

Type I Type II III IV

Fig. S1. Distribution of restriction-modification genes in 187 *S. aureus*. The phylogenomic tree of 187 *S. aureus* and aligned R-M genes show the lineage-specific distribution of the R-M genes. Both human and bovine IMI-associated *S. aureus* isolates mainly possessed Type I/II R-M systems and only few human isolates carried Type III/IV R-M genes. In the Type I R-M system, the green circular boxes indicate the Type I R-M system genes (*hsdR* and *hsdMS*) located in $vSa\alpha$ and $vSa\beta$ as part of the core genome. The blue circular boxes show additional Type I R-M *hsdRMS* genes which are not a part of the *S. aureus* core genome. While each of the *hsdMS* genes shown in green are interchangeable, part of the same R-M system, and should, in combination with the *hsdR*, form a functional complex, the Type I R-M system genes shown in blue would not be expected to be interchangeable, and would instead form a separate, and independent Type I R-M system. The isolates in red in the phylogenomic tree were originated from bovine. The colored circles represent the presence of the R-M genes, and the open circles indicate the inactivated R-M genes.

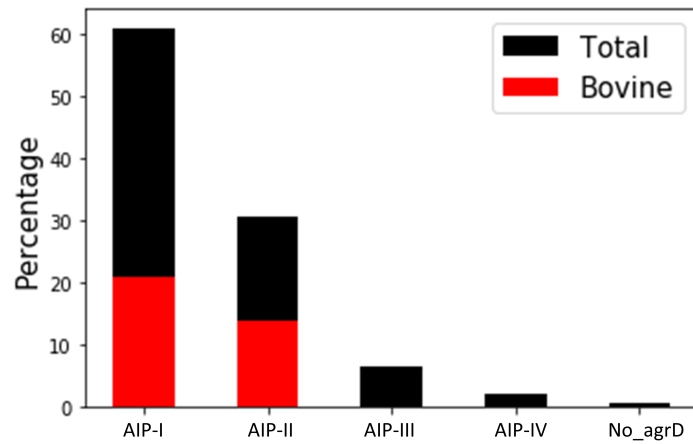


Fig. S2. Distribution of AIPs in 187 *S. aureus*. AIP-I precursor was the most prevalent in *S. aureus* in this study, followed by AIP-II. AIP-I and II were found in bovine isolates (n = 65), while all four known AIP types were found in human isolates (n = 122). Among human isolates, only small fraction of the population encoded AIP-III (n = 13) and AIP-IV (n = 4).

