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Cold Storage Impacts on Technological and Sensorial Quality Traits of Meat from Broiler Chicken

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ABSTRACT

Technological and sensorial quality of meat from broiler chicken stored at -200C were evaluated. Five treatments each consisting of 12 chicken meat samples; Treatment-1 (T1: fresh un-stored meat) and meat stored for 1 week (T2), 2 weeks (T3), 3 weeks (T4) and 4 weeks (T5). Thaw loss, cooking loss, water holding capacity, thermal shortening were technological qualities while colour, flavor, taste, texture and juiciness were sensorial traits assessed using 9-point hedonic scale. The result revealed thaw loss of T2 (breast-6.21%, thigh-2.30% and drumstick-1.90%) been significantly ($p<0.05$) lower than T3-T5. Cooking loss of 18.95%, 14.85% and 13.32% in breast, thigh and drumstick respectively for T1 were significantly ($p<0.05$) lower than those of T2-T5. Water holding capacity in T1 for breast (74.36%), thigh (76.03%) and drumstick (80.10%) were similar to T2 but significantly ($p<0.05$) higher than those of T3-T5. Thermal shortening in T5 for breast (44.07%), thigh (34.65%) and drumstick (31.67%) were significantly ($p<0.05$) higher than those of T1-T4. Sensory quality of breast, thigh and drumstick for colour, flavor, texture, juiciness and overall acceptability in T1 and T2 similar ($p>0.05$). Breast (7.27), thigh (7.10) and drumstick (7.67) of T1 for overall acceptability had significant ($p<0.05$) higher preferences compared to T3-T5. Considering the technological and sensorial qualities assessed on broiler chicken meat, cold storage impacts tended towards being negative particularly when the meat was stored beyond 1 week.

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Introduction

Chicken meat consumption worldwide knows no cultural and religious boundary and whether in its refrigerated or frozen state, it is of great economic importance. To this end, the meat is considered as the most important form of animal protein and its consumption keep increasing owing to the facts that the meat is considered as white meat since consumers desire to live a healthily life [1].

Chicken meat as fresh muscle foods face a severe limitation during storage because quality deteriorations of the meat increase with storage period. A main factor limiting the quality in terms of technological and sensorial changes in chicken meat during storage is lipid oxidation. Improperly stored meat deteriorates rapidly leading to reduction in quality traits values, meat spoilage and being unacceptable to consumers. Consumer's acceptability leading to the actual purchasing of meat is often based on the meat colour, appearance and texture but these quality traits are insufficient in revealing the sensorial and technological qualities of consumers' and processors' preferences for good quality meat traits. Thus, from the consumers' and processors' viewpoint meat is considered of poor quality not only because of being pale in colour but also due to high chilling loss, high drip loss, high cooking loss, low water holding capacity, reduced juiciness and poor emulsifying capacity [2-7].

Sensorial quality traits such as colour, flavour, taste, texture and juiciness are affected by the technological quality traits (chilling loss, drip loss, cooking loss, water holding capacity, thaw loss and thermal shortening) changes that take place in the meat during storage. Sensory assessment is a scientific method that applies principles of experimental design and statistical analysis to the use of human senses (sight, smell, taste and touch) with the goal of assessing consumers' preference for the tested products and the responses made are evaluated using hedonic scale rating [8].

One of the technological changes in stored meat is water holding capacity. It has been defined as the ability of a piece of meat to hold or retain its naturally occurring water during application of any external force such as cutting, grinding or pressing. Water holding capacity is one of the important meat quality traits in processing meat products because it influences the yield, colour, tenderness, texture and juiciness of uncooked and cooked meat. Frozen meat quality is greatly influenced by freezing and thawing processes. Thawing process for foods reducing quality because food undergo damages due to chemical and physical changes as well as microbial. Notably, the longer the time use for thawing

meat, the higher will be the damage due to chemical and physical changes as well as microbial attack on product surface [9-12].

However, reduction in chicken meat spoilage during storage has been possible by employing preservative method such as cold (freezing) storage. Evidently, cold storage as one of the preservative methods employed in maintaining quality and extending the shelf life of meat as being documented. Thus, this study focused on evaluating cold storage on technological and sensorial quality traits of meat from broiler chicken with a view to optimizing cold (freezing) storage relating to weekly assessment on quality of broiler chicken meat in respect to quality traits that influences processing yield and consumers' preference [13-15].

