

CHEMICAL COMPOSITION AND FATTY ACID PROFILE IN WHOLE BODY OF CHICKENS IN RESPONSE TO INCREASED LEVELS OF DIETARY POLYUNSATURATED FAT

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INTRODUCTION

It has been observed recently that diets containing polyunsaturated oils (PUFA), like sunflower, linseed or soybean oils, cause lower body fat deposition in broilers compared to diets rich in saturated fatty acids (SFA) at the same fat inclusion level in the diet. This suggests a different metabolic use of fatty acids (FA) by the body depending on their chemical structure.

OBJETIVE

The aim of this study was to asses the effect of increasing inclusion levels of PUFA-rich dietary oil, maintaining relatively constant the PUFA:SFA ratio, on chemical and lipid body composition of broiler chickens.

MATERIAL AND METHODS

Animals: 96 female broiler chickens

Treatments: 4 dietary oil inclusion levels : 2 (O2), 4 (O4), 6 (O6) or 8 % (O8) of a mixture of linseed and fish oil (4:1). Almond husk was incorporated in different levels in order to achieve isoenergetic diets.

Samples: 96 animals slaughtered at 40 days (2240 ± 14.6 g). Whole body of the chickens (including blood and feathers) was minced and freeze-dried.

Analyses:

1. Crude protein (CP), ashes (A) and gross energy (GE) content.

2. Total fatty acids (TFA) content and FA profile (quantification: C19:0 as internal standard). TFA was used as estimator of body fat³.

1. AOAC, 1995. Official Methods of Analysis. 16th ed. Arlington, Va.

2. Carrapiso et al., 2000. Meat Science 56:159-164

3. Villaverde et al., 2003. Poultry Science Assoc. Meeting, Madison, USA. Abstract 280.

Figure 1: Fatty acid content of the experimental diets (g fatty acid/kg diet)

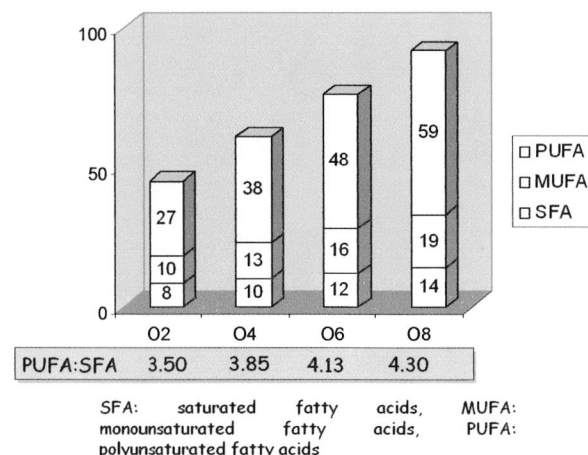
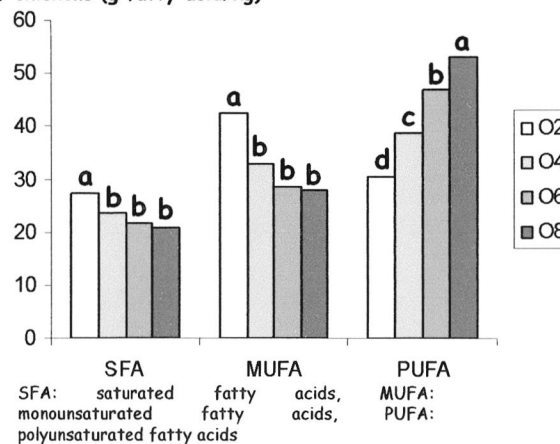


Figure 2: Effect of added oil inclusion level on SFA, MUFA and PUFA content of the whole body of chickens (g fatty acid/kg)



Fatty acid profile of the whole body of chickens was affected by treatment (Fig. 2). PUFA content increases when dietary added oil inclusion levels increases, at the expense of SFA and specially monounsaturated fatty acids (MUFA).

At low fat inclusion levels, the animal synthesizes FA (mainly SFA and MUFA). When added fat inclusion increases, less fatty acids are synthesized *de novo*, and fatty acid composition of the chicken resembles more that of the diet.

RESULTS

Table 1: Effect of inclusion level of added oil on chemical composition (% FM) and gross energy content of the whole body.

Added oil	O2	O4	O6	O8	p. value	RSD
Dietary PUFA g/kg	28	38	48	59		
AME intake (kcal/animal/day)	329	348	340	347	NS	21.3
Water	67.64	68.06	68.12	67.75	NS	1.101
CP	20.31	20.38	20.51	20.35	NS	0.776
Ash	2.43	2.48	2.49	2.61	NS	0.277
TFA	10.49	10.19	10.51	11.08	NS	1.683
GE (kcal/kg)	2272	2271	2253	2245	NS	164.9

n=24

PUFA: polyunsaturated fatty acids, AME: apparent metabolizable energy, CP: crude protein, TFA: total fatty acids, GE: gross energy

Chemical composition and GE content of the chickens was not affected by increasing inclusion levels of added PUFA-rich oil. Therefore, GE content was not affected by treatment either.

The lack of response of body fattening to dietary PUFA gradient, achieved by increasing dietary added oil, suggests that the reported^{4,5} effect of dietary PUFA upon chemical composition of chickens is dependent on the SFA and MUFA content of the diet and to the level of *de novo* fatty acid synthesis depending on dietary oil inclusion level.

4. Crespo and Esteve-Garcia, 2001. Poult. Sci. 80: 71-78.

5. Sanz et al., 2000. J. Nutr. 130: 3034-3037.

CONCLUSION

An increase in dietary PUFA without a concomitant reduction in the dietary content of SFA or MUFA, although it modifies the FA profile of the body, does not cause a lower body fat deposition in chickens.