Additional File 1

No.	Strain name	Accession no. NCBI	Genome structure	Country of origin	Host	Disease/clinical information	ST	CC	year	Seq.	
1	Sa1	JAANBU00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	Legend
2	Sa3	JAANBR00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	SG Shotgun sequencing
3	Sa4	JAANGD00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	PB PacBio
4	Sa5	JAANCB00000000	Draft genome	Canada	Bovine	Intramammary infection	Unknown	Unknown	2007	I	I Illumina
5	Sa6	JAANCH00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	R Roche (454)
6	Sa7	JAANBN00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	SL SOLID
7	Sa8	JAANCD00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	O Oxford nanopore
8	Sa9	JAANBZ00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	IT Ion Torrent
9	Sa10	JAANCE00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	* Unknown or not applicable
10	Sa11	JAANCA00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	- Unknown or not applicable
11	Sa12	JAANCC00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	bold Reference strains
12	Sa14	JAANCF00000000	Draft genome	Canada	Bovine	Intramammary infection	ST3028	CC97	2007	I	y Yes
13	Sa16	JAANBM00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	n No
14	Sa17	JAANBL00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
15	Sa18	JAANBK00000000	Draft genome	Canada	Bovine	Intramammary infection	ST2185	CC151	2008	I	
16	Sa19	JAANBW00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
17	Sa21	JAANBX00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
18	Sa22	JAANYD00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
19	Sa23	JAANBP00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
20	Sa24	JAANSO00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
21	Sa25	JAANBO00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
22	Sa27	JAANBR00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2019	I	
23	Sa28	JAANHO00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2019	I	
24	Sa29	JAANBO00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2019	I	
25	Sa30	JAANBE00000000	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2019	I	
26	Sa31	JAANBE00000000	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
27	Sa1158c	SRR11471981	Draft genome	Canada	Bovine	Intramammary infection	ST8	CC8	2008	I	
28	Sa212	SRR11471976	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
29	Sa217	SRR11471989	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
30	Sa2539	SRR11471965	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
31	Sa2605	SRR11471994	Draft genome	Canada	Bovine	Intramammary infection	ST126	CC126	2008	I	
32	Sa2911	SRR11471986	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
33	Sa2925	SRR11471988	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
34	Sa2946	SRR11471975	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
35	Sa2954	SRR11471977	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
36	Sa2970	SRR11471973	Draft genome	Canada	Bovine	Intramammary infection	ST2270	CC126	2007	I	
37	Sa2978	SRR11471964	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2008	I	
38	Sa3003	SRR11471960	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
39	Sa3014	SRR11471958	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
40	Sa3022	SRR11471957	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
41	Sa3071	SRR11471985	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
42	Sa3129	SRR11471990	Draft genome	Canada	Bovine	Intramammary infection	ST2270	CC126	2008	I	
43	Sa3131	SRR11471991	Draft genome	Canada	Bovine	Intramammary infection	ST2270	CC126	2008	I	
44	Sa3137	SRR11471992	Draft genome	Canada	Bovine	Intramammary infection	ST2270	CC126	2008	I	
45	Sa3151	SRR11471971	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
46	Sa3154	SRR11471968	Draft genome	Canada	Bovine	Intramammary infection	ST351	CC151	2007	I	
47	Sa3199	SRR11471956	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
48	Sa3213	SRR11471970	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
49	Sa3247	SRR11471974	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
50	Sa3302	SRR11471972	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
51	Sa3336	SRR11471993	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2008	I	
52	Sa3363	SRR11471959	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
53	Sa3370	SRR11471963	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2008	I	
54	Sa3454	SRR11471984	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
