

SUPPLEMENTARY DATA

Table S1: Effects of catalase, protease, papain and pH treatments on the antimicrobial activity (%) of the CFS of *S. thermophilus* strain against *G. vaginalis* ATCC 14018. The antimicrobial activity of the strain was highest under acidic pH conditions.

Strains	Remaining antimicrobial activity (%)								
	5 mg mL ⁻¹ catalase	1 mg mL ⁻¹ proteinase K	1 mg mL ⁻¹ papain	pH treatments					
				3.5	4.0	5.0	6.0	6.5	7.0
<i>S. thermophilus</i> KLDS 3.1003	90.49±0.62	100±0	100±0	100±0	100±0	67.02±0.08	6.35±0.03	0±0	0±0

All values were determined in triplicate
Values were expressed as mean ± SD

Table S2: Weekly weights of study animals before and after *S. aureus* ATCC25923 infection. Significant variations (at $P > 0.05$) were observed in the weight of study animals during the study.

Period	C	C	C	C
Week 0	22.00 ^b	23.57 ^b	19.34 ^e	23.24 ^a
	20.90 ^d	22.84 ^c	20.19 ^d	22.60 ^b
	23.92 ^a	23.70 ^b	20.56 ^c	23.78 ^a
	20.89 ^d	23.10 ^c	20.00 ^d	23.51 ^a
Average	22.43	23.30	20.02	23.28
SD	1.29	0.40	0.51	0.51
	C	T _{ST}	T _{SA}	T _{STSA}
Week 1	24.92 ^a	24.15 ^a	21.19 ^c	20.98 ^c
	23.34 ^a	23.13 ^c	20.26 ^d	22.68 ^b
	21.98 ^b	22.96 ^d	20.85 ^c	22.86 ^b
	22.60 ^b	22.36 ^d	24.28 ^a	22.33 ^b
Average	23.21	23.15	21.65	22.21
SD	1.27	0.74	1.80	0.86
Week 2	23.25 ^a	24.28 ^a	19.94 ^d	20.39 ^d
	21.32 ^c	22.09 ^e	18.46 ^f	20.35 ^d
	20.29 ^d	21.82 ^e	19.40 ^e	16.68 ^e
	21.27 ^c	22.89 ^d	22.74 ^b	20.09 ^d
Average	21.53	22.77	20.14	19.38
SD	1.24	1.10	1.84	1.80

Values with the same alphabet along the same column are not significantly different ($P > 0.05$)
Composition of control and trial diets are given in Table 1.

Table S3: Weekly weights of study animals before and after *E. coli* ATCC2522 infection. The infection of test animals with *E. coli* brought about significant (at $P < 0.05$) weight difference in the study animals.

Period	C	C	C	C
Week 0	22.00 ^b	23.57 ^b	21.41 ^b	23.80 ^b
	20.90 ^d	22.84 ^c	22.96 ^a	24.18 ^b
	23.92 ^a	23.70 ^b	21.12 ^b	26.04 ^a
	20.89 ^d	23.10 ^c	21.77 ^b	21.06 ^c
Average	22.43	23.30	21.82	23.77
SD	1.29	0.40	0.81	2.05
	C	T _{ST}	T _{EC}	T _{STEC}
Week 1	24.92 ^a	24.15 ^a	20.51 ^c	18.89 ^e
	23.34 ^a	23.13 ^c	21.54 ^b	19.28 ^e
	21.98 ^b	22.96 ^d	21.24 ^b	21.51 ^c
	22.60 ^b	22.36 ^d	22.49 ^a	22.29 ^c
Average	23.21	23.15	21.45	20.49
SD	1.27	0.74	0.82	1.66
Week 2	23.25 ^a	24.28 ^a	18.59 ^d	20.69 ^d
	21.32 ^c	22.09 ^c	18.36 ^d	19.94 ^d
	20.29 ^d	21.82 ^c	20.85 ^c	21.42 ^c
	21.27 ^c	22.89 ^d	-	-
Average	21.53	22.77	14.45	15.51
SD	1.24	1.10	9.70	10.35

Values with the same alphabet along the same column are not significantly different ($P > 0.05$)
Composition of control and trial diets are given on Table 1.

Table S4: Detailed tRNA analysis of *Streptococcus thermophilus* KLDS 3.1003. The tRNA length was between 71 – 2899 bp with several small and large subunit rRNAs.

