

Table S1 SNP analysis of overproducer mutants. We analyzed SNPs in respective amino acid biosynthesis pathways, transport and degradation.

	Process	gene	SNP	protein level	outcome	literature	notes
E. coli NGF	Biosynthesis	metA	ATC -> AGC	I296S	prevents feedback inhibition --> increases production, prevents norleucine uptake could affect production	Laird et al. 2014	
		metH	GCG -> GGG CAA --> AAA	A1191G Q1194K			
		aspC	T -> G	promoter: -8	makes precursors aspartate so could also improve production		
	Transport	metP			could be mutated		sequence unknown
S. Typhimurium	Biosynthesis	hisG	GAA -> AAA	E271K	decoupled from histidine feedback inhibition	Malykh et al 2018	
		hisI	CGC -> CGA	silent			
		hisA	GTG -> GGG	V112G			
	Degradation	hutH	TTG -> CTG	silent			
		hutG	TGG -> GGG	W208G			
			AAT -> GAT	N210D			
			GTG -> GGG	V214G			
			GAG -> GGG	E215G			
	Transport	hisJ	T->G	promoter			
		hisQ	5 mutations	between -151 and -177			
hisP		GGT -> GGG	silent				
B. theta	Biosynthesis	BT_0531			one or both of these could remove feedback inhibition	Fang et al. 2015	
		BT_0532 (trpE)	GCC -> GTC	A306V			
			AAT -> GAT	N63D	different mutations have been described for E. coli		
		BT_0527 (trpA)	ATT -> AGT	I4S			
			TGC -> GGC	C222G			
	GAA -> GGA	E223G					
	TCC -> ACC	S226T					
B. fragilis	Biosynthesis	BF638R_0532	CTC -> CGC	L26R	arginine repressor, possibly made unfunctional (interface, arginine binding)	Ginesy et al. 2015	could not find arginine transport system, could also be mutated

Table S2 qPCR probes and primers.

		Sequence	Dye	Notes
<i>B. fragilis</i>	Forward Primer	GCTTGCTTCCAGTCGTCTAT		Specific to <i>B. fragilis</i> (including 638R and NCTC 9343)
	Probe	AGGCAGATTGCACAAGAAATGGCG	Hex	
	Reverse Primer	ATTGCAGCATTATCCACAAACA		
<i>B. theta</i>	Forward Primer	GCCAACCACGCTAACAATTAC		Specific to <i>B. thetaiotaomicron</i> (includes strain 7330 and VPI-5482)
	Probe	CCGTAATCCATCAGATGAAACCGGCT	Texas Red	
	Reverse Primer	GTTGCTTCGGAGAGATGTATCA		
<i>S. Typhimurium</i>	Forward Primer	CTGCCGAACCTCGTCAAA		Specific to <i>Salmonella enterica</i> (many serovars) - outside of any island or removed region
	Probe	TCGCAGGATAACCGAACGTGACTT	Cy5.5	
	Reverse Primer	CGAATTATGGCGGGTGAAATG		
<i>E. coli</i>	Forward Primer	CTATCCCAGATTGGGCTTCTTG		Returns two results only: assembly FHI72 and <i>E. coli</i> 536 (no K12 or common strains). Our NGF-1 sequence is not yet a part of the NCBI
	Probe	TCCTGGTCCTCCTGATGGTGAAGT	Cy5	
	Reverse Primer	CCATTGGTCAGGGTGCTAAA		