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Effects of dietary glycerol addition on the intramuscular fatty acid composition in broilers

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Introduction

- Crude glycerol as a by-product of biodiesel industry is considered to be an alternative energy feedstuff for broilers.
- It contains residues of fatty acid methyl esters (FAMEs), which may affect meat fatty acid composition. These residues depend on the oil(s) or fats used in industry.

Objective

To determine the effects of dietary crude glycerol (purity 80%) on the intramuscular fatty acid profile of broiler chicks.

Materials and Methods

- 80 one day-old Cobb chicks were fed either a Control (C) or 3 diets (G7, G14, G21) with 7, 14 and 21% crude glycerol (in replacement of corn mainly).
- Fatty acids (FA) were determined (GC-FID) in diets, glycerol, and in breast tissue after chilling at 4°C for 24h.
- Linear and quadratic effects of dietary glycerol level were studied by using polynomial contrasts (GLM procedures of SPSS 17.0).

Results

Table1. Composition (g/kg) and FA profile (% total FA) of experimental diets (29-42 days of age) and of crude glycerol

Diet	C	G7	G14	G21	Crude glycerol
Glycerol (%)	0	7	14	21	
ME (MJ/kg)	12.4	12.4	12.3	12.2	14.4
Crude protein	175.0	175.0	175.0	175.0	-
Ether extract	31.7	28.8	25.3	22.9	5.2
C16:0	21.0	15.9	14.6	14.5	13.0
C18:0	3.8	2.8	2.8	2.9	2.2
C18:1*cis9*	27.5	23.0	22.0	21.2	42.6
C18:2*n-6*	37.7	51.5	53.5	53.6	31.6
C18:3*n-3*	2.1	3.1	3.7	4.4	5.9

Figure 1. Effects of dietary glycerol level on [A] final body weight and cold carcass weight (g) and [B] dressing yield (%)

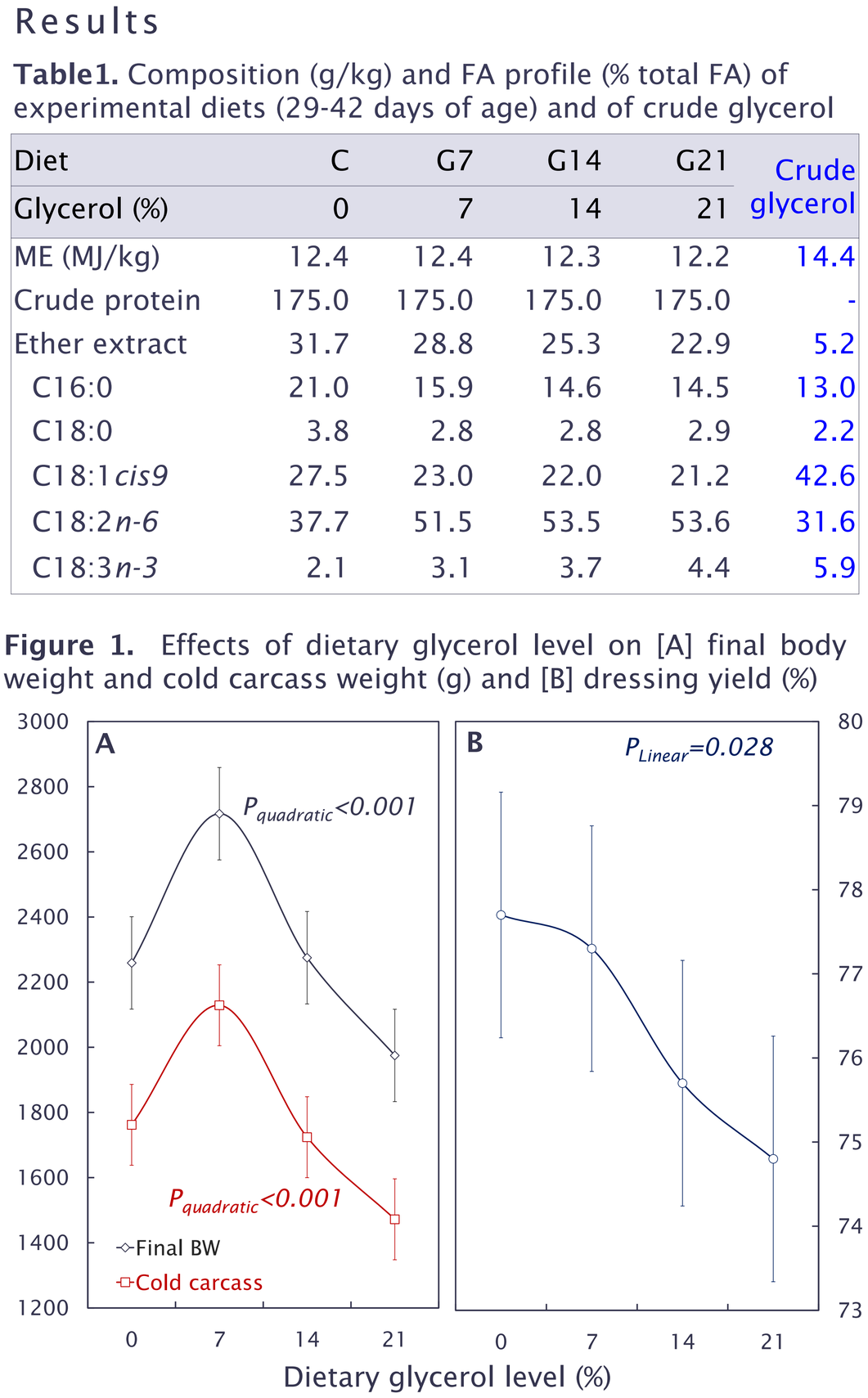
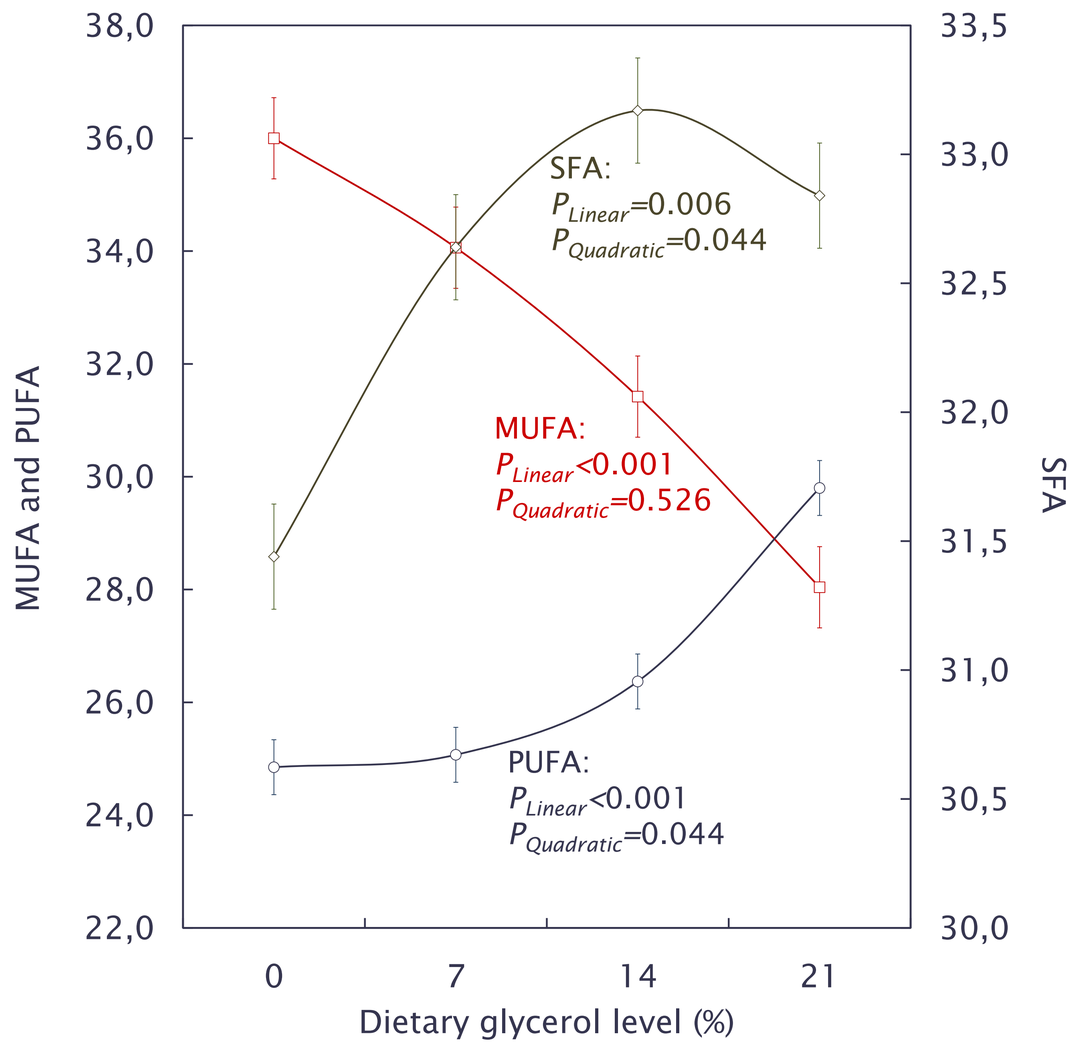


