



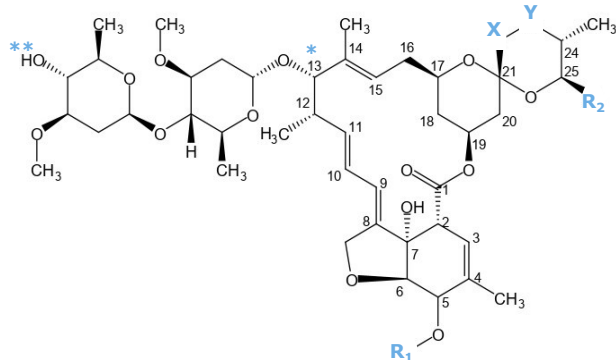
# Analysis of avermectins and milbemycins by LC-MS/MS and introduction of a rapid LFD pre-screening

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## Avermectins and milbemycins are anti-worming agents



## Analytes share a common macrocyclic lactone backbone structure



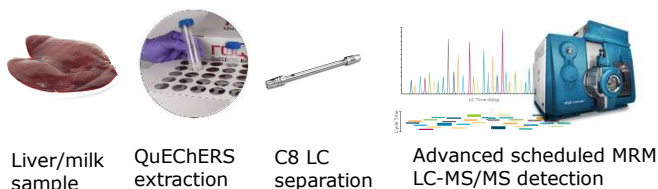
Nomenclature: "A" (R<sub>1</sub> -CH<sub>3</sub>) or "B" (R<sub>1</sub> -H), "1" (X-Y -CH=CH-) or "2" (X-Y -CH<sub>2</sub>-CH(OH)-) and "a" (R<sub>2</sub> -CH(CH<sub>3</sub>)(CH<sub>2</sub>CH<sub>3</sub>)) or "b" (R<sub>2</sub> -CH(CH<sub>3</sub>)<sub>2</sub>)

## A broad selection of analytes was included in the method

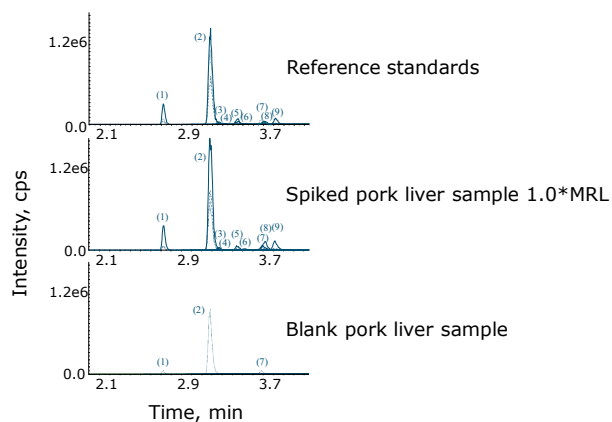
Analyte	Structure	MRL Liver (µg/kg)	MRL Milk (µg/kg)
Abamectin (3)	B <sub>1a</sub>	20 (C), 25 (S)	Unauthorized (S), 1 <sup>a</sup>
Doramectin (5)	B <sub>1</sub> ; R <sub>2</sub> cyclohexane	100 (M)	Unauthorized (R,E), 1 <sup>a</sup>
Eprinomectin (2)	B <sub>1a</sub> ; **-NHCOCH <sub>3</sub>	1500 (C)	20 (C)
Emamectin (1)	B <sub>1a</sub> ; **-NHCH <sub>3</sub>	20 <sup>a</sup>	1 <sup>a</sup>
Ivermectin (9)	B <sub>1a</sub> ; X-Y dehydro	100 (M)	Unauthorized (M), 1 <sup>a</sup>
Milbemycin A3 (4)	B <sub>1</sub> ; R <sub>2</sub> CH <sub>3</sub> ; *CH <sub>2</sub>	43* <sup>a</sup>	1 <sup>a</sup>
Milbemycin A4 (6)	B <sub>1</sub> ; R <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub> ; *CH <sub>2</sub>	100 <sup>a</sup>	1 <sup>a</sup>
Moxidectin (7)	B <sub>1</sub> ; Y =NOCH <sub>3</sub> ; R <sub>2</sub> -C(CH <sub>3</sub> )CHCH(CH <sub>3</sub> ) <sub>2</sub>	100 (C,S,E)	40 (C,S)
Selamectin (8)	OR <sub>1</sub> =NOH; X-Y dehydro; R <sub>2</sub> cyclohexane	100 <sup>a</sup>	1 <sup>a</sup>

C= cattle, E= equidae, S= sheep, R= ruminants, M= mammalian food producing species, excluding animals producing milk for human consumption. \*43 µg/kg, due to natural milbemycin A3/A4 ratio. <sup>a</sup>No MRL established (unauthorized), guide value.

## A fast and reliable analytical method was developed



## All analytes give excellent signals



Solid lines: quantifier ion transitions; dashed lines: qualifier ion transitions; dotted lines: internal standard ion transitions.

## Method has good performance characteristics in full validation (EU) 2021/808 and satisfactory proficiency test scores

Proficiency test	Species	Analyte	z-score <sup>1</sup>
FAPAS 2333	sheep liver	Doramectin	1.34
		Eprinomectin	0.11
FAPAS 2356	bovine liver	Moxidectin	0.51
		Emamectin	0.26
		Abamectin	0.59
Progetto MI1925	bovine milk	Ivermectin	0.39
Progetto MI2025	bovine milk	Eprinomectin	-0.26

<sup>1</sup>z-score = (found value (µg/kg) - assigned value) / Sd. For compliant results: |z| ≤ 2

## Introduction of a rapid LFD pre-screening: on-site risk based monitoring workflow potential

