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

Annex to:

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E.1 Methicillin-resistant *Staphylococcus aureus* in food

Table 1: Methicillin-resistant *Staphylococcus aureus* in food, 2021.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	**Positive for MRSA (%)**
Meat from bovine animals				
Austria	Fresh - retail monitoring	Batch	326	15 (4.6%)[a]
Germany	Fresh - sampling at border control post (monitoring)	Single	73	8 (11%)[b]
	Fresh - retail monitoring	Single	405	15 (3.7%)[c]
Netherlands	Fresh - retail monitoring	Single	261	18 (6.9%)*
Meat from broilers				
Netherlands	Fresh - retail monitoring	Single	310	25 (8.1%)*
Meat from pigs				
Austria	Fresh - retail monitoring	Batch	319	68 (21.3%)[d]
Finland	Fresh - retail survey	Batch	206	26 (12.6%)[e]
Germany	Fresh - sampling at border control post (monitoring)	Single	7	1 (14.3%)[f]
Meat from turkeys				
Netherlands	Fresh - retail monitoring	Single	14	3 (21.4%)*
Meat from deer (venison)				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	15	0 (0%)
Meat from ducks				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	1	1 (100%)*
Meat from sheep				
Netherlands	Fresh - retail monitoring	Single	255	30 (11.8%)*
	Meat preparation - retail monitoring	Single	44	7 (15.9%)*

(a) *Spa*-types: t95 ST45 (7), t011 ST398 (4), t034 ST398 (1), t898 ST399 (1), t588 ST402 (1), t034 ST4561 (1)
(b) *Spa*-types: t1346 ST72 (1), t002 (2), t008 (2), t311 (2), t2112 (1)
(c) *Spa*-types: t174 ST4110 (1), t011 (4), t034 (4), t359 (1), t559 (1), t843 *mecC* positive (1), t899 (1), t1430 (1), t1451 (1)
(d) *Spa*-types: t899 ST9 (5), t1430 ST9 (2), t95 ST45 (11), t011 ST398 (22), t034 ST398 (12), t1793 ST398 (1), t2576 ST398 (1), t9013 ST398 (1), t588 ST400 (1), t011 (2), t571 (1), *spa*-type not provided (9)
(e) *Spa*-types: t728 ST45 (1), t034 ST398 (14), t899 ST398 (1), t2741 ST398 (9), t4677 ST398 (1)
(f) *Spa*-types: t1430 (1)
* *Spa*-types not provided
Note: The isolation method used for detection of MRSA is not considered in the analysis.

Table 2: Methicillin-resistant *Staphylococcus aureus* in food, 2022.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Meat from bovine animals				
Netherlands	Fresh - retail monitoring	Batch	164	15 (9.1%)*
	Fresh - processing plant monitoring	Single	147	9 (6.1%)*
Meat from broilers				
Germany	Fresh - retail monitoring	Single	485	24 (4.9%)[a]
	Fresh slaughterhouse monitoring	Batch	412	69 (16.7%)[b]
	Fresh - sampling at border control post (monitoring)	Single	49	0 (0%)
Netherlands	Fresh - retail monitoring	Single	186	14 (7.5%)*
Spain	Fresh - retail surveillance	Single	90	1 (1.1%)[c]
Meat from pigs				
Netherlands	Fresh - retail monitoring	Single	180	13 (7.2%)*
Meat from turkeys				
Germany	Fresh - retail monitoring	Single	460	158 (34.3%)[d]
	Fresh slaughterhouse monitoring	Batch	417	224 (53.7%)[e]
Netherlands	Fresh - retail monitoring	Single	8	4 (50%)*
Meat from deer (venison)				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	15	0 (0%)
Meat from ducks				
Germany	Fresh - retail monitoring	Single	372	7 (1.9%)*
	Fresh slaughterhouse monitoring	Batch	350	3 (0.9%)*
Meat from farmed game - land mammals				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	2	1 (50%)*
Meat from wild game – birds				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	3	1 (33.3%)*
Meat from other animal species or not specified				
Netherlands	Fresh - sampling at border control post (monitoring)	Batch	1	1 (100%)*
Fruits				
Netherlands	Fresh - retail monitoring	Single	93	0 (0%)

(a) *Spa*-types: t011 (2), t034 (17), t571 (2), t2011 (1), t 2330 (1), t10485 (1)
(b) *Spa*-types: t011 (32), t034 (22), t571 (1), t899 (1), t1430 (1), t1451 (1), t2011 (1), t6575 (1), *spa*-type not reported (9)
(c) *Spa*-types: t6228 (1) detected in skinned fresh broiler meat (out of 90 total units tested, 45 units were from meat with skin and 45 units were from skinned meat).

(d) *Spa*-types: t008 (1), t011 (16), t034 (85), t127 (1), t899 (26), t1255 (1), t1422 (3), t1430 (3), t1580 (1), t2011 (2), t5452 (2), t10204 (2)
(e) *Spa*-types: t538 ST389 (1), t2922 ST398 (1), t14089 ST398 (1), t21217 ST398 (1), t242 ST5 (1), t235 ST8325 (1), t009 (1), t011 (23), t034 (142), t127 (4), t242 (1), t588 (2), t899 (20), t1255 (3), t1422 (2), t1430 (3), t1451 (1), t1793 (1), t2011 (5), t2346 (1), t2576 (1), t10204 (1), no *spa*-type provided ST398 (2), no spa-type or ST provided (5)
*Spa-types not provided
Note: The isolation method used for detection of MRSA is not considered in the analysis.

E.2 Methicillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations excluded

Table 3: Methicillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations excluded, 2021.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cattle (bovine animals)				
Belgium	Veal calves (under one year of age), farm monitoring	Herd /flock	145	79 (54.5%)[a]
	Dairy cows, farm monitoring	Herd /flock	128	15 (11.7%)[b]
	Meat production animals, farm monitoring	Herd /flock	85	4 (4.7%)[c]
Netherlands	Dairy cows, farm surveillance	Herd /flock	362	18 (5%)*
Switzerland	Calves (under one year of age), slaughterhouse monitoring	Animal	294	18 (6.1%)[d]
Pigs				
Norway	Farm control and eradication programme	Herd /flock	763	0 (0%)
Switzerland	Fattening pigs, slaugterhouse monitoring	Animal	289	155 (53.6%)[d]

(a) *Spa*-types: t386 ST1 (1), t011 (65), t034 (6), t1451 (1), t1456 (1), t2346 (1), t2370 (1), t3423 (1), t5210 (1), t6228 (1)
(b) *Spa*-types: t037 ST239 (3), t011 (10), t034 (2)
(c) *Spa*-types: t037 ST239 (2), t011 (2)
(d) *Spa*-types not provided, but 17/18 isolates from calves and all isolates from pigs were ST398
*Spa-types not provided.
Note: The isolation method used for detection of MRSA is not considered in the analysis.

