CONSUMER'S STUDY ON MEAT PIES MADE FROM BEEF AND BROILER CHICKEN MEAT IN DUTSIN-MA KATSINA STATE

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ABSTRACT
The study was carried out to evaluate consumers' preference, acceptability and sensory attributes of pies made using beef and broiler chicken meat at the Animal product and processing Laboratory of the Department of Animal Science Federal University Dutsin-ma. A sixteen (16) trained panelists were used to examine the sensory attributes preference and acceptability of the pies using a five point's hedonic scale. Data obtained on saltiness, appealingness, flavourfulness, aroma, tenderness, juiciness and overall preference/acceptance were analyzed using general linear model of the SPSS version 2016. The results show that 26% of the respondents perfectly accepted the pie made using beef while only 23% of the respondents perfectly accepted the pie made from broiler chicken. There were no significant difference ($p<0.05$) in preference and sensory attributes of pies made from both meat sources. It is concluded that beef pie had more acceptability than broiler chicken pie
Keywords: Sensory attributes, Flavourfulness, Saltiness, Juiciness, Hedonic scale, Preference

INTRODUCTION

Evidence exists to show that meat has served as a food source for humans for thousands of years Bunn, 2007). Animals such as red deer (Cervus elaphus) and bison (commonly known as buffalo in North America) have served as sources of hide, bone, and meat for more than 500,000 years (Kolipinski *et al.,* 2014). Humans have consumed meat throughout history because of meat's sustenance qualities and because it is recognized as an important source of essential amino acids (proteins), iron, B vitamins as well as other nutrients and minerals. Originally, humans hunted animals for meat and non-meat products, but today, animals used for food and sold into commerce are slaughtered under strict guidelines from various governing agencies (Leroy *et al.,* 2023). These agencies ensure the animals are put to death in a humane manner and also ensure the animals are free of disease at the time of death and the carcasses are kept clean throughout the dressing process to provide wholesome products for consumption (Vialles, 1994). The portions of the animal consumed as food are collectively referred to as meat. Even so, other animal products such as milk and eggs are also derived from animals, but they are not considered meat (Westhoek *et al.,* 2011). The definition of meat varies based on application. As an example, the Merriam Webster dictionary simply defines meat as "animal tissue especially as food" (Merriam and Webster 2017).

The code of federal regulations goes a step further and specifically includes the tongue, diaphragm, heart, and esophagus as meat products. The American Meat Science Association (AMSA). Meat is skeletal muscle and its associated tissues derived from mammalian, avian, reptilian, amphibian, and aquatic species commonly harvested for human consumption. Edible offal consisting of organs and non-skeletal muscle tissues also are considered meat. Meat is important for a balanced diet because it is a good source of essential amino acids and micronutrients required for regulation of energy metabolism (Biesalski, 2005). In general, meat pie contains ground meat as the main ingredient and consists of two parts which are Pie crust and pie fillings. Pie crust is prepared from wheat flour which contains high amount of gluten (Peter *et al.,* 2019). Throughout the world, poultry meat consumption continues to grow, both in developed and in the developing countries. In 1999, global production of chickens reached 40 billion, and by 2020 this trend is expected to continue to grow, so that poultry meat will become the consumers' first choice (Bilgili 2002). Fresh chicken meat and chicken products are universally popular. This occurrence can be explained by the fact that this meat is not a subject of culturally or religiously set limitations, and it is perceived as nutritionally valuable foodstuff with low content of fat, in which there are more desirable unsaturated fatty acids than in other types of meat (Cavani and Petraccim, 2021). More importantly, quality poultry products are available at affordable prices, although their production costs may vary (Valceschini, 2017.) If

