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Physicochemical and Sensory Characteristics of Vacuum Aged Buffalo Meat

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ABSTRACT

Meat is a scrumptious and nutrient dense diet that contains a significant amount of proteins and vital bioactive compounds like vitamins and minerals. The present study analyzed the physicochemical and sensorial attributes of vacuum aged buffalo meat. Except for the control group, aging of all the treatments was done by placing them in the refrigerator at 4°C for 1,3,5,7 and 9 days, respectively. Aged meat samples were subjected to proximate analyses, including moisture, crude fat and crude protein determination. The results from the collected data were statistically analyzed to determine the level of significance. The storage duration exerted a highly significant impact on moisture content as compared to the control. Moisture exhibited a decreasing trend from 77.12 to 73.06% throughout the continuation of the aging process. Aging duration also exerted a highly significant impact on crude fat and crude protein content ($P \leq 0.01$). pH and water binding capacity were also influenced by the aging period and exhibited an increasing and decreasing trend, respectively. Cooking yield was not affected as much with respect to the unaged samples. Color parameters, including L*, a* and b* values of aged meat samples were significantly increased from 30.22 to 35.45, 13.96 to 17.52 and 7.05 to 9.23, respectively. TPC was significantly influenced, while the strains of *E. coli* were not detected. Sensory attributes were significantly influenced ($P \leq 0.01$). The results of this study endorsed the improvement in quality and sensorial parameters of buffalo meat under the influence of vacuum aging.

INTRODUCTION

Meat, the flesh of an animal, including organs and palatable tissues, is an indispensable part of the human diet and is preferred among the best nutritious and substantial food choices (Sulaiman *et al*., 2020). Meat has considerable concentrations of vitamins such as B12, B6, D and minerals such as zinc, phosphorus, and iron, all of which are beneficial to human health (Bekker *et al.*, 2017). Being low caloric and low in cholesterol content, buffalo meat is the healthiest type of red meat (Mello *et al*., 2019; Abdolghafour and Saghir, 2014). Although some epidemiological data point to a connection between meat consumption and an increased risk of certain cancers, cardiovascular diseases, and metabolic disorders, meat consumption has been a substantial risk factor for chronic diseases (Milicevic *et al.*, 2015). Bovine meat includes higher levels of cholesterol and saturated fatty acids, hence contemplated detrimental to human health as it is a profound cause of chronic disorders, including several cancers and cardiovascular diseases (Paula *et al.*, 2019). Myoglobin is present in its three different forms depending upon the iron redox state, such as oxymyoglobin, which is bright red in color, deoxymyoglobin which is dark or purple in color and metmyoglobin which is brown in color and often causes discoloration (Kiran *et al*., 2016; Ramanathan and Mancini, 2018). Antioxidant properties in meat come from a number of bioactive compounds (Fariha *et al.*, 2026). Proteolysis of myofibrillar proteins is mediated by calpain enzymes (Kim and Jang, 2021). Calpains are the

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enzymes responsible for meat tenderization during aging (Nagaraj and Santhanam, 2006). Rigor mortis is toughening of muscles which is actually a post mortem modification(Jaspal *et al.*, 2021). Meat processors frequently age bovine meat to enhance the eating quality of beef (Kilgannon *et al.*, 2019). Along with numerous benefits, post mortem aging has a variety of drawbacks as well (Aqsa Naseem *et al.*, 2026). Reduced oxidative stability, mitochondrial degradation, and reduction of reducing intermediates can occur as a result of prolonged aging (Ramanathan *et al.*, 2020; Yu *et al.*, 2023). Dry aging is an extensive process that requires meticulous care as well as an even distribution of fat sections throughout the meat (Lee *et al.*, 2017). Vacuum aging or wet aging is a technique in which meat is encapsulated within a polyethylene vacuum packaging material and refrigerated for the desired period in the absence of oxygen (Kim *et al.*, 2019). Anyhow, the absence of oxygen renders the meat purplish because of deoxymyoglobin, making it undesirable for the end users (Vitale *et al.*, 2014). Considering the potential of vacuum aging to circumvent microbial proliferation, this study possesses immense importance in addressing consumer's queries regarding the shelf life and safe acceptability of vacuum packaged buffalo meat (Muhammad Nabeel Sharif *et al.*, 2025)

METHODOLOGY

Vacuum Aging

Vacuum packaged samples were refrigerated at 4°C for 1,3,5,7 and 9 days, respectively. Periodically obtained samples were stored at chilling temperature and analyzed for physicochemical, microbial, and sensorial characteristics during refrigeration preservation.

