

Point-of-care tests for bovine clinical mastitis: What do we have and what do we need?

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SUPPLEMENTARY FILE

Table 1. What do we have as point-of-care tests for bovine clinical mastitis? Characteristics summary of point-of-care tests available on the market for pathogen identification. (Table 1 near end section “3.1 Culture-dependent pathogen information”)

Test	Number/type of selective media	Pathogens identified by test	Turn-around time	Price per test ¹	Lab or farm-based validation	Sensitivity (%)	Specificity (%)	Accuracy (%)	References ²							
VétoSlide	Biplate: Gram-ve Gram+ve	No bacterial growth Gram+ve Gram-ve <i>E. coli</i>	24-48h	~ £6	Lab	82.0 ^a	76.8 ^a	79.2 ^a	Malcata <i>et al.</i> submitted							
						83.3 ^b	94.3 ^b	89.2 ^b								
						84.3 ^c	97.5 ^c	92.3 ^c								
VétoRapid	Triplate: Gram-ve <i>Staph.</i> <i>Strep. & enterococci</i>	No bacterial growth <i>E. coli</i> <i>Klebsiella spp.</i> <i>Staph. aureus</i> Non-aureus staph. (NAS) <i>Strep. uberis</i> <i>Enterococcus spp.</i> <i>Strep. dysgalactiae</i> <i>Strep. agalactiae</i>	24-48h	~ £13	Lab	91.3 ^a	77.7 ^a	82.4 ^a	Viora <i>et al.</i> 2014							
						NA ^b	NA ^b	NA ^b								
						66.7 ^c	92.5 ^c	86.8 ^c								
											Farm	83.3 ^d	93.5 ^d	92.6 ^d	Malcata <i>et al.</i> submitted	
												92.3 ^e	94.5 ^e	94.1 ^e		
												88.5 ^a	58 ^a	72.3 ^a		
												83.3 ^b	88.6 ^b	86.2 ^b		
												86.3 ^c	92.4 ^c	90.0 ^c		
												100 ^d	70.7 ^d	72.3 ^d		
												90.5 ^e	82.6 ^e	83.8 ^e		
Minnesota Easy Culture-Biplate	Biplate: Gram+ve Gram-ve	No bacterial growth Gram +ve Gram -ve <i>Staph. aureus</i>	18-24h	~ £1.55	Lab	78.4 ^a	82.5 ^a	81.0 ^a	Lago, 2009							
						73.1 ^b	86.5 ^b	83.0 ^b								
											Farm	97.9 ^a	67.5 ^a	NA ^a	McCarron <i>et al.</i> 2009a	
												80-85 ^a	79-87 ^a	81-84 ^a		
												58-72 ^b	92-97 ^b	89-90 ^b		
												50-69 ^c	93-97 ^c	91-94 ^c		
												58-63 ^d	92-96 ^d	91 ^d		
												3 ^e	99 ^e	82 ^e		
												78 ^a	78 ^a	NA		McCarron <i>et al.</i> 2009b
												98 ^d	82 ^d	NA		
Minnesota Easy Culture-Triplate	Triplate: Gram +ve Gram -ve <i>Strep. & Strep-like</i>	No bacterial growth Gram +ve Gram -ve <i>Staph. aureus</i> <i>Staph. spp.</i> <i>Strep. spp.</i>	18-24h		Lab	Different readers: 43.2-59.1 ^d	Different readers: 93.8-95.9 ^d	NA	Royster <i>et al.</i> 2014							
						80-86 ^a	76-93 ^a	83 ^a								
						60-78 ^b	96-97 ^b	90-93 ^b								
						50-69 ^c	93-97 ^c	91-94 ^c								
						52-78 ^d	92-98 ^d	90-93 ^d								
						5-11 ^e	97-98 ^e	29-57 ^e								
						60.0 ^a	82.9 ^a	81.3 ^a		Ferreira <i>et al.</i> 2018						
						55.6 ^b	93.9 ^b	80.2 ^b								

Table 1. (Cont.)

