in the benthos [4]. MCs are the most frequently reported causative agent in cyanobacteria related intoxications.	ATX/HTX (and related derivatives) can be present at high levels in the benthos [5–8]. ATX is also frequently found (lower levels) in the water column and may cause intoxication if the animal consumes large amounts of water (e.g. cattle).	Saxitoxins are responsible for paralytic shellfish poisoning (PSP) associated with marine dinoflagellates, but are also produced by freshwater cyanobacteria (benthic and planktonic). No known intoxications from freshwater STX have been published. Dogs poisoned by eating marine organisms on beaches has been reported [9].	High levels of CYN are rare in the United States, but cannot be ruled out as a source of intoxication. Most CYN sources are planktonic. CYN has been implicated in cattle deaths in Australia, but not confirmed [10].
<b>Rationale to test urine:</b>	Samples can be taken weeks/months after exposure as MCs continue to be eliminated (predominantly metabolized forms) in the urine for weeks, if not months after acute intoxication. [1].	Although little is known about ATX metabolism and elimination, ATX has been detected (unmetabolized) in urine and bile after a dog intoxication [8].	STX (and analogs) has been detected (unmetabolized and possibly metabolized) in urine of humans after exposure and is considered the main excretion pathway in mammals [11–13].	Although little is known about CYN metabolism and elimination, it has been determined that CYN is mainly excreted in the urine [14] (unmetabolized).
<b>Preferred specimens:</b>	Stomach contents and/or urine	Stomach contents and/or urine	Stomach contents and/or urine	Stomach contents and/or urine
<b>Secondary Specimens:</b>	Bile, kidneys, liver, brain, blood	Bile, kidneys, liver, brain, blood	Bile, kidneys, liver, brain, blood	Bile, kidneys, liver, blood

LD<sub>50</sub> = Estimated median lethal dose as determined through experiments with mice.

NOAEL = No observed adverse effect level

R-GV = Recreational Guidance Value presented by the World Health Organization calculated from the NOAEL and variable uncertainty factors

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