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## Research Article

# Consumer Perception on New Ways of Preparing and Presenting “Koose” and Leaves in Wa, Ghana

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## Abstract

**Background and Objective:** Koose as an economical Ghanaian local dish prepared from cowpea can be eaten with moringa leaves or velvet tamarind leaves as a meal in the Northern part of Ghana. As part of strategies to promote the consumption of Ghanaian local dishes, the study sought to review the form of preparing and presenting the meal, introduce a different approach to the preparation and presentation of the meal as well as preparing the meal with dandelion leaves and testing its acceptability within the Wa Township.

**Materials and Methods:** The study employed a descriptive survey design with a sample size of 156 consumers as panellists for sensory evaluation of three samples of the food. The sensory characteristics of the three samples of “koose” and leaves were judged by panellists using the hedonic scale of five-point on the sensory attributes of appearance, overall taste, moisture, texture, aroma, preparation and acceptability amongst other things. **Results:** Using the Kruskal-Wallis Test, significant differences were seen in appearance across the 3 categories of food samples. The findings revealed that the appearance of “koose with leaves” presented as koose salad was preferred over the usual koose mashed with leaves presented. The sample prepared with dandelion leaves were perceived to be more moist and tender than the samples prepared from moringa leaves. The preparation of samples 2 and 3 was perceived to be more hygienic than sample 1. The study revealed that koose salad was more accepted. **Conclusion:** Local dishes will have to be presented neatly and attractively to boost patronage as consumers will find more attractively served dishes more acceptable.

**Key words:** Legume, hygienic conditions, packaging, handpicking, winnowing, consistency, aroma

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Beans belong to the family of legumes which are versatile and commonly eaten food throughout the world. Even though they are economical, they are nutritious and improve diet quality and the long-term health of individuals who consume them regularly<sup>1-5</sup>. Due to the combination of nutrients found in beans, they were classified by the 2010 Dietary Guidelines for Americans as a "Unique Food," food that is a vegetable and protein, one that functions as energy-giving, body-building and protective altogether<sup>6</sup>.

Beans can be used in the preparation of a variety of meals such as breakfast, lunch and dinner or as a snack to improve the nutritional content. Plant-based diets have been considered healthier and more sustainable than diets based on animal foods<sup>7-9</sup>. In Ghana, beans are used to prepare highly nutritious food products such as 'koose' or 'akara', 'waakye', 'gari and beans', 'tubani', 'moimoi' and many others<sup>10</sup>.

'Koose' (also called 'akara') is a traditional West African fried food product prepared by wet milling of dehulled cowpea, with the addition of seasoning ingredients such as onions, pepper and salt and deep fried in vegetable oil, until a golden brown crispy product is obtained<sup>11</sup>. A dry milled dehulled cowpea can also be turned into the batter for use in 'koose' preparation. 'Koose' can be said to be one of the most commonly consumed bean product<sup>12</sup> and in Ghana can be eaten with porridge for breakfast or can be eaten as a snack. In the northern part of Ghana 'koose' can also be eaten with leaves as a meal. The leaves commonly added to 'koose' for the meal are moringa leaves and black velvet tamarind (*Dialium guineense*) leaves.

Black velvet tamarind leaves in Ghana are known as 'yooyi' by the Akans, 'atitoe' by the Ewes and 'gyimbrong' by the Waala and Dagabas. Moringa leaves and the black velvet tamarind leaves are boiled and then mashed with the 'koose' for the meal for consumers. The two are not used together. In the preparation of each meal, one is used. Both moringa and black velvet tamarind leaves have been considered to have both nutritional and medicinal benefits<sup>13-17</sup>. *Moringa oleifera* is a common moringa species in Africa.

Dandelion leaves have also been found to possess beneficial properties of health for the body<sup>18-23</sup> and can survive all year round<sup>20</sup>. As such if cultivated and watered it can be available all the time for these "koose" sellers to access. Velvet tamarind leaves are difficult to get during the rainy season in the Upper-West Region of Ghana. This season is the period the leaves on the tree become too mature for use in the preparation of "koose". Getting towards the end of the rains, the matured leaves are shed off before new fresh leaves begin

to show up from December onwards. The moringa leaves are equally hard to find in the dry seasons, making business unstable for the "koose" and leaves sellers in the region. Dandelions have proved to be available all year round<sup>20</sup> and could serve as a suitable substitute for the meal "koose" with leaves when the other leaves are out of season.

