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# Releitura da culinária asiática: carne de rã enriquecendo o sabor e o valor nutricional

*Rereading of asian cuisine: frog meat enriching the flavor and nutritional value*

*Leyendo cocina asiática: carne de rana enriqueciendo el sabor y valor nutricional*

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**Resumo:** Com base nas carnes utilizadas na cozinha asiática e nos riscos que elas podem provocar à saúde do indivíduo, como a suína, a bovina e a de caça, conforme a região, é de grande valia analisar a carne de rã-touro como uma alternativa a esses cardápios, uma vez que a literatura a considera de excelente qualidade para a saúde, principalmente daquelas pessoas que possuem algum tipo de alergia alimentar. As carnes, em geral, não são consideradas fontes alimentares primárias de cálcio, mas alguns poucos estudos com carne de rã-touro têm relatado a presença de elevados teores deste mineral nesse alimento. Tal biodisponibilidade é semelhante à do cálcio presente em leite e em seus derivados, sugerindo que a carne de rã possa ser indicada como uma alternativa alimentar para o combate à carência desse mineral e, também, para a prevenção de doenças como a osteoporose, a hipertensão arterial, os cancros de cólon e de estômago, dentre outras patologias. A carne de rã também possui excelentes características *gourmet*, além de ser considerada uma alternativa alimentar para na terapia nutricional com o aumento da resposta do sistema imunológico. O presente trabalho teve como objetivo apresentar modos de introdução da carne de rã-touro na culinária asiática, visando a ampliar sua degustação, principalmente por

pessoas portadoras de alergias alimentares a proteínas de origem animal, assim como oferecer uma dieta saudável com baixo teor de colesterol e, finalmente, elaborar cardápios com aproveitamento integral da carcaça da rã-touro, com receitas gastronômicas e terapêuticas.
**Palavras-chave**: Carne de rã-touro; Gastronomia; Cozinha Asiática; Nutrição; Alternativa Alimentar.

**Abstract:** Based on the meats used in Asian cuisine and the risks they can cause to an individual's health, such as pork, beef and game, depending on the region, it is of great value to analyze bullfrog meat as an alternative to these menus. since the literature considers it to be of excellent quality for health, especially for people who have some type of food allergy. Meat, in general, is not considered a primary food source of calcium, but a few studies with bullfrog meat have reported the presence of high levels of this mineral in this food. This bioavailability is similar to that of calcium present in milk and its derivatives, suggesting that bullfrog meat can be indicated as a food alternative to combat the lack of this mineral and also to prevent diseases such as osteoporosis, hypertension arterial disease, colon and stomach cancer, among other pathologies. Frog meat also has excellent gourmet characteristics, in addition to being considered a food alternative for nutritional therapy with increased immune system response. The present work aimed to present ways of introducing frog meat into Asian cuisine, aiming to expand its enjoyment, mainly by people with food allergies to proteins of animal origin, as well as offering a healthy diet with low cholesterol and, finally, develop menus that make full use of the bullfrog carcass, with gastronomic and therapeutic recipes.

**Keywords:** Bullfrog meat; Gastronomy; Asian Cuisine; Nutrition; Alternative Food.

**Resumen**: Partiendo de las carnes utilizadas en la cocina asiática y los riesgos que pueden suponer para la salud de un individuo, como la carne de cerdo, ternera y caza, según la región, resulta de gran valor analizar la carne de rana mugidora como alternativa a estos menús, ya que. la literatura lo considera de excelente calidad para la salud, especialmente para personas que presentan algún tipo de alergia alimentaria. La carne, en general, no se considera una fuente alimenticia primaria de calcio, pero algunos estudios con carne de rana mugidora han reportado la presencia de altos niveles de este mineral en este alimento. Esta biodisponibilidad es similar a la del calcio presente en la leche y sus derivados, lo que sugiere que la carne de rana puede estar indicada como una alternativa alimenticia para combatir la falta de este mineral y también para prevenir enfermedades como la osteoporosis, la hipertensión arterial, el cáncer de colon y estómago. , entre otras patologías. La carne de rana también tiene excelentes características gourmet, además de ser considerada una alternativa alimenticia para terapia nutricional con mayor respuesta del sistema inmunológico. El presente trabajo tuvo como objetivo presentar formas de introducir la carne de rana mugidora

en la cocina asiática, buscando ampliar su disfrute, principalmente por personas con alergias alimentarias a proteínas de origen animal, así como ofrecer una dieta saludable y baja en colesterol y, finalmente, desarrollar menús que aprovechar al máximo el cadáver de rana toro, con recetas gastronómicas y terapêuticas.

