

Annex E – Data reported on antimicrobial resistance in MRSA from food-producing animals and derived meat

Annex to:

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Table 1a: Meticillin-resistant *Staphylococcus aureus* in food, 2020

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Meat from bovine animals				
Netherlands	Fresh – Retail Monitoring	Single	52	2 (3.8%)*
Meat from broilers (<i>Gallus gallus</i>)				
Netherlands	Fresh (chilled) – Retail Monitoring	Single	234	36 (15.9%)*
Austria	Fresh – Retail Monitoring	Batch	306	8 (2.6%)(a)
Meat from pigs				
Netherlands	Fresh – Retail Monitoring	Single	57	2 (3.5%)*
Slovakia	Fresh – Retail surveillance	Batch	63	13 (20.6%)*
Meat from turkey				
Netherlands	Fresh (chilled) – Retail Monitoring	Single	14	5 (35.7%)*
Meat from Sheep				
Germany	Fresh (chilled/frozen) – Retail Monitoring	Single	386	11 (2.8%)(b)
Meat from other animals or unspecified				
Netherlands	Sampling at border control post (monitoring)	batch	1	0
Meat from deer				
Netherlands	Sampling at border control post (monitoring)	batch	1	0
Soft and semi-soft cheese				
Germany	Made from raw or low heat-treated milk – retail monitoring	single	345	0

(a) *Spa*-types: t011 (4 isolates), t034 (4)

(b) *Spa*-types: t011 (2), t034 (1), t1451 (1), t2576 (1), t19979 ST 398 (1), t223 (2), t267 (1), t1154, ST5 (1) t15010 ST97 (1)

* *Spa*-types not provided

Table 1b: Meticillin-resistant *Staphylococcus aureus* in food, 2019

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Meat from bovine animals				
Austria	Fresh – Retail Monitoring	Batch	228	6 (2.6%) ^(a)
Netherlands	Fresh – Retail Monitoring	Single	286	11 (3.8%)*
Switzerland	Fresh (chilled) – Retail Monitoring	Single	309	2 (0.6%) ^(b)
Meat from broilers (<i>Gallus gallus</i>)				
Netherlands	Fresh (chilled) – Retail Monitoring	Single	237	41 (17.3%)*
Meat from pigs				
Austria	Fresh – Retail Monitoring	Batch	318	50 (15.7%) ^(c)
Netherlands	Fresh – Retail Monitoring	Single	296	25 (8.4%)*
Switzerland	Fresh (chilled) – Retail Monitoring	Single	311	1 (0.3%) ^(d)
Meat from turkey				
Netherlands	Fresh (chilled) – Retail Monitoring	Single	14	9 (64.3%)*
Milk from cows				
Germany	Raw milk for manufacture – Farm Monitoring (active)	Single	366	28 (7.7%)*

(a): *spa*-types: t008 ST8 (1 isolate), t011 (2), t127 ST1 (2), t2346 (1). The t008 isolate was PVL-positive; the two t127 isolates were PVL-negative.

(b): *spa*-types were not reported; however, both isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

(c): *spa*-types: t002 ST5 (1 isolate), t003 ST3944 (1), t008 ST8 (1), t011 (22), t011 ST398 (1), t034 (12), t127 ST1 (2), t321 ST5050 (1), t843 ST130 (1), t899 (5), t1451 (2), t1456 (1). The t002 and t008 isolates were PVL-positive. The two t127 isolates, as well as the single t003 and t321 isolates were PVL-negative. The t843 isolate was reported to carry the *mecC* gene. [Additional *ad hoc* sampling of pig meat by Austria revealed MRSA *spa*-types t011 (2 isolates), t034 (1) and t012 ST30 (1); the t012 isolate was PVL-negative. The isolates recovered from additional *ad hoc* sampling are not included in the prevalence data of Table 1b.]

(d): *spa*-type was not reported; however, the isolate was confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

* *spa*-types not reported.

Table 2a: Meticillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations excluded, 2020

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
<i>Gallus gallus</i> (fowl)				
Belgium	Broilers, nasal swabs – OFM	Herd/flock	60	2 (3.3%)(a)
Belgium	Layers, nasal swabs – OFM	Herd/flock	28	0
Turkeys				
Belgium	Nasal swabs – OFM	Herd/flock	18	2 (11.1%)(b)
Pigs				
Netherlands	Fattening pigs, dust swabs – Farm Surveillance	Herd/flock	62	49 (74.2%)*
Slovakia (c)	Fattening pigs, caeca, abattoir	Animal	89	16 (18.0%)*
Norway	OFCEP, pooled skin swabs & pooled environmental swabs	Herd/flock	641	0 (g)
Fur animals (d)				
Finland	Mink, farmed, pharyngeal swabs and paw swabs, on farm survey	Herd/flock	15	0
Finland	Raccoon dogs, pharyngeal swabs and paw swabs, on farm survey	Herd/flock	1	0
Finland	Foxes, farmed, pharyngeal swabs and paw swabs, on farm survey	Herd/flock	11	0
Wild boar				
Germany	Nasal swabs – hunted wild boars	Animal	262	2 (0.8%)*
Wild fish				
Germany	Organ/tissue	Animal	103	1 (1.0%)*

(a) *Spa*-types: t011 (2 isolates)

(b) *Spa*-types: t011 (2 isolates)

(c) data were reported as suspect sampling

(d) two types of samples from the same animals. Samples represented 1-4 animals from the same herd. Animals had been submitted for post mortem or exclusion of SARS CoV 2 infection

* *Spa*-types not reported

Table 2b: Meticillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations excluded, 2019

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cattle (bovine animals)				
Denmark	Veal calves (under 1 year), nasal swabs – Farm Survey (National Survey)	Herd/flock	115	11 (9.6%) ^(a)
	Dairy cows, nasal swabs – Farm Survey (National Survey)	Herd/flock	131	2 (1.5%) ^(b)
Switzerland	Calves (under 1 year), nasal swabs – SHM	Animal	299	11 (3.7%) ^(c)
Gallus gallus (fowl)				
Denmark	Broilers, boot swabs – Farm Survey (National Survey)	Herd/flock	83	0
Pigs				
Belgium	Breeding animals (sows), nasal swabs – OFM (active)	Herd/flock	179	83 (46.4%) ^(d)
	Fattening pigs, nasal swabs – OFM (active)	Herd/flock	180	105 (58.3%) ^(e)
Denmark	Breeding animals (multiplier herds), nasal swabs – Farm Survey (National Survey)	Herd/flock	73	69 (94.5%) ^(f)
Germany	Fattening pigs, boot swabs – OFM (active)	Herd/flock	389	139 (35.7%)*
Netherlands	Fattening pigs, dust swabs – Farm Surveillance	Herd/flock	89	66 (74.2%)*
Norway	OFCEP, pooled skin swabs & pooled environmental swabs	Herd/flock	722	1 (0.1%) ^(g)
Portugal	Fattening pigs, nasal swabs – SHM	Batch	171	171 (100%) ^(h)
Switzerland	Fattening pigs, nasal swabs – SHM	Animal	303	160 (52.8%) ⁽ⁱ⁾
Horses				
Denmark	Nasal swabs – Farm Survey (National Survey)	Herd/flock	120	13 (10.8%) ^(j)

OFM: On-farm monitoring; OFCEP: On-farm control and eradication programme; SHM: slaughterhouse monitoring.

