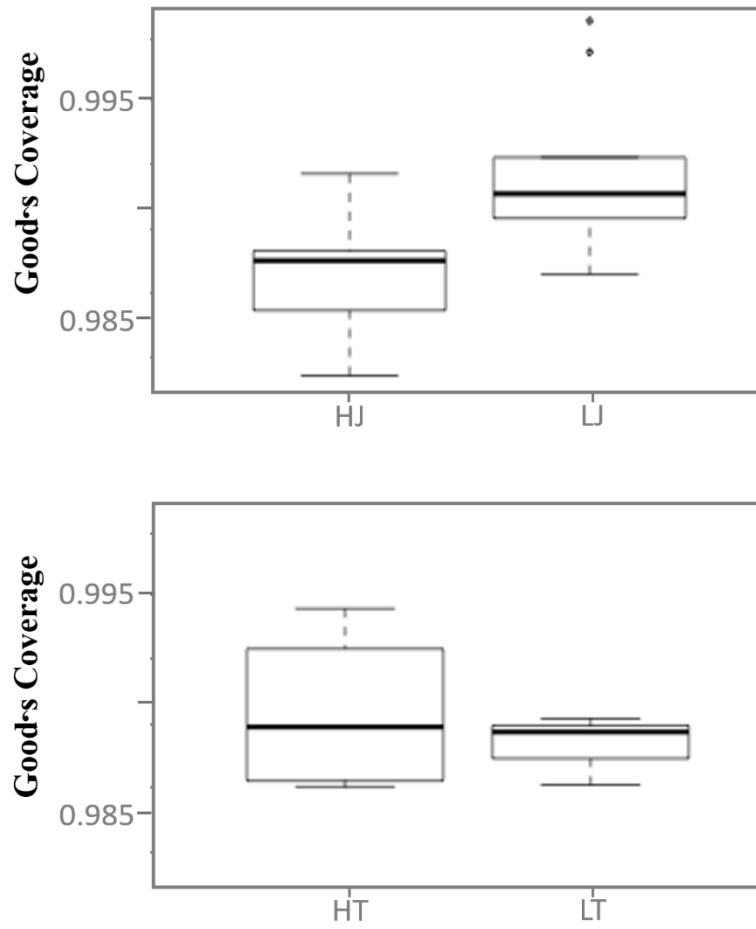
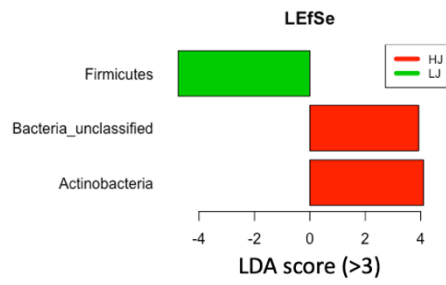


1 Supplementary Data

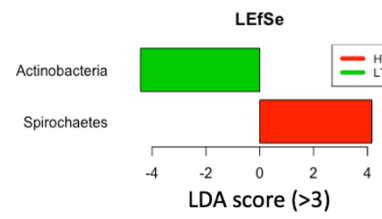


2 Fig. S1. Good's coverage obtained for horse fecal samples in this study. HJ, LJ, HT, and LT indicate high-
3 performance Jeju horses, low-performance Jeju horses, high-performance Thoroughbreds, and low-per-
4 formance Thoroughbreds, respectively.

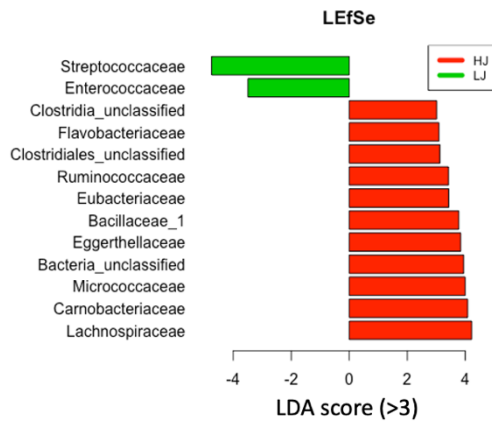
(A)



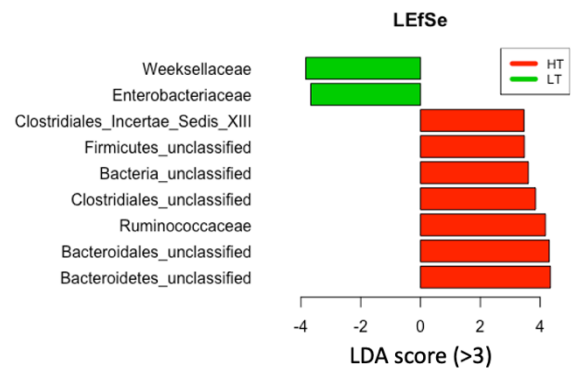
(B)



(C)



(D)



5 Fig. S2. Differential abundance comparisons between high- and low-performance horses: (A), phylum-
6 level comparison between Jeju horses; (B), phylum-level comparison between Thoroughbreds; (C), family
7 level comparison between Jeju horses; and (D), family level comparison between Thoroughbreds.

