

QUALITY OF CHICKEN MEAT FROM CONVENTIONAL AND ORGANIC PRODUCTION

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Abstract

Poultry meat production in the world exceeded 92 million tons in 2009 and constituted one third of global meat production. Commercial poultry production, especially intensive broiler production, has shown a rapid increase and has dominated the Bosnia and Herzegovina agricultural sector over the past decade. Organic rearing of poultry in accordance with the guidelines of European Economic Community Regulation 1804/1999 (European Economic Community, 1999) is perceived as being more respectful of animal welfare compared with intensive rearing because these regulations provide specifications for housing conditions, nutrition, breeding and animal care, disease prevention, and veterinary treatment. Studies on consumer perception of chicken meat and different rearing systems revealed that consumers believe that the meat of free range chickens is healthier and tastier than birds reared in intensive production systems, making their overall perception positive towards free range production systems. The aim of this study is to compare conventional and organic poultry production in terms of quality analysis. Indicators were quantified using scientific literature and national data sets. Changing from a conventional to an organic broiler production system, therefore, not only affects animal welfare, but also affects economic, ecological and other social aspects.

Key words: *broilers, meat, organic system production.*

Introduction

Poultry meat production in the world exceeded 92 million tons in 2009 and constituted one third of global meat production (Evans, 2008). Commercial broiler hybrids reach market weight within 40 days, with excellent feed conversion efficiencies and high yields of edible cuts. Organic broiler production should comply with the overall goals of organic farming, as expressed by the International Federation of Organic Agriculture Movements (IFOAM) (IOFAM, 2000). Some of the principle aims are to encourage and enhance biological cycles within farming systems, to use as much as possible renewable resources in locally organized production systems, to create a harmonious balance between crop production and animal husbandry. Organic and sustainable agriculture plays an important role in offering solutions to meet these challenges (Ellis, 2012). The organic meat sector is currently one of the fastest growing segments of the organic food industry, and poultry accounts for nearly two-thirds of this sector (Cobanoglu et al., 2014). Consumers believe that quality of foods from organic production is superior to foods from conventional production (Lampkin, 1990). Consumption of fresh meat and meat products are mainly driven by quality but also influenced by meat prices and per capita income (Zhao & Schroeder, 2010). Modern consumers are health conscious and are shifting towards more naturally produced products such as free range chicken. The aim of this study is to compare conventional and organic poultry production in terms of quality analysis.

Production and Poultry Meat Consumption

Production of broiler practically presents the most intensive branch of the animal husbandry. According to a 2006 worldwide survey, more than 30 million hectares of land is farmed organically on 700,000 farms. Countries with the greatest organic acreage at the end of 2006 were Australia, China, Argentina, and the United States. International sales of organic foods reached more than \$38 billion in 2006, with Europe and the United States being the largest consumers, and demand has outgrown supply of many organic foods since 2005 (Willer et al., 2008).

The production in the poultry meat sector is organized within a production chain. The poultry meat sector consists of production on farm level and processing industry of broiler, turkey, duck and goose ready for consumption. Table 1 gives an overview of the production of poultry meat in the EU-25 countries. There is a wide variation in production volume between the countries. The main poultry meat producing countries are, in this order: France, UK, Spain, Germany, Italy, Poland and the Netherlands. The total poultry meat production includes broilers, turkeys, ducks and 'spent hens'. In all EU countries, broiler meat is the most important type of meat within poultry meat.

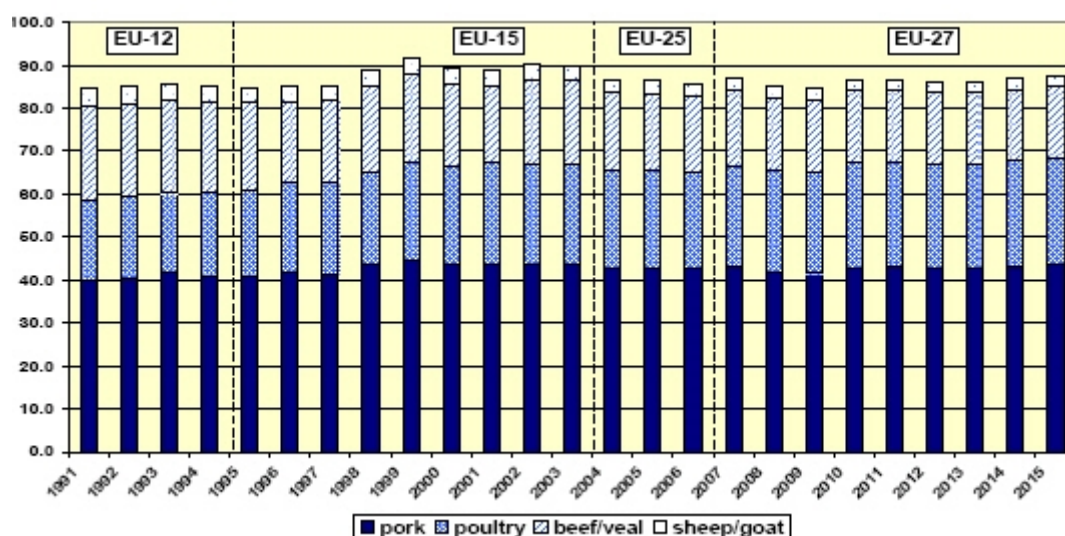
Table 1. Total production of poultry meat (in 1000 tonnes) in EU countries (ZMP, 2007).

