



**EFFECTS OF PROCESSING METHODS ON SNAIL (*Achatina achatina*)
MEAT YIELD AND SENSORY QUALITY**

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ABSTRACT

The study was conducted to evaluate the effect of blanching, unblanching, curing, and smoke drying on snail (*Achatina achatina*) meat yield and quality. A total of 20kg of snail was bought from the market and was processed by blanching or unblanching, and their shell, meat, and waste weights were recorded. Equal weights of snail meat were subjected to curing (with and without spices) in 5% salt solution and subsequently smoke-dried. Sensory evaluation was carried out using a 9-point hedonic scale. Results showed that unblanched snails yielded approximately 6% more meat than blanched snails. However, blanching reduced mucous secretion, facilitated processing and produced meat with a more stable shelf-life. Smoke drying reduced meat weight across all treatments, with retention levels of 40% (control), 30% (cured with spices), and 32% (cured without spices). Sensory evaluation indicated that spiced samples were rated highest in taste, flavor, juiciness, tenderness, and appearance, followed by unspiced samples, while the control rated lowest. Statistical analysis confirmed significant differences at both 1% ($P < 0.01$) and 5% ($P < 0.05$) levels. It was concluded that blanching is the preferred processing method due to its ease and improved hygiene, while smoke drying remains a practical preservation technique for long-term storage and export. The addition of local spices (nutmeg, onion, thyme, grains of paradise) enhanced flavor and consumer acceptance of smoke-dried snail meat.

Keywords: *Achatina achatina*, Blanching, Smoking, Curing, Sensory, Evaluation

INTRODUCTION

Food is one of the most vital requirements for man's survival. However, there is a need for a balance in nutrients in food taken by man for healthy growth in developing countries. Protein malnutrition is a big problem of which, intake could be as low as 5grams per head daily with approximately 70% coming from plant sources and 30% coming from animal sources (FAO, 2020). Protein provide essential amino acids necessary for growth, repair and maintenance of the body tissues. It also help produce antibodies which are crucial for immune system and regulate function like enzymes production, transportation of nutrients and hormones (Ajomiwe *et al.*, 2024) Animal protein ready availability meets human dietary requirements more than protein of plant origin. Malnutrition appear to be one of the most serious health problem in Nigeria, this can be attributed to the fact that livestock production is increasing at 1.5%-2.5% per annum while demand is growing at 4%-5% annually (FAO 2020). As a result of these, snail meat utilization is becoming increasingly recognized as a complementary source of animal protein. In Nigeria the inconsistent power supply coupled with inadequate storage devices (freezer/refrigerator) is becoming a continuous challenge in the storage of and preservation of meat products (Okpala *et al.*, 2021). Smoke-drying is one of the most effective methods of preserving snail meat, especially in areas with limited electricity supply. Economically, smoke-dried snails serve as a valuable source of income for farmers and traders. The long shelf-life makes it possible to transport them over long distances and even export without refrigeration, thus reducing post-harvest losses and increasing market opportunities (Egbe *et al.*, 2021). The trade of processed snails also creates employment opportunities along the value chain, from farming to processing, packaging, and marketing (Olomu, 2011). Hence this study aims to determine the effects of processing methods on meat yield and sensory qualities of snail (*achatina achatina*). The objective of this study is to determine the effects of processing methods on snail (*achatina achatina*) meat yield and sensory quality.



MATERIALS AND METHODS

Study Area

The experiment was carried out at the animal science laboratory of the faculty of Agriculture University of Benin, Edo State. The University is situated in the southern part of Nigeria, within the humid tropical rainforest zone. Geographically, it lies between latitude 6°19' N and 6°21' N and longitude 5°36' E and 5°38' E (Akinola and Akinyemi, 2012). Prior to the commencement of the study, the quarantined snail meat was watered, fed with chick mash and pawpaw leaf for a period of 4 weeks to stabilize them.

Processing of the Snail

Snails were sorted, washed, weighed, and divided into two groups: Group 1 was blanched in boiling water for 20 min before shell and offal removal, while Group 2 was unblanched, with meat extracted manually using a knife and washed with alum, lime or citrus. Meat, shell and waste weights were recorded for both groups.

Pickle preparation (spices): A pickle solution was prepared with 4 L of water containing 5% salt, 2.5% sugar, 0.5% phosphate, 0.5% ascorbate, and ground spices (nutmeg, thyme, onions, and grains of paradise). These were measured using an electronic sensitive scale, based on meat weight or water volume.

Local spice: Spices, derived from various plant parts, enhance the flavor, aroma and appeal of foods (Adeeyo, 2021). Beyond seasoning, some, such as chillies and pepper, also serve as natural preservatives, with extracts shown to possess antimicrobial properties (Ilesanmi *et al.*, 2022).

