

Figure S1

Library	Organism	Cell Numbers	Library Type	Kit	Kit Version
GBBOG	ZymoBIOMICS™ Microbial Community DNA Standard: D6305	100ng DNA	Shotgun	Kapa Hyper Prep Kit	N/A
CZWOH	ZymoBIOMICS™ Microbial Community Standard cells: D6300	1E8 cells	Hi-C	Phase Genomics	1
CZWON	ZymoBIOMICS™ Microbial Community Standard cells: D6300	2.8E8 cells	Hi-C	Arima/Kapa	1
GPANX	ZymoBIOMICS™ Microbial Community Standard cells: D6300	2.8E8 cells	Hi-C	Arima/Kapa	1
GPANY	ZymoBIOMICS™ Microbial Community Standard cells: D6300	1E8 cells	Hi-C	Phase Genomics	1.5
GPANZ	ZymoBIOMICS™ Microbial Community Standard cells: D6300	1E8 cells	Hi-C	Phase Genomics	1.5
GPAOA	ZymoBIOMICS™ Microbial Community Standard cells: D6300	1E8 cells	Hi-C	Phase Genomics	1.5
GPAOB	ZymoBIOMICS™ Microbial Community Standard cells: D6300	1E8 cells	Hi-C	Phase Genomics	1.5

Figure S2

Total Aligned Length of Synthetic Metagenome Bins Before MetaBAT-LR was Applied (in bp)

Reference Genomes	bin.1	bin.10	bin.11	bin.12	bin.13	bin.14	<u>bin.15</u>	bin.2	bin.3	bin.4	bin.5	bin.6	bin.7	bin.8	bin.9
Bacillus subtilis	-	-	-	-	-	-	-	-	1818749	-	1135237	-	890877	-	-
Cryptococcus neoformans	-	-	-	-	-	-	1927	-	-	-	-	-	-	-	-
Enterococcus faecalis	-	-	-	1117655	-	-	-	-	74	1459877	-	-	-	-	-
Escherichia coli	-	-	-	-	-	4538063	-	-	-	-	-	-	-	-	-
Lactobacillus fermentum	-	266607	236079	-	-	-	-	-	-	-	-	497487	-	-	374862
Listeria monocytogenes	-	-	-	-	-	-	-	-	74	-	-	-	-	2922858	-
Pseudomonas aeruginosa	-	-	-	-	6689753	-	-	-	-	-	-	-	-	-	-
Saccharomyces cerevisiae	-	-	-	-	-	-	4712838	-	-	-	-	-	-	-	-
Salmonella enterica	3801292	-	-	-	-	814409	-	-	-	-	-	-	-	-	-
Staphylococcus aureus	-	-	-	-	-	-	-	2636514	79	-	-	-	-	-	-

Total Aligned Length of Synthetic Metagenome Bins After MetaBAT-LR was Applied (in bp)

Reference Genomes	bin.1	bin.10.11.9.6	bin.12.4	bin.13	bin.14	<u>bin.15</u>	bin.2	bin.3.7.5	bin.8
Bacillus subtilis	-	-	-	-	-	-	-	3844863	-
Cryptococcus neoformans	-	-	-	-	-	8840412	-	-	-
Enterococcus faecalis	-	-	2577532	-	-	-	-	74	-
Escherichia coli	-	-	-	-	4538063	-	-	-	-
Lactobacillus fermentum	-	1375035	-	-	-	-	-	-	-
Listeria monocytogenes	-	-	-	-	-	-	-	74	2922858
Pseudomonas aeruginosa	-	-	-	6689753	-	-	-	-	-
Saccharomyces cerevisiae	-	-	-	-	-	9546496	-	-	-
Salmonella enterica	3801292	-	-	-	814955	-	-	-	-
Staphylococcus aureus	-	-	-	-	-	-	2636514	79	-

