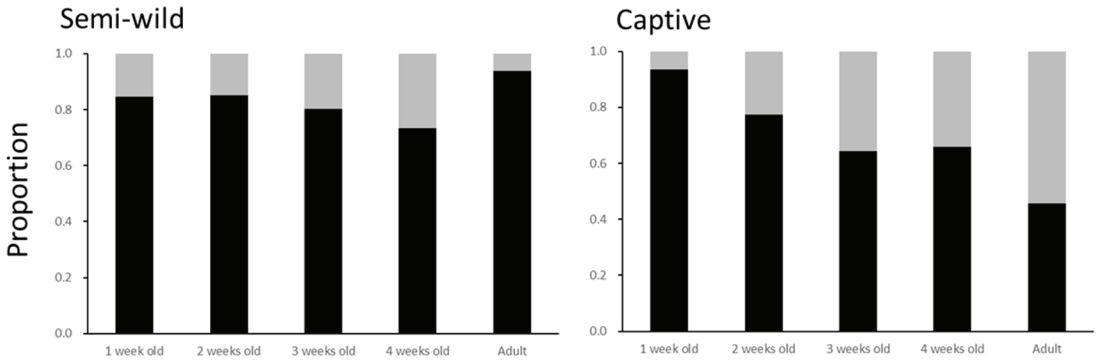

Supplementary Figure 1. The proportion of common OTUs at different ages of chicks and adult individuals. Black tile indicates the proportion of OTUs shared both by chicks and adult individuals.

Supplementary Table 1. The top 30 OTUs of adult microbiome in semi-wild (A) and captive (B) individuals and the change of the proportion in chicks from 1 week old to 4 weeks old.

(A) Semi-wild individuals

No	O T U	1 week	2 week	3 week	4 week	adult
1	*Olsenella* sp. No1	0.0637	0.1131	0.0994	0.0885	0.2286
2	*Actinomyces* sp. No1	0.1168	0.0914	0.0337	0.0403	0.0822
3	*Shuttleworthia* sp. No1	0.0416	0.0300	0.0240	0.0516	0.0671
4	Erysipelotrichaceae incertae sedis sp. No1	0.0231	0.0294	0.0568	0.0111	0.0468
5	*Slackia* sp. No1	0.0255	0.0545	0.0515	0.0454	0.0418
6	*Megamonas* sp. No1	0.0044	0.0076	0.0319	0.0306	0.0304
7	*Robinsoniella* sp. No1	0.0051	0.0056	0.0074	0.0047	0.0297
8	*Megasphaera* sp. No1	0.0044	0.0044	0.0221	0.0203	0.0228
9	*Bifidobacterium* sp. No1	0.0044	0.0065	0.0041	0.0059	0.0219
10	*Cloacibacillus* sp. No1	0.0006	0.0004	0.0005	0.0015	0.0162
11	*Eubacterium* sp. No1	0.0111	0.0053	0.0068	0.0063	0.0151
12	*Alkalibaculum* sp. No1	0.0126	0.0286	0.0127	0.0085	0.0144
13	*Psychrosinus* sp. No1	0.0018	0.0049	0.0063	0.0018	0.0128
14	*Adlercreutzia* sp. No1	0.0037	0.0078	0.0053	0.0034	0.0110
15	*Anaerobacterium* sp. No1	0.0035	0.0043	0.0034	0.0029	0.0101
16	*Asaccharobacter* sp. No1	0.0257	0.0264	0.0151	0.0136	0.0084
17	*Allisonella* sp. No1	0.0005	0.0004	0.0009	0.0010	0.0077
18	*Guggenheimella* sp. No1	0.0007	0.0003	0.0005	0.0009	0.0070
19	*Escherichia/Shigella* sp. No1	0.0011	0.0000	0.0040	0.0004	0.0067
20	Lachnospiracea incertae sedis sp. No1	0.0142	0.0106	0.0084	0.0053	0.0065
21	*Syntrophococcus* sp. No1	0.0026	0.0046	0.0030	0.0017	0.0059
22	*Cloacibacillus* sp. No1	0.0002	0.0001	0.0000	0.0003	0.0058
23	*Parvibacter* sp. No1	0.0054	0.0081	0.0041	0.0038	0.0057
24	*Defluviitalea* sp. No1	0.0030	0.0030	0.0023	0.0023	0.0057
25	*Syntrophococcus* sp. No1	0.0023	0.0031	0.0027	0.0018	0.0056
26	*Slackia* sp. No2	0.0015	0.0045	0.0044	0.0042	0.0055
27	*Flavonifractor* sp. No1	0.0064	0.0028	0.0206	0.0111	0.0046
28	*Faecalitalea* sp. No1	0.0005	0.0005	0.0014	0.0007	0.0046
29	*Butyricicoccus* sp. No1	0.0014	0.0019	0.0027	0.0039	0.0041
30	*Cloacibacillus* sp. No1	0.0002	0.0002	0.0001	0.0004	0.0038