55	Sa3456	SRR11471983	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
56	Sa3468	SRR11471982	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
57	Sa3489	SRR11471978	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
58	Sa3493	SRR11471962	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
59	Sa3498	SRR11471966	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
60	Sa3511	SRR11471969	Draft genome	Canada	Bovine	Intramammary infection	ST151	CC151	2007	I	
61	Sa3532	SRR11471980	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2007	I	
62	Sa3603	SRR11471979	Draft genome	Canada	Bovine	Intramammary infection	ST352	CC97	2008	I	
63	Sa3763	SRR11471987	Draft genome	Canada	Bovine	Intramammary infection	ST2187	CC97	2007	I	
64	RF122	NC_007622	Draft genome	Ireland	Bovine	Intramammary infection	ST151	CC151	1993	I	
65	Newbuild 305	NZ_AKYW0100001 - NZ_AKYW01000028	Highly assembled	Canada	Bovine	Clinical mastitis	ST115	CC97	1958	I	
66	04-002	NZ_CP038021	Highly assembled	USA	Human	Abdominal wound	ST30	CC30	2004	PB	
67	08-02119	NZ_CP015645	Highly assembled	Germany	Human	Wound infection	ST582	CC15	2008	PB, I	
68	08-02300	NZ_CP015646	Highly assembled	Germany	Human	Wound infection	ST77		2008	PB, I	
69	08BA02176	NC_018608	Highly assembled	Canada	Human	LA-MRSA origin, soft tissue infection of skin	ST398		2008	R	
70	11819-97	NC_017351, NC_017350	Highly assembled	Denmark	Human	CA-MRSA, skin abscess	ST80		1997	I, R	
71	135	NZ_CP022720, NZ_CP022721	Highly assembled	Germany	Human	Bacteremia	ST115	CC15	1994	I, PB	
72	16445	NZ_CP043302, NZ_CP043303	Highly assembled	USA	Human		ST8	CC8	2019	O	
73	293G	NZ_CP019591	Highly assembled	Canada	Human		ST398			I, PB	
74	502A	NZ_CP007454, NZ_CP007455	Highly assembled	USA	Human	Colonization	ST5	CC5	1963	PB	
75	5118.N	NZ_CP016855, NZ_CP016854, NZ_CP025482	Highly assembled	USA	Human	Nose from military trainee	ST8	CC8	2010	I	
76	6850	NC_022222	Highly assembled	USA	Human	Bacteremia	ST150			R, SG	
77	ATCC_25923	NZ_CP009361, NZ_CP009362	Highly assembled	USA	Human		ST243	CC30	1945	PB	
78	ATCC_6538	NZ_CP020020, NZ_CP020021	Highly assembled	Germany	Human	Pleural fluid	ST464	CC97	1884	PB, I	
79	ATCC_BAA-39	NZ_CP033505	Highly assembled	Kazakhstan	Human		ST464	CC97	2017	PB	
80	BSN9R	NZ_CP042348, NZ_CP042349	Highly assembled	USA	Human	Infective endocarditis	ST8	CC8	2018	O, I	
81	BSN9S	NZ_CP042346, NZ_CP042347	Highly assembled	USA	Human	Infective endocarditis	ST8	CC8	2018	O, I	
82	Ba62	NZ_CP012013, NZ_CP012014	Highly assembled	Brazil	Human	Blood stream infection	ST239	CC8	1996	R	
83	Bmb19393	NC_021670.1, NC_021657.1	Highly assembled	Brazil	Human	Blood stream infection	ST239	CC8	1993	R	
84	C2406	CP016690	Highly assembled	Canada	Human	USA300, Necrotizing pneumonia	ST8	CC8		PB	
85	C3948	CP020957	Highly assembled	Canada	Human	MSSA	ST8	CC8		PB	
86	C8879	NZ_CP020956	Highly assembled	Canada	Human	MRSA	ST8	CC8		PB	
87	CA-347	NC_021554, NC_021552	Highly assembled	USA	Human	USA600	ST45	CC45	2005	I, PB	
88	CA12	NZ_CP007672, NZ_CP007673	Highly assembled	Colombia	Human	Bacteremia	ST8	CC8	2007	PB	
89	CA15	NZ_CP007674, NZ_CP007675	Highly assembled	Colombia	Human	Bacteremia	ST8	CC8	2007	PB	
90	CC5	NZ_CP021105	Highly assembled	Brazil	Human	Respiratory tract infection	ST5	CC5	2014	I	
91	CC8	NZ_AP017377	Highly assembled	Russia	Human		ST8	CC8	2007	PB	
92	CHU15-056	NZ_CP021171	Highly assembled	Brazil	Human	Bloodstream infection	ST5	CC5	2015	I	
93	CMRSA3	CP02685, MH470063	Highly assembled	Canada	Human	MRSA	ST241	CC8		I, PB	
94	CMRSA6	CP027788	Highly assembled	Canada	Human	MRSA	ST239	CC8		I, PB	
95	CN1	NC_022226, NC_022227, NC_022228	Highly assembled	South Korea	Human	PVL-negative CA-MRSA	ST72	CC8		R	
96	COL	NC_002951, NC_006629	Highly assembled	USA	Human	MRSA	ST250	CC8	1976	SG	
97	Col52-A5	NZ_CP040580, NZ_CP040581	Highly assembled	Colombia	Human	Colonization	ST923	CC8	2017	PB	
98	DAR4145	NZ_CP010526	Highly assembled	India	Human	MRSA	ST772	CC1	2009	PB	
99	DSM_20231	NZ_CP011526, NZ_CP011527	Highly assembled	Human			ST8	CC8	1884	PB	
100	E16SA093	NZ_CP031131	Highly assembled	South Korea	Human	Blood stream infection	ST72	CC8	2016	PB	
101	ECT-R2	NC_017343, NC_017346, NC_017344	Highly assembled	Sweden	Human	MR-MSSA	ST5	CC5	2005	R	
102	EDCC5464	NZ_CP022291	Highly assembled	Germany	Human	Implant associated bone infection	ST22	CC22	2015	PB	
103	F17SA003	NZ_CP031130	Highly assembled	South Korea	Human	Blood stream infection	ST72	CC8	2017	PB	
104	FCFHV36	NZ_CP011147	Highly assembled	Brazil	Human	Osteomyelitis	ST105	CC5	2010	I	

