QUALITY CHARACTERISTICS OF CURED PRODUCTS FROM HAIRLESS MEXICAN PIGS

Rubio L, MS, Méndez M, D, Pérez C, L, Navarro C, JA, de Anda S, A.
Facultad de Medicina Veterinaria y Zootecnia
Universidad Nacional Autónoma de México

BACKGROUND

Rural pig breeding in Mexico includes indigenous pigs and their crosses with white pigs (WP). Hairless Mexican Pigs (HMP) are the native pigs in the rural areas of Mexico, which FAO determined a near extinct species (FAO, 1993).

Native pig production benefits to the economy of rural families, because pigs naturally transform house and harvest waste into money. Due to excess fat, HMP value has been depreciated in the market (Cenobio, 1993). However, it is known that fat positively affect the quality of the meat. By producing high quality meat products, the market value of these pigs will increase and will therefore benefit the small producers.

Different types of high quality meat products such as the morcón, chorizo type Pamplona, and cured ham type Ibérico have better quality if they are produced from Iberian pigs. Because HMP are descendant of Iberian pigs, there are great similarities between them (Berruecos, 1972). In Mexico, most of these high quality products are imported, therefore this work is intended to prove that the HMP can be utilized to make higher quality products from those of white pigs (León, 1990).

OBJECTIVE

The main objective of this study was to find the advantages of the use of Hairless Mexican Pigs (HMP) meat over white pigs in cured sausages, such as chorizo type Pamplona, morcón and Spanish Ham type Ibérico.

METHODS

Production

To make chorizo type Pamplona, loins from HMP and WP without fat, bone and nerves were used. Meat was finely chopped, mixed with 25% of fat and immersed in a brine solution: garlic (40 g), sugar (50 g), smoke (50 g), marjoram (15 g), Spanish paprika (270 g), white pepper (20 g), black pepper (20 g), salt (150 g), curing salt (28 g) and vinegar (380 ml). The mix was stuffed into artificial casing (8 cm diameter) and maturated for four weeks at 10-12 °C and at 70-75 % moisture.

To elaborate morcón, loins from HMP and WP were trimmed of fat, bone and nerves. Meat was cut in 2 cm pieces and immersed in a brine (40 g of garlic, 40 g of oregano, 270 g of Spanish pepper, 15 g of salt, 10 g of cured salt (nitrites and nitrites), 100 g of thyme and 500 ml of white wine) for 24 h at 3-5 °C. Then the pieces were pressed in special casings, then the products were placed in a maturity chamber at temperature between 10-15 °C and at humidity of 76 % were they stayed four weeks for the maturity process and dry up period.

Hams were trimmed of the skin except for the posterior part in the shape of a V. They were salted in containers with marine salt for an average of 1 day per kg. This stage was performed at refrigerate conditions. After that, hams were washed with hot water to eliminate the salt. Then, hams were transported to a room and kept between 0 and 6 °C and 85% humidity for 50 days. Later, the temperature of the room was increased to 16 °C and the relative humidity was decreased to 70% for 90 days, then the temperature was increased to 24 °C and the humidity was reduced to 60% for a further 90 days. Finally, the hams were taken to a room at 15 °C for 115 days. Samples were taken every 45 days during the curing process.

Chemical analysis

Samples of chorizo and morcón were evaluated every 15 days. The following analysis were run: water activity (Aw) with a Rotronic (Prior, 1979), final pH using a potenciomenter (model LSX of Sargent-Welch), humidity using a dry oven, total ashes (Secretaría de Salud, 1993), phosphates by the official Mexican regulation F-320-S-1978, nitrates and nitrites by the spectrophotometric test proposed by the NOM F-318-1978 and F-97-S-1978 respectively using a spectrophotometer Perkin Elmes Lambda 3B and soluble proteins were determined by the Lowry method (Domínguez y Zumalacárregui, 1991).

Sensory analyses

A sensory panel with approximately 90 untrained members was used. To evaluate the aroma, flavor, appearance and texture a 5 point hedonic scale was used, where 1= dislike extremely to 5 like extremely. To measure the overall satisfaction, a 9 point hedonic scale was used where 1= dislike extremely to 9 like extremely (Meilgaard et al., 1991; Pedrero and Pangborn, 1986). Hams attributes from HMP and a commercial brand were evaluated by a trained panel for: meat and fat color, brightness, rancidity, raw, fat and salty flavor, greasy texture, overall tenderness, greasy taste, and rancid aftertaste. Formats used by panelists were graphic simple line scales with marks only at the beginning (1= lightest color, least intense flavor and taste, no greasy texture, very tender) and at the end (10= darkest color, greatest intense flavor and taste, very greasy texture and very tough). Test samples were evaluated five times. The five member taste panel was trained nine months prior testing the samples (Meilgaard et al., 1991; Pedrero and Pangborn, 1986).

