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Effects of compound organic acid calcium on growth performance, hepatic antioxidation and intestinal barrier of male broilers under heat stress

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Table 3. Gene names and primer sequences

Gene	Primer sequence 5'-3'
MUC-2	F: GCCTGCCCAGGAAATCAAG
	R: CGACAAGTTTGCTGGCACAT
Ocln	F: GAGCCCAGACTACCAAAGCAA
	R: GCTTGATGTGGAAGAGCTTGTTG
Cldn1	F: TGGCCACGTCATGGTATGG
	R: AACGGGTGTGAAAGGGTCATAG
Cldn3	F: AATGCGCCATCTCTGCAAAC
	R: GTTTCTCCGCCAGACTCTCC
TLR2	F: TGTTCCTGTTCATCCTCATCCT
	R: AGTTGGAGTCGTTCTCACTGT
-actin	F: TATGTGCAAGGCCGGTTTC
	R: TGTCTTTCTGGCCCATACCAA
TLR4	F: GAATGACACGGACACTCTT
	R: ACATAGGAACCTCTGACAAC
TLR15	F: CTTGTCGTTCTGGTGCTAA
	R: ATCGTGCTCGCTGTATGA
IL-1	F: CGACATCAACCAGAAGTGCTT
	R: GTCCAGGCGGTAGAAGATGA
iNOS	F: TACTCTTGGCGTCATTACTC
	R: GCATAGATCACAGTCACCTT
TGF- 2	F: TCTCGGAGCAGCGGATAGA
	R: AATCCAAGGTTCCTGTCTCTGT

F, forward; R, reverse; *MUC-2*, mucin 2; *Ocln*, occluding; *Cldn*, claudin; *TLR*, toll-like receptor; *IL*, interleukin; *iNOS*, inducible nitric oxide synthase; *TGF- 2*, transforming growth factor-beta 2.

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21 42 5. - , , , (21) (0.05). , 0.4% 0. % 42 (0.05). - , - , - , (21) (0.05), 0.4% 0. % 42 (0.0 3).

2 (*C-2*), - ( ), 1 (*1*), 3 (*3*) - 2 (- *2*) 1. , 21, 3 - *2* 0. % (0.05), (0.05) , *1* (0.05). 42, 0.4% (0.05) *C-2*

Table 4. Effects of dietary compound organic acid calcium on growth performance of broilers

Items	21 days of age[1)]			SEM	p-value
	Control	0.4% COAC	0.8% COAC		
Body weight (g)					
1 day of age	45.80	45.19	45.40	0.35	0.52
21 days of age	563.45[a]	600.15[b]	594.71[b]	9.91	0.04
42 days of age	1,498.89[a]	1,608.86[b]	1,603.45[b]	35.31	0.01
1 to 21 days of age					
ADFI (g)	42.68	44.02	43.43	0.74	0.50
ADG (g)	24.65[a]	26.43[b]	26.16[b]	0.48	0.04
F/G	1.73[b]	1.67[a]	1.66[b]	0.01	0.01
22 to 42 days of age					
ADFI (g)	93.43	95.59	95.98	1.62	0.55
ADG (g)	44.54[a]	48.03[b]	48.04[b]	1.51	0.02
F/G	2.10[b]	1.99[a]	2.00[a]	0.04	0.01
1 to 42 days of age					
ADFI (g)	67.99	69.77	69.71	0.95	0.37
ADG (g)	34.60[a]	37.23[b]	37.10[b]	0.85	0.01
F/G	1.97[b]	1.87[a]	1.88[a]	0.03	0.02

Values reported as means (n = 6).
COAC, compound organic acid calcium; SEM, standard error of means for 6 broilers each; ADFI, the average daily feed intake; ADG, the average daily gain; F/G, the ratio of feed gain.
[1)] Control = basal diet without any feed additive; 0.4% COAC = basal diet + 0.4% compound organic acid calcium; 0.8% COAC = basal diet + 0.8% compound organic acid calcium.
[a,b] Means in the same row with different superscripts differ statistically ($p < 0.05$).

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4, 21, , 0.4% -15 (0.05). 42, 0. % (0.05) . -2, -4, -1 (0.05).

