

Quality of chicken meat from conventional and organic production

M.A. GRASHORN^{1*} and CATIA SERINI²

¹ Dept. of Poultry Science (470c), Inst. of Animal Husbandry and Breeding, University of Hohenheim, 70593 Stuttgart, Germany.

² Dept of Food Science, University of Bologna, 47023 Cesena, Italy

*corresponding author: grashorn@uni-hohenheim.de

Consumers believe that quality of foods from organic production is superior to foods from conventional production. The objectives of the present study have therefore been to compare the quality of chicken meat from organic and conventional production on the basis of traditional meat quality criteria. The experiment was organized as a field study. Fresh organic broiler carcasses were purchased directly from the farms and fresh conventional broiler carcasses from supermarkets. Conventional chicken carcasses were of 5 different origins. In total, 5 farms x 5 carcasses + 5 origins x 5 carcasses = 50 carcasses were included in the survey. Besides criteria of the carcass quality (classification according to EU legislation, proportion of valuable parts, skin colour) meat quality criteria (colour, grilling losses, texture, content of nutrients, fatty acid profiles, sensory attributes) were determined. Carcass weights differed between 1,300 and 3,300 g for organic chickens and between 1,100 and 1,500 g for conventional ones, and prices ranged between 7 and 11 Euro/ kg and/or 2.49 and 3.99 Euro/ kg, respectively. Carcass quality according to EU legislation and marking of carcasses was insufficient for organic chickens. Proportion of breast meat was lower in organic chickens, skin and meat was more yellow, grilling losses were lower and texture values were higher. Content of dry matter, crude protein, ash, fat and n-3 fatty acids was higher in organic chicken meat. Sensory panellists assessed organic broiler meat as tougher and tastier. The microbial status of the meat was not determined. In conclusion, traditional meat quality criteria indicate a slight superior quality of organic chicken meat.

Keywords: broiler, organic production, carcass quality, meat quality

Introduction

Organic plant and animal production has a long tradition in Germany and other European countries. BSE crisis has pushed the demand for organic food, both from consumers and politics. Details of organic production are prescribed in order EU 1991/2003. In general, it is believed that organic food contain no harmful ingredients and thus are more healthy to consumers as conventionally produced food. This is mainly based on the expectation that animal friendly husbandry systems, access to free range and prohibition of GMO feed components and synthetic feed additives are the basis for healthy food. Despite this expectation it is quite difficult to find quality criteria suitable to differentiate objectively between the qualities of conventional and organic poultry meat (Damme, 1998; Schmidt et al., 2004).

The objectives of the present study have therefore been to compare the quality of chicken meat from organic and conventional production on the basis of traditional meat quality criteria.

Material and methods

As consumers believe that organic chicken meat has a superior product quality to conventionally produced chicken meat, the experiment was organized as a field study which was conducted in the area of Stuttgart, Germany. Fresh organic broiler carcasses were purchased directly from farms and fresh conventional broiler carcasses from supermarkets. Conventional chicken carcasses were of 5 different origins (producers). In total, 5 farms x 5 carcasses + 5 origins x 5 carcasses = 50 carcasses were included in the survey. Carcasses were stored in a refrigerator (+2°C) for 48 h prior analyses. Marking and packing as well as the appearance of carcasses were recorded. Skin colour was measured according to the CIE-L*a*b* system by a Minolta Chromameter CR 300 on the back adjacent to the pygostyle. Dissection of carcasses was done by using a cone according to Marché (2000). Weights of thighs (with skin and bones) and breast meat were related to cold carcass weight (without neck, feet and gut). As meat quality criteria were determined: colour (L*a*b*), grilling losses, texture (with Warner-Brazler shear tool) of breast meat. Furthermore, content of dry matter, ash, protein, fat, fatty acid profiles and sensory attributes (WPSA, 1987) of breast and thigh meat were determined, as well.

Data were analysed by one-factorial ANOVA ignoring the effects of origin (farm, supermarket) with the statistic software JMP (Version 5.1, SAS Institute). Comparison of means was done by t-test.

Results and discussion

Carcass weights differed between 1,300 und 3,300 g for organic chickens and between 1,100 and 1,500 g for conventional ones. Prices ranged between 7 and 11 Euro/ kg and/or 2.49 and 3.99 Euro/ kg for organic and conventional fryers, respectively. Especially, for organic fryers marking was insufficient. Carcasses from two organic farms were not signed with either grade class, number of slaughter facility or name of farm, date of best before or optimum storage temperature, whereas, marking of conventional carcasses was according to EU legislation. Several carcasses of both origins showed bruises and scratches of the skin and broken bones. In one organic carcass deep pectoral myopathy was stated.

Skin colour was less red but more yellow in organic carcasses, without differences in brightness (*Figure 1*). Colour of breast meat showed the same tendency as skin colour, but organic carcasses were more pale (*Figure 2*). Proportion of thigh meat and wings was significantly higher in conventional fryers than in organic ones (*Table 1*). Proportion of cuts (breast meat, thighs, wings) amounted to 65.2 and 69.6 % of cold carcass weight in organic and conventional carcasses, respectively.