(a): *spa*-types: t011 CC398 (1 isolate), t034 CC398 (8), t779 CC398 (1), t1580 CC398 (1).

(b): *spa*-types: t127 CC1 (1 isolate), t843 CC130 (1). The t127 isolate was PVL-negative, as well as negative for the human IEC gene *scn*. *spa*-type t843 was confirmed to carry the *mecC* gene.

(c): *spa*-types were not reported; however, all 11 isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

(d): *spa*-types: t011 CC398 (57 isolates), t034 CC398 (18), t108 CC398 (2), t779 CC398 (1), t2346 CC398 (1), t2582 CC398 (1), t2922 CC398 (1), t3119 CC398 (2).

(e): *spa*-types: t011 CC398 (67 isolates), t034 CC398 (11), t1451 CC398 (2), t1457 CC398 (1), t2346 CC398 (1), t2370 CC398 (2), t2383 CC398 (1), t3041 CC398 (1), t3119 CC398 (1), unspecified (18).

(f): *spa*-types: t011 CC398 (10 isolates), t034 CC398 (57), t1928 CC398 (1), t4652 CC398 (1).

(g): *spa*-type: t034 CC398 (1 isolate).

(h): *spa*-types: t011 CC398 (3 isolates), unspecified (168).

(i): *spa*-types were not reported; however, 159/160 isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011). The remaining isolate did not survive cryo-conservation, therefore molecular typing could not be performed.

(j): *spa*-types: t011 CC398 (4 isolates), t034 CC398 (6), t1451 CC398 (1), t843 CC130 (1), t3256 CC130 (1). *spa*-types t843 and t3256 were confirmed to carry the *mecC* gene.

* *spa*-types not reported.

Table 3a: Meticillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations, 2020

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	(%) positive for MRSA
Cattle (bovine animals)				
Slovakia	Dairy cows – OFCI	Animal	5	0
Goats				
Slovakia	Production type unspecified – OFCI	Animal	2	0

OFCI: On-farm clinical investigations.

Table 3b: Meticillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations, 2019

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	(%) positive for MRSA
Cattle (bovine animals)				
Slovakia	Production type unspecified – OFCI	Animal	3	0
	Calves (under 1 year) – OFCI	Animal	2	0
	Dairy cows – OFCI	Animal	65	0
Gallus gallus (fowl)				
Slovakia	Broilers (day-old chicks) – OFCI	Animal	2	0
Goats				
Slovakia	Production type unspecified – OFCI	Animal	8	0
Sheep				
Slovakia	Production type unspecified – OFCI	Animal	1	0
	Milk ewes – OFCI	Animal	20	0

OFCI: On-farm clinical investigations.

Table 4a: Meticillin-resistant *Staphylococcus aureus* in non-food-producing animals, clinical investigations, 2020

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	(%) positive for MRSA
Cats				
Netherlands	VCCI	Animal	1569	12 (0.8%)*
Slovakia	VCCI	Animal	9	0
Dogs				
Netherlands	VCCI	Animal	1363	6 (0.4%)*
Slovakia	VCCI	Animal	23	0
Horses				
Netherlands	OFCI	Animal	772	42 (5.4%)*
Slovakia	VCCI	Animal	2	0
Other pets				
Netherlands	VCCI, pet birds, unspecified	Animal	1	1 (100%)
Slovakia	VCCI, Rabbits	Animal	1	0
Slovakia	VCCI, Guinea pigs	Animal	1	0
Wild animals				
Slovakia	VCCI, Falcons	Animal	1	0
Slovakia	VCCI, Squirrels	Animal	1	0

VCCI: At-veterinary-clinic clinical investigations; OFCI: On-farm clinical investigations.

* *spa*-types not reported.**Table 4b:** Meticillin-resistant *Staphylococcus aureus* in companion animals, clinical investigations, 2019

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	(%) positive for MRSA
Cats				
Netherlands	VCCI	Animal	428	2 (0.5%)*
Dogs				
Netherlands	VCCI	Animal	874	5 (0.6%)*
Horses				
Netherlands	OFCI	Animal	270	33 (12.2%)*

VCCI: At-veterinary-clinic clinical investigations; OFCI: On-farm clinical investigations.

* *spa*-types not reported.

Table 5: Temporal trends in prevalence of meticillin-resistant *Staphylococcus aureus* in various types of meat (at retail monitoring), four reporting countries, 2018-2020

