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Awareness and perception of consumers on the use of natural meat tenderizers in Ogbomoso and Oyo metropolis, Nigeria

***Olawuyi, B. S[1,2]., Koleosho, O. K[2]., Akinwumi, A.O[2], Odunsi, A.A [2]. and Atandah, R.A[2]**
[1]Department of Crop and Animal Science, Ajayi Crowther University, Oyo State, Nigeria. [2]Department of Animal Nutrition and Biotechnology, Ladoke Akintola University of Technology P.M.B 4000, Ogbomosho, Nigeria.

****Corresponding Author:** bs.olawuyi@acu.edu.ng; benjaminolawuyi@gmail.com.*
***Phone Number:** +2348030793133*

Abstract

The meat industry faces ongoing challenges in providing products with consistent quality attributes that meet consumer expectations. Among the various eating and physical quality factors including color, flavor, juiciness, water-holding capacity, cooking loss, and texture, tenderness remains the most critical determinant of consumer satisfaction. This study assessed the awareness and perception of consumers on the use of natural meat tenderizers in Ogbomoso and Oyo metropolis of Oyo State. A structured questionnaire was administered to 100 randomly selected meat consumers from each location. The survey collected information on consumers' socioeconomic characteristics, perceptions of meat tenderness, tenderization methods, natural tenderizers used, awareness of papain and bromelain and types of chicken meat preferred. Information collected were analyzed using descriptive statistics. The findings revealed that most respondents (80% in Oyo and 72% in Ogbomoso) were females aged 21–40 years, reflecting their primary role in household cooking. A high proportion (90% in Oyo; 86% in Ogbomoso) of consumers in both towns preferred tender meat and disliked chewing tough meat for extended periods of time. Broiler meat was preferred over cockerel and spent layers, while meat from male animals was favored due to its relatively lower toughness. Several tenderization methods were identified, with many consumers familiar with natural tenderizers; 76% (Oyo) and 58% (Ogbomoso) indicated awareness, and more than half had made use of them. However, awareness of natural enzymatic tenderizers like papain and bromelain was very low, with 88% (Oyo) and 86% (Ogbomoso) reporting no knowledge of their use. The study concluded that although consumers are knowledgeable about meat tenderness and utilize various traditional and natural tenderization methods, there is limited awareness of widely recognized natural enzymatic tenderizers. Increased sensitization on the safe and effective use of papain and bromelain was therefore recommended.

Keywords: Awareness, Consumers, Meat, Natural enzymes, Tenderization

Introduction

One of the factors that influenced meat quality is meat tenderness which is considered as the most important determinant of consumer preferences (Arshad *et al*., 2016). Therefore, a high score for the customer acceptance is needed in selling processed and unprocessed meat products in other to meet consumer satisfaction (Madhusankha and Thilakarathna, 2021). The major cause of poor-quality meat and poor market value was the toughness of meat. An ongoing challenge for the meat industry is the inability to produce high-quality meat having consistent flavor and texture (Lomiwes, 2014). Texture is another factor considered in meat quality attributes which is also used to determine the consumer's acceptance and marketability of final meat products. Texture quality is evaluated by consumers based on the sensory consideration of appearance, tenderness, and juiciness (Chéret, 2007; Lee, 2014). Toughness of meat and meat products is due to a range of factors including the amount of intramuscular connective tissue, intramuscular fat and the length of the sarcomere (Kemp *et al.*, 2010). Thus, it is unsatisfactory to the consumer, if the meat is so tough that it is difficult to eat (Sunantha and Saroat, 2011).

