ACCEPTABILITY OF CURED DUCK MEAT USING A NEW METHOD

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ABSTRACT

Muscovy duck and native chicken were used to compare the acceptability of smoked duck cured at 2 vs 3 days, 55° vs 70° salinity and with vs without refrigeration in a clay pot. Results indicate that 2-day curing is better than 3-day curing in smoked duck with 55° salinity. It is therefore important when curing meat, especially poultry, that quantitative measurements and time schedule be observed. Clay pot seems to be an acceptable curing container since samples were as acceptable as those cured in the refrigerator. Comparison and hedonic scale tests indicate that clay pot has a temperature sufficiently low to retard most bacterial growth until salt penetration is complete. In addition, cured duck was as acceptable as cured chicken based on the scores given in different sensory qualities evaluated such as color, flavor, off-flavor, saltiness, tenderness, juiciness and general acceptability.

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INTRODUCTION

Poultry is generally raised in the rural areas by small farmers to supplement family income by either selling the eggs or the meat. If the meat can be marketed as cured product, however, a higher income may be realized. Smoked or unsmoked meat products would likewise add variety to the diet thereby improving the nutrition of the rural people.

Madlansacay *et al.* (1974), Palomar (1979), and Palomar and Argañosa (1979) showed the acceptability of processed duck meat and utilized fresh meat in some recipes. However, refrigeration was employed in processing the product. Miller and Ziegler (1936) recommended holding country-style hams at approximately 4.4°C for 30 days after curing to permit adequate penetration of the salt, while Hunt *et al.* (1939) used a 2-week "air

cure" for the same purpose. In both instances, the hams were aged at or above room temperature. Thus, most of the processing methods used required sophisticated equipment usually not available in the farm.

This study shows the feasibility of processing poultry meat into cured products in a clay pot at ambient temperature.

MATERIALS AND METHODS

Preparation of Birds. — Twenty-eight male Muscovy ducks and four male native chicken were fasted for 18 hr, slaughtered, scalded, feathers hand picked, eviscerated and cleaned.

The method of curing used was described earlier (Palomar and Argañosa, 1979).

Treatments. — The study consisted of four different phases with three replications. Phase I, which was done to determine the effect of curing time on the quality of smoked product produced, consisted of two treatments: T_1 - duck meat cured for 2 days, and T_2 - duck meat cured for 3 days. The products were subjected to a paired comparison test with 6 to 7 panel members to determine the more acceptable treatment.

Using the more acceptable curing period in Phase I, two levels of salinity, 55° (S_1) and 70° (S_2), were tested in Phase II. Both treatments were subjected to the same curing period. Paired comparison test was done to determine the acceptability of the cured products using the same panel of judges as in Phase I. Based on the more acceptable treatment in Phase II, Phase III was undertaken to compare the sensory qualities of cured ducks prepared with and without refrigerator curing. The treatments were C_1 (curing in clay pot) (Fig. 1) and C_2 (curing in the refrigerator). The comparison test and a nine-point hedonic scale were used to determine which of the products was more acceptable to a panel of 6 tasters.

Phase IV was conducted to compare the acceptability between cured chicken and duck (D_1 - cured duck and D_2 - cured chicken). The procedure for curing chicken was the same as that already described for duck.

Smoking of the Meat. — The cured meat was washed in tap water and hung for 30 min to drain prior to smoking. Smoking for 8 hr was done in an improvised smokehouse.

Fig. 1 Clay jar measuring 26.4 cm in height used in curing duck and chicken.

Cooking of the Cured Product. — The cured products were cooked separately using water, pineapple juice and brown sugar solution in a ratio of 4:2:1. The amount of solution was enough to completely submerge the meat. Chopped onions and black pepper were also added. Cooking was done for 60 min for every kg of meat.

Sensory Evaluation. — The breast muscle of the smoked poultry was used for the sensory evaluation. The breast was cut into approximately 2.54 sq cm pieces and presented to taste panelists who evaluated the acceptability of the cured products using the paired comparison test and hedonic scale test.

RESULTS AND DISCUSSION

Phase I. Of the 21 taste panelists, 17 preferred the 2-day curing while only 4 preferred the 3-day curing. Based on X^2 and binomial tests, the preference of the panelists for 2 over 3 days was highly significant. This result may be due to the difference in flavor and color noted by the panelists which ranged from "slight" to "much difference". According to Ziegler (1965), prolonged exposure of meat to salt action results in excessive shrinkage and high salt content.