referring to overall consumption of all types of meat, poultry meat consumption takes one of the leading places in all countries throughout the world. Such good rating of poultry meat is influenced by many factors, such as short fattening duration, excellent space utilization, high reproductive ability of poultry, excellent feed conversion, satisfactory nutritional value of poultry meat and relatively low sales prices. The quality of broiler meat is affected by a number of factors, as follows: fattening system, duration of fattening, hybrid and sex, feeding treatment, handling before slaughter, freezing of carcasses, storage time (Kralik and Petrak 2020). The increase in broiler production signifies increase in the availability of broiler meat and utilizing such meat for broiler pie will help in reducing problem associated with storage of the broiler meat, the overgrowing of the broiler birds with high cost of feeding but low economic returns, cardiovascular problems related to consumption beef pie and finally the actualization of broiler pie will provide alternative to meat pies usually made from beef.

MATERIALS AND METHODS

Study area

The study was conducted in Animal product and processing unit of the Department of Animal Science Federal University Dutsin-ma. Dutsin-ma is a Local Government in Katsina State located in Northwestern Nigeria having a geographical coordinates of latitude 12°27"18' North and 7°29"29' East and 605 meter above sea level. The area has a prevalence of ruminant animals in the rural communities with an estimate population of 59,022 as of the year 2007. The rainfall ranges between 700mm to 900mm occurring annually with distinct wet season between may-September and dry season between October-April.

Experimental materials

The experimental materials include, oven, meat grinder, flour mixer and other primary ingredient such as salt, spices, Maggi, Irish potatoes were all purchased at Dutsinma market.

Sample preparation

4kg of both beef and broilers meat was mixed with 1/2kg of Irish potatoes grinded using a meat grinder and kept in two separate bowls. 45g of pepper, 250g of flour 5g of table salt, 10g of maggi, 110g of fresh grated onion, and 65g of cooking oil and10g of baking powder were added to the two separate samples of meat in equal proportions. The pies were stuffed in to the casing for shaping and place into an oven set at 80°c for 25 minutes.

Data collection

The meat pies samples were presented to a group of semi trained panelists where the personnel examined the samples using five-point hedonic scale and quantitative describe analysis scale.

Data analysis

All data obtained on consumers acceptability were analyzed using descriptive statistics while preference and sensory attributes were analyzed using the General linear model of the SPSS version 2016 and means were separated using Tukey's test.

RESULTS AND DISCUSSION

The result shows the Consumer acceptability of beef and broiler chicken pie, which indicate that 26% of the consumer accepted beef meat pie perfectly while only 23% of the Consumers perfectly accepted the meat pie made using broiler meat as shown in table1 below.

Table 1. Consumer acceptability of meat pie made from beef and chicken

Treatment	TUA	SUA	ACCP	PAA
Beef Pie (%)	0.0	3.3	20	26
Chicken Pie (%)	3.3	0.0	23.3	23

Keys= TUC =Totally Unacceptable, SUA= Slightly Unacceptable, ACCP= Acceptable, PAA= Perfectly Acceptable

Table 1, above indicate that the pie made from beef is higher acceptability than that made from broiler chicken meat. This might be due the possibility of the consumer familiarity to beef pie rather than the broiler chicken pie also it may be due to beef been the must available and must consumed meat by consumer which is in line with Connor *et al.* (2013) stating that the most accepted meat was that from heifers and young bulls.

Consumer preference of beef and broiler chicken pie indicate that the consumers had same preference for both pies as seen in Table 2 below

Table 2. Consumer Preference for beef and broiler chicken meat pies

Treatment	Score
Beef Pie	1.47
Chicken Pie	1.53
Standard Error	0.13

The results obtained in table 2 above indicate that consumers had same preference for both pies. This may be due to the fact that all ingredient utilized are the same it is just the meat type that differs making it possible to be similar. The overall results indicate a very close competition between the two products, with neither one clearly outperforming the other which may be attribute to the both meat having good flavor, texture and other sensory attributes. This is in line with findings of (Pereira and Vicente 2013) who shows that meat with good flavor and good taste has higher preference level.

