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## Documentation and Evaluation of Traditional Meat Products of North Malabar

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### ABSTRACT

#### Keywords

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Traditional meat products with their unique sensory attributes have known to hold tremendous mass appeal, usually with high nutritional value. Kerala cuisine is a unique blend of indigenous and exotic dishes adapted to local culinary culture. Ethnic meat products from the Northern Malabar region have been described in several popular culinary books. However, there has been limited scientific documentation of these products and the estimation of their nutritive value. A field survey was conducted in four districts of North Malabar region of Kerala viz., Kasaragod, Kannur, Kozhikode and Wayanad for creating a database of the major and popular ethnic meat products of the region. A total of 24 ethnic meat products of the North Malabar region of Kerala have been cataloged and the proximate composition of five selected products has been described in this study.

### Introduction

Globally the livestock sector is highly dynamic and in developing countries, there is a rapid increase in the demand for livestock products (Thornton, 2010). The traditions and culture influence meat consumption to a great extent in India (Devi *et al.*, 2014). Traditional meat products are high sensory quality foods,

usually with high nutritional value, produced on a small scale, using ingredients and procedures from ancient times (Laranjo *et al.*, 2017). All over the world, different processes are used to preserve meat and the traditional knowledge of people living in different regions gave rise to a great diversity of meat products according to their traditions and historic use. These traditional processes, their

particularities, and their effect on the quality and safety of meat products are important research topics. However, lesser efforts are being laid to convert this actual knowledge to engaging knowledge.

Kerala is the southernmost state on India's tropical Malabar Coast of the Arabian Sea. Kerala has its food heritage and the cuisine of the land is linked to the history, geography, demography, and culture of the land. For over 2000 years, Kerala had been visited by traders from Greece, Rome, Mediterranean, European and Arab countries, mainly for the spices from Malabar. As a result of the trade relationship and cultural influence, Kerala cuisine is a unique blend of indigenous and exotic dishes adapted to local culinary culture. The styles of cooking as well as recipes of the erstwhile Travancore and Kochi, respectively in the south and central parts of Kerala and Malabar in the north Kerala vary widely. Dishes from the Travancore region are influenced by colonial cuisine adapted by the Syrian Christians. Malabar area especially the northern part of Malabar had been influenced by Arabs and has a variety of non-vegetarian dishes probably of Arab origin propagated by Muslims. Besides their historic and cultural influences, Islam and Christianity contributed distinctive styles to Kerala cuisine.

While the temporal changes in meat production has witnessed a steady growth, the market share of processed meat products in India accounts for hardly one percent. This could be attributed to the lesser regard by the population of the region to recognized processed products especially of the western countries, like ham, patties or sausages. However, traditional meat products with their unique sensory attributes have known to hold tremendous mass appeal (Anjaneyulu *et al.*, 2008).

For the conservation of knowledge on the ethnic meat products in Kerala as well for

easy accessibility of this knowledge base, a systematic mapping and documentation is essential. There are traditional products which are popular either in a group of people or to a limited geographical region. There is wide acceptance for these products among other communities in these areas, especially during religious festivals. These delicacies which presently are limited in use in the local areas have to be popularized in other parts of Kerala as well as outside the state. Ethnic meat products from the Northern Malabar region have been described in several popular culinary books. However, there has been limited scientific documentation of these products and the estimation of their nutritive value. Considering the diversities of the ethnic meat products, several popular products have been identified in this study to document the uniqueness in their ingredients and cooking method, the pattern of consumption of these dishes, and their proximate composition.

## **Materials and Methods**

A field survey was conducted in four districts of North Malabar region of Kerala *viz.*, Kasaragod, Kannur, Kozhikode and Wayanad for creating a database of the major and popular ethnic meat products of the region.

Information regarding the products qualifying for the study was gathered from local caterers/cooks, bakers, and housewives. These respondents were interacted with and the information was documented based on direct observation.

Processing of the selected products was standardized at the Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Pookode, Wayanad concerning the formulation, processing, and storage. A total of five popular products were analyzed for the proximate composition as per AOAC(Cunniff, 1995).

## Results and Discussion

North Malabar population has their ethnic meat products that are prepared according to the knowledge handed down through generations. A total of 24 ethnic meat products of the North Malabar region of Kerala have been cataloged in Table 1. The proximate composition of five selected products have been described in Table 2. Photographs of selected meat products are represented in the figures (1-8).