Feature ID	Type Contig	Start	Stop	Length (bp)	Function	Subsystems	Begin	End
fig 6666666.263306.rna.1	RNA CP016877.1	33824	33753	72	tRNA-Glu-TTC	- none -	33753	33824
fig 6666666.263306.rna.2	RNA CP016877.1	33925	33854	72	tRNA-Gln-TTG	- none -	33854	33925
fig 6666666.263306.rna.3	RNA CP016877.1	135162	135092	71	tRNA-Thr-GGT	- none -	135092	135162
fig 6666666.263306.rna.4	RNA CP016877.1	220518	220432	87	tRNA-Ser-GGA	- none -	220432	220518
fig 6666666.263306.rna.5	RNA CP016877.1	386682	386764	83	tRNA-Leu-CAG	- none -	386682	386764
fig 6666666.263306.rna.6	RNA CP016877.1	391961	391888	74	tRNA-Asn-GTT	- none -	391888	391961
fig 6666666.263306.rna.7	RNA CP016877.1	392082	391967	116	5S RNA	- none -	391967	392082
fig 6666666.263306.rna.8	RNA CP016877.1	395063	392166	2898	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	392166	395063
fig 6666666.263306.rna.9	RNA CP016877.1	395282	395210	73	tRNA-Ala-TGC	- none -	395210	395282
fig 6666666.263306.rna.10	RNA CP016877.1	396877	395335	1543	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	395335	396877
fig 6666666.263306.rna.11	RNA CP016877.1	478175	478090	86	tRNA-Leu-AAG	- none -	478090	478175
fig 6666666.263306.rna.12	RNA CP016877.1	512565	512493	73	tRNA-Lys-CTT	- none -	512493	512565
fig 6666666.263306.rna.13	RNA CP016877.1	582909	582836	74	tRNA-Asn-GTT	- none -	582836	582909
fig 6666666.263306.rna.14	RNA CP016877.1	583003	582932	72	tRNA-Glu-TTC	- none -	582932	583003
fig 6666666.263306.rna.15	RNA CP016877.1	583192	583265	74	tRNA-Arg-TCT	- none -	583192	583265
fig 6666666.263306.rna.16	RNA CP016877.1	604621	606163	1543	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	604621	606163
fig 6666666.263306.rna.17	RNA CP016877.1	606216	606288	73	tRNA-Ala-TGC	- none -	606216	606288
fig 6666666.263306.rna.18	RNA CP016877.1	606435	609333	2899	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	606435	609333
fig 6666666.263306.rna.19	RNA CP016877.1	609537	609609	73	tRNA-Val-TAC	- none -	609537	609609
fig 6666666.263306.rna.20	RNA CP016877.1	609612	609684	73	tRNA-Asp-GTC	- none -	609612	609684
fig 6666666.263306.rna.21	RNA CP016877.1	609704	609776	73	tRNA-Lys-TTT	- none -	609704	609776
fig 6666666.263306.rna.22	RNA CP016877.1	609782	609863	82	tRNA-Leu-TAG	- none -	609782	609863
fig 6666666.263306.rna.23	RNA CP016877.1	609878	609950	73	tRNA-Thr-TGT	- none -	609878	609950
fig 6666666.263306.rna.24	RNA CP016877.1	609957	610028	72	tRNA-Gly-GCC	- none -	609957	610028
fig 6666666.263306.rna.25	RNA CP016877.1	610035	610120	86	tRNA-Leu-TAA	- none -	610035	610120
fig 6666666.263306.rna.26	RNA CP016877.1	610135	610208	74	tRNA-Arg-ACG	- none -	610135	610208
fig 6666666.263306.rna.27	RNA CP016877.1	610216	610289	74	tRNA-Pro-TGG	- none -	610216	610289
fig 6666666.263306.rna.28	RNA CP016877.1	610295	610368	74	tRNA-Met-CAT	- none -	610295	610368
fig 6666666.263306.rna.29	RNA CP016877.1	610383	610456	74	tRNA-Met-CAT	- none -	610383	610456
fig 6666666.263306.rna.30	RNA CP016877.1	610476	610565	90	tRNA-Ser-TGA	- none -	610476	610565
fig 6666666.263306.rna.31	RNA CP016877.1	610575	610648	74	tRNA-Met-CAT	- none -	610575	610648
fig 6666666.263306.rna.32	RNA CP016877.1	610652	610724	73	tRNA-Phe-GAA	- none -	610652	610724
fig 6666666.263306.rna.33	RNA CP016877.1	610737	610807	71	tRNA-Gly-TCC	- none -	610737	610807
fig 6666666.263306.rna.34	RNA CP016877.1	610841	610914	74	tRNA-Ile-GAT	- none -	610841	610914
fig 6666666.263306.rna.35	RNA CP016877.1	610919	611006	88	tRNA-Ser-GCT	- none -	610919	611006
fig 6666666.263306.rna.36	RNA CP016877.1	653742	655283	1542	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	653742	655283
fig 6666666.263306.rna.37	RNA CP016877.1	655336	655408	73	tRNA-Ala-TGC	- none -	655336	655408