**Palabras-clave**: Carne de rana mugidora; Gastronomía; Cocina asiática; Nutrición; comida alternativa.

**Introduction**

China occupies most of East Asia totaling more than 1.3 billion people, equivalent to 20% of humanity and seven times the population of Brazil, in a country with almost 9.6 million square kilometers. Its gastronomy gathers about 10,000 dishes and 20 different regional cuisines (FRANCO, 2001; TREVISAN, 2013; IDE et al., 2021).

Chinese cuisine was born with the first peoples who inhabited the region, more than 4,000 years ago, and has lost very little of its characteristics, influencing more than being influenced. It is at the origin, for example, of Japanese cuisine, as well as that of many Southeast Asian countries, such as Thai and Vietnamese (KEVIN, 1993).

In century II a. C., the Han Dynasty promoted the agricultural development of the country. Since then, China started to combine ingredients from various sources and absorb varied information: table etiquette rules proposed by the thinker Confucius; choice of healthy recipes, through nutritional analysis made by Taoists and the introduction of vegetarianism, advocated by Buddhists (FUKUOKA, 2009).

The recipe for Chinese cuisine is represented by four main regions, North, South, East and West, of the country. Its gastronomy is one of the most famous in the world. However, the West knows little about the richness and variety of this cuisine, which unites the extravagances produced in imperial palaces and the simplicity of popular preparations (FRANCO, 2001; IDE et al., 2024; IDE e SILVA, 2024).

Chinese cuisine is based on an ancient cultural background, in its early days closely linked to curative methods and remedies. However, cuisine is explored not only by medicine, but also by religious, philosophical, poetic and even political manifestations. The most famous dishes were created in the period of the Ming Dynasty (1368-1644 AD) for instance, the Peking Duck, with the emergence of the chefs. Chinese emperors used to hold parties for spirits and gods, in order to obtain good harvests (SCHMITT, 2009).

According to Takahashi (2012), the different religious influences and points of contact with the West resulted in a refined gastronomy, which combines ingredients, textures, flavors and colors. In addition, Chinese cooks, based on inventiveness and versatility, have developed subtle techniques for preparing and cooking food that have transformed their kitchen into one of the most refined in the world. At the time, guests used, as today, chopsticks and

spoons. There were no knives on the table because all the food was cut into pieces small enough to be able to grab with chopsticks.

The origin of Japanese cuisine dates back to the 4th century B.C. at first; rice was used only to assist in the conservation of fish meat. The fermentation of rice released the substances necessary for the storage and transport of food. At that time, only fish was consumed and rice was discarded. From the 17th century onwards, its natural fermentation was replaced by the use of rice vinegar in the process (KEVIN, 1993).

Asian cuisine is rich in complexity and refinement, as in Japan where sashimi, sliced fish fillet, comes from the Kamakura Era (1185-1333). Nowadays, Japanese cuisine includes seafood, and pork, poultry and beef. In China, rice occupies a central place in gastronomic habits. In India, in spite of not having the consumption of beef, there are menus with lamb. However, the wide variety of dishes is vegetarian, seasoned with spices (KEVIN, 1993; JESUS, 2013).

Takahashi (2012, p. 23) commented that “gastronomy is a craft based on the knowledge of tradition and culture, but nowadays authorial creations are allowed, integrated with other arts and sciences”.

