Carry–over effects of dietary yeast RNA as a source of nucleotides on the immune system in Leghorn–type chickens

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Exogenous dietary nucleotides in addition to an endogenous supply from biosynthesis, are required for the optimal function of tissues with a high rate of turnover such as lymphoid and intestinal tissues, particularly in growing animals. Recent studies with murine species and human subjects have demonstrated the modulatory effect of dietary nucleotides on humoral and cell–mediated immune responses. As nutritional status in early life can exert long–term influences on avian immune functions (Dibner *et al.* 1998), this study investigated the carry–over effects of short–term, post–hatching supplementation of dietary RNA as a source of nucleotides, on the immune system in chickens.

Day–old ISA–Brown cockerels (n = 180) were allocated to 3 treatment groups. Each group had 6 cages of 10 birds. The birds were fed a commercial starter feed supplemented with 0 (control), 5 (low RNA, LR) or 10 (high RNA, HR) g yeast RNA/kg of feed (as–fed) for 4 weeks. All birds were then offered a commercial pullet grower feed, with no supplementation, for a further 8 weeks. Lymphoid organ weights, serum primary antibody levels against sheep red blood cells (SRBC) and cutaneous reactivity of toe webs to phytohaemagglutinin (PHA) as an indicator of T cell responsiveness, were measured in 2 birds randomly chosen from each cage at 4–week intervals. Data obtained at each time were subjected to one–way ANOVA.

The LR–fed chickens had a higher (P<0.05) spleen weight relative to body weight (BW) than control birds at week 4, but this effect was not detected at other times (P>0.05; Table 1). The enhanced development of the spleen observed at the cessation of supplementation was similar to the elevated kidney and liver weights observed by Kubota *et al.* (1994) in young chickens supplemented with 10 or 50 g yeast RNA/kg of feed. Serum primary antibody levels against SRBC were not affected (P>0.05) by dietary yeast RNA at any time (Table 1). The toe–web PHA response in birds previously fed the LR diet was lower (P<0.05) than control birds at Week 8, although no difference (P>0.05) among dietary treatments was observed at other times (Table 1).

It is concluded that the addition of yeast RNA as a source of nucleotides to a commercial diet had minimal effects on humoral and cell–mediated immune responses in growing Leghorn–type chickens. Supplementation selectively stimulated the development of the spleen, however, this effect did not persist into the later stages of the chickens' life.

Dibner, J.J., Knight, C.D., Kitchell, M.L., Atwell, C.A., Downs, A.C. and Ivey, F.J. (1998). Early feeding and development of the immune system in neonatal poultry. *Journal of Applied Poultry Research* 7, 425–436.

Kubota, T. and Karasawa, Y. (1994). Adverse effects of low concentrations of dietary RNA addition on the growth, food intake and kidney weight of young chickens. *British Poultry Science* 35, 585–588.

Table 1 Lymphoid organ weights relative to body weight (BW), serum primary antibody levels against SRBC and toe–web PHA responses in ISA–Brown cockerels given a control, low RNA (LR) or high RNA (HR) diet from 0–4 weeks of age.

	Week 4			Week 8			Week 12		
	0	LR	HR	0	LR	HR	0	LR	HR
Thymus (g kg^{-1} BW)	4.00	4.45	4.56	4.41	4.71	4.56	3.79	3.42	4.18
Spleen (g kg^{-1} BW)	1.61^{b}	1.92^{a}	1.85^{ab}	2.27	2.20	2.13	1.82	1.88	1.80
Bursa (g kg^{-1} BW)	5.06	5.16	5.21	4.61	4.86	4.88	3.47	3.25	3.45
Anti–SRBC antibody (titre)	2.33	1.83	1.75	1.54	0.83	0.58	2.29	2.33	1.71
Toe–web PHA response (mm)	0.36	0.38	0.27	0.70^{a}	0.41^{b}	0.55^{ab}	0.89	0.94	0.89

^{a,b}Means with different superscripts in the same row within the same age differ (P<0.05)