Several methods have been tested to improve the tenderness of meat including the use of enzymes (Ashie *et al*., 2002; Naveena *et al.*, 2004; Pawar *et al*., 2007), common salts; phosphates (Pietrasik *et al*., 2010) and calcium chloride (Omojola, 2007; Okubanjo *et al.*, 2011). Proteolytic enzymes obtained from plants, such as papain, bromelain and ficin have been widely used as meat tenderizers in most parts of the world and they are the most important enzymes in several industries with 60% of the total market share (Gaur *et al.*, 2010). Papain and bromelain are the two major protease enzymes in the food industry that takes 8% of market demand (Adulyatham and Owusu- Apenten, 2005). Proteolytic enzymes are obtained from plant, bacterial and fungal sources. Five exogenous enzymes (papain, ficin, bromelain, *Aspergillus oryzae* protease and *Bacillus subtilis* protease) are recognized by United States Federal agencies as Generally Recognized as Safe (GRAS) for meat tenderization. Apart from these GRAS enzymes, others have been evaluated which include ginger rhizome (Sullivan and Calkins, 2010). However, this present study was aimed at evaluating the awareness and perception of consumers on the use of natural meat tenderizers in Ogbomoso and Oyo Metropolis in Nigeria. The hypothesis of this study was "there is no significant difference in awareness of the use of natural meat tenderizers in the study areas"

Materials and Methods

Study area

The study was carried out in Ogbomoso and Oyo metropolis. Both towns have two local government areas (LGAs) within the metropolis: Ogbomoso North and South; Oyo - Atiba and Afijio. The two towns are ancient and higher institution-based. Ogbomosho is a large, historically significant city and the second-largest in Oyo State with estimated population of approximately 629,000 while Oyo town is a historic city, founded in the 1830s as the new capital of the Oyo empire, and serves as an administrative and cultural center in the state, approximately with 471,000 in population (World Population Review, 2023).

Instrument for data collection

The study employed snowballing method and one hundred and eight (108) respondents were sampled from both towns for the study. A structured questionnaire was prepared and pre-tested. The questionnaire was administered to respondents in public places such as hotels, eateries/restaurants. Data collected included socioeconomic characteristics of the respondents, knowledge/ opinion of respondents on meat tenderness, attitude of respondents to tough meat, methods applied to tenderize meat by the respondents in the environment and natural ways of tenderizing meat. From the total number of questionnaires administered, only 100 were found exclusively fit for analysis. SPSS version 25 software was used to run the analysis (SPSS, 2006).

Reliability of the Instruments

A pilot study was conducted to determine the reliability of research instruments. For the reliability, internal consistency reliability was used. The instrument was adopted as reliable with Cronbach's Alpha of 0.79

Data analysis/Analytical Techniques

Data collected were analyzed using descriptive and inferential statistics to generate frequency, percentage, mean etc, visualization of the data was also presented inform of graphs, Analysis of variance (ANOVA) and T-test was conducted to show the difference in the socioeconomic characteristics of the respondents in the study area; the hypothesis of the study and the perception of the respondents on the use of natural meat tenderizers in the study area.

Results and Discussion

The socioeconomic characteristics of the respondents from the study area are shown in Table 1. The result revealed that 80% and 72% of the respondents from both Oyo and Ogbomoso were female while the males were 20% and 28% respectively. This present result

was in agreement with the findings of Elegbede *et al.* (2018) that reported more female participants in their studies on consumers' perception about meat types among students of the University of Agriculture Abeokuta and for identifying market segments in beef. It is also in accordance with an earlier study by Ogunwole and Adedeji (2014) who reported more female respondents than male in consumer's preference and perception to different types of chicken meat among staff and students of University of Ibadan.

Greater percentage 64% and 78% of the respondents in Oyo and Ogbomoso were between the age bracket of 21-30 years while 20% (Oyo) and 12% (Ogbomoso) of the respondents were between the ages of 31-40 years. The highest percentage of the respondents is between the ages of 21-30 and 31-40, this corroborate the work of Abegunrin *et al.* (2021) who reported that majority of the consumers were less than 60 years of age.