“Freshwater and saltwater fish, seafood and seaweed are consumed in abundance and their main source of animal protein. Dried and salted fish is a widely used condiment” (IDE et al., 2023, p. 60). There is not much breeding of large animals. What prevails are small animals, especially pig and chicken. Veal, lamb and goat meat are rarities introduced in northern cuisine by Mongol Muslims. All parts of the animal are used, from kids to bones. Meats are usually dried and cured, due to lack of refrigeration, and arrive at the table cut into small pieces and mixed with vegetables (SCHMITT, 2009).

With the opening of this country in the Meiji Period, there was a race to assimilate Western culture, in all areas, from food to technology (FRANCO, 2001).

In Canton, farm animals like dogs, cats, snakes and monkeys go to the plate. As cuisine is art without borders, there are influences from other cuisines in China: tomatoes, potatoes, celery, carrots, cabbage, star anise are ingredients that arrived from the West. To Italy, China took the pasta (CARNEIRO, 2005).

From the above, the present work aimed to present ways of introducing frog meat in Asian cuisine, aiming to expand its tasting, especially by people with food allergies to animal proteins, as well as offering a healthy diet with a low content of cholesterol and, finally, elaborate menus with full use of the bullfrog carcass.

**Metodology**

The selected method is of a qualitative exploratory nature, through the use of bibliographic and documentary revision techniques, to achieve the proposed objectives. According to Gil (2009) bibliographic research has the function of recording what has already been developed on the topic studied, and the analysis is carried out mainly in books, scientific

articles and technical media. As reported by Fonseca (2002, p.31) “documentary research used sources such as statistical databases, newspapers, magazines, reports, official documents, dissertations and other databases dealing with the topic in question.”

In a structured and organized way, the articles used for this research were taken from the following databases: Capes Periodicals, Google Scholar, Scielo, Scopus, Science Direct, Elsevier, Pubmed, making a synthesis of knowledge between the works.

**The quality of frog meat**

The mild flavor, between chicken meat and fish, and the nutritional benefits of frog meat have attracted consumers looking for a healthier diet. The animal's thighs are more appreciated and the back, normally discarded, becomes a by-product. To take advantage of the interest and the raw material, Embrapa Agroindústria de Alimentos (RJ) developed products such as pâtés, sausages and canned frog meat. The demand for frog meat is greater than the supply in Brazil (BASTOS, 2015).

For those who enjoy exotic meats, frog meat is a gastronomic delicacy, which in addition to having numerous health benefits, is rich in vitamins and minerals, such as calcium, iron and potassium. One of the main characteristics of frog meat is that it has amino acids that the human body cannot synthesize, in addition to its low-fat content and cholesterol levels. Another important feature is the high digestibility (over 97%), in other words, eating less and feeding more, in addition to being indicated for people who have food allergies, innutrition, high cholesterol, heart problems and diabetes. Frog meat is appreciated not only for its exquisite taste and texture, but also as a source of high biological value protein (BASTOS, 2015).

The protein composition of bullfrog meat is similar to other lean meats, with 16 to 19% of Crude Protein (CP) in its composition. It also has high digestibility, surpassing the standard recommended by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) (FAO/WHO, 1985) established for children and adults in all essential amino acids (Table 5), being, however, slightly deficient in sulfur amino acids such as leucine and valine (SABRÁ et al., 1986, 1990; RANCÉ et al., 1999).

Noll and Lindau (1987) concluded, based on the proximate composition and protein quality of frog meat, that when compared to other types of meat, frog meat presented a low lipid content, high calcium content and low sodium content, being indicated for weight loss treatments and sodium-restricted diets. They also found good in-vitro digestibility and a high content of unsaturated fatty acids, especially α-linolenic and arachidonic acids.

Regarding the lipid content, bullfrog meat has 0.6 to 0.7%, especially cholesterol, with about 40 mg/100 g, being considered low compared to other commercial meats when compared to others meats such as beef (120 to 200 mg/100g), pork (100 to 300 mg/100g) and chicken (100 to 150 mg/100g). It also contributes with calcium (16 to 20mg/100 g), iron (1 mg/100 g) and niacin (2.7 mg/100 g), even so, there are few studies on the nutritional value

of frog meat and its dietary applications in the prevention or even treatment of specific pathologies (OLIVEIRA, 2007).

