

EFFECT OF COOKING METHODS ON PALATABILITY TRAITS AND CHEMICAL COMPOSITION OF BROILER MEAT

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ABSTRACT

A study on the effects of cooking methods on palatability traits and chemical composition of chicken meat was carried out. A total of thirty (30) adult broiler birds were subjected to three cooking methods namely, boiling, broiling and roasting. Results from the experiment showed a higher ($P < 0.05$) appearance (colour) for meat processed by broiling as against other cooking methods. Also broiled meat was more tender, juicier, had higher flavour and was most accepted by panellists. Chemical composition showed higher values ($P < 0.05$) of moisture content for boiled meat, crude protein for boiled meat, ash for roasted meat and ether extract for boiled meat, respectively. By this, broiling cooking method should be employed by meat processors and home consumer, as it showed best result from panellist assessment.

Keywords: cooking methods, palatability traits, chemical composition, chicken meat.

INTRODUCTION

The chicken meat is an excellent source of high quality protein containing good balance of essential amino acids, such as tryptophan and methionine (Lawrie, 1985). With respect to minerals, the meat contains many amount of minerals including potassium, magnesium, calcium, iron and phosphorus (Glenn, 1988). Obviously, Chicken meat is of great value, however, the overall acceptability of the meat is dependent on its quality. Meat quality is a measure of meat palatability and acceptability (Renard and Fisher, 1997). When cooked, the meat is easily digested and it is an excellent source of many nutrients needed in diets. Different cooking methods can be employed in assessing the meat quality of chicken. Cooking of meat according to Ikeme (1990) is a technique in which heat energy in form of high temperature is applied to meat in order to alter its colour, flavour and texture. It also enhances the tenderness and juiciness, and renders the meat more palatable and digestible. Cooking is an embodiment of different forms of heating methods which consist of dry and moist heating. They include boiling which is the heating of meat in water, broiling or grilling is the cooking of meat by direct heat radiant energy by conduction either on the charcoal or in the oven, while roasting is a type of dry cooking usually carried out on charcoal as well as in oven. Previous reports by Hamm (1982) and Claus *et al.* (1984) showed that post-mortem handling of meat carcasses affect to a larger extent the quality traits of meat. In the same vein, Ikeme (1990), Moleney (1990), Aduku and Olukosi (2000) reported that various cooking methods could have different inputs on the palatability traits or eating qualities of meat. This present study therefore, presents the findings on the effects of cooking methods on the

palatability traits and chemical composition of the chicken meat.

MATERIALS AND METHODS

Thirty (30) adult broiler birds weighing between 4kg-6kg were used for this study. The birds were allocated ten each to the three different cooking methods: The experimental design was a complete randomized design (CRD). Data collected was subjected to a statistical analysis system SAS 1999, while means were separated using analysis of variance (ANOVA).

Processing (Defeathering)/Evisceration.

The common scalding method, where boiled water was poured into a bowl and the bled birds were dipped each for 5-10 minutes to ease the loosening of the hair follicle was adopted. The birds were thoroughly cleaned and there after slaughtered into parts viz; breast muscle, thigh, drumsticks, shanks, wings and their visceral organs etc.

Processing (Cooking) methods: Three cooking methods were applied, namely;

Boiling

Meat weighing 30g each from the breast portion was washed and cooked in an aluminium pot containing 100ml of clean water. The meat was boiled slowly on an adjustable PIFCO Japan Electric cooking plate model (No ECP202) to a summing temperature of 95-100°C for 20minutes (Aduku and Olukosi, 2000). The meat was allowed to cool down and then cut into pieces equivalent of 2g each. Meat samples weighing 30g each from breast portion were washed and wrapped in an aluminium foil and cooked in the oven for 15 minutes at a temperature of 120-140°C (Medved, 1977). The meat was allowed to cool down and then cut into ten pieces equivalent of 2 g each.

Roasting

Meat samples weighing 30g each were also cut from the breast portion. They were roasted on the pot containing burning charcoal at a temperature range of 150-160°C for 20 minutes (Medved, 1977). The meat samples were turned at interval to avoid burning and were later cut into ten pieces equivalent to 2g each after cooking.

Sensory Evaluation

Sensory evaluation was carried out for palatability traits of appearance, flavour, tenderness, juiciness, and overall acceptability of the chicken meat on nine point hedonic scale using a 10 member panel (Price and Schweight, 1971).