There were more married respondents in Ogbomoso (80%) than Oyo (52%), Oyo (48%) had more single respondents than Ogbomoso (20%). The results are consistent with the scope of the present study, as women are predominantly responsible for cooking and therefore possess practical knowledge of meat tenderization methods. This finding agreed with the report of Akinwumi *et al.* (2011) on consumer perception and preference for meat types in the Ogbomoso area of Oyo State. The study revealed that the respondents had gained one form of education or the other. Majority (80% and 90%) of the respondents had tertiary education, while 12% and 8% had O'level and 8% and 2% had primary education in Oyo and Ogbomoso respectively. The respondents who are sourced from people at hotels, eateries/restaurants and higher institutions and offices are expected to be educated hence the higher percentage of literate people reported. A similar observation was made by Akinwumi *et al.* (2011) while Adetunji and Adepoju (2011) reported a low level of education as a determinant factor of the nutritional status of the households.

Table 1: Socioeconomic characteristics of the respondents in Oyo and Ogbomoso LGAs on awareness and perception of use of natural meat tenderizers

			OYO		OGBOMOSO		T-test
S/N	**Characteristics**		**Freq**	**%**	**Freq**	**%**	
1	Sex	Male	20	20	28	28	1.036
		Female	80	80	72	72	
			100	**100**	**100**	**100**	
2	Age (years)	21-30	64	64	78	78	
		31-40	20	20	12	12	1.914**
		41-50	8	8	6	6	
		51-60	4	4	4	4	
		>61	4	4	0	0	
		Mean	**31.5**		**33.5**		
3	Marital status	Single	48	48	20	20	0.883
		Married	52	52	80	80	
		Divorced	0	0	0	0	
			100	**100**	**100**	**100**	
4	Religion	Christianity	64	64	72	72	0.671
		Islam	34	34	28	28	
		Traditional	2	2	0	0	
			100	**100**	**100**	**100**	
5	Education level	Primary	8	8	2	2	0.659
		O' level	12	12	8	8	
		Tertiary	80	80	90	90	
			100	**100**	**100**	**100**	

Source: Field Survey, 2023

The observations of respondents to the different aspects of the questionnaire are depicted in Figures 1-9. Fig 1 showed the consumer's understanding about meat tenderness with a higher percentage (94% and 96%) having understanding at the two locations. More consumers in the study area have proper understanding and concern about meat tenderness (Fig 1) in Oyo and Ogbomoso respectively.

Majority (86% 90%) of the respondents preferred tender meat while less than 15% preferred tough meat (Fig 2). Higher numbers were recorded for respondents from Oyo town. The time used to chew meat is depicted in Fig 3 with (82% and 66%) from Oyo and Ogbomoso respectively chewing meat within 1-2 minutes. Those who will chew meat for over 5 minutes are negligible at the two locations. One of the major reasons why consumers will prefer chewing meat for long period of time could be attributed to satisfaction and toughness of meat, since higher percentage of consumers prefer tender meat to tough meat and toughness of meat determine how long consumers will chew the meat before swallowing it.

Majority of the respondents preferred broiler meat to meats from cockerel and spent layers in both towns (Figure 4) and a higher percentage (90%) was recorded for Oyo town compared to respondents from Ogbomoso (72%). These might be due to tenderness of broiler meat when compared to cockerel and spent layer meats which are usually tough due to age factor. This was previously affirmed by Ogunwale *et al.* (2014) and Salawu *et al*. (2014) that broiler chicken meat was the most preferred meat to cockerel and spent layer chicken meat among consumers at Ibadan. Consumers preferred meat from male ruminant animal to meat from female animals because meats from female animals are usually tough. The female animals are usually sold when they are old after they have been used for breeding for many years and the meat from such animals are usually tough.