Phase II. Since the samples cured for 2 days were significantly preferred than the samples cured for 3 days, 2-day curing was chosen in Phase II. Significant preference was also observed for 55° over 70° salinity, with 15 judges choosing the former and only 3 the latter. Most judges noted a difference especially on saltiness. This proves that poultry, including duck, requires a lesser concentration (55° salinity) than pork with 70° salinity (UPLB Standard).

Phase III. Most judges noted a difference between samples cured in the clay pot and samples cured in the refrigerator, especially on saltiness. However, the preference for samples cured in the refrigerator was not significant (Table 1).

No significant difference was noted in all the sensory qualities evaluated between duck and chicken (Table 2), which support the results in the preference and X^2 tests (Table 1).

Color. No significant difference was observed between the samples cured in the refrigerator and those cured in the clay pot. However, the samples cured in the clay pot had a higher score (7.83) in color.

Flavor. Regardless of the equipment used, the two samples were rated almost similarly in flavor with clay pot curing having a higher score (7.33). This proves that the temperature of the clay pot is sufficiently low to retard most bacterial growth until salt penetration is complete, but permits slow growth of nitrate-reducing organisms.

Off-flavor. Moderately strong off-flavor was noted by the panelists in the two samples evaluated. The scores were higher than the results of a previous study of the author. The difference may be attributed to the psychological bias against duck.

Table 1. Preference and chi-square tests between samples cured in the refrigerator and clay pot.

Trial	Observed preference of judges/ Expected preference of judges		X^2c (Computed value of chi-square)	X^2t* (Tabular value of chi-square)
	Refrigerator	Clay pot		
I	4/3	2/3	0.67	3.84
II	3/3	3/3	0	3.84
III	5/3	1/3	2.67	3.84
Total	12/9	6/9	2.00	3.84

$$X^2c = \sum_{i=I}^{2} \frac{(Oi - Ei)^2}{Ei}$$

where:

Oi = Observed preference of judges

Ei = Expected preference of judges

* Level of significance = .05

Saltiness. The two samples had ratings of 6.00 on the hedonic scale, which is equivalent to moderately salty.

Tenderness. Refrigerator curing received a higher tenderness score (7.33) than clay pot curing (7.17) but the difference was not significant.

Juiciness. Samples cured in the refrigerator were juicier since they were more tender than the samples cured in clay pot. This result supports the contention made by Argañosa *et al.* (1975), Ramsbotton *et al.* (1945), and Palomar (1979) that juiciness and tenderness are closely related.

