

**Table S1 The dietary nutrients and Cr contents of different treatment groups**

Items <sup>1</sup>	LSD	HSD	HSD + Cr-yeast (µg Cr/kg)			
			200	400	800	1600
CP (%)	19.05	19.05	19.00	19.09	19.05	19.13
Ca (%)	0.93	0.93	0.93	0.89	0.90	0.87
P (%)	0.41	0.41	0.41	0.49	0.48	0.49
Lysine (%)	1.12	1.12	1.14	1.09	1.14	1.14
Methionine (%)	0.53	0.53	0.56	0.54	0.54	0.57
Threonine (%)	0.71	0.71	0.73	0.74	0.71	0.74
Tryptophan (%)	0.19	0.19	0.23	0.19	0.22	0.21
Cysteine (%)	0.27	0.27	0.26	0.24	0.25	0.23
Cr (µg/kg)	468.47	468.47	668.47	834.99	1204.09	2324.63

<sup>1</sup> LSD, low stocking density; HSD, high stocking density; CP, crude protein; Ca, calcium; P, phosphorus

**Table S2.** The optimal addition levels of Cr-yeast in broilers under high stocking density.

Items		Broken-line equation	R <sup>2</sup>	Optimal addition level (μg Cr/kg)
Liver health	ALT (ng/L)	y=93.18+0.021(1531.6-x)	0.9525	1531.60
	ALP (ng/L)	y=166.6+0.0135(800-x)	0.9976	800.00
Serum immunity	IL-10 (ng/L)	y=40.304+0.0313(319.3-x)	0.9999	319.30
	T3 (pmol/L)	y=234.7+0.0211(961-x)	0.9742	961.00
Antioxidant Status	Serum			
	SOD (pg/mL)	y=34.4083+0.0039(490-x)	0.9861	490.00
	GSH-Px (pmol/mL)	y=13.952-0.00287(665-x)	0.9993	665.00
	Liver			
	MDA (nmol/mgprot)	y=1.316+0.00475(579-x)	0.9626	579.00
	Breast			
	T-AOC (U/mgprot)	y=0.136-0.00045(425-x)	0.9868	425.00
	CAT (U/mgprot)	y=0.718-0.00004(466.7-x)	0.9833	466.70

R<sup>2</sup> represents the fitting degree of broken-line regression. The closer R<sup>2</sup> is to 1, the better the fitting degree. Therefore, we selected the indicators closer to 1 (R<sup>2</sup> > 0.95) to obtain the break point. Some indicated of R<sup>2</sup> < 0.95 had been deleted in Table S1. The optimal supplementation of Cr-yeast in liver health, immunity ability and antioxidant capacity were at the range of 800.00 - 1531.60, 319.30 - 961.00, and 425.00 - 665.00 μg Cr/kg respectively.

**Table S3.** Effects of Cr-yeast on antioxidant status of broilers under high stocking density <sup>1</sup>.

Item <sup>2</sup>	LSD	HSD	HSD + Cr-yeast (μg Cr/kg)				SEM	p-Value <sup>3</sup>		
			200	400	800	1600		ANOVA	Linear	Quadratic
TNF-α (ng/L)	31.25 <sup>abc</sup>	31.44 <sup>ab</sup>	27.96 <sup>bc</sup>	33.83 <sup>a</sup>	26.78 <sup>c</sup>	27.97 <sup>bc</sup>	0.694	0.010	0.017	0.008
IL-1β (ng/L)	113.09 <sup>d</sup>	113.74 <sup>d</sup>	128.31 <sup>a</sup>	117.44 <sup>c</sup>	109.52 <sup>e</sup>	124.75 <sup>b</sup>	1.153	<0.001	<0.001	<0.001
IL-10 (ng/L)	42.20 <sup>b</sup>	42.98 <sup>b</sup>	36.72 <sup>d</sup>	39.34 <sup>c</sup>	44.37 <sup>a</sup>	38.11 <sup>c</sup>	0.495	<0.001	<0.001	<0.001
T3 (pmol/L)	287.65 <sup>b</sup>	240.10 <sup>d*</sup>	263.88 <sup>c</sup>	269.99 <sup>c</sup>	303.01 <sup>a</sup>	209.22 <sup>e</sup>	5.263	<0.001	<0.001	<0.001
T4 (pmol/L)	1078.59 <sup>c</sup>	1184.21 <sup>a*</sup>	871.06 <sup>e</sup>	998.92 <sup>d</sup>	1073.65 <sup>c</sup>	1149.00 <sup>b</sup>	17.754	<0.001	<0.001	<0.001

<sup>1</sup> Values are expressed as means of six replicates per treatment.

<sup>2</sup> LSD, low stocking density; HSD, high stocking density; TNF-α, Tumor necrosis factor-α; IL-1β, Interleukin-1β; IL-10, Interleukin-10; T3, thyroxine; T4, thyrotropine; SEM, standard error of means.

<sup>3</sup> Results of linear and quadratic analysis of five high stocking density groups.

\* Means t-test results of independent samples in group LSD and group HSD ( $p^* < 0.05$ ,  $p^{**} < 0.01$ ).

<sup>a-d</sup> Means in the same row without the same superscripts differ significantly ( $p < 0.05$ ).