



Review

Slaughter value and meat quality of suckler calves: A review

Piotr Domaradzki^a, Piotr Stanek^b, Zygmunt Litwińczuk^b, Piotr Skąlecki^a, Mariusz Florek^{a,*}^a Department of Commodity Science and Processing of Raw Animal Materials, University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin, Poland^b Sub-department of Organic Production of Food of Animal Origin, University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin, Poland

ARTICLE INFO

Keywords:

Calves
Veal
Carcass quality
Intrinsic properties
Chemical composition

ABSTRACT

Veal is widely prized by consumers for its excellent nutritional value. Calf meat is generally obtained from young (immature) bovine animals up to 8 months of age, or in some cases from older animals, but no older than 12 months. Classification of calf carcasses and specification of cuts are quite well regulated in the European market, in contrast with feeding systems and meat characteristics. There are several calf production systems, but in terms of consumer health the most beneficial meat is obtained from animals reared on pasture with natural suckling.

In view of the above, this review is limited in scope to Member States of the European Union and focuses on the main factors influencing the carcass quality, proximate composition, intrinsic properties, cholesterol content, fatty acid composition and mineral composition of veal from calves reared on pasture with their mothers.

1. Introduction

According to the OECD (2017), global consumption of meat (pig, poultry, sheep, beef and veal) in 2016 was 317 million tonnes, and since 1995 the annual average growth rate has been 2.3%. It is worth noting that ruminant meat consumption has risen more slowly, with beef at only a little over 1% annually, and this trend was observed all around the world in all regions. Furthermore, the share of beef was in average 22% of global meat consumption in 2015–2016.

There is wide variation in meat production and productivity levels. The diversity of the beef sector in Europe is reflected in the different degree of specialization, various animal category (calves, young cattle, heifers, bullocks, bulls, steers, and cows), and wide variety of production systems, which include both the breed of animal and its feeding. This lack of uniformity stems from the different natural environment (agricultural potential of soils, climate, altitude, and topology), agricultural traditions, as well as public policies (Hocquette & Chatellier, 2011).

In the European Union (EU), beef is produced on two categories of farms: i) specialized beef farms with suckler cows or young bovine cattle; and ii) dairy farms for which beef production is a by-product of milk production (Hocquette & Chatellier, 2011). Dairy farms make up two-thirds of the bovine cattle herd. The number of non-dairy cows in 2014 was estimated at about 12.0 million head. Most of the beef cattle population is located in four EU Member States: France (34.4%), Spain (15.2%), the United Kingdom (12.8%) and Ireland (8.7%). Together, they host more than 70% of the European beef herd (EUROSTAT,

2015). In 2013 the major EU producers of beef (in thousands of tonnes) were France (1900.0), Germany (1270.8), the United Kingdom (844.0), Ireland (559.8), Italy (508.0), Spain and Poland (each 459.0), which together account for 78% of total production (FAOSTAT, 2016).

Between 2009 and 2014, production of veal, i.e. meat from calves (aged under 8 months) and young cattle (between 8 and 12 months), increased by about 4% in the EU-28 and 6% for the EU-15. In addition, the average carcass weight of calves and young cattle increased by 7% during this period (EUROSTAT, 2015). The chief producers of veal and young beef (in thousands of tonnes of carcass weight) are Spain (237.6), the Netherlands (217.2), France (209.2), and Italy (101.7), which together account for 78% of total production of this meat category (EUROSTAT, 2015). Veal production in other European countries is limited or restricted due to animal welfare concerns.

Beef consumption is highly varied across the EU. The average beef and veal consumption in the EU-28 in 2015 was 10.7 kg per capita, accounting for 18% of total meat consumption (EC, 2016). Among the traditional consumer Member States (countries of the old EU-15), beef consumption (per capita/year) was highest in the United Kingdom, at 21.1 kg, Italy at 25.0 kg, France at 26.1 kg, Denmark at 27.4 kg, and Luxembourg at 29.5 kg (EC, 2009). The average per capita veal consumption in Europe in 2008 was 1.6 kg, with the largest intake in France and Italy (4.1 and 3.5 kg) (Sans & De Fontguyon, 2009).

