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## Effect of conjugated linoleic acids in pig nutrition on quality of meat

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### Abstract

Relationships among conjugated linoleic acid (CLA) in pig nutrition and carcass quality parameters (hot carcass weight, carcass yield and meatiness) and meat quality parameters (initial and pH value after 24, 48 and 72 h, temperature, drip loss, sensory color and marbling) were determined in pigs (crossbreeds Yorkshire x Landrace). Commercial CLA preparation containing 60% CLA isomers was included in the diet. No significant differences in performance parameters were found between pigs fed with CLA and control group during 60 days period. CLA supplementation in feed significantly increased SFA and decreased MUFA and PUFA fraction in pig muscles.

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### 1. Introduction

The production of high quality pork has been a constant objective of the pig industry for many decades. The main goal is to obtain pigs with high lean percentage and good meat quality traits at the same time<sup>1,2</sup>. Fat and fatty acids (FAs), whether in adipose tissue or muscle, contribute importantly to various aspects of meat quality and are central

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to meat nutritional value<sup>3</sup>. Several attempts to modify the FA composition of pork have been made recently during the last years; one of them is the inclusion of conjugated linoleic acid (CLA) in feed for growing/finishing pigs for its distributive effect between fat and lean<sup>4</sup>. The CLAs are a mixture of positional and geometric isomers of linoleic acid (9c,12c C18:2), which were first identified in rumen fluid as an intermediate of the biohydrogenation process. In synthetic CLA preparations the 9c,11t and 10t,12c isomers are predominant (often in a 1:1 ratio). It appears that the 9c,11t isomer has positive effects on some types of cancer by inhibiting tumorigenesis, while the 10t,12c isomer could be responsible for changes in whole-body fat deposition<sup>5</sup>. The present study showed the effect of CLA and fatty acid composition in pig nutrition on quality of pork meat (performance, carcass and quality parameters).

## 2. Materials and methods

Pigs crossbreed of Yorkshire x Landrace, with initial body weight of 60 kg were used in present study. The pigs were divided into two experimental groups of 30 pigs in each and fed with standard mixture<sup>6</sup>, from 60 to 110 kg (fattening period of 60 days). Only the experimental group received a commercially prepared conjugated linoleic acid 60% CLA (Lutalin, BASF, Germany), added at the recommended rate of 2.0% in their feed mixture. The mixtures were balanced and fully satisfied needs of the animals at this stage of fattening. After carcass refrigeration at 3°C for 24h, carcasses were weighed. Meatiness (in percentages) was determined according to regulation<sup>7</sup> on the basis of hot carcass weight and the sum of carcass fat thickness at two points (on the back and at the sacrum). Meat quality measurements were carried out 60 minutes, 24, 48 and 72 h after slaughter on muscle *Longissimus dorsi* (LD), *pars lumbalis*. Values of pH 60 minutes, 24, 48 and 72 h postmortem (pH<sub>60min</sub>, pH<sub>24h</sub>, pH<sub>48h</sub>, pH<sub>72h</sub>), and temperature 60 minutes postmortem (t<sub>60min</sub>) were measured using a pH-meter Testo 205 (Germany) calibrated with pH 4.00 and 7.00 phosphate buffer. For determination of drip loss, sensory color and marbling of meat samples, 2.5 cm thick loin chops were taken 24 h after slaughter from LD, between the 3rd and 4th lumbar vertebrae. Meat samples were weighed and stored for 48 h at 4°C in a container<sup>8</sup>. Color and drip loss were analyzed in duplicate. An analytical panel of three members assessed sensory color and marbling of meat samples by using the scaling method<sup>9</sup>. After storage, meat samples were reweighed and drip loss (%) was calculated as the difference between sample weight before and after storage divided by the sample weight before storage. Total lipids for fatty acid determination were extracted from pig muscle tissue with hexane/isopropanol mixture by accelerated solvent extraction (ASE 200, Dionex, Germany). After evaporation of solvent until dryness under the stream of nitrogen total lipids were converted to fatty acid methyl esters (FAME) by trimethylsulfonium hydroxide. FAMES were determined by using Shimadzu 2010 gas chromatograph equipped with flame ionization detector (FID) and cyanopropyl HP-88 capillary column (100m x 0.25 mm x 0.20µm)<sup>10</sup>. Statistical analysis of the results was elaborated using software GraphPad Prism version 5.00 for Windows, GraphPad Software, San Diego CA, USA, www.graphpad.com. Student t-test was used for testing the differences in the parameters between the control and experimental group.

## 3. Results and discussion

No significant differences in performance parameters of pigs which were fed with CLA and control group for a period of 60 days were found (average daily feed intake: C: 2.68 kg/day, E: 2.65 kg/day; average daily weight gain: C: 0.78 kg/day, E: 0.79 kg/day; feed to gain ratio: C: 3.44 kg/kg, E: 3.34 kg/kg). Animals fed with the CLA had similar final body weight than those fed with the control diet (C: 111.1 kg, E: 112.10 kg live weight). Dietary CLA did not affect the carcass weight and yield (Table 1). Additionally, although differences were not significant, meatiness was numerically higher in control group animal. The meat quality parameters such as pH value, temperatures, sensory color and marbling were not affected by dietary treatment.

The total SFA including C14:0 ( $p < 0.01$ ), C16:0 ( $p < 0.01$ ), C18:0 ( $p < 0.01$ ) were significantly higher in muscles from pigs fed dietary CLA than in control pigs (Table 2). However, the MUFA including C18:1 ( $p < 0.01$ ) were reduced by CLA. A reduction of n-6 was caused by reduction of C18:2 n-6, C18:3 n-3, C20:2 n-6 and C20:3.

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