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Sensory characteristics of *prosciutto* (dry cured ham) and *fiocco* obtained from pig ancient autochthonous genetic type (AAGT) *Casertana*[1]

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SUMMARY – The aim of this study was to evaluate the sensory characteristics of two products: *prosciutto* (dry cured ham) and *fiocco*, seasoned for 24 and 12 months respectively, obtained from castrated males and entire females of pig AAGT *Casertana*. On 18 hams and 20 *fiocco*, at the end of the ripening period, colour profile (L*, a*, b*) with spectrophotometer (U3000) and rheological traits of single muscle with TPA and compression test were detected. The results showed values of redness and yellowness significantly lower in *fiocco* in comparison with *prosciutto*, which provides better rheological characteristics due to the longer seasoning period, hence the higher proteolysis and lipolysis. Females provided both products with better traits in comparison with males ($P < 0.05$).

Key words: *Fiocco*, dry cured ham, *Casertana*, pig.

RESUME – *"Caractéristiques sensorielles du* prosciutto *(jambon sec) et du* fiocco *issus de porcins de l'ancien type génétique autochtone* Casertana *(TGAA)". L'objectif de l'étude a été l'évaluation qualitative de deux produits : le* prosciutto *après un temps d'affinage de 24 mois, et le* fiocco*, après un temps d'affinage de 12 mois, tous deux issus de mâles castrés et de femelles entières appartenant à l'ancien type génétique autochtone (TGAA)* Casertana*, élevés principalement en Campanie (Italie). Sur 18* prosciutti *et 20* fiocchi *à la fin du séchage ont été relevés : la couleur (L*, a*, b*), en utilisant le spectrophotomètre U3000 muni d'une sphère intégratrice, et les caractéristiques rhéologiques de chaque muscle par le tessurometer et l'Instron. Les résultats ont mis en évidence des valeurs de rouge et de jaune de façon significativement inférieures dans le* fiocco*, par rapport au* prosciutto *qui, à cause d'un plus long temps d'affinage et, donc, d'une plus grande protéolyse et lipolyse, a montré de meilleures valeurs des caractéristiques rhéologiques. Les deux produits fournis par des femelles se sont révélés meilleurs.*

Mots-clés : Fiocco*,* prosciutto*,* Casertana*, porc.*

Introduction

The *prosciutto* of Parma is now known in worldwide for its particular characteristics as well as Serrano, Iberico and Bayonne, typical productions of the different Mediterranean countries, that occupy important market niches. The *fiocco*, or *culatello*, as it is named in Northern Italy, is, together with the ripened *prosciutto*, a pig product of remarkable value; it derives, similarly to *prosciutto*, from leg and has a ripening period of 12 months. On the contrary, the typical traditional *prosciutto* has a longer ripening period: 24 months and it's usually obtained from ancient autochthonous genetic type (AAGT).

In the last years, consumer's attention is increasingly orientated towards the rediscovery of some typical traditional productions obtained from AAGT. *Casertana* is one of these pig AAGT and its productive revaluation and utilization has involved us from several years. The results of other

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research point out that *Casertana* pig has peculiar qualitative characteristics of raw matter, essential requisite for obtaining ripened products of quality (Matassino *et al.*, 1991; Zullo *et al.*, 2003). In this study the results concerning some qualitative characteristics (rheological and colorimetric) of *fiocco* and *prosciutto*, detected at the end of the ripening, obtained from castrated males and entire female of *Casertana* AAGT are reported.

Material and methods

The study compared 20 fiocchi (10 obtained from castrated males and 10 from entire females) and 18 prosciutti (13 obtained from castrated males and 5 from entire females) of *Casertana* AAGT. The pigs were reared in multiple boxes at ConSDABI experimental farm and slaughtered at 160 kg of live weight. The two products were ripened for 12 and 24 months respectively at salumificio in Circello (BN).

At the end of the ripening period, from each products a slice of not less than 1.5 cm of thickness was removed for the relief of sensory characteristics.

The determination of colorimetric (L*, a*, b*) and rheological (hardness, cohesiveness, springiness, adhesiveness, chewiness) characteristics was performed using U3000 Spectrophotometer (Hitachi), equipped with integrating sphere, and Texturometer (Zenchen Tockio) separately on three different muscles: *Biceps femoris* (Bf), *Semimembranosus* (Sm) and *Semitendinosus* (St), as well as on the backfat. Furthermore, using Instron Universal Testing Machine, model 5540, compression parameters were detected: hardness, elasticity, cohesiveness and chewiness.

Data were elaborated by MIXED (SAS, 2004) procedure using the subject as casual factor and the sex as fixed factor. In order to obtain a total estimation of the product value, the muscles were considered as repeated measure. The evaluation of the effect of the muscle as fixed factor was obtained by GLM procedure. The significance of the differences between the means was evaluated by Students' t test.

Results and discussion

The qualitative answer obtained by the texture profile analysis evidenced higher values ($P < 0.05$) of hardness (21%), springiness (25%) and chewiness (26%) in the *fiocco*, if compared with *prosciutto*, when it was obtained from castrated male (Table 1).