Country	Year	Production type/description	Sample unit	Method of isolation	Number	
					Units tested	Positive for MRSA (%)
Meat from broilers (<i>Gallus gallus</i>)						
Austria	2018	Fresh – ARM	Single	1-S	298	3 (1,0 %) ^(a)
	2020	Fresh – ARM	batch	1-S	306	8 (2,6 %) ^(b)
Germany	2011	Fresh – ARM	Single	2-S	404	107 (26.5%)*
	2013	Fresh – ARM	Single	2-S	443	107 (24.2%)*
	2016	Fresh – ARM (active)	Single	2-S	422	55 (13.0%)*
	2018	Fresh (skinned) – ARM (active)	Single	2-S	444	73 (16.4%)*
Netherlands	2018	Fresh (chilled) – ARM	Single	1-S	129	26 (20.2%)*
	2019	Fresh (chilled) – ARM	Single	1-S	237	41 (17.3%)*
	2020	Fresh (chilled) – ARM	Single	1-S	234	36 (15.4 %)*
Switzerland	2016	Fresh – ARM	Single	2-S	302	9 (3.0%) ^(c)
	2018	Fresh – ARM	Single	2-S	312	4 (1.3%) ^(d)
Meat from turkeys						
Germany	2012	Fresh – ARM	Single	2-S	749	282 (37.7%)*
	2014	Fresh – ARM (active)	Single	2-S	339	144 (42.5%)*
	2016	Fresh – ARM (active)	Single	2-S	458	204 (44.5%)*
	2018	Fresh (skinned) – ARM (active)	Single	2-S	525	224 (42.7%)*
Netherlands	2018	Fresh (chilled) – ARM	Single	1-S	3	3 (100%)*
	2019	Fresh (chilled) – ARM	Single	1-S	14	9 (64.3%)*
	2020	Fresh (chilled) – ARM	Single	1-S	14	5 (35.7%)*
Meat from bovine animals						
Netherlands	2018	Fresh – ARM	Single	1-S	140	3 (2.1%)*
	2019	Fresh – ARM	Single	1-S	286	11 (3.8%)*
	2020	Fresh – ARM	Single	1-S	52	2 (3.8 %)*
Switzerland	2017	Fresh (chilled) – ARM	Single	2-S	299	0
	2019	Fresh (chilled) – ARM	Single	1-S	309	2 (0.6%) ^(e)
Meat from pigs						
Netherlands	2018	Fresh – ARM	Single	1-S	135	8 (5.9%)*
	2019	Fresh – ARM	Single	1-S	296	25 (8.4%)*
	2020	Fresh – ARM	Single	1-S	57	2 (3.5 %)*
Switzerland	2017	Fresh (chilled) – ARM	Single	2-S	301	2 (0.7%) ^(f)
	2019	Fresh (chilled) – ARM	Single	1-S	311	1 (0.3%) ^(g)

ARM: at retail monitoring. Method of isolation: 1-S (1 step method); 2-S (2 step method).

 (a) *spa*-types t011 (2 isolates), t034 (1)

 (b) *spa*-types t011 (4), t034 (4)

 (c) *spa*-types: t034 (3 isolates), t153 (1), t1430 (3), t2123 (2). PVL status of the t153 isolate was not reported.

 (d) *spa*-types: t034 CC398 (1 isolate), t1430 (1), t571 CC398 (1), t13177 (1)

 (e) *spa*-types were not reported; however, both isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

 (f) *spa*-types t002 (1 isolate), t011 (1)

 (g) *spa*-type was not reported; however, the isolate was confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

 * *spa*-types not reported.

Table 6: Temporal trends in prevalence of meticillin-resistant *Staphylococcus aureus* in various food-producing animals, five reporting countries, 2018-2020

Country	Year	Production type/description	Sample unit	Method of isolation	Number	
					Units tested	Positive for MRSA (%)
Broilers						
Belgium	2014	During rearing period, OFM, NS, objective sampling	Herd/flock	2-S	79	2 (2.5 %) ^(a)
	2017	During rearing period OFS, NS, convenience sampling	Herd/flock	2-S	80	2 (2.5 %) ^(b)
	2020	During rearing period OFM, NS, objective sampling	Herd/flock	2-S	60	2 (3.3 %) ^(c)
Laying hens						
Belgium	2014	Adult OFM, NS, objective sampling	Herd/flock	2-S	246	6 (2.4%) ^(d)
	2017	Adult OFS, NS, convenience sampling	Herd/flock	2-S	236	3 (1.3 %) ^(e)
	2020	Adult OFM, NS, objective sampling	Herd/flock	2-S	28	0
Turkeys						
Germany	2012	Meat production animals, DS – OFM	Flock	2-S	235	30 (12.8%)*
	2014	Meat production animals, DS – OFM (active)	Flock	2-S	192	42 (21.9%)*
	2018	Fattening turkeys (before slaughter), DS – OFM (active)	Flock	2-S	297	51 (17.2%)*
Cattle (bovine animals)						
Belgium	2012	Veal calves (under 1 year), NS – OFM	Herd	2-S	104	49 (47.1%) ^(f)
	2015	Veal calves (under 1 year), NS – OFM (active)	Herd	2-S	147	116 (78.9%) ^(g)
	2018	Veal calves (under 1 year), NS – OFM (active)	Herd	2-S	145	79 (54.5%) ^(h)
	2012	Dairy cows, NS – OFM (active)	Herd	2-S	141	14 (9.9%) ⁽ⁱ⁾
	2015	Dairy cows, NS – OFM (active)	Herd	2-S	96	10 (10.4%) ^(j)
	2018	Dairy cows, NS – OFM (active)	Herd	2-S	93	13 (14.0%) ^(k)
	2012	Meat production animals, NS – OFM	Herd	2-S	187	19 (10.2%) ^(l)
	2015	Meat production animals, NS – OFM (active)	Herd	2-S	104	16 (15.4%) ^(m)
	2018	Meat production animals, NS – OFM (active)	Herd	2-S	103	9 (8.7%) ⁽ⁿ⁾
Denmark	2018	Dairy cows, NS – FS (National Survey)	Herd	1-S	132	8 (6.1%) ^(o)
	2019	Dairy cows, NS – FS (National Survey)	Herd	1-S	131	2 (1.5%) ^(p)
Switzerland	2015	Calves (<1 year), NS – SHM	Animal	2-S	292	19 (6.5%) ^(q)
	2017	Calves (<1 year), NS – SHM	Animal	2-S	297	24 (8.1%) ^(r)
	2019	Calves (<1 year), NS – SHM	Animal	1-S	299	11 (3.7%) ^(s)