(B) Captive individuals

No	O T U	1 week	2 week	3week	4 week	Adult
1	*Escherichia/Shigella* sp. No1	0.0001	0.0509	0.0621	0.0740	0.0741
2	*Ruminococcus2* sp. No1	0.1829	0.0718	0.0555	0.0736	0.0618
3	*Ruminococcus2* sp. No2	0.0108	0.0625	0.0626	0.0610	0.0467
4	*Fusicatenibacter* sp. No1	0.0001	0.0210	0.0307	0.0295	0.0383
5	*Blautia* sp. No1	0.0000	0.0313	0.0187	0.0176	0.0282
6	*Ruminococcus2* sp. No3	0.0204	0.0332	0.0289	0.0309	0.0264
7	*Ruminococcus2* sp. No4	0.0456	0.0444	0.0436	0.0356	0.0247
8	*Citrobacter* sp. No1	0.0007	0.0504	0.0314	0.0217	0.0245
9	*Clostridium* XlVa sp. No1	0.0000	0.0001	0.0016	0.0021	0.0227
10	*Klebsiella* sp. No1	0.2441	0.1893	0.0455	0.0685	0.0135
11	*Flavonifractor* sp. No1	0.0002	0.0040	0.0110	0.0087	0.0123
12	*Clostridium* XlVa sp. No2	0.0000	0.0043	0.0075	0.0091	0.0122
13	*Acetitomaculum* sp. No1	0.0000	0.0099	0.0101	0.0161	0.0118
14	*Clostridium* XlVa sp. No3	0.0000	0.0000	0.0000	0.0000	0.0087
15	*Coprococcus* sp. No1	0.0001	0.0034	0.0048	0.0059	0.0086
16	*Ruminococcus* 2 sp. No5	0.0000	0.0000	0.0011	0.0012	0.0084
17	*Blautia* sp. No2	0.0000	0.0000	0.0000	0.0000	0.0072
18	*Blautia* sp. No3	0.2625	0.0354	0.0351	0.0348	0.0072
19	*Ruminococcus* 2 sp. No6	0.0000	0.0001	0.0025	0.0089	0.0068
20	*Fusicatenibacter* sp. No1	0.0000	0.0000	0.0000	0.0000	0.0067
21	*Gemmiger* sp. No1	0.0001	0.0250	0.0255	0.0261	0.0063
22	*Anaerobacterium* sp. No1	0.0000	0.0000	0.0000	0.0000	0.0062
23	*Coprobacillus* sp. No1	0.0000	0.0000	0.0000	0.0000	0.0060
24	Lachnospiracea incertae sedis sp. No1	0.0000	0.0002	0.0073	0.0068	0.0056
25	*Ruminococcus2* sp. No6	0.0049	0.0069	0.0062	0.0065	0.0054
26	*Ruminococcus2* sp. No7	0.0000	0.0002	0.0024	0.0036	0.0053
27	*Clostridium* XlVa sp. No4	0.0000	0.0003	0.0050	0.0049	0.0049
28	*Faecalibacterium* sp. No1	0.0000	0.0011	0.0012	0.0011	0.0044
29	Lachnospiracea incertae sedis sp. No2	0.0000	0.0000	0.0001	0.0068	0.0044
30	*Coprococcus* sp. No1	0.0000	0.0000	0.0000	0.0026	0.0043