DISCUSSION

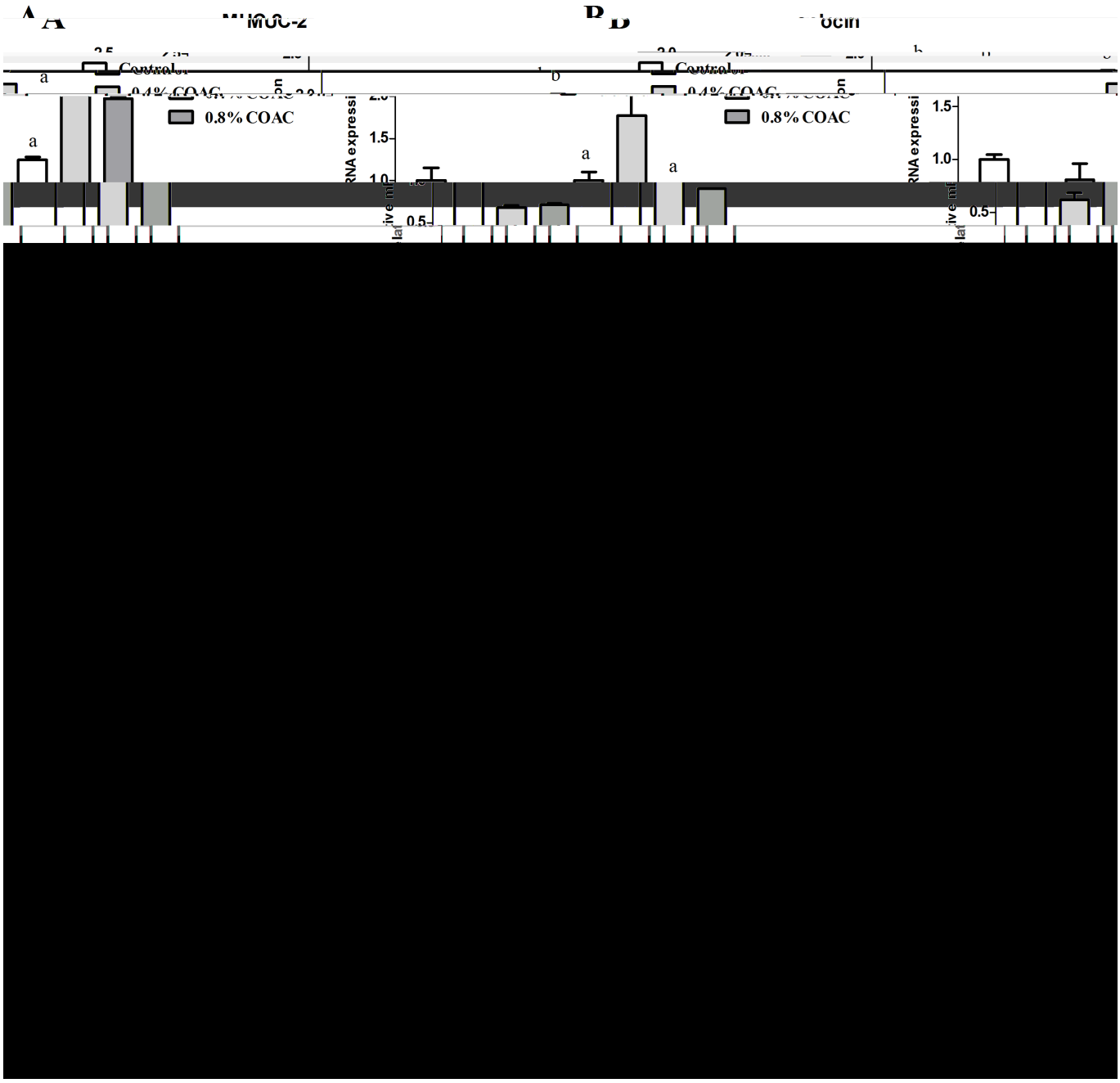

Figure 1. Effects of compound organic acid calcium on MUC-2, ocln, cldn1, cldn3 and TGF- 2 mRNA expression in jejunum of broilers. At 21 and 42 days of age, the expression of MUC-2 (A), ocln (B), cldn1 (C), cldn3 (D) and TGF- 2 (E) were measured by real-time polymerase chain reaction. MUC-2, mucin 2; Ocln, occluding; Cldn, claudin; TGF- 2, transforming growth factor-beta 2. Different letters (a-c) denote a statistical difference ($p<0.05$).

