CHROMagar™
The Chromogenic Media Pioneer

Performance of the RambaQUICK™ Salmonella method

Use of CHROMagar™ Salmonella Plus and RambaQUICK™ Salmonella for detection and isolation of Salmonella species including lactose positive strains

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This report contains 16 pages, including 2 pages of annexes

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1. Introduction

Salmonella species are known pathogenic agents behind major worldwide foodborne diseases and epidemiologic issues. The ISO 6579 is the bacteriological standard method for the detection of *Salmonella* spp. (1), but the occurrence of lactose-positive *Salmonella* interferes with the recognition of suspect colonies. Accurate and reliable methods for the detection of *Salmonella* are necessary to ensure public health safety and regulatory compliance.

CHROMagar™ Salmonella Plus (ref. SA16) has been developed to enable clear and straightforward visible detection of *Salmonella* spp., including lactose-positive *Salmonella*, *S.* Typhi, *S.* Paratyphi and serovars (2 and Fig. 1) in food, water, feed and environmental samples. ISO 6579 (2017) includes CHROMagar™ Salmonella Plus as a choice of a second selective plating medium (which is complementary to Xylose Lysine Deoxycholate, XLD agar) meeting the standard's requirement for the detection of lactose-positive *Salmonella*. The best functions found in conventional enrichment broths, namely Rappaport-Vassiliadis medium with soy (RVS broth) and Muller-Kauffmann tetrathionate-novobiocin broth (MKTTn), are achieved by using a shorter enrichment step with only RambaQUICK™ Salmonella selective broth (ref. SQ001). After the revivification phase in Buffered Peptone Water (BPW), bacteria are incubated at 41.5°C for 7 hours (instead of 24 hours as per ISO 6579) in RambaQUICK™ Salmonella. During this selective enrichment, *Salmonella* bacteria multiply in an exponential growth phase and competitive flora are inhibited. Finally plating is carried out on the same day (see annexes 1 & 2).

CHROMagar™ Salmonella Plus consists of a powder base and a liquid supplement, which are stored at 15-30°C. Optionally, plates can have an opaque background when a white opaque supplement is incorporated during their preparation. Samples can be streaked onto agar plates after selective broth enrichment employing RambaQUICK™ Salmonella which is composed of a powder base (see annex 1). Medium plates are incubated under aerobic conditions at 37 °C for 18-24 hours. *Salmonella*, including lactose-positive *Salmonella* species are distinctively grown as mauve colonies while *E. coli* and some *Proteus* species grow as colourless colonies, and coliforms grow blue colonies on CHROMagar™ Salmonella Plus.

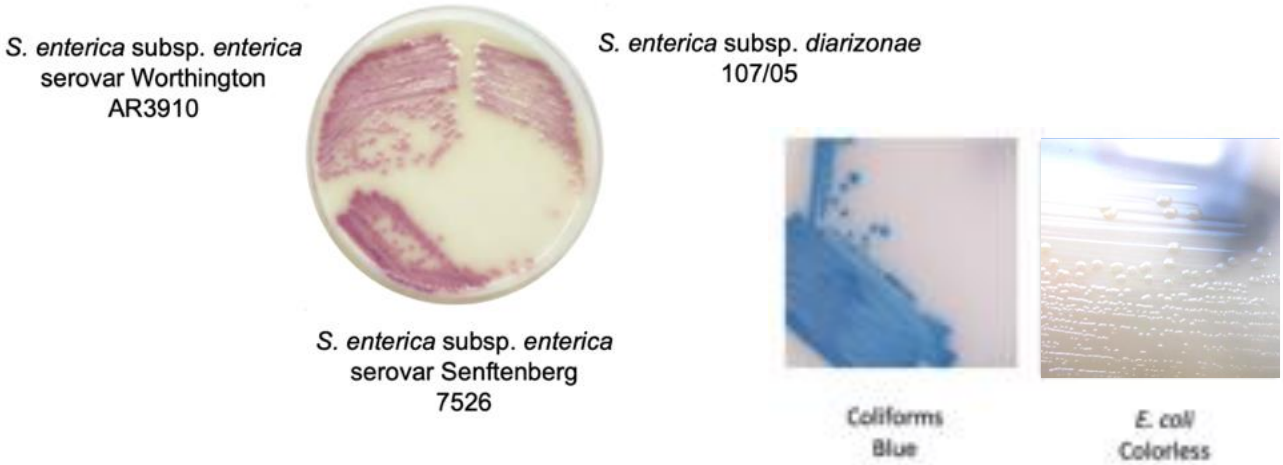

Figure 1. Detection of *Salmonella* strains (ONPG$^+$, lactose$^+$) on CHROMagar™ Salmonella Plus (2).

Together, CHROMagar™ Salmonella Plus (one culture plate) and RambaQUICK™ Salmonella (one selective enrichment broth), referred to here as the **RambaQUICK™ Salmonella method**, provide a powerful solution to the ever-present challenge of *Salmonella* detection, ensuring that safety and quality standards are met with confidence and efficiency.