Materials and Methods

Experimental Site

The experiment was carried out at the Poultry Experimental Unit of the Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria. The broiler chicken meat was stored under the ambient temperature of -20o^{C} in a cold room.

Experimental Animal and Processing

A total number of sixty (60) birds were purchased from a reputable farm in Ibadan, Oyo state. The birds were deprived of feed and fasted for 8 hours, weighed prior to slaughtering. The slaughtering was done manually using a knife to cut through the jugular in a bleeding cone device; the birds were thoroughly bled in the cone before been removed.

Scalding was carried out in hot water of 60±1oC was poured on each carcass to soften the feathers and they were defeathered using a defeathering machine. Carcasses were eviscerated and all organs were removed carefully to avoid contamination. They were washed and cut into primal cuts (breast, thigh and drumstick) and then each primal cut was weighed.

Preservation of the Meat and Experimental Design

The primal cuts were preserved in a cold room with ambient temperature of -20^{o}C for 1 week, 2 weeks, 3 weeks and 4 weeks respectively. The breast, thigh and drumstick were randomly selected and allotted into four storage treatments and were replicated three times with 6 meat primal cuts (2 breasts, 2 thighs and 2 drumsticks) per replicate using completely randomized design. The treatments are as follows:

T1 - Fresh broiler chicken meat not stored.
T2 - Broiler chicken meat parts (breast, thigh and drumstick) stored at -20^{o}C for 1 week.
T3 – Broiler chicken meat parts (breast, thigh and drumstick) stored at -20^{o}C for 2 weeks.
T4 – Broiler chicken meat parts (breast, thigh and drumstick) stored at -20^{o}C for 3 weeks.
T5 – Broiler chicken meat parts (breast, thigh and drumstick) stored at -20^{o}C for 4 weeks.

At the end of each storage days the breast, thigh and drumstick samples were assessed for thaw loss, water holding capacity, cooking loss, thermal shortening and sensory evaluation (colour, flavour, taste, texture, juiciness and overall acceptability).

Technological Meat Quality Traits

The technological quality traits evaluated were the thaw loss, cooking loss, thermal shortening and water holding capacity of the stored meat. Freshly cut breast, thigh and drumstick meat sliced to approximately 2 cm thick, 20g and 6 cm long respectively were used in three replicates each for breast, thigh and drumstick meat in determining the thaw loss, cooking loss, thermal shortening and water holding capacity.

The thaw loss was determined by weighing each of the meat streaks from breast, thigh and drumstick prior to freezing and again after thawing. The method of thawing employed involved immersing the meat samples in water (25 ±1oC) container for 15 minutes. The thaw loss was not assessed on the fresh meat samples since it was not frozen. Thaw loss was expressed as a percentage of initial weight prior to freezing [15].

$$\text{Thaw loss (\%)} = \frac{\text{Sample weight before freezing (g)} - \text{Sample weight after thawing (g)}}{\text{Sample weight before freezing (g)}} \times 100$$

The cooking loss was determined by using freshly cut breast, thigh and drumstick meat sliced to approximately 2 cm thick, 20g and 6 cm long respectively. Three streaks from breast, thigh and drumstick muscle were obtained from the five treatments and were placed in sealed polytene bags immersed in boiling water for 20 minutes to 72ºC doneness of the meat. The meat samples were cooled for 10 minutes at room temperature (25 ±1oC) to determine the cooking loss for the breast, thigh and drumstick. The cooking loss was expressed as a percentage of weight of raw meat relative to the weight of the cooked meat [16].

$$\text{Cooking loss \%} = \frac{\text{Weight of raw meat (g)} - \text{Weight of cooked meat (g)}}{\text{Weight of raw meat (g)}} \times 100$$

The thermal shortening was determined by using freshly cut breast, thigh and drumstick meat sliced of 6 cm long respectively. The meat samples were subjected to heat (in boiling water of 100 ±1oC) for 20 minutes. The final lengths of the meat samples were taken after cooling to room temperature (25 ±1oC). Thermal shortening was expressed as a percentage of initial length of meat samples before cooking relative to its length after cooking [17].