Table 4: Methicillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations excluded, 2022.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cattle (bovine animals)				
Netherlands	Veal calves (under one year of age), farm survey	Holding	173	44 (25.4%)*
Pigs				
Belgium	Sows, farm monitoring	Herd /flock	179	81 (45.3%)[a]
	Fattening pigs, farm monitoring	Herd /flock	180	144 (80%)[b]
Norway	Farm control and eradication programme	Herd /flock	591	0 (0%)
Slovakia	Fattening pigs, slaughterhouse monitoring	Animal	48	6 (12.5%)*

(a) *Spa*-types: t011 ST398 (43), t034 ST398 (14), t588 ST 398 (1), t1451 ST398 (1), t1457 ST398 (1), t2011 ST398 (3), t3423 ST398 (1), t5104 ST398 (1), t6575 ST398 (1), t15528 ST398 (1), t011 ST3706 (2), t034 ST7645 (1), t011 ST8149 (1), t034 ST8151 (1), *spa*-type not reported (9)

(b) *Spa*-types: t011 ST398 (60), t034 ST398 (24), t779 ST398 (1), t1255 ST398 (1), t1451 ST398 (1), t1580 ST398 (2), t2011 ST398 (2), t3423 ST398 (1) t011 ST3706 (2), t034 ST7645 (1), t034 ST 8152 (1), t011 ST8150 (1), no *spa*-type provided ST398 (1), no *spa*-type or ST provided (46)

Spa-types not provided

Note: The isolation method used for detection of MRSA is not considered in the analysis.

E.3 Methicillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations

Table 5: Methicillin-resistant *Staphylococcus aureus* in food-producing animals, clinical investigations, 2022.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cattle (bovine animals)				
Italy	Cattle, suspect sampling on farm	Animal	2	2 (100%)*

Spa-types not provided

Note: The isolation method used for detection of MRSA is not considered in the analysis.

E.4 Methicillin-resistant *Staphylococcus aureus* in non-food-producing animals, clinical investigations

Table 6: Methicillin-resistant *Staphylococcus aureus* in non-food-producing animals, clinical investigations, 2021.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cats				
Netherlands	Suspect sampling on veterinary clinics	Animal	723	6 (0.8%)*
Dogs				
Netherlands	Suspect sampling on veterinary clinics	Animal	4121	6 (0.1%)*
Solipeds, domestic				
Netherlands	Horse, suspect sampling on farm	Animal	530	10 (1.9%)*

Spa-types not provided
Note: The isolation method used for detection of MRSA is not considered in the analysis.

Table 7: Methicillin-resistant *Staphylococcus aureus* in non-food-producing animals, clinical investigations, 2022.

Country	Production type/monitoring description (where specified)	Sample unit	Number	
			Units tested	Positive for MRSA (%)
Cats				
Netherlands	Suspect sampling on veterinary clinics	Animal	200	4 (2%)*
Dogs				
Netherlands	Suspect sampling on veterinary clinics	Animal	3340	6 (0.2%)*
Solipeds, domestic				
Netherlands	Horse, suspect sampling on farm	Animal	327	15 (4.6%)*

Spa-types not provided
Note: The isolation method used for detection of MRSA is not considered in the analysis.

E.5 *spa*-type characterization in methicillin-resistant *Staphylococcus aureus*

Table 8: Methicillin-resistant *Staphylococcus aureus spa*-type characterization, 2021.

Category	Country	Animal/food type	Sample type/unit	No. of isolates	Where reported					Inferred CC	LA, CA or HA	Inferred ST/CC & type
					spa-type	PVL status / IEC genes	ST	CC	*mec*-gene			
Food-producing animals	Belgium	Veal calves (under one year of age)	Herd, nasal swab, OFM	1/145	386	-	1	1	-	-	CA	CC1/CA
				65/145	11	-		398	-	-	LA	CC398/LA
				6/145	34	-		398	-	-	LA	CC398/LA
				1/145	1451	-		398	-	-	LA	CC398/LA
				1/145	1456	-		398	-	-	LA	CC398/LA
				1/145	2346	-		398	-	-	LA	CC398/LA
				1/145	2370	-		398	-	-	LA	CC398/LA
				1/145	3423	-		398	-	-	LA	CC398/LA
				1/145	5210	-		398	-	-	LA	CC398/LA
				1/145	6228	-		398	-	-	LA	CC398/LA
		Dairy cows	Herd, nasal swab, OFM	3/128	37	-	239	8	-	-	HA	CC8/ HA
				10/128	11	-		398	-	-	LA	CC398/LA
				2/128	34	-		398	-	-	LA	CC398/LA
		Cattle - meat production	Herd, nasal swab, OFM	2/85	37	-	239	8	-	-	HA	CC8/HA
				2/85	11	-		398	-	-	LA	CC398/LA
	Switzerland	Calves (under one year of age)	Animal, SM	17/294		-		398	-	-	LA	CC398/LA
		Fattening pigs	Animal, SM	155/289		-		398	-	-	LA	CC398/LA
Food	Austria	Bovine meat	Batch, fresh, RM	7/326	95	-	45	-	-	45	HA	CC45/HA
				4/326	11	-	398	-	-	398	LA	CC398/LA
				1/326	34	-	398	-	-	398	LA	CC398/LA
				1/326	898	-	399	-	-	121	LA	CC121/LA
				1/326	588	-	402	-	-	1	CA	CC1/CA