This document compiles the **RambaQUICK™ Salmonella method** evaluations at two stages:

- In-house evaluations of the selective enrichment formula with pure strains and with food samples artificially contaminated. Biochemical and serological confirmatory testing on strains cultured in the broth formula and grown on CHROMagar™ Salmonella Plus plates.

- Independent laboratory evaluations using *Salmonella* strains and food samples.

2. Performance of the RambaQUICK™ Salmonella formula

2.1. Analytical data

Different *Salmonella* and other bacterial strains (n=30 and n=23, respectively) were incubated in RambaQUICK™ Salmonella for 7 hours at 41.5°C and streaked on CHROMagar™ Salmonella Plus. Agar plates were incubated for 18-24 hours at 37°C to evaluate the inclusivity and exclusivity of the formula in the **RambaQUICK™ Salmonella method**. Results are shown in Tables I and II.

Table I. inclusivity **RambaQUICK™ Salmonella method**.

***Salmonella* strains**	**Strain #**	**Colonie appearance**
Salmonella	AR3011	M++, 2
S. Typhimurium	AR3015	M+, 1
S. Typhimurium	ATCC© 13311	M++, 1.5
S. Typhimurium	ATCC© 14028	M++, 2
S. Enteritidis	ATCC© 13076	M+, 1
S. Typhi	AR3104	M, 1
S. Typhi	AR3105	M+, 2
S. Typhi	AR4052	M+, 1
Salmonella spp.	AR4053	M++, 3
S. Dublin	AR3580	Uncol., 3
S. arizonae (lac+)	AR3910	M, 1
S. arizonae	ATCC© 13314	M+, 2.5
S. Hadar	AR4125	M+, 2
S. St Paul	AR4316	M++, 3
S. Derby	AR4429	M+, 2

***Salmonella* strains**	**Strain #**	**Colonie appearance**
S. Senftenberg (lac+)	AR5093	M+, 2.5
S. Abony	CIP 110658	M+, 1.5
S. Gallinarum	CIP 57.53	M+/-, 0.6-1
S. Kentucky	CIP 105623	M++, 2
S. indica	ATCC© 43976	M--/+, 2
S. Abaetetuba	ATCC© 35640	M+/-, 3
S. Paratyphi A	AR5082	M++, 2
S. Paratyphi A	CIP 55.39	M++, 2
S. Paratyphi B	AR5086	M++, 2
Salmonella spp.	AR5149	M++, 2
Salmonella spp.	AR5150	M++, 2
Salmonella spp.	AR5151	M++, 2
Salmonella spp.	AR5424	M+, 1
Salmonella spp.	AR5425	M+, 1
Salmonella spp.	AR5430	M++, 1.5

M, mauve ; B, blue ; Uncol., uncolored ; +, color intensity ; colony size in mm ; AR, CHROMagar™ strain collection ; ATCC, American Type Culture Collection ; CIP, Strain collection Institut Pasteur.

Table II. Exclusivity of **RambaQUICK™ Salmonella method**.

Strains	Strain #	Colonie appearance
Citrobacter freundii §	ATCC© 8090	B++, 1
Citrobacter spp. §	AR3378	B++, 1.5
C. freundii §	AR3870	B++, 1
Escherichia coli	ATCC© 25922	Uncol., 2
E. coli	AR3740	Uncol., 2
E. coli	AR5428	Uncol., 2
E. coli	AR3859	Uncol., 2
E. coli	AR3741	Uncol., 1.5
E. coli	AR3857	Uncol., 1.5
E. coli	AR5011	Uncol., 2
E. coli	AR5427	M--/+, 2
E. coli	AR5428	Uncol., 2
E. hermanii	AR5849	Uncol. DZ
Klebsiella oxytoca	AR5755	B++, 3
Hafnia alvei	AR3862	-
Hafnia spp.	AR5010	M--/+, 3 ¶
Morganella morganii	AR4080	-
Proteus mirabilis	AR3022	-
Serratia marcescens	AR5569	-
Staphylococcus aureus	ATCC© 25923	-
S. aureus	AR3916	-
Pseudomonas aeruginosa	ATCC© 9027	-
P. aeruginosa	ATCC© 10145	-

M, mauve ; B, blue ; Uncol., uncolored ; +, color intensity ; colony size in mm ; DZ, dense zone ; -, absence of growth (but growth on TSA) ; AR, CHROMagar™ strain collection ; ATCC, American Type Culture Collection. §*Citrobacter* is a false positive on XLD agar. ¶*Colonies show weaker coloration than Salmonella colonies, not considered a false positive.*