Chemical and statistical analysis

The processed meat samples weighing 30g were taken each from the three different treatments for chemical analysis using the method of (AOAC, 2002). The data were obtained using a complete randomized design (CRD) and analysed by the procedure of statistical analysis system (SAS 1999) which were subjected to analysis of variance and means separated using standard error of means (SEM) and Duncan multiple range test (DMRT).

RESULTS AND DISCUSSIONS

Data on the effect of cooking methods on the palatability traits and chemical composition of chicken meat are presented as follows: From the table above, appearance of meat samples was higher in broiling followed by roasting, though not significantly ($p>0.05$) different, and was least in boiling which was significantly ($p<0.05$) different from broiling. Here, panellists rated appearance (colour) of broiled meat higher before roasted meat, where boiled meat was rated the least. This result contradicts previous report from Apata *et al.* (2007), where colour of fried meat from singed chevon was higher among other cooking methods. Chicken meat was more tender in broiling and boiling and less tender in roasting. This result was expected as the heat (fire) applied for roasting reduced to some extent the moisture content, thereby making meat samples drier and less tender. The treatment did not affect juiciness of the chicken meat, but the value of roasted meat was least compared with boiled and broiled meat. This again could be attributed to the treatment applied for roasted meat. This result contradicts the report of Apata *et al.* (2007), where roasted meat from skinned chevon received highest score ($p<0.05$) as the most juicy. The flavour of broiled and roasted chicken meat was preferred. The lesser value of flavour for boiled meat was as a result of the water used to cook the meat, unlike broiled and roasted

meat where water was not added hence its flavour was not altered. The overall acceptability of the chicken meat was not affected by the cooking methods applied, though broiled meat was rated highest, while roasted was rated lowest. This finding was at variance with Apata *et al.* (2007) report, where roasted chevon from skinned carcass received highest score ($P<0.05$) as the most acceptable. From the result above, moisture content of meat was affected by the cooking methods applied with a higher value reported for boiled meat and a lesser value for the roasted meat, though they did not differ significantly ($p>0.05$). This result was expected as water used in cooking the meat added to the boiled meat while the fire applied in roasting reduced the moisture content of the roasted meat. Crude protein was higher in broiled meat and lower in roasted meat. This was due to the cooking method applied as heat from the coal denatured to some extent the crude protein of meat during roasting. Ash content was higher for the roasted meat compared with broiling and boiling which was least. This result was expected as heat (fire) tends to increase ash content in meat products (Ikeme 1990). Cooking methods differed significantly ($p<0.05$) for ether extract, with the broiled meat having a higher value and the roasted meat, a lesser value. This was again expected as no water was added during broiling. The meat juice (broth) and collagen were intact (i.e. not denatured), which are components of ether extract in meat (Ikeme, 1990).

CONCLUSION

From the findings above, it can be said that cooking methods affected to a large extent the palatability traits and chemical composition of chicken meat, as appearance (colour) of broiled meat was more pronounced among others, more tender had higher flavour, more juicy and was most accepted by the panellists. Chemical composition was highest in moisture content for boiled meat. Crude protein and ether extract were more retained in the broiled meat, while roasted meat showed higher concentration of ash. Broiling cooking method should be employed by meat processors and home consumers as it showed best results from the parameters measured.

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Table 1 shows how cooking methods affected the various palatability traits.

Cooking methods	Appearance	Tenderness	Juiceness	Flavour	Overall Acceptability
Boiling	7.43 ^a	7.50 ^a	6.90	7.03 ^b	7.63
Roasting	7.97 ^{ab}	6.30 ^b	6.70	7.70 ^a	7.43
Broiling	8.13 ^a	8.10 ^a	6.93	8.03 ^a	7.73

Means in the same column with similar superscripts are not significantly ($P > 0.05$) different.

Table 2 Effect of cooking methods on the chemical composition of chicken meat.

Cooking methods	Moisture content (%)	Crude protein (%)	Ash (%)	Ether Extract (%)
Boiling	50.29	19.61	1.80	1.78 ^a
Roasting	42.87	18.05	2.25	1.00 ^b
Broiling	46.37	20.95	2.19	1.90 ^a

Means in the same column with similar superscripts are not significantly ($p > 0.05$) different.