Country	Food	Sampling	N/total							Category	CC
			1/326	34	-	4561	-	-	398	LA	CC398/LA
	Pig meat	Batch, fresh, RM	5/319	899	-	9	-	-	9/398*	LA	CC9/CC398/LA
			2/319	1430	-	9	-	-	9	LA	CC9/LA
			11/319	95	-	45	-	-	45	HA	CC45/HA
			22/319	11	-	398	-	-	398	LA	CC398/LA
			12/319	34	-	398	-	-	398	LA	CC398/LA
			1/319	1793	-	398	-	-	398	LA	CC398/LA
			1/319	2576	-	398	-	-	398	LA	CC398/LA
			1/319	9013	-	398	-	-	398	LA	CC398/LA
			9/319		-	398	-	-	398	LA	CC398/LA
			1/319	588	-	400	-	-	398	LA	CC398/LA
			2/319	11	-	-	-	-	398	LA	CC398/LA
			1/319	571	-	-	-	-	398	LA	CC398/LA
Finland	Pig meat	Batch, fresh, NS	1/206	728	-	45	45	-		HA	CC45/HA
			14/206	34	-	398	398	-	398	LA	CC398/LA
			1/206	899	-	398	398	-	398	LA	CC398/LA
			9/206	2741	-	398	398	-	398	LA	CC398/LA
			1/206	4677	-	398	398	-	398	LA	CC398/LA
Germany	Bovine meat	Single, fresh, BCP	1/73	1346	-	72	8	-		CA	CC8/CA
			2/73	2	-	-	-	-	5	HA	CC5/HA
			2/73	8	-	-	-	-	8	HA	CC8/HA
			2/73	311	-	-	-	-	5	HA	CC5/HA
			1/73	2112	-	-	-	-	97	LA	CC97/LA
	Bovine meat	Single, fresh, RM	1/405	174	-	4110	1	-		CA	CC1/CA
			4/405	11	-	-	-	-	398	LA	CC398/LA
			4/405	34	-	-	-	-	398	LA	CC398/LA
			1/405	359	-	-	-	-	97	LA	CC97/LA
			1/405	559	-	-	-	-	1	CA	CC1/CA
			1/405	843	-	-	-	*mecC*	130	LA	CC130/LA
			1/405	899	-	-	-	-	9/398*	LA	CC9/CC398/LA

			1/405	1430	-	-	-	-	9	LA	CC9/LA
			1/405	1451	-	-	-	-	398	LA	CC398/LA
	Pig meat	Single, fresh, BCP	1/7	1430	-	-	-	-	9	LA	CC9/LA

BCP: border control post, OFM: On-farm monitoring, RM: retail monitoring, SM: slaughterhouse monitoring, CC: clonal complex, ST: sequence type

CA: community-associated, HA: healthcare- associated, LA: livestock-associated.

Note: Purple columns show CA-MRSA, beige columns show HA-MRSA and dark turquoise columns show CC398 LA-MRSA, light green columns show non-CC398 LA-MRSA and orange columns show likely LA-MRSA.

For isolates where inferred CC is stated, the CC is based on the *spa*-type or ST as reported in literature.

The category "likely LA-MRSA" includes CC692 associated with birds (Monecke et a., 2016).

The category "non-CC398, LA-MRSA" includes CC9, CC97, CC121 and CC130 (Bal et al., 2016).

The category "HA-MRSA" includes CC5, CC8 ST247, CC8 t008, CC8 t009 and CC45 (Boost et al., 2012; Bal et al., 2016; Cuny et al., 2016)

The category "CA-MRSA" includes CC1 and CC8 ST72 (Bal et al., 2016; Earls et al., 2021).

Details on the categorisation of *spa*-types can be found in the chapter on MRSA in the main part of the AMR report (section 6.3.3 Animals and food: results from molecular typing of isolates). A summary of the information presented in this table is also visualised in Figure 56 of the MRSA chapter in the main part of the AMR report.

Table 9: Methicillin-resistant *Staphylococcus aureus spa*-type characterization, 2022.

Category	Country	Animal/ food type	Sample type/ unit	No. of isolates	Where reported					Inferred CC	LA, CA or HA	Inferred ST/CC & type
					spa-type	PVL status/ IEC genes	ST	CC	*mec*-gene			
Food-producing animals	Belgium	Pigs - breeding animals	Herd, OFM	43/179	11	-	398	398	*mecA*	-	LA	CC398/LA
				14/179	34	*sak, scn*†	398	398	*mecA*	-	LA	CC398/LA
				1/179	588	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	1451	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	1457	-	398	398	*mecA*	-	LA	CC398/LA
				3/179	2011	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	3423	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	5104	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	6575	-	398	398	*mecA*	-	LA	CC398/LA
				1/179	15528	-	398	398	*mecA*	-	LA	CC398/LA
				2/179	11	-	3706	398	*mecA*	-	LA	CC398/LA
				1/179	34	-	7645	398	*mecA*	-	LA	CC398/LA
				1/179	11	-	8149	398	*mecA*	-	LA	CC398/LA
				1/179	34	-	8151	398	*mecA*	-	LA	CC398/LA
		Fattening pigs	Herd, OFM	60/180	11	-	398	398	*mecA*	-	LA	CC398/LA
				24/180	34	-	398	398	*mecA*	-	LA	CC398/LA
				1/180	779	-	398	398	*mecA*	-	LA	CC398/LA
				1/180	1255	-	398	398	*mecA*	-	LA	CC398/LA
				1/180	1451	-	398	398	*mecA*	-	LA	CC398/LA
				2/180	1580	-	398	398	*mecA*	-	LA	CC398/LA
				2/180	2011	-	398	398	*mecA*	-	LA	CC398/LA
				1/180	3423	-	398	398	*mecA*	-	LA	CC398/LA
				1/180		-	398	398	*mecA*	-	LA	CC398/LA
				2/180	11	-	3706	398	*mecA*	-	LA	CC398/LA
				1/180	34	-	7645	398	*mecA*	-	LA	CC398/LA
				1/180	34	-	8152	398	*mecA*	-	LA	CC398/LA
				1/180	11	-	8150	-	*mecA*	398	LA	CC398/LA