Top 30 OTUs are listed for Adult individuals (the rightest columns). The detection rates of these OTUs in chicks of different ages (from One week old to 4 weeks old) are shown. The darker colors indicate bigger prevalence.

Supplementary Table 2. The prevalence of genera in the cecal microbiome of semi-wild Japanese rock ptarmigan at different age.

	Genus	1 week old	2 weeks old	3 weeks old	4 weeks old	Adult
Actinobacteria						
1	*Olsenella*	0.0734	0.1317	0.1166	0.1049	0.2595
2	*Actinomyces*	0.1214	0.0949	0.0361	0.0433	0.0869
3	*Slackia*	0.0335	0.0709	0.0640	0.0581	0.0564
7	*Bifidobacterium*	0.0045	0.0067	0.0043	0.0062	0.0228
5	*Parvibacter*	0.0087	0.0173	0.0076	0.0082	0.0145
6	*Adlercreutzia*	0.0068	0.0120	0.0095	0.0065	0.0136
4	*Asaccharobacter*	0.0276	0.0289	0.0166	0.0150	0.0093
8	*Dermabacter*	0.0058	0.0060	0.0029	0.0037	0.0068
9	*Eggerthella*	0.0010	0.0023	0.0021	0.0021	0.0020
10	*Coriobacterium*	0.0003	0.0009	0.0006	0.0005	0.0013
11	Other 41 genera	0.0022	0.0027	0.0018	0.0028	0.0053
	Sub total	**0.2854**	**0.3744**	**0.2619**	**0.2512**	**0.4785**
Bacteroidetes						
1	*Paraprevotella*	0.0004	0.0007	0.0008	0.0083	0.0021
2	*Anaerorhabdus*	0.0010	0.0010	0.0005	0.0010	0.0035
3	*Phocaeicola*	0.0003	0.0005	0.0004	0.0017	0.0006
4	*Bacteroides*	0.0001	0.0000	0.0003	0.0014	0.0006
5	*Macellibacteroides*	0.0001	0.0001	0.0001	0.0005	0.0006
6	Other 24 genera	0.0001	0.0000	0.0002	0.0022	0.0018
	Sub total	**0.0020**	**0.0024**	**0.0022**	**0.0151**	**0.0092**
Firmicutes		a	b	c	d	e
1	*Shuttleworthia*	0.0466	0.0354	0.0289	0.0604	0.0799
2	Erysipelotrichaceae_incertae_sedis	0.0260	0.0317	0.0619	0.0127	0.0521
3	*Megamonas*	0.0055	0.0098	0.0411	0.0410	0.0405
4	*Robinsoniella*	0.0087	0.0116	0.0102	0.0071	0.0357
5	*Megasphaera*	0.0044	0.0044	0.0224	0.0203	0.0233
6	*Ruminococcus* 2	0.2733	0.1618	0.1504	0.1602	0.0221
7	*Eubacterium*	0.0122	0.0058	0.0074	0.0069	0.0171
8	Lachnospiracea_incertae_sedis	0.0591	0.0531	0.0518	0.0548	0.0170
9	*Alkalibaculum*	0.0141	0.0317	0.0141	0.0095	0.0167
