Article

Lactic acid fermentation inactivates *Salmonella* Typhimurium in contaminated cattle manure at moderate and low temperatures

Hannah Halm[1,*], Sören Woelke[1], Ines Lehnert[2], Thorben Schilling[2], Thorsten Meissner[3], Charlotte Schröder[1], Ludwig E. Hoelzle[2], Hendrik A. Scheinemann[3]

[1] Friedrich-Loeffler-Institute, Federal Research Institute for Animal Health, Hannah.Halm@fli.de
[2] University of Hohenheim, ines.lehnert/thorben.schilling@uni-hohenheim.de
[3] Bundeswehr Research Institute for Protective Technologies and CBRN Protection (WIS), HendrikScheinemann@bundeswehr.org
* *Correspondence: Hannah.Halm@fli.de ; Tel.: +49 38351 7 4961*

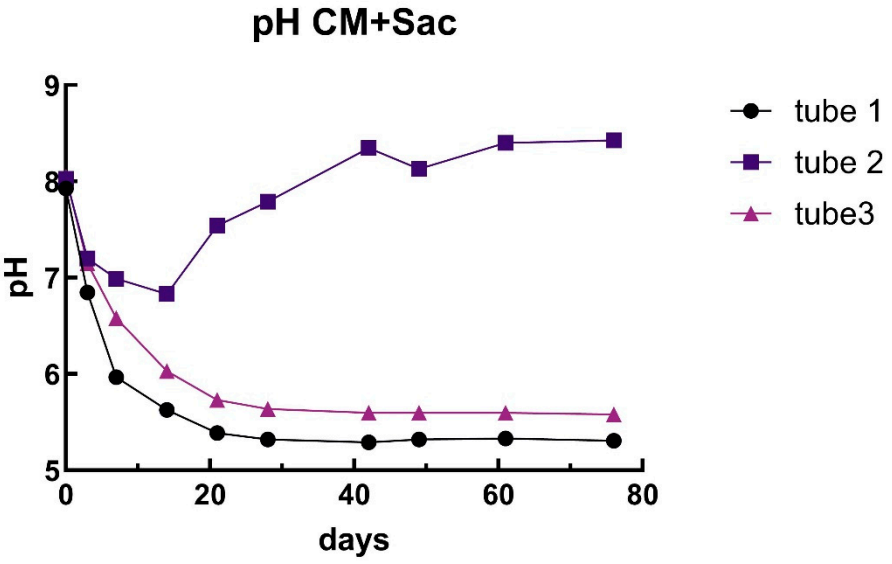


Figure S1. Results of pH measurement of SA (Exp2).

Table S1. Overview of results of MALDI-TOF. In column "CM", "CM+HC" and "CM+SO" numbers represent number of detected species at time of sampling. Abrv.: CM- cattle manure; HC – hay cobs; SO – squeezed oat.

temp.	next organism	CM									CM+HC									CM+SO								
	day	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*
10°C	***Acinetobacter* sp.**									3																		
10°C	*Aerococcus viridans*	1		1	1							1	3	2	2						1	1						
	***Bacillus* sp.**	**2**		**2**	**2**	**1**	**1**	**3**	**1**	**1**	**4**	**1**	**2**	**0**	**1**	**0**	**1**	**0**	**2**	**0**	**0**	**3**	**3**	**2**	**1**	**1**	**1**	**2**
10°C	*B. cereus*					1					1												1	1				1
10°C	*B. coagulans*										1																	
10°C	*B. licheniformis*	1		1	1			1			1											1	1		1			
10°C	*B. oleronius*																					1						
10°C	*B. pumilus*	2		2	2			2		2	3		2		1				1			1	2	2		1	1	1
10°C	*B. subtilis*						1	1	1				1				1		1									
10°C	*B. thermoamylovorans*											1																
	Clostridium sp.	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**3**	**0**	**0**	**2**	**1**	**0**	**0**	**2**	**0**
10°C	*Cl. perfringens*	2		1	1	1	1	1	1		1					1		1		3			2	1			1	
10°C	*Cl. tertium*																										1	
10°C	*Cl. tyrobutyricum*		2																									
10°C	*Corynebacterium sp.*											1						1										
	Enterococcus sp.	**2**	**4**	**1**	**1**	**4**	**4**	**4**	**3**	**2**	**4**	**7**	**4**	**4**	**4**	**1**	**3**	**2**	**1**	**4**	**4**	**5**	**3**	**0**	**0**	**0**	**0**	**0**
10°C	*En. aquamarinus*											1	1	1	1													
10°C	*En. avium*																					1						
10°C	*En. casseliflavus*											1																
10°C	*En. devriesei*					1								1			2											
10°C	*En. faecium*	2	2			2	3	3	2	1	2	1					1			2	1	2						
10°C	*En. hirae*		2	1	1	1	1	1	1	1	2	3	3	1	1					2	3	1	1					
10°C	*En. malodoratus*													1	1	1		1	1			1						
10°C	*En. mundtii*																						1					
10°C	*En. pseudoavium*											1			1			1					1					
10°C	*Escherichia coli*													1	1													
	Lactobacillus sp.	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**2**	**0**	**1**	**4**	**4**	**3**	**3**	**2**	**2**	**0**
10°C	*L. buchneri*																								1			
10°C	*L. coryniformis*			1	1									1	1	1	1	1	2					1	1	1	1	
10°C	*L. curvatus*																				1	3	3	1				
10°C	*L. plantarum*																						1	1	1	1	1	
10°C	*L. sakei*																					1						
10°C	*L. raffinolactis*																				2							
10°C	*Lelliottia amnigena*											1																
10°C	*Pantoea agglomerans*																				4							
10°C	*Pediococcus parvulus*																									1		1
10°C	***Pseudomonas sp.***		2	1	1									1														
10°C	*Rummelii Bac. suwonensis*										1																	
10°C	***Staphylococcus sp.***		1						1					1														
10°C	*Weissella hellenica*																						1					
temp.	**next organism**	**CM**									**CM+HC**									**CM+SO**								
	day	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*	*0*	*3*	*7*	*14*	*21*	*30*	*50*	*63*	*100*