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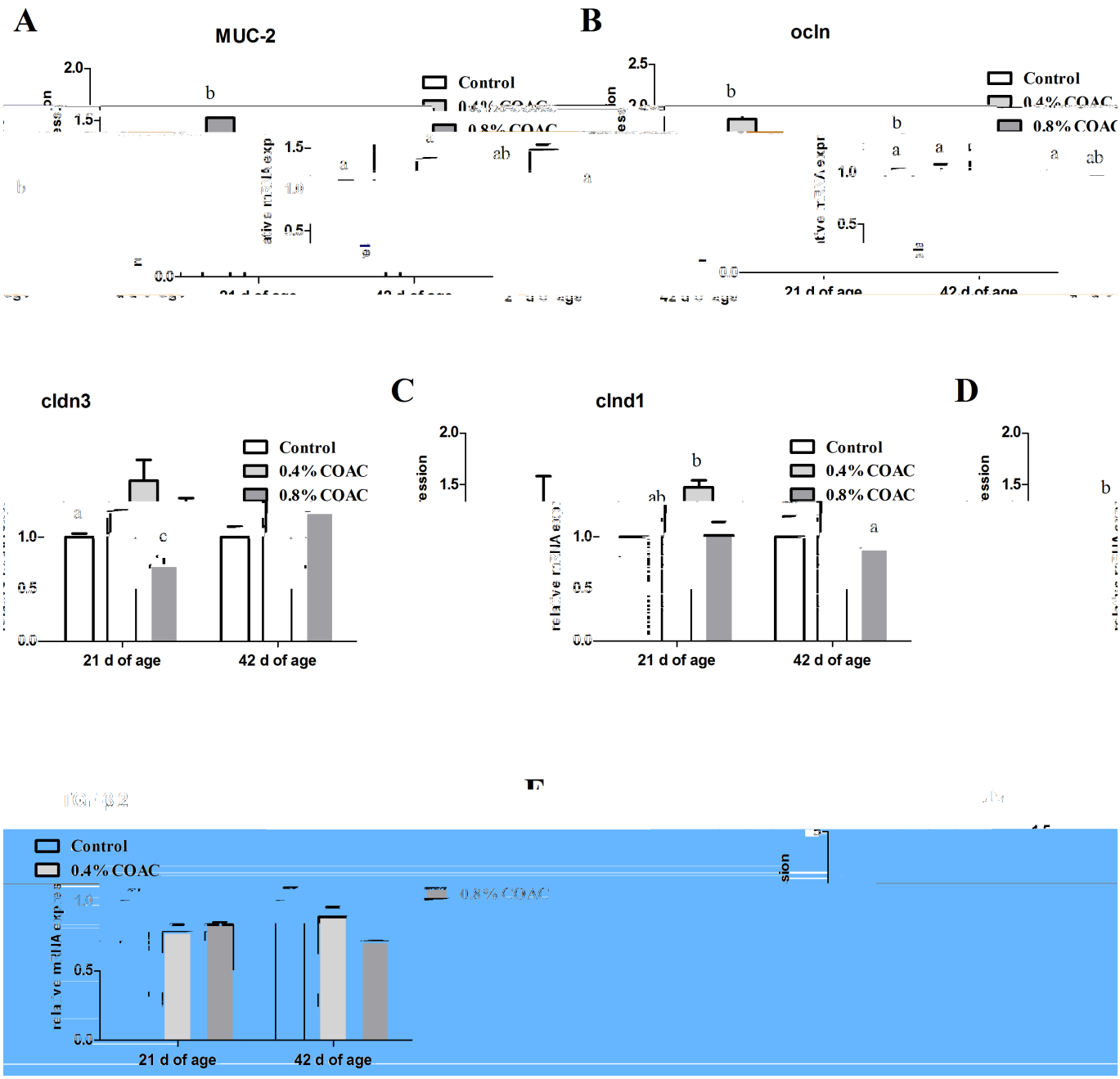

Figure 2. Effects of compound organic acid calcium on ocln, cldn1, cldn3 and TGF- 2 mRNA expression in ileum of broilers. At 21 and 42 days of age, the expression of ocln (A), cldn1 (B), cldn3 (C) and TGF- 2 (D) were measured by real-time polymerase chain reaction. Ocln, occluding; Cldn, claudin; TGF- 2, transforming growth factor-beta 2. Different letters (a-c) denote a statistical difference ($p<0.05$).

