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Dalbergia palo-escrito, a natural alternative to preserve rabbit meat

Dalbergia palo-escrito, una alternative para la conservación de la carne de conejo

Sarai García-Valencia [b], Armando Zepeda-Bastida [b], Juan Ocampo-López [b], Maricela Ayala-Martínez [b], Alfonso Suárez-Islas [b], Sergio Soto-Simental [a, b]*

Abstract:

Rabbit meat is subject to oxidation and microorganism growth, due unsaturated fatty acids and nutritional content are making to develop those processes. The search of natural options to decrease microbial loads and oxidation reaction is continues. Besides an alternative is to utilize *Dalbergia palo-escrito* to increase rabbit meat quality.

Keywords:

Antioxidant activity, meat product, meat quality

Resumen:

La carne de conejo es susceptible a la oxidación y crecimiento de microorganismos, ya que posee ácidos grasos insaturados y un contenido nutricional que la hace idónea a esos procesos. La búsqueda de opciones naturales para disminuir las cargas microbianas y la oxidación es constante, por ello aquí se presenta como una alternativa la utilización de Dalbergia palo-escrito como una alternativa que contribuya a mejorar la calidad de la carne de conejo.

Palabras Clave:

Actividad antioxidante, producto cárnico, calidad de la carne

Introduction

Meat is appreciated for its sensorial characteristics. Besides, it is an important source of fatty acids, minerals, vitamins, aminoacid essentials and proteins with high nutritional value. Protein is an important compound to growth for human. Rabbit meat is classified as a white meat with a low content of purins and uric acid. This meat has an easy digestion, for that is properly to feed in all physiological stage (SEMERGEN, 2007). According to the Consejo Mexicano de la Carne (2017) pork is the meat most consumed in the world, following by poultry, beef and turkey. However, in México, meat per capita consumption was 32.3 kg to poultry, 19.2 kg to pork, 15.4 kg to beef and 1.5 kg to turkey. The world production of rabbit meat in 2010 was 1683 millions of tons. Asia produce 48.1%, Europe 30.5%, South America 16.7, Africa 4.7% and Central America 0.3%. In México, the consumption of rabbit meat is lower that other countries, it has 200 g per capita (Flores, 2016), but other authors indicate that consumption vary between 40 to 134 g per capita (Olivares et al. 2009; Armada, 2016).

Nutritional composition of rabbit meat

Nutritional composition of rabbit meat was showed in Table 1. Despite of several advantages of this meat, the growing of rabbit production has become limited for some factors as deficiency government support, lack health management programs, low interest of teaching and research institutions, producers lack reproductive and genetics knowledge, and finally little public exposure of consumption of this meat and lack to prepare dishes using this meat (Olivares et al., 2009).

Other alternatives to meat rabbit marketing is produce meat products (Cury et al., 2011; Luna et al., 2015). A meat product is prepared using meat, fat, viscera, edible byproducts from animals used to human consumption, furthermore of non-meat

[a] Autor de Correspondencia, Universidad Autónoma del Estado de Hidalgo, Instituto de Ciencias Agropecuarias, https://orcid.org/0000-0002-6923-0926, Email: sotos@uaeh.edu.mx

[b] Universidad Autónoma del Estado de Hidalgo, Instituto de Ciencias Agropecuarias. Ave. Universidad s/n. ExHacienda de Aquetzalpa, Tulancingo, Hidalgo. MÉXICO.

ingredients as additives allowable that have been a properly technological process. Meat products are classified as: 1) cooked meats, 2) raw meat, 3) canning meat (Instituto Nacional de Vigilancia de Medicamentos y Alimentos, 2014).

Table 1. Chemical composition of five different meats

Meat	Protein %	Fat %	Cholesterol (mg/100g)	Sodium (mg/100g)
Poultry	16	9-11	81-100	83
Pork	14	30-38	65-110	76
Beef	18	12-19	69-98	90
Lamb	16	20-25	75-78	78
Rabbit	21	3-6	34-45	40

Source: Olivares et al., 2009

In the book edited by Tarté (2009) accumulate information about functions, limitations and properties of additives used in meat industry. However, all ingredients and additives used to prepare a meat product play a fundamental role to give some special characteristics to the product, as flavor, color, taste appreciated by the consumers. Furthermore, increase shelf life when decrease microbial and oxidant activities, but high intake meat and meat products, industry must use synthetic additives to preserve them, for example, in cured or fresh meat products its important utilize antioxidant. The main antioxidant used and permitted in food are butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT) and tertiary-butylhydroquinone (TBHQ), octyl gallate (OG) and dodecyl gallate (DG). The most used in meat product is BHT (Mejía, Pérez , & Rosas , 2014), (Ramírez, Vargas , Torres , Torrescano, & Sánchez , 2018). Muñoz (2008) indicate main adverse effects of synthetic additives and highlight the importance of regulations of these ingredients. There are some harmful and toxic effects on human health has given distrust to the consumers. Therefore, some researchers are focused to seek new natural additives (rosemary, oregano, moringa, and others), whose they have high phytochemical content with has antioxidant and antimicrobial properties (Vieiteza, Maceirasa, Jachmanián, & Alborés, 2018), (Falowo, Muchenje, Hugo, Aiyegoro, & Fayemi, 2017). These phytochemicals are important in the physiology and morphology of the plants; they play an important role in growth and reproduction. Secondary metabolites has some structural characteristics that give antioxidant or anti-inflammatory properties (Balasundram, Sundram, & Samman, 2006) (Ramírez, Vargas , Torres , Torrescano, & Sánchez , 2018). Plant extract, citric juice, by-products of seeds has been used to decrease or delay lipid oxidation in meat products. Grün (2009) suggest the best method to add antioxidant is during animal feeding, because an important advantage is that molecules are consistently distributed in the meat. The objective of this review is to describe some characteristics of *Dalbergia palo-escrito* could be used as antibacterial and/or antioxidant in meat products.