### Seasoned and curried meat products

Curried meat products are spicy Indian traditional food products prepared with meat, vegetables, spices, and condiments (Girish *et al.*, 2018). *Varuthaarachakozhi* curry and *Kozhivarattiyathu* are the most commonly made curry products of Malabar which are cooked in water as a medium with grated coconut, seasonings and spices whereas, in curries like chicken stew, mutton *pachamallythenga pal*, coconut milk is added to get desired consistency to the gravy. Meat curry is usually served with steamed rice and also with traditional rice and wheat preparations like *vellappam*, *vattayappam*, *idiyappam/noolappam*, *pathiri*, *puttuchappati*, *paratha* etc. However, *Kozhikadambu/kozhipidi* or *Kakkaoroti/Kunjipathiri* is the chicken/meat curry served with rice dumplings. Similarly, *Eenthupidi* is a chicken curry served with queen palm sago (*Cycas circinalis*) dumplings.

The ideal ratio of meat to gravy ratio for the curried product should be 60:40 (Anjaneyulu *et al.*, 2008). Chilling or freezing is the most common method of storing meat curries in households. Chicken curry made from deboned broiler chunks had a shelf life of six months during freezer storage without marked changes in the quality (Modi *et al.*, 2006). Further, with the use of hurdle technology, the storage life of mutton and chicken curry could

be extended (Das and Radhakrishna, 2001; Das and Jayaraman, 2003). Thermal processing in retort pouches to extend shelf life has been successfully documented for different meat products by many researchers; like chicken meat (Lyon and Klose, 1981), beef stew (Cremer and Pizzimenti, 1992), beef curries (Koo *et al.*, 1993), *Chettinad* chicken curry (Rajkumar *et al.*, 2010) and pork curry (Girish *et al.*, 2018).

Kerala is popular for its wide range of tropical spices and herbs. Traditionally, meats are seasoned with salt, spices, and herbs to preserve and to enhance the organoleptic properties. *Kozhivaraval* is chicken cooked with grated coconut, condiments, and spices without gravy. *Erachisukka* is beef cooked with grated coconut, condiments, and spices in earthen pot without oil. *Kozhinirachathu* is whole spring chicken stuffed with spices and hard-boiled eggs deep-fried or roasted. *Aattinkalchuttathu* and *Aattinthala* are seasoned goat legs and head, respectively.

The antimicrobial and antioxidant effects of different spices on *rista*, a traditional meat product from Jammu and Kashmir has been evaluated during ambient and refrigerated ( $4\pm 1^\circ\text{C}$ ) conditions for 25 days of storage and demonstrated that clove spice used in the *rista* is highly effective against microbial growth and lipid oxidation and show greater potential as a natural antioxidant and sensory attributes in the product during storage (Mir *et al.*, 2017). Similarly, the antimicrobial activity of six Indian spice extracts which have been traditionally used in folk medicine has been evaluated and tested against three potent foodborne pathogens, namely *Escherichia coli*, *Staphylococcus aureus*, and *Bacillus cereus* and the results showed that the extracts of clove, cinnamon and mustard had good inhibitory action at 1% concentration, while garlic showed medium activity. At 3% concentration, a complete bactericidal effect was achieved. Ginger and mint showed

negligible antibacterial activity against these pathogens at the same concentration (Sofia *et al.*, 2007).

One of the distinct meat preparations of the Malabar region *Nadankozhimarunnu* curry was standardized in the present study and the results of the proximate analysis are given in Table 3. This product is revered for its medicinal value and is served in the monsoon months. Ayurvedic ingredients like *ajwan* or carom seeds (*Trachyspermum ammi*), coriander, cumin seeds, black pepper, ground gooseberry, ginger-garlic paste, lemon juice and “*inthuppu*” (potassium chloride) are used in the preparation. This medicinal masala mix is applied inside as well as on the outside of the whole chicken and wrapped in plantain leaves, tied and covered with clay, and cooked in the traditional stove with coconut husk as fuel.

The chicken is slowly cooked in its fat for one and a half hours and the warmth will be maintained for almost five hours. This product is dry heat cooked and has low moisture content and keeps well for 2-3 days. This is believed to be beneficial for stimulating the immune system and health during the monsoon months when most of the ayurvedic treatments are done.

