

RED PIGMENT FEATURES IN CHINESE RAW HAM

R. Sakata*¹, T. Oshida¹, F. Jin² and X.H. Qi³

¹*School of Veterinary Medicine, Azabu University, Sagami-hara 229-8501, Japan*

²*China National Foodstuffs Group Corp., 45 Fuxingmennei Street, Beijing 100801, China*

³*China Meat Research Center, 70 Yang Qiao, Yong Ding Men Wai, Beijing 100075, China*

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Introduction

In a previous study on the characteristics of red pigment in Parma ham, pigment separation and physicochemical examination were carried out (Sakata *et al.*, 1998). Parma ham produced in northern Italy is famous world-wide. Though this product is prepared from pig thigh using only marine salt and controlled aging, a unique red color is produced. China produces raw ham called Jin-Hua ham similar to that of Parma. Jin-Hua ham, a traditional speciality of the Jin-Hua province, is made using only pig thigh and marine salt over a long aging period to produce red color. In the salting stage, both hams are produced in essentially the same manner. The Jin-Hua ham is thus considered the origin from which Parma ham and Spanish raw ham, *e.g.* Jamón Serrano, were both initially derived.

The present study shows nitrite and nitrate as color forming agents to possibly bring about the generation of carcinogenic substances such as nitrosamines. The authors thus undertook to establish a method for reddening without the use of nitrite. To elucidate the characteristics of the dark red color in Chinese raw ham produced without nitrite, the absorption spectrum of pigment was measured by acetone extraction and EPR (Electron paramagnetic resonance) was carried out for the clarification of these characteristics.

Materials and Methods

Raw ham samples: Chinese raw ham was purchased from a Peking meat market and Parma ham was obtained from a Japanese store for use in making comparison of spectrophotometrical characteristics. The samples were kept in a refrigerator and used within the shelf-life periods specified on the wrapping label.

Total and nitrosyl heme pigment content: Total heme pigment content of each raw ham sample was determined by the 75% acetone-HCl extraction method (Sakata, 2000). The extract obtained was used to measure absorption maximum at a wavelength of 383nm, since a linear positive correlation between absorbance at 383 nm and heme pigment content had previously been detected. Red pigments which generally are nitrosyl heme pigments in meat were extracted with 75% acetone and absorbance was measured. Absorption maximum of nitrosyl heme was apparent at 395nm for cured meat products (Sakata, 2000).

Residual nitrite content: Nitrite in raw ham sample was determined by the method of Mirna and Schütz (1972) using an acetone extract of nitrosyl heme pigments, alkali, and deprotein agents. The filtrate was colored with diazo-coupling reaction and measured at 540nm colorimetrically and residual nitrite was expressed as NO₂⁻ ppm.

Analysis by EPR: Chinese raw ham was directly transferred to an EPR tube. The spectrum was recorded on an EPR spectrophotometer (JES-TE2X, JEOL, Tokyo), as described by Morita *et al.* (1998).

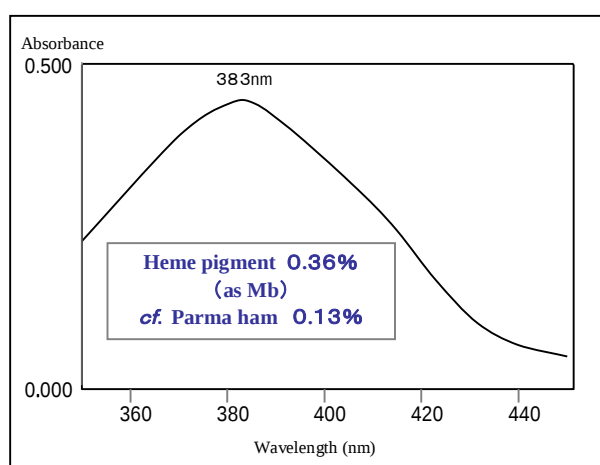


Figure 1. Absorption spectrum of 75% acetone-0.7% HCl extract from Chinese raw ham.

Results and Discussion

Chinese raw ham showed a darker red color and the heme pigment extract with acetone-HCl indicated an absorption maximum wavelength at 383nm in the Soret-band, this being basically the same as for normal meat. Applying the standard equation, Chinese raw ham was shown to contain 0.36% heme pigment as myoglobin (Mb) and Parma ham, *ca.* 1/3 (0.13% Mb), thus indicating Chinese raw ham should to have darker red color (**Fig. 1**).