105	FORC_012	NZ_CP010998	Highly assembled	South Korea	Human	Sputum	ST72	CC8	2009	I, PB
106	FORC_045	NZ_CP017115	Highly assembled	South Korea	Human		ST1	CC1	2014	PB
107	FORC_061	NZ_CP022607, NZ_CP022608	Highly assembled	South Korea	Human	Food poisoning	ST72	CC8	2017	PB
108	FORC_062	NZ_CP022582	Highly assembled	South Korea	Human	Food poisoning	ST5	CC5	2017	PB
109	GN1	NZ_AP018349	Highly assembled	Japan	Human	MSSA	ST50		2005	PB
110	GN3	NZ_AP017891	Highly assembled	Japan	Human	MSSA	ST50		2005	PB
111	GR2	NZ_CP010402, NZ_CP010403, NZ_CP010404	Highly assembled	Greece	Human		ST80		2006	R, I
112	Gv88	NZ_CP012018, NZ_CP012017	Highly assembled	Brazil	Human	Wound infection	ST239	CC8	1997	R
113	H-EMRSA-15	NZ_CP007659	Highly assembled	Belgium	Human	Abscess	ST22	CC22	2011	I
114	H489	NZ_CP020659	Highly assembled	Canada	Human	MSSA	ST8	CC8		PB
115	HC1340	NZ_CP012011	Highly assembled	Brazil	Human	Nasa colonization	ST239	CC8	2001	R
116	HOU1444-VR	NZ_CP012593, NZ_CP012594, NZ_CP012595, NZ_CP012596	Highly assembled	Brazil	Human	Bacteremia	ST5	CC5	2012	PB
117	HO_5096_0412	NC_017763	Highly assembled	UK	Human	Fatal neonatal infection	ST22	CC22	2005	I
118	HUV05	NZ_CP007676, NZ_CP007677, NZ_CP007678, NZ_CP007679	Highly assembled	Colombia	Human	Bacteremia	ST8	CC8	2006	PB
119	HZJH450	NZ_CP020741	Highly assembled	China	Human	Impetigo	ST59		2016	PB
120	IT1-S	NZ_CP028468, NZ_CP028469	Highly assembled	Italy	Human	Endocarditis	ST22	CC22	2013	I
121	IT4-R	NZ_CP028470, NZ_CP028471	Highly assembled	Italy	Human	Endocarditis	ST22	CC22	2013	I
122	J01	NZ_CP040619, NZ_CP040620, NZ_CP040621	Highly assembled	USA	Human	Infective endocarditis	ST8	CC8	2011	I, PB
123	JE2	NZ_CP020619	Highly assembled	USA	Human	Soft tissue infections	ST8	CC8	2013	I, PB
124	JH4899	NZ_AP014921, NZ_AP014922	Highly assembled	Japan	Human	Invasive growth	ST8	CC8	2013	I
125	JK3137	CP020960	Highly assembled	Canada	Human	MRSA	ST8	CC8		PB
126	JKD6004-DR	NZ_CP040625	Highly assembled	USA	Human		ST239	CC8	2019	I
127	JKD6004	NZ_CP040622	Highly assembled	Australia	Human	Pacemaker abscess	ST239	CC8	2004	I, PB
128	JKD6008	CP002120	Highly assembled	New Zealand	Human	MRSA, VSSA	ST239	CC8	2003	R, SG, SL
129	JMUB1273	NZ_AP018922	Highly assembled	Japan	Human	Subcutaneous abscess	ST188	CC1	2016	I, O
130	JMUB3031	NZ_AP018923, NZ_AP018924	Highly assembled	Japan	Human	Subcutaneous abscess	ST1	CC1	2017	PB, I
131	JP02758	NZ_AP017922, NZ_AP017923	Highly assembled	Japan	Human	Super biofilm-elaborating	Unknown	Unknown	2005	PB
132	KG-03	NZ_AP019542	Highly assembled	Japan	Human	Persistent bacteremia	ST5	CC5	2015	PB, I
133	KG-18	NZ_AP019543, NZ_AP019544	Highly assembled	Japan	Human	VISA	ST5	CC5	2015	PB, I
134	KG-22	NZ_AP019545, NZ_AP019546	Highly assembled	Japan	Human	VISA	ST5	CC5	2015	PB, I
135	KUH140046	NZ_AP020313, NZ_AP020314	Highly assembled	Japan	Human	MRSA	ST8	CC8	2014	I, O
136	KUH140331	NZ_AP020316, NZ_AP020317	Highly assembled	Japan	Human	MRSA	ST188	CC1	2014	I, O
137	KUH180062	NZ_AP020320, NZ_AP020321	Highly assembled	Japan	Human		ST764	CC5	2018	I, O
138	KUN1163	NZ_AP020324, NZ_AP020325	Highly assembled	Japan	Human		ST764	CC5	2006	I, O
139	M013	NC_018928, NZ_CP039966	Highly assembled	Taiwan	Human	CA-MRSA	ST59		2002	R
140	M121	NZ_CP007670, NZ_CP007671	Highly assembled	Colombia	Human	Healthy volunteer	ST8	CC8	2004	I, PB
141	M92	CP015447	Highly assembled	Canada	Human	MRSA, Colonization	ST5354	CC8		PB
142	MI	NZ_AP017320, NZ_AP017321	Highly assembled	Human	Human	VISA, Peritonitis	ST5	CC5	1997	I, PB
143	MRSA252	NC_009592	Highly assembled	UK	Human	MRSA, Fatal bacteremia	ST36	CC30	1997	
144	MS4	NZ_CP008628	Highly assembled	China	Human	Wound exudate of bone fracture	ST338		2012	I, PB
145	MSSA476	BX571857, BX571858	Highly assembled	Human	Human	Osteomyelitis and bacteremia	ST1	CC1	1998	
146	MW2	BA000033, AP004932	Highly assembled	USA	Human	CA-MRSA, septicemia and septic arthritis	ST1	CC1	1998	SG
147	Mu50	BA000017, AP003367	Highly assembled	Japan	Human	Surgical wound infection, VRSA	ST5	CC5	1997	SG
