

Supplementary Material

The hatching time of broiler chickens modifies not only the production traits, but also the bacteriota development in the ceca

Nikoletta Such ¹, Kornél Schermann ¹, László Pál ¹, László Menyhárt ², Valéria Farkas ¹, Gábor Csitári ¹, Brigitta Kiss ¹, Kesete Goitom Tewelde ¹ and Károly Dublec ¹

¹ Institute of Physiology and Nutrition, Hungarian University of Agriculture and Life Sciences, Georgikon Campus, 8360 Keszthely, Hungary; Deák Ferenc Street 16.; such.nikoletta.amanda@uni-mate.hu; schermannkornel2000@gmail.com; pal.laszlo@uni-mate.hu; farkas.valeria@uni-mate.hu; csitari.gabor@uni-mate.hu; kiss.brigitta.gyongyi@phd.uni-mate.hu; kesete.goitom.tewelde@phd.uni-mate.hu; dublec.karoly@uni-mate.hu

² Institute of Technology, Hungarian University of Agriculture and Life Sciences, Georgikon Campus, Deák Ferenc Street 16, 8360 Keszthely, Hungary; menyhart.laszlo@uni-mate.hu

* Correspondence: dublec.karoly@uni-mate.hu

† These authors contributed equally to this work.

Table S1. The effect of hatching time and parent age on the caecal microbiota composition at the family level at 11 day of age.

Family (%)	Parent flock age				FDR p-values		
	Hatching time	Young parent	Old parent	Average (Hatching time)	Hatching time	Parent flock age	Interaction
<i>Ruminococcaceae</i>	Early	35.051	33.467	34.259	0.443	0.750	0.635
	Late	29.792	24.768	27.280			
	Average (Age)	32.422	29.118				
<i>Lachnospiraceae</i>	Early	22.571	30.636	26.604	0.886	0.683	0.846
	Late	27.650	23.050	25.350			
	Average (Age)	25.111	26.843				
<i>Lactobacillaceae</i>	Early	14.110	12.439	13.275	0.504	0.717	0.729
	Late	10.458	7.046	8.752			
	Average (Age)	12.284	9.743				
<i>Bacteroidaceae</i>	Early	9.662	5.952	7.807	0.517	0.742	0.933
	Late	12.424	27.494	19.959			
	Average (Age)	11.043	16.723				
<i>Erysipelotrichaceae</i>	Early	4.533	5.118	4.826	0.542	0.702	0.425
	Late	2.845	3.680	3.262			
	Average (Age)	3.689	4.399				
<i>Peptostreptococcaceae</i>	Early	0.318	1.073	0.695	0.533	0.816	0.921
	Late	0.232	0.372	0.302			
	Average (Age)	0.275	0.722				
<i>Clostridiales_vadinBB60_group</i>	Early	3.098	5.917	4.508	0.294	0.849	0.634
	Late	7.171	7.921	7.546			
	Average (Age)	5.135	6.919				
<i>Enterococcaceae</i>	Early	0.435	1.172	0.804	0.849	0.695	0.707
	Late	0.895	0.518	0.706			
	Average (Age)	0.665	0.845				
<i>Enterobacteriaceae</i>	Early	0.153	0.420	0.287	0.365	0.965	1.447
	Late	1.929	0.398	1.163			
	Average (Age)	1.041	0.409				
<i>Christensenellaceae</i>	Early	0.192	0.124	0.158	0.589	0.700	0.553
	Late	0.103	0.052	0.077			
	Average (Age)	0.148	0.088				
<i>Defluviitaleaceae</i>	Early	0.108	0.124	0.116	0.959	0.699	0.914
	Late	0.099	0.129	0.114			
	Average (Age)	0.103	0.127				
<i>Eggerthellaceae</i>	Early	0.071	0.088	0.079	0.374	0.910	0.950
	Late	0.040	0.063	0.051			
	Average (Age)	0.055	0.075				
<i>Family_XIII</i>	Early	0.075	0.064	0.070	0.708		0.912
	Late	0.076	0.030	0.053			

	Average (Age)	0.076	0.047		0.832	
<i>Pseudomonadaceae</i>	Early	0.006	0.008	0.007	0.502	0.736
	Late	0.002	0.001	0.002		
	Average (Age)	0.004	0.005			0.916
<i>Staphylococcaceae</i>	Early	0.003	0.000	0.002	0.990	0.818
	Late	0.004	0.000	0.002		
	Average (Age)	0.004	0.000			1.131
<i>Anaeroplasmataceae</i>	Early	3.444	1.118	2.281	0.513	0.850
	Late	1.788	0.275	1.032		
	Average (Age)	2.616	0.697			0.526
<i>Bacillaceae</i>	Early	4.044	1.726	2.885	0.837	0.805
	Late	3.246	3.838	3.542		
	Average (Age)	3.645	2.782			0.664
<i>Clostridiaceae_1</i>	Early	0.257	0.222	0.239	0.888	0.411
	Late	0.659	0.022	0.340		
	Average (Age)	0.458	0.122			0.669
<i>Not_Assigned</i>	Early	1.560	0.149	0.854	0.535	0.895
	Late	0.339	0.007	0.173		
	Average (Age)	0.950	0.078			0.805
<i>Peptococcaceae</i>	Early	0.027	0.012	0.019	0.835	0.692
	Late	0.014	0.035	0.024		
	Average (Age)	0.020	0.023			0.913
<i>Rikenellaceae</i>	Early	0.001	0.000	0.001	0.720	0.970
	Late	0.000	0.008	0.004		
	Average (Age)	0.001	0.004			0.680
<i>Streptococcaceae</i>	Early	0.000	0.043	0.021	0.595	1.116
	Late	0.002	0.000	0.001		
	Average (Age)	0.001	0.021			0.680

Table S2. The effect of hatching time and parent age on the caecal microbiota composition at the family level at 39 day of age.