RESULTS and DISCUSSION

Chorizos from HMP retained more moisture throughout the curing process, with the exception of the final product, were both had the same moisture (Table 1). The content of soluble proteins in chorizo throughout the curing process was consistently greater in those from HMP than from white pigs (Table 1). Regarding sensory qualities, chorizos from HMP had better appearance and texture than those from white pigs. On the other hand, aroma and flavor were found similar for both types of meat because the production process undertook the chopping and destruction of the structure of the meat unit and therefore the special properties given by the intramuscular fat usually could not be appreciated. No differences were found for any of the other variables studied.

Morcón from HMP had a higher ($p<0.05$) moisture percentage (26.67%) and water activity (0.88%) in the final product compared to that of the WP (24.01 and 0.85 %, respectively). The higher content in intramuscular fat of HMP allows a higher water retention that leads to a better acceptance of the product. However, soluble protein percentage was higher in morcón from WP compared to that of the HMP ($p<0.05$). On the other hand, sensory analyses showed that morcón from HMP had better aroma and texture than that of the WP ($p<0.05$). Better texture could be the result of the higher retention of water on the product from HMP, better aroma could be the result of the higher amount of intramuscular fat of the Hairless Mexican meat (López, 1998, personal communication).

Hams from HMP had an initial percentage of moisture of 63.04±4.48 and they finished with 43.27±3.80 percent of moisture. Intramuscular fat of HMP hams was 11.55±4.60% and that of the WP hams was 5.52±1.97%. This difference reveals that HMP could have a improved palatability. Sensory trained panel results are presented in Table 2. It should be noted that the higher values of the standard deviations showed how uniformed the samples were. However, significant differences were found for brightness and color of meat, with HMP hams being brighter and redder. Hams from HMP had a stronger greasy flavor and texture than that of the WP (Table 2). The rest of the chemical analyses from hams are not yet finished.

CONCLUSIONS

From the results, it can be concluded that the use of meat from HMP has certain advantages on the cured product. Products from HMP had better texture than those from WP. For chorizo, the determining factors were the high moisture throughout the processing and the greater percentage of soluble protein in HMP, which helped to obtain a product with better appearance and texture. Meat from HMP retained more water through the whole process of morcón curing and that probably helped texture and aroma results. Sensory results from cured hams reflected the amount of intramuscular fat of HMP.

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Table 1. Means and standard deviation of the moisture and soluble proteins percentages of Hairless Mexican and white chorizos.

Variables	Curing days	HMP	WP
Moisture %	7	51.23^{a}±3.86	40.42^{b}±2.62
Soluble proteins %	7	4.02^{a}±0.58	2.41^{b}±0.19
Moisture %	14	42.75^{a}±1.20	33.99^{b}±1.08
Soluble proteins %	14	7.11^{a}±0.66	5.33^{b}±0.18
Moisture %	21	41.03^{a}±0.72	32.76^{b}±0.52
Soluble proteins %	21	7.04^{a}±0.84	5.12^{b}±0.28
Moisture %	28	25.05^{a} ±1.82	24.53^{a}±1.01
Soluble proteins %	28	9.18^{a}±2.26	6.96^{b}±0.36

$^{a, b}$ Means on the same row and with different superscript are statistically different ($P \leq 0.05$).

Table 2. Means and standard deviations of the sensory attributes of the Hairless Mexican and the commercial hams.

Variables*	Hairless Mexican hams	Commercial ham
Meat color	4.60^{a}±2.89	3.8^{b}±2.32
Subcutaneous fat color	4.60^{a}±3.63	1.84^{b}±2.43
Brightness	3.68^{a}±2.43	1.38^{b}±1.61
Rancid flavor	1.14^{a}±1.32	0.94^{b}±1.27
Greasy flavor	2.92^{a}±2.31	1.57^{b}±0.98
Raw flavor	1.94^{a}±1.24	2.09^{a}±1.76
Salty flavor	2.68^{a}±1.35	3.34^{a}±1.80
Greasy texture	4.69^{a}±2.72	2.59^{b}±2.02
Overall tenderness	3.08^{a}±2.67	1.11^{b}±0.96
Greasy taste	3.10^{a}±2.30	1.54^{b}±1.14
Rancid aftertaste	1.19^{a}±1.27	0.95^{a}±1.27

$^{a, b}$ Means on the same row and with different superscript are statistically different ($P \leq 0.05$).

*Scales were graphic simple line with marks only at the beginning (1= lightest color, least intense flavor and taste, no greasy texture, very tender) and at the end (10= darkest color, greatest intense flavor and taste, very greasy texture and very tough).