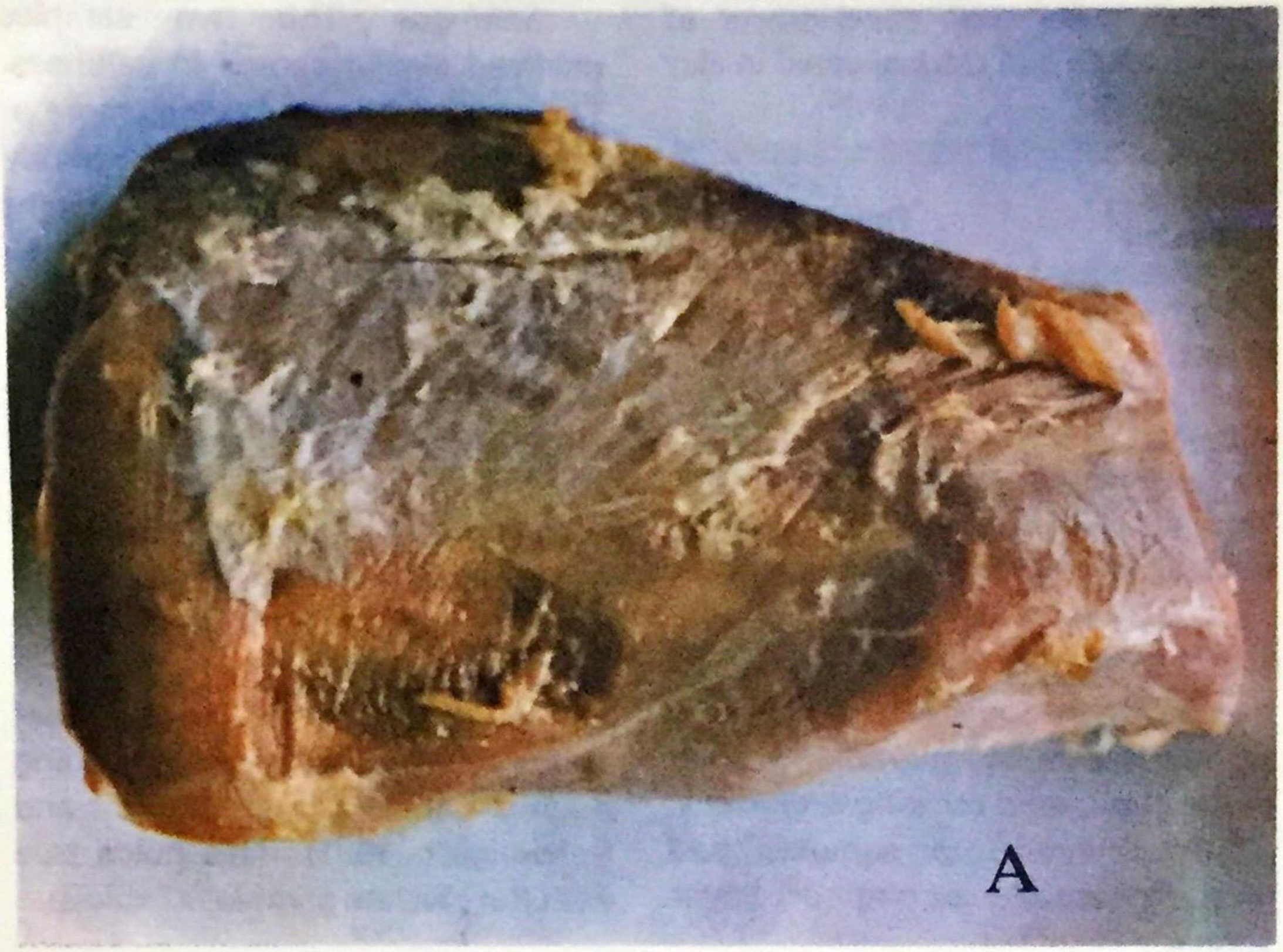
Table 2. Mean taste panel scores of cured duck using refrigerator and clay pot.

Qualities Evaluated	Refrigerator Curing	Clay pot Curing
Color	7.67	7.83
Flavor	7.00	7.33
Off-flavor	6.17	7.16
Saltiness	6.00	6.00
Tenderness	7.33	7.17
Juiciness	7.67	7.50
General Acceptability	7.66	8.00

Comparison Between Cured Duck and Chicken

Color. Cured duck was rated higher in color score than cured chicken (Table 3). The difference might be attributed to the darker color of cured duck (Fig. 2A) compared to cured chicken (Fig. 2B). Duck has normally dull red breast muscles while chicken has light breast muscles (Forrest *et al.*, 1975). The color intensity of cured meats reflects the amount of myoglobin present in the raw lean muscle tissues (Price and Schweigert, 1971).

Flavor. Flavor score of cured duck was higher than that of chicken, indicating that the spices used blended well with flavor, making duck meat more flavorful than chicken. According to Price