Cruz (2004) evaluated the effects of *Rana catesbeiana* meat in diabetic and dyslipidemic animal models. Frog meat reduced cholesterol in non-diabetic animals and increased glycemia in diabetics, with total serum proteins, albumin, triacylglycerols, LDL and HDL cholesterol being similar in both groups. The second trial was performed with Apo E knockout mice, treated with normolipidic diet with casein, normolipidic with frog meat, hyperlipidic with casein and hyperlipidic with frog meat. There were no effects of frog meat on concentrations of LDL-cholesterol, triacylglycerols, glucose, as well as on liver lipids, both in normolipidic and hyperlipidic diets.

Fragoso et al. (2012) studied the handling of complementary foods by preparing the carcasses, concluded that, in addition to the use of frog carcasses at affordable prices in the market, it also met the standards established by Brazilian legislation in relation to the nutritional characteristics of a product target for children, with high nutritional value and is safe for children and pleasant taste.

The bullfrog's liver, which corresponds to 5% of its weight when alive, can be used in human food in the form of pâtés or special preparations, but this is more common abroad (RAMOS, 2000).

Bullfrog meat is recognized for its interesting nutritional profile (Table 1) compared to other commercial meats (Table 2). As well as having a low lipid content, with a high prevalence of unsaturated fatty acids over saturated ones, both from meat and from the fat body, being considered sources of essential fatty acids (Linoleic, Linolenic and Arachidonic) (Table 3), as well as their levels of minerals (Table 4). It can also be observed that this meat has a protein source of high biological value, as it does not have limiting amino acids (Table 5).

**Table 1 - Proximate composition of bullfrog meat**

| Composition | Every 100g |
|---|---|
| Protein | 17.7g |
| Fat | 0.27g |
| Total sugars | 0g |
| Calorific value | 73.23 Kcal |
| Cholesterol | 0.034g |
| Sat Fat | 0.1g |
| Total Fibre | 0g |
| Sodium | 0.063g |
| Iron | 0.01g |

**Source**: Feix et al. (2006).

These characteristics make it suitable for low-calorie diets in order to fight

cholesterol, obesity and high blood pressure and also for the treatment of gastrointestinal disorders, in the diet of athletes, convalescents and growing children allergic to animal protein. (Conceição, 2000; Mello et al., 2006; Nóbrega et al., 2007).

**Table 2 - Comparison of the composition of bullfrog meat with the meat of other animals**

| Species | Protein (g/100g) | Fat (g/100g) | Calories (kcal/100g) |
|---|---|---|---|
| frog | 16.4 | 0.3 | 68 |
| Chicken | 18.1 | 18.7 | 264 |
| Bovine | 19.4 | 15.8 | 225 |
| Pork | 16.7 | 22.7 | 276 |
| rabbit | 21.0 | 8.0 | 162 |

**Source**: Feix et al. (2006).

**Table 3 - Distribution of fatty acids in the composition of bullfrog meat**

| Fatty acids (%) | frog fat | swine fat | beef fat |
|---|---|---|---|
| Pentadecanoic Acid | 1.2 | - | - |
| Palmitic acid | 22.4 | 27 | 29.1 |
| palmitolenic acid | 2.3 | 3 | 3.4 |
| Stereatic acid | 12 | 43.5 | 44 |
| Oleic acid | 23.5 | - | - |
| Linoleic acid | 10.7 | 10.5 | 0.3 |
| linolenic acid | 1.4 | 0.5 | - |
| aequidonic acid | 18.8 | - | - |
| eicosapentaenoic acid | 1.8 | - | - |
| myristic acid | - | 1.5 | 3.1 |
| myristolenic acid | - | - | 0.4 |
| margaric acid | - | 0.5 | 0.4 |
| heptadecenoic acid | - | - | 0.4 |
| Stearic acid | - | 13.5 | 18.9 |

**Source**: Feix et al.

**Table 4 - Mineral composition of bullfrog meat (mg)**

| Chemical element | Percentage per milligram of muscle (%/mg) |
|---|---|

| | |
|---|---|
| Calcium | 75.58 |
| Iron | 0.79 |
| Magnesium | 21.68 |
| Sodium | 93.28 |
| Potassium | 242.1 |

**Source**: Feix et al.

The technological development of frog slaughter and its further processing for human consumption has attracted increasing attention. As a result, the *Codex Alimentarius* recommendations are being adopted as a criterion for frog meat quality, following an international standard (RAMOS et al., 2005; NÓBREGA et al., 2007).

