

## AGING INDEXES IN "IBERICO" HAM\*

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## SUMMARY

The Non Protein Nitrogen (NPN) fraction and the total Free Fatty Acids (FFA) in 32 samples coming from eight regions of the lean part of four individual IBERICO hams have been evaluated.

NPN content ranged from 2,59 to 3,48 mg/g of ham. The FFA ranged from 2,06 to 3,13 % in the different regions in ham. There were significant differences in NPN and FFA content in the eight regions and individual hams. When expressed in different basis (in the dry matter and total protein basis for NPN and in the % of total fat basis for FFA), a different pattern for proteolysis and lipolysis in ham is shown. The conclusion is that proteolysis varies in different regions of ham depending of the drying process. Lipolysis is basically similar in all the regions, without depending of the drying process.

Although the aging period is very large, the extent of both proteolytic and lipolytic processes in the IBERICO ham is lower than in dry sausage.

## INTRODUCTION

The IBERICO ham is the most appreciated meat product of Spain. This traditional product is elaborated with the legs of the IBERICO hogs, a Spanish breed characterized by its high intramuscular fat content. The processing of this type of ham includes a dry salting step of about 15 days and then the hanging of hams in "natural" conditions for aging. The aging period lasts even more than two years.

During the aging period meat products suffer degradation changes in the main meat components, proteins and fats. Usually proteins are degraded to lower molecular compound by proteolysis and fats suffer lipolytic processes. NPN and FFA content in meat products can be used to monitor the extension of these changes (1).

The extent of proteolytic and lipolytic processes can be used to characterize fermented meat products. However ham is not an uniform meat product and there are differences in IBERICO ham due to sample location in sensory properties (2) and chemical composition (3). Similar differences have been shown in Italian hams (4).

## MATERIAL AND METHODS

The 32 samples used in this study were obtained from 8 different locations of 4 individual IBERICO hams, aged in the traditional way for 2 years. The cutting pattern for obtaining the samples has been presented previously (2) but it is also included in this paper in Figure 1.

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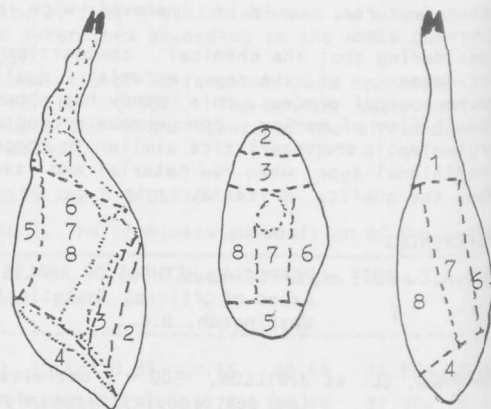


Figure 1: Cutting pattern to prepare the eight regions of ham used in this study (from 2).

After homogenizing, the ham samples were analyzed for total humidity, protein and fat following the AOAC methods. Total NPN content was evaluated in 10 % water homogenates of ham after precipitation of proteins with 5 % TCA acid. Total FFA were evaluated by titrating with NaOH 0,02 N the alcoholic solutions prepared from chloroform extracts(5). The FFA acids are expressed as oleic acid.

## RESULTS AND DISCUSSION

The mean values of the evaluated parameters are presented in Table 1 for the 8 different regions and in table 2 for the 4 individual hams. The Analysis of the Variance of these data is included in table 3.

Table 1: Mean values of NPN and FFA values in the eight regions of IBERICO ham.

region	NPN values			FFA values	
	mg/g HAM	mg/g DM*	mg/g TP*	% HAM	% TF*
1	2.64a	5.21a	13.30a	2.12a	9.78a
2	2.79a	4.44b	8.07b	2.77bc	10.84b
3	3.12b	5.48a	11.22cd	2.58b	10.70b
4	2.79a	5.16a	10.75c	3.13c	9.89a
5	2.68a	4.30b	10.74c	2.86bc	9.13a
6	3.45c	5.75ac	9.00bc	2.06a	11.56a
7	3.42c	6.72d	13.33a	1.89a	9.23a
8	3.27bc	6.31cd	12.96ad	1.74a	9.12a

Table 2: Mean values of the studied parameters in the four individual IBERICO hams.

region	NPN values			FFA values	
	mg/g HAM	mg/g DM*	mg/g TP*	% HAM	% TF*
1	2.59a	4.79a	11.59a	2.65a	11.23a
2	3.05b	5.60ab	11.97a	2.23a	8.20b
3	2.95ab	5.08a	10.34a	2.51a	10.82a
4	3.48c	6.22b	10.81a	2.20a	9.88a

\* DM= total dry matter content

TP= total protein content

TF= total fat content

a,b,c...= means in the same column with different letter are significantly different ( $P > 0.05$ )

Table 3: F values in the Analysis of the Variance of the studied parameters

D.F.	NPN values			FFA values		
	mg/g HAM	mg/g DM(a)	mg/g TP(a)	% HAM	% TF(a)	
regions	7	4.206*	4.034**	2.528*	4.275**	1.987
hams	3	10.146**	4.511*	0.710	1.436	8.679**

(a): DM =total dry matter content  
 TP =total protein content  
 TF =total fat content

\* P 0.95  
 \*\* P 0.99

There were significant differences among individual hams in NPN content when data was expressed on the basis of raw product. However, these differences were less apparent when data was expressed on the basis of dry matter and not significant when data was expressed on the basis of total protein content. The NPN content presented significant differences among regions on all these basis.

These differences in NPN indicate that proteolysis must proceed in different extent in the various parts of the ham. As the lower NPN values correspond to the regions 2 and 4, having the lower water content (3), drying probably reduces proteolysis in IBERICO ham.

The NPN content in the IBERICO ham is similar to the one found in Italian ham (6). These values are lower than the ones found usually in fermented meat products (dry sausage) being 6-9 mg of NPN/g of raw product (1,7,8), in spite of the much longer aging period of ham.

There were also significant differences among regions in the FFA content when the results were expressed on the raw product basis. However these differences were not apparent when the results were expressed on the total fat content basis. Then, it is possible to conclude that the lipolytic process has a similar extension in the fat from the different regions of the ham. The apparent differences in FFA must be due to the different fat content of the 8 considered regions in ham (3).

The values for total FFA in ham of this study are below the 4-7 % of FFA that can be found in dry sausages (1,9). Also lypolysis in IBERICO ham has a lower extension than in dry sausage products.

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