EAAP 2013 64th ANNUAL MEETING OF THE EUROPEAN FEDERATION OF ANIMAL SCIENCE AUGUST 26th - 30th, 2013 NANTES, FRANCE

Intramuscular fatty acid composition in organic and conventional beef, poultry and pork systems.

Villalba, D., Tor, M., Cubiló, D.,Babot, D., Alvarez-Rodríguez, J.
Animal Production Department, University of Lleida, Spain. dvillalba@prodan.udl.cat

There is still a lack of information about the differences in **quality** between **organic** and **conventional** livestock products. Moreover, **quality is a complex term** that includes different components to be considered. So animal welfare, animal health, and carcass and meat quality has been assessed at conventional an organic systems in Spain. The study has been conducted in beef, pig and poultry farms. In this poster we present the results from one important aspect of meat quality, the **fatty acids profile of intramuscular fat**.

The objective of the study was to compare intramuscular fatty acid (FA) composition from meat obtained in organic and conventional systems

METHODOLOGY

• Meat samples from animals reared under organic, (ORG, European Union Regulation (EC) No 889/2008) or conventional (CONV) systems were obtained in the same slaughter conditions from beef (*L.dorsi,* 59 vs 37, 2 vs 3 farms), poultry (*Semimembranous*, 24 vs 12, 2 vs 1 farms) and pork (*L.dorsi*, 31 vs 29, 2 vs 3 farms).
• Samples were completely defrosted, vacuum drip losses were eliminated and muscle was dissected out separately. Once minced the sample was freeze-dried. A representative aliquot from the pulverized freeze-dried specimens was used for chemical analyses. Fatty acid methyl esters were directly obtained by transesterification using a solution of boron trifluoride 20% in methanol (Rule, 1997). Analysis of fatty acid methyl esters were performed by gas chromatography with a capillary column SP2330 (Supelco, Tres Cantos, Madrid) and a flame ionization detector with helium as the carrier gas at 1 mL/min. The quantification was carried out through area normalization by adding into each sample 1, 2, 3-Tripentadecanoylglycerol as internal standard before transesterification. Fatty acid composition was calculated as the percentage of each individual fatty acid relative to total fatty acids.
• Procedure GLM of SAS was used to compare the within species husbandry system effect on individual FA composition. A multivariate analysis has been performed with PRINCOMP and DISCRIM procedures of SAS

RESULTS

		Pig	Poultry	Beef
Breed	CONV	Three-way crossbred genotypes (0% to 75% Duroc genes)	Fast growth (Ross 308)	Local Breed crossed with Charolais and Limousin
	ORG	Three-way crossbred genotypes (0% to 75% Duroc genes)	Slow growth (Hubbard I 657)	Local Breed crossed with Charolais and Limousin
Feeding	CONV	Conventional concentrate	Conventional concentrate	Concentrate + Straw or Concentrate + Forage
	ORG	Organic concentrate including straw	Organic concentrate including forage	Organic including forages (60%F:40%C)
Housing conditions	CONV	0.75 m2/pig + concrete slatted floor without outdoor area	Indoor housing. 13 animals/m2	2.5-3 m2/head without access to outdoor area
	ORG	2.2 m2/pig + straw deep litter indoors and concreted outdoor area	Indoor area:10 animals/m2 Outdoor area: 4 animals/m2	2.5-4 m2/head with access to outdoor area
Slaughter age	CONV	5.5 months	38 days	13 months
	ORG	6 months	100 days	16 months
Carcass weight	CONV	75.1 kg	3.8 kg	230 kg
	ORG	77.5 kg	2.2 kg	240 kg

• **Pigs** farms differ basically in the type of feed (conventional feed includes oilseeds after solvent extracted oil vs. organic feed is composed by full oilseeds or mechanically oil extracted), access to straw in organic, and housing conditions.

• **Poultry** organic farms use different breed, housing and type of feed.

• **Beef** organic farms followed a very similar management than conventional farms (fattening of weaned calves (at 6 months of age) but with forage as a 60% of the diet and with access to outdoors)

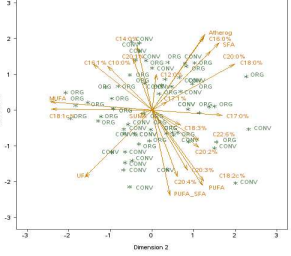
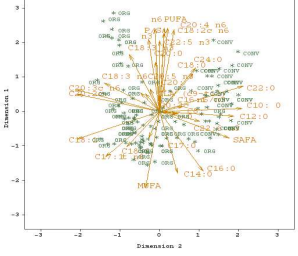
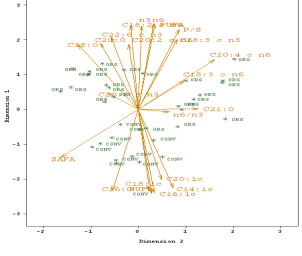
For beef meat, 15 out of the 23 FA identified were different between systems; the percentage of saturated and monounsaturated FA was lower and the level of conjugated linoleic acid was higher ($p<0.05$) in ORG systems. For poultry meat, 13 out of the 16 FA identified were different between systems ($p<0.05$); the polyunsaturated to saturated ratio was higher ($p<0.05$) in ORG systems. For pork meat, 7 out of the 16 FA were different between systems ($p<0.05$); meat from ORG system had a lower ratio n6/n3 than CON system ($p<0.05$).



	PIG			POULTRY			BEEF		
	CONV	ORG	SE	CONV	ORG	SE	CONV	ORG	SE
IMF (%)	1.34	5.07	0.41	5.79	5.87	0.15	2.64	2.31	0.25
Total SFA	38.85	40.97	1.04	29.55a	27.83b	0.25	46.25a	43.35b	0.27
Total MUFA	44.75	43.97	1.23	40.3a	33.83b	0.43	40.1b	42.37a	0.39
Total PUFA n-6	15.78	14.13	0.95	27.37b	34.76a	0.49	8.79	8.44	0.35
Total PUFA n-3	0.63a	0.92b	0.07	2.78b	3.57a	0.05	0.75	0.69	0.03
Total PUFA	16.40	15.05	1.00	30.15b	38.34a	0.53	9.95	9.10	0.35
PUFA/SFA ratio	0.44	0.37	0.03	1.02b	1.38a	0.03	0.22	0.21	0.01
PUFA n-6/PUFA n-3 ratio	27.08a	16.06b	1.3	9.84	9.74	0.09	12.23b	13.01a	0.41

CON=conventional, ORG=organic. SE=standard error (for ORG mean). Within each row and specie, different letter denotes statistical differences (P<0.05).



In the three species, the multivariate analysis of FA profile allowed a good discrimination between the ORG and CON systems. The estimated error in discriminating the system origin of an observation was less than 1% for beef and poultry and 3% for pork.

Differences in FA profile, in general favorable to the organic system, could be explained by differences in dietary feedstuffs, genotypes and age at slaughter, especially in poultry, but overall, the meat that arrive to consumers from the organic system could be considered different than the conventional in terms of intramuscular fat quality.

Research funded by **AGEC2011** (Economy and Knowledge Department. Generalitat de Catalunya)