Tenderness has been the principal limitation for meat from older animals and these have provided motivation for a multitude of research in anticipation for solution to overcome the problem of tough meat. Consumers are aware of so many materials and ways for tenderizing meat which include chopping, salting, adding spices and over cooking. However, in this study, respondents are conversant with the use of spices and salt (Fig. 5). About (14 and 32%) claimed ignorance of use of materials for tenderizing meat. Several ways have been employed to improve the tenderness of meat including salt and phosphates (Pietrasik *et al*., 2010), calcium chloride (Omojola, 2007, Okubanjo *et al.,* 2011), natural enzymes (Ashie *et al.,* 2002, Naveena *et al.,* 2004, Falade and Omojola 2010) and also the use of physical methods such as chopping, pressure treatment, ultra sound and electrical stimulation (Joyasoriya *et al.,* 2007, Pietrasik *et al.,*2010). All these methods and ways have been tested and confirmed to improve meat tenderness.

Consumers are aware of some natural plant enzymes used to tenderize meat in the study areas (Figure 7). In Oyo, about 62% are aware which is greater than 54% for Ogbomoso town. Those not aware varied from 38-46% in both towns. The identified natural materials (Fig 8) used to tenderize meat is ginger (45-55%) while about (42%) respondents from Ogbomoso are not aware of the use of natural materials to tenderize meat. The result showed that majority of the respondents in the study area have little awareness on the use of papain and bromelain, this might have caused the low rate of use of the meat tenderizers as shown in Figure 9. However, the study showed that most respondents are much familiar with the use of ginger as natural enzyme obtained from plant as a good tenderizing agent. The proteolytic natural enzyme extracted from plant that are commonly used as meat tenderizers as reported by Fayaz *et al.* (2024) are papain, bromelain and ficin while Sullivan and Calkins (2010) reported on ginger rhizome.

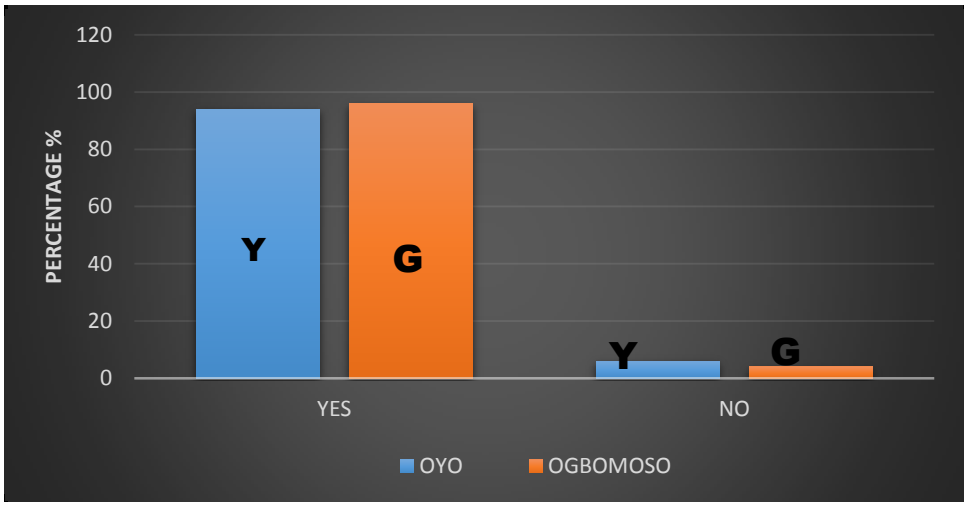

Fig 1: Consumers' understanding about meat tenderness in the study areas
Source: Field survey, 2023