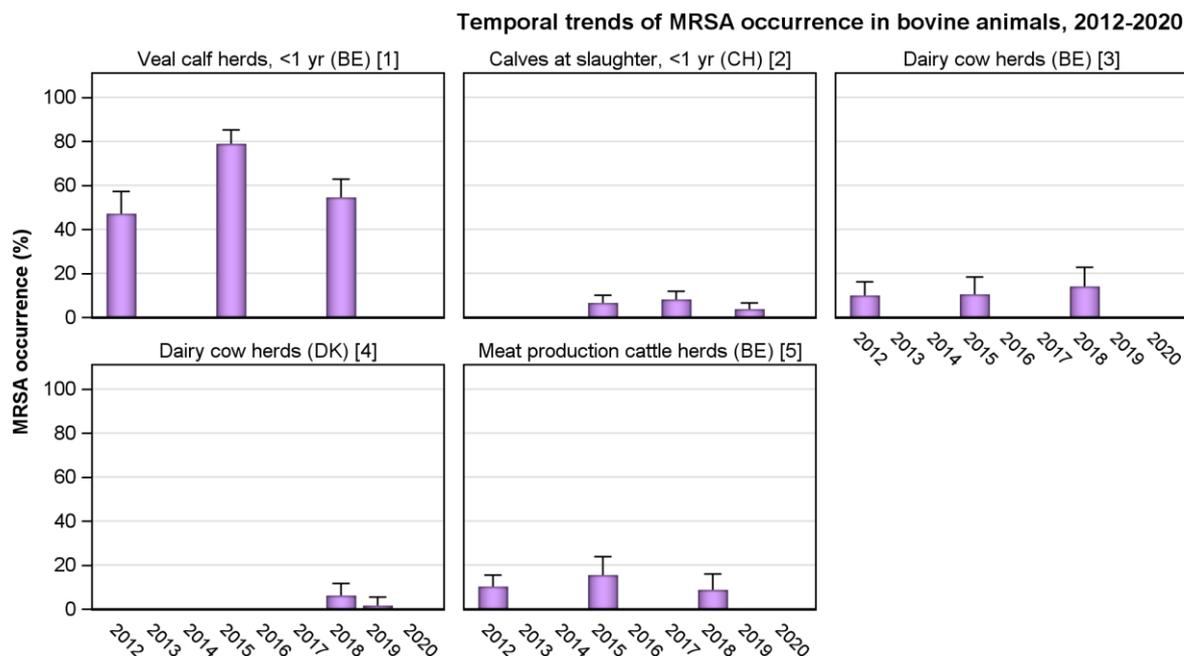
Pigs						
Belgium	2016	Breeding animals, NS – OFM	Herd	2-S	153	91 (59.5%) ^(t)
	2019	Breeding animals, NS – OFM	Herd	2-S	179	83 (46.4%) ^(u)
	2016	Fattening pigs, NS – OFM	Herd	2-S	177	112 (63.3%) ^(v)
	2019	Fattening pigs, NS – OFM	Herd	2-S	180	105 (58.3%) ^(w)
Denmark	2016	Breeding animals, NS – OFM (National Survey)	Herd	2-S	6	6 (100%)*
	2018	Breeding animals, NS – OFM (National Survey)	Herd	1-S	41	34 (82.9%) ^(x)
	2019	Breeding animals (multiplier herds), NS – OFM (National Survey)	Herd	1-S	73	69 (94.5%) ^(y)
	2016	Fattening pigs (conventional herds), NS – OFM (National Survey)	Herd	2-S	57	50 (87.7%)*
	2018	Fattening pigs (raised under CHC), NS – OFM (National Survey)	Herd	1-S	130	116 (89.2%) ^(z)
Germany	2017	Fattening pigs, BS – OFM (active)	Herd	2-S	341	130 (38.1%)*
	2019	Fattening pigs, BS – OFM (active)	Herd	2-S	389	139 (35.7%)*
Norway	2014	Pigs, PSS & PES – NFCEP	Herd	2-S	986	1 (0.1%) ^(aa)
	2015	Pigs, PSS & PES – NFCEP	Herd	2-S	821	4 (0.5%) ^(bb)
	2016	Pigs, PSS & PES – NFCEP	Herd	2-S	872	1 (0.1%) ^(cc)
	2017	Pigs, PSS & PES – NFCEP	Herd	2-S	826	3 (0.4%) ^(dd)
	2018	Pigs, PSS & PES – NFCEP	Herd	1-S	716	0
	2019	Pigs, PSS & PES – NFCEP	Herd	1-S	722	1 (0.1%) ^(ee)
	2020	Pigs, PSS & PES – NFCEP	herd	1-S	641	0
Switzerland	2010	Fattening pigs, NS – SHM	Animal	2-S	392	23 (5.9%) ^(ff)
	2011	Fattening pigs, NS – SHM	Animal	2-S	392	22 (5.6%) ^(gg)
	2012	Fattening pigs, NS – SHM	Animal	2-S	397	72 (18.1%) ^(hh)
	2013	Fattening pigs, NS – SHM	Animal	2-S	351	73 (20.8%) ⁽ⁱⁱ⁾
	2014	Fattening pigs, NS – SHM	Animal	2-S	298	79 (26.5%) ^(jj)
	2015	Fattening pigs, NS – SHM	Animal	2-S	300	77 (25.7%) ^(kkhh)
	2017	Fattening pigs, NS – SHM	Animal	2-S	298	131 (44.0%) ^(ll)
	2019	Fattening pigs, NS – SHM	Animal	1-S	303	160 (52.8%) ^(mm)
Horses						
Denmark	2018	Horses, NS – FS (National Survey)	Premises (stable)	1-S	123	10 (8.1%) ⁽ⁿⁿ⁾
	2019	Horses, NS – FS (National Survey)	Premises (stable)	1-S	120	13 (10.8%) ^(oo)

OFM: on-farm monitoring; OFS: on-farm surveillance; NFCEP: National Farm Control and Eradication Programme; FS: Farm survey; CHC: controlled housing conditions; SHM: slaughterhouse monitoring; BTM: bulk tank milk; BS: boot swabs; NS: nasal swabs, PSS: pooled skin swabs; PES: pooled environmental swabs; DS: dust samples. Method of isolation: 1-S (1 step method); 2-S (2 step method).

(a): *spa*-types: t011 CC398 (1 isolate), t1985 CC398 (1)

(b): *spa*-type t011 (2 isolates)