Consumer sensory attributes of beef and broiler chicken meat pie indicate that of all the sensory attributes studied there were no significant ($P< 0.05$) across all the attributes as seen in table 4.3, below.

Table 3: Consumer Sensory Attributes

Parameters	Saltines	App	Flavor	Arm	Tenderness	Juiciness
B.P	6.22	8.16	8.38	6.91	7.97	5.86
C.P	4.70	7.02	7.42	6.19	6.44	5.26
S.E	2.49	2.3	2.35	2.25	2.19	2.18

Key: App= Appealingness; Arm=Aroma,

The results obtained in table 3 above for consumer sensory attributes for meat pie made from beef and broiler pie from chicken indicate that there is no significant difference in all the Sensory Attributes tasted.

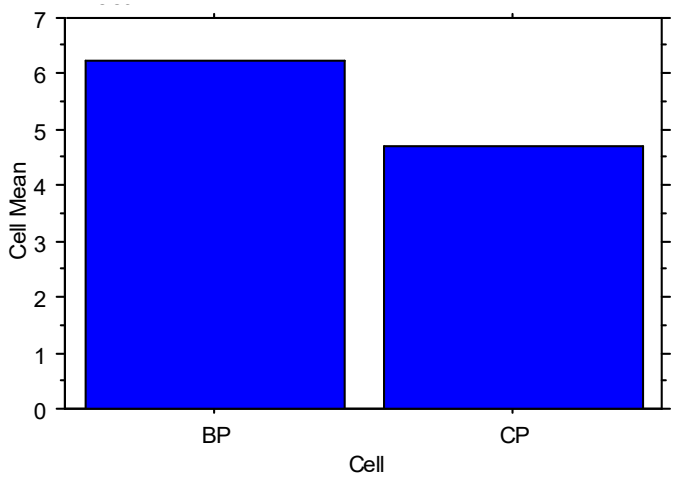

Figure 1: Consumer saltiness for meat pie made from beef and chicken

The chart above had saltiness of 6.1% meat pie made from beef while a chicken pie had a saltiness of 4.5% which indicates that consumers felt the saltiness in beef pie than in chicken pie because the beef is generally known for its flavor and tenderness, which may be more appealing to consumer. Even though all the saltiness attributes are not significant. This is in line with the findings by (Azet *et al*., 2021). All subjects recorded the same perceive preference for salt, in terms of its importance and its utilization in day to day activities, also the importance of salt cannot be over emphases since it is well utilized by subjects as a flavor enhancer reported by Gillette (2003). Salt tends to improve the flavor intensity of food and meat products and it also provides a binding effect in meat (Hamm, 2013) making it more tender and palatable, hence increases it preference in humans.

