

EFFECT OF PRESERVATION METHOD AND PERCENTAGE OF ONION ON THE PROPERTIES OF “MORCILLA DE BURGOS”

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Keywords: Preservation method, Horcal onion, Morcilla de Burgos.

Introduction

“Morcilla de Burgos” is a popular cooked blood sausage produced in Burgos, in the north of Spain, consisting on a mixture of chopped onion, rice, animal fat, blood, salt and different spices such as black pepper, paprika and oregano. Different types of Morcilla de Burgos can be differentiated depending on the elaboration process, the kind and amount of spices, and the proportion of ingredients used (Santos et al, 2003).

One of the most characteristic ingredients, primordial in the elaboration of Morcilla the Burgos, is the kind of onion used. The most traditional onion is a regional variety known as Horcal. This onion is white, with elliptical shape and bigger size compared with other types of onions. The horcal onion is a seasonal crop (harvest between September and November) with a short period of storage, but it gives to Morcilla de Burgos the best sensory quality. According with the first draft of the regulation to obtain the quality label “Protected Geographical Indication” (PGI), the amount of Horcal onion included in formulation is one of the main factors to classify the different types of Morcilla de Burgos. Three kinds of Morcilla have been defined, the first one, called “Morcilla de Burgos”, is a product with at least 35% of Horcal onion. The second type (“Morcilla de Burgos Tradicional”) must include at least 45% of Horcal onion and the third one (“Morcilla de Burgos Matancera”) includes 50% of Horcal onion.

The purpose of this study was to know the influence of the preservation method and the amount of Horcal onion on the physical-chemical characteristics of Morcilla de Burgos, in order to determine if the percentage of onion is suitable as main factor to classify morcilla and besides to find physical-chemical parameters for PGI control.

Materials and Methods

Sample preparation: Three types of Morcilla, only differing in the percent of onion added, were made. One type was made with 35% of Horcal onion, because this is the minimum amount needed for the morcilla to be called “Morcilla the Burgos”. The second type was made with 20% of Horcal onion, amount that is not included in the regulation for the PGI, and the third type was made with 47% of Horcal onion, because is the middle amount between the percentages proposed in PGI for the other two categories. In this batch of morcillas, the onion was used short time after harvesting (Fresh).

Another two batches of morcilla were made with the same formulation and the same elaboration process. One batch was made with Horcal onion stored nine months under refrigeration at 4°C (Refrigerated), and the other one with Horcal onion ultrafrozen immediately after harvesting and frozen stored for nine months (UF).

Four morcillas (around 300g weight) from each type, randomly chosen, were homogenised in a lab blender and used for physical-chemical analysis.

Physical-chemical analyses: pH, water activity (a_w), moisture content, ether-extractable fat, protein, starch, total sugar, ash and Total Dietary Fiber (TDF) (Hernández et al, 1995) were determined by sixuplicate for each morcilla type.

Statistical analysis: Data were statistically analysed using multifactor analysis of variance (ANOVA) in order to determine the effect of onion percentage and the preservation method of onion on the physical-chemical properties of morcilla. Besides, Principal Component Analysis (PCA) and Discriminant Analysis (DA) were also applied. Data analyses were conducted using the statistical package Statgraphics Plus for Windows ver. 5.1.

Results and Discussion

Table 1 shows the results of the physical-chemical parameters of morcilla. The statistical analysis denotes that the physical-chemical parameters that vary with the onion percentage (Factor A) are pH, moisture, total sugar, ash and dietary fiber. The physical-chemical parameters that vary with the preservation method (Factor B) are pH, moisture, fat, total sugar, ash, dietary fiber and protein. These parameters differ significantly ($p < 0.05$) between the samples with different percent of onion and with different preservation method.

The physical-chemical parameters total dietary fiber, total sugar and pH are linearly related with the percentage of Horcal onion used in the elaboration of morcillas, in this way the pH increased when the percentage of horcal onion added to morcilla decreased, while total sugar and dietary fiber decreased.