fig 6666666.263306.rna.38	RNA CP016877.1	655555	658452	2898	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	655555	658452
fig 6666666.263306.rna.39	RNA CP016877.1	658536	658651	116	5S RNA	- none -	658536	658651
fig 6666666.263306.rna.40	RNA CP016877.1	658657	658729	73	tRNA-Val-TAC	- none -	658657	658729
fig 6666666.263306.rna.41	RNA CP016877.1	658734	658804	71	tRNA-Gly-TCC	- none -	658734	658804
fig 6666666.263306.rna.42	RNA CP016877.1	658838	658911	74	tRNA-Ile-GAT	- none -	658838	658911
fig 6666666.263306.rna.43	RNA CP016877.1	658918	658989	72	tRNA-Glu-TTC	- none -	658918	658989
fig 6666666.263306.rna.44	RNA CP016877.1	658998	659087	90	tRNA-Ser-TGA	- none -	658998	659087
fig 6666666.263306.rna.45	RNA CP016877.1	659097	659170	74	tRNA-Met-CAT	- none -	659097	659170
fig 6666666.263306.rna.46	RNA CP016877.1	659174	659246	73	tRNA-Phe-GAA	- none -	659174	659246
fig 6666666.263306.rna.47	RNA CP016877.1	659261	659341	81	tRNA-Tyr-GTA	- none -	659261	659341
fig 6666666.263306.rna.48	RNA CP016877.1	659347	659417	71	tRNA-Trp-CCA	- none -	659347	659417
fig 6666666.263306.rna.49	RNA CP016877.1	659429	659501	73	tRNA-His-GTG	- none -	659429	659501
fig 6666666.263306.rna.50	RNA CP016877.1	659508	659579	72	tRNA-Gln-TTG	- none -	659508	659579
fig 6666666.263306.rna.51	RNA CP016877.1	659589	659672	84	tRNA-Leu-CAA	- none -	659589	659672
fig 6666666.263306.rna.52	RNA CP016877.1	669270	669340	71	tRNA-Cys-GCA	- none -	669270	669340
fig 6666666.263306.rna.53	RNA CP016877.1	709162	710703	1542	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	709162	710703
fig 6666666.263306.rna.54	RNA CP016877.1	710756	710828	73	tRNA-Ala-TGC	- none -	710756	710828
fig 6666666.263306.rna.55	RNA CP016877.1	710975	713871	2897	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	710975	713871
fig 6666666.263306.rna.56	RNA CP016877.1	714075	714147	73	tRNA-Val-TAC	- none -	714075	714147
fig 6666666.263306.rna.57	RNA CP016877.1	714150	714222	73	tRNA-Asp-GTC	- none -	714150	714222
fig 6666666.263306.rna.58	RNA CP016877.1	714242	714314	73	tRNA-Lys-TTT	- none -	714242	714314
fig 6666666.263306.rna.59	RNA CP016877.1	714320	714401	82	tRNA-Leu-TAG	- none -	714320	714401
fig 6666666.263306.rna.60	RNA CP016877.1	714416	714488	73	tRNA-Thr-TGT	- none -	714416	714488
fig 6666666.263306.rna.61	RNA CP016877.1	714495	714566	72	tRNA-Gly-GCC	- none -	714495	714566
fig 6666666.263306.rna.62	RNA CP016877.1	714573	714658	86	tRNA-Leu-TAA	- none -	714573	714658
fig 6666666.263306.rna.63	RNA CP016877.1	714673	714746	74	tRNA-Arg-ACG	- none -	714673	714746
fig 6666666.263306.rna.64	RNA CP016877.1	714754	714827	74	tRNA-Pro-TGG	- none -	714754	714827
fig 6666666.263306.rna.65	RNA CP016877.1	714963	716505	1543	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	714963	716505
fig 6666666.263306.rna.66	RNA CP016877.1	716558	716630	73	tRNA-Ala-TGC	- none -	716558	716630
fig 6666666.263306.rna.67	RNA CP016877.1	716777	719674	2898	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	716777	719674
fig 6666666.263306.rna.68	RNA CP016877.1	719758	719873	116	5S RNA	- none -	719758	719873
fig 6666666.263306.rna.69	RNA CP016877.1	719879	719952	74	tRNA-Asn-GTT	- none -	719879	719952
fig 6666666.263306.rna.70	RNA CP016877.1	929337	930879	1543	Small Subunit Ribosomal RNA; ssuRNA; SSU rRNA	- none -	929337	930879
fig 6666666.263306.rna.71	RNA CP016877.1	930932	931004	73	tRNA-Ala-TGC	- none -	930932	931004
fig 6666666.263306.rna.72	RNA CP016877.1	931151	934048	2898	Large Subunit Ribosomal RNA; lsuRNA; LSU rRNA	- none -	931151	934048
fig 6666666.263306.rna.73	RNA CP016877.1	934252	934324	73	tRNA-Val-TAC	- none -	934252	934324
fig 6666666.263306.rna.74	RNA CP016877.1	934327	934399	73	tRNA-Asp-GTC	- none -	934327	934399
fig 6666666.263306.rna.75	RNA CP016877.1	934419	934491	73	tRNA-Lys-TTT	- none -	934419	934491
fig 6666666.263306.rna.76	RNA CP016877.1	934497	934578	82	tRNA-Leu-TAG	- none -	934497	934578
fig 6666666.263306.rna.77	RNA CP016877.1	934593	934665	73	tRNA-Thr-TGT	- none -	934593	934665

