

EFFECT OF DIETARY POLYUNSATURATED FATTY ACIDS ON TISSUE VITAMIN E STATUS IN GROWING PIGS

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It is generally agreed that the requirement of vitamin E for pigs is related to the dietary polyunsaturated fatty acids (PUFA). The mechanism of this effect has been postulated to involve both the absorption and storage of vitamin E but the evidence has not been clearly identified. The purpose of the present experiment was to investigate the effect of dietary fats varying in degree of unsaturation and dietary vitamin E supplementation on the tissue content of vitamin E in growing pigs.

Twenty pigs were weaned at 17 days of age and divided into five experimental groups. They were fed a basal diet of wheat starch, skim milk, meat meal, soyabean meal, vitamins and minerals, which contained 0.5 mg/kg vitamin E. Vitamin E stripped soyabean oil and tallow were added to the diets which were supplemented with 0 or 50 mg/kg of dl- $\alpha$ -tocopherol acetate, as shown in the table. The pigs were housed in individual pens and offered the diets *ad libitum* for 62 days.

At the end of the experiment, the pigs were anaesthetized and slaughtered. Tissues were removed and immediately stored at  $-20^{\circ}\text{C}$  until analysed.  $\alpha$ -tocopherol in tissue was determined by HPLC.

$\alpha$ -tocopherol concentrations in tissues of pigs

Group	Vit. E suppl. (mg/kg)	Dietary Fat (%)		Tissues $\alpha$ -tocopherol ( $\mu\text{g/g}$ )				
		Soyabean oil	Tallow	Heart	Liver	Muscle	Kidney	Adipose tissue
1	0	1	0	0.31 <sup>a</sup>	0.24 <sup>a</sup>	0.16 <sup>a</sup>	0.15 <sup>a</sup>	0.60 <sup>a</sup>
2	50	1	0	6.35 <sup>b</sup>	6.21 <sup>c</sup>	2.25 <sup>c</sup>	2.11 <sup>b</sup>	6.56 <sup>c</sup>
3	0	10(61.5)	0	0.11 <sup>a</sup>	0.17 <sup>a</sup>	0.17 <sup>a</sup>	0.15 <sup>a</sup>	0.40 <sup>a</sup>
4	50	10(61.5)	0	5.16 <sup>b</sup>	4.93 <sup>b</sup>	1.73 <sup>b</sup>	1.79 <sup>b</sup>	4.36 <sup>b</sup>
5	50	0	10(4)	5.21 <sup>b</sup>	5.18 <sup>bc</sup>	1.61 <sup>b</sup>	1.92 <sup>b</sup>	5.79 <sup>c</sup>
SEM				0.620	0.407	0.134	0.233	0.456

<sup>a,b,c</sup> differ at  $P < 0.05$ ; ( ) % PUFA according to the calculations of individual fatty acids (Laboratory Handbook for Oil and Fat Analysis. Cocks Van Rede, 1966).

The results in the table show that  $\alpha$ -tocopherol concentration in tissues was significantly greater in the pigs which were supplemented with vitamin E, than in those which were not supplemented. High intake of dietary fatty acids (Groups 4 and 5) was found to reduce vitamin E status in tissues, particularly in pigs fed soyabean oil (Group 4), which showed significantly lower levels of  $\alpha$ -tocopherol in liver, muscle and adipose tissue than the pigs on the low fat diet (Group 2). Tallow tended to promote a higher concentration than soyabean oil, although the difference was not significant except in adipose tissue.

The results of this experiment demonstrated that vitamin E storage in tissue is influenced by the dietary PUFA level possibly due to the effect on the change of tissue ratio of  $\alpha$ -tocopherol to PUFA by the dietary fatty acid composition. Thus, it appears that the dietary vitamin E requirement for growing pigs increases with intake of dietary fat.