Smoking kiln

The smoking kiln, built with brick and insulated metal doors, has an upper tray chamber and a lower fire chamber with adjustable air inlets (Agbor *et al.*, 2021). Meat was smoked on the second tray for one hour, turned every 15–20 minutes and cooled after removal.

Taste Panel Evaluation

A ten-member untrained panel assessed cured and smoked samples for tenderness, flavor, juiciness and palatability using nine-point hedonic scale (Li *et al.*, 2023).

Data Analysis

Data were analyzed using the General Linear Model (SAS), and treatment means were compared using the Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The bar chart (Fig. 1) shows the blanched changes in snail weight at different processing stages before curing, after curing, and after smoking, expressed as percentages of the initial (pre-curing) weight. Processing (curing and smoking) substantially reduces the weight of blanched snails. The curing stage causes moderate weight loss, while smoking results in a much greater reduction. This pattern reflects the cumulative effects of moisture removal and solid loss during processing, which are typical in smoked animal products. Blanching is an important processing step in snail meat handling because it reduces slime production, facilitates cleaning, and improves overall processing efficiency. The slime of snails consists mainly of water (about 95%) and mucopolysaccharides, and its removal during blanching helps to minimize handling difficulties while improving product quality (Li *et al.*, 2023).

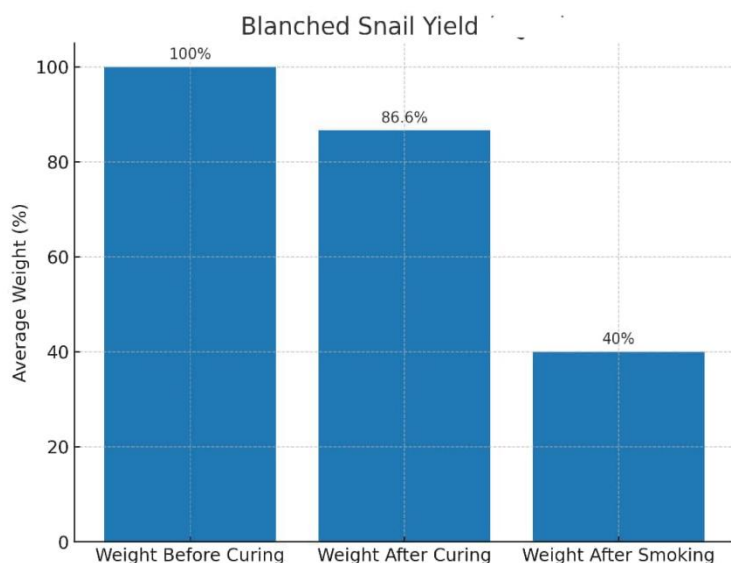


Figure 1. Average Weight of Snail Meat, Shell and Waste (blanching)

Studies have shown that short blanching treatments (10–15 seconds) can significantly reduce slime, making the meat easier to process and less messy compared to chemical treatments such as vinegar or lemon juice (Li *et al.*, 2023). In addition, blanching lowers microbial contamination risk and contributes to improved hygienic standards in snail meat preparation (Adeyeye *et al.*, 2020). Furthermore, blanching is often a prerequisite for subsequent processing methods like drying or smoking, which extend the shelf life of snail meat by lowering moisture content and reducing post-harvest losses (Ahmadu *et al.*, 2024).

The bar chart (Fig. 2) illustrates the percentage changes in the weight of unblanched snails across different processing stages; before curing, after curing, and after smoking, relative to their initial pre-curing weights. The results indicate a clear decline in snail weight as processing progresses. Curing leads to a noticeable but moderate reduction, whereas smoking causes a much sharper drop. This progressive loss in weight highlights the combined impact of moisture evaporation and tissue shrinkage that typically occur during thermal processing of animal products such as smoked snail meat.

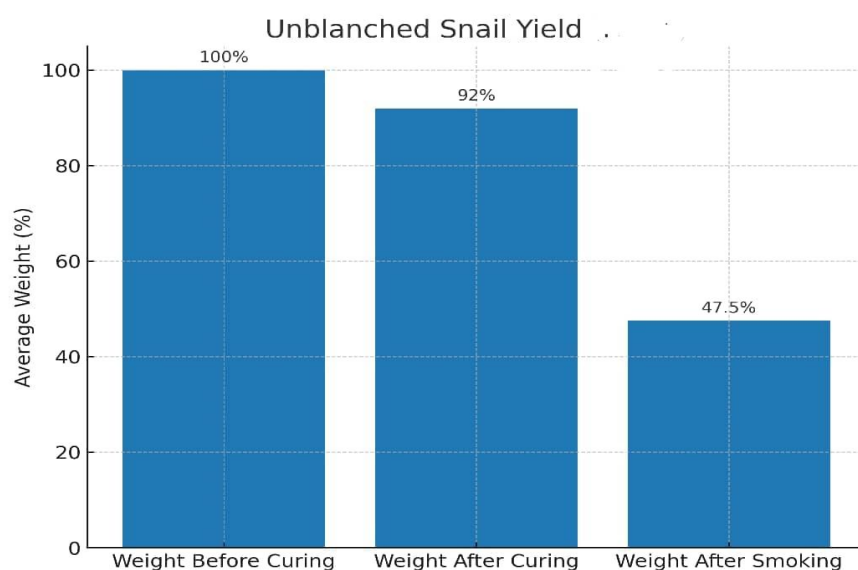


Figure 2: Average Weight of Snail Meat, Shell and the Waste (unblanched)

