

TRADITIONAL ITALIAN HAM: RECENT TRENDS IN FAT CONTENT AND FATTY ACIDS PROFILE

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Abstract – The rearing of the Italian heavy pigs is mainly intended to the production of hams. In order to maintain quality and avoid imitations, most of the Italian production of ham is protected by Protected Designation of Origin (PDO) and protected Geographical Indication (PGI) in agreement with the European Union for preserving regional foods. The work describes how the fat content and fatty acid profile have recently changed compared to the past. Six types of Italian hams were sampled: four dry cured hams (PDO Modena, PDO Parma, PDO San Daniele and Nazionale), one cooked ham (cotto) and one smoked ham (PGI Speck). Both fat and fatty acids composition was compared with values from a similar survey carried out in 1993. The Polyunsaturated/Saturated (P/S) ratio was used as criteria to evaluate the nutritional quality of fat.

Key Words – ham, fatty acids, P/S ratio.

I. INTRODUCTION

The Italian name for ham is *prosciutto* and it comes from the Latin meaning "deprived of liquid." Many varieties of *prosciutto* exist in Italy and their different taste is related to several factors. Italians call their dry-cured ham *prosciutto crudo*, cooked ham *prosciutto cotto* and smoked ham *speck*.

Fat is an important attribute of the technological and sensory quality of cured ham (dry, cooked and smoked) [1].

The key changes occurring during ham seasoning are related to water loss, salt intake, lypolysis and proteolysis. These processes affect the texture as well as the development of specific taste and aroma; if the process is too intensive, it can lead to sensory defects that alter the quality of the product. To meet consumer demands, numerous strategies for reducing fat content have been tested by manufactures but each strategy presents challenges to the processing technology and might also alter

the sensory and nutritional quality of the meat cured products.

Minister of Agriculture Food and Forestry (MiPAAF) is the Italian authority for food monitoring. A systematic monitoring of the Italian foods was undertaken in 1946, registering and following changes in the food composition and to estimate the significance of these changes in the Italian diet. A considerable part of the data is collected in the Italian Food Composition Tables (IFCT) published by the Italian Research Institute on Food and Nutrition (INRAN) [2]. The latest INRAN study on the nutritional quality of hams dates back to 1993 (data not published).

As food composition information are addressed to a wide range of users, accuracy, precision and continuous updating of the food composition tables are requested. Data are used in the public administration, in the food industry and for the calculation of the nutrient intake. The purpose of this study was to update the data of nutrient of different types of hams produced in Italy. In this work data on fat content and fatty acid profile are discussed focused on the PUFA/SFA. Furthermore, fat content and fatty acid profile were compared with those obtained in the previous INRAN study to assess changes in the nutritional quality of ham fat along with time.

II. MATERIALS AND METHODS

Six types of hams were sampled: 4 dried-cured hams (San Daniele, Modena, Parma, Nazionale), 1 cooked ham (cotto) and 1 smoked ham (Speck from Alto Adige). Samples were studied selecting products among the most representative in Italy. The selected samples were provided by five manufacturers; manufactures sent two items for

each sample. Sampling was carried out following the guidelines of Greenfield and Southgate [3].

Moisture, ash, protein and lipid analyses were performed following the AOAC method [4].

Fatty acids analysis. Total lipid extraction was carried out according to Bligh and Dyer method [5]. The preparation of fatty acid methyl esters was performed through acid-catalysed transesterification with methanolic hydrogen chloride (5%) according to Christie [6]. Fatty acid separation and identification were performed on a 7890 A GC system (Agilent Technologies), equipped with a microfluid 2-way splitter for simultaneous data acquisition using two different detectors: a FID and an Agilent 5975 MS detectors.

III. RESULTS AND DISCUSSION

The results obtained for proximate and fatty acids composition are reported in table 1.

The water content of dry cured hams ranged from 45.6% to 50.5 %, while lipid content ranged from 13.7% to 22.9%. The lipid content, both for dry cured and smoked hams, was similar to that found in our previous study [2]. Cooked ham showed the highest water content (72.2%) and the lowest lipid content (7.6%) and data were not comparable with those reported in our database (62.8% and 14.7% respectively).

Table 1 also shows the fatty acid (FA) profile of each variety of analyzed ham. FA were reported as net amount (g/100g lipid) in order to amend the differences in muscle composition. Hams showed differences in fatty acid composition.

All the samples analysed showed a considerable percentage of oleic acid (C18:1) followed by palmitic acid (C16:0). Among the saturated fatty acids, palmitic and stearic acids were found to be the dominant ones in all the sampled hams. Approximately half of the SFA was palmitic acid and about a third was stearic acid. Myristic acid showed values ranging from 1.67% to 2.02%, while the others SFA were minor components.