148	N315	BA000018, AP003139	Highly assembled	Japan	Human	Pharyngeal smear, mecA but methicillin susceptible	ST5	CC5	1982	
149	NCCP18830	NZ_CP003843, NZ_CP043844	Highly assembled	South Korea	Human	Diabetes, uricace	ST513		2008	PB, IT
150	NCTC8325	NC_007795	Highly assembled	Human	Human	Toxic-shock syndrome, staphylococcal scarlet fever	ST8	CC8		
151	NML151290	MEG20000001- MEG20000008	Highly assembled	Canada	Human	Endocarditis and septic arthritis	ST25			I
152	NP66	NZ_CP041037	Highly assembled	South Africa	Human	Pus aspirate	ST12		2018	PB
153	Newman	NC_009641	Highly assembled	UK	Human		ST254	CC8	1952	SG
154	Newman_D2C	NZ_CP023391	Highly assembled	Human	Human	Osteomyelitis	ST254	CC8	1970	I
155	PCFH-226	NZ_CP035005, NZ_CP035006	Highly assembled	South Korea	Human	Healthy, hand	ST541		2017	PB
156	R46	NZ_CP039164, NZ_CP039165, NZ_CP039166	Highly assembled	Pakistan	Human		ST113	CC8	2017	I
157	RVM1607	NZ_CP013619, NZ_CP013620	Highly assembled	Netherlands	Human		ST398		2008	R, I
158	RVM3897	NZ_CP013621	Highly assembled	Netherlands	Human	LA-MRSA, nosocomial transmission	ST398		2008	R, I
159	RK14	NZ_CP011528, NZ_CP011529	Highly assembled	Germany	Human	Staphylococcal food poisoning	ST27	CC8	2008	I, PB
160	S57	NZ_CP003136	Highly assembled	Brazil	Human	Osteomyelitis	ST9	CC1	2010	PB
161	SA288	NZ_CP006630	Highly assembled	China	Human		ST59		2012	I
162	SAW1	NZ_CP045468, NZ_CP045469, NZ_CP045470, NZ_CP045471	Highly assembled	China	Human	Endocarditis	ST59		2018	O
163	SR153	NZ_CP048643, NZ_CP048644, NZ_CP048645, NZ_CP048646	Highly assembled	China	Human	Acute pancreatitis	ST5	CC5	2013	PB
164	SR434	NZ_CP019563, NZ_CP019564, NZ_CP019565, NZ_CP019566, NZ_CP019567	Highly assembled	China	Human	Skin abscess	ST88		2015	PB
165	SVH7513	NZ_CP029166, NZ_CP029167, NZ_CP029165	Highly assembled	Australia	Human	Cellulitis	ST612	CC8	2009	PB, I
166	Seattle_1945	NZ_CP021907, NZ_CP021908	Highly assembled	Germany	Human	PVL+	ST243	CC30	2013	I
167	T0131	NC_017347	Highly assembled	China	Human	MRSA	ST239	CC8	2006	R
168	TCH60	NC_017342, NC_017345, NZ_CP019305	Highly assembled	Human	Human	MRSA	ST4618	CC30		R
169	TUM9458	NZ_AP019305	Highly assembled	Human	Human		ST2389	CC5	2008	I, O
170	TUM9463	NZ_AP019306	Highly assembled	Human	Human		ST2389	CC5	2009	I, O
171	TW20	NC_017331, NC_017352, NC_017332	Highly assembled	UK	Human	MRSA	ST239	CC8	2003	
172	Tager_104	NZ_CP012409	Highly assembled	USA	Human	Cutaneous abscess	ST49		1947	I, PB
173	UC128	NZ_CP018768, NZ_CP018769	Highly assembled	USA	Human	No contact with swine	ST5	CC5	2009	PB, I
174	UC162	NZ_CP018766, NZ_CP018767	Highly assembled	USA	Human	No contact with swine	ST5	CC5	2010	PB, I
175	USA300_FPR3757	CP000255, CP000256, CP000257, CP000258	Highly assembled	USA	Human	MRSA	ST8	CC8		SG
176	USA300_TCH1516	NC_010079, NC_010083, NC_012417	Highly assembled	USA	Human	CA-MRSA	ST8	CC8		R
177	USA500	NZ_CP007499, NZ_CP007500	Highly assembled	USA	Human		ST8	CC8		I, PB
178	USA_100	NZ_CP029474, NZ_CP029475	Highly assembled	USA	Human		ST5	CC5	2015	I, O
179	UTSW_MRSA_55	NZ_CP013231, NZ_CP013227, NZ_CP013228, NZ_CP013229, NZ_CP013230	Highly assembled	USA	Human	Osteomyelitis, MRSA	ST8	CC8	2013	PB
180	V2200	NZ_CP007657	Highly assembled	Venezuela	Human	Osteomyelitis	ST923	CC8	2007	PB
181	VGC1	NZ_CP039448, NZ_CP039449, NZ_CP039450	Highly assembled	Taiwan	Human	Pneumonia and bacteremia	ST59		2013	I, O
182	WCH-SK2	NZ_CP031537	Highly assembled	Australia	Human	Pneumoniae, SSTI, Cystic fibrosis	ST239	CC8	2009	PB
183	WCUH29	NZ_CP039156	Highly assembled	Poland	Human	MRSA, Osteomyelitis	ST5	CC5	2004	PB
184	XQ	NZ_CP013137	Highly assembled	China	Human	Acute skin infections	ST121		2009	IT
185	Z172	NC_022604, NC_022610, NC_022605	Highly assembled	Taiwan	Human	VISA, Bacteremia	ST239	CC8	2010	I, PB
186	ZJ5499	NZ_CP011685	Highly assembled	China	Human	Pulmonary infection	ST5	CC5	2010	I
187	ZY05	NZ_CP045472, NZ_CP045473	Highly assembled	China	Human	Toxic shock syndrome	ST338		2016	PB