2.2. Enrichment/Selectivity evaluation

Mixtures of bacteria species, *Salmonella* (AR4053, AR3011, AR3015, AR4052, AR3104 and AR3910 (*lac+*) strains at 10^{-7} dilutions), *E. coli* (AR3741, AR3859 and AR3857 strains at 10^{-3} dilutions) and *Citrobacter* (AR3870, ATCC®8090 and AR3378 strains at 10^{-3} dilutions) were used to evaluate the RambaQUICK™ Salmonella selectivity. A sample of 0.1 mL of each of these mixes was added to a BPW tube to incubate 18 hours at 37°C. An aliquot of 0.1 mL was inoculated into a RambaQUICK™ Salmonella tube to incubate for 7 hours at 41.5°C. Plating of a 10 µL aliquot of the BPW culture and the enriched RambaQUICK™ Salmonella broth (Time 7h) was carried out on CHROMagar™ Salmonella

Plus plates. The selective *Salmonella* enrichment results in the detection of either some mauve colonies in a mix of blue and colourless colonies or the presence of 90-100 % of mauve colonies and less than 10 % of blue and colourless colonies on CHROMagar™ Salmonella Plus plates (Fig. 2).

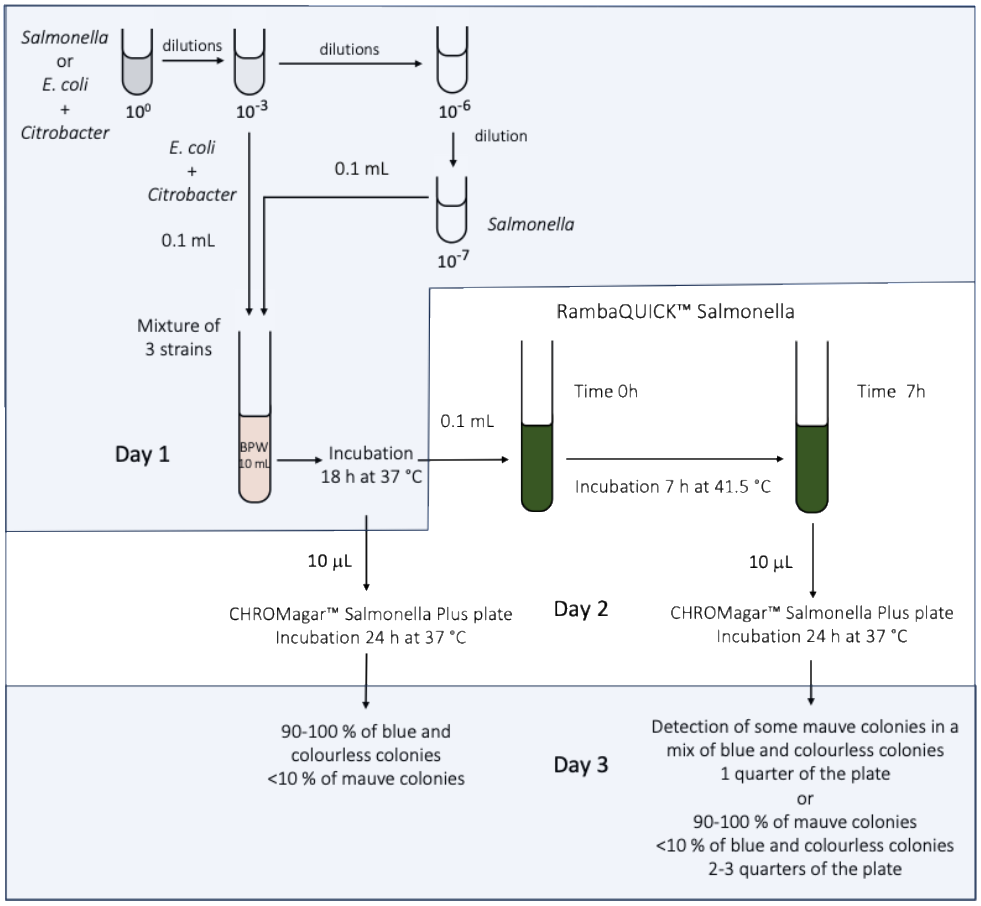

Figure 2. Selectivity evaluation of RambaQUICK™ Salmonella.

Combinations of bacterial strains of interest used in the **RambaQUICK™ Salmonella method** demonstrated the enrichment and chromogenic differentiation of *Salmonella* (Table III).

Table III. Examples of results obtained with the **RambaQUICK™ Salmonella method** with different strains.

Mixture N°	Species	Strain	Dilution of inoculum	% of colonies		Colony aspect
				At time 0 h	At time 7 h	
1	*Salmonella* spp.	AR4053	10^{-7}	ND	~90	mauve
	E. coli	AR3741	10^{-3}	~60	< 5	colourless
	C. freundii	AR3870	10^{-3}	~40	< 5	blue
2	*Salmonella*	AR3011	10^{-7}	~2	~90	mauve
	E. coli	AR3859	10^{-3}	~50	ND	colourless
	C. freundii	ATCC©8090	10^{-3}	~50	~10	blue
3	*S.* Typhimurium	AR3015	10^{-7}	~2	~90	mauve
	E. coli	AR3857	10^{-3}	~50	ND	colourless
	Citrobacter spp.	AR3378	10^{-3}	~50	~10	blue

AR, CHROMagar™ strain collection ; ATCC, American Type Culture Collection ; ND, non-detected.