One major concern relating to the production of the meal is the poor nature in which it is handled by the sellers. In most observations, the handling and hygienic condition of it does not fall in line with food safety requirements in Ghana. The meal is prepared in an unhygienic environment and unhygienic manner. The "koose" is fried, the leaves boiled and mashed together with the fingers to mix the "koose" pieces uniformly with the boiled leaves. Chopped onions and powdered pepper are then sprinkled on the mixture in a bowl for customers to eat. In most cases, the same palm that is used to collect money from customers is also used to mash the "koose" and the boiled leaves together. The meal, though healthy, will not appeal to some people as do other fast foods, due to its handling and presentation. Most sellers work on the ground exposing cooking utensils to animals and dust.

There have been several calls for promoting Ghanaian local dishes in the hospitality and tourism sector and making Ghanaian dishes tourist products. Amuquandoh and Asafo-Adjei<sup>24</sup>, are of the view that improving the packaging, service quality and sanitary conditions of Ghanaian dishes and eating places will help sustain interest in Ghanaian local dishes. In developing National food cultures, certain Ghanaian local cuisines were noted to have gone through several changes and modifications ranging from ingredients, cooking method, packaging and serving practices<sup>25</sup>. Bondzi-Simpson and Ayeh<sup>26</sup> found out that poorly prepared local dishes contributed to low patronage or non-patronage of local dishes by consumers in hospitality facilities. The call for promoting local dishes is a basis for modifying local dishes to improve their acceptance nationwide and beyond. Promoting local dishes as tourist products calls for a better and more attractive presentation of the "koose" and leaves dish for consumers. The researchers believed that if the meal is well prepared more hygienically, it could contribute significantly to the nutritional needs of consumers as well as boost sales of the sellers as more people will accept it and patronize the more hygienically and attractively prepared 'koose' with leaves. In light of this, therefore, the researchers sought to review the current form of preparing and presenting "koose with the conventional leaves", introduce a different approach to preparing and presenting 'koose with the usual leaves" and test its acceptability and finally prepare 'koose' with dandelion leaves and test its acceptability within the Wa township.

## MATERIALS AND METHODS

**Research design, population and sampling:** The study employed a descriptive survey research design. The target population was the consumers of “koose” and leaves in Wa township. A multistage sampling technique was used to arrive at the sample for the study. The study estimated that a total number of 28 “koose” and leaves sellers existed in Wa. Six out of the twenty-eight koose sellers were simply randomly selected as “koose” joints for the data collection. The selected sellers were contacted to secure their consent for the involvement of their customers in the study. The six “koose” joints used were at the following locations: Opposite Teagberree junction, behind Kedge Lodge, Wapaani, Zongo, Kpaguri and around Airstrip. A sample size of 156 was arrived at from the estimated population of consumers of “koose with leaves” and used in the study. The sample size was determined by using Cochran’s formula for sample size determination as follows<sup>27</sup>:

$$n_o = \frac{z^2 pq}{e^2}$$

where,  $n_o$  is the required sample size,  $e$  is the desired level of precision (i.e. the margin of error),  $p$  is the (estimated) proportion of the population which eats “koose” with leaves and  $q$  is  $1-p$ .

For this study, the researchers estimated that the proportion of the population in Wa Town which eats “koose” with leaves is 11%. Using this 11% prevalence of “koose” eaters with a 5% margin of error at 95% confidence, we arrived at a sample size of 150 which was rounded up to 174 to increase statistical power and precision.

The calculated sample size was then used to determine the total number of participants to be recruited at each “koose” joint since it was difficult to get a sampling frame for the customers who patronized “koose” and leaves daily from each of these sellers. As a result, the sample size was divided equally among the six selected “koose” sellers for the data collection. In all, 29 “koose” consumers were selected at each of the 6 “koose” joints using systematic sampling while taking into account gender mix until the required number was obtained. However, 156 respondents were available for the study. The sampling process lasted for about 2 weeks.

