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Influence of familiarity with goat meat on liking and preference for capretto and chevon

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ABSTRACT

The research aimed at assessing liking and preference for capretto and chevon as a function of consumer familiarity with goat meat. Five meats were produced: traditional milk capretto (MC), heavy summer capretto (HSC), summering (SCh), fall (FCh) and late fall chevon (LFCh). HSC was the most tender meat, having less cooking losses than both MC and redder chevon types. The instrumental profile corresponded with the appearance and texture attributes perceived by panellists. With aging of kids, meat lost its milk aroma (MC) and sweet taste (HSC) and acquired an increasing intensity of goat flavour and livery notes, partially related to feeding regime and fatty acid profile. A niche market preferred chevon over capretto, while the cluster of consumers who were unfamiliar with chevon showed a decrease in pleasantness when tasting chevon, the familiar group reduced their ratings only for meat from the oldest kids.

1. Introduction

Goat husbandry in Italy is aimed at milk and cheese production. In 2010 year, goat meat production was 2103 tonnes in Italy. In particular, 86.7% of slaughtered goats were young animals that weighed less than 10 kg (ISTAT, 2010). The "capretto", i.e. four to seven-week old kid fed on milk (Piasentier, Mills, Sepulcri, & Valusso, 2000; Piasentier, Volpelli, Sepulcri, Maggioni, & Corti, 2005), is the traditional and, still, the main meat product (Boyazoglu & Morand-Fehr, 2001) in this class. It is a major component of farm income during the Easter (regular kidding) and Christmas (early, de-seasoned kidding) times. However, not all the young kids are available during these holydays periods, because of late births that occur randomly or are programmed to extend the dairy season. Moreover, the concentration of demand during these peak periods also concentrates imports at these times, with an increased availability of capretto that forces prices down (Rubino & Claps, 1995). As a consequence, there is producer interest to diversify fresh goat meat offerings, to provide heavier carcasses and chevon meat beside traditional capretto outside the peak demand periods.

Animal age, changes in feeding regime, birth, rearing and slaughter season modify the intrinsic characteristics of goat meat (Bas, Dahbi, El Aich, Morand-Fehr, & Araba, 2005; Casey & Webb, 2010; D'Alessandro et al., 2013), including its perceived appearance, texture, taste and flavour (Madruga & Bressan, 2011). Sensory diversity is an important factor in consumer attitudes towards meats (Sañudo et al., 2007), but chevon may not be well appreciated and valued in the market. Indeed, in Italy, while capretto meat is considered a delicacy, like in France and Latin America (Naude & Hofmeyr, 1981), fresh meat from later matured goats has no real market, except in some southern regions of Italy, such as Puglia and Calabria for 3–4 month old animals sold during summer, and a few traditional areas for does and bucks. Most of this meat is used for processed products (Rubino & Claps, 1995).

A limited or a complete lack of prior experience with a food (Verbeke & Vackier, 2004) or with its flavour principles (Prescott, Young, Zhang, & Cummings, 2004) may result in poor consumer acceptability for it. On the other hand, familiarity for products with similar sensory profiles, i.e. familiar flavours, can provide a context for newly developed foods, signalling their palatability and safety, thus increasing their liking and purchase (Prescott et al., 2004). Deliza and MacFie (1996) and Tuorila et al. (2008) demonstrated that familiarity is one of the most important drivers of preference for food products, because it reduces product uncertainty and leads to a more likely match between expectations and product characteristics.

The purposes of the research were: i) evaluating the most important properties of representative types of goat meat, comprising traditional capretto and chevon from older animals unsold at Easter or born too late to be finished for the Easter period, paying particular attention to the sensory aspects directly perceivable by consumers; and ii) investigating the variability and structure of liking for goat meat by consumers who differ in their familiarity with the product.

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2. Materials and methods

2.1. Goat meat procurement

The goat meat was obtained from 38 buck kids of Alpine breed, born in six farms of the Friuli Venezia Giulia region (N–E Italy), randomly allotted into five groups: traditional milk capretto (MC), heavy summer capretto (HSC), summering chevon (SCh), fall chevon (FCh) and late fall chevon (LFCh) (Table 1). The kids were suckled by dams in the farms of origin up to weaning at 1–1.5 months, when the MC group was slaughtered in April. After weaning, the kids of SCh group were moved, within the dams' flocks, to mountain farms and reared at pasture until slaughter, which occurred in late July (4–5 months of age). The remaining kids were brought into the experimental farm of the University of Udine and fed with a mixed diet (Table 1) in multiple boxes on straw until slaughter, which occurred at the beginning of July for the HSC group (3–4 months of age), at the beginning of October for FCh group (5–5.5 months of age) and in late November for LFCh group (5.5–6 months of age; born later at the end-season).

Twenty four hours after slaughtering at an EU-licensed abattoir and after dressing using standard commercial techniques, the carcasses were weighed (Table 1) and visually evaluated for meat and fat colour and for kidney and subcutaneous fat deposition. Finally, the carcasses were divided into thighs, shoulders and trunk (Colomer Rocher, Morand-Fehr, & Kirton, 1987). All procedures met the requirements of the European Commission Directive, 86-609-EC for Scientific Procedure Establishments.

