

Good hygiene practices and HACCP system in the technology of grilled meats in four cities of Tchad

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Abstract

This review addresses the sanitary quality of grilled meats consumed in Tchad. The general considerations presented are based on the different types of grilled products (*Amkamile*, conventional meat, *Kilichi*, *Bassim*, *Tchélé*, and tongue), the technologies associated with their preparation, and the application of the Hazard Analysis and Critical Control Points (HACCP) system to these products. The processing and consumption of grilled meat have increased considerably, driven by the availability and accessibility of ready-to-eat products. This rise is also explained by higher population growth rates, changes in dietary habits, and the large influx of Sudanese and Central African refugees into Tchad. Grilled meat remains a staple food for many households for nutritional and dietary reasons. In Tchad, the lack of HACCP implementation constitutes a major public health concern, particularly within the production and consumption chain of grilled meats. These shortcomings may compromise the hygienic and microbiological quality of grilled products and lead to significant health risks for consumers. The impact of poor hygiene practices on food safety is reflected in an increased risk of foodborne illnesses among the population. Therefore, to ensure consumer confidence, the rigorous application of HACCP throughout the entire production chain is essential for controlling hazards associated with the processing of grilled meats.

Keywords: Grilled meats; Good hygiene practices; HACCP; Tchad

1. Introduction

Tchad, one of the largest livestock-producing countries in the Sahel, has experienced in recent years a considerable increase in demand for animal-derived proteins. This rise is partly attributable to higher levels of urbanization, rapid population growth, evolving dietary habits, and the large influx of refugees into the country [1]. Among the animal protein sources consumed, meat constitutes a fundamental component of the diet for many households, for cultural, nutritional, and dietary reasons [2]. Meat is consumed in various forms depending on cultural and traditional contexts. The most notable and widely appreciated method of preparation across the population is grilling [3]. Considered one of the most commonly consumed foods, grilled meat represents both a significant cultural heritage and an important economic resource. Every day, thousands of individuals of all ages and genders frequent grilling sites throughout the country for consumption. According to Jegede et al. [4], the consumption of processed meat products has increased substantially due to the availability and accessibility of ready-to-eat meat products. Estimates from the Ministry of Livestock indicate that the consumption of grilled meat has become increasingly excessive, reaching approximately 22

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kg per capita. Grilled meat is consumed at least two to three times per day by the population, often without consideration of preparation and selling conditions. According to FAO/WHO [5], when prepared and sold in a sanitary environment and in compliance with good hygiene practices, it provides consumers with a high-quality source of protein, iron, and vitamin B12 essential for muscle development and immune function without posing health risks. Access to safe and nutritious food is a fundamental human right and a key determinant of adequate health status. Despite its socio-economic importance, hygiene practices during processing and at points of sale remain a major concern for consumers [6]. Poor hygiene practices promote contamination and the proliferation of pathogenic microorganisms such as *Staphylococcus aureus*, *Salmonella spp.*, *Bacillus spp.*, and *Escherichia coli*, which may lead to food quality deterioration [7]. These pathogens affect millions of people annually, causing a wide range of foodborne illnesses, including salmonellosis, diarrhea, *Escherichia coli* infections, botulism, typhoid fever, and cholera [8].

Insufficient knowledge of potential hazards and failure to adhere to basic hygiene rules may result in microbial contamination and pose a significant threat to consumers [9]. Microbiological analyses conducted on meat products in Tchad have identified critical control points, revealing the presence of microbial populations [3,6,10,11]. This situation constitutes a serious public health issue, with substantial social, health, and economic repercussions. It represents a major challenge, particularly given that most infections are transmitted through contaminated food. Therefore, the present review was undertaken with the aim of contributing to the understanding of microbiological risks associated with the consumption of grilled meats produced in four cities of Tchad.

2. Types and Techniques of Grilled Meats

Grilled meat is the final product obtained from the processing of fresh meat under the action of heat. In Tchad, several types of grilled meat are distinguished, including the type commonly referred to in Arabic as “*Amkamile*”, conventional grilled meat, grilled heads known as “*Bassim*”, dried meat grilling referred to as “*kilichi*”, skewered meat called “*Tchélé*”, and grilled tongue.

Most of these methods are rooted in ancestral practices and confer upon grilled meat desirable sensory characteristics, including enhanced flavor, improved texture, and a taste that is widely appreciated by consumers.

2.1. Grilled Product Commonly Referred to in Arabic as “*Amkamile*”

This type of grilled product consists of wrapping, into a single unit, various viscera and offal combined with ingredients of different types (Figure 2). The grilling process involves several successive steps (Figure 1). First, the viscera and offal are cut into small pieces. Subsequently, selected ingredients are added, including onions, garlic cloves, chili pepper, and salt. The resulting mixture is then inserted into the large intestine. The latter is wrapped around a pointed rod, with both ends secured using a portion of the small intestine [12].

The roll, either plain or wrapped in paper depending on the griller’s practice, is then brushed with oil and placed a few centimeters above the grill, where it is exposed to the heat of the embers. As this heat is not controlled, it presents a critical issue. Consequently, to avoid any microbiological risk, the heat and cooking time must be sufficient to ensure the elimination of pathogenic bacteria. Fats and oils play an important role, particularly in relation to the functional and sensory quality of many food products [13]. During grilling, the rolls are turned progressively to ensure that all surfaces are evenly exposed to heat. The cooking temperature is not standardized but varies according to the type of meat and consumer preferences.