Proximate Analyses of Vacuum Aged Buffalo Meat

Moisture Content

After weighing, the sample was transferred to a hot air oven at 100±5℃ for 24 hours. The sample and china dish were weighed again to achieve a consistent weight measurement. Moisture content was calculated in terms of percentage by using the formula mentioned below:

$$\text{Moisture (\%)} = \frac{\text{Sample weight before drying} - \text{Sample weight after drying}}{\text{Sample weight before dying}} \times 100$$

Crude Fat

Hexane was used as a solvent to extract the soluble fat. Thimble was placed in siphon chamber and subjected to 6-8 washings at moderate speed to completely remove soluble fat from the meat sample. Formula was used to calculate fat content.

$$\text{Fat (\%)} = \frac{\text{Sample weight before fat extraction} - \text{Sample weight after fat extraction}}{\text{Sample weight before fat extraction}} \times 100$$

Crude Protein

After dilution, 10 mL of the diluted sample and 10 mL of 40% NaOH were added to the beaker and placed in distillation assembly. After distillation, the color of boric acid was changed from pink to golden yellow. The crude protein content was determined by following the formula.

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$$\text{Nitrogen (\%)} = \frac{\text{Vol. of 0.1N } H_2SO_4 \text{ used} \times \text{Vol. of dilution} \times 0.0014}{\text{Weight of sample} \times \text{Vol. of diluted sample weight}} \times 100$$

Protein % = N % × 6.25

Quality Analyses of Vacuum Aged Buffalo Meat

pH

pH was determined utilizing a digital pH meter. For requisite precision, the pH meter was calibrated using different buffer solutions.

Color Analysis

The color of aged meat samples was assessed with the help of a tri stimulus handheld colorimeter. The triplicate readings were used to determine the lightness (L*), redness (a*) and yellowness (b*) values of vacuum aged meat samples as described by El-Gasim *et al*. (2000).

Water Holding Capacity (WHC)

After getting centrifuged, the supernatant was drained. The weight difference before and after centrifugation was put in the formula to calculate water holding capacity.

$$\text{Water Holding Capacity (\%)} = \frac{W1 - W2 - W}{W} \text{ x } 100$$

Cooking Yield

Cooking yield was calculated by removing trim weight from actual product weight. The cooking yield was expressed in percentage by putting the values of the initial and final weight in the formula, as explained by Palanisamy *et al.* (2019).

$$\text{Cooking Yield (\%)} = \frac{\text{Weight of sample after cooking}}{\text{Weight of sample before cooking}} \text{ x } 100$$

Texture Profile Analysis (TPA)

For each replicate, the meat sample was encapsulated in a polyethylene bag and boiled in water bath at 90°C for 30 minutes. The cooked sample was cut into cubes having dimensions 1×1×1 cm^3 and shifted to the stage, below the specific dye of texture analyzer.