$$\text{Thermal shortening (\%)} = \frac{\text{Initial length before cooking (cm)} - \text{Length after cooking (cm)}}{\text{Initial length before cooking (cm)}} \times 100$$

The Water Holding Capacity (WHC) was determined by the press method as described. The 2g of meat sample was place in the filter paper (11 cm in diameter Whatman filter paper) and press in a glass by a pressing device for 1 minutes. The compressed meat samples were oven dried at 60°^{C} for 48 hours to determine the moisture content which was the difference between the initial and the final weight. Tracing sheets were placed on the filter papers to trace two areas out which were the areas of pressed meat samples and area of exudates. The quantities of water released were measured as follows [18] :

$$\text{WHC \%} = 100 - \frac{[(Ar - Am) \times 9.47]}{Wm \times Mo} \times 100$$

Ar = Area of water released from meat (cm2)
Am = Area of meat sample (cm2)
Wm = Weight of meat sample in (mg)
Mo =Moisture content of meat (%)

Sensorial Meat Quality Traits

The sensorial meat quality traits evaluated were: colour, flavour, taste, texture, juiciness and overall acceptability based on 9-point hedonic scale rating (Table 1). There were 10 semi-trained panelist that were used for the sensory evaluation.

Table 1: **9-point Hedonic Scale**

Quality attributes						
Point	**Colour**	**Flavour**	**Taste**	**Texture**	**Juiciness**	**Overall acceptability**
1	Extremely dark	Extremely perceptible	Extremely non-tasty	Extremely coarse	Extremely dry	Dislike extremely
2	Just dark	Very perceptible	Just non-tasty	Very coarse	Very dry	Dislike very much
3	Moderately dark	Moderately perceptible	Moderately non-tasty	Moderately coarse	Moderately dry	Dislike moderately
4	Slightly dark	Slightly perceptible	Slightly non-tasty	Slightly coarse	Slightly dry	Dislike slightly
5	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
6	Slightly light	Slightly strong	Just tasty	Slightly fine	Slightly juicy	Like slightly
7	Moderately light	Moderately intense	Moderately tasty	Moderately fine	Moderately juicy	Like moderately
8	Very light	Strongly intense	Very tasty	Very fine	Very juicy	Like very much
9	Extremely light	Extremely intense	Extremely tasty	Extremely fine	Extremely juicy	Like extremely

Source: Adopted after Heinz and Hautzinger (2007).

Results and Discussion

Thaw loss of breast, thigh and drumstick in T2 (breast: 6.21%; thigh: 2.30%; drumstick: 1.90%) were significant ($p<0.05$) lower than those of T3 (breast: 7.16%, thigh: 5.84% and drumstick: 2.92%), T4 (breast: 8.08%; thigh: 6.03% and drumstick: 3.76%) and T5 (breast: 8.26%; thigh: 6.82% and drumstick: 4.90%) as presented in Table 2. Notably, the thaw loss increased gradually as storage period increases with a significant increase between meat samples (breast, thigh and drumstick) stored for 1 week (T2) and those stored for 4 weeks (T5). The optimum significant increase in the thaw loss observed for meat samples of the breast and thigh was observed between the storage period of 1 week (T2) and 3 weeks (T4). Conversely, the drumstick meat samples had the least increase in thaw loss as such the only increment observed has been significantly ($p<0.05$) different was between those samples stored for 1 week (T2) and 4 weeks (T5). This trend could be due to the increased number of the connective tissue in the drumstick than those of the breast and thigh meat samples. The increased thaw loss was due to storage period in the cold room which led to reduction in moisture content of the meat samples. This phenomenon was also observed in the report on the "Application of partial least squares regression (PLSR) in correlating physical and chemical properties of pork ham with different cooling methods" that decrease in moisture content could be responsible for the increased thaw loss during meat thawing [19].

