

Supplementary Information

Table S1. qPCR primer sequences for gene expression and bacterial load

Gene	Forward	Reverse	Reference
Toll	TAGAGTGGCGCATTGTCAAG	ATCGCAATTTGTCCCAAAC	(Lang et al., 2022)
Spz4	CAACGAATTCAGGGACGAGG	AGTAGTGCCGGGAAATTC	This study
Cactus-1	CTATCGTGGAGAACTGCGTAT	TCAGGAAGTGGTTCTGGTATTG	(Lang et al., 2022)
Cactus-2	ATCAGACGGCTCTGCTCTAT	TCGTCTTCGTCAGTGGTATCT	(Lang et al., 2022)
Dorsal	AGAGATGGAACGCAGGAAAC	TGACAGGATATAGGACGAGGTAA	(Lang et al., 2022)
PGRP-LC	TCCGTCAGCCGTAGTTTTTC	CGTTTGTGCAAATCGAACAT	(Lang et al., 2022)
Dredd	GCGTCATAAAGAAAAAGGATCA	TTTCGGGTAATTGAGCAACG	(Lang et al., 2022)
Relish	GGAGCTGATCCAAATCGAAC	AGTGGCATCCATCCATCATT	(Lang et al., 2022)
Abaecin	TCGGATTGAATGGTCCCTGAC	ATCTTCGCACTACTCGCCAC	(Lang et al., 2022)
Apidaecin	GTAGGTCGAGTAGGCGGATCT	TTTTGCCTTAGCAATCTTGTTG	(Lang et al., 2022)
Hymenoptaecin	GTCGTCCATCCTTGGACATT	TTCCCAAACCTCGAATCCTG	(Lang et al., 2022)
Defensin-1	TGCGCTGCTAACTGTCTCAG	AATGGCACTTAACCGAAACG	(Lang et al., 2022)
Defensin-2	GCAACTACCGCCTTTACGTC	GGGTAACGTGCGACGTTTTA	(Lang et al., 2022)
Lysozyme	ACACGGTTGGTCACTGGTCC	GTCCCACGCTTTGAATCCCT	(Lang et al., 2022)
Hafnia	CGAGGAGGAAGGCATTGTGG	CCCAAGTTAAGCTCGGGGAT	(Lang et al., 2022)
Actin	TGCCAACACTGTCCTTTCTG	AGAATTGACCCACCAATCCA	(Lang et al., 2022)