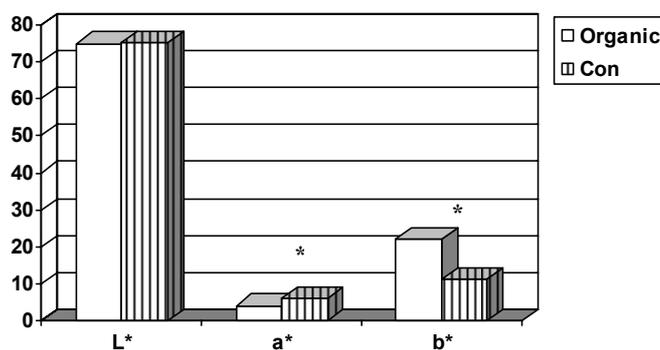


Figure 1 Skin colour (a) and breast meat colour (b) according to CIE-L*a*b* (* = P<0.05).

Grilling losses and texture of breast meat were higher in breast meat of organic fryers than of conventional ones (*Figure 3*). Breast and thigh meat of organic and conventional fryers did not differ in fatty acid profiles (data not shown). Results on contents of dry matter, protein and fat are yet not available. The sensory assessment of breast and thigh meat revealed significant differences between

organic and conventional meat (Table 2). The total grade for organic meat was significantly worse as for conventional meat, mainly attributed to tougher organic meat.

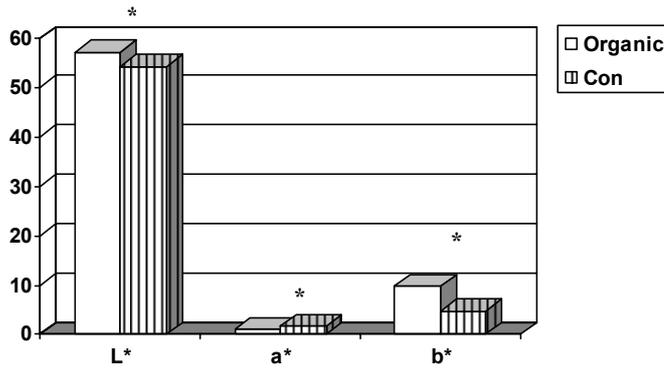


Figure 2 Breast meat colour according to CIE-L*a*b* (* = P<0.05).

Table 1 LSQ-Means of proportion of wings, thighs, breast meat and cuts.

	Wings (%)	Thighs (%)	Breast meat (%)	Cuts (%)
Organic	10.6 ^{b*}	32.8	21.8 ^b	65.2 ^b
Conventional	11.1 ^a	33.4	25.1 ^a	69.6 ^a

*p>0.05

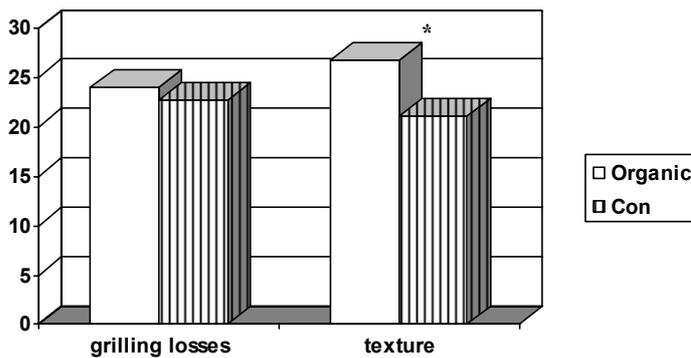


Figure 3 Grilling losses (%) and texture (N) of breast meat (* = P<0.05).

Table 4 Sensory evaluation of organic and conventional breast and thigh meat.

	Organic	Conventional
Results of tests		
Breast		22 correct/ 8 false
Thigh		19 correct/ 11 false
Grade*		
Breast	2.41	1.86
Thigh	2.08	1.66

* P<0.05

In conclusion, carcasses from organic and conventional production differ mainly in their sizes and in their proportions of valuable parts due to the use of different genetic types of broilers (Grashorn and Clostermann, 2002). Packing and marking of organic fryers is insufficient, in general. The reason may be that most organic fryers are produced and slaughtered on small farms with less skilled personnel and less control. In contrary, commercial slaughter facilities have to consider largely regulations of the EU and have to face a strict control system. The microbial status of carcasses may be an interesting aspect in this view, but it was not determined in the present study due to the low sample size.

Differences in meat quality characteristics of organic and conventional chicken meat were only minor. The more yellow colour of skin and breast meat is caused by the use of corn in diets in organic

production which is not common in conventional production. The higher content of carotenoids in tissues of organic chicken may improve the antioxidative status of the meat, but is of less importance. It was of interest to notice that fatty acid profiles did not differ between organic and conventional meat, although this was expected due to the access to free range of organic chicken. Probably, the amount of nutrients ingested from pasture is overestimated. Observed differences in grilling losses and texture of breast meat are in accordance with Culioli et al. (1990). Organic breast and thigh meat is more juicy and less tender than conventional chicken meat, but exhibits a superior flavour. In the present study organic chicken meat was assessed negatively due to the low experience of the test panel with organic meat. Probably, new quality criteria are necessary to determine the quality of organic chicken meat. Application of the biophoton emission method may be an interesting issue which has to be investigated further.

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