### Sample preparation procedures

**Preparation of “koose”:** Black-eyed bean was purchased from Wa market. This type is mostly used for the preparation of the

“koose”. Foreign materials of sticks, dried pods, stones, as well as insect-attacked seeds and unwholesome seeds in the cowpea were removed by handpicking and winnowing. About 1kg of cowpea was washed with 2.5 L of water each for two consecutive times. The washed beans were then soaked in about 3 L of water for 5 to 10 min and then drained. The soaked beans were poured into a hollow mortar and pounded slightly with the pestle to help peel off the hull from the kernel. The pounded wet bean was then spread on trays lined with calico and sundried to bone dried. The dried beans were then sieved with a local cane basket and winnowed to remove the chuff of the hull from it. The de-hulled dried bean was then milled into smooth flour by the use of a commercial grinding mill.

“Koose” was prepared with 600 g of beans flour, 800 mL of water, three levelled teaspoonfuls of salt and 150 g of ground onion to season it. The ingredients were mixed and beaten vigorously in the same direction into a batter consistency. The mixture was then deep-fried in a dessert spoonful in hot oil till golden brown and drained.

**Preparation of powdered pepper for the samples:** Blanched, dried chilli pepper was purchased from Wa market. About 130 g of the chilli pepper was blended dry with one heaped tablespoon of salt (40 g) and one tablespoon of sunflower oil. The pepper mixture was bottled for use in the preparation of the “koose” with leaves dish.

### Conventional preparation of “koose” and leaves (control):

Moringa leaves were boiled separately and the boiling water was discarded. The boiled leaves were mashed together with the “koose” and mixed with chopped onions, salt and powdered pepper for sample 857. About 18.6 g of boiled moringa/leaves were added to about 28.6 g of prepared “koose” and ¼ teaspoonful levelled of powdered pepper (with salt and oil) and one ring of onion (about 10 g) chopped for the meal. Sample 1, (857) was served in plastic disposable plates covered with cling film for sensory evaluation by consumers serving as panellists.

**“Koose” salad prepared with the conventional leaves:** The boiled moringa leaves were neatly chopped separately on a clean chopping board with a clean kitchen knife. “Koose” was sliced with a knife. Onions were ringed and sautéed. The chopped leaves, sliced “koose” and onions were nicely arranged on disposable plates. About ¼ teaspoonful levelled of powdered pepper (with salt and oil) were sprinkled on about 28.6 g of sliced “koose” and 18.6 g of chopped moringa

Table 1: Age and gender cross tabulation

Age	Gender		Total
	Male	Female	
20-29	25	12	37
30-39	37	22	59
40-49	16	19	35
50-59	12	9	21
60-69	4	0	4
Total	94	62	156

leaves and one ring of onion (about 10 g) for the “koose” salad, served on a plastic disposable plate and covered with cling film. Sample 2 was labelled 785 for sensory analysis.

**“Koose” salad prepared with dandelion leaves:** Dandelion leaves were boiled in water just covering in a saucepan for 30 min. The boiled leaves were neatly chopped. Onions were cut into rings and sautéed. The “koose” was sliced and arranged together with the chopped boiled dandelion leaves on a disposable plate. The “koose” salad with dandelion leaves was sprinkled with powdered pepper (with salt and oil) and covered with cling film. About 28.6 g of “koose” was served with 18.6 g of dandelion leaves, one ring of onion and ¼ levelled teaspoonful of powdered pepper (with salt and oil). Sample 3 was labelled 578 and presented for sensory evaluation.

**Sensory evaluation:** The sensory characteristics of the three samples of “koose” and leaves were judged by consumers of “koose” and leaves who were selected as panellists for the sensory evaluation. The selected panellists by age and gender were described in Table 1.

Panellists were briefed a day before each of the testing sessions on the dos and don'ts of the exercise to enable successful sensory testing sessions devoid of biases. The selected panellists were semi-trained for the exercise using the hedonic scale of five-point. The panellists were asked to evaluate the three samples for different sensory attributes namely appearance, taste, moisture, texture, aroma and acceptability. “Koose” and leaves dish was prepared and presented to the panellists for the sensory evaluation. However, after the evaluation of various sensory attributes by the panellists, the preparation of the meal and “koose” salads (the three samples) was done in the presence of the panellists for evaluating or assessing the preparations’ in terms of hygienic conditions.