Secondary plant metabolism

All live organisms carry out several physiological functions imply in metabolic paths including cellular respiration and protein synthesis. These functions are important to the life of the organisms. All metabolic functions developed by the plants are known as primary plant metabolism. However, the plants have another kind of metabolic routes almost exclusive of them that produce molecules named secondary metabolites. Several extract types are used to obtain that phytochemical compounds as alkaloids, polysaccharides, terpenoids, saponins, and phenolic compounds (phenolic acids and flavonoids). All of these molecules have some activities as antiallergenic, antifungi, antiinflamatory, antiviral, and anticancerigen activity, besides some metabolites has specific structural characteristics involve in antioxidant and antiinflamatory activities (Balasundram et al., 2006; Ramírez et al., 2018).

Dalbergia genus

Dalbergia is a pantropical genus composed with around 250 species distributed in Central and South America, Africa and Asia. In Mexico, 20 species are spread in this genus. Some of them (15 species) are used to obtain wood, from them six are endemic in Mexico (CITES, 2016). Mexican species of Dalbergia are included in different taxonomic branches. However, some biological basic aspect are unknown. A high proportion of this genus flourishes in spring season, some of them lost leaves during dry season and then flowering. The flowers has a butterfly shape, measure less than 2 cm of large and generally are white or yellow color. These plants are pollinated by bees, however is less known biology of reproduction of these Mexican species, there no was population information and it is conservation state is ignored (Cervantes-Maldonado , 2016).

Wood characteristics

Dalbergia wood is considered as precious and valuable for it is color, durability, hardness and chemical composition as pigments and alkaloids. These all characteristics made it has a high value, even higher than mahogany and cedar. D. palo-escrito is used to build guitars, and the international prices by cubic meter is high (Cervantes- Maldonado , 2016). The external bark is rugose, light yellow color, it has cover by lichen and moss that provide a green color on the bark, it has 0.2 cm of thickness. The inner bark is cream color and has 0.4 cm of thickness. The wood has large differences in color since cream to deep violet with dark wood grain (Rzedowski & Guridi-Gomez, 1988).

Uses of Dalbergia

The excellent acoustic properties of the Dalbergia wood is due slow growth to obtain a hard wood, this characteristic is utilized to produce musical instruments. In Europe, since several centuries ago is used to manufacture luxury furniture and musical instruments. In Mexico, information of the use of this plant is scare and fragmented, but the wood is used to manufacture Paracho guitars, marimbas, and hand crafted as knife handle. Dalbergia is utilized as living fence (Cervantes-Maldonado , 2016). However, the main use is to obtain wood, but this management produce large size of waste without improved and caused an environmental damage. There are some reports that Dalbergia can be used to natural pesticide (Villavicencio-Nieto, Pérez-Escandón, & Gordillo-Martínez, 2010), other authors reports it has been used to bovine feeding (Sosa-Rubio et al., 2000). In the traditional medicine is used as therapeutic (Dalbergia glabra) in vomit, asthma, anti-inflammatory and anti-convulsive properties. Dalbergia congestiflora is used as natural colorant and antioxidant properties in beverages and foods (Gutiérrez-Zuñiga et al., 2014; Pérez-Gutierrez et al., 2007).

Dalbergia palo-escrito characteristics

This specie belong to equiseptoosida class, order fabales, fabacea family and Dalbergia genus. This tree is known commonly as palo escrito, tlajuilocuahuitl (nahuatl), tzipil, tzipilin (huasteco), tlacuilo and tlanchinol.

Taxonomía

Clase: Equiseptosida
Orden: Fabales
Familia: Fabaceae
Género, especie: *Dalbergia palo- escrito*
Nombre común: Palo escrito, escrito, tlajuilocuáhuitl (náhuatl), tzipil, tzipilín (huasteco), tlacuilo y tlanchinol

Dalbergia palo-escrito

This plant is a tree has reaches up to 35 m tall, it has a trunk until 80 cm of diameter, tree branches with antrorsa and red or whitening hairy between 0.1 to 0.2 mm of large (Rzedowski & Guridi- Gomez, 1988). Dalbergia palo-escrito has leaflets and falling stipule, petiole and raquis glabros during maturity age. Little petioles between 2 to 3 mm, narrow or oval leaflets with width of 2 to 3.5 cm and large of 4 to 7 cm. Inflorescence in large axillary clusters,

In spite of little information about *Dalbergia* genus in México, especially palo escrito specie, in others countries as Brasil, Melo (2016) published a review about *Dalbergia* genus and their biological activities.

Table 2. Dalbergia genus compounds and activity

Compound	Activity
Isoflavone	Antioxidant
Glycoside	Antibacterial
Quinone	Analgesic
Flavone	Anti-inflammatory
Neoflavonoide	Antidiarrheal

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