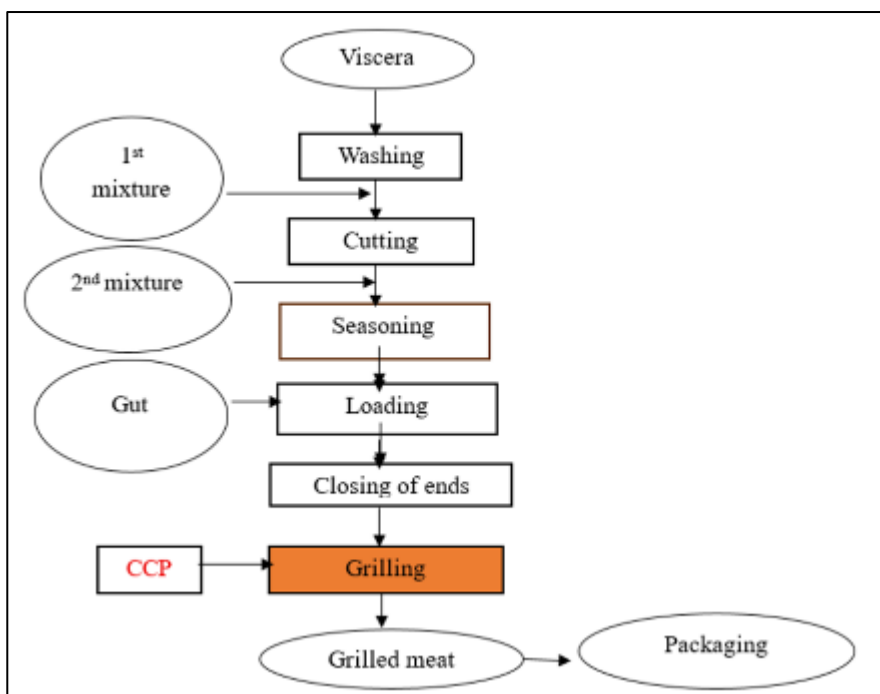
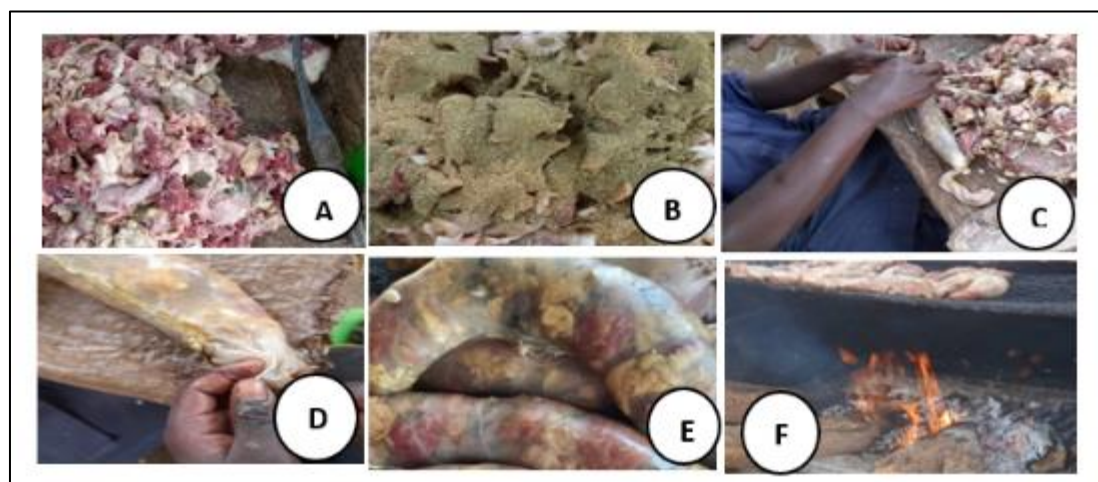


Figure 1 Flow diagram for the production of grilled meat “Amkamille” and Critical Control Points (CCPs)



Legend : (A) cutting into pieces ; (B) seasoning ; (C) insertion into the large intestine ; (D) closure of both ends of the intestine ; (E) filled intestine ; (F) grilling ; (G) grilled meat ready for consumption.

Figure 2 Production of *Amkamille*

2.2. Grilling of Conventional Meat

Grilling is a cooking technique based on the transfer of dry heat. Prior to use, the grill is thoroughly cleaned with a detergent, rinsed with clean water, and then air-dried (Figure 3).

For preheating, cardboard is placed on the grill and ignited using a small amount of fat. This process enables rapid heating of the grill while simultaneously removing residual grease through combustion. Once the cardboard is completely burned, the grill surface is brushed to eliminate ash residues. To prevent the meat from adhering to the grill surface, the hot grill is then coated with oil or a piece of fat. It is preheated at a high temperature for 10 to 15 minutes before placing the meat on it (Figure 4). Large pieces of meat are then arranged separately on the grill, directly above the flame. After approximately 10 minutes of cooking, the pieces are basted with oil and lightly salted, and then turned regularly using a knife to ensure uniform browning and thorough cooking on all sides. Cooking temperature and duration vary depending on the type of meat.