There is a demand for veal among many European consumers because it has traditionally been considered a healthy product of the highest quality, with low fat content and a good smooth flavour (Vieira, García, Cerdeño, & Mantecón, 2005).

* Corresponding author.

E-mail address: mariusz.florek@up.lublin.pl (M. Florek).

The total value of the meat is determined by the intrinsic and extrinsic cues used by consumers to form expectations about beef quality (Grunert, Bredahl, & Brunso, 2004). It is worth noting that consumers' prioritization of safety, efficiency, technological value, sensory and nutritional qualities, convenience, and other considerations (such as the water or carbon footprint) depends on geographical location, with more emphasis on environmental and social concerns in Europe (Hocquette & Chatellier, 2011). Feeding and management practices change to accommodate new consumer demands regarding food origin and environmental concerns. The majority of the world's beef is produced using grazing pastures based on extensive rearing systems, recognized as low-cost solutions. In particular, natural and animal-friendly meat production systems satisfy the demands of retailers and consumers. In addition to these idealistic aspects, a key determinant of food quality is its healthiness and nutritional value for the customer (Schor et al., 2008).

Milk serves as a source of concentrated, high-energy nutrition, which increases reserves of fat in suckling animals (Moreno et al., 2006; Vieira et al., 2005). Therefore, the length of the suckling period may cause differences in calf carcass and veal characteristics, which has been reported in milk-fed animals (Bispo, Monserrat, González, Franco, & Moreno, 2010a; Florek, 2009). Owing to the peculiar digestive and metabolic characteristics of young calves, in which the effect of diet on body composition is of special importance, it may be assumed that the meat and fat of calves reared with cows and receiving milk until slaughter should display distinct characteristics from calves reared under intensive production systems (Vieira et al., 2005). Furthermore, Ruiz de Huidobro, Miguel, Onega, and Blazquez (2003) pointed out that veal production utilizing natural milking, local pastures and partial supplementation with concentrate was directly shown to be a more economical option. If this is accompanied by improved meat quality it could provide an added benefit for local beef producers and consumers.

Hence the objective of this review was to summarize the carcass quality and characteristics of veal from calves reared with cows under different production systems in the European Union.

2. Systems of calf rearing in Europe

In compliance with applicable European Union legislation, veal is defined as the meat of bovine animals aged less than 8 months at slaughter (category V); however, management systems and meat features are not regulated. Bovine animals aged from 8 months to less than 12 months should be classified as category Z. Additionally, in the Member States it may only be marketed under the relevant sales description for each Member State, e.g. Jungrindfleisch (Austria, German), rosé veal (Ireland), or carne de ternera (Spain). The term 'beef' is equally used for the meat of older (from 12 months) male and female bovine animals (EU, 2013). According to the United Nations Economic Commission for Europe (UNECE, 2011), veal products are derived from young bovine animals in accordance with requirements arising from the regulations of individual countries. The following categories are distinguished: i) female (heifer), castrate (steer) or intact male (bull) that has no permanent incisor teeth; ii) animals not exceeding 8 months of age (in compliance with EU regulations); and iii) animals aged from 8 to 12 months. Additionally, a production system (intensive, extensive, organic or other), feeding system (whole milk, fed by mother, formula, combination, or free of GMO (genetically modified organisms), GP (growth promoters), IAO (ingredients of animal origin) or FM (fish meal)), or other requirements may be specified.

Most of the veal is obtained conventionally from calves largely representing a by-product of dairy husbandry. The European legislation banned the use of crates for calves in 2006 (EC, 2008). Pure dairy-bred male calves (Holstein and Holstein-Friesian (HF) types) are the most commonly used for veal production. For instance, in the United Kingdom two different systems of veal production are used, i.e. calves up to 6–7 month of age and between 270 and 300 kg live weight,

producing smaller carcasses (130–150 kg), and animals at 10 months and between 400 and 420 kg live weight, producing larger carcasses (200–215 kg) (EBLEX, 2011). Belgium produces almost exclusively white veal according to specific production type, which is based on different breeds. In most herds, dairy calves (red and black HF, 60%) are raised, but also purebred double muscled Belgian Blue (BB, 15%) calves and crossbreds (predominantly HF × BB, 25%). To obtain white meat, veal calves are maintained under specific housing conditions (no access to soil or conventional roughage) and are fed specific milk diets to ensure low iron intake (Pardon et al., 2014).