2.3. Sensitivity evaluation with a foodstuff

The detection of *Salmonella* in food products, such as cocoa, is critical due to the complexity of chocolate as a polyphenol-rich matrix which presents unique challenges for microbiological analysis. Rigorous protocols involving key steps such as sample preparation, enrichment, selective inoculation and confirmation by biochemical and molecular methods are required.

A cocoa sample was used as an illustrative use case, to evaluate the sensitivity of the formula. Ten grammes of cocoa containing less than 1000 UFC/g were tested without (n=2) or with *Salmonella* spp. (AR4053 strain, n=4) or *E. coli* (AR3741, n=4) spiking at approximately 1000 UFC/g. A revivification step in BPW during 24 h at 37°C, followed by the inoculation of 0.1 mL of this pre-enrichment was performed to follow the ISO 6579 method. Also, 0.1 mL of pre-enriched samples were inoculated into 10 mL of RambaQUICK™ Salmonella selective broth. After a 7 hour incubation at 41.5°C, 10 µL of these tubes were seeded onto CHROMagar™ Salmonella Plus and onto XLD agar plates to be incubated at 37°C for 18-24 hours.

E. coli colonies grew white on CHROMagar™ Salmonella Plus and yellow on XLD agar. *Salmonella* was successfully detected as mauve colonies with the **RambaQUICK™ Salmonella method** (black colonies grown on XLD agar) in the four AR4053-spiked samples tested, offering a streamlined workflow that delivered results in a fraction of the time required by the ISO 6579 method.

2.4. Confirmatory biochemical and serological testing

Confirmation of bacterial enrichment in RambaQUICK™ Salmonella using biochemical and serological testing can be performed directly from isolated colonies grown on CHROMagar™ Salmonella Plus (Tables IV and V). These tests can overcome the limitations of the method and provide a serotyping procedure for unknown *Salmonella* isolates.

- **Oxidase test.** Performed on Filter Paper (Whatman No. 1 or equivalent) with a few drops of Oxidase test reagent or by streaking a loopful of bacteria onto the reagent-saturated paper with a platinum loop or wooden applicator stick. Positive reactions turn the bacteria violet to purple immediately (*e.g.* some *Pseudomonas* showing a mauve colouration), or up to 30 s. Negative reactions remain colorless or turn light-pink/light-purple after 30 sec (Beckton Dickinson, ref. 261181).

- **ONPG test.** Performed with reagent disc added to a bacterial suspension in sterile saline water and incubated 2 hours at 37 °C. Positive reactions turn the bacterial suspension yellow as is the case for *E. coli* and *Salmonella* lactose (+) strains (Biomérieux, ref. 55601).

- **Urea-Indole test**. Performed by the inoculation of the yellow-orange medium and incubation for 2 hours at 37°C. Urease positive bacteria (*e.g.*, *Proteus*) turn liquid media red-brown. The degradation of L-tryptophane contained in the broth is detected by the presence of a pink-red ring in the surface when the James reactant is added. This results in an indole positive test, as for *E. coli* (Biomérieux, ref. 55752).

- **Serological tests**. Performed on suspected colonies grown on CHROMagar™ Salmonella Plus can confirm the presence of *Salmonella* strains (Salmonella confirm latex kit, Bio-Rad ref. 355-6711; Microgen Salmonella latex test), S. Typhi and S. Paratyphi (Antiserum Salmonella Vi monovalent, Bio-Rad ref. 3560951B) as well as *Salmonella* serovars (Salmonella Polyvalent O Groupe A-S Agglutination serum, Oxoid ref. ZCO2/R30858201).

Table IV. Biochemical testing of bacterial colonies on CHROMagar™ Salmonella Plus.

Species	Strain	Oxidase test	ONPG test	Urea test	Indole test
S. Typhi	AR4052	-	-	-	-
Salmonella spp.	AR4053	-	-	-	-
S. arizonae (lac+)	AR3910	-	+	-	-
E. coli	AR3740	-	+	-	+
E. coli	AR3859	-	+	-	+
Citrobacter spp.	AR3378	-	+	-	-
Citrobacter koseri	AR3134	-	+	-	+
Proteus mirabilis	AR3022	-	-	+	-
P. aeruginosa	ATCC© 9027	+	-	-	-

+, positive enzymatic reaction test ; -, negative enzymatic reaction test.

Table V. Serological testing of bacterial colonies on CHROMagar™ Salmonella Plus.

Species	Strain	Salmonella confirm latex kit	Antiserum Salmonella Vi monovalent	Polyvalent O Groupe A-S Agglutinating Serum
S. Typhi	AR4052	-	+	+/-
S. Typhimurium	ATCC© 13311	+/-	-	+/-
S. Typhimurium	ATCC© 14028	+	-	+/-
S. Abaetetuba	ATCC© 35640	+	-	+
S. Dublin	AR3580	+	-	+
S. arizonae (lac+)	AR3910	+/-	-	+
S. Abony	CIP 110658	+	-	+
E. coli	AR3859	-	/	/
Hafnia alvei	AR3862	-	/	/
Citrobacter spp.	AR3378	-	/	/

+, positive serological test ; -, negative serological test ; +/-, slow serological reaction ; /, test not preformed.