Initially, cooking is carried out over high heat generated by wood flames. After about 15 minutes of grilling, the wood is removed, and cooking continues over embers, providing a more moderate and consistent heat. The grilling process is continuously monitored to prevent the meat from burning. However, refrigeration and grilling are essential steps in ensuring a safe product. Indeed, poor refrigeration leads to the proliferation of pathogenic microorganisms. It is therefore necessary to refrigerate fresh meat at a temperature of 4°C to prevent any spoilage caused by the uncontrolled growth of microorganisms. Furthermore, the cooking temperature and time must be sufficient to eliminate all pathogenic microorganisms.

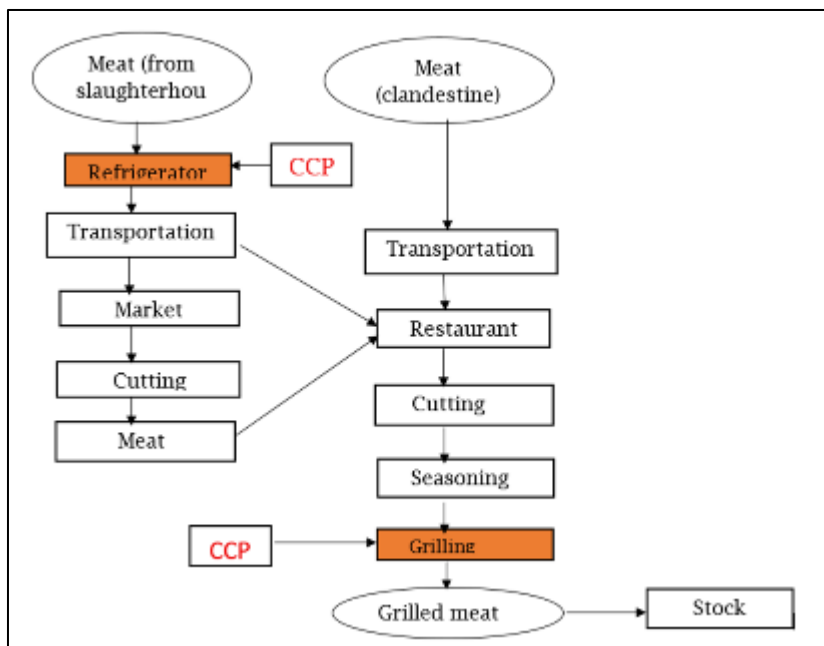


Figure 3 Production flow diagram of conventional grilled meat and Critical Control Points (CCPs)



Legend : (A) fresh meat ; (B) grilling over a wood fire ; (C) grilling over a doum palm fire ; (D) served dish of grilled meat.

Figure 4 Production of conventional grilled meats

2.3. Production of *Kilichi*

In Tchad, *Kilichi* is a traditional meat-based food product, typically prepared from beef or camel meat (Figure 6). Its production involves slicing the meat into thin strips, followed by sun-drying. After drying, the strips are seasoned and grilled over a charcoal fire, which is sometimes fuelled with doum palm nuts (*Hyphaene thebaica*) (Figure 5).

Kilichi is considered a palatable product and is relatively rich in proteins, although it is less frequently consumed by the general population. The processing technique comprises several stages. First, tendons are removed, followed by slicing the meat into thin strips, which are then exposed to sunlight for dehydration. Subsequently, the dried strips are coated with a mixture of ingredients, including ground peanut paste, before being grilled over a charcoal fire. The final product

is either consumed on site or packaged in aluminium foil or cement paper for home consumption [14]. The grilling stage is essential to eliminate any risk of microbiological contamination. The combination of time and temperature must be sufficient to eliminate pathogenic microorganisms in the grilled meat.

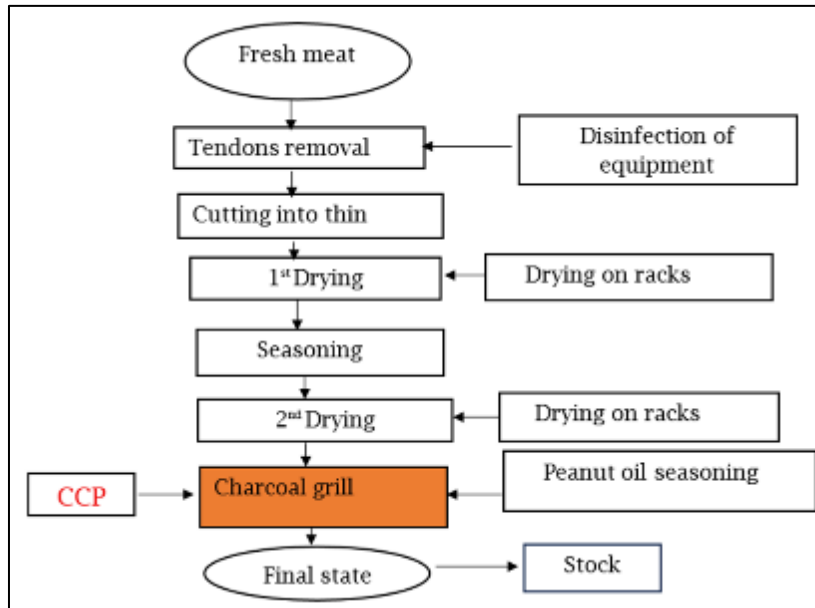


Figure 5 Production flow diagram of dried and grilled meat (*Kilichi*) and Critical Control Points (CCPs)



Legend : (A) fresh meat ; (B) drying on racks ; (C) dried meat, grilled.