Bifidobacterium

10 20 30 40 50 60 70 80 90 100 110
WB109 1 GGCACTACAGGGTATCTAATCCTGTCGCTCCCAAGCTTTCGCTCCTCAGGTCAGTACGGCCAGAGAGACTGGCTTCGCCATGGTGTCTCCCGATATCTACACATCCACCGT 120
WB102 1 GGCACTACAGGGTATCTAATCCTGTCGCTCCCAAGCTTTCGCTCCTCAGGTCAGTACGGCCAGAGAGACTGGCTTCGCCATGGTGTCTCCCGATATCTACACATCCACCGT 120
WB112 1 GGCACTACAGGGTATCTAATCCTGTCGCTCCCAAGCTTTCGCTCCTCAGGTCAGTACGGCCAGAGAGACTGGCTTCGCCATGGTGTCTCCCGATATCTACACATCCACCGT 120
WB119 1 GGCACTACAGGGTATCTAATCCTGTCGCTCCCAAGCTTTCGCTCCTCAGGTCAGTACGGCCAGAGAGACTGGCTTCGCCATGGTGTCTCCCGATATCTACACATCCACCGT 120
WB111 1 GGCACTACAGGGTATCTAATCCTGTCGCTCCCAAGCTTTCGCTCCTCAGGTCAGTACGGCCAGAGAGACTGGCTTCGCCATGGTGTCTCCCGATATCTACACATCCACCGT 120
130 140 150 160 170 180 190 200 210 220 230
WB109 121 ACACCGGGAAATCCAGTCCCTACCGCACTCAAGTCGCGCGCTACCGGGCGGATCCACCGTTAAGCGATGGACTTCACACAGAGCGGAGAACCGCTACAGGCTTCACGCC 240
WB102 121 ACACCGGGAAATCCAGTCCCTACCGCACTCAAGTCGCGCGCTACCGGGCGGATCCACCGTTAAGCGATGGACTTCACACAGAGCGGAGAACCGCTACAGGCTTCACGCC 240
WB112 121 ACACCGGGAAATCCAGTCCCTACCGCACTCAAGTCGCGCGCTACCGGGCGGATCCACCGTTAAGCGATGGACTTCACACAGAGCGGAGAACCGCTACAGGCTTCACGCC 240
WB119 121 ACACCGGGAAATCCAGTCCCTACCGCACTCAAGTCGCGCGCTACCGGGCGGATCCACCGTTAAGCGATGGACTTCACACAGAGCGGAGAACCGCTACAGGCTTCACGCC 240
WB111 121 ACACCGGGAAATCCAGTCCCTACCGCACTCAAGTCGCGCGCTACCGGGCGGATCCACCGTTAAGCGATGGACTTCACACAGAGCGGAGAACCGCTACAGGCTTCACGCC 240
250 260 270 280 290 300 310 320 330 340 350
WB109 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB102 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB112 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB119 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB111 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
370 380 390 400 410 420 430 440
WB109 361 ACCCGAAGCGGCTATCCGCAAGCGGGCTGCTGCATCAGGCTTCGCCATTGTGCAATATCCCACTGCTGCTCCCGTAGG 446
WB102 361 ACCCGAAGCGGCTATCCGCAAGCGGGCTGCTGCATCAGGCTTCGCCATTGTGCAATATCCCACTGCTGCTCCCGTAGG 446
WB112 361 ACCCGAAGCGGCTATCCGCAAGCGGGCTGCTGCATCAGGCTTCGCCATTGTGCAATATCCCACTGCTGCTCCCGTAGG 446
WB119 361 ACCCGAAGCGGCTATCCGCAAGCGGGCTGCTGCATCAGGCTTCGCCATTGTGCAATATCCCACTGCTGCTCCCGTAGG 446
WB111 361 ACCCGAAGCGGCTATCCGCAAGCGGGCTGCTGCATCAGGCTTCGCCATTGTGCAATATCCCACTGCTGCTCCCGTAGG 446

Gilliamella

10 20 30 40 50 60 70 80 90 100 110
B1448612 1 CCTACGGGAGGACAGTGGGGAATATTGCACAAATGGGGGAAACCTGATGAGCAGCTGCGCGGTATGAAGAAGGCTTCGGTGTAAAGTACTTCGGTAAAGGAAAGTGTGT 120
B1448613 1 CCTACGGGAGGACAGTGGGGAATATTGCACAAATGGGGGAAACCTGATGAGCAGCTGCGCGGTATGAAGAAGGCTTCGGTGTAAAGTACTTCGGTAAAGGAAAGTGTGT 120
B1448614 1 CCTACGGGAGGACAGTGGGGAATATTGCACAAATGGGGGAAACCTGATGAGCAGCTGCGCGGTATGAAGAAGGCTTCGGTGTAAAGTACTTCGGTAAAGGAAAGTGTGT 120
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B1448612 121 ATCTAATAGTGCATCAATTCAGCTTAATACAGAAGAAGCAGCGGCTAACTCCGTCAGCAGCGCGGTAAACGGAGGTCGAGCGCTAATCGGAATGACTGGGCTAAAGGGCAT 240
WB123 121 ATCTAATAGTGCATCAATTCAGCTTAATACAGAAGAAGCAGCGGCTAACTCCGTCAGCAGCGCGGTAAACGGAGGTCGAGCGCTAATCGGAATGACTGGGCTAAAGGGCAT 240
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B1448612 241 GTAGCGGATTAATTAAGTGTAGTGTGAAGCCCTGGGCTCAACTAGGAATGCACTAAAACCTGTTAAGTGTAGTGTAGAGGAAGTGAATCCAGCTGTAGCGGTAATGCG 360
WB123 241 GTAGCGGATTAATTAAGTGTAGTGTGAAGCCCTGGGCTCAACTAGGAATGCACTAAAACCTGTTAAGTGTAGTGTAGAGGAAGTGAATCCAGCTGTAGCGGTAATGCG 360
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WB123 241 GTAGCGGATTAATTAAGTGTAGTGTGAAGCCCTGGGCTCAACTAGGAATGCACTAAAACCTGTTAAGTGTAGTGTAGAGGAAGTGAATCCAGCTGTAGCGGTAATGCG 360
B1448612 361 TAGAGTGTGGAGGAATACCGGTGGCGAAGCGGGCTTCTGGACAGATCTGACGCTGAGTGGGAAGCGTGGGGAGCAACAGGATAGATACCTGGTAGTCC 466
WB123 361 TAGAGTGTGGAGGAATACCGGTGGCGAAGCGGGCTTCTGGACAGATCTGACGCTGAGTGGGAAGCGTGGGGAGCAACAGGATAGATACCTGGTAGTCC 466
B1448613 361 TAGAGTGTGGAGGAATACCGGTGGCGAAGCGGGCTTCTGGACAGATCTGACGCTGAGTGGGAAGCGTGGGGAGCAACAGGATAGATACCTGGTAGTCC 466
WB123 361 TAGAGTGTGGAGGAATACCGGTGGCGAAGCGGGCTTCTGGACAGATCTGACGCTGAGTGGGAAGCGTGGGGAGCAACAGGATAGATACCTGGTAGTCC 466