Table 2: The Effect of Cold Storage on thaw Loss of Broiler Chicken Meat Stored for 4 Weeks at -20°C

Treatments					
Variables (%)	**T1 (fresh)**	**T2 (1 week)**	**T3 (2 weeks)**	**T4 (3 weeks)**	**T5 (4 weeks)**
Breast	NA*	6.21 ± 0.52^{c}	7.16 ± 0.32^{b}	8.08 ± 0.21^{a}	8.26 ± 0.15^{a}
Thigh	NA*	2.30±1.63c	5.84 ± 0.22^{b}	6.03 ± 0.12^{b}	6.82 ± 0.52^{a}
Drumstick	NA*	1.90 ± 0.70^{d}	2.92 ± 0.52^{c}	3.76 ± 0.12^{b}	4.90 ± 0.52^{a}

$^{a, b, c, d}$ means on the same row with different superscripts are significantly different. SEM: Standard Error of Mean. *NA: Not applicable as meat samples were fresh and not stored.

The cooking loss of breast, thigh and drumstick in T1 (breast: 18.95%; thigh: 14.85%; drumstick: 13.32%) were significantly ($p<0.05$) lower than to those of T2 (breast: 23.01%; thigh: 18.72%, drumstick: 17.30%), T3 (breast: 23.34%; thigh: 19.08%; drumstick: 18.97%), T4 (breast: 23.84%; thigh: 21.96%; drumstick: 20.81%) and T5 (breast: 23.06%; thigh: 22.28%; drumstick: 21.75%) as shown in Table 3. There was an increase in cooking loss as the storage period increases with a notable significant increase between meat samples (thigh and drumstick) stored for 1 week (T2) and 3 weeks (T4). This trend could be due to enzymatic reaction by ionic sublimation which aids in disintegrating the myofibril protein and the connective tissue. It was observed that cooking loss did not increase significantly ($p>0.05$) over storage period in breast meat samples. Although fresh un-stored breast meat of T1 had a significantly ($p<0.05$) l of cooking loss when compared to stored breast meat samples and same can be said of thigh and drumstick meat samples [20].

Table 3: The Effect of Cold Storage on Cooking Loss of Broiler Chicken Meat Stored for 4 Weeks at -20°C

Treatments					
Variables (%)	**T1 (Fresh)**	**T2 (1 week)**	**T3 (2 weeks)**	**T4 (3 weeks)**	**T5 (4 weeks)**
Breast	18.95±1.02^{b}	23.01±1.02^{a}	23.34±0.01^{a}	23.84±0.02^{a}	23.06±0.05^{a}
Thigh	14.85±1.80^{d}	18.72±0.12^{c}	20.78±0.15^{b}	21.06±0.42^{b}	22.28±1.22^{a}
Drumstick	13.32±1.21^{e}	17.30±0.13^{d}	18.97±0.04^{c}	20.81±0.03^{b}	21.75±1.02^{a}

$^{a, b, c, d}$ means on the same row with different superscripts are significantly different. SEM: Standard Error of Mean.

The thermal shortening of breast, thigh and drumstick had the highest value in T5 (breast: 44.07%; thigh: 34.67%; drumstick: 31.67%) been significantly ($p<0.05$) different from T1 (breast: 33.00%, thigh: 27.00%; drumstick: 25.00%), T2 (breast: 37.67%; thigh: 29.83%; drumstick: 27.17%), T3 (breast: 38.33%; thigh: 31.33%; drumstick: 28.64%) and T4 (breast: 42.93%, thigh: 32.00%, drumstick: 29.00%) as shown in Table 4. The thermal shortening in the meat samples increased over the storage periods with a significant increase observed in meat samples (breast, thigh and drumstick) between 1 week and 3 weeks. This could be that cold storage increased the amount of water in the myofibril and with increase in the storage period the level of water in the myofibril increases causing the myofibrils to link to one another and to the cell membrane via protein connection leading to reduction in the diameter of the myofibril (muscle cell) during thermal application. This phenomenon harmonized with the observation made in a study involving repeated free-thaw cycles on beef quality and safety. Also, observable trend among thaw loss (TL), cooking loss (CL) and thermal shortening (TS) as technological meat quality traits of broiler chicken meat samples (breast, thigh, drumstick) evaluated was that they increase significantly as the storage period increases with T2 (1 week) having the least in TL (breast: 6.21%, thigh: 2.30%, drumstick: 1.90%), CL (breast: 23.01%, thigh: 18.72%, drumstick: 17.30%) and TS (breast: 37.67%, thigh: 29.83%, drumstick: 21.17%) while the highest in TL (breast: 8.26%, thigh: 6.82%, drumstick: 4.90%), CL (breast: 23.06%, thigh: 22.28%, drumstick: 21.75%) and TS (breast: 44.07%, thigh: 34.65%, drumstick: 31.67%) were reckoned in T5. Thus, a notably phenomenon in this study was the direct proportional relationship observed among thaw loss, cooking loss and thermal shortening of broiler chicken meat stored at -20o^{C} and evaluated weekly for 4 weeks [21].

