



Following the route of veterinary antibiotics tiamulin and tilmicosin from livestock farms to agricultural soils

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Introduction

Veterinary antibiotics (VAs) are used in livestock farming. They are not metabolized in the animal body and are (40-90%) excreted in animal excreta. These are either stockpiled or anaerobically digested before applied as manures in agricultural soils. Their persistence along their route from animals to soils may facilitate VA dispersal impacting environmental quality and human health. **Tiamulin (TIA)** and **Tilmicosin (TLM)** are two VAs widely used in livestock farming in EU and for which little is known regarding their environmental persistence. TIA is a semi-synthetic derivative of pleuromutilin used to treat enteric and respiratory infections of pigs. TLM is a macrolide mostly used to treat respiratory infections in calves and pigs.

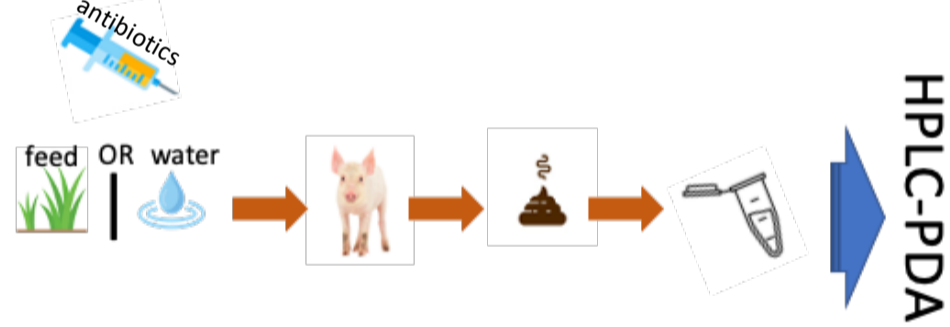
Objectives:

1. Investigate how different administration modes affect VAs excretion temporal patterns
2. Define efficiency of anaerobic digestion and ambient storage in VA removal from feces along with the reciprocal effect of VAs on the anaerobic digestion process
3. Determine VA persistence in agricultural soils