Figure 6 Production of dried meat (*Kilichi*)

2.4. Head Grilling, Commonly Referred to in Arabic as “*Bassim*”

This type of grilled product is specifically prepared from the heads of small ruminants, particularly goats and sheep (Figure 8). The preparation process begins with the removal of the skin, followed by the extraction of the eyes and, in some cases, the teeth. The head is then thoroughly washed with water to remove blood residues and other impurities (Figure 7).

After preheating the grill at high temperature, a piece of cardboard previously soaked in oil is placed on it. The whole heads are then individually arranged on the grill, above a wood fire or a fire fuelled by doum palm nuts (*Hyphaene thebaica*). During cooking, the heads are regularly turned and coated with oil approximately every minute.

This grilled product is highly appreciated by consumers due to its high protein content and organoleptic qualities, particularly its flavour. The head is teeming with a wide variety of microbial flora. It must be grilled with great care to protect the consumer’s health. The grilling time and temperature must be sufficient to eliminate any microbial hazards.

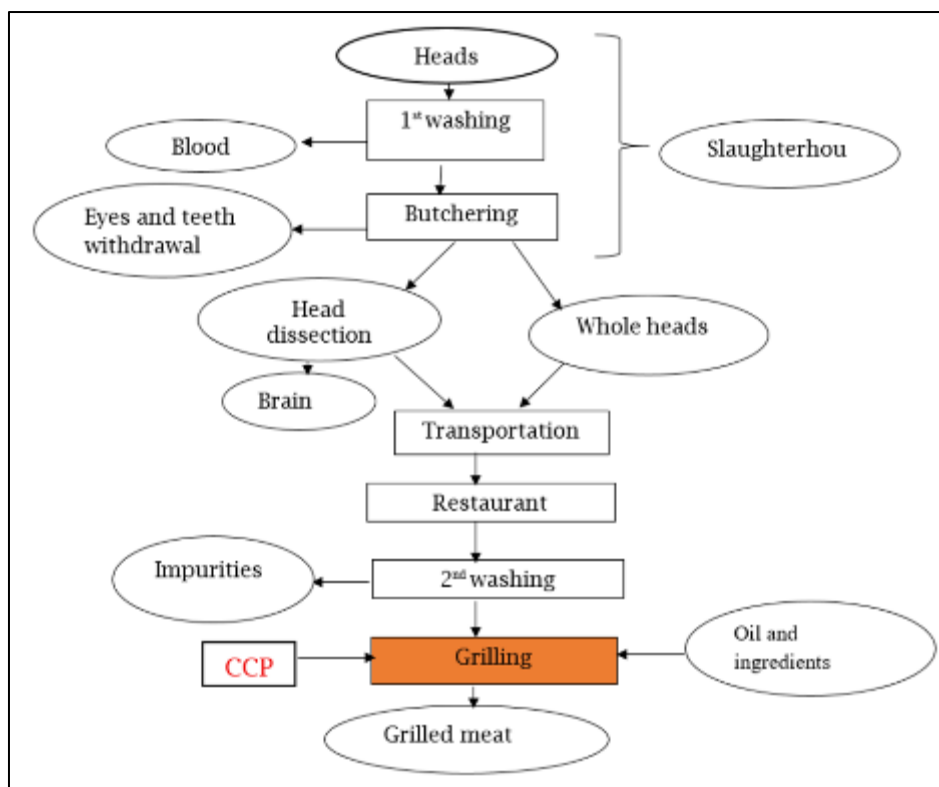
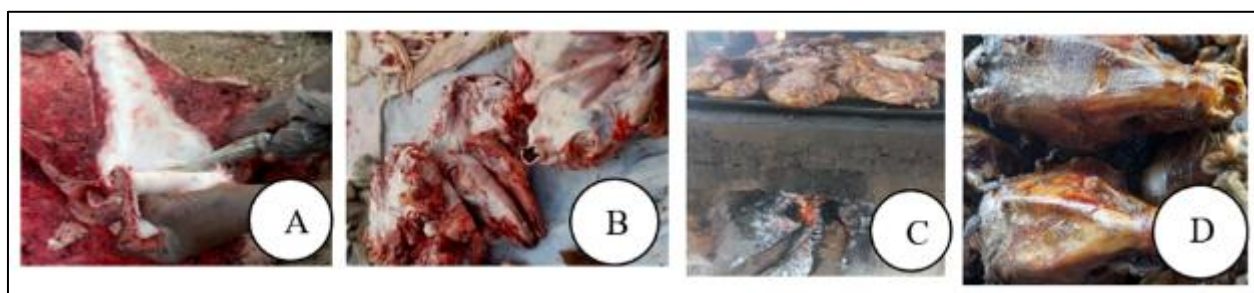


Figure 7 Improved processing flow diagram for roasting animal heads



Legend : (A) skin removal ; (B) skinned heads ; (C) roasting over fire ; (D) grilled meat ready to be served.

Figure 8 Production of animal heads

2.5. Skewered Grilled Meat, Referred to in Arabic as “*Tchélé*”

This grilling method is predominantly practiced by Hausa Nigerians residing in Tchad. Despite its organoleptic qualities, this food product remains relatively little known in rural areas and is only minimally consumed in urban settings (Figure 10). The process involves the use of a pointed wooden or metal skewer on which pieces of meat, generally beef, are threaded. The technique consists of cutting the meat into small, uniformly sized cubes or strips, which are then mounted onto the skewer. The meat pieces are subsequently marinated using a mixture of ingredients including crushed garlic, onion, pepper, Maggi seasoning cubes, vegetable oil, salt, peanut paste (locally referred to as “*wili-wili*” in Arabic), and other spices (Figure 9).

