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Influence of dietary conjugated linoleic acid (CLA) and L-Lysine on heavy pigs performances and meat quality

R. Rossi, G. Pastorelli, M. Musella, C. Corino

Dipartimento Scienze e Tecnologie Veterinarie per la Sicurezza Alimentare, Università di Milano, Italy

Corresponding author: Carlo Corino. Dipartimento Scienze e Tecnologie Veterinarie per la Sicurezza Alimentare. Via Celoria 10, Milano, Italy – Tel: +39 02 50317900 – Fax: +39 02 50317898 – Email: carlo.corino@unimi.it

RIASSUNTO – Effetto dell'integrazione con coniugati dell'acido linoleico (CLA) e L-lisina sulle performance e qualità della carne nel suino pesante. *Per la prova sono stati utilizzati 72 suini ibridi, del peso vivo di 104 kg circa, metà maschi castrati e metà femmine, suddivisi in 4 gruppi ed alimentati con mangimi sperimentali che differivano per i livelli d'integrazione di L-lisina HCl (0% e 0,16%) e di CLA (0 e 0,75%). Gli animali sono stati macellati ad un peso vivo medio di 154,5 kg. Non si sono osservate differenze significative sulle performance di crescita, caratteristiche della carcassa e sulla composizione chimica del muscolo Longissimus dorsi. Significativa invece la diminuzione del numero di iodio negli animali alimentati con CLA. I risultati della presente ricerca non hanno permesso di evidenziare una interazione nutrizionale CLA-lisina. Viene confermata l'azione positiva dei CLA sulla qualità tecnologica del grasso.*

Key words: conjugated linoleic acid, L-lysine, meat quality, nutrition, pigs.

INTRODUCTION – Conjugated linoleic acid (CLA) refers to a group of positional and geometric fatty acid isomers derived from linoleic acid. Dietary CLA supplementation has been shown to increase feed efficiency and may reduce body fat content in swine as recently reviewed by Corino *et al.*, (2005). There was only one research conducted in heavy pig in which the authors did not observed any significant effect of dietary CLA on growth performances and lean tissue (Corino *et al.*, 2003). These data might be the consequence partly of not adequate nutrient requirements: the higher potential growth of lean tissue may require a higher lysine intake. Lysine is accepted as the first limiting amino acid in pig diets based on maize and soybean meal, and therefore it has become an established practice to supplement pig diets with crystalline lysine. The aim of the study was to evaluate whether dietary CLA with increased amounts of lysine, may affect growth performances, carcass characteristics, and meat quality.

MATERIAL AND METHODS – Seventy-two pigs (Goland x Hypor), of average 104 kg LW half barrows and half females, were randomly assigned to four dietary treatments according to a 2 x 2 factorial experiment with 2 levels of supplementation of L-lysine HCl (0% and 0.16%; to obtain 0.5% and 0.7% lysine as fed) and two levels (0% and 0.75% as fed) of CLA (50% *cis* 9, *trans* 11 and 50% *trans* 10, *cis* 12). Experimental diets continued to be fed up to about 154.5 kg LW, at which pigs were slaughtered. Growth performances and carcass characteristics were recorded. On *Longissimus dorsi* muscle (LD) pH, brightness and colour indices at 24 hours post-mortem were assessed. Samples of LD muscle and subcutaneous adipose tissue were taken and stored at -20°C pending analysis. Chemical analyses (AOAC, 1994) for dry matter, nitrogen, and fat were conducted on each sample of LD muscle. The samples of adipose tissue were analysed to determine the iodine value (IV) using the Wijs method (AOAC 1994). Data were analysed by factorial analyses of ANOVA (main factors CLA, and lysine and interaction CLA x lysine). The data are presented as least squared means ± pooled SEM.

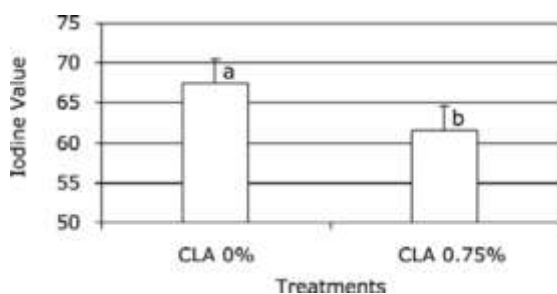
RESULTS AND CONCLUSIONS - The data on pig performance, carcass characteristics and meat quality are shown in table 1. The data of the present experiment are in agreement with our previous study (Corino *et al.*, 2003) that reported no effects of dietary CLA supplementation on growth performance and carcass characteristics in heavy pigs (Table 1). In CLA fed pigs pH resulted lower ($P<0.05$) and b^* values higher ($P<0.01$) than control. In pigs fed 0.7% lysine pH resulted higher ($P<0.01$) than control. No other parameter was affected by dietary CLA or lysine. No significant interaction were found between CLA and lysine, except for a^* values ($P<0.01$). Literature regarding the effects of dietary CLA on meat quality is too heterogeneous (Corino *et al.*, 2005). With regard to colour indices, also Wiegand *et al.* (2002) observed that chops from CLA-fed pigs had higher b^* values, corresponding to a more yellow product.

Table 1. Effects of dietary CLA and Lysine on pigs performance, carcass characteristics and meat quality of LD muscle.

	CLA		Lysine		SEM	P		
	0%	0.75%	0.5%	0.7%		CLA	Lys	CLA x Lys
Initial weight, kg	103.7	105.0	104.1	106.2	1.25	0.342	0.209	0.077
Final weight, kg	153.9	155.0	153.2	155.3	1.16	0.857	0.745	0.413
Carcass weight, kg	123.9	125.0	123.8	125.5	0.76	0.493	0.853	0.605
Dressing,%	80.7	80.9	80.8	80.8	0.67	0.549	0.947	0.434
Lean,%	50.3	50.5	50.8	50.5	0.23	0.542	0.478	0.666
Meat quality:								
pH 24h	5.49	5.44	5.43	5.50	0.02	0.024	0.008	0.114
L^*	46.07	46.59	46.37	46.30	0.68	0.657	0.830	0.223
a^*	7.63	7.88	7.87	7.64	0.96	0.305	0.236	0.002
b^*	5.14	6.38	5.66	5.91	0.23	0.008	0.837	0.871
Dry matter,%	26.65	26.69	26.53	26.81	0.09	0.841	0.615	0.754
Crude Protein,%	21.58	21.06	20.69	21.99	0.41	0.604	0.084	0.538
Fat,%	3.01	3.02	3.04	2.99	0.15	0.999	0.512	0.349

The iodine value of subcutaneous adipose tissue resulted lower ($P<0.001$) in CLA fed pigs than control as shown in Figure 1. This result are in agreement with our previous study (Corino *et al.*, 2003) and with the studies of Gatlin *et al.* (2002) and Eggert *et al.* (2001) that also found that dietary CLA supplementation reduced the iodine value of pig adipose tissue. In conclusion this study failed to reveal a nutritional interaction between CLA and lysine during the finishing phase and confirm the results of our previous study on heavy pigs. Moreover it is attested the positive effect of CLA on fat quality.

Figure 1. Effects of dietary CLA on iodine value of subcutaneous adipose tissue of heavy pigs ($a, b P<0.001$).



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