Experimental setup

1st

Excretion of VAs under different administration regimes



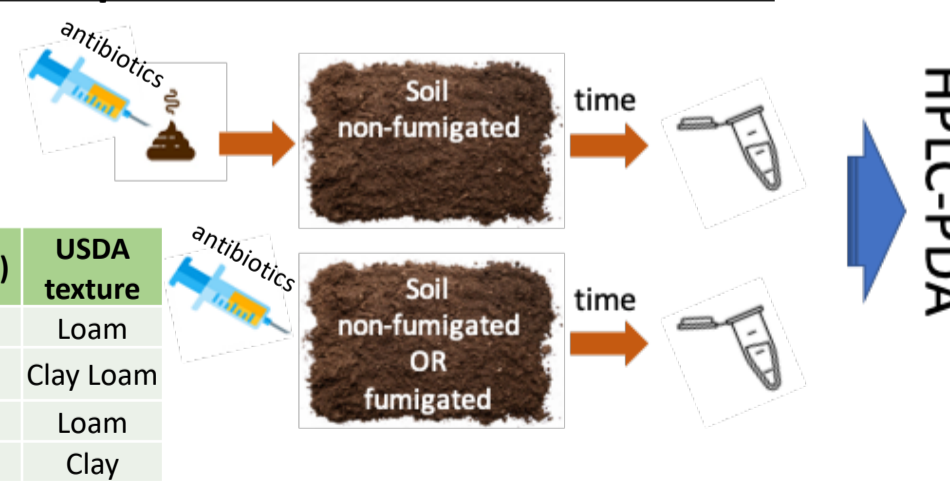
2nd

VA fate under different treatment regimes



3rd

Dissipation of VAs in different soils



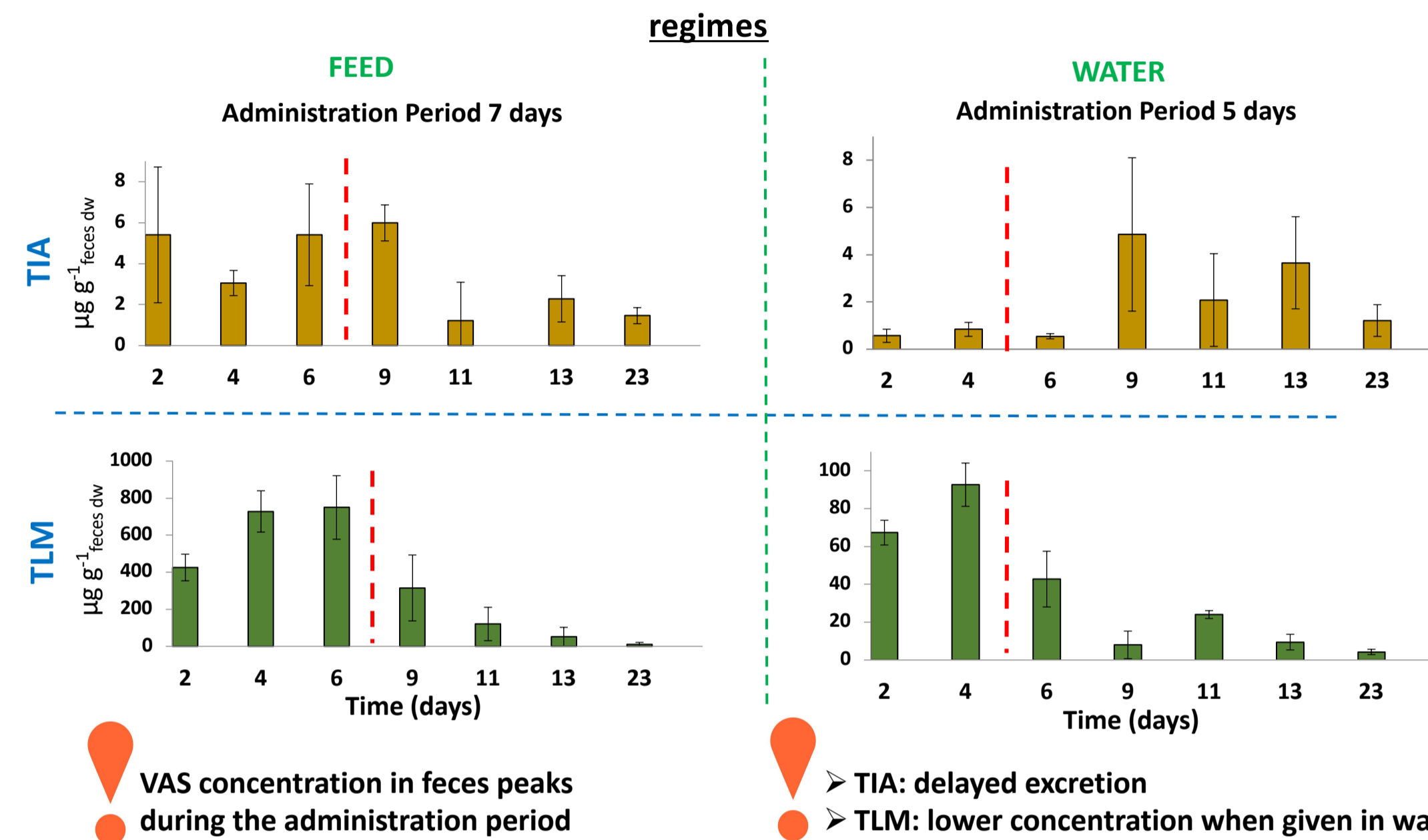
Soil	pH	OC(%)	USDA texture
Livadi	5.9	2.31	Loam
University	8.8	0.60	Clay Loam
Rodia	7.9	1.37	Loam
Zappeio	6.5	2.30	Clay