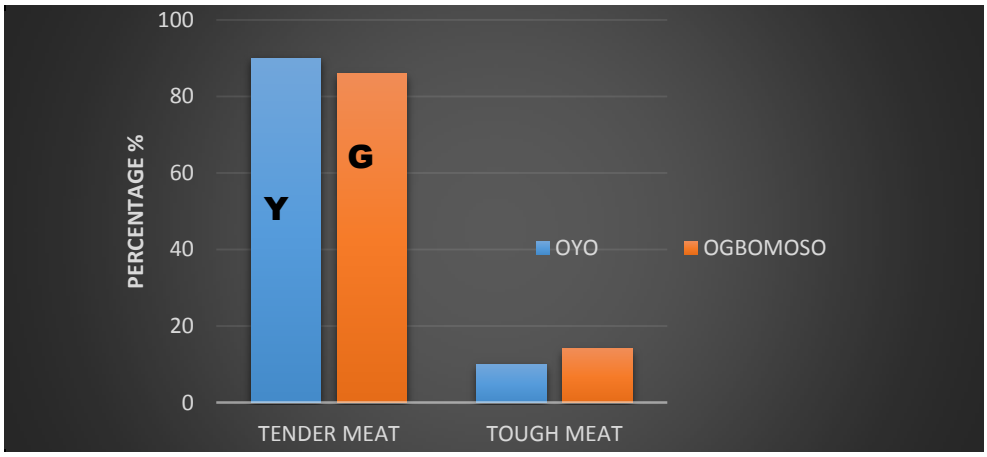

Fig 2: Preferred meat among the consumers in the study areas
Source: Field survey, 2023

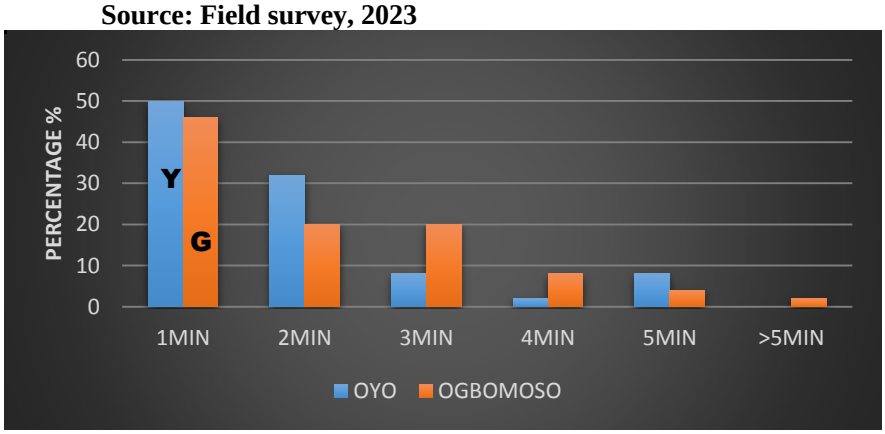

Fig 3: Time used in chewing meat before swallow in the study areas
Source: Field survey, 2023

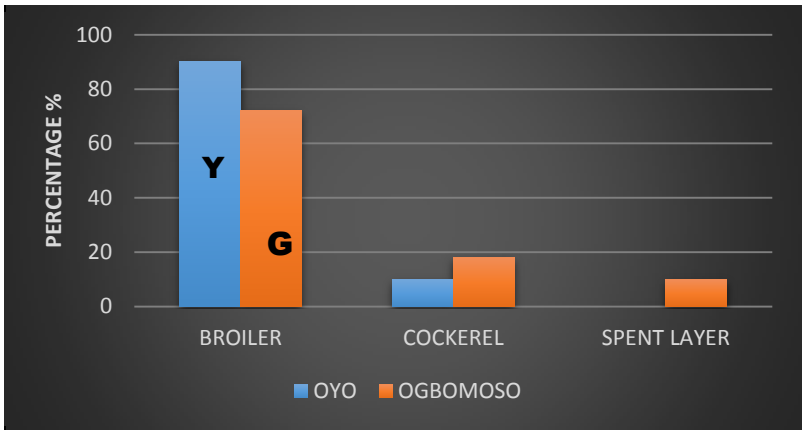

Fig 4: Preferred chicken meat type by the consumers the study areas
Source: Field survey, 2023