- (c): *spa*-type t011 (2 isolates)
- (d): *spa*-type t011 CC398 (2 isolates), t037 ST239 (1). WGS of the t037 isolate confirmed it to belong to ST239 and carry *sak* and *scn* genes.
- (e): *spa*-type t011 (2 isolates), t037 ST239 (1)
- (f): *spa*-types: t011 (40 isolates), t1451 (3), t1456 (1), t1985 (3), t3423 (1), untypable (1).
- (g): *spa*-types: t011 (64 isolates), t034 (15), t037 (8), t044 (3), t1451 (3), t1580 (7), t1985 (8), t2287 (2), t3423 (5), untypable (1). The t044 isolates were PVL-negative.
- (h): *spa*-types: t011 CC398 (65 isolates), t034 CC398 (8), t1451 CC398 (1), t1580 CC398 (2), t3423 CC398 (1), t3479 CC398 (1), t9433 CC398 (1).
- (i): *spa*-types: t011 (8 isolates), t037 (1), t388 (1), t1456(1), t6228 (2), untypable (1).
- (j): *spa*-types t011 (4 isolates), t034 (1), t1580 (1), t1985 (2), t2383 (1), untypable (1).
- (k): *spa*-types: t011 CC398 (8 isolates), t034 CC398 (1), t223 (3), t1257 (1). The t223 isolates were PVL-negative; TSST status was not determined. The PVL status of the t1257 isolate was not reported.
- (l): *spa*-types: t011 (16 isolates), t121 (1), t1456 (1), t1985 (1).
- (m): *spa*-types: t011 (9 isolates), t034 (2), t1451 (1), t1580 (2), t2287 (1), t3423 (1).
- (n): *spa*-types: t011 CC398 (5 isolates), t1451 CC398 (1), t223 (2), t223 ST22 (1). All three t223 isolates were PVL-negative. One t223 isolate was confirmed to belong to ST22, harbour the *tst* gene and IEC genes (*chp*, *sak* and *scn*) from WGS data.
- (o): *spa*-types: t034 (7 isolates), t267 CC97 (1).
- (p): *spa*-types: t127 CC1 (1 isolate), t843 CC130 (1). The t127 isolate was PVL-negative, as well as negative for the human IEC gene *scn*. *spa*-type t843 was confirmed to carry the *mecC* gene.
- (q): *spa*-types: t011 (11 isolates), t034 (6) and t008 (2). The t008 isolates were PVL-positive.
- (r): *spa*-types: t011 (14 isolates), t034 (7), t127 (1), t17339 (2). PVL status of the t127 isolate was not reported.
- (s): *spa*-types were not reported; however, all 11 isolates were confirmed to belong to CC398 using the *sauI-hsdS1* CC398 PCR reaction (Stegger et al., 2011).
- (t): *spa*-types: t011 CC398 (55 isolates), t1451 CC398 (2), t1456 (1), t1456 CC398 (3), t1580 (1), t1985 (5), t1985 CC398 (1), t034 (1), t034 CC398 (4), t4659 CC398 (1), unspecified (17).
- (u): *spa*-types: t011 CC398 (57 isolates), t034 CC398 (18), t108 CC398 (2), t779 CC398 (1), t2346 CC398 (1), t2582 CC398 (1), t2922 CC398 (1), t3119 CC398 (2).
- (v): *spa*-types: t011 CC398 (71 isolates), t1451 (1), t1456 (1), t1456 CC398 (1), t1580 (5), t1985 (8), t1985 CC398 (3), t034 (7), t034 CC398 (2), t037 (1), t898 (1), unspecified (11).
- (w): *spa*-types: t011 CC398 (67 isolates), t034 CC398 (11), t1451 CC398 (2), t1457 CC398 (1), t2346 CC398 (1), t2370 CC398 (2), t2383 CC398 (1), t3041 CC398 (1), t3119 CC398 (1), unspecified (18).
- (x): *spa*-types: t011 CC398 (6 isolates), t034 CC398 (24), t1250 CC398 (2), t1793 CC398 (1), t3171 CC398 (1).
- (y): *spa*-types: t011 CC398 (10 isolates), t034 CC398 (57), t1928 CC398 (1), t4652 CC398 (1).
- (z): *spa*-types: t011 CC398 (22 isolates), t034 CC398 (85), t571 CC398 (3), t898 CC398 (1), t2383 CC398 (1), t2974 CC398 (1), t3423 CC398 (1), t4652 CC398 (1), t9266 CC398 (1).
- (aa): *spa*-type: t011 CC398 (1).
- (bb): *spa*-type: t034 CC398 (2), t177 CC1 (2).
- (cc): *spa*-type: t034 CC398 (1).
- (dd): *spa*-types: t091 CC7 (1 isolate), t843 CC130 (1), t6292 CC425 (1). The t091 isolate was PVL-negative, *spa*-types t843 and t6292 were confirmed to carry the *mecC* gene.
- (ee): *spa*-type: t034 CC398 (1).
- (ff): *spa*-types: t034 ST398 (17 isolates), t011 ST398 (1), t208 ST49 (5).
- (gg): *spa*-types: t034 ST398 (19 isolates), t011 ST398 (1), t208 ST49 (1), t2279 ST1 (1).
- (hh): *spa*-types: t034 CC398 (61 isolates), t011 CC398 (9), t208 ST49 (2).
- (ii): *spa*-types: t034 (63 isolates), t011 (10).
- (jj): *spa*-types: t034 (57 isolates), t011 (19), t208 (1), t899 (1), t2741 (1).
- (kk): *spa*-types: t034 (48 isolates), t011 (23), t032 (1), t571 (1), t899 (1), t1145 (1), t1250 (1), t4475 (1).
- (ll): *spa*-types: t034 (63 isolates), t011 (61), t899 (2), t1451 (3), t2330 (1), t2876 (1).
- (mm): *spa*-types were not reported; however, 159/160 isolates were confirmed to belong to CC398 using the *sauI-hsdS1* CC398 PCR reaction (Stegger et al., 2011). The remaining isolate did not survive cryo-conservation, therefore typing could not be performed.
- (nn): *spa*-types: t011 CC398 (3 isolates), t034 CC398 (6), t843 CC130 (1). *spa*-type t843 was confirmed to carry the *mecC* gene.
- (oo): *spa*-types: t011 CC398 (4 isolates), t034 CC398 (6), t1451 CC398 (1), t843 CC130 (1), t3256 CC130 (1). *spa*-types t843 and t3256 were confirmed to carry the *mecC* gene.
- * *spa*-types not reported.



BE: Belgium; CH: Switzerland; DK: Denmark.

The 2-S method of isolation was used by Belgium and Switzerland from 2012-2018; while the 1-S method was used by Denmark since 2018 and by Switzerland since 2019.

* *spa*-types not reported.

- 1: In 2012, *spa*-types: t011 (40 isolates), t1451 (3), t1456 (1), t1985 (3), t3423 (1), untypable (1).
In 2015, *spa*-types: t011 (64 isolates), t034 (15), t037 (8), t044 (3), t1451 (3), t1580 (7), t1985 (8), t2287 (2), t3423 (5), untypable (1). The t044 isolates were PVL-negative.
In 2018, *spa*-types: t011 CC398 (65 isolates), t034 CC398 (8), t1451 CC398 (1), t1580 CC398 (2), t3423 CC398 (1), t3479 CC398 (1), t9433 CC398 (1).
- 2: In 2015, *spa*-types: t011 (11 isolates), t034 (6) and t008 (2). The t008 isolates were PVL-positive.
In 2017, *spa*-types: t011 (14 isolates), t034 (7), t127 (1), t17339 (2). PVL status of the t127 isolate was not reported.
In 2019, *spa*-types were not reported; however, all 11 isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).
- 3: In 2012, *spa*-types: t011 (8 isolates), t037 (1), t388 (1), t1456 (1), t6228 (2), untypable (1).
In 2015, t011 (4 isolates), t034 (1), t1580 (1), t1985 (2), t2383 (1), untypable (1).
In 2018, *spa*-types: t011 CC398 (8 isolates), t034 CC398 (1), t223 (3), t1257 (1). The t223 isolates were PVL-negative; TSST status was not determined. The PVL status of the t1257 isolate was not reported.
- 4: In 2018, *spa*-types: t034 (7 isolates), t267 CC97 (1).
In 2019, *spa*-types: t127 CC1 (1 isolate), t843 CC130 (1). The t127 isolate was PVL-negative, as well as negative for the human IEC gene *scn*. *spa*-type t843 was confirmed to carry the *mecC* gene.
- 5: In 2012, *spa*-types: t011 (16 isolates), t121 (1), t1456 (1), t1985 (1).
In 2015, *spa*-types: t011 (9 isolates), t034 (2), t1451 (1), t1580 (2), t2287 (1), t3423 (1).
In 2018, *spa*-types: t011 CC398 (5 isolates), t1451 CC398 (1), t223 (2), t223 ST22 (1). All three t223 isolates were PVL-negative. One t223 isolate was confirmed to belong to ST22, harbour the *tst* gene and IEC genes (*chp*, *sak* and *scn*) from WGS data.