Conclusions

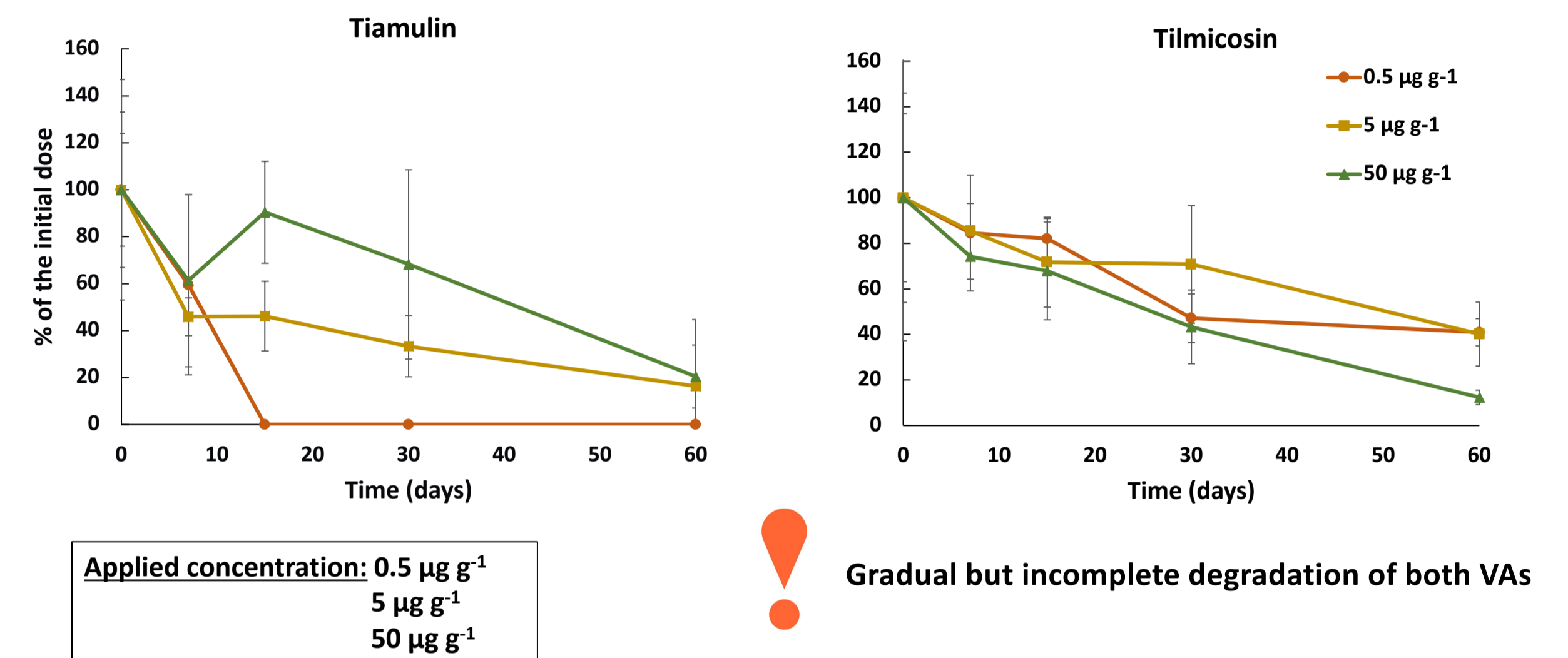
- 1) TLM was excreted at higher amounts in animal feces than TIA
- 2) Storage at ambient temperature or anaerobic digestion are not effectively reducing the levels of TIA and TLM in feces before applied as manures in agricultural soils, while both VAs negatively affected biomethanation
- 3) Soil microbes contribute significantly in the dissipation of VAs in soils