According to Lima et al. (2006a) despite the existence of several effective consumers, frog meat is still a product surrounded by prejudice on the part of the domestic consumer. In addition to the unattractive physical appearance, the lack of knowledge on how to prepare this meat is one of the items that most discourage purchases.

**Table 5 - Composition of amino acids present in bullfrog meat**

| Amino acid | male frog | female frog | Average |
|---|---|---|---|
| Lysine | 5.9772 | 6.2926 | 6.1349 |
| Histidine | 1.5463 | 1.1528 | 1.537 |
| Arginine | 4.6406 | 4.8007 | 4.7207 |
| Tryptophan | 2.5229 | 2.304 | 2.4135 |
| Aspertic Acid | 8.1662 | 7.9906 | 8.0784 |
| Threonine | 3.3403 | 3.2832 | 3.3118 |
| Serine | 3.1322 | 3.1931 | 3.1627 |
| Glutamic Acid | 11.6057 | 11.5204 | 11.5631 |
| Proline | 2.3598 | 2.3233 | 2.3416 |
| Glycine | 3.4478 | 3.585 | 3.5164 |
| Alanine | 4.0281 | 4.3396 | 4.1839 |
| cystine | 0.6768 | 0.6024 | 0.6396 |
| Valine | 3.5311 | 2.8981 | 3.2146 |
| Methionine | 2.092 | 2.0085 | 2.0503 |
| Isoleucine | 3.4021 | 2.7929 | 3.0975 |
| Leucine | 6.0221 | 5.7902 | 5.9062 |
| Tyrosine | 2.6046 | 2.4399 | 2.5223 |
| Phenylalanine | 3.069 | 2.9997 | 3.0344 |

**Source**: Feix et al. (2006).

**The therapeutic innovation with frog meat**

The term bioavailability was initially used to estimate the use of pharmaceutical compounds (JACKSON, 1997). In terms of nutrition, bioavailability is defined as the proportion of the nutrient in the food which is absorbed and utilized. Utilization is the process of transport, cell assimilation and conversion into a biologically active form (O'DELL, 1984). According to Jackson (1997, p. ) "bioavailability is defined as the fraction of the nutrient that is used for normal physiological functions or storage".

An important factor in determining the adequate bioavailability of minerals is the efficiency of their absorption in different types of meals, different foods and under different health conditions and physiological conditions. Biological availability is influenced by factors intrinsic to foods, arising from the diet, or by factors of the individual (Rosenberg and Solomons, 1982).

The study of food digestibility consists of evaluating the percentage of proteins that are hydrolyzed, through digestive enzymes, and absorbed in the form of free amino acids, being a determinant of the protein quality of the food (Pires et al., 2006).

One of the techniques used to improve the digestibility of foods is heating, which in addition to ensuring microbiological safety, eliminating microorganisms or toxins, also improves the nutritional value resulting from the increase in digestibility (Ordóñez, 2005).

Frog meat is mentioned in the literature as a possible source of substitutive protein in the diet of allergic individuals, despite the scarcity of studies that address its use (Sabrá et al., 1995; Martins, 1995). After evaluating the amino acid composition, some research concluded that frog meat has an adequate profile of essential amino acids according to the World Health Organization (WHO), characterizing a protein of high biological value (WHO, 1989; Noll and Lindau, 1987; Correa, 1988; Seixas Filho et al., 2020). Frog meat is a white meat that bears similarities to rabbit and chicken meat, and its flavor is classified as intermediate between fish and chicken meat. It has been cited as a food with great sensory characteristics, rich in proteins, of high biological value, mineral salts and vitamins, and for presenting low levels of lipids and cholesterol, being, therefore, a meat with low caloric value (Noll and Lindau, 1987; Marengoni and Santos, 2002; Ramos 2004).