Table 2. Effects of dietary glycerol level on total FA weights (mg/100g) and FA composition (% total FA) of the fresh breast muscle

	Glycerol level (%)				SEM	*P*-values	
	0	7	14	21		*Linear*	*Quadratic*
Total FA	**988**	**773**	**668**	**623**	**41.1**	**<0.001**	**-**
14:0	0.4	0.5	0.50	0.4	0.01	-	**0.027**
16:0	22.2	22.8	23.0	21.6	0.18	-	**0.004**
18:0	8.7	9.3	9.6	10.7	0.16	**<0.001**	-
18:1*cis9*	27.4	25.54	22.7	21.2	0.61	**<0.001**	-
18:2*n-6*	16.4	15.8	16.8	18.2	0.27	**0.006**	**0.043**
18:3*n-3*	0.6	0.5	0.6	0.6	0.02	-	-
20:4*n-6*	4.2	4.8	4.7	6.0	0.19	**<0.001**	-
22:4*n-6*	1.0	1.1	1.2	1.3	0.04	**0.010**	-
22:5*n-3*	0.4	0.4	0.5	0.5	0.02	**<0.001**	-
22:6*n-3*	0.4	0.5	0.5	0.9	0.03	**<0.001**	**0.005**
PUFA:SFA	0.8	0.7	0.8	0.9	0.02	**<0.001**	**0.009**

Figure 2. Effects of dietary glycerol level on SFA, MUFA and PUFA (% of total FA) of breast muscle



Conclusions

- Increasing dietary glycerol modified intramuscular FA profile, which was not always consistent with changes in the dietary FA profile (i.e. SFA) brought about by glycerol FA residues.
- FA residues may vary due to the efficiency of FAME extraction (biodiesel production) the origin of glycerol and the feeding regime.
- Other parameters may also contribute to the altered intramuscular FA profile (e.g. reduced growth with increasing glycerol).

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