10	*Syntrophococcus*	0.0075	0.0106	0.0080	0.0062	0.0163
11	*Anaerobacterium*	0.0081	0.0104	0.0113	0.0061	0.0158
12	*Flavonifractor*	0.0245	0.0398	0.0724	0.0258	0.0092
13	*Coprococcus*	0.0346	0.0352	0.0472	0.0667	0.0049
14	*Clostridium* IV	0.0083	0.0095	0.0130	0.0107	0.0029
15	*Clostridium* XIVa	0.0284	0.0214	0.0399	0.0552	0.0022
16	*Clostridium* XVIII	0.0207	0.0229	0.0067	0.0030	0.0018
17	*Murimonas*	0.0069	0.0074	0.0058	0.0047	0.0016
18	*Anaerosporobacter*	0.0045	0.0039	0.0107	0.0066	0.0015
19	*Dorea*	0.0215	0.0244	0.0149	0.0157	0.0014
20	*Blautia*	0.0238	0.0201	0.0024	0.0033	0.0001
21	Other 121 genera	0.0703	0.0705	0.0758	0.0801	0.0992
	Sub total	**0.7090**	**0.6215**	**0.6962**	**0.6569**	**0.4613**
Proteobacteria						
1	*Raoultella*	0.0000	0.0000	0.0068	0.0509	0.0002
2	*Providencia*	0.0000	0.0000	0.0229	0.0099	0.0000
3	*Escherichia/Shigella*	0.0012	0.0000	0.0045	0.0005	0.0089
4	*Buttiauxella*	0.0000	0.0000	0.0005	0.0039	0.0000
5	*Hafnia*	0.0000	0.0000	0.0020	0.0001	0.0040
6	*Bilophila*	0.0007	0.0004	0.0003	0.0016	0.0008
7	*Citrobacter*	0.0000	0.0000	0.0001	0.0021	0.0000
8	*Leclercia*	0.0000	0.0000	0.0002	0.0012	0.0000
9	*Helicobacter*	0.0001	0.0001	0.0001	0.0006	0.0010
10	*Kluyvera*	0.0000	0.0000	0.0000	0.0003	0.0012
11	Other 49 genera	0.0003	0.0001	0.0006	0.0016	0.0010
	Sub total	**0.0022**	**0.0006**	**0.0380**	**0.0725**	**0.0172**
Spirochaetes						
1	*Sphaerochaeta*	0.0000	0.0000	0.0000	0.0001	0.0000
2	*Treponema*	0.0000	0.0000	0.0000	0.0004	0.0001
	Sub total	**0.0000**	**0.0000**	**0.0000**	**0.0005**	**0.0001**
Synergistetes						
1	*Cloacibacillus*	0.0011	0.0007	0.0006	0.0027	0.0320
2	*Lactivibrio*	0.0002	0.0002	0.0001	0.0002	0.0000
3	*Aminiphilus*	0.0000	0.0000	0.0000	0.0001	0.0007
4	*Jonquetella*	0.0000	0.0000	0.0000	0.0000	0.0004
5	*Synergistes*	0.0000	0.0000	0.0000	0.0000	0.0003
6	*Aminomonas*	0.0000	0.0000	0.0000	0.0000	0.0003
	Sub total	**0.0013**	**0.0008**	**0.0007**	**0.0030**	**0.0337**
Other 11 phyra						
1	16 genera	0.0001	0.0002	0.0010	0.0007	0.0001