Moreover, a study using Microgen Salmonella latex test and CHROMagar™ Salmonella Plus showed 100% specificity and 100% sensitivity using 111 *Salmonella* strains and 35 non-target bacterial strains, respectively (3).

3. Independent laboratory evaluation of the product

3.1. Comparison to the ISO 6579 method

Naturally and artificially contaminated food samples were tested using both the **RambaQUICK™ Salmonella method** and ISO 6579 by independent laboratories.

a) Laboratory Adria Normandie (4-6). Foodstuffs tested (n=64), which were known to be either uncontaminated or contaminated with *Salmonella* were meat products, seafood, egg products, pastries, and dairy products. Other media plates employed were XLD and Rambach agar. The data from this study showed agreement between the two methods regarding the absence of *Salmonella* detection in 39 samples. *Salmonella* was detected in the other 25 positive samples with the **RambaQUICK™ Salmonella method** whereas only 24 samples resulted positive with the ISO 6579 method, as shown in Table VI.

Table VI. Comparison of the performance of the ISO 6579 and the **RambaQUICK™ Salmonella method** (Laboratory Adria Normandie).

# sample	Food sample (Sample ID)	ISO 6579 method	RambaQUICK™ Salmonella method
1	Egg 412	+	+
2	Egg 512	+	+
3	Duck liver	-	+
4	Sausages	+	+
5	Meat	+	+
6	Ham with bone	-	-
7	Pork ear	+	+
8	Scallops	+	+
9	Pork liver	+	+
10	Pork liver	+	+
11	Raw milk	+	+
12	Raw cream	+	+
13	Peeled prawns	+	+
14	Peeled prawns	+	+
15	Pudding flan	+	+
16	Minced meat	+	+
17	Salmon dish	+	+
18	Egg	+	+
19	Egg	+	+
20	Hakefish (21)	-	-
21	Minced meat (22)	-	-
22	Chicken (23)	-	-
23	Minced steak (24)	-	-
24	Cuttlefish (25)	-	-
25	Salmon lasagne (26)	-	-
26	Pudding flan (27)	-	-
27	Liver pâté (28)	-	-
28	Chicken (29)	-	-
29	Low salt ham (30)	-	-
30	Duck leg (31)	-	-
31	Egg 312 (32)	-	-
32	Egg 108 (33)	-	-

# sample	Food sample (Sample ID)	ISO 6579 method	RambaQUICK™ Salmonella method
33	Sausages (34)	-	-
34	Red mulet fish (35)	-	-
35	Pork throat (36)	-	-
36	Egg 312 4000G (37)	-	-
37	Minced meat (38)	-	-
38	Jellied pork tongue (39)	-	-
39	Garlic sausage (40)	-	-
40	Chicken leg (41)	-	-
41	Pork liver (42)	-	-
42	Pork throat (43)	-	-
43	Meat (44)	-	-
44	Raw cream (26)	-	-
45	Scallops (27)	-	-
46	Ham 6D (28)	+	+
47	Meat 4D (29)	-	-
48	Pork ear (30)	-	-
49	Pork liver (31)	+	+
50	Pork liver (32)	-	-
51	Ham with bone (33)	-	-
52	Ham with bone (34)	-	-
53	Pork throat (35)	-	-
54	Pork throat 12080010 (36)	-	-
55	Pork throat 1006016 (37)	-	-
56	Ham with bone 1206008 (38)	-	-
57	Pork ear 1117004 (39)	+	+
58	Pork ear 1117005 (40)	+	+
59	Pork head 0504043 (41)	+	+
60	Meat 4D 0504045 (42)	+	+
61	Ham 6D 1006019 (43)	-	-
62	Pork liver 1208015 (44)	+	+
63	Egg 312 4000D (45)	-	-
64	Egg 312 2000 (46)	-	-

Positive tests for ISO 6579 method: 24 (96 %)
Positive tests for RambaQUICK™ Salmonella method: 25 (100 %)

b) A heat treatment (3.5 to 8 min at 57°C) intended to stress *Salmonella* strains was used before bacterial spiking foodstuffs at 1-30 UFC/25 g. Spiked *Salmonella* species including the *lac+* species could be detected as mauve colonies with the **RambaQUICK™ Salmonella method**, as shown in Table VII.

Table VII. Results obtained in the sensitivity evaluation of the ISO 6579 and the **RambaQUICK™ Salmonella method** with artificially contaminated foodstuffs (Laboratory Adria Normandie).