### Meat cooked with whole cereals

Biryani, seasoned rice cooked with meat is a very popular meat product throughout India. “*Thalasserybiryani*” or “*Malabar biryani*” is the signature dish of the north Malabar region and has high consumer appeal and is served during marriages and other functions as well as during festivals especially by the Muslim community. Generally, this product is cooked and consumed fresh except in households where the surplus product is chiller stored for 1-2 days. Previous researchers developed dehydrated *pulav* with a shelf life of about six months at 37°C (Mathur *et al.*, 1973). Similarly, mutton keema biryani was evaluated for its shelf stability in retort pouches under room temperature for two months and noted that on storage, moisture, water activity, protein and ash contents of the product did not show any significant change but the total fat content was found to decrease (Lavanya *et al.*, 2016). Chicken *pulav* in pouches of polypropylene film and paper-foil-polyethylene laminate had a shelf-life of 8-12 months at ambient storage and 14-18 months at chill temperatures with acceptable physio-chemical, microbiological and sensory attributes (Das and Jayaraman, 2003).

**Table.1** Proximate composition (%±SE) of selected ethnic meat of Malabar region of Kerala

S. No.	Product	Moisture	Fat	Protein	Ash	Carbohydrate
1.	<i>Erachipathiri</i>	62.62±0.48	2.21±0.06	3.12±0.08	1.50±0.09	30.18±0.65
2.	<i>Kozhiada</i>	65.63±0.58	4.57±0.20	3.56±0.16	1.37±0.10	24.86±0.53
3.	<i>Eenthupidi</i>	37.40±0.44	18.60±0.64	3.35±0.15	2.31±0.16	38.34±0.84
4.	<i>Marunnukozhi</i>	49.47±1.47	1.34±0.13	4.27±0.19	3.98±0.27	40.95±1.11
5.	<i>Alissa</i>	72.50±0.77	3.47±0.22	1.55±0.10	0.88±0.08	21.60±0.83

**Table.2** Description of popular traditional meat products of North Malabar region of Kerala

S. No	Ethnic name	Description	Method of cooking
1.	<i>Chorapathiri/erachipathiri /Attipathiri</i> <sup>#\$^</sup>	Meat stuffed layered rice pancakes	Steaming
2.	<i>Athishayapathiri</i>	Meat stuffed layered wheat pancakes	Steaming
3.	<i>Chatti pathiri (spicy)</i> <sup>#\$^</sup>	Meat stuffed flatbread	Shallow fat frying along with application of cinders on the lid
4.	Cutlet <sup>\$</sup>	Patty of spiced minced meat with potato as binder and covered with breadcrumbs	Deep fat frying
5.	<i>Samosa</i> <sup>\$</sup>	Triangular pastry case containing spiced meat	Deep fat frying
6.	<i>Erachiada/erachipathal/erachi petti</i> <sup>\$</sup>	Crescent shaped pastry case containing spiced meat	Steaming Deep fat frying
7.	Chicken roll <sup>\$</sup>	Cylindrical savory containing spiced meat	Deep fat frying
8.	<i>Kakkaoroti/Kunjipathiri</i> <sup>^</sup>	Rice dumplings in meat curry	Steaming
9.	<i>Erachi bonda</i> <sup>\$</sup>	Savory balls of minced meat and potato, battered and fried	Deep fat frying
10.	<i>Erachiidli</i> <sup>\$</sup>	Spiced wheat dumplings with meat	Steaming
11.	<i>Alissa</i> <sup>^</sup>	Wheat porridge cooked with meat and spices	Pressure cooking/stewing
12.	<i>Biriyani</i> <sup>^</sup>	Seasoned rice cooked with meat	Steaming
13.	Mutton <i>pachamallythenga pal</i> curry <sup>^</sup>	Curried mutton in coconut milk.	Braising
14.	<i>Varutha arachakozhi</i> curry <sup>^</sup>	Curried chicken is sautéed and ground coconut	Braising
15.	<i>Kozhi varattiyathu</i> <sup>^</sup>	Curried Chicken in coconut milk.	Braising
16.	Chicken stew <sup>#^</sup>	Chicken stewed in coconut milk	Stewing
17.	<i>Kozhi nirachathu</i> <sup>^</sup>	Whole spring chicken stuffed with spices and hard-boiled eggs	Deep fat frying/roasting
18.	<i>Aattin kalchuttathu</i> <sup>^</sup>	Seasoned goat leg	Roasting
19.	<i>Aattinthala</i> <sup>^</sup>	Seasoned goat head	Simmering/braising
20.	<i>Kozhi kadambu/kozhipidi</i> <sup>^</sup>	Rice dumplings in chicken curry	Steaming
21.	<i>Eenthupidi</i> <sup>^</sup>	Queen palm sagodumplings in chicken curry	Steaming
22.	<i>Kozhi varaval</i> <sup>^</sup>	Chicken cooked with grated coconut, condiments and spices without gravy	Braising
23.	<i>Erachi sukka</i> <sup>^</sup>	Beef cooked with grated coconut, condiments and spices in earthen pot without oil	Simmering
24.	<i>Nadankozhi marunnu</i> curry <sup>^</sup>	Country chicken cooked with ayurvedic (medicinal) ingredients	Dry heat cooked in traditional stove with coconut husk as fuel