8 Table S1. Detailed description of horses used in this study

Animals	Sex	Age (Year)	Body Weight (Kg)	BCS	Health status	Feed		Traing	Vaccination	Deworming	Medication
						Roughage	Concentrated				
HJ01	Gelded	4.0	321	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ02	Female	3.3	316	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ03	Female	5.6	311	4.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ04	Male	5.0	290	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ05	Female	6.0	298	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
HJ06	Female	5.4	320	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ07	Female	3.3	321	4.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ08	Female	6.9	315	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
HJ09	Male	4.4	324	4.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ10	Female	7.3	319	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ11	Female	5.4	316	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
HJ12	Female	5.4	303	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HJ13	Gelded	7.3	311	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ01	Female	4.7	317	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ02	Gelded	3.3	297	4.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ03	Female	3.0	289	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ04	Gelded	2.9	300	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ05	Male	3.0	302	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
LJ06	Gelded	4.7	284	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ07	Gelded	4.0	308	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ08	Female	2.7	298	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ09	Male	3.0	326	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ10	Female	4.0	320	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
LJ11	Gelded	7.0	290	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ12	Gelded	3.2	323	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ13	Male	4.6	304	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ14	Gelded	3.4	310	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop	JE, INF, Strangles	IVE, PRA	None
LJ15	Female	4.8	298	5.5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ16	Male	2.8	307	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LJ17	Male	2.2	288	5	Sound	Alfafa, Timothy	Jeogtoma	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT01	Male	7.8	470	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT02	Gelded	5.0	457	5.5	Sound	Alfafa, Timothy	Victory	Gallop	JE, INF, Strangles	IVE, PRA	None
HT03	Male	5.1	450	5	Sound	Alfafa, Timothy	Victory	Gallop	JE, INF, Strangles	IVE, PRA	None
HT04	Female	5.0	440	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT05	Gelded	4.9	448	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT06	Female	2.7	448	5.5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT07	Female	5.1	442	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
HT08	Male	4.3	454	5.5	Sound	Alfafa, Timothy	Victory	Gallop	JE, INF, Strangles	IVE, PRA	None
HT09	Male	3.8	448	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT01	Male	5.3	438	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT02	Female	4.2	436	5.5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT03	Female	4.2	438	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT04	Female	3.3	440	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT05	Female	4.8	441	5	Sound	Alfafa, Timothy	Victory	Gallop	JE, INF, Strangles	IVE, PRA	None
LT06	Female	4.1	443	5.5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT07	Female	4.2	446	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT08	Male	3.7	453	5	Sound	Alfafa, Timothy	Victory	Gallop	JE, INF, Strangles	IVE, PRA	None
LT09	Male	3.3	463	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None
LT10	Male	4.8	469	5	Sound	Alfafa, Timothy	Victory	Gallop, Canter	JE, INF, Strangles	IVE, PRA	None

9
10 HJ, high-performance Jeju horses; LJ, low-performance Jeju horses; HT, , high-performance Thoroughbreds; LT, low-performance Thoroughbreds; JE, Japanese Encephalitis; INF, Influenza; IVE, Ivermectin; Pra, Praziquantel.

11 Table S2. β -Diversity Analysis for the identifying significant differences among the bacterial community

Comparison	F statistics	Bonferroni corrected P-value
HJ-LJ	2.72078	<0.001
HT-LT	1.83656	0.021
HJ-HT	3.19601	<0.001
LT-LJ	3.11626	<0.001

12 HJ, high-performance Jeju horses; LJ, low-performance Jeju horses; HT, high-performance Thoroughbreds; LT, low-
 13 performance Thoroughbreds.

14 Table S3. Enriched metabolic pathways of the gut microbiota in LJ compared to HJ

Pathway Code (MetaCyc)	Pathway Name	ALDEx diff.	Metabolite
PWY-6629	superpathway of L-tryptophan biosynthesis	7.11	L-tryptophan
PWY-6165	chorismate biosynthesis II (archaea)	5.38	Chorismate
ECASYN-PWY	enterobacterial common antigen biosynthesis	5.09	ECA
ORNDEG-PWY	superpathway of ornithine degradation	5.05	4-aminobutanoate
ARGDEG-PWY	superpathway of L-arginine, putrescine, and 4-aminobutanoate degradation	4.35	Succinate
ORNARGDEG-PWY	superpathway of L-arginine and L-ornithine degradation	4.32	Succinate
PWY-7446	sulfoquinovose degradation I	3.77	(2S)-2,3-dihydroxypropane-1-sulfonate
LACTOSECAT-PWY	lactose and galactose degradation I	3.61	glycerone phosphate, D-glyceraldehyde 3-phosphate
GLYCOL-GLY- OXDEG-PWY	superpathway of glycol metabolism and degradation	3.17	2-phospho-D-glycerate
METHGLYUT-PWY	superpathway of methylglyoxal degradation	3.15	Pyruvate

15 LJ, low-performance Jeju horses; HJ, high-performance Jeju horses; ECA, enterobacterial common antigen.

16 Table S4. Enriched metabolic pathways of the gut microbiota in LT compared to HT

Pathway Code (MetaCyc)	Pathway Name	ALDEx diff.	Metabolite
ORNDEG-PWY	superpathway of ornithine degradation	4.95	4-aminobutanoate
PWY-5183	superpathway of aerobic toluene degradation	4.81	Acetyl-CoA, Succinyl-CoA
METHYLGALLATE-DEGRADATION-PWY	methylgallate degradation	4.19	Pyruvate
ORNARGDEG-PWY	superpathway of L-arginine and L-ornithine degradation	4.17	Succinate
GALLATE-DEGRADATION-I-PWY	gallate degradation II	4.12	Pyruvate, Oxaloacetate
PWY-6629	superpathway of L-tryptophan biosynthesis	4.02	L-tryptophan
ARGDEG-PWY	superpathway of L-arginine, putrescine, and 4-aminobutanoate degradation	3.98	Succinate
PWY-6906	chitin derivatives degradation	3.96	β -D-fructofuranose 6-phosphate
ST-PWY	L-arginine degradation II (AST pathway)	3.86	L-glutamate
PWY-6165	chorismate biosynthesis II (archaea)	3.78	Chorismate

17 LT, low-performance Thoroughbreds; HT, high-performance Thoroughbreds.