Food	Germany	Broiler meat	Batch, carcase, SM	32/412	11	-	-	-	mecA	398	LA	CC398/LA
				22/412	34	-	-	-	mecA	398	LA	CC398/LA
				1/412	571	-	-	-	mecA	398	LA	CC398/LA
				1/412	899	-	-	-	mecA	9/398*	LA	CC9/CC398/LA
				1/412	1430	-	-	-	mecA	9	LA	CC9/LA
				1/412	1451	-	-	-	mecA	398	LA	CC398/LA
				1/412	2011	-	-	-	mecA	398	LA	CC398/LA
				1/412	6575	-	-	-	mecA	398	LA	CC398/LA
			Single, fresh, RM	2/485	11	-	-	-	mecA	398	LA	CC398/LA
				17/485	34	-	-	-	mecA	398	LA	CC398/LA
				2/485	571	-	-	-	mecA	398	LA	CC398/LA
				1/485	2011	-	-	-	mecA	398	LA	CC398/LA
				1/485	2330	-	-	-	mecA	398	LA	CC398/LA
				1/485	10485	-	-	-	mecA	398	LA	CC398/LA
		Turkey meat	Batch, carcase, SM	1/417	538	-	398	398	mecA	-	LA	CC398/LA
				1/417	2922	-	398	398	mecA	-	LA	CC398/LA
				1/417	14089	-	398	398	mecA	-	LA	CC398/LA
				1/417	21217	-	398	398	mecA	-	LA	CC398/LA
				1/417		-	398	398	mecA	-	LA	CC398/LA
				1/417	242	-	5	-	mecA	5	HA	CC5/HA
				1/417		-	398	-	mecA	398	LA	CC398/LA
				1/417	235	-	8325	-	mecA	1	CA	CC1/CA
				1/417	9	-	-	-	mecA	8	HA	CC8/HA
				23/417	11	-	-	-	mecA	398	LA	CC398/LA
				142/417	34	-	-	-	mecA	398	LA	CC398/LA
				4/417	127	-	-	-	mecA	1	CA	CC1/CA
				1/417	242	-	-	-	mecA	5	HA	CC5/HA
				2/417	588	-	-	-	mecA	398	LA	CC398/LA
				20/417	899	-	-	-	mecA	9/398*	LA	CC9/CC398/LA
				3/417	1255	-	-	-	mecA	398	LA	CC398/LA
				2/417	1422	-	-	-	mecA	692	LA	CC692/LA
				3/417	1430	-	-	-	mecA	9	LA	CC9/LA
				1/417	1451	-	-	-	mecA	398	LA	CC398/LA

			1/417	1793	-	-	-	*mecA*	398	LA	CC398/LA
			5/417	2011	-	-	-	*mecA*	398	LA	CC398/LA
			1/417	2346	-	-	-	*mecA*	398	LA	CC398/LA
			1/417	2576	-	-	-	*mecA*	398	LA	CC398/LA
			1/417	10204	-	-	-	*mecA*	9	LA	CC9/LA
		Single, fresh, RM	1/460	8	-	-	-	*mecA*	8	HA	CC8/HA
			16/460	11	-	-	-	*mecA*	398	LA	CC398/LA
			85/460	34	-	-	-	*mecA*	398	LA	CC398/LA
			1/460	127	-	-	-	*mecA*	1	CA	CC1/CA
			26/460	899	-	-	-	*mecA*	9/398*	LA	CC9/CC398/LA
			1/460	1255	-	-	-	*mecA*	398	LA	CC398/LA
			3/460	1422	-	-	-	*mecA*	692	LA	CC692/LA
			3/460	1430	-	-	-	*mecA*	9	LA	CC9/LA
			1/460	1580	-	-	-	*mecA*	398	LA	CC398/LA
			2/460	2011	-	-	-	*mecA*	398	LA	CC398/LA
			2/460	5452	-	-	-	*mecA*	398	LA	CC398/LA
			2/460	10204	-	-	-	*mecA*	9	LA	CC9/LA
Spain	Broiler meat	Single, fresh, RM	1/90‡	6228	-	-	-	*mecA*	398	LA	CC398/LA

*Hybrid strain, t899 associated with CC9 and CC398, OFM: On-farm monitoring, RM: retail monitoring, SM: slaughterhouse monitoring

CC: clonal complex, ST: sequence type, CA: community-associated, HA: healthcare-associated, LA: livestock-associated, IEC: immune evasion cluster, PVL: Panton-Valentin leukocidin

Note: Purple columns show CA-MRSA, beige columns show HA-MRSA and dark turquoise columns show CC398 LA-MRSA, light green columns show non-CC398 LA-MRSA and orange columns show likely LA-MRSA.

For isolates where inferred CC is stated, the CC is based on the *spa*-type or ST as reported in literature.

The category "likely LA-MRSA" includes CC692 associated with birds (Monecke et a., 2016).

The category "non-CC398, LA-MRSA" includes CC9, CC97, CC121 and CC130 (Bal et al., 2016).

The category "HA-MRSA" includes CC5, CC8 ST247, CC8 t008, CC8 t009 and CC45 (Boost et al., 2012; Bal et al., 2016; Cuny et al., 2016)

The category "CA-MRSA" includes CC1 and CC8 ST72 (Bal et al., 2016; Earls et al., 2021).

Details on the categorisation of *spa*-types can be found in the chapter on MRSA in the main part of the report (section 6.3.3 Animals and food: results from molecular typing of isolates). A summary of the information presented in this table is also visualised in Figure 56 of the MRSA chapter in the main part of the AMR report.

† One isolate from sows carried the *sak* and *scn* genes associated with the IEC.

‡Spain reported 45 samples from fresh broiler meat with skin and 45 samples from fresh broiler meat without skin. These are reported together in the table.