Food sample (Sample ID)	Spiked Salmonella species	ISO 6579 method	RambaQUICK™ Salmonella method
Raw milk (11)	*S.* Virchow	+	+ (mauve colonies)
Raw cream (12)	S*. enterica* serovar Senftenberg	+	+ (mauve colonies)
Peeled prawns (13)	*S.* Typhimurium	+	+ (mauve colonies)
Peeled prawns (14)	*S. enterica* serovar Senftenberg	+	+ (mauve colonies)
Pudding flan (15)	*S. enteritidis*	+	+ (mauve colonies)
Minced meat (16)	*S.* Typhimurium	+	+ (mauve colonies)
Salmon dish (17)	*S. enterica* serovar Derby	+	+ (mauve colonies)
Egg (18)	*S. enteritidis*	+	+ (mauve colonies)
Egg (19)	*S. enteritidis*	+	+ (mauve colonies)

In these studies, an optimal specificity was obtained with incubation conditions of the RambaQUICK™ Salmonella for 7 hours at 41.5°C (see annex 1).

c) Laboratory ASEPT (7). Tested food samples previously known to be either uncontaminated or contaminated by *Salmonella* (n=26). In this study, negative samples proved to be consistent for both methods. Detection of *Salmonella* in ten out of eleven positive samples was possible using both methods (sensitivity 91%), as shown in Table VIII. However, the **RambaQUICK™ Salmonella method** gave faster results, two days earlier.

Table VIII. Results obtained in the sensitivity evaluation of the ISO 6579 and the **RambaQUICK™ Salmonella method** (Laboratory ASEPT).

# sample	Food sample	ISO 6579 method	RambaQUICK Salmonella method
19656	Duck foie gras	+	+
19657	Raw duck magret	-	-
19658	Raw duck magret	+	+
19659	Raw duck magret	-	-
19660	Smoked duck magret	-	-
19661	Raw duck magret	-	-
19662	Smoked duck magret	-	-
19663	Smoked duck magret	-	-
19664	Raw duck magret	-	-
19665	Raw duck magret	+	+
19666	Raw duck magret	+	+
19667	Raw duck magret	-	-
19668	Duck foie gras	-	-
19898	Whole Egg	-	-
19899	Egg white	-	-
19900	Whole Egg	-	-
19901	Egg white	-	-
19902	Egg white	+	+
19903	Whole Egg	+	+
19904	Whole Egg	+	+
19905	Egg yolk	+	-
19906	Egg yolk	+	+
19907	Egg yolk	+	+
19908	Pet food	-	-
19909	Pet food	-	-
19910	Pet food	-	+
Positive tests %		10 91%	10 91%

3.2. Comparison to Rappaport-Vassiliadis medium

Furukawa and collaborators (8) used different bacterial strains to artificially contaminate retail chicken samples. Twenty-five grams of spiked food were incubated overnight at 35 °C in 225 mL of BPW. A pre-enrichment sample of 0.1 mL was inoculated into 10 mL of RambaQUICK™ Salmonella broth and incubated for 7 hours at 42 °C. A pre-enrichment sample of 0.5 mL was inoculated into 10 mL of RV medium (BPW-RV method). Samples of 10 µL of each broth culture were streaked on CHROMagar Salmonella medium. Agar plates were incubated for 18 hours at 35 °C before performing serological testing on mauve colonies.

Obtained data confirmed that RambaQUICK™ Salmonella supports the growth of *Salmonella* strains and inhibits the growth of non-target microorganisms tested. In contrast, an *Enterobacter cloacae* strain was not inhibited in the BPW-RV method (Table IX).

Table IX. Data obtained in the evaluation of RambaQUICK™ Salmonella.

Bacterial strains	Strain #	BPW-RV method	Method with RambaQUICK™ Salmonella
S. Enteritidis	001	+	+
S. Enteritidis	002	+	+
S. Enteritidis	003	+	+
S. Enteritidis	004	+	+
S. Typhimurium	ATCC© 13311	+	+
Escherichia coli	ATCC© 25922	-	-
Citrobacter freundii	ATCC© 8090	-	-
Enterobacter cloacae	ATCC© 13047	+	-
Klebsiella pneumoniae	NCTC 9636	-	-
Proteus mirabilis	ATCC© 29906	-	-
Pseudomonas aeruginosa	ATCC© 27853	-	-
Enterococcus faecalis	ATCC© 29212	-	-
Staphylococcus aureus	ATCC© 25923	-	-
Bacillus subtilis	ATCC© 6633	-	-
Candida albicans	ATCC© 10231	-	-

ATCC, American Type Culture Collection ; NCTC, National Collection of Type Cultures ; +, growth ; -, absence of growth.

Furthermore, 58 samples of retail chicken meats were analyzed. The detection rate within two days for the **RambaQUICK™ Salmonella method** was 63.8% (A total of 37 positive results), being higher than the detection rate for the BPW-RV method of 31.0% (A total of 18 positive results), colonies of non-target flora were detected in light pink and in blue (8, Table X). The authors concluded that the **RambaQUICK™ Salmonella method** was useful for the quality control workflow in the laboratory of food industry.

Table X. Frequency of organisms isolated from food using BPW-RV or RambaQUICK™ Salmonella methods.