Different meat that promotes the balance of the functions of the human body, indicated for patients undergoing to chemotherapy treatment, recovery from surgeries, respiratory diseases, food intolerances and for people seeking diets based on food with a high content of proteins and amino acids.

When referring to the nutritional needs of healthy newborns, they vary

according to weight, gestational age, growth rate and environmental factors. Breast milk has a wide variation in volume and composition in the immediate postpartum period, making recommendations based only on its intake difficult. Yet the intake recommendations for some components are derived from what is currently known about the average composition of early human milk and the amounts consumed in the normal postpartum period by healthy mature infants (WHO, 1997).

Still in relation to the composition of breast milk, a study conducted by the World Health Organization (WHO, 1997) with nursing mothers from four different countries concluded that environmental conditions seem to play a decisive role in the concentration of nutrients in milk. For some of them, however, such as calcium, chlorine, magnesium, phosphorus, sodium and potassium, there seems to be a small difference between groups and countries and their concentrations are not significantly influenced by the mother's nutritional status.

Meats, in general, are not considered primary food sources of calcium, but a few studies carried out with frog and fish meats have observed the presence of high levels of calcium in these foods (Noll and Lindau, 1987; Larsen et al., 2000), suggesting that they can serve as an alternative food source to milk, especially for individuals who are allergic or intolerant to milk and its derivatives.

Variation of concentration under usual conditions, that is, after excluding areas of exceptionally high or low values, can be useful in determining the desirable amount of micronutrients in breast-milk substitutes. The study also concluded that it is opportune to review the recommendation of the Expert Committee of the WHO (WHO, 1997) that infant formula should contain all essential micronutrients, at least in the same amount as they are found in human milk in order to meet the needs minimum nutritional requirements. However, it is now believed that the levels of some of these elements in formulas far exceed the normal needs of babies in the first few months of life.

IOM (1997) and Ybarra et al (2001) mentioned that calcium is an essential element in the homeostasis of the metabolism of the animal organism, being the main structural constituent of bones and teeth, in addition to performing other important functions, such as assisting in nerve transmissions, glandular secretions, vasodilation and muscle contraction, mitosis and cell motility

Allen (1982) already reported that the main known food sources with good calcium bioavailability are milk and its derivatives, considering that vegetable sources of this mineral have high levels of oxalate that reduce this bioavailability

However, several authors such as Velasquèz–Melendéz et al. (1997), Silva et al. (2002), among others, had already assessed calcium consumption and they observed that the general population is unable to meet the daily intake recommendations regardless of the age group studied.

Adequate calcium intake has been correlated with a reduction in the incidence of pathologies such as osteoporosis, high blood pressure, and colon cancer (Guéguen and Pointillart, 2000). These discoveries have led researchers to investigate new dietary sources of calcium, as well as the bioavailability of calcium present in various salts to be used for food fortification with the aim of preventing these pathologies (Bernner et al., 1990; Bronner and Pansu, 1999).

The element Iron is found in food in two forms, non-heme iron and heme iron. The first is the inorganic form, in which iron is found in its free ionic form, and is found both in foods of vegetable origin and in foods of animal origin, and may be in the form of $Fe^{+2}$ or $Fe^{+3}$ (Grotto, 2008). Heme iron is found only in muscle tissue and is characterized by being linked to the heme protein group. This gives it a special characteristic, this iron is less susceptible to luminal interference and facilitating its absorption, which makes it more bioavailable. However, this represents only 40% of the total iron in muscle tissue, and the remainder is composed of non-heme iron.

On the other hand, several authors (Bothwell, 1995; Hurrell, 1997; Heath and Fairweather, 2002) have reported that non-heme iron absorption is influenced by several factors present in the intestinal lumen, both in digestion and in food absorption. Inhibitors such as phytate, present in fiber, polyphenols, found in teas and coffee, and calcium are among these inhibitors.