Table 4: The Effect of Cold Storage on Thermal Shortening of Broiler Chicken Meat Stored for 4 Weeks at -20°C

Treatments					
Variables (%)	T1 (Fresh)	T2 (1 week)	T3 (2 weeks)	T4 (3 weeks)	T5 (4 weeks)
Breast	33.00±2.27^{d}	37.67±0.93^{c}	38.33±0.25^{c}	42.93±0.93^{b}	44.07±0.13^{a}
Thigh	27.00±0.33^{d}	29.83±1.93^{c}	31.33±0.97b^{c}	32.00±0.15^{b}	34.65±0.12^{a}
Drumstick	25.00±0.47^{d}	27.17±0.93^{c}	28.64±0.66^{b}	29.00±0.31^{b}	31.67±0.13^{a}

$^{a, b, c, d}$ means on the same row with different superscripts are significantly different. SEM: Standard Error of Mean.

The WHC for breast, thigh and drumstick was highest in T1 (breast: 74.36%; thigh: 76.03% and drumstick: 80.10%) been significantly ($p<0.05$) different from T3 (breast: 69.40%; thigh: 72.87% and drumstick: 76.13%), T4 (breast: 69.02%; thigh: 69.99% and drumstick: 75.56%) and T5 (breast: 66.56%; thigh: 69.93% and drumstick: 74.06%) as shown in Table 5. It was observed that water holding capacity obtained in meat stored for period of 28 days (4 weeks) decreases with storage from 1 week (T2) to 4 weeks (T5). There was significant ($p<0.05$) decreased in WHC observed from 1 week (T2) to 2 weeks (T3) in the breast (73.73% to 69.40%), thigh (75.66% to 72.87%) and drumstick (79.65% to 76.13%) meat samples stored. This trend is similar to the report made on water holding capacity of frozen chevon which decreases from 18.06% to 3.24% over 15 days of freezing preservation. Notably, there was no significant ($p>0.05$) difference between fresh un-stored meat samples (T1) and those stored for 1 week (T2) but beyond 1 week (T2) of storage the WHC in the meat samples (breast, thigh and drumstick) decreased significantly ($p<0.05$) in the following order: WHC in breast (T2>T3≥T4>T5), thigh (T2>T3>T4≥T5) and drumstick (T2> T3≥T4>T5). Also, an observable trend between WHC and other technological meat quality traits (thaw loss, cooking loss and thermal shortening) evaluated in this study was that WHC decreases with increasing storage period of the meat samples (breast, thigh and drumstick) while the other technological meat quality traits (thaw loss, cooking loss and thermal shortening) increase with storage. Implying that among the stored meat samples (breast, thigh and drumstick); those stored for 1 week (T2) with the highest WHC (breast: 73.73% thigh: 75.66% and drumstick: 79.65%) had the least thaw loss (breast: 6.21%, thigh: 2.30% and drumstick: 1.90%), Cooking loss (breast: 23.01%, thigh: 18.72% and drumstick: 17.30%) and thermal shortening (breast: 37.67%, thigh: 29.83% and drumstick: 21.17%) when compared to those stored for 2 weeks (T3), 3 weeks (T4) and 4 weeks (T5). Thus, a remarkable phenomenon observed in this study was that water holding capacity (WHC) as a technological meat quality trait was inversely proportional to thaw loss, cooking loss and thermal shortening of broiler chicken meat stored at -20°C and evaluated weekly for 4 weeks [22].