Figure S3

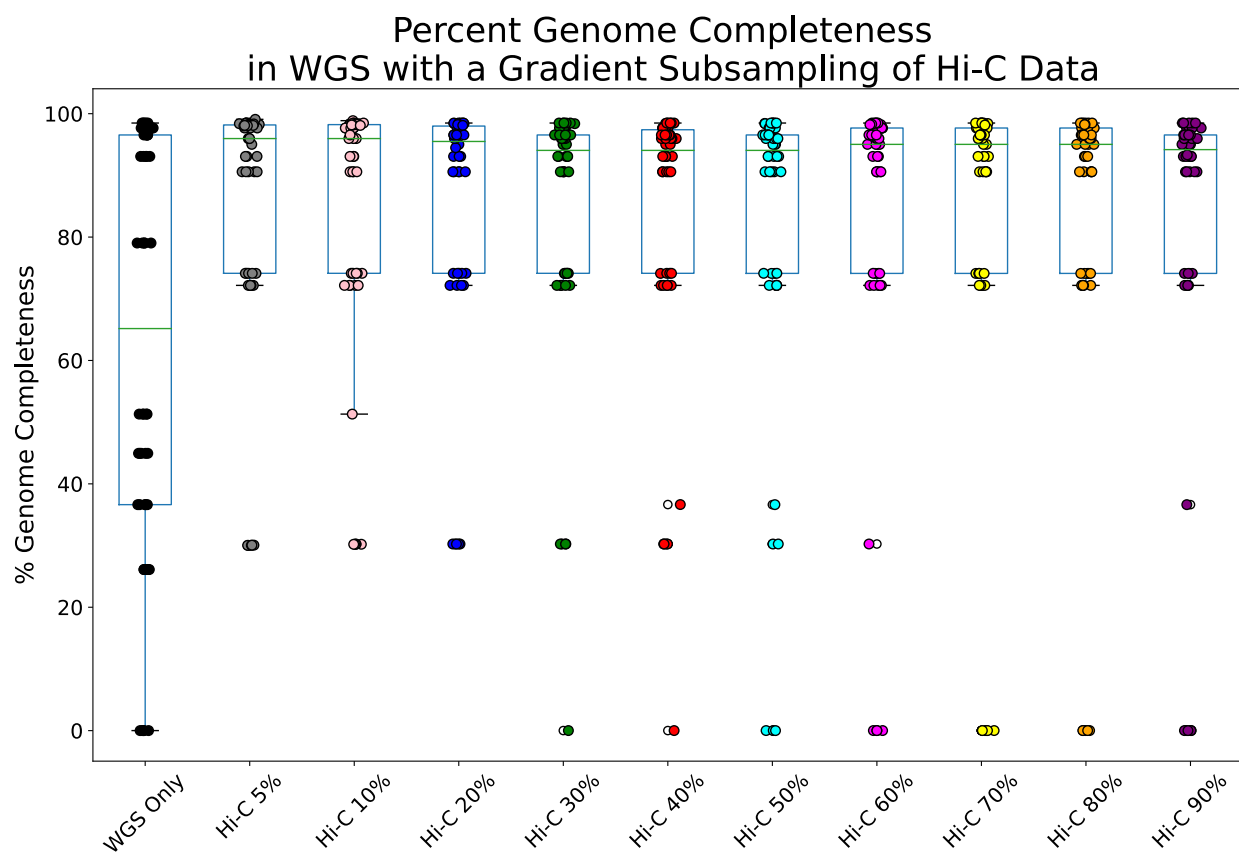


Figure S4

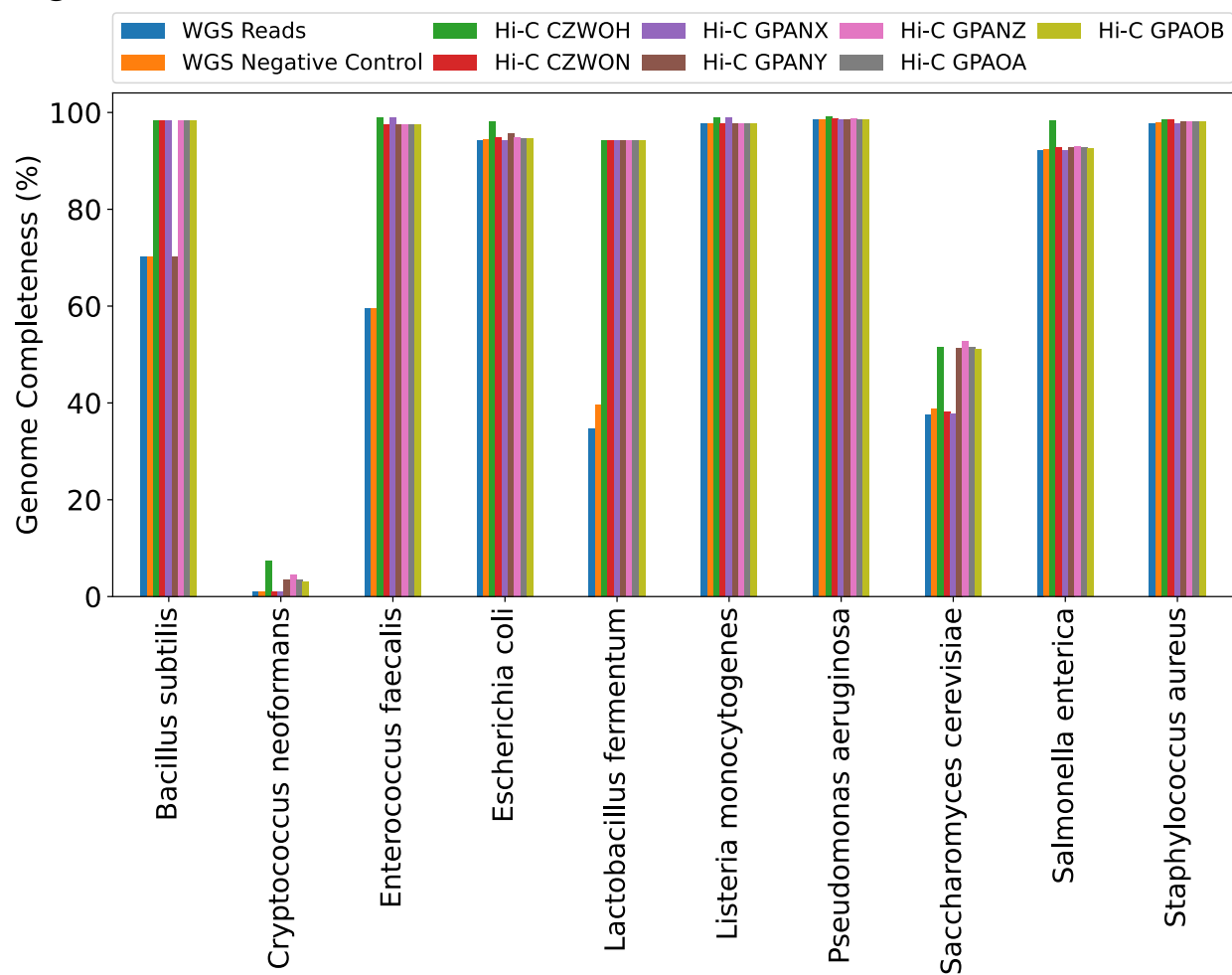


Figure S5

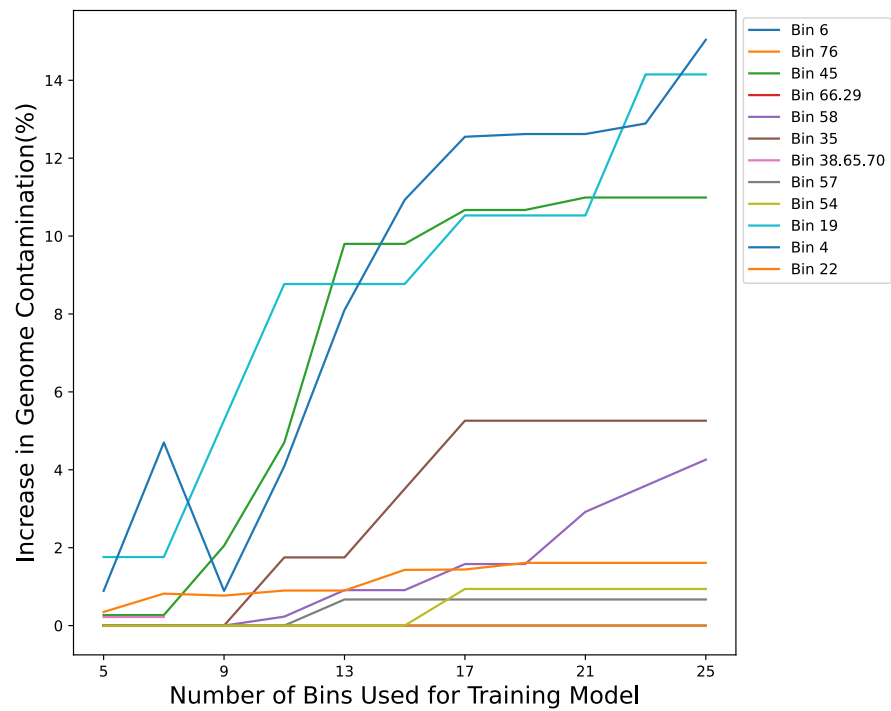
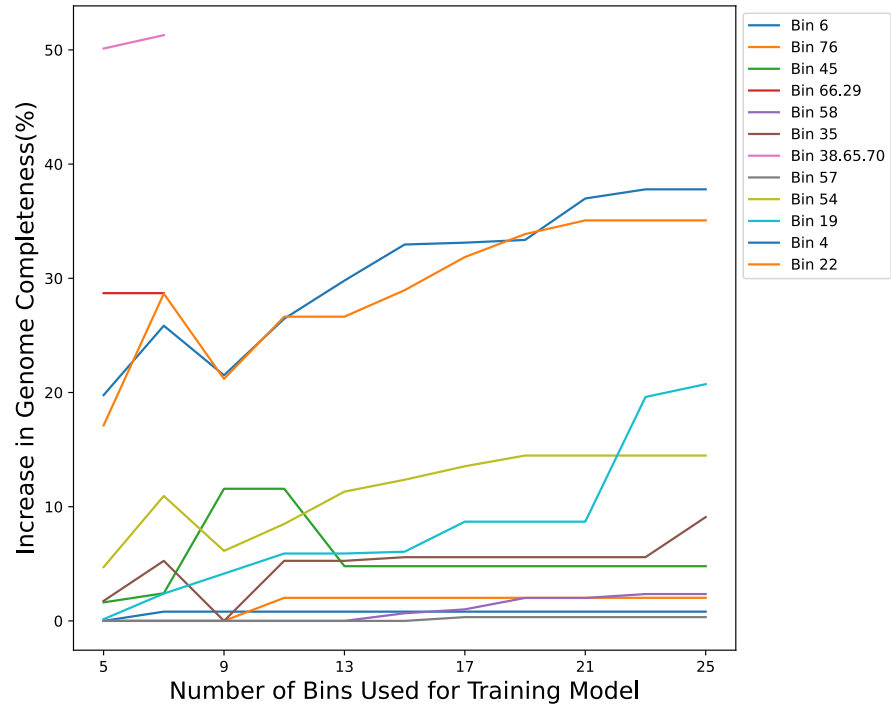


Figure S6

Metabat-LR Unique Bins from Cat Fecal Dataset

Completeness	Contamination	Bin Id	Marker lineage
98.88	2.25	bin.14.fa	k__Bacteria (UID2329)
82.79	2.5	bin.7.fa	o__Bacteroidales (UID2621)
74.8	4.08	bin.6.fa	o__Clostridiales (UID1120)
72.74	4.74	bin.4.fa	o__Lactobacillales (UID544)
68.1	1.72	bin.13.fa	k__Bacteria (UID203)
61.94	8.62	bin.17.fa	k__Bacteria (UID203)
52.74	3.45	bin.65.fa	k__Bacteria (UID203)
51.72	1.72	bin.46.fa	k__Bacteria (UID203)

Metabat-LR Unique Bins from Human Fecal Dataset

Completeness	Contamination	Bin Id	Marker lineage
96.31	0	bin.15.fa	o__Bacteroidales (UID2654)
89.13	4.52	bin.49.fa	f__Lachnospiraceae (UID1256)
74.49	0.81	bin.45.fa	p__Actinobacteria (UID2112)
55.93	1.75	bin.72.fa	k__Bacteria (UID203)
50.51	0	bin.35.fa	k__Bacteria (UID203)