Results

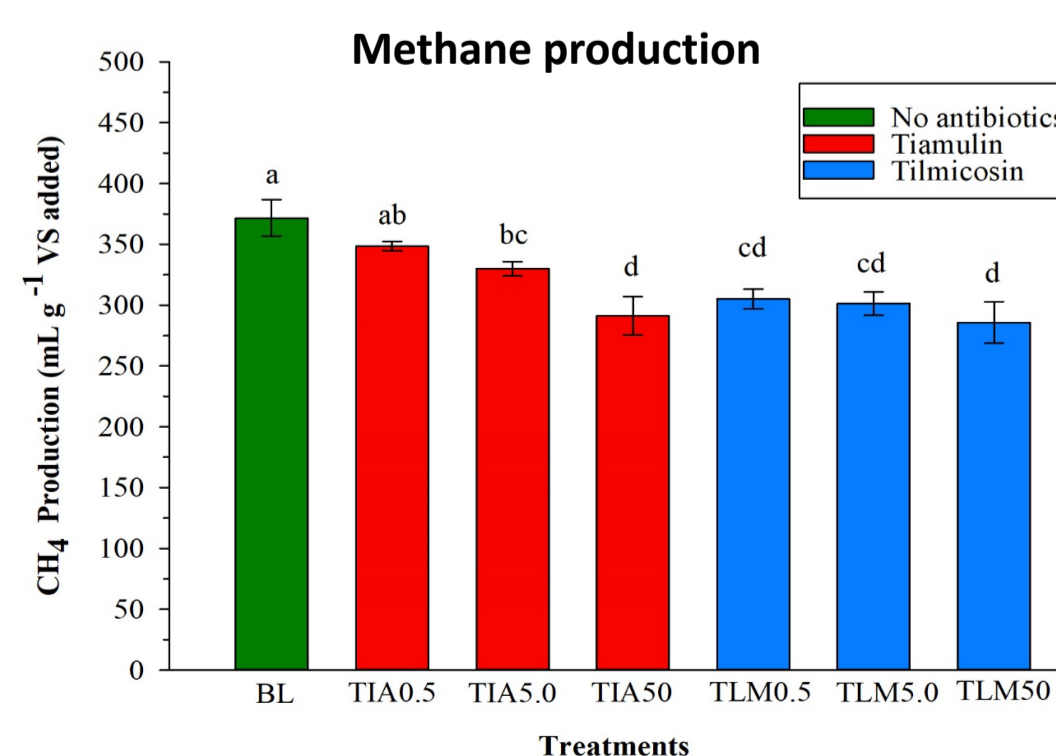
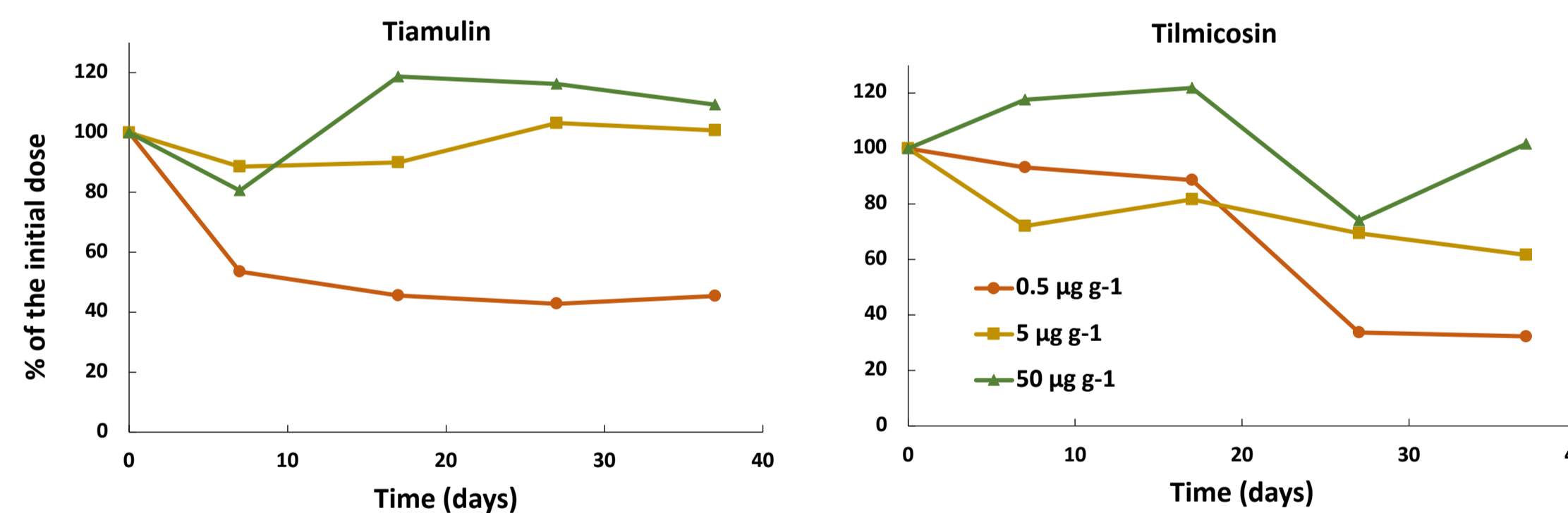
Excretion of VAs under different administration regimes