The prepared skewers are placed on a previously cleaned and preheated grill. They are spaced apart to allow air circulation and ensure uniform cooking. Grilling begins over high heat; after approximately 10 minutes, the burning logs are removed, and cooking continues over embers. The cooking temperature is difficult to standardize and is estimated to range between 65 and 70°C. Cooking duration is similar for both wooden and metal skewers. The combination of time and temperature is crucial for removing moisture and eliminating any pathogenic microorganisms. Adherence to these conditions ensures that the product poses no risk to consumers.

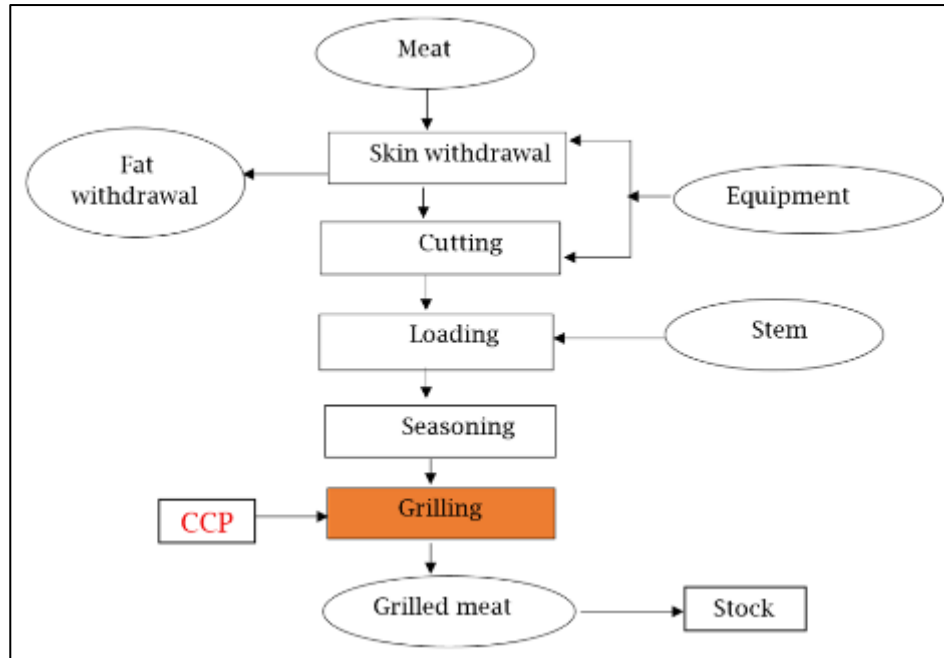


Figure 9 Improved processing flow diagram as “Tchélé” and Critical Control Points (CCPs)



Legend : (A) removal of the membrane ; (B) threading meat pieces onto a skewer ; (C and D) marinating the skewers ; (E) grilling over a wood fire ; (F) skewer ready to be served for consumption.

Figure 10 Production of skewers

2.6. Grilling of Beef Tongue

The grilling of beef tongue is a traditional and artisanal method adapted to local socio-cultural contexts (Figure 12). It is regarded as a flavourful dish among consumers. The process follows several well-defined steps. Initial preparation involves receiving the tongue and thoroughly washing it with cold water to remove all impurities. This is followed by a pre-cooking stage, consisting of boiling the tongue for approximately one hour, with the duration varying according to the size of the piece. This step facilitates the tenderisation of the meat. Once pre-cooking is completed, peeling is carried out by removing the thick outer skin covering the tongue, an operation that is easier while the tongue is still hot (Figure 11). The next steps involve cutting and seasoning. The tongue is cut into large pieces, then seasoned with spices, salt, and oil. The pieces are left to rest for a few minutes to allow absorption of flavours.

The seasoned pieces are placed on a preheated and lightly oiled grill to prevent sticking. Cooking control is essential to ensure uniform and complete grilling. The meat is turned regularly to achieve homogeneous cooking. The grilling time is generally longer than for other meat cuts due to the firm and dense texture of the tongue. A core temperature of between 70°C and 71°C must be maintained for at least 2 minutes. As the tongue is a thick cut, the heat must penetrate right through to the centre. It is essential to check the core temperature systematically using a disinfected meat thermometer before removing the tongue from the grill.