Onion preservation method also determined differences between morcillas, so morcilla with fresh onion have higher value for TDF and total sugar, than those made with ultrafrozen onion, and these have higher value than morcilla made with refrigerated onion. The parameter pH varies in a contrary way than TDF and total sugar.

Table 1. Effect of percent and preservation method of onion on physical-chemical properties of "Morcilla de Burgos".

	% ONION (A)			PRESERVATION (B)			A	B
	47	35	20	R	UF	F		
pH	6.39 ^a	6.56 ^b	6.70 ^c	6.63 ^b	6.59 ^b	6.43 ^a	***	***
aw	0.98 ^a	0.98 ^a	0.98 ^a	0.98 ^a	0.98 ^a	0.98 ^a	NS	NS
MOISTURE	56.58 ^a	56.04 ^a	59.37 ^b	56.06 ^a	60.40 ^b	55.52 ^a	***	***
FAT	32.80 ^a	34.08 ^a	33.96 ^a	35.47 ^b	30.58 ^a	34.79 ^b	NS	***
SUGAR	3.91 ^c	3.42 ^b	2.48 ^a	2.38 ^a	3.92 ^c	3.51 ^b	***	***
ASH	3.79 ^a	3.74 ^a	4.02 ^b	3.86 ^b	4.06 ^c	3.64 ^a	**	***
TDF	4.98 ^c	4.08 ^b	3.43 ^a	3.95 ^a	4.02 ^a	4.52 ^b	***	***
STARCH	33.71 ^a	33.13 ^a	33.35 ^a	30.87 ^a	35.49 ^a	33.83 ^a	NS	NS
PROTEIN	13.30 ^a	13.23 ^a	13.30 ^a	13.82 ^b	13.88 ^b	12.13 ^a	NS	**

R: Refrigerated; UF: UltraFrozen; F: Fresh.

Means in a row and within each factor, with different letters (a-c) are significantly different ($p < 0.05$)

NS: not significant. * :($p < 0.05$). ** :($p < 0.01$). ***: ($p < 0.001$).

Principal Component Analysis (PCA) was applied to all physical-chemical data to know the similarities or differences between the nine types of Morcilla analysed. The two first components were extracted. These components accounted for the 58.4% of the variability in the original data. The first and second principal components explained 33.7% and 24.7% of the overall variability, respectively.

The first principal component was defined by the physical-chemical parameters, TDF, total sugar and pH. In this way, morcillas made with 47% of Horcal onion, have a higher value of TDF and total sugar, and a lower value of pH, compare with those morcillas with 20% of Horcal onion. The second component differentiates, although not so clearly, morcillas elaborated with ultrafrozen onion, especially when high percentages were used.

Besides, within each onion percentage, a distribution along PC1 of morcillas made with onion differently preserved was observed. Fresh onion and refrigerated onion were the most different, being the UF onion situated between them. As it was expected, differences between the preservation methods of onion were less pronounced in morcillas made with 20% onion.

Forward method of the step discriminant analysis (SDA) was applied; in this method variables were added one by one according to its discriminant effect. The SDA provided a 6 variable model, which provided a 100% classification of different types of morcilla. This model selected the following parameters in this order: TDF, total sugar, pH, ash, starch and aw.

Conclusions

The method used for the preservation of Horcal onion and percent included in the formulation, have a great influence on the Morcilla characteristics. The parameters closely related to onion effect are dietary fiber, total sugar and pH, so they could be useful indicators for PGI "Morcilla de Burgos" monitoring. However, it must be taking in account that storage period and preservation method of onion also affects morcilla properties, and then, other parameter should be considered to achieve a correct classification of this product within the categories established by PGI.

Acknowledgements

We want to express our thanks to Excm. Diputación Provincial de Burgos for supporting with a grant this project. We also want to express the gratitude to the Junta de Castilla y León project BU 28/04 and to Mercadona S.A for supporting this research project.

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