Figure 1: Temporal trends of MRSA prevalence in cattle, 2012-2020

Table 7a: Occurrence of resistance (%) to selected antimicrobials in MRSA from food and animals, 2020

Country	N	GEN	KAN	STR	CHL	RIF	CIP	ERY	CLI	Q/D	LZD	TIA	MUP	FUS	SMX	TMP	TET	VAN
Meat from broilers – fresh																		
Austria	8 ^(a)	0	0	0	0	12,5	12,5	62,5	62,5	50,0	0	50,0	0	0	0	50,0	100	0
Meat from sheep – fresh or frozen																		
Germany	11 ^(c)	0	9,1	9,1	9,1	0	0	45,5	18,2	9,1	0	9,1	0	0	0	27,3	54,5	9,1
Gallus gallus broiler flocks																		
Belgium	2 ^(c)	0	0	0	0	0	0	50,0	50,0	0	0	0	0	0	0	50,0	100	0
Turkey – fattening flocks																		
Belgium	2 ^(d)	0	0	0	0	0	100	50,0	50,0	0	0	0	0	0	0	100	100	0

N: Number of isolates tested; GEN: gentamicin; KAN: kanamycin; STR: streptomycin; CHL: chloramphenicol; RIF: rifampicin; CIP: ciprofloxacin; ERY: erythromycin; CLI: clindamycin; Q/D: quinupristin/dalfopristin; LZD: linezolid; TIA: tiamulin; MUP: mupirocin; FUS: fusidic acid; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline. All MRSA isolates were resistant to penicillin and ceftioxin.

(a) *Spa*-types: t011 (4 isolates), t034 (4)

(b) *Spa*-types: t011 (2), t034 (1), t1451 (1), t2576 (1), t19979 ST 398 (1), t223 (2), t267 (1), t1154, ST5 (1) t15010 ST97 (1)

(c) *Spa*-types: t011 CC398 (2 isolates)

(d) *Spa*-types: t011 CC398 (2 isolates)

Table 7b: Occurrence of resistance (%) to selected antimicrobials in MRSA from food and animals, 2019

Country	N	GEN	KAN	STR	CHL	RIF	CIP	ERY	CLI	Q/D	LZD	TIA	MUP	FUS	SMX	TMP	TET	VAN
Meat from pigs – fresh																		
Austria ¹	54 ^(a)	5.6	9.3	13	7.4	1.9	38.9	50	46.3	22.2	0	27.8	0	0	0	35.2	83.3	0
Switzerland	1 ^(b)	0	0	0	0	0	100	0	0	0	0	0	0	0	0	100	0	0
Meat from cattle (bovine animals) – fresh																		
Austria	6 ^(c)	33.3	83.3	33.3	0	0	0	83.3	33.3	0	0	0	0	0	0	33.3	83.3	0
Switzerland	2 ^(d)	0	0	50	0	0	0	50	50	50	0	50	0	0	0	50	100	0
Fattening pig herds/slaughterhouse batches/fattening pigs																		
Belgium	87 ^(e)	26.4	17.2	3.4	6.9	0	36.8	44.8	58.6	24.1	0	25.3	0	2.3	5.7	93.1	100	0
Portugal ²	119 ^(f)	4.2	13.4	7.6	24.4	0.8	27.7	64.7	87.4	66.4	2.5	79.8	1.7	1.7	1.7	48.7	100	0
Switzerland ³	159 ^(g)	17	17	28.3	12.6	0.6	31.4	15.7	28.3	27	0	28.3	0	1.9	0.6	31.4	95	0
Breeding pig herds																		
Belgium	83 ^(h)	16.9	18.1	7.2	0	0	37.3	37.3	55.4	27.7	0	27.7	1.2	1.2	2.4	89.2	100	0
Cattle (bovine animals) – calves (under 1 year)																		
Switzerland	11 ⁽ⁱ⁾	0	0	36.4	9.1	0	45.5	54.6	54.6	36.4	0	27.3	0	0	0	27.3	100	0

N: Number of isolates tested; GEN: gentamicin; KAN: kanamycin; STR: streptomycin; CHL: chloramphenicol; RIF: rifampicin; CIP: ciprofloxacin; ERY: erythromycin; CLI: clindamycin; Q/D: quinupristin/dalfopristin; LZD: linezolid; TIA: tiamulin; MUP: mupirocin; FUS: fusidic acid; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline.

All MRSA isolates were resistant to penicillin and ceftiofur, as expected.

1: Antimicrobial susceptibility data are also included for four isolates recovered from additional *ad hoc* sampling of some of the batches of pig meat.

2: Susceptibility data for 52 isolates recovered from batches of fattening pigs were not reported.

3: Susceptibility data for one isolate recovered from a fattening pig was not available; the isolate did not survive cryo-conservation.

(a): *spa*-types: t002 ST5 (1 isolate), t003 ST3944 (1), t008 ST8 (1), t011 (22), t011 ST398 (1), t034 (12), t127 ST1 (2), t321 ST5050 (1), t843 ST130 (1), t899 (5), t1451 (2), t1456 (1). The t002 and t008 isolates were PVL-positive. The two t127 isolates, as well as the single t003 and t321 isolates, were PVL-negative. The t843 isolate was reported to carry the *mecC* gene. Additional *ad hoc* sampling of pig meat by Austria revealed MRSA *spa*-types t011 (2 isolates), t034 (1) and t012 ST30 (1); the t012 isolate was PVL-negative. Susceptibility data for the isolates recovered from additional *ad hoc* sampling are included in Table 7b.