Meal time: #Breakfast \$Snack \*Sweet/Dessert ^Lunch/ Dinner



**Fig. 1** *Erachipathiri*



**Fig.1**

**Fig.2** Cutlet



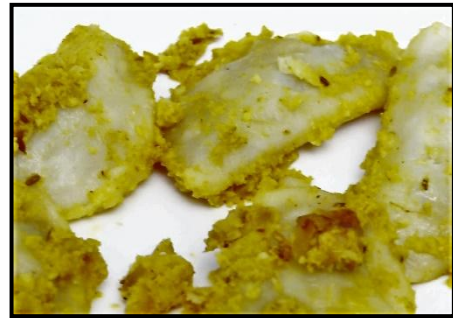
**Fig.2**

**Fig. 3-** *Samosa*



**Fig.3**

**Fig. 4-** *Erachiada*



**Fig.4**

**Fig. 5-** *Chicken roll*



**Fig.5**

**Fig. 6-** *Alissa*



**Fig.6**

**Fig. 7- Eenthupidi**



**Fig.7**

**Fig. 8- Nadankozhi marunnu curry**



**Fig.8**

Alissa is a porridge cooked with whole wheat, meat, and spices similar to *Harrisa* of Jammu and Kashmir and *Hyderabadi Haleem*. These products have a pasty consistency and rich spicy flavor. These products are commonly consumed during the holy month of *Id-ul-milad/ Ramadan*. The shelf life of goat meat *Haleem* made with a meat to extender ratio of 3:1 with wheat as an extender has been studied. The ratio was found to be optimum to prepare quality *Haleem* which could be stored in a freezer ( $-18\pm 1^{\circ}\text{C}$ ) safely up to 30 days (Rasheed *et al.*, 2007).

During the present study, the proximate composition of the *Alissa* revealed moisture as  $72.50\% \pm 0.77$ ; fat as  $3.47\% \pm 0.22$ ; protein as  $1.55\% \pm 0.10$  and ash as  $0.88\% \pm 0.08$ . Studies on similar product *Harrisa* prepared using mutton meat was attempted and reported moisture as  $74.7\% \pm 0.15$ ; fat as  $10.5\% \pm 0.35$ , protein as  $12.1\% \pm 0.37$  and ash as  $2.1\% \pm 0.18$  (Bhat and Pathak 2012). Similarly, the proximate composition of chicken meat-based *Hyderabadi Haleem* has been reported as moisture 79.1%; protein 6.5%, and fat 7.0% (Muthukumar *et al.*, 2015).

### **Enrobed and stuffed meat products**

Enrobing with edible coatings has been reported to improve the quality and extended

shelf life of fresh frozen and fabricated foods (Biswas *et al.*, 2004; Chidanandaiah *et al.*, 2005; Mendiratta *et al.*, 2005). Enrobed and stuffed meat products are popular in North Malabar and are often consumed as snacks. They may be fried or steam cooked. *Erachiada/erachipathal/erachi petti* is a snack which is either steam-cooked or deep-fried. It is prepared from seasoned and spiced chicken or beef mince stuffed in dough made of either fine rice flour or refined wheat flour. *Adas* prepared using rice dough are usually steam cooked and those prepared from refined wheat flour dough are deep-fried. They are usually semicircular and molded by hand or by small molds. For greater shelf life, onion and green chilies are not added in the meat mix and the mix is heated on low flame to reduce the moisture content. *Kozhiada* is an enrobed and steamed product stuffed with spiced and minced chicken similar to chicken *Momo*. The proximate composition of the *Kozhiada* revealed moisture as  $65.63\% \pm 0.58$ ; fat as  $4.57\% \pm 0.20$ ; protein as  $3.56\% \pm 0.16$  and ash as  $1.37\% \pm 0.10$ . The fat and protein content of the *Kozhiada* is significantly higher while compared to reported moisture ( $62.67\% \pm 0.30$ ); fat ( $10.66\% \pm 0.01$ ) and protein ( $17.94\% \pm 0.20$ ) of similar product chicken *Momo* (Rathod, 2019).