fig 6666666.263306.rna.78	RNA CP016877.1	934673	934744	72	tRNA-Glu-TTC	- none -	934673	934744
fig 6666666.263306.rna.79	RNA CP016877.1	1145442	1145522	81	tRNA-Tyr-GTA	- none -	1145442	1145522
fig 6666666.263306.rna.80	RNA CP016877.1	1145591	1145665	75	tRNA-Gln-TTG	- none -	1145591	1145665
fig 6666666.263306.rna.81	RNA CP016877.1	1147054	1147125	72	tRNA-Arg-CCG	- none -	1147054	1147125
fig 6666666.263306.rna.82	RNA CP016877.1	1411550	1411623	74	tRNA-Met-CAT	- none -	1411550	1411623
fig 6666666.263306.rna.83	RNA CP016877.1	1684403	1684332	72	tRNA-Arg-CCT	- none -	1684332	1684403

Table S5: Some MG-RAST Subsystem features of *Streptococcus thermophilus* KLDS 3.1003 (Vitamin groups). Varying subsystem categories exist in the strain including biotin biosynthesis, thiamin biosynthesis, heme siroheme biosynthesis and flavodoxin.

Category	Subcategory	Subsystem	Role	Features
Cofactors, Vitamins, Prosthetic Groups, Pigments	Biotin	Biotin biosynthesis	Substrate-specific component BioY of biotin ECF transporter	fig 6666666.263306.peg.1363, fig 6666666.263306.peg.1995
Cofactors, Vitamins, Prosthetic Groups, Pigments	Biotin	Biotin biosynthesis	Biotin operon repressor	fig 6666666.263306.peg.1838
Cofactors, Vitamins, Prosthetic Groups, Pigments	Biotin	Biotin biosynthesis	Biotin-protein ligase (EC 6.3.4.15)	fig 6666666.263306.peg.1838
Cofactors, Vitamins, Prosthetic Groups, Pigments	Biotin	Biotin biosynthesis Experimental	Competence protein F homolog, phosphoribosyltransferase domain	fig 6666666.263306.peg.1003
Cofactors, Vitamins, Prosthetic Groups, Pigments	Cofactors, Vitamins, Prosthetic Groups, Pigments - no subcategory	Thiamin biosynthesis	tRNA S(4)U 4-thiouridine synthase (former ThiI)	fig 6666666.263306.peg.1051
Cofactors, Vitamins, Prosthetic Groups, Pigments	Cofactors, Vitamins, Prosthetic Groups, Pigments - no subcategory	Thiamin biosynthesis	Substrate-specific component ThiT of thiamin ECF transporter	fig 6666666.263306.peg.189
Cofactors, Vitamins, Prosthetic Groups, Pigments	Cofactors, Vitamins, Prosthetic Groups, Pigments - no subcategory	Thiamin biosynthesis	Thiamin pyrophosphokinase (EC 2.7.6.2)	fig 6666666.263306.peg.415
Cofactors, Vitamins, Prosthetic Groups, Pigments	Cofactors, Vitamins, Prosthetic Groups, Pigments - no subcategory	Thiamin biosynthesis	Putative cysteine desulfurase, associated with tRNA 4-thiouridine synthase	fig 6666666.263306.peg.1050
Cofactors, Vitamins, Prosthetic Groups, Pigments	Tetrapyrroles	Heme and Siroheme Biosynthesis	Hypothetical radical SAM family enzyme in heat shock gene cluster, similarity with CPO of BS HemN-type	fig 6666666.263306.peg.1931
Cofactors, Vitamins, Prosthetic Groups, Pigments	Tetrapyrroles	Heme and Siroheme Biosynthesis	Glutamyl-tRNA synthetase (EC 6.1.1.17)	fig 6666666.263306.peg.434
Cofactors, Vitamins, Prosthetic Groups, Pigments	Tetrapyrroles	Heme and Siroheme Biosynthesis	Ferrochelatase, protoheme ferro-lyase (EC 4.99.1.1)	fig 6666666.263306.peg.1603
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	riboflavin to FAD	FMN adenylyltransferase (EC 2.7.7.2)	fig 6666666.263306.peg.1677
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	riboflavin to FAD	Riboflavin kinase (EC 2.7.1.26)	fig 6666666.263306.peg.1677
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	Flavodoxin	Flavodoxin	fig 6666666.263306.peg.1856
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	Riboflavin, FMN and FAD metabolism	FMN adenylyltransferase (EC 2.7.7.2)	fig 6666666.263306.peg.1677