(b): *spa*-type was not reported; however, the isolate was confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

(c): *spa*-types: t008 ST8 (1 isolate), t011 (2), t127 ST1 (2), t2346 (1). The t008 isolate was PVL-positive; the two t127 isolates were PVL-negative.

(d): *spa*-types were not reported; however, both isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

(e): *spa*-types: t011 CC398 (67 isolates), t034 CC398 (11), t1451 CC398 (2), t1457 CC398 (1), t2346 CC398 (1), t2370 CC398 (2), t2383 CC398 (1), t3041 CC398 (1), t3119 CC398 (1), unspecified (18).

(f): *spa*-types: t011 CC398 (3), unspecified (116). Susceptibility data for 52 isolates recovered from batches of fattening pigs were not reported and are not included in Table 7b.

(g): *spa*-types were not reported; however, all 159 isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011). Susceptibility data for one isolate recovered from a fattening pig is not included in Table 7b.

(h): *spa*-types: t011 CC398 (57 isolates), t034 CC398 (18), t108 CC398 (2), t779 CC398 (1), t2346 CC398 (1), t2582 CC398 (1), t2922 CC398 (1), t3119 CC398 (2).

(i): *spa*-types were not reported; however, all 11 isolates were confirmed to belong to CC398 using the *sau1-hsdS1* CC398 PCR reaction (Stegger et al., 2011).

Table 8: Frequently occurring MDR-patterns in MRSA-isolates from animals and food 2020. Isolates are counted if the pattern is included, irrespective of additional resistance traits.

MDR-patterns in MRSA-isolates	Turkeys (Belgium, n=2)	Broilers (Belgium, n=2)	Broiler meat (Austria, n=8)	Sheep meat (Germany, n=11)	Total
PNC-FOX-TET	2	2	8	6	18
PNC-FOX-TET-ERY	1	1	5	3	10
PNC-FOX-ERY	1	1	5	5	12
PNC-FOX-TET-ERY-CLI	1	1	4	2	8
PNC-FOX-TET-ERY-CLI -TMP	1	1	1	2	5
PNC-FOX-TET-ERY-CLI-Q/D-TIA	0	0	3	1	4
PNC-FOX-TMP	2	1	4	3	10
PNC-FOX-TET-TMP-	2	1	4	2	9

PNC= penicillin, FOX=cefoxitin, TET= tetracycline, ERY= erythromycin, CLI= clindamycin, TMP= trimethoprim, Q/D= quinupristin/dalfopristin

Table 9a: MRSA *spa*-type characterisation, 2020

Category	Country	Animal/ food type	Sample type/unit	No. of isolates	Where reported				Inferred ST/CC	LA, CA or HA	Inferred ST/CC & type
					<i>spa</i> -type(s)	PVL status / IEC genes	ST/CC	<i>mec</i> gene			
Food-producing animals	BE	Broilers	Flock, nasal swabs, OFM	2/60	t011 (2)	-	CC398	-	-	LA	CC398 / LA
		Fattening turkeys	Flock, nasal swabs, OFM	2/18	t011 (2)	-	CC398	-	-	LA	CC398 / LA
Food	AT	Broiler meat	Fresh – ARM	8/306	t011 (4)	-	CC398	-	-	LA	CC398 / LA
					t034 (4)	-	CC398	-	-	LA	CC398 / LA
Food	DE	Meat from sheep	Fresh – ARM	11/386	t011 (2)	-	CC398*	-	-	LA	CC398 / LA
					t034 (1)	-	CC398*	-	-	LA	CC398 / LA
					t223 (2)	-	CC22*	-	-	HA	CC22/HA
					t267 (1)	-	CC97*	-	-	HA or LA	CC97/not clear
					t1154 (1)	-	ST5	-	-	HA	CC5 / HA
					t1451 (1)	-	CC398*	-	-	LA	CC398 / LA
					t2576 (1)	-	CC398*	-	-	LA	CC398 / LA
					t15010 (1)	-	ST97	-	-	HA or LA	CC97/not clear
					t19979 (1)	-	CC398	-	-	LA	CC398 / LA

*inferred from *spa*-type

Table 9b: MRSA *spa*-type characterisation, 2019

Category	Country	Animal/food type	Sample type/unit	No. of isolates	Where reported				Inferred ST/CC	LA, CA or HA	Inferred ST/CC & type
					<i>spa</i> -type(s)	PVL status / IEC genes	ST/CC	<i>mec</i> gene			
Food-producing animals	BE	Breeding pigs (sows)	Herd, nasal swabs, OFM	83/179	t011 (57)	-	CC398	-	-	LA	CC398 / LA
					t034 (18)	-	CC398	-	-	LA	CC398 / LA
					t108 (2)	-	CC398	-	-	LA	CC398 / LA
					t779 (1)	-	CC398	-	-	LA	CC398 / LA
					t2346 (1)	-	CC398	-	-	LA	CC398 / LA
					t2582 (1)	-	CC398	-	-	LA	CC398 / LA
					t2922 (1)	-	CC398	-	-	LA	CC398 / LA
					t3119 (2)	-	CC398	-	-	LA	CC398 / LA
					t011 (67)	-	CC398	-	-	LA	CC398 / LA
		t034 (11)	-	CC398	-	-	LA	CC398 / LA			
		t1451 (2)	-	CC398	-	-	LA	CC398 / LA			
		t1457 (1)	-	CC398	-	-	LA	CC398 / LA			
		t2346 (1)	-	CC398	-	-	LA	CC398 / LA			
		t2370 (2)	-	CC398	-	-	LA	CC398 / LA			
		t2383 (1)	-	CC398	-	-	LA	CC398 / LA			
		t3041 (1)	-	CC398	-	-	LA	CC398 / LA			
		t3119 (1)	--	CC398	-	-	LA	CC398 / LA			
		Unspecified (18)	-	-	-	-	-	-			
	DK	Veal calves (<1yr)	Herd, nasal swabs, FS (NS)	11/115	t011 (1)	-	CC398	-	-	LA	CC398 / LA
					t034 (8)	-	CC398	-	-	LA	CC398 / LA
					t779 (1)	-	CC398	-	-	LA	CC398 / LA
					t1580 (1)	-	CC398	-	-	LA	CC398 / LA
		Dairy cows	Herd, nasal swabs, FS (NS)	2/131	t127 (1)	PVL negative, negative for <i>scn</i>	CC1	-	-	CA or LA	CC1 / LA
					t843 (1)	-	CC130	<i>mecC</i>	-	<i>mecC</i>	<i>mecC</i> – CC130
		Breeding pigs	Multiplying herds, nasal swabs, FS (NS)	69/73	t011 (10)	-	CC398	-	-	LA	CC398 / LA
					t034 (57)	-	CC398	-	-	LA	CC398 / LA
					t1928 (1)	-	CC398	-	-	LA	CC398 / LA
t4652 (1)					-	CC398	-	-	LA	CC398 / LA	
Horses		Herd, nasal swabs, FS (NS)	13/120	t011 (4)	-	CC398	-	-	LA	CC398 / LA	
				t034 (6)	-	CC398	-	-	LA	CC398 / LA	
	t1451 (1)			-	CC398	-	-	LA	CC398 / LA		
	t843 (1)			-	CC130	<i>mecC</i>	-	<i>mecC</i>	<i>mecC</i> – CC130		

