

Table S1. Cultivable bacterial populations (CFU/g cecal content) in Ross 308 broiler chickens from the experimental groups (L1–L6).

	TCAB ×10 ⁴ CFU/g	<i>E. coli</i> ×10 ³ CFU/g	ENT ×10 ⁴ CFU/g
L1	86264 ± 419.73	34618.7 ± 2925	43275.1 ± 1848.2
L2	36692.3 ± 5116.7	12187.3 ± 1268.4	28029.3 ± 82.73
L3	51311.9 ± 35.78	2819.3 ± 24.19	49136 ± 4627.7
L4	45866.7 ± 6025.3	4602.7 ± 109.9	37931 ± 3060.3
L5	68693.7 ± 6273.5	40853.5 ± 1911	51733.4 ± 2518.7
L6	79695.8 ± 881.9	40937.4 ± 1921.9	66405.9 ± 625.5

Legend: TCAB (total number of cultivable aerobic bacteria), *E. coli* (total number of *Escherichia coli*), ENT (total number of *Enterobacteriaceae*)

Table S2. Quantitative microbiological parameters (log₁₀ CFU/g) in experimental broiler groups (L1–L6).

	TCAB (log ₁₀ CFU/g)	<i>E. coli</i> (log ₁₀ CFU/g)	ENT (log ₁₀ CFU/g)
L1	8.94 ± 0.002	7.54 ± 0.037	8.64 ± 0.02
L2	8.56 ± 0.06	7.09 ± 0.045	8.45 ± 0.001
L3	8.72 ± 0.001	6.45 ± 0.004	8.69 ± 0.04
L4	8.66 ± 0.056	6.66 ± 0.01	8.58 ± 0.04
L5	8.84 ± 0.04	7.61 ± 0.02	8.71 ± 0.02
L6	8.90 ± 0.005	7.61 ± 0.02	8.82 ± 0.004

Legend: TCAB (total number of cultivable aerobic bacteria), *E. coli* (total number of *Escherichia coli*), ENT (total number of *Enterobacteriaceae*)

Table S3. Tukey HSD pairwise comparisons for total cultivable aerobic bacteria (TCAB)

Comparison	Mean difference (log ₁₀ CFU/g)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	0.373	0.224–0.522	0.0005
L1 vs L3	0.217	0.068–0.366	0.009
L1 vs L4	0.276	0.127–0.425	0.003
L1 vs L5	0.100	-0.050–0.249	0.215
L1 vs L6	0.034	-0.115–0.183	0.931
L2 vs L3	0.156	0.007–0.305	0.041
L2 vs L4	0.098	-0.052–0.247	0.228
L2 vs L5	0.274	0.125–0.423	0.003
L2 vs L6	0.339	0.190–0.488	0.0008
L3 vs L4	0.059	-0.091–0.208	0.645
L3 vs L5	0.118	-0.032–0.267	0.126
L3 vs L6	0.183	0.034–0.332	0.02
L4 vs L5	0.176	0.027–0.325	0.024
L4 vs L6	0.242	0.093–0.391	0.005
L5 vs L6	0.066	-0.084–0.215	0.551

Table S4. Tukey HSD pairwise comparisons for *Escherichia coli* (log₁₀ CFU/g)

Comparison	Mean difference (log ₁₀ CFU/g)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	0.454	0.347–0.561	<0.0001
L1 vs L3	1.089	0.982–1.195	<0.0001
L1 vs L4	0.876	0.769–0.983	<0.0001
L1 vs L5	0.072	-0.035–0.179	0.209
L1 vs L6	0.073	-0.034–0.179	0.205
L2 vs L3	0.63	0.528–0.741	<0.0001
L2 vs L4	0.422	0.315–0.529	<0.0001
L2 vs L5	0.526	0.419–0.633	<0.0001
L2 vs L6	0.527	0.42–0.633	<0.0001
L3 vs L4	0.213	0.106–0.32	0.002
L3 vs L5	1.161	1.054–1.267	<0.0001
L3 vs L6	1.161	1.054–1.268	<0.0001
L4 vs L5	0.948	0.841–1.055	<0.0001
L4 vs L6	0.949	0.842–1.055	<0.0001
L5 vs L6	0.0005	-0.106–0.107	1

Table S5. Tukey HSD pairwise comparisons for Enterobacteriaceae (ENT).

Comparison	Mean difference (log ₁₀ CFU/g)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	0.188	0.086–0.29	0.003
L1 vs L3	0.054	-0.048–0.156	0.391
L1 vs L4	0.058	-0.044–0.160	0.332
L1 vs L5	0.078	-0.025–0.18	0.143
L1 vs L6	0.186	0.084–0.288	0.003
L2 vs L3	0.242	0.14–0.344	0.0006
L2 vs L4	0.13	0.023–0.232	0.017
L2 vs L5	0.266	0.163–0.368	0.0004
L2 vs L6	0.374	0.272–0.476	<0.0001
L3 vs L4	0.112	0.01–0.214	0.034
L3 vs L5	0.024	-0.079–0.126	0.929
L3 vs L6	0.132	0.03–0.234	0.016
L4 vs L5	0.136	0.033–0.238	0.014
L4 vs L6	0.244	0.142–0.346	0.0006
L5 vs L6	0.109	0.006–0.211	0.039

Table S6. Percentage and logarithmic reduction of selected cultivable bacterial populations

Parameter	L2 vs L1	L3 vs L1	L4 vs L6	L5 vs L6
TCAB	57,5%	40,5%	42,4%	13,8%
	0,37 log ₁₀ CFU/g	0,23 log ₁₀ CFU/g	0,24 log ₁₀ CFU/g	0,06 log ₁₀ CFU/g
<i>E. coli</i>	64,8%	91,9%	88,8%	22,1%
	0,45 log ₁₀ CFU/g	1,09 log ₁₀ CFU/g	0,95 log ₁₀ CFU/g	0,11 log ₁₀ CFU/g
ENT	35,2%	0	42,9%	22,1%
	0,19 log ₁₀ CFU/g		0,24 log ₁₀ CFU/g	0,11 log ₁₀ CFU/g