Bombilactobacillus and Apilactobacillus

10 20 30 40 50 60 70 80 90 100 110
WB089 1 GGCACTACAGGGTATCTAATCCTGTCGCTACCACTGCTTCGAGCCTCAGGTCAGTACAGACCAGAGAGCGGCTTCGCCACTGGTGTCTCCATATATCAGGATTCACCGCT 120
WB092 1 GGCACTACAGGGTATCTAATCCTGTCGCTACCACTGCTTCGAGCCTCAGGTCAGTACAGACCAGAGAGCGGCTTCGCCACTGGTGTCTCCATATATCAGGATTCACCGCT 120
MD345 1 GGCACTACAGGGTATCTAATCCTGTCGCTACCACTGCTTCGAGCCTCAGGTCAGTACAGACCAGAGAGCGGCTTCGCCACTGGTGTCTCCATATATCAGGATTCACCGCT 120
130 140 150 160 170 180 190 200 210 220 230
WB089 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGTCTTTCAGTTCGATGCTTTCCTCAGTTCAGCTGAGGCTTCACATTCAGACTAAGAGCCGCTGGGCTTTCACCG 239
WB092 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGTCTTTCAGTTCGATGCTTTCCTCAGTTCAGCTGAGGCTTCACATTCAGACTAAGAGCCGCTGGGCTTTCACCG 240
MD345 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGTCTTTCAGTTCGATGCTTTCCTCAGTTCAGCTGAGGCTTCACATTCAGACTAAGAGCCGCTGGGCTTTCACCG 238
250 260 270 280 290 300 310 320 330 340 350
WB089 240 CCCAATAATCCGGACAAGCTTCGCCACTACGATTAACCGGGCTGCGGACAGTGTAGCCGTGACTTTCGTTGATTAACCGTCACTTATGACAGTACTCTACACCGGCTTC 359
WB092 241 CCCAATAATCCGGACAAGCTTCGCCACTACGATTAACCGGGCTGCGGACAGTGTAGCCGTGACTTTCGTTGATTAACCGTCACTTATGACAGTACTCTACACCGGCTTC 360
MD345 239 CCCAATAATCCGGACAAGCTTCGCCACTACGATTAACCGGGCTGCGGACAGTGTAGCCGTGACTTTCGTTGATTAACCGTCACTTATGACAGTACTCTACACCGGCTTC 360
370 380 390 400 410 420 430 440 450 460
WB089 360 TCTTAAACACAGGTTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 467
WB092 361 TCTTAAACACAGGTTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 468
MD345 359 TCTTAAACACAGGTTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 466