**Statistical analysis:** The SPSS version 22 was used for the data analysis. The Kruskal-Wallis Test, the non-parametric counterpart of the one-way analysis of variance

was conducted on the sensory analysis of the three food samples with the results presented below.

## RESULTS AND DISCUSSION

Few comments from respondents as seen in Table 2 indicated that not many respondents needed pepper and salt adjustments. Very few respondents noted that fish, sardine, chicken and other vegetables could be added to the samples presented.

The Kruskal-Wallis Test is the non-parametric counterpart of the one-way analysis of variance conducted on the sensory analysis of the three food samples with the following hypotheses, which were developed based on the following parameters (appearance, moisture, texture, salty taste, pepper taste, overall taste, aroma, preparation and overall acceptability) on the three food samples.

### Appearance:

**H<sub>0a</sub>** : The distribution of appearance of the sample is the same across categories of food samples

**H<sub>1a</sub>** : The distribution of appearance of the sample is not the same across categories of food samples

On the appearance of the sample food samples, from Table 3, the p-value for appearance is less than the alpha value ( $0.000 < 0.05$ ) and that indicates highly statistically significant differences do exist in appearance across the categories of food samples. Hence, the researchers failed to accept the null hypothesis. Following the rejection of the null hypothesis, a pairwise comparison (Mann Whitney Test) was performed which also revealed that highly significant differences exist when the sample1 was compared with sample 2 ( $0.000 < 0.05$ ) and sample one with sample three ( $0.000 < 0.05$ ) but no differences exist when sample two was compared with sample three ( $0.332 > 0.05$ ) as indicated in Table 4. The sample three is responsible for the significant differences across the categories of food as it presents the highest mean rank (312.96). Hence, it can be said without constriction that koose salad (samples 2 and 3) had a better appearance than koose salad with dandelion leaves (sample 3) presenting the most remarkable appearance across the three sample food categories. Literature confirmed that sensory characteristics of food are considered the key area which food manufacturers can successfully use to differentiate their products to help enhance their acceptability<sup>28</sup>. Food service providers will therefore have to take cues from the sensory responses of consumers to enhance food products for acceptability. In

Table 2: Comments from respondents

Sample food	Comments from respondents						
	Needs salt addition	Needs pepper addition	Needs salt reduction	Needs pepper reduction	Add fish, sardine, or chicken	others	Needs vegetable addition
Sample 1		1		1	1	1	3
Sample 2	2	3		1		1	2
Sample 3	3	1	1	6	1	5	
Total	5	5	1	8	2	7	5

Table 3: Test statistics

Test statistics	Appearance of	Texture of	Moisture content		Peper taste	Overall taste	Aroma of	Preparation	Overall acceptability
	sample	sample	of sample	Salt content		of sample one	sample	conditions	of sample
Chi-Square	246.241	66.055	85.809	5.413	9.885	26.886	61.316	294.640	68.778
Df	2	2	2	2	2	2	2	2	2
Asymp. Sig.	0.000	0.000	0.000	0.067	0.007	0.000	0.000	0.000	0.000

Alpha value = 0.05

sensory evaluations test, packaging and the form in which the product is presented play a key role in determining its acceptability<sup>29</sup>. Presenting the same food as layers of koose slices and leaves in a salad form, with the salted oily, powdery pepper and dandelion leaves gave it a unique colourful look that makes it appear different from the usual koose with leaves thereby giving it a characteristic which appealed better to consumers. The appearance was said to be the number one feature perceived by the human sense in food selection and was shown to impact appetite stimulation or depression<sup>30</sup>. In a consumer acceptance of preservation techniques in organic meat production, it was found that appearance was among the important factors influencing consumer acceptance Haugaard *et al.*<sup>31</sup> Another study found a significant relationship between purchase intent and acceptability of bread by consumers based on appearance<sup>32</sup>. This is because consumers often use visual cues to judge the quality of food they intend to eat<sup>33</sup>. Appearance in terms of colour appeal and shape were among the reasons cookies were acceptable to consumers<sup>34</sup>. Researchers have established that food appearance determines how fulfilling the food is before its consumption<sup>35</sup>.

