

## B. Tech. (Food)

### PREPARATION OF CHICKEN MEAT PICKLE AND ITS STORAGE STABILITY STUDIES AT ROOM TEMPERATURE

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#### Abstract

The present work was undertaken to develop shelf stable ready to eat chicken meat pickle and evaluate its quality and storage stability. The pickle was prepared by two different methods; frying and smoking methods. These meat were mixed with spices, salt and vinegar followed by light frying and was separately filled in clean glass jars and was topped with mustard oil and packed air tight. The pickle prepared from smoking method was found to be best product from sensory evaluation. The chemical composition of best pickle (smoked) was found to be protein (23.3%), fat (35.71%), ash (4.3%), moisture (33.59%), salt (2.60%) and carbohydrate (0.5%). The pickle prepared by smoking method was found to be the best product due to low number of TPC, yeast and mold count, PV and pH on 60<sup>th</sup> day of storage period. On 60<sup>th</sup> day the mean value of TPC (Log10cfu/g), yeast and mold count (Log10cfu/g), PV (mEq/Kg) and pH were found to be 2.34, 1.4, 7.17 and 4.75, respectively for pickle prepared by smoking method. Coliform, Salmonella spp, and Staphylococcus spp were not detected in both the products over the entire storage period that was analysed.

**Keywords:** Meat, pickling, storage, stability

#### Introduction

Pickling is the process of preserving or expanding the lifespan of food by either anaerobic fermentation in brine or immersion in vinegar. Pickling of chicken meat in edible oil with added salt, spices and condiments and vinegar provides a ready-to-eat product with good storage stability at room temperature. Reduced water activity (aw) and pH are the two major hurdles contributing to shelf stability of pickles (Reddy and Rao, 1996). Chicken pickle was prepared by using meaty portions of spent hens like breast, thigh and drumstick. Along with preservative effect pickling also helps to improve desirable characteristics like color, flavor and texture. In the orient, especially in countries like Nepal, India and some countries of East, pickle type of food is well known for its appetite enhancing property and the property to aid in digestion of food by stimulating the flow of gastric juice (Gadekar *et al.*, 2010).

In place of skeletal muscle different viscera of animal and poultry can also be used for the preparation of meat pickle. Meat pickle is also good alternative of meat in times of its scarcity. These products serve as adjuncts to bread and rice and are also used as snacks. Meat pickles have a long shelf life without refrigeration. In developing country including Nepal, the storage of meat and meat products is a serious problem due to climatic conditions and limited refrigeration facilities.

Meat pickling is a way of curing and preserving different types of meats and was developed before the days of refrigeration or easy access to ice for keeping meats cold (Kanagaraju and Subramanian, 2012; Anonymous, 2015).

#### Materials and Methods

Chicken meat (breast part) was procured from the local market of Kathmandu valley. It was then cleaned with warm water. Then the heat treatment of meat was done by frying and smoking method. The meat was fried in little mustard oil in frying pan at 175±5 degree Celsius for 10 minutes to golden brown color to prepare fried chicken meat pickle. While wood smoke at 75-80 degree Celsius, for 30 minutes was done to prepare smoked chicken meat pickle. Thus, cooked meat was cut to desirable size of about 1-2cm. The spices were mixed and fried in the oil. The spices, salt, and vinegar were mixed with pre-cooked meat followed by light frying. Thus, prepared meat pickle by frying and smoking methods were separately filled in clean dry glass jar up to the neck. This was topped with mustard oil which was heated to 175 degrees Celsius and cooled to room temperature a short while ago. Samples for analysis from the ready pickle were drawn. The bottle filled with the meat pickle was capped air-tight and stored in a dry place at room temperature for further analysis. Chemical composition, sensory quality,

microbiological quality, acid value and peroxide value were investigated at fifteen day intervals up to two months. Moisture, crude protein, crude fat, salt, ash, peroxide value and acid value were determined according to AOAC (2005). Microbiological analysis (Total plate count, coliform count, *Staphylococcus spp* detection, *Salmonella spp* detection, yeast and mold count) was carried out according to Harrigan and McCane (1979) and Varadraj (1993). Sensory test was done by 9-point hedonic rating test in the participation of ten semi trained panelists comprising of faculties and undergraduate students of GoldenGate International College, Kathmandu. Statistical analysis was performed by T-test using SPSS Statistical package (Version 20).