Concerning MUFA, oleic was the main fatty acid in all samples showing values over 40%, followed by palmitoleic acid ranging from 2.82 to 3.09% of total fatty acids.

The percentage of polyunsaturated fatty acids (PUFA) varied from 6.70% in cooked ham to 17.69% in Speck; dry cured ham showed similar values for PUFA profile ranging from 14.2%

determined in “San Daniele” ham to 15.02 % in “Parma” ham. Cooked ham had the lowest PUFA content compared to the other samples.

Table 1 Water (%), lipid(%) and fatty acid profile (% of total fatty acid) of the varieties of Italian cured hams (means of observation for each group)

Item	Modena	Nazionale	Parma	San Daniele	Cotto	Speck
	Dry cured				Cooked	Smoked
Water	45.6	50.5	50.3	50.2	72.2	43.6
Lipid	22.9	13.7	18.3	18.6	7.6	19.1
<i>Fatty acid</i>						
C _{10:0}	0.24	0.23	0.14	0.19	1.02	0.19
C _{12:0}	0.15	0.15	0.12	0.13	0.17	0.35
C _{14:0}	1.67	1.70	1.56	1.67	1.72	2.02
C _{16:0}	23.33	23.73	22.56	23.23	27.25	22.33
C _{17:0}	0.23	0.26	0.21	0.21	0.39	0.31
C _{18:0}	10.47	10.78	10.32	10.88	13.63	10.95
C _{20:0}	0.15	0.13	0.14	0.14	0.17	0.13
SFA	36.24	36.98	35.05	36.45	44.35	36.28
C _{14:1}	0.03	0.03	0.00	0.02	0.06	0.04
C _{16:1}	3.04	2.95	2.82	2.87	3.09	2.95
C _{17:1}	0.26	0.30	0.25	0.24	0.36	0.36
C _{18:1}	45.01	44.39	45.79	44.29	44.45	41.68
C _{20:1}	0.95	0.84	1.00	0.90	0.73	0.78
MUFA	49.29	48.51	49.86	48.32	48.69	45.81
C _{18:2}	12.73	12.27	12.70	13.32	6.14	15.00
C _{18:3}	0.65	0.94	0.66	0.63	0.42	1.26
C _{20:4}	0.05	1.09	0.84	1.07	0.14	1.43
PUFA	13.43	14.30	14.2	15.02	6.70	17.69
P/S	0.37	0.39	0.41	0.41	0.15	0.49

The lowest PUFA levels found in cooked ham were attributed mainly to the lowest level of linoleic and linolenic acids.

To assess the nutritional properties of ham fat, the PUFA/SFA ratio (P/S) was considered. The recommended P/S value for healthy foods and diets ranges from 0.40 to 0.65 [7].

Figure 1 shows the comparison between the P/S ratio values found in this study (2011) with those obtained from a study carried out in 1993.

The P/S ratio calculated for dry cured hams was higher (0.4) than the P/S ratio found in 1993. Cooked ham and smoked ham showed a reduction of the P/S ratio.

The P/S ratio of cooked ham showed a drastic reduction (67%) with respect to the value obtained in 1993, with a P/S ratio of 0.15.

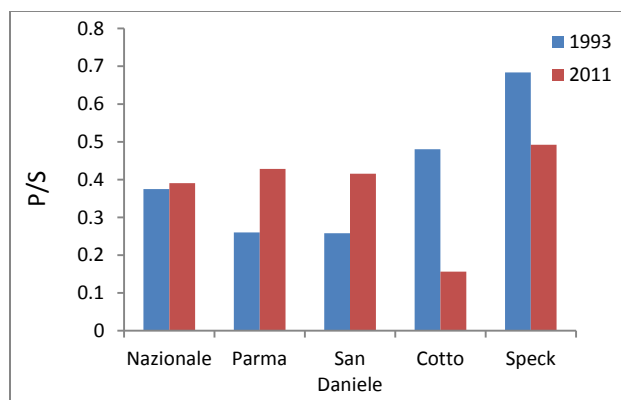


Figure 1. P/S ratio in dry, cooked and smoked ham

The P/S ratio of cooked ham showed a drastic reduction (67%) with respect to the value obtained in 1993, with a P/S ratio of 0.15. Although smoked ham (Speck) showed a marked reduction (30%) in the P/S ratio compared to 1993, the P/S ratio was the highest among the analyzed samples.

IV. CONCLUSION

The continuous changing in pork rearing and feeding as well as the innovative features in meat product manufactures, have led to a qualitative improvement in the fat composition of Italian hams.

The observed trend indicates a reduction in total fat content especially in cooked ham, compared to the past, and a change in the ratio of the fatty acid classes.

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