**Moisture and texture:**

**H<sub>0b</sub>** : The distribution of moisture of sample is same across categories of food samples

**H<sub>1b</sub>** : The distribution of moisture of sample is not the same across categories of food samples

The moisture across the categories of food as unveiled in Table 3 was statistically highly significantly different as the significant value is less than the alpha-value (0.000<0.05) and as a result the researchers failed to reject the alternative hypothesis. Therefore, a pairwise comparison was conducted which revealed that sample one compared with sample two

did not show any significant differences as revealed in Table 4 (1.00>0.05). However, when sample one was compared with sample three and also sample two with sample three, all indicated that highly significant differences exist across each of the two sample pairs (0.000<0.05). Furthermore, Table 4 indicated that sample three was responsible for the significant differences across the categories of food as it presents the highest mean rank (306.64). It can be implied that sample three presented outstanding moisture content to respondents.

**H<sub>0c</sub>** : The distribution of texture of sample is same across categories of food samples

**H<sub>1c</sub>** : The distribution of texture of sample is not the same across categories of food samples

On the issue of texture, Table 3 revealed that the p-value was smaller than the alpha-value (0.000<0.05) indicating that highly significant differences do exist across the categories of food and as such we failed to accept the null hypothesis. Since significant differences exist, a pairwise comparison was conducted and we could not find any significant differences between sample two and sample one (1.00>0.05). However, when samples two and three were compared and sample one with three, each pair presented as unravelled in Table 4 (0.000<0.05) a p-value smaller than the alpha value and thus indicating significant differences. Moreover, the Table 4 also indicated that sample three is responsible for the significant differences as it comes with the highest mean rank value (297.77). Therefore, it can be implied that sample three presents the most remarkable texture to the sensory evaluators.

From the results of the analysis, the “koose” salad prepared from dandelion leaves was perceived by the evaluators to be tenderer and moisturized than the samples

Table 4: Pairwise comparison

Ranks	Pairwise	Significance	Sample food	N	Mean Rank
Appearance of sample	One vs. Two	0.000	Sample 1	156	101.16
	One vs. Three	0.000	Sample 2	156	289.37
	Two vs. Three	0.332	Sample 3	156	312.96
			Total	468	
Texture of sample	One vs. Two	1.00	Sample 1	156	204.17
	One vs. Three	0.000	Sample 2	156	201.57
	Two vs. Three	0.000	Sample 3	156	297.77
			Total	468	
Moisture content of sample	One vs. Two	1.00	Sample 1	156	195.79
	One vs. Three	0.000	Sample 2	156	201.08
	Two vs. Three	0.000	Sample 3	156	306.64
			Total	468	
Salt content			Sample 1	156	243.86
			Sample 2	156	241.37
			Sample 3	156	218.27
			Total	468	
Pepper taste	Three vs. One	0.58	Sample 1	156	232.26
	Three vs. Two	0.005	Sample 2	156	255.62
	One vs. Two	0.203	Sample 3	156	215.62
			Total	468	
Overall taste of sample one	One vs. Two	1.00	Sample 1	156	200.73
	One vs. Three	0.000	Sample 2	156	230.26
	Two vs. Three	0.000	Sample 3	156	272.51
			Total	468	
Aroma of sample	One vs. Two	0.000	Sample 1	156	172.94
	One vs. Three	0.000	Sample 2	156	248.21
	Two vs. Three	0.51	Sample 3	156	282.36
			Total	468	
Preparation conditions	One vs. Three	0.000	Sample 1	156	92.27
	One vs. Two	0.000	Sample 2	156	318.51
	Two vs. Three	0.22	Sample 3	156	292.71
			Total	468	
Overall acceptability of sample	One vs. Two	0.00	Sample 1	156	169.49
	One vs. Three	0.00	Sample 2	156	248.72
	Two vs. Three	0.03	Sample 3	156	285.29
			Total	468	