Table 5: The Effect of Cold Storage on Water Holding Capacity of Broiler Chicken Meat Stored for 4 Weeks at -20°C

Treatments					
Variables (%)	T1 (Fresh)	T2 (1 week)	T3 (2 weeks)	T4 (3 weeks)	T5 (4 weeks)
Breast	74.36±1.40[a]	73.73±1.27[a]	69.40±1.05[b]	69.02±1.15[b]	66.56±1.25[c]
Thigh	76.03±1.75[a]	75.66±0.79[a]	72.87±0.85[b]	69.99±0.25[c]	69.93±1.25[c]
Drumstick	80.10±0.09[a]	79.65±0.55[a]	76.13±0.95[b]	75.56±1.05[b]	74.06±0.54[c]

[a, b, c, d] means on the same row with different superscripts are significantly different. SEM: Standard Error of Mean.

The sensorial meat quality traits of food products to any food processing technology are crucial in evaluating consumer acceptability. The sensory quality traits analyzed for the meat samples stored at ambient temperature of – 20oC in a cold room for a storage period of 4 weeks are presented in Table 6. The results obtained indicated that there were significant variations ($p < 0.05$) in all the sensorial quality traits evaluated. Considering colour, flavor, texture and juiciness as sensorial quality traits in meat samples (breast, thigh and drumstick) stored for 1-week (T2) and fresh un-stored (T1) meat samples (breast, thigh and drumstick) there were no significant ($p>0.05$) differences between them. Notably, beyond 1 week (T2) of storage; the meat samples (breast, thigh and drumstick) decrease significantly ($p<0.05$) in colour, flavor, texture and juiciness preferences as adjudged by the sensory panelist. Conversely, the taste for fresh un-stored meat samples (breast, thigh and drumstick) been 'Moderately tasty' according to the 9-point hedonic scale had significantly ($p<0.05$) higher preference in T1 (breast: 7.33; thigh: 7.00 and drumstick: 7:07) than those of stored meat samples (breast, thigh and drumstick) for 1 week (T2), 2 weeks (T3), 3 weeks (T4) and 4 weeks (T5).

Juiciness in meat samples (breast, thigh and drumstick) had the highest preference ('Slightly juicy' according to the 9-point hedonic scale) value in T1 (breast: 6.80, thigh: 6.43 and drumstick: 6.37) been significantly ($p<0.05$) higher than those of T3 (thigh: 5.25), T4 (breast: 6.30, thigh: 4.47 and drumstick: 5.45) and T5 (breast: 6.17, thigh: 4.05 and drumstick: 4.33) while the juiciness of the thigh and drumstick meat sample had the same (non-significant; $p>0.05$) preference level ('slightly juicy' according to the 9-point hedonic scale) values in T1 (breast: 6.80, thigh: 6.43 and drumstick: 6.37) and T2 (breast: 6.77, thigh: 6.10 and drumstick: 6.33) respectively as shown in Table 6. Meat juiciness is an important constituents of meat tenderness, texture and taste and it has two major modes of indicators viz: first is the perception of wetness produced by the release of fluid from the meat when the meat is chewed for few seconds, while the second is the more sustained juiciness that apparently results from the stimulating effect of fat on the production of saliva in the mouth. In harmony with the first mode of indicator of juiciness in terms of the 'wetness produced from the meat'; this could be attributed to the higher preference for juiciness reckoned in freshly un-stored meat samples (T1) and those stored meat samples for 1 week (T2) probably because there were higher water holding capacity in freshly un-stored meat samples and for meat samples stored for 1 week (T2) when compared to those stored for 2 weeks (T3), 3 weeks (T4) and 4 weeks (T5) [23].

The sensorial quality traits of breast, thigh and drumstick in terms of overall acceptability had the highest preference ('like moderately' on the 9-point hedonic scale rating) value in T1 (breast:7.27; thigh: 7.10 and drumstick: 7.37) been significantly ($p<0.05$) higher than those of T3 (breast: 6.23; thigh: 5.87 and drumstick: 5.91), T4 (breast: 6.02; thigh: 4.83; drumstick: 5.23) and T5 (breast: 5.23; thigh: 4.81; drumstick: 4.83) as shown in Table 6. The sensorial quality assessment traits (colour, taste, flavor, texture, Juiciness and overall acceptability) analysis showed a similar trend on the 9-point hedonic scale in terms of preference value with increasing storage period the preference value tends from "like moderately" to less preference value of "dislike slightly". Considering the overall acceptability of the sensorial meat quality traits; meat samples stored for 1 week (T2) was equally preferred to the fresh un-stored meat samples (T1) as adjudged by the sensory panelist.

