

QUALITY TRAITS OF ORGANIC CHIANTINA BEEF (An Italian experience)

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Introduction

During the last decade, consumer concern about residue in meat due to animal treatments and environmental pollutants has been increasing all over Europe. Recently, this has exploded with the BSE and dioxin episodes. This feeling, stressed by the media, leading to a greater demand for safe and high quality products and an increasing interest in organic food. A large number of consumers are also aware of animal welfare and are willing to pay higher prices for products obtained from naturally raised animals. Due to this trend, the organic farms in Europe increased from 12,735 to 81,783 units in the first 7 years of the '90s (Foster and Lampkin, 1999). This tendency has also involved Italy where during the same time period organic farms increased from 1,300 to 30,844 units (Zanolini, 1999), but only a few of them produce meat. In this context, the University of Perugia, Italy, has developed a project aimed at collecting scientific data about animal health, production and meat quality which could support the commercial production of organic Chianina beef according to the EC regulation (EC Reg. n° 2092/91 and n°1804/99). In this paper preliminary data on meat quality traits of Chianina bulls raised in an organic farm at the end of the conversion period from the traditional system are presented.

Materials and methods

Twenty-three Chianina bulls, from 14.7 to 24.9 months old (mean value 21.3 months) and weighing from 580 to 850 kg (mean value 714 kg) were considered. The animals were raised in the open-lot system, for at least six months before slaughtering, on an organic farm of the University of Perugia. They were slaughtered at the city abattoir and the carcasses were slow chilled and traditionally aged in a chilling room at 2 ± 0.5 °C for different periods of time in order to evaluate the effect of the post mortem treatment on the meat quality. Samples were taken from the *Longissimus dorsi* (LD) muscle at the level of the last thorax and the first lumbar vertebra, at the end of the ageing period. The muscle samples were tested for: -) colour of the cut surface after air exposure at 4°C for 60 min, by using a CR 2000 Minolta Chromameter (C.I.E. L*a*b* system); -) pH, according to the iodoacetate method (Bendall, 1975) measured with a Mettler Toledo MP230 pH meter; -) Water-holding capacity (WHC), according to the filter paper absorption method and expressed as the ratio of meat film area to fluid area; -) Cooking loss using samples weighing from 80 to 100 g put into plastic bags and placed in waterbath at 80 °C for 1h; -) Shear force by using the Instron 1011 equipped with a Warner Bratzler device (50 kg load cell and 100 mm/min speed), expressed in kg/cm².

Results and discussion

The meat quality traits are presented in relation to the age of the animals (Tables 1 and 3) and the length of the ageing period (Tables 2 and 4). The colour of the meat was acceptable in all animals and was slightly darker in the older ones. The mean L* value was inversely related to the age of the animals and comparable to the values reported by other authors (Funghi et al, 1994). No correlation was observed with the length of the ageing period. The mean values of the pH were never higher than 6.20 and only in few cases were 6.00 or around this value and no DFD muscle was detected. The LD muscles showed a relatively low WHC which, however, must be considered as normal in meat aged for 6 or more days. The cooking loss values were relatively low thus indicating a good tendency of the meat to retain water during the cooking process. Our results can not be compared with the data available in the literature due to differences in way of measuring (Funghi et al, 1994; Ferruzzi et al, 1995). No correlation of pH, WHC and cooking loss values with animal age and length of the ageing period was observed. The shear force values show a correlation with ageing: the longer the ageing period the more tender the meat becomes. This observed values are analogous to the data reported in the literature for conventionally raised Chianina bulls about the same age (Funghi et al, 1994). Regarding meat tenderness, the effect of the slow chilling system and a proper length of the ageing period seems to have played a significant role.

Tab. 1- Values of colour (L*, a*, b*) and pH at the end of the ageing period in relation to the age of the animals.

Class of age (months)	N° of animals	L* (mean±sd)	a* (mean±sd)	b* (mean±sd)	pH (mean±sd)
<18	1	41.49	24.81	10.03	6.00
18-19.9	3	39.71 ± 1.20	25.61 ± 2.37	9.66 ± 0.79	5.87 ± 0.12
20-21.9	9	38.41 ± 1.64	24.23 ± 3.09	8.54 ± 2.26	5.79 ± 0.15
22-23.9	8	38.88 ± 2.06	23.76 ± 2.18	8.79 ± 1.85	5.78 ± 0.13
≥24	2	37.21 ± 0.93	26.13 ± 2.36	9.80 ± 1.12	5.81 ± 0.03

Tab. 2 - Values of colour (L*, a*, b*) and pH of the meat at the end of the various ageing periods.

Class of ageing (days)	N° of animals	L* (mean±sd)	a* (mean±sd)	b* (mean±sd)	pH (mean±sd)
6	1	35.79	18.77	4.75	6.08
8	1	38.32	23.51	9.13	5.98
9	1	41.49	24.81	10.03	6.00
12	4	38.56 ± 1.86	23.71 ± 2.82	8.17 ± 2.16	5.79 ± 0.16
13	4	38.13 ± 1.69	25.42 ± 2.05	9.44 ± 1.31	5.76 ± 0.06
14	4	39.54 ± 0.94	27.06 ± 1.11	10.04 ± 0.55	5.76 ± 0.09
15	5	39.84 ± 1.35	24.90 ± 0.99	9.92 ± 0.48	5.72 ± 0.02
18	2	35.20 ± 0.86	24.36 ± 3.34	8.40 ± 2.16	5.95 ± 0.17
19	1	37.76	24.63	9.65	5.83

Tab. 3 - Values of WHC, cooking loss and shear force of the meat in relation to the age of the animals.

Class of age (months)	N° of animals	WHC (mean±sd)	Cooking loss % (mean±sd)	Shear force Kg/cm ² (mean±sd)
<18	1	0.647	39.88	6.13
18-19.9	3	0.827 ± 0.164	38.03 ± 1.33	4.38 ± 2.78
20-21.9	9	0.626 ± 0.081	39.89 ± 1.82	5.47 ± 1.46
22-23.9	8	0.653 ± 0.059	40.31 ± 1.55	5.06 ± 1.14
≥24	2	0.615 ± 0.274	38.88 ± 4.57	5.18 ± 0.16

Tab. 4 - Values of WHC, cooking loss and shear force of the meat at the end of the various ageing periods.

Class of ageing (days)	N° of animals	WHC (mean±sd)	Cooking loss % (mean±sd)	Shear force Kg/cm ² (mean±sd)
6	1	0.700	37.96	8.34
8	1	0.695	38.74	7.30
9	1	0.647	39.88	6.13
12	4	0.630 ± 0.130	40.68 ± 2.41	5.28 ± 0.74
13	4	0.655 ± 0.084	40.09 ± 1.93	5.25 ± 0.90
14	4	0.748 ± 0.186	38.58 ± 1.47	4.00 ± 2.11
15	5	0.660 ± 0.090	40.49 ± 1.66	4.69 ± 0.94
18	2	0.528 ± 0.151	37.88 ± 3.17	4.81 ± 0.69
19	1	0.662	41.04	3.22

Conclusions

This preliminary data shows that Chianina meat produced according to the organic system has quality traits similar to conventionally produced Chianina meat. To obtain a valuable product an appropriate period of traditional ageing resulted of utmost importance in order to increase tenderness. It is important to state that the prime interest of the consumers of the organic meat produced on our farm were the safety aspects and the colour and tenderness were of secondary importance.

References

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