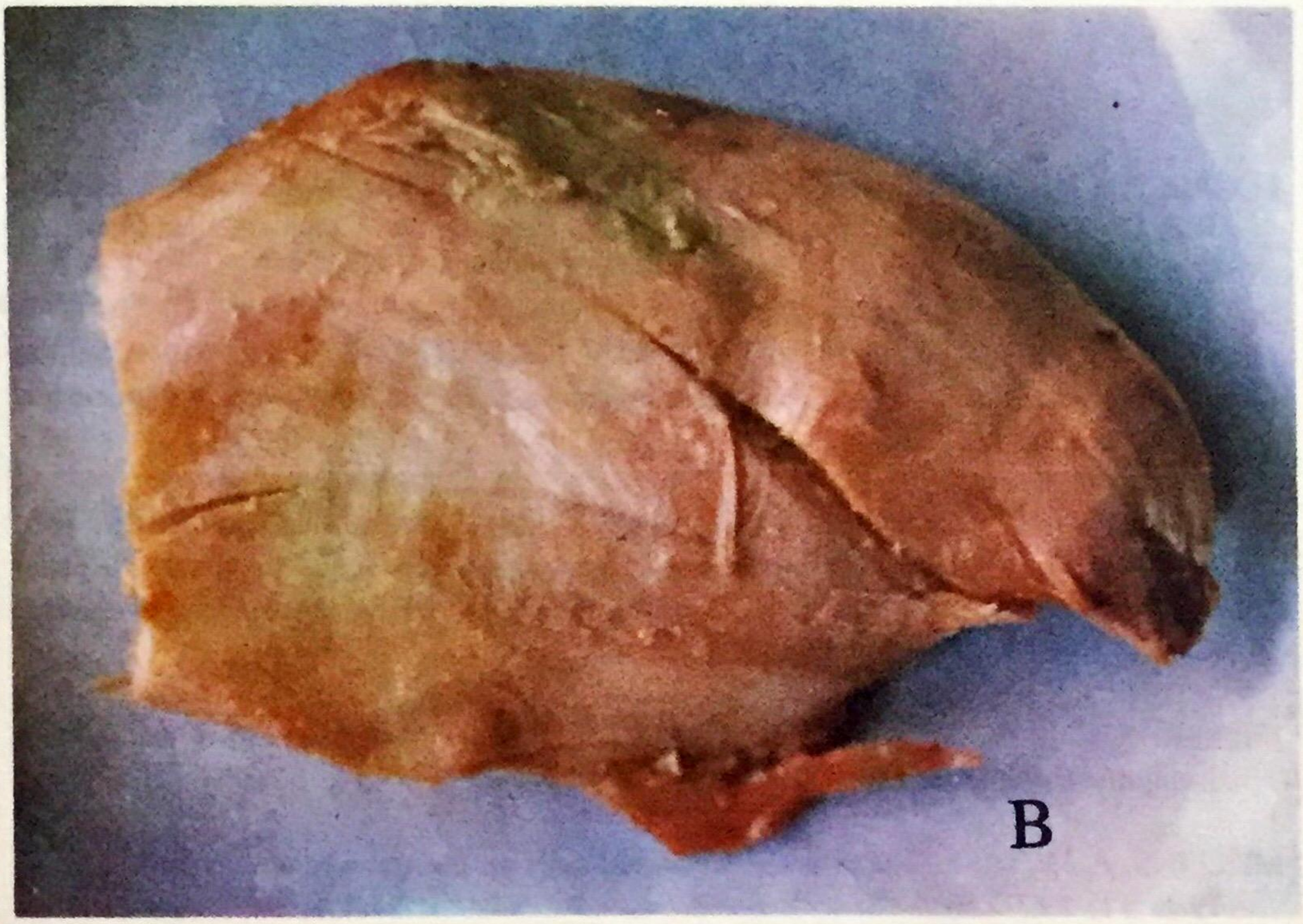


Fig. 2. Poultry meat (A - Duck; B - Chicken) cured for 2 days at 53° salinity pump pickle without refrigeration.

Table 3. Mean taste panel scores of duck and chicken cured in clay pot.

Qualities Evaluated	Duck	Chicken
Color	7.86	6.00
Flavor	7.00	6.71
Off-flavor	4.86	4.57
Saltiness	5.43	5.43
Tenderness	7.14	8.43
Juiciness	7.00	7.28
General Acceptability	5.67	6.17

and Schweigert (1971), the distinctive flavor of cooked cured meat is mainly due to the ingredients used in the curing and cooking processes.

Off-flavor. Both samples had less moderately strong off-flavor scores.

Saltiness. The two samples received similar scores in saltiness. This proves that poultry has more or less similar salt absorption efficiency.

Tenderness. Chicken samples were more tender than duck samples. This could be attributed to factors other than species.

Juiciness. The more tender samples were also noted to be juicier.

General Acceptability. The more tender samples (chicken) were more acceptable. Consumer studies show that tenderness is the most important factor in the acceptance of beef and probably other meats, including poultry and game (Price and Schweigert, 1971). This holds true with the chicken samples (Table 3).

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