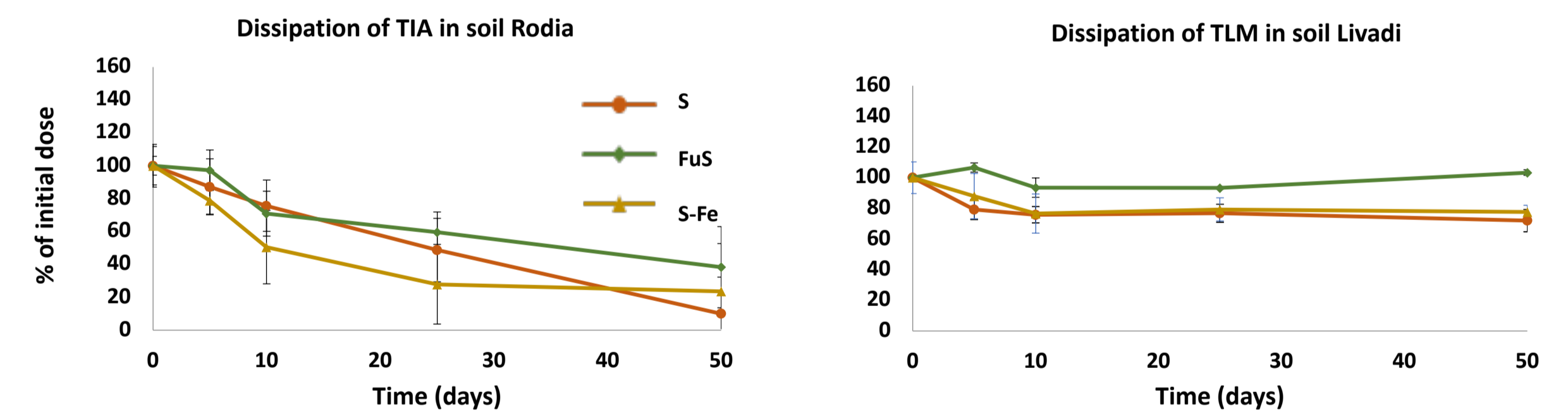
Dissipation of VAs in feces during storage at ambient conditions



Dissipation of VAs in feces during anaerobic digestion and their effects on biomethanation.



Dissipation of VAs in different soils



Soil	Treatment	Kinetic Model	DT ₅₀ (days)	DT ₉₀ (days)	k _{deg} (days ⁻¹)	k ₁ (days ⁻¹)	k ₂ (days ⁻¹)	t _b (days)	χ ² (%)
Tiamulin									
Livadi	S	SFO	80.0	265.7	0.009				1.163
	FuS	HS	360.9	>365		0.053	0.002	1.6	1.254
	S-Fe	SFO	>365	>365	<0.0001				1.503
University	S	SFO	31.7	105.3	0.022				5.822
	FuS	SFO	42.8	142.3	0.016				9.065
	S-Fe	SFO	60.0	199.4	0.012				3.85
Rodia	S	SFO	20.1	66.9	0.034				5.944
	FuS	SFO	33.7	112.1	0.021				6.319
	S-Fe	HS	10.9	174.1		0.064	0.007	19.8	5.572
Zappeio	S	HS	94.5	>365		0.046	0.005	4.6	4.793
	FuS	SFO	30.9	102.6	0.022				10.83
	S-Fe	SFO	57.1	189.6	0.012				7.885
Tilmicosin									
Livadi	S	SFO	141.1	>365	0.005				7.16
	FuS	SFO	>365	>365	<0.0001				4.257
	S-Fe	SFO	170.2	>365	0.004				6.244
University	S	HS	158.4	>365		0.052	0.003	3.2	3.116
	FuS	SFO	>365	>365	0.001				2.118
	S-Fe	SFO	>365	>365	0.001				3.875
Rodia	S	SFO	121.1	>365	0.006				4.105
	FuS	SFO	>365	>365	0.001				5.631
	S-Fe	HS	>365	>365		0.099	0.001	28.6	1.896
Zappeio	S	SFO	128.7	>365	0.005				3.864
	FuS	SFO	348.6	>365	0.002				2.921
	S-Fe	HS	>365	>365		123.5	<0.0001	4.0	5.48

S : Soil
 FuS : Fumigated Soil
 S-Fe : Soil amended with feces.

- ! VA dissipation was retarded in fumigated soils
 ! VA dissipation was delayed when applied through feces



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CERTIFICATE OF PRESENTATION

This is to certify that

Ms Eleni Katsivelou, Greece

presented their abstract

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