E.6 Occurrence of resistance to selected antimicrobials in methicillin-resistant *Staphylococcus aureus*
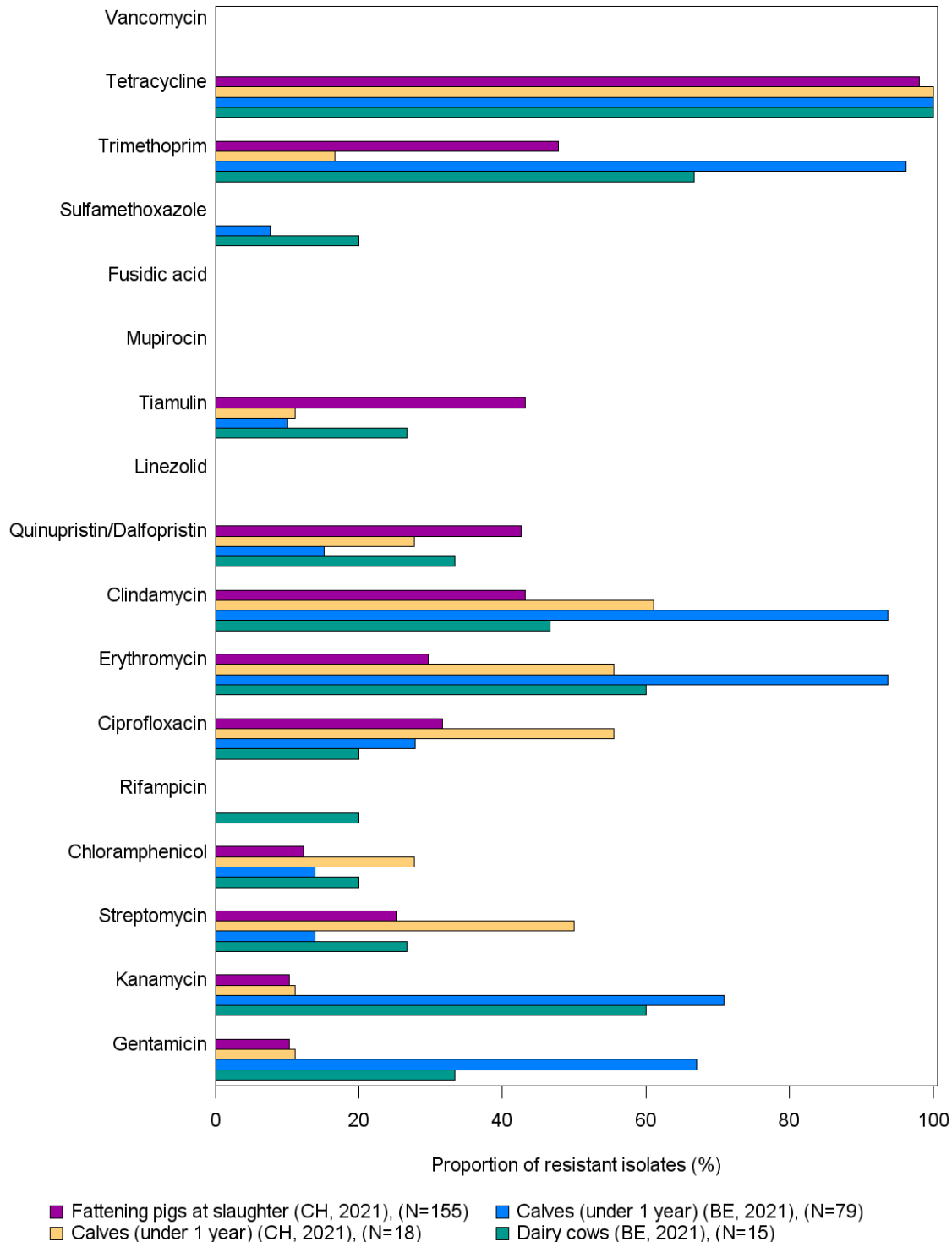
BE: Belgium; CH: Switzerland. All isolates were resistant to penicillin and cefoxitin.

Figure 1: Antimicrobial resistance in methicillin-resistant *Staphylococcus aureus* from animals in 2021.

Table 10: Occurrence of resistance (%) to selected antimicrobials in methicillin-resistant *Staphylococcus aureus* from food and animals, 2021.

Country	N	GEN	KAN	STR	CHL	RIF	CIP	ERY	CLI	Q/D	LZD	TIA	MUP	FUS	SMX	TMP	TET	VAN
Cattle (bovine animals) - calves (under one year of age)																		
Belgium	79[a]	67.1	70.9	13.9	13.9	0	27.9	93.7	93.7	15.2	0	10.1	0	0	7.6	96.2	100	0
Switzerland	18*	11.1	11.1	50	27.8	0	55.6	55.6	61.1	27.8	0	11.1	0	0	0	16.7	100	0
Cattle (bovine animals) - dairy cows																		
Belgium	15[b]	33.3	60	26.7	20	20	20	60	46.7	33.3	0	26.7	0	0	20	66.7	100	0
Cattle (bovine animals) - meat production animals																		
Belgium	4[c]	50	100	50	50	50	0	50	0	0	0	0	0	0	50	50	100	0
Meat from bovine animals - fresh																		
Austria	15*	0	6.7	33.3	0	0	26.7	26.7	26.7	13.3	0	13.3	0	0	0	20	53.3	0
Germany	23[d]	8.7	17.4	8.7	0	0	34.8	30.4	17.4	4.4	0	17.4	0	0	0	21.7	43.5	0
Pigs - fattening pigs																		
Switzerland	155*	10.3	10.3	25.2	12.3	0	31.6	29.7	43.2	42.6	0	43.2	0	0	0	47.7	98.1	0
Meat from pigs - fresh																		
Austria	68*	5.9	4.4	16.2	2.9	2.9	23.5	38.2	47.1	25	0	25	0	0	0	33.8	76.5	0
Germany	1[e]	0	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	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; VAN: vancomycin. All MRSA isolates were resistant to penicillin and cefoxitin as expected.

(a) *Spa*-types: t386 ST1 (1), t011 (65), t034 (6), t1451 (1), t1456 (1), t2346 (1), t2370 (1), t3423 (1), t5210 (1), t6228 (1)
(b) *Spa*-types: t037 ST239 (3), t011 (10), t034 (2)
(c) *Spa*-types: t037 ST239 (2), t011 (2)
(d) *Spa*-types: t1346 (1), t002 (2), t008 (2), t311 (2), t2112 (1), t174 ST41110 (1), t011 (4), t034 (4), t359 (1), t559 (1) t843 *mecC* positive (1), t899 (1), t1430 (1), t1451 (1)
(e) *Spa*-types: t1430 (1)
Spa-types not provided

Table 11: Occurrence of resistance (%) to selected antimicrobials in methicillin-resistant *Staphylococcus aureus* from food and animals, 2022.

Country	N	GEN	KAN	STR	CHL	RIF	CIP	ERY	CLI	Q/D	LZD	TIA	MUP	FUS	SMX	TMP	TET	VAN
Meat from broilers - fresh																		
Spain	1[(a)]	0	0	0	0	-	100	100	100	0	0	0	0	0	0	100	100	0
Germany	24 [(b)]	8.3	4.2	4.2	4.2	0	8.3	70.8	95.8	75	0	83.3	0	0	0	95.8	100	0
Meat from broilers - carcase																		
Germany	60[(c)]	11.7	0	8.3	0	1.7	10	85	95	75	0	76.7	0	0	1.7	88.3	96.7	0
Meat from turkeys - fresh																		
Germany	143[(d)]	7	9.1	7.7	2.1	0	53.9	81.8	81.8	69.2	0	78.3	0	0	0.7	82.5	93.7	0
Meat from turkeys - carcase																		
Germany	219[(e)]	6.4	5.9	9.1	0	0.5	38.4	79.5	80.8	69.4	0	79	0	0	1.8	77.6	92.2	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; VAN: vancomycin. All MRSA isolates were resistant to penicillin and cefoxitin as expected.