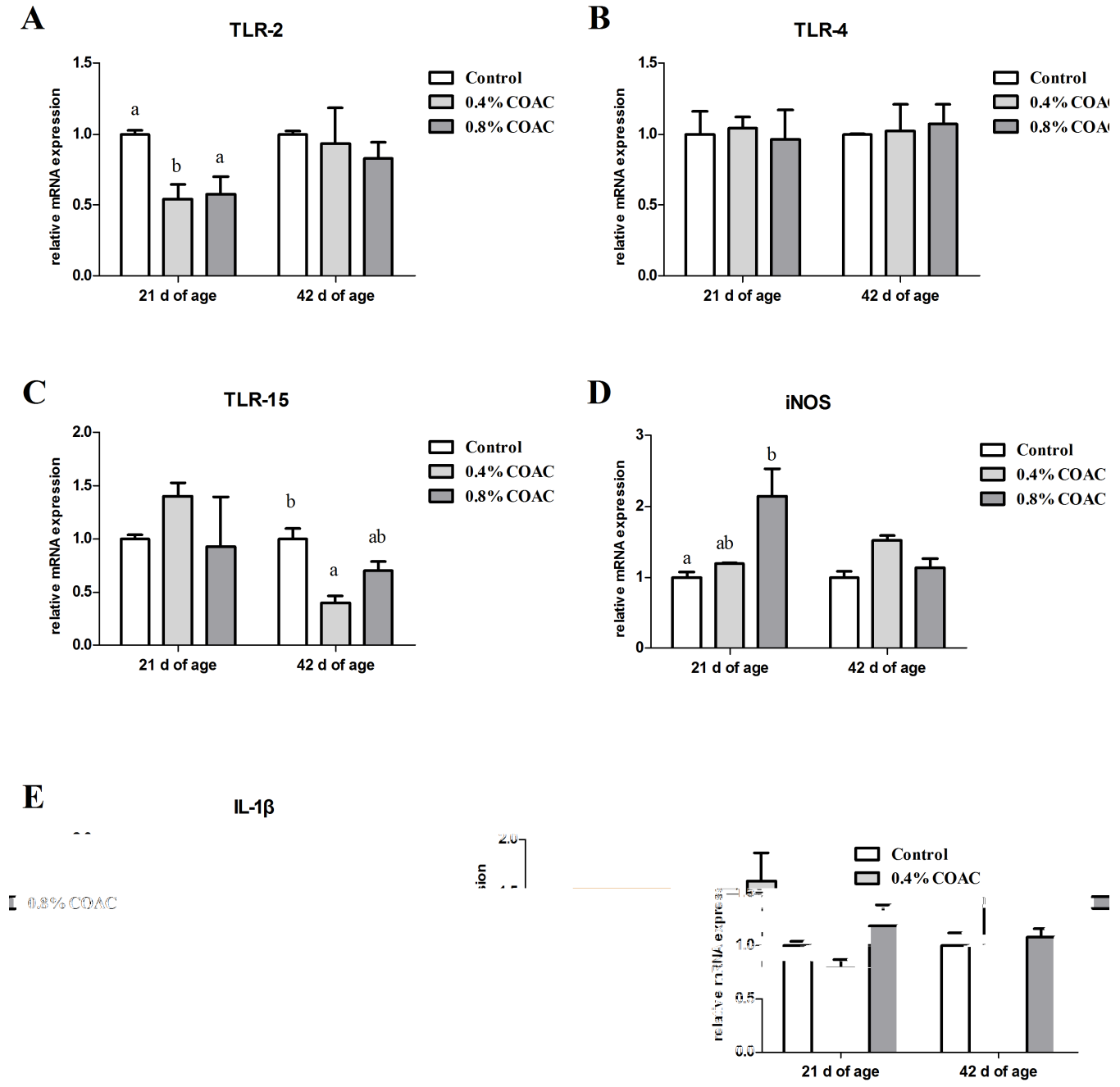

Figure 3. Effects of compound organic acid calcium on TLR, iNOS and IL-1 mRNA expression in jejunum of broilers. At 21 and 42 days of age, the expression of TLR-2 (A), TLR-4 (B), TLR-15 (C), iNOS (D) and IL-1 (E) were measured by real-time polymerase chain reaction. TLR, toll-like receptor; iNOS, inducible nitric oxide synthase; IL-1 , interleukin 1 . Different letters (a, b) denote a statistical difference ($p<0.05$).