Constant changes in consumer demands force producers to maintain the high quality of veal while taking into consideration animal welfare. In order to accomplish the intended purpose of production, several milk feeding systems are used. These include once or twice a day or ad libitum feeding systems with different types of milk replacers, supplemented with concentrates or rolled cereal and straw. The finishing diet may contain maize silage with a cereal, but grass-based feeds should be avoided. The term 'Rosé veal' may be applied to meat from animals under 12 months old. After the age of 8 weeks the animals must be fed ad libitum on a varied diet containing straw and concentrate or meal, and reared in a welfare-friendly environment (loose housing in open yards) (EBLEX, 2011).

In Poland, young calves are traditionally fed on whole milk alone for 50–60 days, up to the weight of 80 kg. The next stage of feeding for white meat calves or 'baby beef' (live weight of more than 120 kg) is based solely on milk replacers. Veal production in Poland also involves suckler beef to a limited extent, comprising mainly Limousin calves reared by their dams on the pasture. These animals are usually slaughtered at weights ranging between 250 and 350 kg, shortly after weaning (Florek, Litwińczuk, Skąlecki, Kędziarska-Matysek, & Grodzicki, 2012). The significant popularity of the Limousin breed in Poland (for over 25 years) (Zalewski et al., 1998) derives from its excellent meat and carcass qualities, mainly its high proportion of muscle and low fat content (Litwińczuk, Florek, Stanek, Skąlecki, & Jankowski, 2001; Litwińczuk, Stanek, Jankowski, Domaradzki, & Florek, 2013; Nogalski et al., 2013). Limousin calves are often used as suckler beef in other European countries, such as Germany (Golze, 2001), Switzerland (Razminowicz, Kreuzer, & Scheeder, 2006) and Austria (Terler, Velik, Häusler, Kitzer, & Kaufmann, 2014). In France, in addition to 'baby beef' calves, there are a few local categories of the Limousin breed, i.e. de Saint Etienne calves (age – 79 months and body weight 250–350 kg), d'Aveyron calves (8–10 months and 350–450 kg) or older and heavier ones—the Lyon type (12–16 months and 400–600 kg) (Florek, Stanek, Litwińczuk, & Żółkiewski, 2013).

The majority of veal in Croatia is produced from Simmental calves fed with milk (Kelava, Konjačić, Ivanković, Ramljak, & Kos, 2009). In Slovenia, the most widespread breed in suckler herds is locally adapted Simmental cattle. However, an increasing number of purebred beef cattle, such as Charolais and Limousin, are reared in a cow-calf system on pastures (Čepon, Simčič, & Malovrh, 2008). In Romania, the Limousin breed was introduced in 2001 and is an alternative for farmers, valued for its precocity, adaptability, resistance, feed efficiency and strong maternal instinct (Parvu, Andronie, Simion, & Amfim, 2015).

Local bovine breeds reared in Mediterranean areas have received renewed interest due to the European Union policy of promoting and supporting the production of indigenous cattle well adapted to their environment, which are commercialized with a 'certification of origin' (Costa et al., 2008). Protected Designation of Origin (PDO) meat products are certified by European Union legislation and should represent unique quality and organoleptic characteristics (EU, 2012).

The largest population among cattle breeds in Portugal is Mertolenga. In the case of purebred animals, they can be marketed as Mertolenga-PDO beef and Mertolenga-PDO veal. However, 'Vitela Tradicional do Montado' PGI veal is obtained from crossbred animals, mainly with Limousin and Charolais sires (Monteiro et al., 2013). All animals are reared in a traditional semi-extensive production system

Download English Version:

<https://daneshyari.com/en/article/5543223>

Download Persian Version:

<https://daneshyari.com/article/5543223>

[Daneshyari.com](https://daneshyari.com)