(a) *Spa*-types: t6228 (1)

(b) *Spa*-types: t011 (2), t034 (17), t571 (2), t2011 (1), t 2330 (1), t10485 (1)

(c) *Spa*-types: t011 (32), t034 (22), t571 (1), t899 (1), t1430 (1), t1451 (1), t2011 (1), t6575 (1)

(d) *Spa*-types: t008 (1), t011 (16), t034 (85), t127 (1), t899 (26), t1255 (1), t1422 (3), t1430 (3), t1580 (1), t2011 (2), t5452 (2), t10204 (2)

(e) *Spa*-types: t538 ST389 (1), t2922 ST398 (1), t14089 ST398 (1), t21217 ST398 (1), t242 ST5 (1), t235 ST8325 (1), t009 (1), t011 (23), t034 (142), t127 (4), t242 (1), t588 (2), t899 (20), t1255 (3), t1422 (2), t1430 (3), t1451 (1), t1793 (1), t2011 (5), t2346 (1), t2576 (1), t10204 (1), no *spa*-type provided ST398 (2), no *spa*-type or ST provided (5)

E.7 MDR patterns in methicillin-resistant *Staphylococcus aureus*

Table 12: MDR patterns in methicillin-resistant *Staphylococcus aureus* isolates from animals and food, 2021.

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET		27 (17.4)			1 (1.3)	1 (6.7)			4 (7.0)	33 (9.3)
GEN-KAN-PNC-FOX-ERY-CLI-TMP-TET					28 (35.4)	2 (13.3)				30 (8.5)
PNC-FOX-TET	1 (5.6)	13 (8.4)		2 (11.8)		1 (6.7)		1 (12.5)	11 (19.3)	29 (8.2)
PNC-FOX-CLI-Q/D-TIA-TMP-TET		16 (10.3)				1 (6.7)			4 (7.0)	21 (5.9)
PNC-FOX-CIP-TET		18 (11.6)							2 (3.5)	20 (5.6)
STR-PNC-FOX-TET		16 (10.3)						1 (12.5)	3 (5.3)	20 (5.6)
CHL-PNC-FOX-CIP-TET	3 (16.7)	16 (10.3)								19 (5.4)
GEN-KAN-PNC-FOX-TET	2 (11.1)	11 (7.1)								13 (3.7)
STR-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET	1 (5.6)	10 (6.5)				1 (6.7)				12 (3.4)
PNC-FOX-CIP-ERY-CLI-TMP-TET				1 (5.9)	5 (6.3)				2 (3.5)	8 (2.3)
GEN-KAN-PNC-FOX-CIP-ERY-CLI-TMP-TET					7 (8.9)					7 (2.0)
GEN-KAN-PNC-FOX-TMP-TET		1 (0.7)			3 (3.8)	1 (6.7)	2 (50.0)			7 (2.0)
PNC-FOX-CIP				4 (23.5)					3 (5.3)	7 (2.0)
PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)		1 (5.9)	1 (1.3)				4 (7.0)	7 (2.0)
PNC-FOX-ERY-CLI-TET								1 (12.5)	6 (10.5)	7 (2.0)

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
PNC-FOX-ERY-CLI-TMP-TET					4 (5.1)			1 (12.5)	2 (3.5)	7 (2.0)
STR-PNC-FOX-CIP-TET	1 (5.6)	4 (2.6)						1 (12.5)	1 (1.8)	7 (2.0)
GEN-KAN-PNC-FOX-ERY-CLI-Q/D-TMP-TET					4 (5.1)	1 (6.7)				5 (1.4)
KAN-STR-CHL-PNC-FOX-RIF-ERY-SMX-TET						3 (20.0)	2 (50.0)			5 (1.4)
STR-PNC-FOX-CIP-CLI-Q/D-TIA-TMP-TET		4 (2.6)						1 (12.5)		5 (1.4)
PNC-FOX-CIP-TMP-TET					1 (1.3)	2 (13.3)			1 (1.8)	4 (1.1)
STR-PNC-FOX-ERY-CLI-TET	4 (22.2)									4 (1.1)
GEN-KAN-PNC-FOX-CIP-TMP-TET		2 (1.3)				1 (6.7)				3 (0.8)
GEN-KAN-PNC-FOX-ERY-CLI-SMX-TMP-TET					3 (3.8)					3 (0.8)
PNC-FOX-CLI-Q/D-TIA-TMP		3 (1.9)								3 (0.8)
PNC-FOX-ERY-TMP-TET		3 (1.9)								3 (0.8)
STR-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)						1 (12.5)	1 (1.8)	3 (0.8)
STR-PNC-FOX-CLI-Q/D-TIA-TMP-TET		2 (1.3)							1 (1.8)	3 (0.8)
GEN-KAN-PNC-FOX				2 (11.8)						2 (0.6)
GEN-KAN-STR-PNC-FOX-CIP-ERY-CLI-TMP-TET					2 (2.5)					2 (0.6)