Table 6: The Effects of Cold Storage on The Sensory Evaluation of Broiler Breast, Thigh and Drumstick Stored for 4 Weeks at -20°C

Treatments						
Parameters	**Primal cuts**	**T1 (Fresh)**	**T2 (1 week)**	**T3 (2 weeks)**	**T4 (3 weeks)**	**T5 (4 weeks)**
Colour	Breast	7.53±0.24[a]	7.47±0.21[a]	6.53±0.22[b]	5.47±0.18[c]	5.40±0.24[c]
	Thigh	6.77±0.13[a]	6.51±0.23[a]	5.13±0.14[b]	5.07±0.22[b]	4.06±0.28[c]
	Drumstick	7.47±0.24[a]	6.85±0.24[a]	5.64±0.24[b]	5.43±0.24[bc]	5.07±0.24[c]
Flavour	Breast	5.93±0.18[a]	5.77±0.22[a]	5.33±0.18a[b]	5.17±0.21[b]	4.73±0.28[b]
	Thigh	5.55±0.14[a]	5.45±0.25[a]	4.07±0.24[b]	3.93±0.29[b]	3.77±0.24[b]
	Drumstick	5.77±0.2[a]	5.63±0.14[a]	5.53±0.15[a]	5.47±0.23[ab]	4.85±0.27[b]
Taste	Breast	7.33±0.15[a]	6.40±0.12[b]	5.97±0.19[b]	5.87±0.24[b]	4.57±0.24[c]
	Thigh	7.00±0.38[a]	6.13±0.14[b]	6.10±0.21[b]	5.13±0.24[c]	4.23±0.35[d]
	Drumstick	7.07±0.21[a]	6.03±0.20[b]	5.97±0.18[b]	5.82±0.24[b]	5.07±0.24[c]
Texture	Breast	6.17±0.23[a]	6.06±0.35[a]	5.27±0.02[b]	5.19±0.09[b]	4.93±0.34[b]

	Thigh	6.33±0.21[a]	6.10±0.26[a]	5.15±0.04[b]	4.17±0.34[c]	4.08±0.39[c]
	Drumstick	6.83±0.23[a]	6.80±0.24[a]	5.53±0.09[b]	5.48±0.14[b]	5.45±0.24[b]
Juiciness	Breast	6.80±0.27[a]	6.77±0.14[a]	6.57±0.21[a]	6.30±0.22[b]	6.17±0.20[b]
	Thigh	6.43±0.29[a]	6.10±0.34[a]	5.25±0.14[b]	4.47±0.33[bc]	4.05±0.36[c]
	Drumstick	6.37±0.31[a]	6.33±0.24[a]	5.80±0.28[ab]	5.45±0.34[b]	4.33±0.38[c]
Overall acceptability	Breast	7.27±0.23[a]	7.00±0.24[a]	6.23±0.22[b]	6.02±0.21[b]	5.23±0.22[c]
	Thigh	7.10±0.28[a]	7.02±0.32[a]	5.87±0.16[b]	4.83±0.21[c]	4.81±0.29[c]
	Drumstick	7.37±0.23[a]	6.89±0.29[a]	5.91±0.38[b]	5.23±0.04[c]	4.83±0.24[c]

a, b, c, d means on the same row with different superscripts are significantly different. SEM: Standard Error of Mean.

Conclusion

Freezing as a preservative method employed in this study aided in maintaining the quality of the chicken meat. Hence, the cold storage had no adverse effects on the technological and sensorial quality traits of broiler chicken's meat. However, it is recommended that for optimal processing yield influenced by technological quality traits such as low thaw loss, low cooking loss, reduced thermal shortening and high-water holding capacity as well as consumers' preference for freshness with respect to sensorial quality traits such as colour, flavor, texture and juiciness; cold room storage of broiler chicken meat beyond one week in practice should be minimal.

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