21°C	***Acinetobacter sp.***			1	2			2															1						
21°C	*Aerococcus viridans*											1																		
	Bacillus sp.	**6**	**3**	**3**	**1**	**3**	**1**	**5**	**3**	**1**	**4**	**1**	**1**	**1**	**3**	**3**	**2**	**2**	**3**	**7**	**1**	**2**	**1**	**3**	**2**	**2**	**4**	**5**
21°C	*B. cereus*	2				1												1						1						
21°C	*B. kochii*							1																						
21°C	*B. licheniformis*	2	1			2		1			1								2	3		1				1	1	3
21°C	*B. mojavensis*																				1									
21°C	*B. mycoides*	1																												
21°C	*B. oleronius*																										1			
21°C	*B. pumilus*	1	1	3	1		1	2	2		1		1	1	3	2	2	1	1	2		1	1	2	2	1	2	1	
21°C	*B. siralis*															1														
21°C	*B. subtilis*		1						1	1										1										1
21°C	*B. subtilis Gruppe*										2	1																		
21°C	*B. thuringiensis*							1												1										
21°C	*Citrobacter freundii*		1																											
	Clostridium sp.		**2**		**1**	**1**	**2**	**1**		**2**				**1**		**1**	**3**	**1**					**1**			**1**	**1**		
21°C	*Cl. butyricum*															1														
21°C	*Cl. cadaveris*																										1			
21°C	*Cl. perfringens*		2		1	1	2	1		2				1			3	1					1			1				
21°C	*Corynebacterium casei*																					1								
	Enterococcus sp.	**2**	**7**	**5**	**3**	**2**	**3**	**4**	**1**	**1**	**2**	**1**	**2**	**3**	**1**	**1**	**4**	**4**	**1**	**1**	**1**	**3**	**1**							
21°C	*En. aquamarinus*										1																			
21°C	*En. avium*																	1												
21°C	*En. casseliflavus*							1							1			1												
21°C	*En. faecium*	2	6	2	2	1	2	1	1	1	1									1										
21°C	*En. hirae*		1	3	1	1	1	1					2								1	3	1							
21°C	*En. malodoratus*							1				1		1			1	1	1											
21°C	*En. pseudoavium*													2		1	2	1												
21°C	*En. thailandicus*																1													
21°C	*E. coli*		4	3	1	5	3	2	1				1	1	1															
	Lactobacillus sp.					**2**	**1**			**1**		**1**				**1**	**1**	**1**			**4**	**6**	**4**	**1**	**1**	**1**	**1**	**1**		
21°C	*La. acidipiscis*																1	1												
21°C	*La. brevis*					1																1								
21°C	*La. coryniformis*																						1		1					
21°C	*La. curvatus*																				1	3	1							
21°C	*La. pentosus*									1																				1
21°C	*La. plantarum*					1	1					1				1					3	2	2	1		1	1			
21°C	*Lysinbacillus sp.*(2)	1																												
21°C	*Pantoea agglomerans*	1																												
21°C	*Pediococcus parvulus*																							1						
21°C	*Serratia fonticola*			2																										
21°C	*Solibacillus silvestris*						1	1																						