Family (%)	Hatching time	Parent flock age			FDR p-values		
		Young parent	Old parent	Average (Hatching time)	Hatching time	Parent flock Age	Interaction
<i>Ruminococcaceae</i>	Early	29.016	28.005	28.510	0.911	0.639	0.762
	Late	30.406	27.834	29.120			
	Average (Age)	29.711	27.919				
<i>Lachnospiraceae</i>	Early	25.967	20.575	23.271	0.892	0.863	0.680
	Late	23.783	26.714	25.249			
	Average (Age)	24.875	23.645				
<i>Lactobacillaceae</i>	Early	25.336	32.926	29.131	0.735	0.861	0.657
	Late	24.549	20.733	22.641			
	Average (Age)	24.943	26.830				
<i>Bacteroidaceae</i>	Early	2.984	1.325	2.155	1.012	1.016	0.896
	Late	2.628	1.709	2.169			
	Average (Age)	2.806	1.517				
<i>Erysipelotrichaceae</i>	Early	2.016	1.862	1.939	0.613	0.979	0.785
	Late	1.822	3.414	2.618			
	Average (Age)	1.919	2.638				
<i>Peptostreptococcaceae</i>	Early	0.822	0.857	0.839	1.015	0.604	0.810
	Late	1.401	2.214	1.807			
	Average (Age)	1.112	1.535				
<i>Clostridiales_vadinBB60_group</i>	Early	3.259	2.806	3.032	0.963	0.720	0.853
	Late	3.651	2.622	3.136			
	Average (Age)	3.455	2.714				
<i>Enterococcaceae</i>	Early	0.081	0.482	0.282	0.862	0.647	0.789
	Late	0.078	0.257	0.167			
	Average (Age)	0.080	0.370				
<i>Enterobacteriaceae</i>	Early	0.142	0.113	0.128	0.689	0.844	0.824
	Late	0.449	0.335	0.392			
	Average (Age)	0.296	0.224				
<i>Christensenellaceae</i>	Early	1.529	0.976	1.252	0.847	0.951	0.739
	Late	1.256	1.703	1.479			
	Average (Age)	1.392	1.340				
<i>Defluviitaleaceae</i>	Early	0.185	0.100	0.142	0.938	0.628	0.488
	Late	0.117	0.152	0.135			
	Average (Age)	0.151	0.126				
<i>Eggerthellaceae</i>	Early	0.021	0.029	0.025	0.858	1.921	0.814
	Late	0.017	0.042	0.030			
	Average (Age)	0.019	0.035				
<i>Family_XIII</i>	Early	0.220	0.234	0.227	0.575		0.675
	Late	0.131	0.218	0.174			

	Average (Age)	0.175	0.226		0.639	
<i>Pseudomonadaceae</i>	Early	0.000	0.005	0.002	0.957	0.803
	Late	0.002	0.003	0.003		
	Average (Age)	0.001	0.004			0.588
<i>Staphylococcaceae</i>	Early	0.004	0.000	0.002	0.860	0.925
	Late	0.012	0.003	0.007		
	Average (Age)	0.008	0.001			0.755
<i>Anaeroplasmataceae</i>	Early	0.008	0.063	0.036	0.812	0.828
	Late	0.002	0.034	0.018		
	Average (Age)	0.005	0.049			0.844
<i>Bacillaceae</i>	Early	1.465	2.362	1.914	0.884	0.647
	Late	1.671	0.717	1.194		
	Average (Age)	1.568	1.540			0.966
<i>Clostridiaceae_1</i>	Early	0.000	0.007	0.003	0.953	0.842
	Late	0.033	0.216	0.124		
	Average (Age)	0.016	0.112			0.605
<i>Not_Assigned</i>	Early	0.849	0.962	0.906	0.878	0.762
	Late	1.136	0.949	1.042		
	Average (Age)	0.992	0.955			0.965
<i>Peptococcaceae</i>	Early	0.514	0.423	0.469	0.880	0.767
	Late	0.594	0.425	0.510		
	Average (Age)	0.554	0.424			0.742
<i>Rikenellaceae</i>	Early	0.018	0.003	0.010	0.814	0.650
	Late	0.003	0.007	0.005		
	Average (Age)	0.011	0.005			0.576
<i>Streptococcaceae</i>	Early	0.426	0.044	0.235	0.747	0.695
	Late	0.589	1.844	1.217		
	Average (Age)	0.508	0.944			0.622