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
KAN-STR-PNC-FOX-ERY-TET				2 (11.8)						2 (0.6)
PNC-FOX-CIP-ERY-CLI-Q/D-TET	2 (11.1)									2 (0.6)
PNC-FOX-TMP-TET		1 (0.7)		1 (5.9)						2 (0.6)
STR-CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET					2 (2.5)					2 (0.6)
STR-PNC-FOX-CIP-ERY-CLI-TMP-TET					1 (1.3)				1 (1.8)	2 (0.6)
STR-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)				1 (1.8)	2 (0.6)
CHL-PNC-FOX-CIP			1 (100)							1 (0.3)
CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET					1 (1.3)					1 (0.3)
CHL-PNC-FOX-CIP-ERY-CLI-TET		1 (0.7)								1 (0.3)
CHL-PNC-FOX-CIP-ERY-CLI-TMP-TET	1 (5.6)									1 (0.3)
CHL-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET					1 (1.3)					1 (0.3)
CHL-PNC-FOX-ERY-CLI-TET					1 (1.3)					1 (0.3)
CHL-PNC-FOX-TET									1 (1.8)	1 (0.3)
GEN-CHL-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	Total
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
GEN-KAN-CHL-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)
GEN-KAN-PNC-FOX-CLI-TIA-TMP-TET		1 (0.7)								1 (0.3)
GEN-KAN-PNC-FOX-ERY-CLI-Q/D-SMX-TMP-TET					1 (1.3)					1 (0.3)
GEN-KAN-PNC-FOX-ERY-CLI-Q/D-TIA-TET									1 (1.8)	1 (0.3)
GEN-KAN-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET									1 (1.8)	1 (0.3)
GEN-KAN-STR-CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TET		1 (0.7)								1 (0.3)
GEN-KAN-STR-CHL-PNC-FOX-CIP-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)
GEN-KAN-STR-PNC-FOX-ERY-CLI-SMX-TMP-TET					1 (1.3)					1 (0.3)
GEN-KAN-STR-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)
GEN-PNC-FOX-ERY-CLI-TMP-TET									1 (1.8)	1 (0.3)
GEN-STR-PNC-FOX-ERY-CLI-TET									1 (1.8)	1 (0.3)
KAN-CHL-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
KAN-PNC-FOX-ERY-CLI-Q/D-TIA-TET						1 (6.7)				1 (0.3)
KAN-PNC-FOX-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)
KAN-STR-CHL-PNC-FOX-CIP-ERY-CLI-TMP-TET					1 (1.3)					1 (0.3)
KAN-STR-CHL-PNC-FOX-ERY-CLI-TET					1 (1.3)					1 (0.3)
KAN-STR-PNC-FOX-CIP-ERY-TET								1 (12.5)		1 (0.3)
KAN-STR-PNC-FOX-ERY-CLI-TET									1 (1.8)	1 (0.3)
PNC-FOX-CIP-ERY-CLI-TIA-TMP-TET				1 (5.9)						1 (0.3)
PNC-FOX-CIP-TIA-TET				1 (5.9)						1 (0.3)
PNC-FOX-CLI-Q/D-TIA-TET									1 (1.8)	1 (0.3)
PNC-FOX-ERY-CLI-Q/D-TIA-TET					1 (1.3)					1 (0.3)
PNC-FOX-ERY-CLI-SMX-TMP-TET					1 (1.3)					1 (0.3)
PNC-FOX-ERY-CLI-TIA-TMP-TET				1 (5.9)						1 (0.3)
PNC-FOX-ERY-Q/D-TMP-TET		1 (0.7)								1 (0.3)
PNC-FOX-ERY-TIA-TMP-TET		1 (0.7)								1 (0.3)

MDR patterns in MRSA isolates	Switzerland		Germany		Belgium			Austria		Total
	Calves (N=18)	Pigs (N=155)	Pig meat (N=1)	Bovine meat (N=23)	Calves (N=79)	Dairy cows (N=15)	Meat production animals (N=4)	Bovine meat (N=15)	Pig meat (N=68)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
PNC-FOX-RIF-CIP									1 (1.8)	1 (0.3)
PNC-FOX-TIA-TMP-TET					1 (1.3)					1 (0.3)
STR-CHL-PNC-FOX-CIP-CLI-Q/D-TIA-TMP-TET	1 (5.6)									1 (0.3)
STR-CHL-PNC-FOX-CIP-TET		1 (0.7)								1 (0.3)
STR-CHL-PNC-FOX-TET									1 (1.8)	1 (0.3)
STR-PNC-FOX-CIP-ERY-CLI-Q/D-TET	1 (5.6)									1 (0.3)
STR-PNC-FOX-CIP-ERY-CLI-TET	1 (5.6)									1 (0.3)
PNC-FOX-ERY				1 (5.9)						1 (0.3)
PNC-FOX-RIF									1 (1.8)	1 (0.3)
Total MDR	18 (100)	155 (100)	1 (100)	17 (73.9)	79 (100)	15 (100)	4 (100)	8 (53.3)	57 (83.8)	354 (93.7)

MDR: multi drug resistant; N: total number of isolates tested; n: number of isolates with MDR pattern; FOX: cefoxitin; PNC: penicillin; GEN: gentamicin; KAN: kanamycin; STR: streptomycin; CHL: chloramphenicol; RIF: rifampicin; CIP: ciprofloxacin; ERY: erythromycin; CLI: clindamycin; Q/D: quinupristin/dalfopristin; TIA: tiamulin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline.

Table 13: MDR patterns in methicillin-resistant *Staphylococcus aureus* isolates from animals and food, 2022.

MDR patterns in MRSA isolates	Germany				Spain	Total
	Meat from turkey, carcase (N=219)	Meat form turkey, fresh (N=143)	Meat from broilers, carcase (N=60)	Meat form broilers, fresh (N=24)	Meat from broiler, fresh (N=1)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET	78 (35.6)	44 (30.8)	31 (52.5)	13 (54.2)		166 (37.2)
PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET	47 (21.5)	40 (28.0)	2 (3.4)			89 (20.0)
PNC-FOX-CIP	12 (5.5)	7 (4.9)				19 (4.3)
PNC-FOX-ERY-CLI-TIA-TMP-TET	11 (5.0)	4 (2.8)				15 (3.4)
STR-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET	7 (3.2)	2 (1.4)	2 (3.4)			11 (2.5)
PNC-FOX-TET	6 (2.7)	4 (2.8)	1 (1.7)			11 (2.5)
GEN-KAN-PNC-FOX-TMP-TET	5 (2.3)	2 (1.4)		1 (4.2)		8 (1.8)
PNC-FOX-CIP-TIA-TMP-TET	3 (1.4)	5 (3.5)				8 (1.8)
PNC-FOX-CLI-Q/D-TIA-TET	7 (3.2)		1 (1.7)			8 (1.8)
PNC-FOX-CLI-Q/D-TIA-TMP-TET			3 (5.1)	4 (16.7)		7 (1.6)
GEN-KAN-PNC-FOX-CIP-ERY-CLI-TMP-TET	3 (1.4)	3 (2.1)				6 (1.3)
PNC-FOX-CIP-ERY-CLI-TIA-TMP-TET	3 (1.4)	3 (2.1)				6 (1.3)
GEN-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET	2 (0.9)		3 (5.1)			5 (1.1)
PNC-FOX-ERY-CLI-TET	1 (0.5)	2 (1.4)	2 (3.4)			5 (1.1)
PNC-FOX-TIA-TET	3 (1.4)	2 (1.4)				5 (1.1)
GEN-PNC-FOX-ERY-CLI-TMP-TET	1 (0.5)		2 (3.4)	1 (4.2)		4 (0.9)
KAN-STR-PNC-FOX-ERY-TET	3 (1.4)	1 (0.7)				4 (0.9)
PNC-FOX-CIP-ERY-CLI-TMP-TET	2 (0.9)		1 (1.7)		1 (100)	4 (0.9)
PNC-FOX-CIP-TET	2 (0.9)	2 (1.4)				4 (0.9)