The darker color means higher proportion in the age.

Supplementary Table 3. The prevalence of genera in the cecal microbiome of captive Japanese rock ptarmigan at different age.

	Genus	1 week old	2 weeks old	3 weeks old	4 weeks old	Adult
Actinobacteria						
1	*Slackia*	0.0003	0.0000	0.0000	0.0000	0.0001
2	*Eggerthella*	0.0004	0.0000	0.0000	0.0000	0.0000
3	*Enterorhabdus*	0.0000	0.0000	0.0000	0.0000	0.0001
4	*Bacteroidetes*	0.0000	0.0000	0.0000	0.0000	0.0000
5	*Olsenella*	0.0000	0.0000	0.0000	0.0000	0.0000
6	*Parvibacter*	0.0000	0.0000	0.0000	0.0000	0.0000
	Sub total	**0.0007**	**0.0001**	**0.0000**	**0.0000**	**0.0002**
Bacteroidetes						
1	*Barnesiella*	0.0000	0.0000	0.0000	0.0000	0.0000
2	*Anaerorhabdus*	0.0000	0.0000	0.0000	0.0000	0.0000
3	*Macellibacteroides*	0.0000	0.0000	0.0000	0.0000	0.0000
	Sub total	0.0000	0.0000	0.0000	0.0000	0.0000
Cyanobacteria/Chloroplast						
1	*Streptophyta*	0.0437	0.0085	0.0013	0.0000	0.0000
Firmicutes						
1	*Ruminococcus* 2	0.2922	0.2925	0.3132	0.3118	0.2772
2	*Clostridium* XlVa	0.0364	0.0661	0.0827	0.0799	0.1121
3	*Coprococcus*	0.0617	0.0490	0.0692	0.0698	0.0686
4	*Fusicatenibacter*	0.0004	0.0222	0.0411	0.0387	0.0596
5	*Blautia*	0.2687	0.0708	0.0919	0.0632	0.0555
6	Lachnospiracea_incertae_sedis	0.0002	0.0112	0.0247	0.0333	0.0304
7	*Flavonifractor*	0.0038	0.0111	0.0223	0.0174	0.0279
8	*Anaerobacterium*	0.0000	0.0048	0.0049	0.0049	0.0188
9	*Acetitomaculum*	0.0000	0.0106	0.0112	0.0177	0.0132
10	*Eisenbergiella*	0.0000	0.0024	0.0032	0.0063	0.0128
11	*Clostridium* IV	0.0000	0.0004	0.0025	0.0056	0.0129
12	*Robinsoniella*	0.0001	0.0017	0.0039	0.0032	0.0126
13	*Clostridium* XVIII	0.0106	0.0281	0.0398	0.0300	0.0090
14	*Gemmiger*	0.0002	0.0331	0.0339	0.0351	0.0078
15	*Subdoligranulum*	0.0000	0.0060	0.0307	0.0227	0.0094
16	*Lachnospira*	0.0000	0.0100	0.0161	0.0093	0.0057
17	*Dorea*	0.0001	0.0052	0.0130	0.0126	0.0083
18	*Anaerostipes*	0.0000	0.0031	0.0041	0.0066	0.0056
19	*Pseudoflavonifractor*	0.0000	0.0023	0.0030	0.0049	0.0082
20	*Butyricicoccus*	0.0000	0.0019	0.0023	0.0031	0.0085
21	Other 155 genera	0.0079	0.0234	0.0261	0.0255	0.0954
	Sub total	**0.6824**	**0.6560**	**0.8399**	**0.8017**	**0.8597**
Proteobacteria						
1	*Klebsiella*	0.2481	0.1947	0.0472	0.0703	0.0141
2	*Escherichia/Shigella*	0.0001	0.0638	0.0693	0.0922	0.0860
3	*Citrobacter*	0.0070	0.0561	0.0343	0.0265	0.0273
6	*Kluyvera*	0.0000	0.0005	0.0004	0.0012	0.0052
4	*Enterobacter*	0.0111	0.0091	0.0026	0.0029	0.0021
7	*Pseudocitrobacter*	0.0000	0.0011	0.0014	0.0017	0.0018
5	*Leclercia*	0.0045	0.0032	0.0014	0.0015	0.0004
8	*Trabulsiella*	0.0010	0.0015	0.0009	0.0010	0.0005
9	*Pantoea*	0.0001	0.0035	0.0002	0.0001	0.0005
10	*Salmonella*	0.0013	0.0012	0.0005	0.0004	0.0008
11	*Raoultella*	0.0000	0.0001	0.0001	0.0001	0.0004
12	OTher 25 genera	0.0000	0.0007	0.0005	0.0004	0.0010
	Sub total	**0.2732**	**0.3355**	**0.1588**	**0.1983**	**0.1401**

The darker color means higher proportion in the age.