The red Mb derivative of Chinese-raw ham was extracted with acetone and its absorption spectrum was measured. In Chinese raw ham, absorption maximum was 415nm on the Soret band, this being essentially the same as for Parma ham (**Fig. 2**) but differing with the spectra for nitrosyl Mb derivatives.

Residual nitrite was found present in small amount at 1.1ppm (**Fig. 2**), this being essentially the same as in meat. The absorption spectra indicated no use of nitrite.

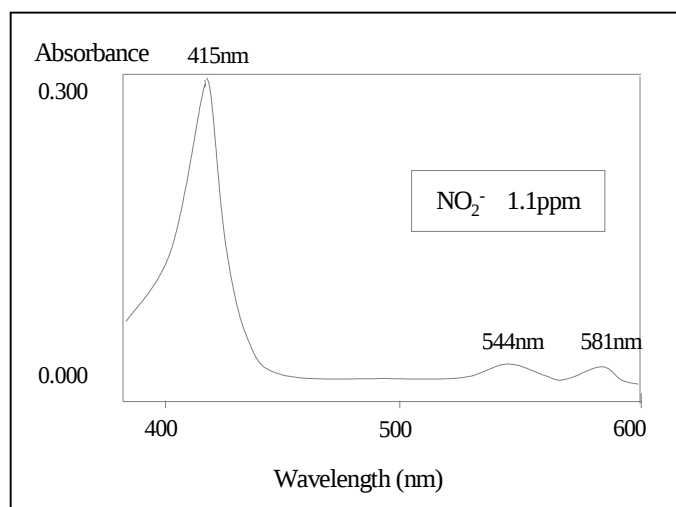


Figure 2. Absorption spectrum of 75% acetone extract from Chinese raw ham and residual nitrite content.

EPR (Electron paramagnetic resonance) disclosed the typical signal of nitrosylheme or nitrosyl heme pigments in Chinese raw ham (**Fig. 3**), which was at variance with previous data obtained for Parma ham (Morita *et al.*, 2000). But with even trace NO present in the meat as a Mb derivative, this signal should certainly be apparent, possibly due to the greater sensitivity of EPR compared to the case of extraction with an organic solvent such as acetone. Thus, the salt used in the processing of these hams and/or the particular methods for processing should be examined in greater detail so as to clarify the reasons for the red color and ensure the safety of meat products.

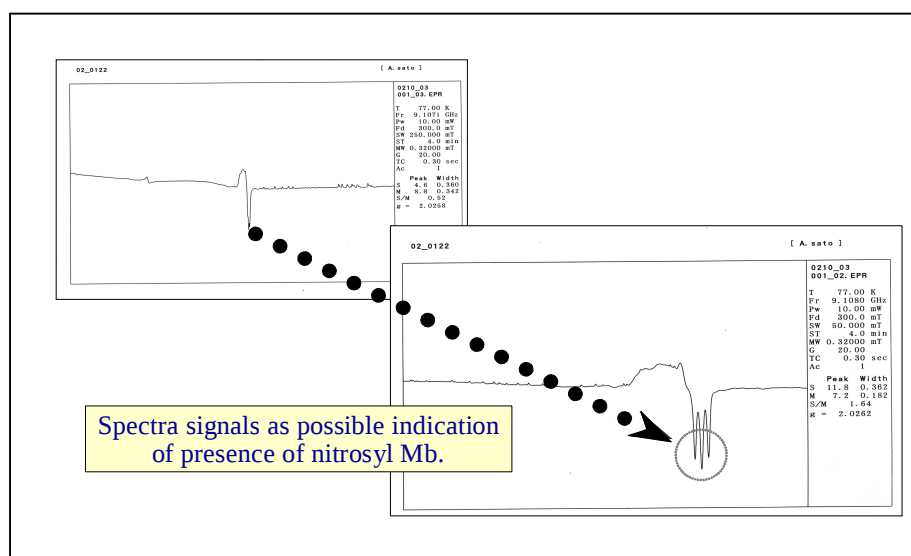


Figure 3. EPR (Electron paramagnetic resonance) spectrum of Chinese raw ham.

Conclusions

The red pigment of Chinese raw ham may be considered basically the same as that of Parma ham, but based on signals disclosed by EPR, either nitrate or nitrite may be concluded present in the marine salt used for meat salting or possibly, artificial color forming agents may have used.

References

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