Test	Number/type of selective media	Pathogens identified by test	Turn-around time	Price per test ¹	Lab or farm-based validation	Sensitivity (%)	Specificity (%)	Accuracy (%)	References ²	
Petrifilm (Aerobic Count, Coliform Count, Staph Express Disk)	One	Using Aerobic Count & Coliform Count together: No bacterial growth Gram +ve Gram -ve <i>Staph. aureus</i> (Staph Express Disk)	24h + 3h with STX Disk 24h + 3h with STX Disk 24h	~ £1.50-3.50	Lab	93.8 ^a	70.1 ^a	NA	McCarron <i>et al.</i> 2009a	
						94 ^a	70 ^a	NA	McCarron <i>et al.</i> 2009b	
						Experienced reader: 97.4 ^d 92.1 ^d (STX Disk)	Experienced reader: 76.1 ^d 93.1 ^d (STX Disk)			
						Farm	64 ^a	48 ^a	NA	MacDonald, 2011
						Farm (by trained researcher)	85.2 ^a 89.9 ^b 88 ^d	75.4 ^a 88.4 ^b 66 ^d	NA	Mansion-de Vries <i>et al.</i> 2014
						58.6-85.3 ^a 58.3-72.2 ^b	81.5-97 ^a 78.1-94 ^b	58.6-85.3 ^a 58.3-72.2 ^b	Leimbach & Krömker, 2018	
AccuMast	Triplate: Gram -ve <i>Streptococci/Enterococci/</i> <i>Staphylococci</i>	No bacterial growth Gram -ve <i>E. coli</i> <i>Klebsiella/Enterobacter</i> <i>Strep. uberis</i> <i>Enterococcus</i> spp. <i>Lactococcus</i> spp. <i>Staph.</i> spp. <i>Staph. aureus</i>	16-20h	~ £5.50	Farm (by trained researcher)	81.6 ^b 75.0 ^c 100 ^d	98.9 ^b 97.9 ^c 99.8 ^d	96.4 ^b 95.7 ^c 99.8 ^d	Ganda <i>et al.</i> 2016	
					Lab	100 ^c	95.5 ^c	96.8 ^c	Ferreira <i>et al.</i> 2018	
SSGN Plate	Quad plate: Growth Gram -ve <i>Streptococci/</i> <i>Staphylococci</i>	No bacterial growth <i>Staph.</i> spp. <i>Staph. aureus</i> <i>Strep.</i> spp. <i>Strep. agalactiae</i> Gram -ve <i>E. coli/coliforms</i>	24-48h	~ £2.50	Lab	73.3 ^c	92.4 ^c	90.3 ^c	Ferreira <i>et al.</i> 2018	
Mastatest	One plate containing 24 wells	No bacteria <i>Strep. uberis</i> <i>Staph. aureus</i> <i>Staph.</i> spp. Gram -ve	22h	NA	Lab	80 ^a 77 ^b 85 ^d 88 ^e	94 ^a 100 ^b 96 ^d 80 ^e	NA	Jones <i>et al.</i> 2019	

Table 1. (Cont.)

Test	Number/type of selective media	Pathogens identified by test	Turn-around time	Price per test ¹	Lab or farm-based validation	Sensitivity (%)	Specificity (%)	Accuracy (%)	References ²
NeoFilm	Two: Growth Gram -ve	No bacterial growth Gram +ve Gram -ve	NA	NA	NA	NA	NA	NA	Lago & Godden, 2018
Point-of-cow	One cassette: Gram +ve Gram -ve	No bacterial growth Gram +ve Gram -ve	6-16h	~ £7.00	NV	NV	NV	NV	Fluimedix, 2017
MicroMast	Triplate: Gram -ve Streptococci Blood sheep agar non selective	<i>E. coli</i> <i>Klebsiella</i> spp. <i>Staph. aureus</i> Non-aureus staph. (NAS) <i>Strep. uberis</i> <i>Enterococcus</i> spp. <i>Strep. dysgalactiae</i> <i>Strep. agalactiae</i>	24h	~£5	NV	NV	NV	NV	Prášek, 2017
Selma	Triplate: Growth Gram -ve <i>Staphylococci</i> / <i>Enterococci</i>	No bacterial growth <i>Staph.</i> spp. <i>Staph. aureus</i> <i>Strep.</i> spp. Gram -ve	18-48h	~£2.80	NV	NV	NV	NV	SVA, 2019
Dip-slide Mastitis	Three: Growth Gram +ve Gram -ve	<i>Strep. uberis</i> <i>Staph. agalactiae</i> <i>Staph. aureus</i> <i>Pseudomonas</i> <i>Klebsiella</i> spp. <i>E. coli</i> <i>Proteus mirabilis</i>	18-48h	NA	NV	NV	NV	NV	Axonlab, 2019
Speed Mam Color	One mini culture plate	<i>Staph.</i> spp <i>Strep</i> spp <i>Strep. uberis</i> <i>E. coli</i> <i>Enterobacteriaceae</i> <i>Enterococcus</i> spp. <i>Mycoplasma</i> spp <i>Pseudomonas</i>	24-48h	NA	NV	NV	NV	NV	Manner, 2001

^aGram+ve, ^bGram-ve/coliform, ^c*E. coli*, ^d*S. aureus*, ^e*S. uberis*. NA: Information not available, NV: not validated

¹Price excludes any initial set-up costs; ²Reference detailed information provided in the supplementary information

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