Legend: **TCAB** (total number of cultivable aerobic bacteria), *E. coli* (total number of *Escherichia coli*), *ENT* (total number of *Enterobacteriaceae*)

Table S7. Measurements of the morphohistological parameters

	Mitotic index of intestinal crypt	Intestinal villi thickness (μm)	<i>Tunica muscularis</i> thickness (μm)	Intestinal crypt depth (μm)
L1	0.56 ± 0.02	128.73 ± 3.35	97.01 ± 9.54	153.05 ± 0.4
L2	0.74 ± 0.03	134.41 ± 0.69	122.43 ± 7.38	247.26 ± 10.3
L3	0.88 ± 0.06	115.27 ± 1.37	104.74 ± 2.78	252.47 ± 10.11
L4	0.7 ± 0.07	122.18 ± 0.82	102.26 ± 10.62	282.59 ± 5.05
L5	0.53 ± 0.08	106.23 ± 0.89	131 ± 7.39	319.95 ± 7.28
L6	0.68 ± 0.06	112.48 ± 0.03	109.24 ± 4.06	282.24 ± 2.21

Table S8. Tukey HSD pairwise comparisons for mitotic index of intestinal crypts

Comparison	Mean Difference	95% CI	Adjusted <i>P</i> -value
L1 vs L2	0.18	-0.038–0.398	0.107
L1 vs L3	0.32	0.102–0.538	0.008
L1 vs L4	0.141	-0.077–0.359	0.237
L1 vs L5	0.026	-0.192–0.244	0.996
L1 vs L6	0.121	-0.097–0.339	0.352
L2 vs L3	0.14	-0.078–0.358	0.242
L2 vs L4	0.039	-0.179–0.257	0.974
L2 vs L5	0.206	-0.012–0.424	0.064
L2 vs L6	0.059	-0.159–0.277	0.875
L3 vs L4	0.179	-0.039–0.397	0.109
L3 vs L5	0.346	0.128–0.564	0.006
L3 vs L6	0.199	-0.019–0.417	0.073
L4 vs L5	0.167	-0.051–0.385	0.14
L4 vs L6	0.02	-0.198–0.238	0.999
L5 vs L6	0.147	-0.071–0.365	0.21

Table S9. Tukey HSD pairwise comparisons for intestinal crypt depth (μm)

Comparison	Mean Difference (μm)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	94.22	66.46–121.97	<0.0001
L1 vs L3	99.43	71.67–127.18	<0.0001
L1 vs L4	129.55	101.79–157.30	<0.0001
L1 vs L5	166.91	139.15–194.66	<0.0001
L1 vs L6	129.2	101.44–156.95	<0.0001
L2 vs L3	5.21	-22.54–32.96	0.968
L2 vs L4	35.33	7.58–63.08	0.017
L2 vs L5	72.69	44.94–100.44	0.0004
L2 vs L6	34.98	7.23–62.73	0.018

L3 vs L4	30.12	2.37–57.87	0.035
L3 vs L5	67.48	39.73–95.23	0.0006
L3 vs L6	29.77	2.02–57.52	0.037
L4 vs L5	37.36	9.61–65.11	0.013
L4 vs L6	0.35	-27.40–28.10	1
L5 vs L6	37.71	9.96–65.46	0.012

Table S10. Tukey HSD pairwise comparisons for intestinal villus thickness (μm)

Comparison	Mean Difference (μm)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	5.68	-0.63–11.99	0.077
L1 vs L3	13.46	7.15–19.77	0.001
L1 vs L4	6.55	0.24–12.86	0.043
L1 vs L5	22.50	16.19–28.81	<0.0001
L1 vs L6	16.25	9.94–22.56	0.0004
L2 vs L3	19.14	12.83–25.45	0.0002
L2 vs L4	12.23	5.92–18.54	0.002
L2 vs L5	28.18	21.87–34.49	<0.0001
L2 vs L6	21.93	15.62–28.24	<0.0001
L3 vs L4	6.91	0.60–13.22	0.034
L3 vs L5	9.04	2.73–15.35	0.009
L3 vs L6	2.79	-3.52–9.10	0.545
L4 vs L5	15.95	9.64–22.26	0.0005
L4 vs L6	9.70	3.39–16.01	0.007
L5 vs L6	6.25	-0.06–12.56	0.052

Table S11. Tukey HSD pairwise comparisons for *tunica muscularis* thickness (μm)

Comparison	Mean Difference (μm)	95% CI	Adjusted <i>P</i> -value
L1 vs L2	25.41	-4.42–55.25	0.095
L1 vs L3	7.73	-22.11–37.56	0.892
L1 vs L4	5.25	-24.59–35.08	0.975
L1 vs L5	33.99	4.15–63.82	0.028
L1 vs L6	12.23	-17.61–42.06	0.61
L2 vs L3	17.69	-12.15–47.52	0.299
L2 vs L4	20.16	-9.67–50	0.208
L2 vs L5	8.57	-21.26–38.41	0.848
L2 vs L6	13.19	-16.65–43.02	0.546
L3 vs L4	2.48	-27.36–32.31	0.999
L3 vs L5	26.26	-3.58–56.1	0.084
L3 vs L6	4.5	-25.34–34.34	0.987
L4 vs L5	28.74	-1.10–58.57	0.059
L4 vs L6	6.98	-22.86–36.81	0.924
L5 vs L6	21.76	-8.08–51.6	0.164