Thiobarbituric Acid Reactive Substances (TBARS)

After homogenization, the sample was kept for 10 minutes for filtration. Afterward, 3 mL of filtrate was mixed with 3 mL of TBA solution (0.1%). The optical density was taken with the help of a spectrophotometer at 530nm and compared with a blank sample. TBARS values as MDA/kg were calculated by the following formula:

$$\text{TBA Value (mg MDA/kg)} = \frac{50 \text{ x } (A - B)}{m}$$

Total Volatile Basic Nitrogen (TVBN)

The distillate was absorbed in 20 mL of (2%) aqueous boric acid solution containing a mixture of indicators prepared by dissolving 0.1 g methyl red and 0.1 g methylene blue in 100 mL of ethanol. The solution was titrated against 0.1 N H_2SO_4 till the light pink endpoint. The amount of acid used in titration was recorded and TVBN present in the

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meat sample was evaluated by the formula:

$$\text{TVBN Value (mg \%)} = \frac{14 \text{ x N (x}-\text{y) x } 100}{\text{S}} \text{ x } 100$$

Mineral Content

Mineral content present in the meat sample was assessed using the atomic absorption spectrophotometer at a wavelength of 4000 nm. The standard solution of each mineral was run with a minimum of 4 different concentrations, such as 5,10,15 and 20 ppm.

Microbial Analyses of Vacuum Aged Buffalo Meat

Total Plate Count (TPC)

For each treatment, 5 g of meat sample was dissolved in 45 mL of saline solution (0.85%) and then homogenized for 2 minutes using the stomacher. After getting autoclaved at 121℃ for 15 minutes, serial decimal dilutions were prepared and the suitable dilutions (0.1 mL) were transferred to solidified plate count agar and incubated at 37℃ for 48 hours to enumerate the total plate count.

***Escherichia coli* Count**

For *E. coli* detection and enumeration, 90 mL of saline water solution and 10 g of minced meat were mixed in a screw cap bottle. 0.1 mL inoculum from suitable dilutions was transferred on MacConkey agar by spread plate technique and incubated at 37℃ for 24 hours.

Statistical Analysis

The results obtained from analyses were taken in replicates and analyzed by one way analysis of variance (ANOVA) through CRD design.

RESULTS AND DISCUSSION

Proximate Analyses of Vacuum Aged Buffalo Meat

Moisture Content

Moisture plays a pivotal role in the maintenance of metabolic functions and is strongly linked to the fat concentration of meat. Juiciness, which is an important sensorial attribute of meat, is directly related to the level of moisture retained after the aging process. Kandeepan *et al.* (2013) reported the decrease in moisture content with increased aging duration. According to the results, decreasing trend in moisture content was likely due to an increase in fat content of aged meat samples. Jennifer *et al.* (2000) investigated the moisture content of vacuum aged beef retail cuts along with other compositional parameters and came up with the comparable findings.

Crude Fat

In buffalo meat, crude fat content ranges from 2 to 3% (Tamburrano *et al*., 2019). Soxhlet's apparatus was used for fat extraction. The results indicated that the effect of storage period during vacuum aging was highly significant on fat content of meat samples ($P \leq 0.01$). Phelps *et al.* (2018) conducted a similar study and assessed the impact of wet aging on proximate composition of buffalo meat and found an increasing

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trend in fat content with the comparable results. The results of this research work were exactly found to be in accordance with the results of Spanier *et al.* (1997).

Crude Protein

There was a highly significant variation among all the treatments. The highest mean value, 19.25%, was demonstrated at T_5 and the lowest mean value, 17.02%, was found at T_0 among the treatments. The decrease in protein with the increase in aging period could be linked to several factors. A decrease in the moisture content of meat might lead to subsequent decrease in protein content. Andrighetto *et al.* (2014) studied about the proximate composition of buffalo meat aged for 0, 7, 14 and 21 days and found the results in accordance with the values present in literature about the composition of proteins. The study involved the compositional analysis of buffalo meat and concluded that buffalo meat had about 19 to 25% proteins. The analysis done in the present study showed approximately same results as compared to the results of Smith *et al*. (2011).

