

Dietary conjugated linoleic acid modulates the immune system of growing pigs

E Ostrowska^{1,2}, A Knowles³, M Muralitharan⁴, RF Cross², DE Bauman⁵, FR Dunshea¹

¹Agriculture Victoria, Victorian Institute of Animal Science, Werribee, VIC 3030

²Swinburne University, John Street, PO Box 218, Hawthorn, VIC 3122

³University of Sydney, NSW 2006

⁴Charles Sturt University, PO Box 588, Wagga Wagga, NSW 2650

⁵Cornell University, Ithaca, NY 14853, USA

Conjugated linoleic acids (CLA) have been shown to possess anticarcinogenic and antiatherogenic properties in experimental models (1). Some of the observed biological activity of CLA may be mediated through enhanced immune function. Therefore, the aim of the present study was to determine the effects of CLA on the levels of total serum leucocytes, granulocytes, monocytes and lymphocytes in pigs. Thirty pigs were fed different levels of dietary CLA (0, 1.25, 2.5, 5.0, 7.5 and 10.0 g of CLA-55 (55% of CLA isomers; 18.0% *c/t*-11,13; 30.5% *c/t*-10,12; 24.7% *c/t*-9,11; 14.5% *c/t*-8,10) per kg of diet) for eight weeks. Blood samples were collected by jugular venipuncture before slaughter for assessment of haematological and immune status.

	Dose of CLA (g/kg)						Significance ³		
	0	1.25	2.5	5.0	7.5	10.0	L	Q	CC
Lymphocytes ¹	12.9	11.9	14.9	14.1	12.8	13.4	0.81	0.47	0.71
Eosinophils ¹	1.09	0.53	0.50	0.50	0.49	0.36	<0.001	0.040	<0.001
Basophils ¹	0.0168	0.0408	0.0702	0.0380	0.0148	0.00	0.085	0.057	0.48
IgG ng/mL	185	73	81	77	65	147	0.59	0.004	0.006
Lymphocyte proliferation ²	60.1	38.3	58.1	53.9	92.1	48.8	0.63	0.66	0.94
Neutrophil function %	68.6	76.8	71.5	72.1	67.9	67.2	0.12	0.30	0.44
CD4 ¹	2.74	2.82	2.41	2.47	2.14	2.25	0.077	0.61	0.29
CD8 ¹	5.17	5.16	5.15	6.01	4.87	5.04	0.85	0.50	0.91

¹ Cells x 10⁶ per mL whole blood. ² Expressed as stimulation index (cpm of stimulated cultures/cpm of unstimulated cultures) cells x 10⁸. ³ L= linear effect of CLA; Q=quadratic effect of CLA; CC=CLA vs control

No significant difference was observed between different dietary groups for total white blood cells, neutrophils, monocytes and lymphocyte counts. A dose-dependent reduction ($P < 0.001$) in eosinophil count suggests that CLA exerts anti-inflammatory activities. The effect of dietary CLA on basophil count was quadratic in nature ($P = 0.057$), being maximised at 2.5 g of CLA per kg of diet. *In vitro* lymphocyte proliferation in response to an immunostimulus was not influenced by dietary CLA, but the neutrophil function tended to be improved ($P = 0.12$) at lower levels of CLA (1.25, 2.5 and 5.0 g/kg). The IgG concentration was in general 52% lower in CLA-fed pigs ($P = 0.006$), although the response was quadratic in nature ($P = 0.004$). T-cell population analysis showed a trend towards a linear reduction ($P = 0.077$) of CD4⁺ cells with the increasing inclusion of CLA in the diet. Our results suggest that dietary CLA modulates immune response selectively, maintaining protective immunity and reducing inflammatory response.

Supported in part by the Pig Research and Development Corporation and Swinburne University Postgraduate Award

1. Pariza MW, Park Y, Cook MW. Mechanisms of action of conjugated linoleic acid: evidence and speculation. Proc Soc Exp Biol Med 2000;223:8-13.