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	Riboflavin, FMN and FAD metabolism	Substrate-specific component RibU of riboflavin ECF transporter	fig 6666666.263306.peg.900
Cofactors, Vitamins, Prosthetic Groups, Pigments	Riboflavin, FMN, FAD	Riboflavin, FMN and FAD metabolism	Riboflavin kinase (EC 2.7.1.26)	fig 6666666.263306.peg.1677
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	Predicted transcriptional regulator of pyridoxine metabolism	fig 6666666.263306.peg.1979
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	D-3-phosphoglycerate dehydrogenase (EC 1.1.1.95)	fig 6666666.263306.peg.146
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	Pyridoxamine 5'-phosphate oxidase	fig 6666666.263306.peg.1357

Groups, Pigments			(EC 1.4.3.5)	
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	Pyridoxal kinase (EC 2.7.1.35)	fig 6666666.263306.peg.1975, fig 6666666.263306.peg.1976
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	Phosphoserine aminotransferase (EC 2.6.1.52)	fig 6666666.263306.peg.148
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin (Vitamin B6) Biosynthesis	NAD-dependent glyceraldehyde-3-phosphate dehydrogenase (EC 1.2.1.12)	fig 6666666.263306.peg.408
Cofactors, Vitamins, Prosthetic Groups, Pigments	Pyridoxine	Pyridoxin(Vitamin B6) Degradation Pathway	Hypothetical NagD-like phosphatase	fig 6666666.263306.peg.1929
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Substrate-specific component NiaX of predicted niacin ECF transporter	fig 6666666.263306.peg.1572
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Nudix-related transcriptional regulator NrtR	fig 6666666.263306.peg.1065, fig 6666666.263306.peg.1066
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Nicotinate phosphoribosyltransferase (EC 2.4.2.11)	fig 6666666.263306.peg.859
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Ribosylnicotinamide kinase (EC 2.7.1.22)	fig 6666666.263306.peg.1067
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	NAD kinase (EC 2.7.1.23)	fig 6666666.263306.peg.77
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	N-Ribosylnicotinamide phosphorylase (EC 2.4.2.1)	fig 6666666.263306.peg.1782
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Transcriptional repressor for NAD biosynthesis in gram-positives	fig 6666666.263306.peg.1573
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Predicted N-ribosylNicotinamide CRP-like regulator	fig 6666666.263306.peg.786
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	C-terminal domain of CinA type S	fig 6666666.263306.peg.707, fig 6666666.263306.peg.707
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	ADP-ribose pyrophosphatase (EC 3.6.1.13)	fig 6666666.263306.peg.1203
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	NAD synthetase (EC 6.3.1.5)	fig 6666666.263306.peg.860
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Nicotinate-nucleotide adenyltransferase (EC 2.7.7.18)	fig 6666666.263306.peg.249
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Nicotinamidase (EC 3.5.1.19)	fig 6666666.263306.peg.263
Cofactors, Vitamins, Prosthetic Groups, Pigments	NAD and NADP	NAD and NADP cofactor biosynthesis global	Nicotinamide-nucleotide adenyltransferase, NadR family (EC 2.7.7.1)	fig 6666666.263306.peg.1067
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	GTP cyclohydrolase I (EC 3.5.4.16) type 1	fig 6666666.263306.peg.161
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	Cell division protein FtsH (EC 3.4.24.-)	fig 6666666.263306.peg.658, fig 6666666.263306.peg.2052
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	Dihydropteroate synthase (EC	fig 6666666.263306.peg.160