Lactobacillus

10 20 30 40 50 60 70 80 90 100 110
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WB173 1 GGCACTACAGGGTATCTAATCCTGTCGCTACCACTGCTTCGAACTCAGGTCAGTACAGACCAGAGAGCGGCTTCGCCACTGGTGTCTCCATATATCAGGATTCACCGCT 120
130 140 150 160 170 180 190 200 210 220 230
WB172 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGAAAAGTTCAGTTCAGTTCGCTTCGTTAAGCGAGGGCTTCACAGCTGACTTTCCTCCGCTCGGCTCGCTTACGCC 240
WB093 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGAAAAGTTCAGTTCAGTTCGCTTCGTTAAGCGAGGGCTTCACAGCTGACTTTCCTCCGCTCGGCTCGCTTACGCC 240
WB173 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGAAAAGTTCAGTTCAGTTCGCTTCGTTAAGCGAGGGCTTCACAGCTGACTTTCCTCCGCTCGGCTCGCTTACGCC 240
WB093 121 ACACATGGAGTCCACTTCCTCTTCGCACTCAAGAAAAGTTCAGTTCAGTTCGCTTCGTTAAGCGAGGGCTTCACAGCTGACTTTCCTCCGCTCGGCTCGCTTACGCC 240
250 260 270 280 290 300 310 320 330 340 350
WB172 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB093 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB173 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
WB093 241 CAATAAATCCGGAAACCGTTCGACCTACGATTAACCGGGCTGCTGGCAGTGTAGCCGGTCTTATCGAAAGGTACACTCACTCGCTGCTCCCAATCAAAAGGGTGTACA 360
370 380 390 400 410 420 430 440 450 460
WB172 361 ACCAACCAACAGGCTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 466
WB093 361 ACCAACCAACAGGCTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 466
WB173 361 ACCAACCAACAGGCTTACGATCCGAACACTTCTCACTCAGCGGCTGTGCTCCATCAGACTTCGCTCAATGTGGAGAAATCCCTACTGCTGCTCCCGTAGG 466

Bartonella

10 20 30 40 50 60 70 80 90 100 110
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B1083466 1 CCTACGGGAGGACAGTGGGGAATATTGCACAAATGGGGGAAACCTGATGAGCAGCTGCGCGGTATGAAGAAGGCTTCGGTGTAAAGTACTTCGGTAAAGGAAAGTGTGT 120
MD193 1 CCTACGGGAGGACAGTGGGGAATATTGCACAAATGGGGGAAACCTGATGAGCAGCTGCGCGGTATGAAGAAGGCTTCGGTGTAAAGTACTTCGGTAAAGGAAAGTGTGT 120
130 140 150 160 170 180 190 200 210 220 230
B1083415 121 TAACCGGAGAAGAGCCCGGCTAACTCGTCCAGCAGCGCGGTAAACGAAGGGGGCTAGCGTGTTCGGATTTACTGGGCTAAAGCGCAGTAGGCGGATTTAAGTACAGGGT 240
B1083466 121 TAACCGGAGAAGAGCCCGGCTAACTCGTCCAGCAGCGCGGTAAACGAAGGGGGCTAGCGTGTTCGGATTTACTGGGCTAAAGCGCAGTAGGCGGATTTAAGTACAGGGT 240
MD193 121 TAACCGGAGAAGAGCCCGGCTAACTCGTCCAGCAGCGCGGTAAACGAAGGGGGCTAGCGTGTTCGGATTTACTGGGCTAAAGCGCAGTAGGCGGATTTAAGTACAGGGT 240
250 260 270 280 290 300 310 320 330 340 350
B1083415 241 GAAATCCCGGGCTCAACCCCGGAACCTGCTTGAATCTGGATCTCTGAGTATGGAAGAGGTAAAGTGAATCCGAGTGTAGAGGTAAGTTCGATAGTTCCGGAGAACACCTGG 360
B1083466 241 GAAATCCCGGGCTCAACCCCGGAACCTGCTTGAATCTGGATCTCTGAGTATGGAAGAGGTAAAGTGAATCCGAGTGTAGAGGTAAGTTCGATAGTTCCGGAGAACACCTGG 360
MD193 241 GAAATCCCGGGCTCAACCCCGGAACCTGCTTGAATCTGGATCTCTGAGTATGGAAGAGGTAAAGTGAATCCGAGTGTAGAGGTAAGTTCGATAGTTCCGGAGAACACCTGG 360
370 380 390 400 410 420 430 440
B1083415 361 CGAAGGCGCTTACTGCTCATTACTGACGCTGAGGTGCGAAGCGTGGGAGCAACAGGATAGATACCTGGTAGTCC 441
B1083466 361 CGAAGGCGCTTACTGCTCATTACTGACGCTGAGGTGCGAAGCGTGGGAGCAACAGGATAGATACCTGGTAGTCC 441
MD193 361 CGAAGGCGCTTACTGCTCATTACTGACGCTGAGGTGCGAAGCGTGGGAGCAACAGGATAGATACCTGGTAGTCC 441

Fig. S1. Differences of the V3 - V4 region of 16S rRNA genes of strains in the relevant genus. Our results indicated the feasibility of using 16S rRNA genes V3 - 4 region for species classification.