Colony colour	Identified organism	Serotype	N° of isolates	
			BPW-RV method	RambaQUICK© Salmonella method
Mauve	*Salmonella* spp.	O7	10	22
		O4	5	12
		O8	3	3
Light pink	*P. mirabilis*		1	1
Blue	*E. cloacae*		30	30
	E. asburiae		7	7
	K. oxytoca		17	17
	C. koseri		2	2
	A. baumannii		1	2

4. Conclusion

The performance of the **RambaQUICK™ Salmonella method** has been demonstrated by several evaluations which included inclusivity/exclusivity studies and sensitivity focused on the detection of *Salmonella* in diverse food samples.

Parameter	Performance of RambaQUICK™ Salmonella method (SQ001 & SA16)
Inclusivity / Exclusivity	97 % / 96 % with bacterial strains
Detection of *Salmonella* including lactose (+) strains	Sensitivity 91-100 % (5, 8) Specificity 100 % (4)
Morphological appearance of *Salmonella* colonies	Selective enrichment visible as distinctive mauve colonies after streaking or spreading on CHROMagar™ Salmonella Plus
Turnaround time	Food samples can be determined as negative in 2 days A positive sample can be determined in only 3 days
Biochemical ID confirmation and other tests	Tests: oxidase, urease, indole, serological MALDI-TOF MS (9) and PCR (10) directly from colony

The **RambaQUICK™ Salmonella method** meets ISO 6579-1:2017 requirements by detecting lactose positive *Salmonella*.

With proper storage at 15-30°C, the shelf life of RambaQUICK™ Salmonella powder base is 2 years. The shelf life of the RambaQUICK™ Salmonella broth distributed in tubes is 6 months when stored at 2-8 °C.

The results of the **RambaQUICK™ Salmonella method** are easy to read with the naked eye and a final identification on suspected colonies must be done by biochemical and serological tests (*i.e.*, latex agglutination) or by mass spectrometry or PCR. Testing can be carried-out directly on colonies grown on CHROMagar™ Salmonella Plus.

This medium has a very high sensitivity but some limitations can be pointed out:

- Some *S. enterica* serovar Dublin may appear colourless, nevertheless this serovar is rarely encountered.
- Some *E. coli* strains may develop a very slight mauve colouration but can be characterized by an indol test.
- Some *Pseudomonas* species may have similar mauve colony aspect but can be characterized by an oxidase test.

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5. Literature

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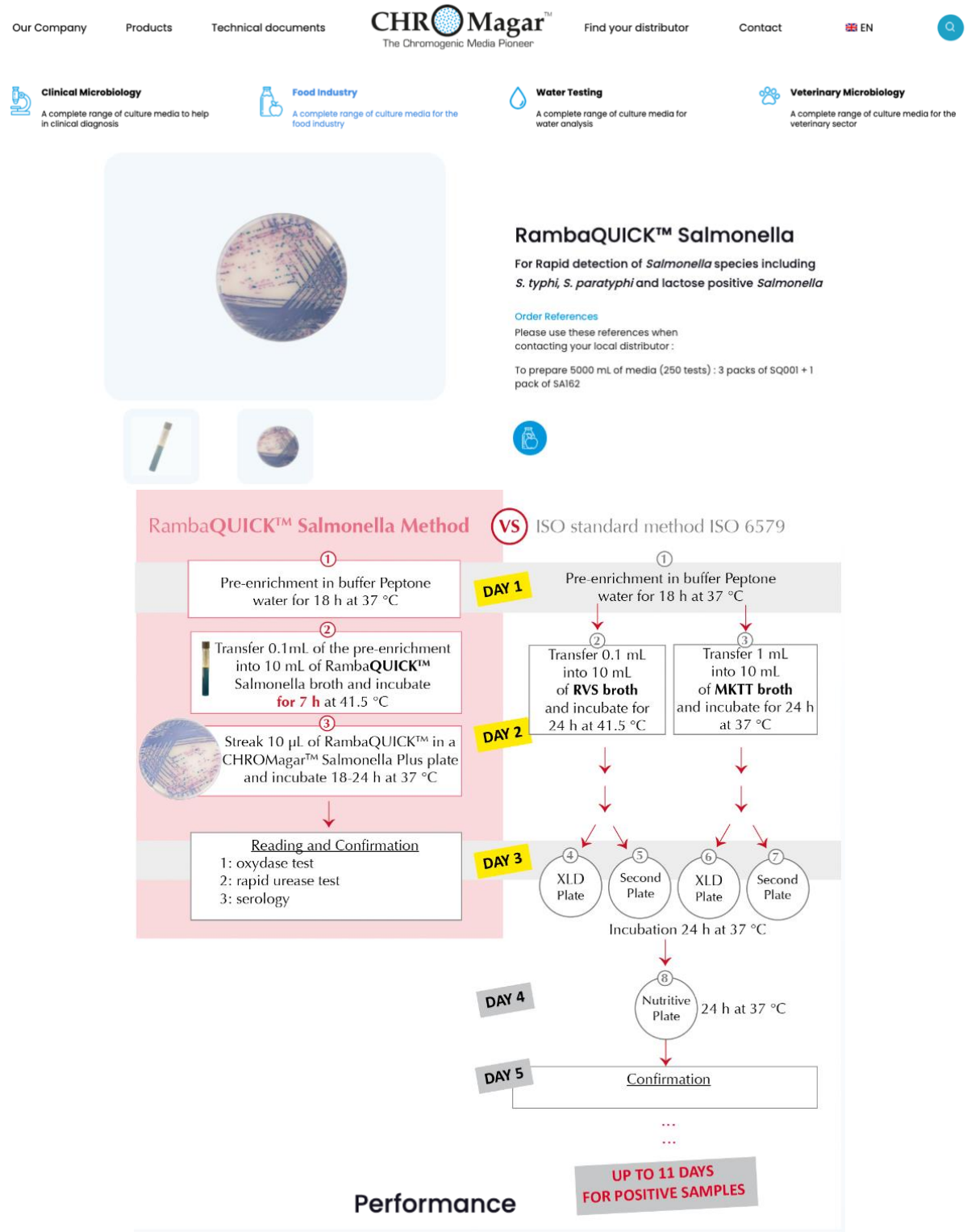
Annexes