Alpha value = 0.05

prepared from moringa leaves. The texture of food is an indicator of food quality and it strongly affects food acceptability. The texture was found to be part of the factors influencing consumer preference and willingness to consume microgreens as their overall acceptance was determined by flavour and texture<sup>36</sup>. People have beliefs that harder foods have a higher satiety property and will often prefer softer foods to eat a little more before becoming full. Studies have also indicated that people normally feel full after consuming solid foods as opposed to the consumption of softer foods<sup>37</sup>. Thus, people who want to eat a little more before becoming full will prefer liquid foods or foods which are much more tender, hence the observation being made in this study. Another likely explanation for their preference for the tender koose with dandelion leaves could be that texture and moisture content of food has a great impact on the oral processing of foods which in turn determines whether an individual will prefer a given product over the other. However,

the reason for the koose with dandelion leaves being softer than the other samples could not be immediately ascertained by the researchers but it is believed that dandelion leaves may have a higher water holding capacity than the others leaves used in those samples thereby resulting in the observed outcome.

#### **Salt and pepper:**

**H<sub>0d</sub>** : The distribution of salt content of sample is same across categories of food samples

**H<sub>1d</sub>** : The distribution of salt content of sample is not the same across categories of food samples

From Table 3, the p-value of the salt content is more than the alpha value (0.067>0.05) indicating no significant differences exist across the categories of the sample food on the salt content and hence, we fail to reject the null hypothesis thus the distribution of salt content of the sample is same

across categories of food samples. As a result, we conclude that the salt content is desired across all the sample food categories.

**H<sub>0e</sub>** : The distribution of pepper taste of sample is same across categories of food samples

**H<sub>1e</sub>** : The distribution of pepper taste of sample is not the same across categories of food samples

The taste of pepper was also considered in this investigation. As indicated in Table 3, the p-value is smaller than the alpha-value ( $0.000 < 0.05$ ) indicating that highly significant differences do exist across the categories of food and as such we failed to accept the null hypothesis. Since significant differences exist, we conducted a pairwise comparison and we could not find any significant differences between sample three and sample one and sample one and two as their respective p-values are higher than the alpha value: ( $0.57 > 0.05$ ) and ( $0.203 > 0.05$ ) respectively. However, when samples three and two were compared as unravelled in Table 4 ( $0.005 < 0.05$ ) the p-value is smaller than the alpha value, thus the presence of significant differences. Moreover, the Table 4 also indicated that sample two was responsible for the significant differences as it comes with the highest mean rank value (255.62). Therefore, sample two presents the most outstanding pepper taste.

The results revealed that the taste of salt was perceived as the same across the 3 food samples. However, a slight difference was perceived in the pepper taste with sample 2(758) perceived to be slightly peppery than sample 1(857) and sample 3(578).

#### **Overall taste:**

**H<sub>0f</sub>** : The distribution of overall taste of sample is same across categories of food samples

**H<sub>1f</sub>** : The distribution of overall taste of sample is not the same across categories of food samples

On the overall taste of each of the food categories, Table 3 unveiled that the p-value is smaller than the alpha value ( $0.000 < 0.05$ ) and it is an indication that there is a highly significant difference across the food categories regarding overall taste. As a result, we fail to accept the null hypothesis that the distribution of the overall taste of the sample is the same across categories of food samples. Since there are significant differences, we proceeded with a pairwise comparison which reveals no differences between samples 1 and 2 as presented in Table 4 ( $0.101 > 0.05$ ). The table further

shows that when sample one and two and also sample two with three was compared, a significant difference exists in the overall taste across the categories of food. Table 4 showed that sample three presents the highest mean rank (272.51) and one can conclude that the significant differences in the overall taste occur as a result of sample three. Taste comes in several forms such as sour, sweet, bitter and salty and it plays a critical role in indicating nutrient-rich foods. For instance, while salty and savoury tastes are associated with proteins and electrolytes, the sweet taste is often linked with carbohydrates<sup>38</sup>. Bitter and sour tastes, on the other hand, are associated with unripe fruits or foods that may be harmful when ingested. The effect of taste on food acceptability is strongly correlated with the personal preferences that people have for tastes<sup>37</sup>. Stronger taste dictates food acceptability since people normally associate the experience with the presence of food nutrients in the products<sup>39</sup>. For example, food that has a sour or bitter taste is often avoided by most people, especially children. Dandelion leaves neither taste bitter, sour, or sweet. The taste of food is considered a "feel good" factor that influences acceptability because tasty food satisfies consumers' need for enjoyment<sup>27</sup>. There is also a lot of literature regarding the nutrition and health benefits of dandelion leaves. It can therefore be inferred that the sample with dandelion leaves had the highest acceptability concerning taste as a result of the other health benefits the consumers thought they would derive from it. Health consciousness was found amongst other factors influencing consumer preference for dairy products<sup>40</sup>. It is not surprising that "koose" and leaves prepared with dandelion leaves had a more appealing taste to the panellists than the ones prepared from moringa.