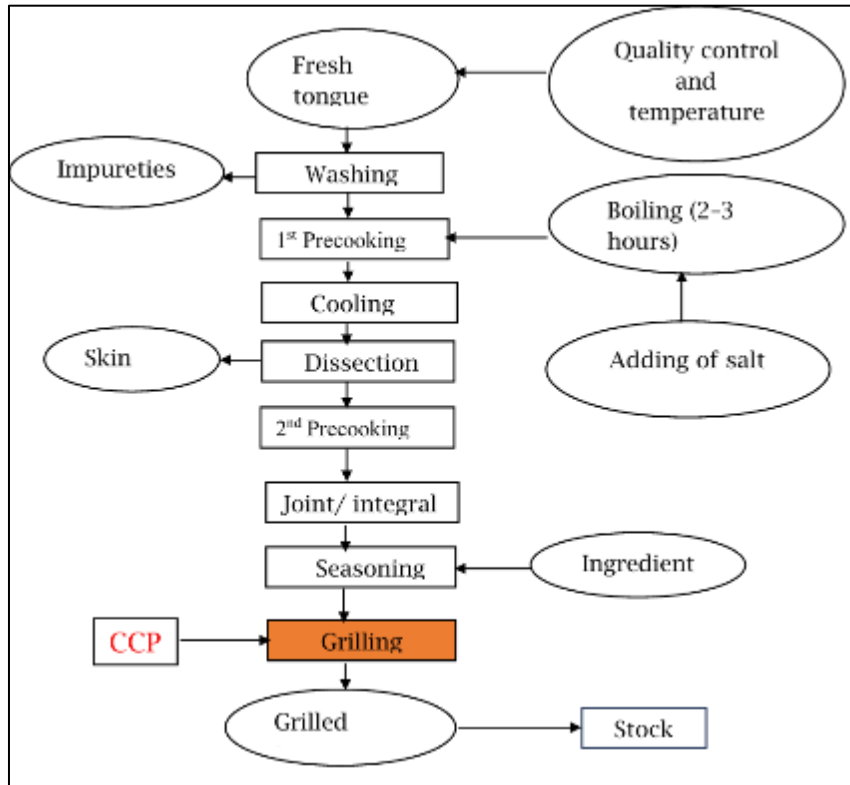
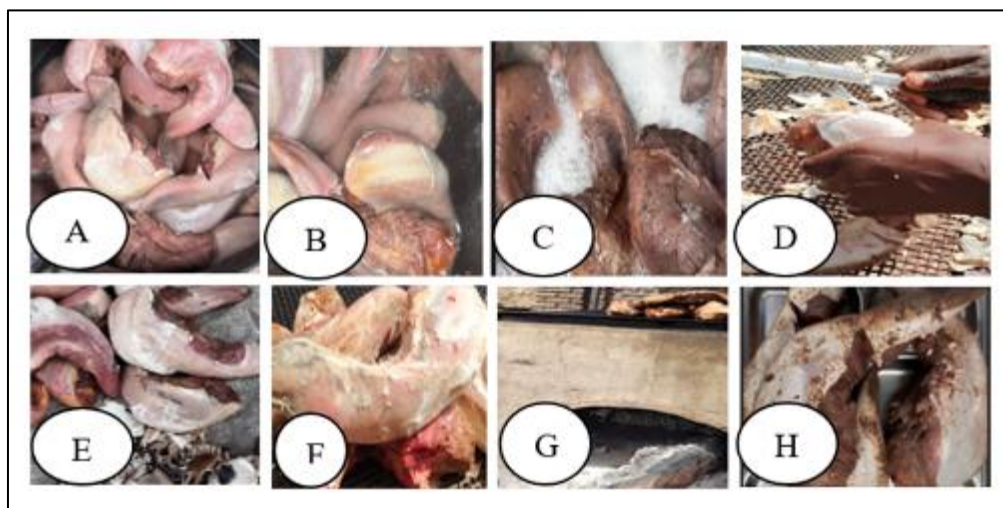


Figure 11 Process flow diagram for tongue roasting and Critical Control Points (CCPs)



Legend : A : Fresh tongue ; B : immersion in a water-containing container ; C : boiling ; D : peeling ; E : removal of the outer skin ; F : placement of the tongue on the grill ; G : grilling ; H : cooked tongue served.

Figure 12 Beef Tongue Processing

3. Hygiene Practices During the Preparation Process of Grilled Meats

Food safety for human consumption remains one of the fundamental pillars of food law and a critical driver of economic growth in developing countries worldwide [15,16]. Good hygiene practices are essential to ensure that grilled meat products are clean, safe, and of high quality for consumers.

Furthermore, the presence of microorganisms throughout the production chain may adversely affect the sanitary quality of these products. Contamination may occur during slaughter (pre-mortem contamination) or during carcass processing (post-mortem contamination). Its exogenous origin highlights the importance of strict enforcement of hygiene regulations and the control of critical points throughout the manufacturing process. Personnel, contaminated water, raw materials, equipment, and handling practices constitute major sources of contamination in processed meat products.

4. Application of the HACCP System in Grilled Meat Processing

To ensure the prevention of various types of hazards, the Hazard Analysis and Critical Control Point (HACCP) system, internationally recognized as one of the most effective tools, enables the identification of hazards at different stages of food production and the establishment of a system for hazard assessment and control. Critical points, hazards, and critical limits are presented in Table I. In contrast, the identification of hazard sources and causes is illustrated in Table II. The determination of Critical Control Points (CCPs) is presented in Figures 1, 3, 5, 7, 9, and 11.

The HACCP system should encompass product composition, structure, processing conditions, packaging, storage and distribution conditions, shelf life, and intended use [17]. The improvement of meat sanitary quality necessarily requires training food handlers in good hygiene practices and grilling technology. The HACCP system aims to prevent risks and ensure food safety by strengthening and improving good hygiene practices throughout the production chain.