Additional File 2

Sample	Mastitis Association	SampleType	MastitisScore	SCC (x 1,000 cells/mL)
Sa6	No	L1	0	214
Sa4	No	L1	0	886
Sa14	No	L1	0	77
Sa10	Yes	M1	3	missing value
Sa8	Yes	M1	2	missing value
Sa12	Yes	M1	3	missing value
Sa5	No	V1	missing value	4133
Sa11	No	T1	0	445
Sa9	No	L2	0	11
Sa22	Yes	M1	1	missing value
Sa21	No	T1	0	231
Sa19	Yes	M2	missing value	missing value
Sa1	No	L1	0	1008
Sa24	Yes	M1	2	missing value
Sa3	No	L2	1	3534
Sa23	Yes	M1	2	missing value
Sa25	Yes	M2	missing value	4571
Sa7	No	T1	0	126
Sa16	Yes	M1	2	missing value
Sa17	No	T1	0	8483
Sa18	Yes	M1	1	missing value
Sa27	Yes	M1	2	missing value
Sa28	Yes	M1	1	missing value
Sa29	Yes	M1	2	missing value
Sa30	Yes	M1	1	missing value
Sa31	Yes	M1	3	missing value
Sa2112	No	L1	0	5162
Sa2605	No	T2	0	-2
Sa2946	No	T1	0	499
Sa2954	No	V1	0	2611
Sa2970	No	T1	0	3134
Sa2978	No	L1	0	1452
Sa3151	No	T1	0	1616
Sa3247	Yes	M2	0	2706
Sa3302	No	T2	0	6038
Sa3336	No	L3	0	928
Sa3489	No	L1	0	11
Sa3532	No	L3	missing value	149
Sa3603	No	L3	0	1713
Sa3763	Yes	M1	1	missing value
Sa3511	Yes	M1	1	missing value
Sa2539	No	L1	0	398
Sa3370	No	L1	0	3525
Sa3003	No	L1	0	2620
Sa3014	Yes	M2	missing value	47
Sa3199	Yes	M1	2	missing value
Sa3131	No	T1	0	2188
Sa2117	No	L1	0	404
Sa2911	No	L1	0	489
Sa3454	Yes	M1	1	missing value
Sa3468	Yes	M1	1	missing value
Sa3493	No	L1	0	11
Sa3353	No	L1	0	1273
Sa3022	Yes	M1	2	missing value
Sa3137	No	T1	0	1577
Sa3129	No	T1	0	198
Sa2925	No	L1	0	972
Sa3071	No	L1	0	9
Sa3456	Yes	M1	missing value	7159
Sa1158c	No	L2	0	440
Sa3213	Yes	M1	2	missing value
Sa3154	Yes	M1	2	missing value
Sa3498	No	L1	0	missing value