Annex E: EUSR AMR in zoonotic and indicator bacteria from humans, animals and food 2019-2020

					t3256 (1)	-	CC130	<i>mecC</i>	-	<i>mecC</i>	<i>mecC</i> – CC130
Food-producing animals	DE	Fattening pigs	Herd, boot swabs, OFM	139/389	-	-	-	-	-	-	-
	NL	Fattening pigs	Herd, dust swabs, OFS	66/89	-	-	-	-	-	-	-
	NO	Pigs	Herd, animal hide - OFCEP	1/722	t034 (1)	-	CC398	-	-	LA	CC398 / LA
	PT	Fattening pigs	Slaughter batch, nasal swabs, SHM	171/171	t011 (3)	-	CC398	-	-	LA	CC398 / LA
					Unspecified (168)	-	-	-	-	-	-
	CH	Calves (<1yr)	Animal, nasal swabs, SHM	11/299	-	-	CC398	-	-	LA	CC398 / LA
		Fattening pigs	Animal, nasal swabs, SHM	160/303	-	-	CC398 (159)	-	-	LA	CC398 / LA (159)
Untypable (1) ^(a)	-				Unknown (1) ^(a)	-	-	-	-		
Food	AT	Cattle meat	Fresh – ARM	6/228	t008 (1)	PVL positive , <i>sak</i> & <i>scn</i> detected	ST8	<i>mecA</i>	-	CA or HA	ST8 (CC8) / CA
					t011 (2)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
					t127 (2)	PVL negative, <i>sak</i> & <i>scn</i> detected	ST1	<i>mecA</i>	-	CA or LA	ST1 (CC1) / LA
					t2346 (1)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
		Pig meat	Fresh – ARM	50/318	t002 (1)	PVL positive , <i>sak</i> & <i>scn</i> detected	ST5	<i>mecA</i>	-	HA, CA or LA	ST5 (CC5) / CA
					t003 (1)	PVL negative, <i>sak</i> & <i>scn</i> detected	ST3944	<i>mecA</i>	-	HA or CA	ST3944 (CC5) / HA
					t008 (1)	PVL positive , <i>sak</i> & <i>scn</i> detected	ST8	<i>mecA</i>	-	HA or CA	ST8 (CC8) / CA
					t011 (23)	PVL negative (1)	ST398 (1)	<i>mecA</i>	CC398 (22)	LA	CC398 / LA
					t034 (12)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
		t127 (2)	PVL negative, <i>sak</i> & <i>scn</i> detected	ST1	<i>mecA</i>	-	CA or LA	ST1 (CC1) / LA			
		t321 (1)	PVL negative	ST5050	<i>mecA</i>	-	CA	ST5050 (CC1)/ CA (regardless PVL)			
		t899 (5) ^(b)	-	-	<i>mecA</i>	CC9/CC398	LA	CC9/CC398 / LA			

Annex E: EUSR AMR in zoonotic and indicator bacteria from humans, animals and food 2019-2020

					t1451 (2)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
					t1456 (1)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
					t843 (1)	-	ST130	<i>mecC</i>	-	<i>mecC</i>	<i>mecC</i> – CC130
Food	AT	Pig meat - Additional <i>ad hoc</i> sampling	Fresh – ARM	4	t011 (2)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
					t012 (1)	PVL negative, <i>sak</i> & <i>scn</i> detected	ST30	<i>mecA</i>	-	HA or CA	ST30 (CC30)/CA (regardless PVL)
					t034 (1)	-	-	<i>mecA</i>	CC398	LA	CC398 / LA
					-	-	-	-	-	-	-
	DE	Milk from cows	Raw milk – OFM	28/366	-	-	-	-	-	-	-
	NL	Cattle meat	Fresh - ARM	11/286	-	-	-	-	-	-	-
		Broiler meat	Fresh (chilled) - ARM	41/237	-	-	-	-	-	-	-
		Pig meat	Fresh - ARM	25/296	-	-	-	-	-	-	-
		Turkey meat	Fresh (chilled) - ARM	9/14	-	-	-	-	-	-	-
	CH	Cattle meat	Fresh (chilled) - ARM	2/309	-	-	CC398	-	-	LA	CC398 / LA
Pig meat		Fresh (chilled) - ARM	1/311	-	-	CC398	-	-	LA	CC398 / LA	
Clinical examinations	NL	Cats	Animal sample - VCCI	2/428	-	-	-	-	-	-	-
		Dogs	Animal sample - VCCI	5/874	-	-	-	-	-	-	-
		Horses	Animal sample - OFCI	33/270	-	-	-	-	-	-	-

BE: Belgium; DK: Denmark; DE: Germany; NL: Netherlands; NO: Norway; PT: Portugal; CH: Switzerland; AT: Austria; ARM: At retail monitoring; FS: Farm Survey; NS: National Survey; OFCI: On-farm clinical investigations; OFCEP: On-farm control and eradication programme; OFM: On-farm monitoring; OFS: On-farm surveillance; SHM: Slaughterhouse monitoring; VCCI: Veterinary clinic clinical investigations.

-: Not reported; PVL: Pantone-Valentine leukocidin; IEC genes; immune evasion cluster genes (*chp*: chemotaxis inhibitor protein; *sak*: staphylokinase; *scn*: encoding the staphylococcal complement protein inhibitor); ST: sequence type; CC: clonal complex; *mecA*: methicillin resistance gene; *mecC*: variant of the *mecA* gene, sharing 70% identity with *mecA* at the DNA level; CA: community-associated; HA: healthcare-associated; LA: livestock-associated.

(a): One isolate did not survive cryo-conservation, therefore molecular typing could not be performed.

(b): These are *spa*-types which can be associated with sequence types which have mosaic or hybrid genomes.