In 1.000 Ton	2001	2002	2003	2004	2005	2006
Belgium/Luxemburg	291	321	304	310	297	269
Denmark	218	219	205	213	205	190
Germany	986	1.026	1.077	1.166	1.196	1.190
Greece	163	164	169	166	165	133
Spain	1.305	1.331	1.336	1.310	1.302	1.309
France	2.269	2.145	2.015	1.975	1.920	1.801
Ireland	121	121	120	122	122	111
Italy	1.134	1.169	1.097	1.128	1.092	1.041
Netherlands	717	705	485	555	565	557
Austria	108	110	112	114	118	109
Portugal	317	311	270	281	286	287
Finland	76	83	84	87	86	84
Sweden	106	111	106	105	104	99
United Kingdom	1.572	1.544	1.574	1.574	1.606	1.605
EU-15	9.381	9.360	8.954	9.106	9.064	8.785
Czech. Republic	234	238	227	228	235	230
Estonia	9	11	14	15	9	10
Cyprus	36	37	37	37	37	37
Latvia	9	11	12	14	15	15
Lithuania	30	33	39	42	45	45
Hungary	472	515	492	490	490	480
Malta	6	7	8	8	8	8
Poland	695	794	860	915	1.020	1.040
Slovenia	64	69	70	74	74	74
Slovakia	72	77	76	80	80	80
EU-25	11.008	11.152	10.789	11.009	11.077	10.804

Total poultry meat production in the EU-25 in 2005 was 11 million tonnes. In 2006, the production decreased (-2.9%) as a consequence of the lower demand due to the Avian Influenza (AI) scare. The short term disruption due to AI is not expected to alter the medium outlook for poultry production (EU, 2007). Poultry meat is relatively cheap compared to

other meats and the consumer preference in food preparations are also in favor of poultry meat.

Figure 1 gives an overview of the EU production and consumption over the period 1991 to 2005 and the prospects towards 2015.



In spite of the significant increase in poultry meat consumption per capita during the last decade, Bosna and Herzegovina poultry meat consumption per capita is still lower than EU average and developed countries average.

Table 2. Poultry Meat Consumption per capita in B&H and World in 2006

Region	Consumption per capita (kg/year)
World	11.7
USA	46.2
Russia	16.7
EU	15.8
Bosna and Herzegovina	< 5

Source: USDA-FAS

Quality of chicken meat from conventional and organic production

Chicken meat is a low fat protein source and provides essential vitamins and minerals such as niacin, vitamin A, vitamin E and magnesium. It also has a favourable ratio of polyunsaturated fatty acids to saturated fatty acids making it beneficial to consumers within a cholesterol lowering diet and thereby helping to reduce the risk of cardiovascular diseases (Charlton et al., 2008). Consumers frequently see chicken meat as a “healthier” option when compared to other meat or protein products on the market (Verbeke & Viane 1999; du Toit & Crafford, 2003). Studies on consumer perception of chicken meat and different rearing systems revealed that consumers believe that the meat of organic production is healthier and tastier than birds reared in intensive production systems, making their overall perception positive towards organic production systems (Harper & Makatouni 2002; Fanatico et al., 2007; Castellini et al., 2008; Branciarri et al., 2009). An increasing number of studies has compared meat quality from organic, free-range and conventional broiler production systems (Grashorn, 2005; Husak et al., 2008; Ponte et al., 2008). However, relatively few studies have reported on the meat quality features of slow-growing broiler genotypes grown without outdoor access (Fanatico et al., 2007).

Küçükyılmaz et al. (2012) reported that there chemical composition of breast and thigh meat from broilers reared under conventional or organic systems (tab. 2).

Table 2. Chemical composition of breast and thigh meat from broilers reared under conventional or organic systems (Küçükylmaz et al. 2012)

Rearing systems	Conventional fast-growing	Conventional slow-growing	Organic growing
Thigh meat (%)			
Moisture	73.4	73.9	73.8
Ash	0.94	0.91	0.89
Fat	6.54 ^b	8.29 ^a	8.11 ^a
Protein	18.6 ^a	17.4 ^b	17.3 ^b
Breast meat (%)			
Moisture	74.1 ^a	72.7 ^b	72.9 ^b
Ash	1.15 ^{ab}	1.10 ^b	1.20 ^a
Fat	2.41	2.81	2.66
Protein	22.4	22.7	22.6

^{a, b}Means within rows the different superscript are significantly different ($P < 0.05$)

The rearing system influenced some of the traits concerning the chemical composition of the breast and thigh meat. Factors such as production system, genotype, age, stocking density, lighting regime, temperature and diet have an effect on the overall quality of chicken meat. Castellini et al. (2002) studied the effect of rearing system on the chemical composition of broiler meat in conventional broilers (8 birds/m²) and organic broilers (8 birds/m² +4 m² free range/bird) and observed minimum differences in protein content and substantial differences in fat content in different muscle groups. Organically produced chickens show a difference in the composition of the carcass and the chemical content of breast and thigh meat. Organic production system, among many other improved conditions and standards in rearing, provides free range area for greater physical activity and that seems to be an important contributing factor for the production of higher quality meat in chickens and livestock (Angood et al., 2008). According to Castellini et al. (2007) more natural rearing conditions and increased activity of the birds contribute to the lower lipid content in broiler meat and pasture intake generates their meat with a greater degree of consumer acceptability (Ponte et al. 2008). Husak et al. (2008) reported, that both the breast and thigh meat from conventional broilers were more tender than the breasts and thighs from free-range birds. Likewise, Farmer et al. (1997) showed that free-range access made the meat of free-range chickens tougher than the meat of birds raised under the standard production system. The effect of rearing system on protein and fat content of breast and leg muscles was also reported by Bogosavljević-Bošković et al. (2008). The results obtained were attributed to the fact that extensive indoor and free range production systems, with the latter involving access to natural environment (fresh air and sunlight), resulted in differences in terms of the structural manifestations of tissues and organs, as well as in terms of the biochemical processes involved in the metabolism.

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