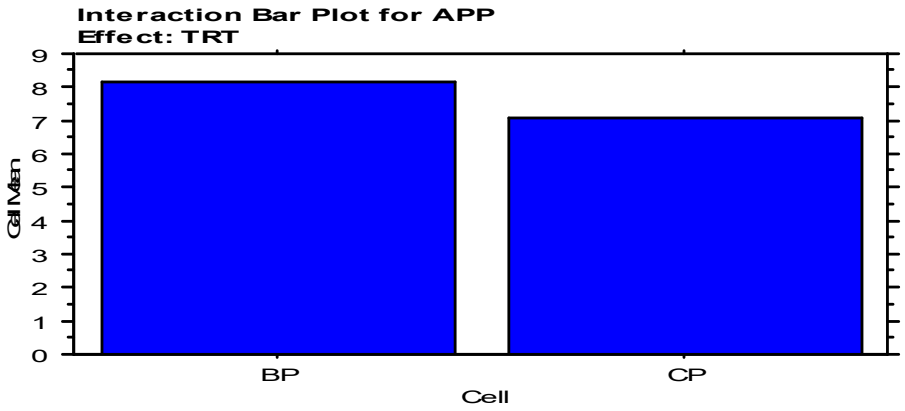

Figure 2: Consumer appealingness for meat pie made from beef and chicken

The results in figure 2 above show that the consumers find meat pie made from beef had more appealing compared to those made from chicken. The beef meat pie received an appealingness rating of 8.2%, indicating a high level of attractiveness to consumers. The chicken meat pie had a lower appealingness rating of 7.0, suggesting a slightly lower level of attractiveness. The difference in appealingness between two types of meat pie could be due to various factors such as taste, texture, flavor, and personal preference. This is in line with the findings of (Akinwumi *et al.,* 2011) Stating that beef is generally known for its tenderness and flavor, which might have make it more appealing to some consumers.

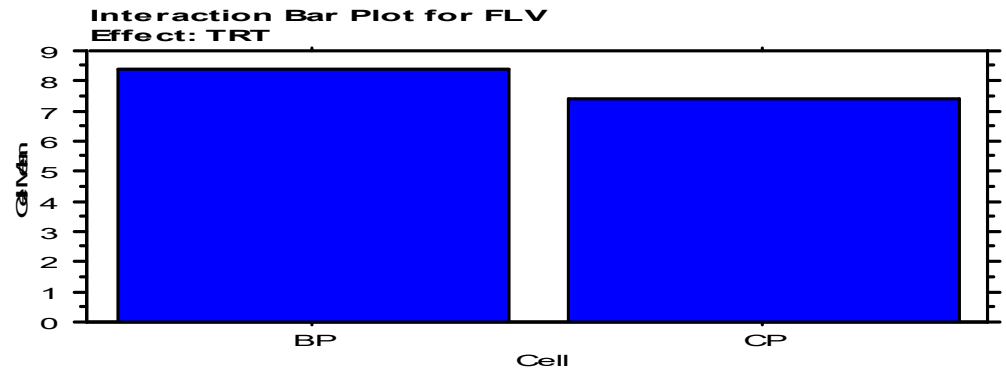

Figure 3. Consumer flavourfulness for meat pie made from beef and chicken

The chart in figure 3 above shows that the consumer preference for meat pie made from beef had a flavourfulness of 8.4%, which is higher than that of the chicken with 7.2%, this indicates that a higher percentage of consumer preference of beef - based meat pie compared to the chicken. This might be attributed to the taste and flavor of beef; stating that individual preference can vary, and this result may not necessarily reflect the overall consumer preference for meat pie.

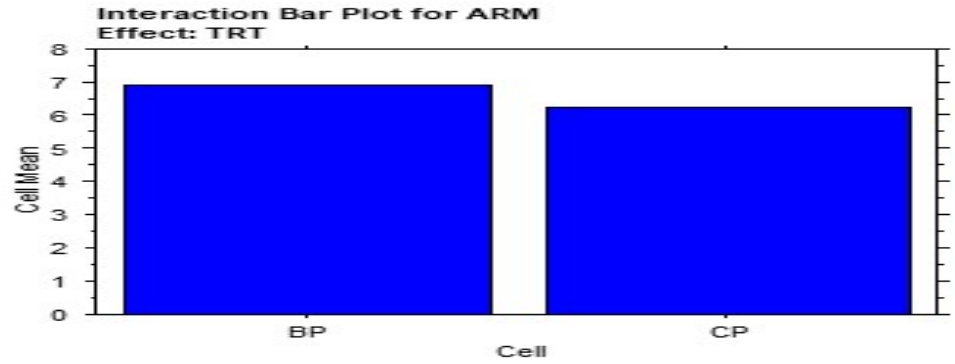

Figure 4. Consumer aroma for meat pie made from beef and chicken

The chart 4.4 above shows that the meat pie made from beef has a stronger aroma of 6.9% rating while the meat pie made from chicken has a relatively lower aroma of 5.8% rating. This might be due to beef 's naturally stronger umami flavor profile which is often associated with a more robust aroma as earlier observed by (Adams and Akpan, 2017) that cooking method such as Browning can enhance the aroma of beef, and also the use of spices in the beef pie recipe that complements its natural aroma.