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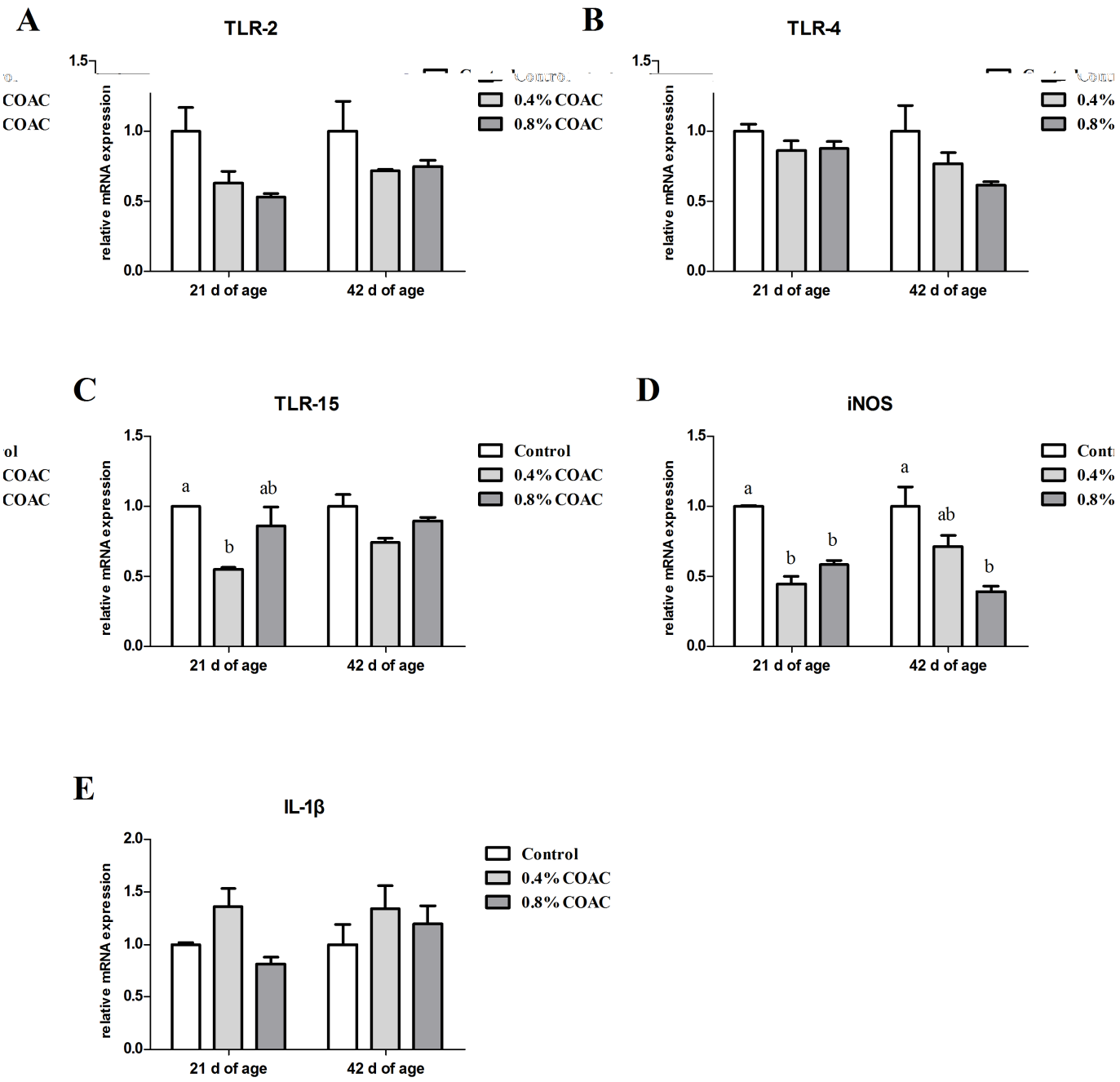

Figure 4. Effects of compound organic acid calcium on TLR, iNOS, and IL-1 mRNA expression in ileum of broilers. At 21 and 42 days of age, the expression of TLR-2 (A), TLR-4 (B), TLR-15 (C), iNOS (D), and IL-1 (E) were measured by real-time polymerase chain reaction. TLR, toll-like receptor; iNOS, inducible nitric oxide synthase; IL, interleukin. Different letters (a, b) denote a statistical difference ($p<0.05$).

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