Legend	
M1	day of diagnostic
M2	+ 14 days after diagnostic
L1-L3	during lactation
T1 and T2	before drying-off
V1	after calving

Additional File 3

Primers	Nucleotides Sequence (5'-3')	Target gene
blaZ-F	CAAAGATGATATAGTTGCTTATTCTCC	<i>blaZ</i>
blaZ_R	TGCTTGACCACTTTTATCAGC	<i>blaZ</i>
hsdM_F	ATGTCTATTACTGAAAAACAACG	<i>hsdM</i>
hsdM_R	TTACTCATCTTTCAACACCC	<i>hsdM</i>
CC97_hsdSb_F	ATAAGAGTGATAAATTTAACCCCTC	<i>hsdS</i>
CC97_hsdSb_R	GCTGCAATTCAATTAGTTTTTCATTTT	<i>hsdS</i>
USA500_hsdSa_F	AGATAGAGTAATTAGGAAAAATAAAAAAC	<i>hsdS</i>
USA500_hsdSa_R	TTTTTAATTGTTTATATTTTAAGTTCC	<i>hsdS</i>

Additional File 4

VFclass	Virulence factors	Related genes
	Autolysin	atl
	Cell wall associated fibronectin binding protein	ebh
	Clumping factor A	clfA
	Clumping factor B	clfB
	Elastin binding protein	ebp
	Fibrinogen binding protein	efb
	Fibronectin binding proteins	fnbA fnbB
Adherence		icaA icaB icaC icaD icaR sdrC sdrD sdrE
	Intercellular adhesion	
	Ser-Asp rich fibrinogen-binding proteins	sdrD sdrE
	Staphylococcal protein A	spa
	Cysteine protease	sspB sspC
	Hyaluronate lyase	hysA
	Lipase	geh lip
	Serine V8 protease	sspA
Enzyme		spIA spIB spIC spID spIE spIF
	Serine protease	spIC spID spIE spIF
	Staphylocoagulase	coa
	von Willebrand factor-binding protein	vWbp-bov
	Thermonuclease	nuc
		capA cap8B cap8C cap8D cap8E cap8F cap8G cap5H cap5I cap5J cap5K cap8H cap8I cap8J cap8K cap8L cap8M capN cap8O cap8P
Immune evasion	Capsule	

	APH3-PRIME	aph3-prime
MDR regulator	ARLR	arlR
	ARLS	arlS
	BLAI	blai
Penicillin resistance	BLAR	blaR
	BLAZ	blaZ
Phenicol resistance	DHAP	dhaP
Fosfomycin resistance	FOSB	fosB
Biocide resistance	LMRS	lmrS
Lincosamide resistance	LNUA	linA
beta-lactam resistance	MECA	mecA
	MECR	mecR
	MEPA	mepA
Multi-drug resistance	MEPB	mepB
	MEPR	mepR
MDR regulator	MGRA	mgrA
Biocide resistance	NORA	norA
	NORB	norB
Biocide resistance	QACC	qacC
MLS resistance	RLMH	rlmH
	TET38	tet38
Tetracycline resistance	TETK	tetK
	TETM	tetM