**Table 1:** Recipe for pickle

Ingredients	Amount (g)
Meat	500
Fenugreek seeds	2.5
Cumin	5
Mustard seeds	5
Chili powder	15
Turmeric powder	5
Salt	15
Vinegar	100
Mustard oil	200
Chicken <i>masala</i>	5

(Source: P. Kanagaraju and A. Subramanian, 2012)

## Results and Discussion

**Table 2:** Mean values for chemical composition of pickle

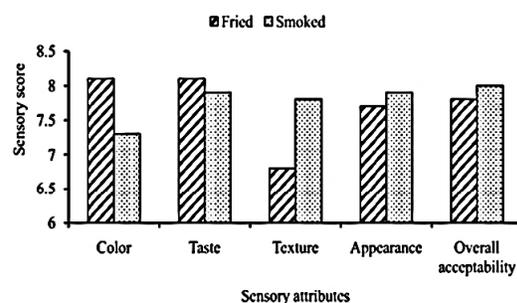
Pickle Sample	1 (Fried)	2 (Smoked)
M.C (%)	24.87b ±0.29	33.59b ±0.50
Protein (%)	22.69a ±0.59	23.3a ±0.59
Fat (%)	45.25b ±0.21	35.71a ±0.93
Salt (%)	2.98a ±0.78	2.60a ±0.48
Ash (%)	3.82a ±0.56	4.3a ±0.56
Carbohydrate (%)	0.39a ±0.19	0.5a ±0.15

Sample 1 is known for pickle prepared by frying method and sample 2 is known for pickle prepared by smoking method. Moisture, protein, ash content and carbohydrate were found to be higher in smoked pickle whereas fat content and salt content was higher in fried pickle.

### Sensory quality of pickle

From the statistical analysis ( $p < 0.05$ ), products were not found to be significantly different in terms of color, taste, texture,

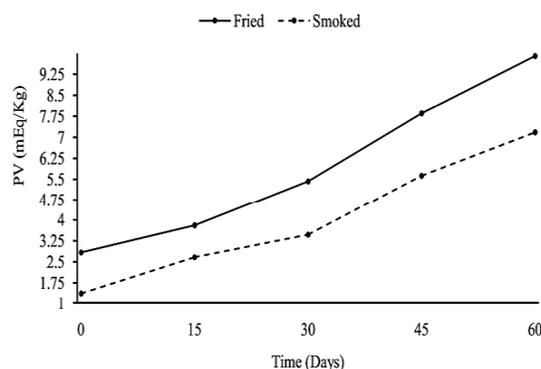
appearance and overall acceptability.



**Figure 1.** Mean sensory scores of pickle

### Physiochemical changes during storage Peroxide value

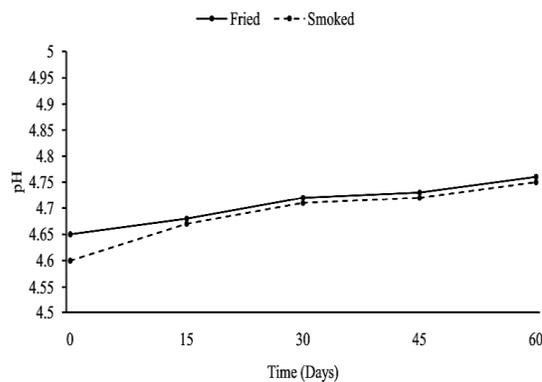
The initial PV of the fat taken from pickle was found to be 2.45 for sample 1 (Fried) and 1.37 for sample 2 (Smoked). However, from the graph it is seen that PV value of pickle made by two different methods increased slowly up to 30<sup>th</sup> day. On the 60<sup>th</sup> day, the mean PV of sample 1 and sample 2 were found to be 9.91 and 7.17 respectively. The PV of pickle made by two different methods and stored at room temperature is acceptable under codex standard (10mEq/Kg). However, smoked pickle is preferred due to its low PV value on 60<sup>th</sup> day. These results are in accordance with the finding of Reddy and Rao (1997) and Chowdhury *et al.*, (2002). The reason behind the increase in PV may be that pickle itself has slightly porous structure and it has also some space inside it which contains air. This air was probably not completely evacuated during the packaging as a result of which cause an increase in peroxide value. Increase in PV was found to be least in case of pickle prepared from smoking method. The comparison of PV up to 60<sup>th</sup> days in two different types of pickle is shown in Fig 2.