MDR patterns in MRSA isolates	Germany				Spain	Total
	Meat from turkey, carcase (N=219)	Meat form turkey, fresh (N=143)	Meat from broilers, carcase (N=60)	Meat form broilers, fresh (N=24)	Meat from broiler, fresh (N=1)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
PNC-FOX-ERY-CLI-TMP-TET		1 (0.7)	2 (3.4)	1 (4.2)		4 (0.9)
PNC-FOX-CIP-ERY-CLI	1 (0.5)	1 (0.7)	1 (1.7)			3 (0.7)
PNC-FOX-CIP-ERY-CLI-TET	2 (0.9)	1 (0.7)				3 (0.7)
PNC-FOX-CLI-TIA-TMP-TET			1 (1.7)	2 (8.3)		3 (0.7)
STR-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET	1 (0.5)	1 (0.7)		1 (4.2)		3 (0.7)
STR-PNC-FOX-ERY-CLI-Q/D-TIA-TET	2 (0.9)	1 (0.7)				3 (0.7)
GEN-STR-PNC-FOX-ERY-CLI-Q/D-TIA-TMP-TET	1 (0.5)	1 (0.7)				2 (0.4)
GEN-STR-PNC-FOX-ERY-CLI-TMP-TET			2 (3.4)			2 (0.4)
PNC-FOX-CIP-ERY-CLI-Q/D-TIA-SMX-TMP-TET	1 (0.5)	1 (0.7)				2 (0.4)
PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TET		2 (1.4)				2 (0.4)
PNC-FOX-ERY-CLI-Q/D-TIA-TET		1 (0.7)	1 (1.7)			2 (0.4)
PNC-FOX-RIF-ERY-CLI-Q/D-TIA-TMP-TET	1 (0.5)		1 (1.7)			2 (0.4)
CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)				1 (0.2)
CHL-PNC-FOX-CIP-ERY-CLI-TET				1 (4.2)		1 (0.2)
FOX-CIP-ERY-CLI-Q/D-TIA-SMX-TMP-TET	1 (0.5)					1 (0.2)
GEN-KAN-PNC-FOX-CIP-CLI-TMP-TET		1 (0.7)				1 (0.2)
GEN-KAN-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)				1 (0.2)
GEN-KAN-PNC-FOX-CIP-TMP-TET		1 (0.7)				1 (0.2)

MDR patterns in MRSA isolates	Germany				Spain	Total
	Meat from turkey, carcase (N=219)	Meat form turkey, fresh (N=143)	Meat from broilers, carcase (N=60)	Meat form broilers, fresh (N=24)	Meat from broiler, fresh (N=1)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
GEN-KAN-PNC-FOX-ERY-CLI-TMP-TET		1 (0.7)				1 (0.2)
GEN-KAN-STR-PNC-FOX-CIP-SMX-TMP-TET	1 (0.5)					1 (0.2)
GEN-PNC-FOX-ERY-CLI-Q/D-TIA-TET	1 (0.5)					1 (0.2)
KAN-STR-CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)				1 (0.2)
KAN-STR-PNC-FOX-CIP		1 (0.7)				1 (0.2)
KAN-STR-PNC-FOX-CIP-CLI-Q/D-TIA-TMP-TET		1 (0.7)				1 (0.2)
KAN-STR-PNC-FOX-ERY	1 (0.5)					1 (0.2)
PNC-FOX-CIP-CLI-Q/D-TIA-TMP-TET	1 (0.5)					1 (0.2)
PNC-FOX-CIP-CLI-TIA-TET	1 (0.5)					1 (0.2)
PNC-FOX-CIP-ERY-CLI-Q/D-TMP-TET		1 (0.7)				1 (0.2)
PNC-FOX-CIP-ERY-CLI-SMX-TMP-TET			1 (1.7)			1 (0.2)
PNC-FOX-CIP-ERY-TMP-TET		1 (0.7)				1 (0.2)
PNC-FOX-CIP-SMX-TET	1 (0.5)					1 (0.2)
PNC-FOX-ERY-Q/D	1 (0.5)					1 (0.2)
PNC-FOX-Q/D-TIA-TET	1 (0.5)					1 (0.2)
PNC-FOX-TMP-TET			1 (1.7)			1 (0.2)
STR-CHL-PNC-FOX-CIP-ERY-CLI-Q/D-TIA-TMP-TET		1 (0.7)				1 (0.2)
STR-PNC-FOX-CIP	1 (0.5)					1 (0.2)
STR-PNC-FOX-CIP-CLI-Q/D-TIA-TMP-TET			1 (1.7)			1 (0.2)

MDR patterns in MRSA isolates	Germany				Spain	Total
	Meat from turkey, carcase (N=219)	Meat form turkey, fresh (N=143)	Meat from broilers, carcase (N=60)	Meat form broilers, fresh (N=24)	Meat from broiler, fresh (N=1)	
	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)	n (% of MDR isolates)
STR-PNC-FOX-CIP-ERY-CLI-TET	1 (0.5)					1 (0.2)
STR-PNC-FOX-CIP-ERY-CLI-TMP-TET		1 (0.7)				1 (0.2)
STR-PNC-FOX-ERY-CLI-TIA-TMP-TET	1 (0.5)					1 (0.2)
STR-PNC-FOX-TET	1 (0.5)					1 (0.2)
PNC-FOX-ERY	1 (0.5)					1 (0.2)
Total MDR	**219 (100)**	**143 (100)**	**59 (98.3)**	**24 (100)**	**1 (100)**	**446 (99.8)**

MDR: multi drug resistant; N: total number of isolates tested; n: number of isolates with MDR pattern; FOX: cefoxitin; PNC: penicillin; GEN: gentamicin; KAN: kanamycin; STR: streptomycin; CHL: chloramphenicol; RIF: rifampicin; CIP: ciprofloxacin; ERY: erythromycin; CLI: clindamycin; Q/D: quinupristin/dalfopristin; TIA: tiamulin; SMX: sulfamethoxazole; TMP: trimethoprim; TET: tetracycline.