#### **Aroma:**

**H<sub>0g</sub>** : The distribution of aroma of sample is same across categories of food samples

**H<sub>1g</sub>** : The distribution of aroma of sample is not the same across categories of food samples

With regards to the aroma, the p-value is smaller than the alpha-value ( $0.000 < 0.05$ ) indicating that highly significant differences do exist across the categories of food on the aroma as shown in Table 3 and as a such, we fail to accept the null hypothesis. Since significant differences exist, we conducted a pairwise comparison and we could not find any significant differences between sample three with sample one and sample one with two as their respective alpha-values are higher than the p-values: ( $0.57 > 0.05$ ) and ( $0.203 > 0.05$ )



respectively. However, when samples three and two were compared as unravelled in Table 4 the p-value is smaller than the alpha value ( $0.005 < 0.05$ ), indicating a significant difference between them. Furthermore, Table 4 again indicated that sample two is responsible for the significant differences as it comes with the highest mean rank value (255.62). Aroma plays a pivotal role in attracting consumers to food. The literature posits that aroma plays a very important role in the acceptance or rejection of a food product and as such the pleasantness of aroma plays important role in the acceptability of cookies<sup>33</sup>. It was revealed that attracting consumers with very pleasant food aromas such as those of warm cookies or pizza can easily stimulate salivation, promotes prospects of consumption and increase appetite<sup>27</sup>. Moringa has a distinctive "green" flavour that is bitter and slightly sweet. It has also acquired itself as the provider of numerous health benefits. It can thus be opined that sample two was rated highest in aroma due to the presence of the moringa leaves as well as how the sample was presented to the participants.

**Preparation:**

**H<sub>0h</sub>** : The distribution of preparation condition of sample is same across categories of food samples

**H<sub>1h</sub>** : The distribution of preparation condition of sample is not the same across categories of food samples

On the issue of preparation conditions, the researchers tried to get the views of participants on the hygienic conditions of each sample. Table 3 indicates that highly significant differences do exist across the categories of food because the p-value is smaller than the alpha value ( $0.000 < 0.05$ ). Therefore, we failed to accept the null hypothesis and thus we maintained that the distribution of the preparation condition of the sample is not the same across categories of sample food. With the existence of significant differences, we proceeded to conduct a pairwise comparison. No significant differences between the paired sample three with sample two were found in Table 4 because the p-value is higher than the alpha value ( $0.203 > 0.05$ ). However, highly significant differences exist when sample three paired with sample one and sample one with sample two were compared as unravelled in Table 4, their respective p-values are smaller than the alpha value, ( $0.000 < 0.05$ ) and ( $0.000 < 0.05$ ). Additionally, Table 4 also indicated that sample two is responsible for the significant differences as it comes with the highest mean rank value (318.51). Several factors may interplay to determine a person's liking or disliking of a

particular food and the preparation conditions are often one. Food vendors must guarantee the wholesomeness, quality and purity of the food they serve to the general public. Food poorly handled may turn out to affect human health. Literature defines the common law on food safety as "caveat emptor" (buyer beware)<sup>41</sup>. This implies that individuals should be responsible for the kind of food they buy and consume by ensuring that cooking and serving environment as well as the food being sold are safe for consumption. The method and the condition under which the food is prepared to do affect people's willingness to eat the food, even if that is their favourite meal. Unhygienic food is associated with food contamination and food-borne diseases hence people turn to avoid food prepared and presented under unhygienic conditions. The nicely prepared and packaged "koose" salad with the green moringa leaves thus appeared more attractive to the consumers hence the sample had the highest acceptability with regards to preparation and presentation conditions.

