

**Table S2. Response surface matrix with endpoints**

Experiment	Components tested							Endpoint results		
	PGM (g/L)	Glucose (%)	Glutamine (mM)	FeSO <sub>4</sub> (μM)	Lincomycin (μg/mL)	EGTA (mM)	pH (units)	MHT* (log <sub>2</sub> )	Bacterial density (OD/mL)	Final pH
1 <sup>a</sup>	0.4	0.4	8.4	87.4	45.5	0.6	7.1	7.0	3.28	6.84
2 <sup>a</sup>	1.1	0.6	10.4	162.7	45.5	0.6	7.1	6.75	4.73	6.78
3 <sup>b</sup>	1.1	0.6	10.4	102.5	50.5	0.6	7.3	6.75	4.70	6.89
4 <sup>b</sup>	1.1	0.6	10.4	102.5	50.5	0.6	7.3	7.25	4.66	6.90
5	1.1	0.6	20.0	78.9	42.7	1.0	7.3	6.25	5.23	7.18
6	1.1	0.1	13.7	126.9	58.6	0.7	8.5	7.5	1.32	8.32
7 <sup>b</sup>	1.1	0.6	10.4	102.5	50.5	0.6	7.3	7.25	4.56	6.93
8 <sup>a</sup>	1.1	0.6	16.5	87.4	45.5	0.6	7.1	7.5	4.96	6.94
9	1.1	0.6	0.5	126.9	58.6	0.7	6.0	3.75	3.51	4.04
10	1.1	1.0	7.2	78.9	81.8	0.4	7.3	7.0	4.20	5.46
11	0.1	0.3	7.2	78.9	81.8	0.4	7.3	6.75	3.63	4.85
12	1.1	0.6	10.4	102.5	50.5	0.1	6.0	5.0	3.67	4.45
13	2.0	0.3	7.2	78.9	42.7	1.0	7.3	6.25	4.75	4.86
14	0.1	0.3	16.8	55.4	34.8	0.4	7.3	5.0	3.78	4.89
15	1.1	0.6	10.4	5.0	58.6	0.7	8.5	6.75	4.43	7.12
16	0.1	0.8	13.7	126.9	58.6	0.7	8.5	6.75	3.72	5.93
17	1.1	0.6	10.4	102.5	50.5	0.1	8.5	6.0	3.32	6.97
18	1.1	0.6	20.0	173.2	34.8	0.4	7.3	5.25	6.62	7.25
19 <sup>a</sup>	1.1	0.6	10.4	102.5	50.5	0.9	7.1	6.0	5.08	6.94
20	2.0	0.3	7.2	173.2	34.8	0.4	7.3	6.5	5.50	5.11
21	0.1	0.8	13.7	126.9	58.6	0.7	6.0	4.75	3.55	4.36
22 <sup>a</sup>	1.7	0.4	8.4	87.4	45.5	0.6	7.1	7.75	3.80	7.08
23	0.1	0.3	7.2	173.2	34.8	0.4	7.3	6.25	3.70	4.97
24	2.0	0.8	13.7	126.9	58.6	0.7	6.0	6.5	4.31	4.56
25	1.1	0.6	20.0	78.9	81.8	0.4	7.3	8.5	4.98	7.16
26	1.1	1.0	16.8	55.4	34.8	0.4	7.3	6.75	5.06	5.33
27 <sup>b</sup>	1.1	0.6	10.4	102.5	50.5	0.6	7.3	7.5	4.81	6.83
28 <sup>a</sup>	1.1	0.8	8.4	87.4	45.5	0.6	7.1	6.75	5.71	6.55
29	1.1	1.0	7.2	173.2	34.8	0.4	7.3	6.75	4.85	5.28
30	2.0	0.3	7.2	78.9	81.8	0.4	7.3	8.0	4.87	5.15
31	2.0	0.8	13.7	126.9	58.6	0.7	8.5	7.75	5.30	6.82
32	1.1	0.6	10.4	200	81.8	0.4	7.3	9.0	4.11	6.69
33 <sup>a</sup>	1.1	0.6	10.4	102.5	75.5	0.6	7.1	8.0	4.81	6.79
34	1.1	1.0	7.2	78.9	42.7	1.0	7.3	7.25	4.70	5.25
35	0.1	0.3	7.2	78.9	42.7	1.0	7.3	6.75	3.40	4.89
36	1.1	0.1	13.7	126.9	58.6	0.7	6.0	6.75	2.60	6.26
37	1.1	0.6	10.4	102.5	10.0	0.7	6.0	5.75	3.67	4.54
38	1.1	0.1	4.0	55.4	34.8	0.4	7.3	7.75	1.51	7.43
39	1.1	0.6	10.4	102.5	89.7	1.0	7.3	8.25	4.53	6.92
40	0.1	0.8	4.0	55.4	34.8	0.4	7.3	6.0	4.22	5.76
41	1.1	0.6	10.4	200	42.7	1.0	7.3	7.25	5.04	7.10
42	2.0	0.3	16.8	55.4	34.8	0.4	7.3	7.25	5.80	5.31
43	1.1	0.6	10.4	102.5	10.0	0.7	8.5	5.0	5.19	7.66
44	1.1	0.6	10.4	5.0	58.6	0.7	6.0	7.0	4.30	4.56
45	2.0	0.8	4.0	55.4	34.8	0.4	7.3	7.5	5.73	6.80
46 <sup>a</sup>	1.1	0.6	10.4	102.5	50.5	0.6	8.3	7.5	5.21	7.43
47	1.1	0.6	0.5	126.9	58.6	0.7	8.5	7.5	4.16	7.12

<sup>a</sup>test points, <sup>b</sup>center points, \*MHT indicates minimal hemagglutination titer detected by MRHA, associated with CFA/I surface expression