

# INFLUENCE OF ONION ON PHYSICO-CHEMICAL CHARACTERISTICS OF "MORCILLA DE BURGOS"

I. Jaime, L. González-Arnáiz\*, A.M. Díez and J. Rovira

Department of Biotechnology and Food Science. University of Burgos.  
Pza Misael Bañuelos s/n 09001. Burgos. Spain.  
Email: [ij Jaime@ubu.es](mailto:ij Jaime@ubu.es)

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## Introduction

"Morcilla de Burgos" is a popular cooked blood sausage produced in Burgos, in the north of Spain, consisting in a mixture of chopped onion, rice, animal fat, blood, salt and different spices such as black pepper, paprika and oregano. According with the elaboration process, the kind and amount of spices, and the proportion of ingredients different types of Morcilla de Burgos can be differentiated.

One of the more 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) and a short period of storage, but it gives to Morcilla de Burgos a better 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 will be one of the main factors to classify the different types of Morcilla de Burgos. The project is to establish three types of morcilla, 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 is to determine the influence of Horcal onion on the physico-chemical characteristics of Morcilla de Burgos, in order to determine if the percentage of onion is suitable as a main factor to classify morcilla and besides to find physico-chemical parameters of control for PGI of this product.

## Materials and Methods

**Sample preparation:** Three batches of 60 Morcillas were made with the same formulation, with the only difference being the percentage onion added. One batch was made with 35% of Horcal onion, because this is the minimum amount for the morcilla to be called "Morcilla the Burgos". The second batch was made with 20% of Horcal onion, amount that is not included in the regulation for the PGI, and the third batch was made with 47% of Horcal onion, because this is the middle amount between the percentages proposed in PGI for the other two categories.

After removing casings, four morcillas from each batch, randomly chosen, were homogenised in a lab blender and used for physicochemical analysis.

**Physicochemical analyses:** pH, water activity ( $a_w$ ), moisture content, ether-extractable fat, protein, starch, total sugar, ash and total dietary fibre were determined by sextuplicate for each morcilla type.

**Statistical analysis:** Data was statistically analysed using one-way analysis of variance (ANOVA) in order to determine the effect of onion percentage on the physicochemical properties of morcilla. Besides, Principal Component Analysis (PCA) was also applied to obtain the parameters of higher weight on variability of product characteristics. 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 physicochemical parameters of morcilla. The statistical analysis denotes that the physicochemical parameters that vary with the onion percentage are pH, total sugar and dietary fibre. These parameters differs significantly between the three samples with different percentage of onion with a 0.05 level of significance ( $P < 0.05$ ).

The pH increased when the percentage of horcal onion added to "morcilla de Burgos" decreased, however, total sugar and dietary fibre decreased. This linear correlation between amount of onion and content of sugar and total fibre on the composition of the product could allow using both parameters in PGI control. Moreover, the ratio between the parameters total sugar and dietary fibre is  $1 \pm 0.3$ , irrespectively of percentage of onion. This ratio is an important additional control parameter to avoid a source of total sugar and dietary fibre different from onion, which is not allowed in PGI. If only total sugar and dietary fibre were individually controlled a high value in one of these parameters could be due to the addition of sugars or rice with a high content of fibre, respectively and not because of the onion added to "Morcilla de Burgos", but in this case the ratio will be outside the normal interval. The rest of the composition parameters do not differ between the three batches or present punctual differences, as was expected since they are not related with the onion components. Concerning to the parameters moisture content and ash statistically significant differences were found, but they do not seem to be related with the different percent of horcal onion added to the three experimental batches of "Morcilla de Burgos".

**Table 1:** Means of physicochemical parameters of the "morcilla" elaborated with different onion percentages (n = 6), expressed on dry matter basis.

% Onion	47	35	20
pH	6,27 <sup>a</sup>	6,443 <sup>b</sup>	6,58 <sup>c</sup>
aw	0,982 <sup>a</sup>	0,981 <sup>a</sup>	0,984 <sup>b</sup>
Moisture content	55,15 <sup>b</sup>	53,33 <sup>a</sup>	58,09 <sup>c</sup>
Fat	35,25 <sup>b</sup>	35,10 <sup>b</sup>	34,02 <sup>a</sup>
Protein	12,45 <sup>a</sup>	11,31 <sup>a</sup>	12,64 <sup>a</sup>
Total sugar	4,20 <sup>c</sup>	3,54 <sup>b</sup>	2,79 <sup>a</sup>
Starch	34,81 <sup>a</sup>	33,99 <sup>a</sup>	32,68 <sup>a</sup>
Ash	3,59 <sup>b</sup>	3,35 <sup>a</sup>	3,97 <sup>c</sup>
Dietary fibre	4,23 <sup>c</sup>	2,74 <sup>b</sup>	2,17 <sup>a</sup>

Means in the same row with different letters (a-c) are significantly different (P<0.05).

A Principal Component Analysis was applied to data of all physical-chemical analysis to obtain which parameters permit discrimination of the three types of morcilla. Two components with eigenvalues greater or equal to 1 extracted. These components accounted for 79.97% of the variability in the original data. The first and second principal component explained 61.78% and 18.19% of the overall variation, respectively. The PCA clearly separated morcilla samples into three groups that match with the three types of "morcillas" manufactured, and they are especially defined by the parameters total sugar and dietary fibre linearly related with onion percentage.

### Conclusions

The horcal onion has a great influence in the content of total sugar and dietary fibre expressed on a dry matter basis and there is a linear correlation between these two parameters and the percentage of horcal onion in the formulation of the product. So, the percentage of horcal onion used in the elaboration of "Morcilla de Burgos" is a very important factor to classify different types of "Morcilla" in order to obtain a Protected Geographical Indication. Besides, total sugar content and dietary fibre, together with the ratio between both parameters, could be suitable parameters to control the established types of morcilla satisfied the requirements of PGI.

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