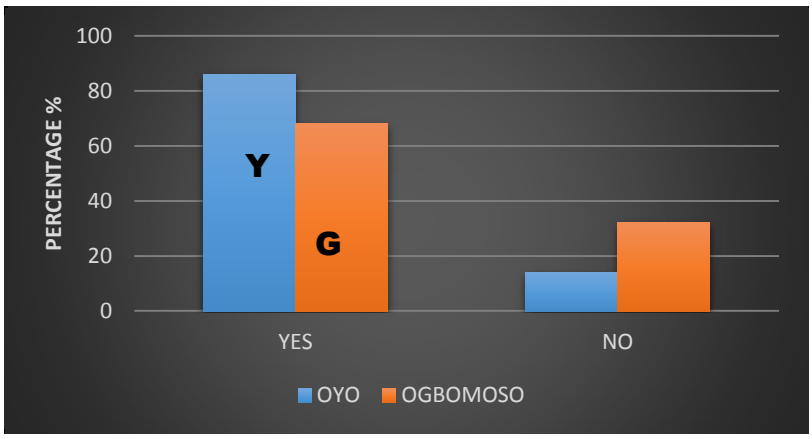

Fig 5: Awareness of some materials used in tenderizing meat
Source: Field survey, 2023

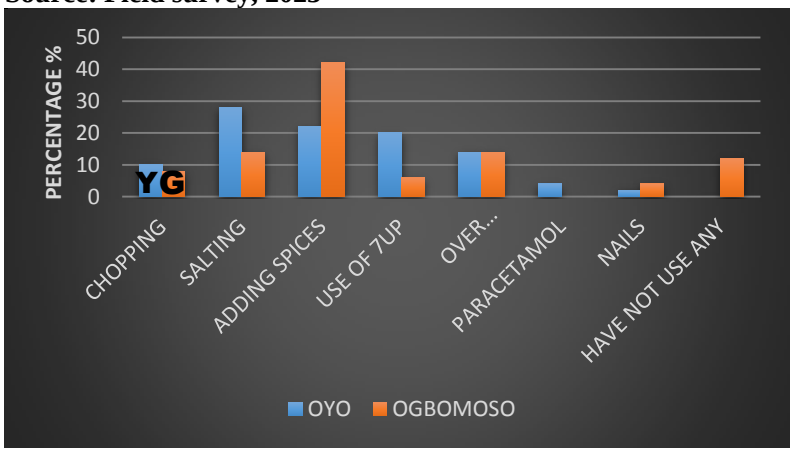

Fig 6: Materials used for tenderize meat by consumers in the study areas
Source: Field survey, 2023

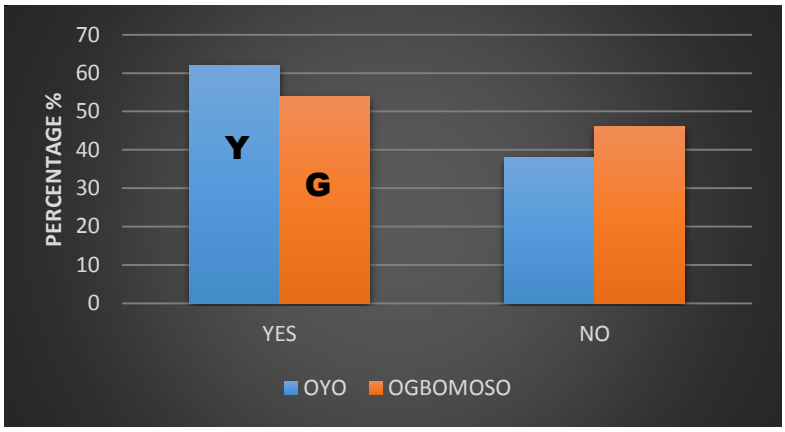

Fig 7: Usage of natural materials to tenderize meat in the study area
Source: Field survey, 2023