Erachi bonda is a savory ball of minced meat and potato, battered and fried.

*Chorapathiri*, *erachipathiri*, *Attipathiri* are layered rice pancakes stuffed with seasoned and spiced meat. Similarly, *Athishayapathiri* is layered wheat pancakes stuffed with meat. All the above products are steam cooked, whereas *Chatti pathiri* is a meat-stuffed flatbread cooked by shallow fat frying along with the application of cinders on the lid. Meat *samosa* especially chicken *samosa* is another popular snack that is seasoned and spiced meat filled in pastry sheets made of refined wheat flour and deep-fried. Unlike the North Indian *samosas*, these *samosas* are triangular shaped and thinner. Previous researchers have evaluated the quality of meat *samosa* stuffed by incorporating different binders (Keshri *et al.*, 1988) and extenders: Meat stuff extended with 10% potato mash and 5% green peas was rated to be highly acceptable (Sharma *et al.*, 1988). *Samosa* can also be prepared by effectively utilizing the chicken meat from Chicken frames (Chauhan *et al.*, 2003).

Chicken/meat cutlet is the most popular snack product available in restaurants and bakeries all over the Malabar region. Cutlets are flat croquette of flour, pulse, nuts, potato, condiments, spices and often coated with bread rusk crumbs and are considered as one of the most popular snack-based products (Singh *et al.*, 2014). In Kerala cooked and minced chicken, as well as beef, are used for cutlet preparation, and potato is used as binder. Ready-to-fry cutlets after enrobing can be freezer stored. Novel chicken cutlets were prepared to replace the potato with elephant foot yam (*Amorphophallus paeoniifolius*) and observed that the products had a higher level of phenolic antioxidants, higher DPPH radical scavenging ability and better nutritive value than traditional cutlets (Kurian *et al.*, 2016). *Erachiidli* is a steam cooked wheat dumpling with spiced and seasoned meat added. The effect of various cooking methods for the preparation of

chicken meat cutlets was assessed and reported that oven cooking followed by shallow frying was found optimum for the preparation of chicken cutlets (Singh *et al.*, 2015). Similarly, effect of clove bud oleoresin and turmeric oleoresin on the quality of chicken cutlet incorporated with elephant foot yam (*Amorphophallus paeoniifolius*) and stored in a freezer (-18±2°C) was studied and reported that clove bud oleoresin and turmeric oleoresin at 0.5% level can effectively be incorporated in chicken cutlets for increasing freezer shelf life without affecting the sensory attributes (Paulose *et al.*, 2018)

So concluded currently, worldwide, in an attempt to bring in food sovereignty, indigenous communities seek to revive their healthy cultural nutrition practices in ways that honor their traditions and world views. Building well-being based on local food systems depends on understanding and sharing the local food resources and traditional ways of growing, harvesting, preserving and preparing the foods, and using this information to build health-promotion activities. Similar attempts concerning traditional meat products and heritage foods have been undertaken by many researchers in India also. The accessibility to traditional cuisine has been influenced by changes in landscapes as well as immigration to various places in search of livelihood. The desirability of traditional products is influenced by these factors as evidenced by the high response to various convenient products. In this context, the documentation of these ethnic products is of relevance.

However, with the consumers being more informed and increasingly more demanding, there is a need to satisfy the expectations of consumers, regarding sensory, nutritional aspects, and safety. The major constraints in promoting traditional food products are the lack of standardized technology in



production, adoption of a batch process which is time-consuming, limited shelf life attributed to the lack of scientific approach in processing as well as non-availability of cold chains<sup>4</sup>. The food safety concerns of traditional foods have to be given due consideration and there is a need for formulation of standards for established ethnic products. Moreover, the knowledge base on process optimization, packaging systems, and storage conditions has to be enhanced with the scientific practices in place to enhance the quality of these products. Adoption of newer technologies like continuous processing systems and thermal processing might help in the distribution of the products to much wider geographical areas and different cultures. This way, it can contribute to the economy of the region by promoting culinary tourism.

The current study helped in creating a database by collecting firsthand information from the home track of the dishes and authentic documentation has been done. The formularies, processing techniques as well as proximate composition have been assessed. However, assessment and assurance of Physico-chemical and microbiological qualities as well as optimum packaging conditions, the shelf life of these products, etc. are some of the attributes to be standardized and validated for consistency and uniformity of the product. This is required for the industrial production of these products. This would help in the large-scale industrial production of the products, which has the potential to generate employment in the sector.

### **Competing interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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