**Figure 2.** Change in PV during storage

### Change in pH

The initial pH of pickle was found to be 4.65 and 4.60 for sample 1 (Fried) and 2 (Smoked) respectively. However from graph it is seen that pH value of two different pickles increased slowly on storage at room temperature. On the 60<sup>th</sup> day, the mean pH of pickle sample of fried and smoked pickle was found to be 4.76 and 4.75, respectively. However, smoked pickle is preferred due to its low pH value on 60<sup>th</sup> day. With the increase in time of storage period at room temperature, a significant increase in pH was also observed. These results are in accordance with the finding of Maiti *et al.*, (2009). The comparison of pH on 15, 30, 45 and 60<sup>th</sup> days of two different pickle is given in Fig 3

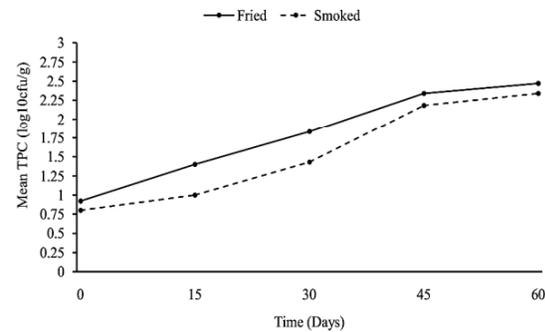


**Figure 3. Changes in pH during storage**

### Total plate count

The initial value of TPC in pickle was found to be 0.92 and 0.80 for sample 1 (Fried) and 2 (Smoked) respectively. However, from the graph it is seen that TPC value of pickle prepared by two different methods increased slowly over the storage period. On the 60<sup>th</sup> days, the mean TPC (log<sub>10</sub>cfu/g) of sample 1 and 2 was found to be 2.47 and 2.34, respectively.

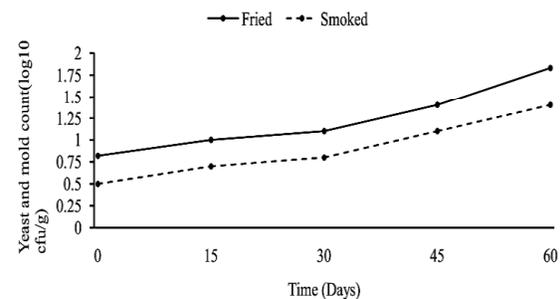
The smoked pickle is preferred due to its low mean TPC value on 60<sup>th</sup> day. The growth of microorganism might be due to break down fat and protein into smaller form, which might be rapidly utilized by the microorganism. The comparison of TPC on 15, 30, 45 and 60<sup>th</sup> days in two different pickle is given in Fig 4



**Figure 4. Variation in TPC during storage**

### Yeast and mold count

The initial value of yeast and mold count in pickle was found to be 0.82 and 0.50 for sample 1 (Fried) and sample 2 (Smoked), respectively. However, from the graph it is seen that yeast and mold count value of pickle prepared by two different methods increased slowly over the storage period. On the 60<sup>th</sup> days, the mean yeast and mold count (log<sub>10</sub>cfu/g) of sample 1 and 2 was found to be 1.83 and 1.4, respectively.



**Figure 5. Variation in yeast and mold count during storage**

The smoked pickle is preferred due to its low mean yeast and mold count value on 60<sup>th</sup> day.

### Coliform

No coliform was seen in pickle during entire storage period of time. They must have been destroyed by cooking process.

### Salmonella spp.

*Salmonella spp* was not detected in either of two pickle sample over the entire storage period.

### Staphylococcus spp

*Staphylococcus spp* was found to be absent in two different sample of pickle over the storage period.

## Conclusions

Following conclusions were drawn from the result of present work. Pickling of meat offers highly delicious and nutritious ready to eat shelf stable product with relatively longer shelf life and good market potential. From the result obtained in the present study on physiochemical, microbiological and sensory evaluation, it may be concluded that vinegar based chicken meat pickle has storage stability up to 60 days at room temperature. Among the two sample of pickle, that prepared by smoking method was found to be the most preferred pickle from sensory evaluation and physiochemical analysis.

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