Groups, Pigments			2.5.1.15)	
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	Dihydroneopterin aldolase (EC 4.1.2.25)	fig 6666666.263306.peg.158
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	2-amino-4-hydroxy-6-hydroxymethyldihydropteridine pyrophosphokinase (EC 2.7.6.3)	fig 6666666.263306.peg.157
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	tRNA(Ile)-lysine synthetase (EC 6.3.4.19)	fig 6666666.263306.peg.656
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate biosynthesis cluster	Hypoxanthine-guanine phosphoribosyltransferase (EC 2.4.2.8)	fig 6666666.263306.peg.657
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Aminodeoxychorismate lyase (EC 4.1.3.38)	fig 6666666.263306.peg.1454
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Folylpolyglutamate synthase (EC 6.3.2.17)	fig 6666666.263306.peg.163, fig 6666666.263306.peg.1048
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Dihydropteroate synthase (EC 2.5.1.15)	fig 6666666.263306.peg.160
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	5-formyltetrahydrofolate cyclo-ligase (EC 6.3.3.2)	fig 6666666.263306.peg.455
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Dihydrofolate reductase (EC 1.5.1.3)	fig 6666666.263306.peg.1220
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Dihydrofolate synthase (EC 6.3.2.12)	fig 6666666.263306.peg.163, fig 6666666.263306.peg.1048
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	GTP cyclohydrolase I (EC 3.5.4.16) type 1	fig 6666666.263306.peg.161
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Para-aminobenzoate synthase, aminase component (EC 2.6.1.85)	fig 6666666.263306.peg.1454
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Thymidylate synthase (EC 2.1.1.45)	fig 6666666.263306.peg.1219
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	2-amino-4-hydroxy-6-hydroxymethyldihydropteridine pyrophosphokinase (EC 2.7.6.3)	fig 6666666.263306.peg.157
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Dihydroneopterin aldolase (EC 4.1.2.25)	fig 6666666.263306.peg.158
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	Folate Biosynthesis	Para-aminobenzoate synthase, amidotransferase component (EC 2.6.1.85)	fig 6666666.263306.peg.84, fig 6666666.263306.peg.211, fig 6666666.263306.peg.1779, fig 6666666.263306.peg.500, fig 6666666.263306.peg.501, fig 6666666.263306.peg.502, fig 6666666.263306.peg.503, fig 6666666.263306.peg.504, fig 6666666.263306.peg.505, fig 6666666.263306.peg.1565, fig 6666666.263306.peg.1566,
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Alcohol dehydrogenase (EC 1.1.1.1)	

Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Isocitrate dehydrogenase [NADP] (EC 1.1.1.42)	fig 6666666.263306.peg.1604
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Formate--tetrahydrofolate ligase (EC 6.3.4.3)	fig 6666666.263306.peg.1958
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	5-formyltetrahydrofolate cyclo-ligase (EC 6.3.3.2)	fig 6666666.263306.peg.1462
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Dihydrofolate reductase (EC 1.5.1.3)	fig 6666666.263306.peg.455
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Serine hydroxymethyltransferase (EC 2.1.2.1)	fig 6666666.263306.peg.1220
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Methylenetetrahydrofolate dehydrogenase (NADP+) (EC 1.5.1.5)	fig 6666666.263306.peg.1439
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Phosphoribosylglycinamide formyltransferase (EC 2.1.2.2)	fig 6666666.263306.peg.1253
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	Phosphoribosylaminoimidazolecarboxamide formyltransferase (EC 2.1.2.3)	fig 6666666.263306.peg.679
Cofactors, Vitamins, Prosthetic Groups, Pigments	Folate and pterines	5-FCL-like protein	5,10-methylenetetrahydrofolate reductase (EC 1.5.1.20)	fig 6666666.263306.peg.680
Cofactors, Vitamins, Prosthetic Groups, Pigments	Lipoic acid	Lipoic acid metabolism	Lipoate-protein ligase A	fig 6666666.263306.peg.1457
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	2-dehydropantoate 2-reductase (EC 1.1.1.169)	fig 6666666.263306.peg.1691
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Phosphopantetheine adenylyltransferase (EC 2.7.7.3)	fig 6666666.263306.peg.740
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Ketol-acid reductoisomerase (EC 1.1.1.86)	fig 6666666.263306.peg.279
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Phosphopantothenoylcysteine synthetase (EC 6.3.2.5)	fig 6666666.263306.peg.492
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Phosphopantothenoylcysteine decarboxylase (EC 4.1.1.36)	fig 6666666.263306.peg.1461
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Pantothenate kinase (EC 2.7.1.33)	fig 6666666.263306.peg.1460
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Dephospho-CoA kinase (EC 2.7.1.24)	fig 6666666.263306.peg.1468
Cofactors, Vitamins, Prosthetic Groups, Pigments	Coenzyme A	Coenzyme A Biosynthesis	Substrate-specific component PanT of predicted pantothenate ECF transporter	fig 6666666.263306.peg.1263
				fig 6666666.263306.peg.1459

Table S6: Two-component regulatory system in *S. thermophilus* KLDS 3.1003. The regulatory system is encoded by histidine kinase, sensor kinase, transcriptional regulator and other proteins.

Component	Encoded protein	Assigned gene
TCRS_1	Histidine kinase	BEN15_RS01380 BEN15_RS03090
TCRS_2	Sensor histidine kinase Transcriptional regulator	BEN15_RS04725 BEN15_RS04720
TCRS_3	Histidine kinase	BEN15_RS05380
TCRS_4	Response regulator Sensor histidine kinase	BEN15_RS05865 BEN15_RS05860
TCRS_5	Transcriptional regulator TCS sensor kinase ciaH	BEN15_RS06565 BEN15_RS06570
TCRS_6	Sensor histidine kinase	BEN15_RS05375
TCRS_7	Sensor kinase Transcriptional regulator	BEN15_RS08785 BEN15_RS08790
TCRS_8	Transcriptional regulator Histidine kinase	BEN15_RS00170 BEN15_RS00175
TCRS_9	Sensor histidine kinase Response regulator	BEN15_RS09720 BEN15_RS09725
TCRS_10	Response Regulator Sensor kinase	BEN15_RS07710 BEN15_RS07715
TCRS_11	Histidine kinase	BEN15_RS07225
TCRS_12	Response regulator Sensor histidine kinase	BEN15_RS05860 BEN15_RS06570

Table S7: Peptide and amino acid transport system in *Streptococcus thermophilus* KLDS 3.1003. The number of assigned genes regulating the transport system ranged from 1 – 19 in the strain.

Specificity	Assigned genes	Product
Oligopeptide	3	OppF (ATP-binding protein ABC transporter (ATP-binding protein, permease and substrate-binding-protein)
Amino acid	19	
Amino acid	5	Permease and transporter
Branched-chain amino acid	4	Permease and ABC transporter permease ABC transporter (ATP-binding protein, permease and substrate-binding-protein)
Glycine/betaine	4	ABC transporter (ATP-binding protein, permease and substrate-binding-protein)
Glutamine	5	ABC transporter (ATP-binding protein and permease)
Methionine	2	ABC transporter (permease)
Polar amino acids	1	Transporter SSiT
Serine/threonine	1	Transporter Rht8
Threonine	1	