**Overall acceptability:**

**H<sub>0i</sub>** : The distribution of overall acceptability of sample is same across categories of food samples

**H<sub>1i</sub>** : The distribution of overall acceptability of sample is not the same across categories of food samples

On the general acceptability of each of the food categories, Table 3 unveiled that the p-value is smaller than the alpha value ( $0.000 < 0.05$ ) and it is an indication that there is a highly significant difference across the food categories on the issue of general acceptability. As a result, we fail to accept the null hypothesis thus the distribution of general acceptability of the sample is not the same across categories of sample food. Since there are significant differences, we proceeded with a pairwise comparison. From the result of the pairwise comparison in Table 4, we could find highly significant differences between sample three with sample two, sample one with sample two and sample one with sample three because their respective p-values are higher than the alpha value ( $0.000 < 0.05$ ), ( $0.000 < 0.05$ ) and ( $0.000 < 0.05$ ) respectively. Additionally, Table 4 further indicates that sample three is responsible for the significant differences as it comes with the highest mean rank value (285.29). Several factors interplay to determine the acceptability of food. These factors include consumer expectations, consumer Innovativeness, consumers' knowledge and belief, consumer attitudes towards healthy foods as well as other food preparation attributes such as appearance, aroma and texture among

others. There is a strong link between consumer expectations of a given product and their acceptance of the product. The belief of a consumer regarding a particular product has a positive outcome on the acceptability of the product<sup>42</sup>. Knowledge influences food preferences and their acceptability. Knowledge about the composition, functional properties, health benefits and to some extent the processing steps influence whether the food product will be accepted or rejected by the consumers<sup>39,43</sup>. Sample three had the highest acceptability in this study and this could be due to the knowledge and beliefs the consumers had about the composition of sample three and also how it was prepared and presented. Dandelion leaves are perceived by many to possess valuable medicinal and health properties. It can thus be opined that it got the highest acceptability due to the perception of its nutritional and health properties and the way it was packaged in this study. A study found the quality and health consciousness amongst others as factors influencing consumer preference for dairy products<sup>39</sup>. Quality was defined by consumers to refer to the taste, uniqueness and service of the food product<sup>39</sup>. The uniqueness respondents saw in samples 2 and 3 could be accountable for the overwhelming acceptance. Sensory attributes of flavour, aroma, texture, appearance as well as ingredients in food were found to be among other factors influencing tourists' food consumption. The study postulated that food preference leads to food choice and then food intake<sup>44</sup>. We could conclude that the acceptance of samples 2 and 3 are signs that consumers would be willing to patronize and consume the "koose" salads. However, further studies are needed to validate the acceptance of "koose" salad among the entire population to arrive at this conclusion.

### **CONCLUSION**

The study looked at new ways of preparing and presenting "koose" and leaves. The study presented the dish as "koose" salad which was compared with the conventional koose with leaves using appearance, moisture and texture, aroma, taste and overall acceptability as the comparing attributes. Dandelion leaves were introduced in the preparation of the local dish and the dish was compared with the conventionally prepared "koose" and leaves in a sensory evaluation exercise. In terms of overall acceptability, sample three (koose salad with dandelion leaves) ranked first, followed by koose salad with moringa leaves with the conventional koose with moringa leaves at the bottom. The findings of this study thus show that koose salad with dandelion leaves or moringa leaves was overwhelmingly

accepted by the participants and it could be substituted for the conventional way of presenting koose with moringa leaves. This way, more people could be drawn into its patronage thereby creating more market for the large commercial production of the food product and increasing the income margins of the sellers. It could be concluded from the study that the presentation of dishes contributes to their acceptance by consumers. Customers will find more appealingly prepared dishes more acceptable, thus it will be especially important for local delicacies to be presented neatly and attractively to increase patronage.

### **SIGNIFICANCE STATEMENT**

Koose with leaves is a cheap but nutrient-dense local Ghanaian dish, rich in protein and vitamins. It is mostly prepared and served to consumers in a mashed form, with both the koose and leaves mixed together. Many critical questions regarding the hygiene of its preparations have been raised but no studies have been conducted to offer other ways of preparing the dish. This study thus offers the researchers opportunity to explore and discover other better ways of preparing and serving the meal in ways which are more hygienic, acceptable and appealing to consumers while contributing to meeting their nutritional needs.

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