Table I Identification of the different sources and causes of hazards associated with grilled meat production in four regions of Tchad within the framework of HACCP implementation

| Potential hazard sources | Causes of hazards | Potential hazard sources | Causes of hazards | Potential hazard sources | Causes of hazards |
|--|---|-------------------------------|---|--|--|
| 1. Fecal contamination | Transmission of microorganisms via personnel (contaminated hands, clothing, floor, water) | 1. Toxic substances | Direct contact with disinfectant residues or fuel | 1. Toxic compounds | Presence of smoke, rusted grills, chemical residues on utensils, burnt meat |
| 2. Environmental microbial contamination | Contamination of animals during slaughtering, skinning, and evisceration | 2. Transport conditions | High temperature, disruption of the cold chain, absence of refrigerated transport | 2. Cross-contamination | Contact between cooked and raw meat; irregular cleaning and disinfection of utensils; insufficient cooking |
| 3. Bacterial proliferation on surfaces and equipment | Poorly cleaned and disinfected floors, knives, and hooks | 3. Cross-contamination | Contact with other food products | 3. Environmental contamination (Enterobacteriaceae, molds, etc.) | Lack of separation between clean and dirty areas |
| 4. Endogenous contamination | Inadequate veterinary inspection | 4. Foreign body contamination | Introduction of insects, dust, and sand particles | 4. Human contamination | Contaminated hands, utensils, and inappropriate use of additives |

5. Critical Control Points and Hazards Associated with Grilled Meat Production (HACCP)

The identification of various sources and causes of hazards constitutes an essential component of food safety management, internationally recognized and based on biological, chemical, and physical hazards throughout the food chain [18]. Food processed under inadequate hygienic conditions is unfit for consumption due to its exposure to various pathogenic microorganisms. Such foods are now considered effective vehicles through which diverse pathogenic microorganisms can reach their hosts. According to Okwuanaso et al. [19], food safety and hygiene play a fundamental role in maintaining and improving consumer health.

Table II Critical Control Points, Hazards, Critical Limits, and Improvement Strategies in Grilled Meat Processing Sites in Tchad

| No. | Critical Control Point (CCP) | Hazards | Critical Limits | Quality Control Analysis / Improvement Strategy |
|-----|------------------------------|--|--|--|
| 1 | Batch of slaughtered animals | Chemical: antibiotic residues. Biological: contamination by bacteria and parasites (Mycobacterium spp., Salmonella spp., Brucella spp., Taenia spp.), animal health status (diseases) | Antibiotic residues \leq regulatory limits | Systematic veterinary inspection of slaughtered animals; traceability of animal sources; rational and controlled use of veterinary drugs |
| 2 | Cooling of fresh meat | Biological: proliferation of pathogenic and resistant bacteria (Clostridium perfringens, Salmonella spp., Staphylococcus spp., Escherichia coli O157: H7) | Storage temperature $\leq 4^{\circ}\text{C}$ | Temperature monitoring; regular verification and maintenance of refrigeration equipment |
| 3 | Grilling of grilled meat | Biological: pathogenic bacteria. Physical: rust particles from grills; cross-contamination. Chemical: toxic substances (e.g., combustion by-products) | Sufficient cooking time; uniform grilling; hot holding; storage at hot temperature < 2 h | Uniform cooking control; cleaning and disinfection of grills; visual inspection; continuous monitoring of cooking conditions |
| 4 | Waste management | Biological: proliferation of bacteria, insects, and animals. Chemical: exposure to toxic cleaning agents | Temporary storage in clean and closed bins | Separation of waste from clean production areas; use of closed containers located outside processing zones; immediate cleaning; systematic replacement of damaged containers; staff training |

6. Strategy for Improving the Quality of Grilled Meats

The strategy for quality improvement necessarily relies on awareness-raising and training of food handlers regarding the importance of good hygiene practices. The opening of any grilling establishment must be authorized by municipal and health authorities and accompanied by a certification confirming training in good hygiene practices and compliance with applicable standards by grill operators.

The premises should be sufficiently spacious, covered, and well ventilated, with adequately designed areas that are easy to clean and disinfect. Properly structured zones should ensure separation between the cooking area and the dining area. The municipal hygiene service should organize training sessions on workspace layout, promoting the use of accessible and appropriate equipment to protect food from dust, pests, and risks of cross-contamination.

Health authorities should conduct regular inspections and monitoring of personnel to verify compliance with hygiene regulations as well as their health status. Each establishment should also implement a well-defined and strictly enforced cleaning and disinfection plan covering equipment, utensils, floors, and walls.

To improve the quality of grilled meat, it is necessary to select fresh meat derived from healthy animals and use natural ingredients to enhance flavour. Each establishment should be equipped with a refrigerator to ensure proper maintenance of the cold chain.

For grilling, operators should use well-formed red-hot charcoal without open flames and ensure that the grill is properly cleaned. Preheating of the grill is also required to achieve uniform cooking. Regarding cooking techniques, grilling time should be adjusted according to the thickness and type of meat.

7. Conclusion

The improvement of grilled meat quality relies on sound organization, control of processing steps, and strict adherence to hygiene rules. The majority of the restaurants surveyed do not have staff training programs in hygiene, nor adequate premises that are spacious, well ventilated, and properly illuminated, with sufficient shelving to allow proper classification of equipment by product type and category. The surroundings of the establishments are not consistently maintained in a clean condition. Processing areas for meat handling are not supplied with potable water, nor are adequate handwashing hygiene systems available. Pest control measures, including rodent and insect control systems, are virtually absent. Handwashing with soap before and after handling food, as well as after toilet use, is insufficiently practiced. Medical examinations of food handlers are also almost nonexistent. Necessary measures should be implemented to exclude from food handling any personnel who are either asymptomatic carriers or clinically ill within the production chain. The implementation of the HACCP system in grilled meat processing enables the identification of potential biological, chemical, and physical hazards throughout the production chain. To this end, the establishment of standardized procedures would contribute significantly to ensuring food safety.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Authors' contribution

All the authors contributed to the drafting of this review.

Submission statement

This manuscript is original and has not been submitted.