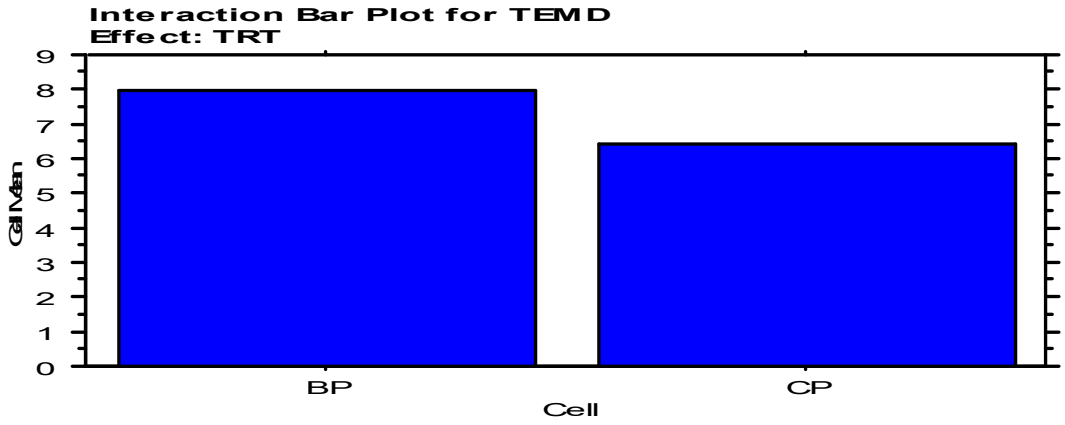

Fig 5: Consumer tenderness for meat pie made from beef and chicken

The figure 4.5 above shows that the meat pie made from beef has a significantly higher tenderness rating of 8.0% while the meat pie made from chicken has a relatively lower tenderness rating of 6.5%. This might be attributed to the part of the beef used which may have higher fat making it juicier and tender. Also, the cooking method can break the connective tissue in beef resulting in a more tender product than that of chicken meat as inadequate or overcooking of chicken can make it tougher (Marchello and Garden 2017).

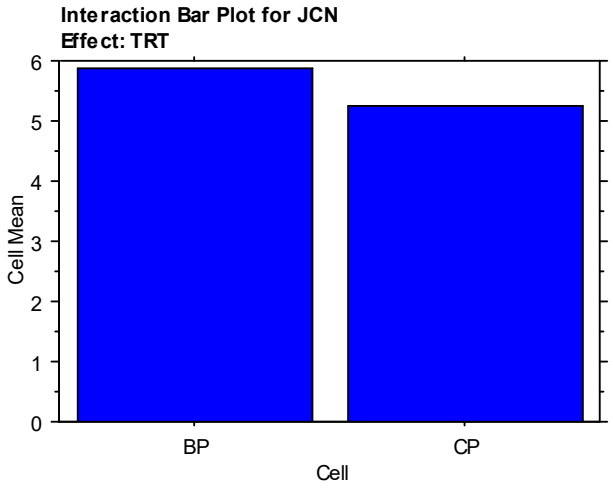

Fig 6: Consumer juiciness for meat pie made from beef and chicken

The chart 4.6 above indicate that the meat pie made from beef has a slightly higher juiciness rating of 5.9% while the meat pie made from chicken has a relatively lower juiciness rating of 5.1%. It is clear that, the more the tenderness, the more the juiciness as seen in Figure 5 above.

CONCLUSION AND RECOMMENDATION

The study concluded that both pies from Broiler meat and Beef have same sensory attributes and preference. However, broiler pie can easily replace beef pie with the same sensory attributes of consumers. It is therefore recommended that chicken pie should be introduced to producers as well as poultry farmers in order to reduce the incident of broiler meat glut.

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