Annex 1. Website information about RambaQUICK™ Salmonella



Annex 2. Website information about CHROMagar™ Salmonella Plus

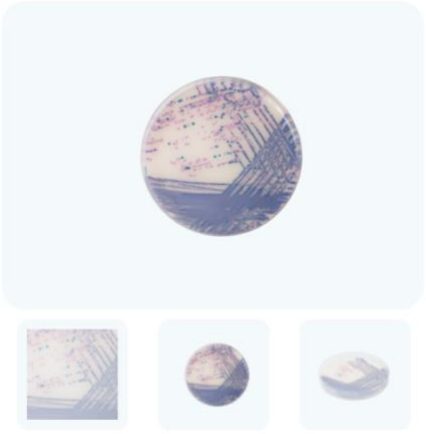
Our Company Products Technical documents CHROMagar™ The Chromogenic Media Pioneer Find your distributor Contact EN

Clinical Microbiology A complete range of culture media to help in clinical diagnosis

Food Industry A complete range of culture media for the food industry

Water Testing A complete range of culture media for water analysis

Veterinary Microbiology A complete range of culture media for the veterinary sector



CHROMagar™ Salmonella Plus

For detection and isolation of *Salmonella* species including lactose positive *Salmonella*

Order References

Please use these references when contacting your local distributor:

5000 mL Pack SA162

25 L Pack SA163-25

CHROMagar™ White Opaque supplement (optional) :

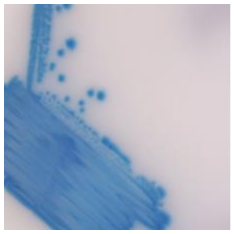
5000 mL Pack SU702

25 L Pack SU703-25

Salmonella, including *S.* Typhi, *S.* Paratyphi and lactose-positive *Salmonella*
Mauve

Composition

Powder Base	Total ..... 32.8 g/L Agar ..... 15.0 Peptone and Yeast extract ..... 8.0 Salts ..... 8.5 Chromogenic mix ..... 1.3 Storage at 15/30 °C - pH: 7.5 ± 0.2 Shelf Life ..... 3 years
+ Supplement (included in the pack)	1st : Liquid form ..... 6 mL/L Storage at 15/30 °C Shelf Life ..... 5 years
CHROMagar™ White Opaque supplement	In order to obtain a white opaque background: Powder form : ..... 1.0 g/L Storage at 15/30 °C Shelf Life ..... 3 years



Coliforms
Blue

Usual Samples	food, meat, fresh eggs,milk products etc.
Procedure	Inoculation after selective broth enrichment of samples according to ISO 6579. Incubation 18-24 h at 37 °C. Aerobic conditions.
Scientific Publications on this product: available on www.CHROMagar.com Please read carefully the instructions for use (IFU document) available on www.CHROMagar.com	

E. coli
Colorless

Performance

Mainly due to contamination in the food chain and/or during food-production processes, *Salmonella* commonly induces enteric illness whose major symptoms are abdominal cramps, diarrhea, nausea, vomiting.

1. Meets ISO 6579-1 requirements by detecting lactose positive Salmonella in intense mauve color.

2. Easy to read by naked eye: Another feature of this medium resides in its nice colour contrast due to the fact that *E. coli* are colourless. *E. coli*, which ate usually present in abundance in samples tested for *Salmonella* and could potentially hide suspect colonies, are no longer a concern.

3. High Sensitivity and Specificity:
Salmonella including lactose positive *Salmonella* : 99 %*

*Specificity and sensibility from scientific study "Evaluation of a new chromogenic medium CHROMagar™ Salmonella Plus for the detection of *Salmonella* species including lactose positive *Salmonella, S. typhi and S. paratyphi*" de Beaumont C., Breuil J. , Dedicova D., Tran Q. 2006.