References

- [1] OECD/FAO: OECD-FAO Agricultural Outlook 2022-2031. OECD Publishing, Paris / FAO, Rome. 2022.
- [2] Clinquart, A., Ellies-Oury, M.P., Hocquette, J.F., Guillier, L., Santé-Lhoutellier, V., & Prache, S. On-farm and processing factors affecting bovine carcass and meat quality. *Animal*, 2022 ;16, 100426.
- [3] Doutoum, A.A., Tidjani, A., Attamar, A., Doungous, D.M., Hamid, A.A., Yaya, A.M.A., Moukhtar, R., & Markhous, A.N. Hygiene practices of meat products in the city of Abéché, Chad. *Journal of Food Security*, 2019; 7(4), 115-121. <https://doi.org/10.12691/jfs-7-4-3>
- [4] Jegede, O.B., Ogunwole, O.A., & Omojola, A.B. Quality attributes and safety of processed meat products in Ibadan, Nigeria. *Nigerian Journal of Animal Production*, 2020; 45(4), 210. <https://doi.org/10.51791/njap.v45i4.599>
- [5] FAO/WHO. Impact on Human Health of Food Safety Systems Established in the Near East. Regional Meeting on Food Safety for the Near East. Amman, Jordan (NEM 05/3).2005.
- [6] Erbi, D., Somda, N.S., Doutoum, A.A., Ali, H.M., Cissé, H., Hien, Y.E., et al. Microbiological quality and antimicrobial resistance of *Salmonella* spp. and *Escherichia coli* isolated from grilled meat. *International Journal of Biological and Chemical Sciences*, 2022; 16(6), 2881-2891. <https://doi.org/10.4314/ijbcs.v16i6.32>
- [7] Peters, H., Mgbang, J.E., Onyenweaku, E.O., & Ikpeme, C.E. Microbiological evaluation of some ready-to-eat street foods sold in Calabar and its environs. *Journal of Food Safety*, 2017 ;5(3), 100-106. <https://doi.org/10.12691/jfs-5-3-3>

- [8] Sonia, M., Archibal, E.D., Danquah, A., & Stefa, O.S. Food poisoning risks and their consequences on food safety. In *Microorganisms for Sustainable Environment and Health*, 2020; pp. 383–400. <https://doi.org/10.1016/B978-0-12-819001-2.00019-X>
- [9] Douamba, Z., Tankoano, A., Kaboré, D., Compaoré-Sereme, D., Ouédraogo, M., Samadoulougou-Kafando, P.M.J., Paré, A., Dicko, M.H., & Sawadogo/Lingani, H. Microbiological quality of fresh and grilled mutton sold in Ouagadougou, Burkina Faso. *Food and Nutrition Sciences*, 2022; 13, 986–1000. <https://doi.org/10.4236/fns.2022.1312069>
- [10] Mayoré, A.D., Bessimbaye, N., Bodering, A., Evariste, B., Abdelsalam, T., & Nicolas, B. Resistance profile of Salmonella isolated from food sold in the streets of N'Djaména, Chad. *African Journal of Microbiology Research*, 2021 ;15(6), 334–340. <https://doi.org/10.5897/AJMR2021.9475>
- [11] Tidjani, A., Bechir, M., Moussa, A., Dionadji, M., & Mbairi, D.G. Street-vended foods: Experience of the Research and Support Project for Street Food Safety (PRASAR) in Chad. *Revue Scientifique du Tchad*, 2016 ;75–86.
- [12] Erbi, D., Doutoum, A.A., Cissé, H., Abba, H., & Savadogo, A. Grilling meat technology and sanitary risks along the production chain in Chad. *Journal of Food Research*, 2024 ;14(1), 2025. ISSN 1927-0887; E-ISSN 1927-0895.
- [13] Youssef, M.K., & Barbut, S. Effects of protein level and fat/oil on emulsion stability, texture, microstructure and colour of meat batters. *Meat Science*, 2009; 82(2), 228–233.
- [14] Tidjani, A., Doutoum, A.A., Brahim, B.O., Bechir, M., Tidjani, S.M.T., Toukourou, F., & de Souza, C. Quality assurance approach in process control of dried meat (“Kilichi”) production diagrams in Chad. *Microbiologie, Hygiène Alimentaire*, 2013; 25(72).
- [15] Saba, C.K., & Gonzalez-Zorn, B. Microbial food safety in Ghana: A meta-analysis. *Journal of Infection in Developing Countries*, 2012; 6(12), 828–835. <https://doi.org/10.3855/jidc.1886>
- [16] Doutoum, A.A. *Microbiological Characteristics of Main Foods Consumed in Chad*. Generis Publishing. 2022.
- [17] Codex Alimentarius Commission. *Recommended International Code of Practice – General Principles of Food Hygiene CAC/RCP 1-1969, Rev. 4 (2003)*. FAO/WHO, Rome, 2003; 29 pp.
- [18] FAO. *Hazard Analysis and Critical Control Point (HACCP) overview*. In: *FAO Food Safety Good Hygiene Practices and HACCP Toolkit*. Rome. 2025. <https://doi.org/10.4060/cc6246fr>
- [19] Okwuanaso, C.B., Onyemelukwe, N.F., & Ofodile, C.A. Food safety knowledge and hygiene practices among food handlers in Nnewi metropolis, southeast Nigeria. *African Journal of Clinical and Experimental Microbiology*, 2025; 26(1), 21–29.