Muscles *Longissimus lumborum* (LL) and *thoracis* (LT) were obtained from the left and right trunk. pH measurement, using a glass piercing electrode (Crison 52-32) connected to a Hanna HI8424 (HANNA Nord Est Srl, Italy) pH meter and instrumental analyses were conducted on samples of right LL, after one day (pHu) and seven days of ageing, respectively. The samples for chemical analysis were taken from the right LT 24 h after slaughtering and immediately stored at −20 °C until analysis. The sensory profile was performed on the left LT (panellist training) and LL (sensory profile), and the consumer test was performed on slices of thigh, all of them stored at −20 °C after seven days of ageing.

2.2. Instrumental analysis

The meat colour was evaluated on fresh samples of right LL at 48 h after slaughtering according to the CIE L*, a*, and b* colour system by a Minolta CM-2600d Spectrophotometer (Minolta Camera, Osaka, Japan) with D65 as light source, with a measured area diameter of 8 mm and 10° of observer angle. Slices of LL muscle of 2 cm thickness were cooked in a waterbath in plastic bags at 75 °C for 45 min. Each slice of meat was weighed before and after cooking (drying with paper and cooling until 4 °C). The cooking loss (CL) was calculated as the difference between the weight before and after cooking and expressed as a percentage of the initial sample weight. Shear force was measured on cooked loin (see CL), using a Warner–Bratzler device (Warner–Bratzler Share Force, WBSF) with a triangular hole of 60° in the shear blade, mounted on a Lloyd TA Plus texture analyser (Llyod, UK). The samples were cylinders 15 mm in diameter (7 sample/slice). Samples were made in the fibre direction and cut perpendicularly to the fibre direction. Test speed was 100 mm/min. Texture parameters measured were maxim force and total work of the test.

2.3. Chemical analysis

Extraction of total lipids was performed according to the procedure of Folch, Lees, and Sloane-Stanley (1957) on LT samples. A total of 15 mg of nonadecanoic acid (C19:0) was added to a 1.5 g sample of minced meat sample and homogenized in 30 mL of a chloroform–methanol mixture (2:1 *v*/*v*) using an Ultra-Turrax homogenizer (T 25 basic; Ika-Werke, Staufen, Germany). Fatty acid methyl esters (FAME) were prepared using methanolic HCl (Sukhija & Palmquist, 1988) and were separated using a Carlo Erba gas chromatograph (GC) (HRGC 5300 mega-series; Rodano, Milan, Italy) equipped with a 60 m SP-2380 fused silica capillary column (0.25 mm i.d., film thickness 0.25 μm; Supelco Inc., Bellafonte, PA). The oven temperature was increased from 160 to 180 °C at 1 °C/min, from 180 to 260 °C at 5 °C/min and then held at 260 °C for 5 min. Helium was used as the carrier gas at the rate of 1.2 mL/min, and FAME were identified using external standards (Supelco 37-component FAME mix including conjugated linoleic acids; Sigma-Aldrich, Milan, Italy). The FAME were quantified comparing the retention time with the internal standard (C19:0) and were expressed as the percentage of the total lipids that were identified.

2.4. Sensory analysis

The samples of the five goat meat types were presented monadically, randomized between subjects and sessions. Both trained descriptive panellists and consumers performed their evaluations in individual booths in a sensory laboratory (Meilgaard, Civille, & Carr, 2007). The appearance evaluation was carried out on raw meat samples under incandescent white light. The taste of meat samples was evaluated after portioning and cooking. The firing was done in a convection oven with humidity control (Self Cooking®, Rational AG, Landsberg, DE), until reaching 70 °C at the heart of the product in approximately 5 min, monitored by an internal thermocouple. The samples were labelled with numeric codes and their taste was assessed under red light. The assessors were instructed to rinse their mouth by eating a piece of carrot and drinking a sip of water, before starting the analysis and between each sample.

Table 1
Age, feeding regime, live weight (LW), cold carcass weight (CCW) and number of ram kids per goat meat type.

		Goat meat type					SEM	Significance of "kid age" contrasts[c]			
		MC	HSC	SCh	FCh	LFCh		S*v*W	H*v*C	$G_c vM_c$	F*v*L
Kids	No.	10	7	7	7	7					
Age	Months	1–1.5	3–4	4–5	5–5.5	5.5–6					
Feeding regime		Suckled milk	Mixed diet	Grazed herbage[b]	Mixed diet	Mixed diet					
Hay[a]	g/d	–	530	–	390	340					
Concentrate[a]	g/d	–	410	–	740	780					
LW	kg	11.3	19.1	23.3	24.8	26.4	0.34	0.000	0.000	0.021	
CCW	kg	5.34	7.91	10.61	11.06	11.49	0.170	0.000	0.000		

MC = traditional milk capretto, HSC = heavy summer capretto, SCh = summering chevon, FCh = fall chevon and LFCh = late fall chevon.

[a] Average daily intake in the last two months before slaughtering. Meadow hay: DM = 89%; CP = 9%DM; NDF = 62%DM. Commercial concentrate: DM = 89%; CP = 18%DM (15%DM for LFCh); NDF = 29%DM (22%DM for LFCh).

[b] Mountain pasture based on: *Phleum alpinum*, *Festuca pratensis*, *Poa alpina*, *Trifolium repens* and *pratense*.

[c] Contrast: S*v*W, suckling vs. weaned rams, i.e. MC vs. mean(HSC,SCh,FCh,LFCh); H*v*C, heavy summer capretto vs. chevon, i.e. HSC vs. mean(SCh,FCh,LFCh); $G_c vM_c$, grazing vs. mixed diet fed chevons, i.e. SCh vs. mean(FCh,LFCh); F*v*L, fall vs. late fall chevon, i.e. FCh vs. LFCh.