Ascorbic acid and muscle tissues (meat) act as modifiers facilitating the absorption of non-heme iron, while meat is a source of high-quality iron, as it provides heme iron that is well absorbed, and because it modifies the absorption of Non-heme iron from other components of a meal (Layrisse et al., 1968; Cook and Monsen, 1999).

The offer of iron and calcium is among the most relevant minerals for this age group, given the importance of these minerals in the synthesis of hemoglobin and bone calcification, respectively. Therefore, to ensure the proper growth and development of the baby, special attention to nutrition is necessary, in order to provide the required amounts of both energy and nutrients (Mahan; Escott-Stump, 2012).

Oliveira (2007) commented that there are studies that suggest an incidence close to 2% of the adult population, in the world, that presents food hypersensitivity, being 1% food allergy itself. The numbers are higher for children under the age of three, ranging between 6% and 8%.

The prevalence of food allergy varies according to the population's nutritional habits. It is observed in oriental cultures, mainly in Japan, a greater predominance of individuals allergic to soy; while in France, there is a higher frequency of egg allergy (Ebisawa et al., 2004; Oliveira, 2007).

Sabrá et al (1986) and Rancé et al. (1999) commented that there are few

studies on the incidence of food allergies in developing countries, reporting that cow's milk allergy in Brazil is responsible for 7% of diarrhea found in the pediatric population, although its most common clinical manifestations linked to food allergy are cutaneous, mainly atopic dermatitis and urticaria, and gastrointestinal mediated or not by IgE.

Food sensitivity is also associated with the development of asthma, an increasing cause of morbidity in the pediatric population (HOST et al., 2002; Wang et al., 2005).

Oliveira (2007) added that the diagnosis of food allergy necessarily implies the need to implement an exclusion diet. This measure entails a high cost to the family, with risk of loss in weight and height, especially in childhood. This highlights the need to test the allergenic potential of other protein sources, especially those rich in calcium, which can be used safely in cases of allergy to cow's milk.

**Figure 3 - Aspect of the new presentation of the bullfrog thigh cut.**

Source: Ide (2017).

The results confirm those reported by Bastos (2015) when he highlighted the mild taste of bullfrog meat, even comparing it as an intermediary between chicken and fish. The author also praised this fact with its nutritional benefits.

Ide (2017) commented that the use of skirt steak in Asian cuisine had a better result than that attributed by Bastos (2015) when he considered the back of the bullfrog carcass as a by-product, reporting its use only after its processing in the processing industry, such as pâtés, sausages and preserves, discarding their use in their natural form.

The Post-against thigh (Ide, 2017) is the final region of the hind legs that would connect with the dactyls joined by the interdigital membrane, which are removed during slaughter. It is an extremely rigid region, with musculature firmly attached to the skeleton and was used

as a shaving, along with the skirt steak (Fragoso et al., 2012) and the Palheta (Ide, 2017), as part of the soup and filling for the mushroom.

The valorization of the use of frog meat trimmings as skirt, pick and post-upper thigh made the proposal by Fragoso et al. (2012) when they concluded that the handling of foods from the less noble parts of the bullfrog carcass would reduce the price, creating a more accessible market for a food with a pleasant taste and nutritional characteristics of a product for children, with high nutritional value.

**Conclusion**

The results of expanding the use of bullfrog carcasses, valuing the less noble regions of their musculature, have been proposed since the end of the last century (Lima and Agostinho, 1998) when there was already concern that only half of the bullfrog carcass Bullfrogs were being sold as premium quality meat, with other products, such as the whole or boneless back and the back in pieces, being little explored.

The introduction of different cuts of frog meat in typical Asian dishes obtained by Ide (2017) and Ide et al. (2021), as well as the use of the skeleton as a source of calcium, through a food supplement in powder form (Seixas Filho et al., 2020) provided greater use of the carcass, offering a more digestive and low-calorie menu as a health promotion , implementing a proposal from Feix et al. (2006), in addition to the full use of fish, generating new products, with greater added value, which can be fully utilized, generating income from what would otherwise be discarded, implementing a circular economy proposal, as recommended by Rodrigues et al. (2012).

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