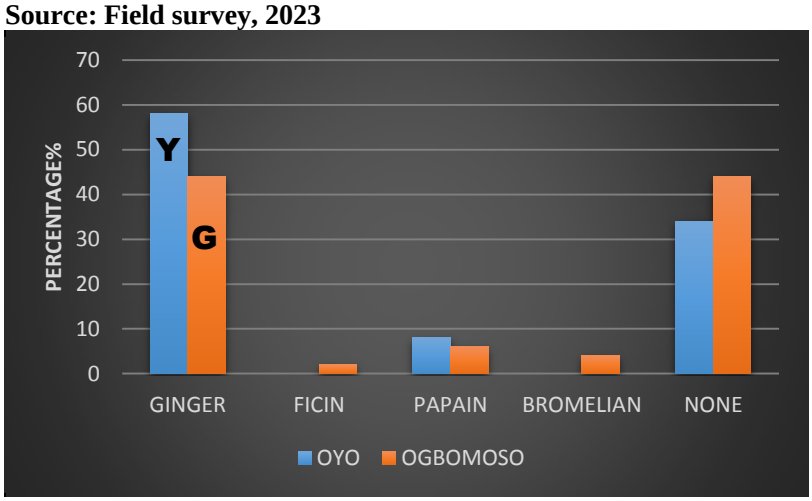

Fig 8: Types of natural materials used to tenderize meat in the study area
Source: Field survey, 2023

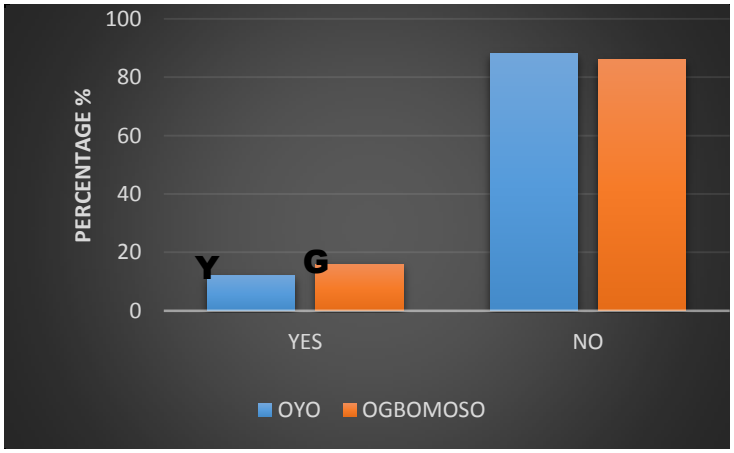

Fig 9: Awareness of papain and bromelain as meat tenderizers in the study areas
Field survey, 2023.

The result of this hypothesis "there is no significant difference in awareness of the use of natural meat tenderizer in the study area" was tested using Analysis of variance (ANOVA) and the result is presented in Table 2. The significance of the difference was determined at 0.05 level. The result shows significant difference between awareness of the use of natural meat tenderizer in the study areas.

Table 2: Test of difference of awareness of natural meat tenderizers

Variables		Mean	Std.Dev	F-value	T-value	Sig.	Decision
Awareness and use of meat tenderizer	Oyo	14.00	12.57	208.3	6.13	0.001	Significant
	Ogbomoso	16.00	29.46				

P – Value ≤ 0.05 significant
Source: Field Survey, 2023

Conclusion and Recommendations

This study concluded that the consumers are aware of meat tenderization and have several ways and method of tenderizing their meats. Even though, consumers are aware of the use of natural materials for meat tenderization, awareness and knowledge of papain and bromelain specifically remain low as most respondents are familiar with the use of ginger in the study area. This limited awareness calls for the need to increase public enlightenment and targeted sensitization by researchers and relevant stakeholders on the benefits and proper use of papain and bromelain as effective natural meat tenderizers. Though, education is a key factor to adoption of new innovation or technology, it is therefore, very important for extension agent and other stakeholder to sensitize people on the use of papain and bromelain in meat tenderization. Furthermore, there is a need for further studies to explore the effectiveness, safety, and optimal application of papain and bromelain in meat tenderization, with the aim of promoting their wider acceptance and utilization

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