Table 1. Effects of sex [castrated males = (♂), and entire females = ♀] on qualitative traits of *fiocco* and *prosciutto*

Characteristic	Product	Sex		Comparison between sex
		(♂)	♀	
Hardness	*Fiocco*	22.96[a]	16.85	xxx
	Prosciutto	19.24[b]	16.34	
Elasticity	*Fiocco*	4.30[A]	6.07	xxx
	Prosciutto	5.57[B]	5.83	
Cohesiveness	*Fiocco*	0.47	0.23	x
	Prosciutto	0.31	0.28	
Chewiness	*Fiocco*	21.07	25.40	
	Prosciutto	24.37	24.37	

[a,b]$P < 0.05$; [A,B]$P < 0.01$.

On the contrary, there were no significant differences between the two products obtained from the entire female, even if the values tended to be higher in the *prosciutto*.

The slice of *fiocco*, under 70% compression, in the castrated males, requires a maximum load of more than 17% ($P < 0.05$) in comparison with slice of *prosciutto* as it is harder by 22% and less springy by 27%. There was no significant difference between the two products obtained from the entire female. The results obtained suggest that the ripening for 24 months determined a product with better rheological characteristics which may be explained by slower proteolysis and lipolysis which in *prosciutto* reduce some possible differences due to the sex that are detectable in the *fiocco* also after 12 months. Čandek-Potokar *et al*. (2002) observed that *prosciutto* obtained from the female has a more compact texture due to a lower content of intramuscular fat, in disagreement with Matassino *et al*. (1987), who on eight pig genetic types reported higher tenderness for *prosciutto* derived from females. The Italian typical traditional *prosciutto*, in comparison with the other Mediterranean prosciutti, such as Serrano, Parma or Corso evidenced lower values for hardness and chewiness (Monin *et al*., 1996).

In both products, the *Semitendinosus* is lighter, less red and has a lower value ($P < 0.05$) of chewiness, springiness and hardness, while the *Semimembranosus* has different characteristics (Table 2).

Table 2. Mean value of qualitative characteristics of muscles of *fiocco* and *prosciutto* separately for castrated males [(♂)] and entire females [♀]

Trait	Product	(♂)				♀			
		Fat	Muscle			Fat	Muscle		
			Bf	Sm	St		Bf	Sm	St
Illuminant A									
L*	*Fiocco*	66.65	37.93^{b}	37.12^{b}	34.09^{a}	62.57	36.70^{b}	36.88^{b}	33.95^{a}
	Prosciutto	70.12	35.08^{b}	36.24^{b}	32.95^{a}	67.31	39.75^{A}	38.67^{B}	33.47^{A}
a*	*Fiocco*	5.95	9.08^{A}	9.72^{A}	6.16^{B}	2.99	12.58	11.28	8.05
	Prosciutto	5.20	10.66^{A}	11.44^{A}	8.37^{B}	5.97	13.70	13.93	10.97
b*	*Fiocco*	7.77	7.78	8.09	7.52	6.04	6.69	5.87	5.18
	Prosciutto	9.57	7.10	8.33	7.09	8.98	8.18	9.80	10.72
Compression test									
Hardness	*Fiocco*	18.24	25.62	33.66	16.15	10.65	18.26	27.89	9.35
	Prosciutto	15.31	23.17	22.96	15.44	13.59	17.74	22.20	11.84
Elasticity	*Fiocco*	3.80	3.58	4.34	4.42	6.33	6.07	6.05	6.41
	Prosciutto	6.21	4.56	5.53	5.95	6.47	5.25	5.10	6.59
Cohesiveness	*Fiocco*	1.05	0.52	0.32	0.30	0.09	0.28	0.28	0.28
	Prosciutto	0.10	0.45	0.32	0.32	0.15	0.32	0.33	0.25
Chewiness	*Fiocco*	23.70	31.20	47.49	17.80	6.40	28.55	47.69	16.77
	Prosciutto	9.19	20.30	38.43	30.24	10.00	26.86	39.29	19.80
Texture profile analysis									
Hardness	*Fiocco*	7.36	4.47	6.27	4.34	4.71	3.42	5.78	3.38
	Prosciutto	6.38	4.19	4.97	3.06	5.63	4.08	4.62	2.54
Springiness	*Fiocco*	12.79	12.84	12.78	12.84	12.75	12.87	12.79	12.85
	Prosciutto	12.72	12.70	12.80	12.83	12.73	12.72	12.73	12.72
Gumminess	*Fiocco*	391.50	310.49	445.06	299.70	246.05	232.04	384.45	210.43
	Prosciutto	337.55	288.35	337.99	199.06	318.61	291.03	306.65	154.92
Chewiness	*Fiocco*	5011.11	3970.73	5682.81	3879.06	3137.67	3000.16	4926.82	2733.14
	Prosciutto	4296.86	3661.40	4331.57	2559.25	4057.00	3704.55	3904.10	1972.21

$^{a,b}P < 0.05$; $^{A,B}P < 0.01$.

In comparison with *prosciutto*, *fiocco* appeared globally less red and its outer fat has lower values of lightness ($P < 0.01$) and yellowness ($P < 0.01$). On the contrary, there were no differences between the two products as regards lightness of the lean portion (Table 2).

Conclusions

Qualitative characteristics of *prosciutto* were significantly different from those of *fiocco*, showing lower values of cohesiveness, springiness and chewiness.

At the light of the results obtained, the productive use of ancient autochthonous genetic types might be addressed to products characterized by long ripening periods, which allow to raw matter to express better the qualitative potentiality, probably also due to a slower proteolysis and lipolysis.

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