Processing (curing and smoking) leads to progressive weight reduction in unblanched snails. Curing causes minimal loss, while smoking results in pronounced weight decline. Compared to blanched snails (Fig 1), unblanched snails retained more weight after curing and smoking (92% vs. 47.5%), suggesting that blanching before curing may enhance moisture and nutrient loss during subsequent processing. Djikeng *et al.* (2022) give experimental support for strong moisture loss under smoke-drying and other processing, which is consistent with the observed large drops from curing to smoking.

The bar chart (Fig 3) compares the percentage yield (weight retention) of snails under three processing treatments; control, curing with spices and curing without spices across three stages: weight before curing, after curing, and after smoking. All treatments show major yield reduction after smoking, confirming that smoking is the stage responsible for the largest loss of weight due to moisture evaporation. Curing with spices results in the lowest yield, possibly because of salt and spice-induced osmotic dehydration. The control group retained the highest yield after smoking, indicating that the absence of curing or spice treatment preserved more water in the snail tissue. Okonkwo and Anyaene (2009) similarly found that the edible portion of *Archachatina marginata* made up about 38.5% of live weight and that curing reduced moisture and yield, supporting this study's observation of weight loss after curing and smoking.

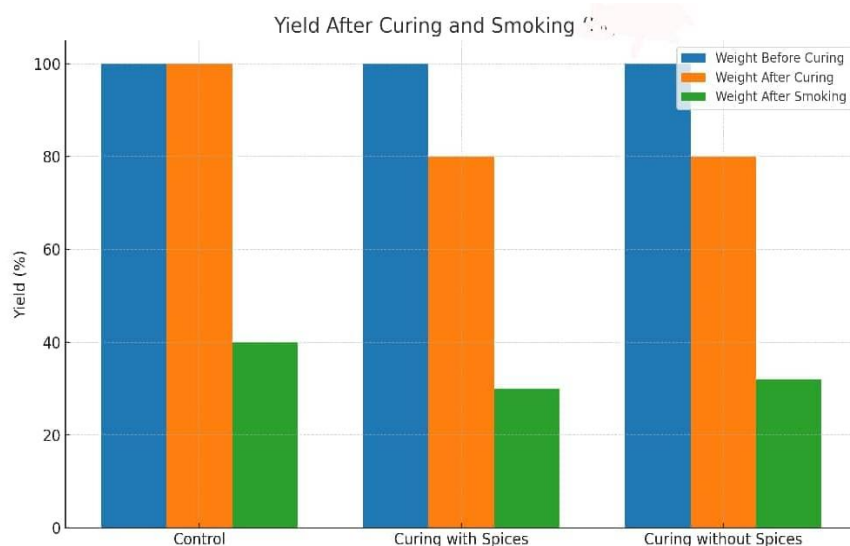


Figure 3. Yield after Curing and Smoking

Smoke-drying significantly reduces the weight of snail meat due to moisture loss, but the extent of yield retention varies depending on treatment conditions. In our findings, yield retention was 40% in the control, 30% in spiced samples, and 32% in samples without spices. This trend agrees with reports that smoking causes substantial dehydration because snail meat is composed of about 70% water, and drying leads to high weight losses (Adeyeye *et al.*, 2020). The relatively lower yield in spiced samples may be linked to the osmotic effects of spices and salt, which enhance water loss during drying, while unspiced samples retain slightly more moisture (Ahmadu *et al.*, 2024). Smoke-drying, however, remains a valuable preservation method because, despite yield reduction, it extends shelf life, improves microbial safety, and reduces post-harvest losses (Djikeng *et al.*, 2022).

CONCLUSION AND RECOMMENDATION

Unblanched snails exhibited slightly higher meat yield compared to blanched counterparts. However, blanching enhanced processing efficiency, reduced slime production, and improved product stability. Subsequent smoke-drying significantly extended shelf life through moisture reduction and microbial load suppression, while the incorporation of local spices enhanced organoleptic properties and consumer acceptability. Blanching and smoke-drying are recommended for improved snail meat



quality, stability, and shelf life. Using local spices enhances flavour and acceptability, while a 5% salt level provides effective preservation and microbial control.

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