Table 1- Mean ± Std. Dev. values for moisture, crude fat and crude protein of vacuum aged buffalo meat

Treatments	Moisture	Crude Fat	Crude Protein
T_0	77.12 ± 0.04^{a}	2.05 ± 0.05^{d}	19.25 ± 0.02^{a}
T_1	76.74 ± 0.05^{b}	2.11 ± 0.04^{cd}	18.86 ± 0.02^{b}
T_2	76.02 ± 0.04^{c}	2.30 ± 0.04^{c}	18.23 ± 0.05^{c}
T_3	75.45 ± 0.06^{d}	2.84 ± 0.03^{b}	17.92 ± 0.03^{d}
T_4	74.88 ± 0.02^{e}	3.13 ± 0.03^{a}	17.45 ± 0.06^{e}
T_5	73.06 ± 0.03^{f}	3.18 ± 0.02^{a}	17.02 ± 0.05^{f}

Quality Analyses of Vacuum Aged Buffalo Meat

pH

pH directly affects tenderness and rancidity of meat. Lower pH enhances lipid oxidation rate thus rendering meat rancid in no time (Aroeira *et al.,* 2016). As evident from the mean values, pH exhibited a linear trend which increased with the increase in storage period. The minimum mean value of 5.21 was detected in fresh meat at T_0. The highest mean value of pH, 5.89, was detected on day 9 at T_5. According to Daszkiewicz *et al.* (2003), the increase in pH could be linked to degradation of proteins into subsequent amino acids and the conformational alterations as a result of proteolytic disintegration of muscle fibers. According to Jayawardana *et al.* (2015), pH values increased significantly during 14 days of storage at 4±1°C. The present study ended up with approximately similar results as compared to results of Zarasvand *et al.* (2012).

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Weglarz (2010) investigated the meat quality with respect to pH and reported that pH played a potential role in improvement of quality parameters including protein solubility.

Water Holding Capacity

Freshness of the meat sample can be perceived by its water holding capacity and it exerts a profound effect on juiciness of the sample (Zou *et al*., 2018). The highest mean value was demonstrated at T_0 that was 37.10%. The lowest mean value was demonstrated at T_5 that was 32.74%. Filho *et al*. (2017) analyzed water holding capacity of meat by using different methods and found it to be in range of 35 to 40% under different conditions. The changes in WHC observed in the present study were in line with the results of Pinto *et al*. (2013) who reported reduction in WHC in beef during post mortem aging.

Cooking Yield

Murphy *et al*. (1975) analyzed cooking yield of different cooked foods to estimate the nutritional as well as quality properties of meat. Cooking yield was thought to be very important in determining nutritional and economical values of the food products as losses in nutritional values during different process also reduced these values. Oz and Celik, (2015) also studied cooking loss and cooking yield of meat and reported that during wet aging, only minimal losses were observed as the samples were vacuum packaged.

Table 2- Mean ± Std. Dev. values for pH, WHC, and cooking yield of vacuum aged buffalo meat

Treatments	pH	WHC	Cooking Yield
T_0	5.21 ± 0.03^{c}	37.10 ± 0.03^{a}	64.36 ± 0.05^{a}
T_1	5.35 ± 0.05^{bc}	36.33 ± 0.07^{ab}	63.87 ± 0.04^{a}
T_2	5.58 ± 0.07^{abc}	35.09 ± 0.02^{abc}	63.02 ± 0.02^{a}
T_3	5.65 ± 0.06^{abc}	34.25 ± 0.03^{abc}	62.54 ± 0.06^{a}
T_4	5.78 ± 0.02^{ab}	33.48 ± 0.06^{bc}	61.81 ± 0.03^{a}
T_5	5.89 ± 0.03^{a}	32.74 ± 0.05^{c}	61.24 ± 0.06^{a}

Color Analysis

Color or appearance is the first thing observed by consumers hence it is more than important to maintain color of any food commodity near to its natural color (Jacob *et al*., 2014). Colorimeter was used to determine the color parameters of aged meat samples. Chakanya *et al*., (2017) investigated the impact of aging on color properties of beef and reported comparable trends with the slight change in color values due to the variation in type of cuts and circumstances.

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L* (Lightness) value

The maximum value of L* was 35.45 and observed on day 0 at T_5 while the minimum value was 30.22 and observed on day 9 at T_0. Yu *et al.* (2017) reported that L* values of beef muscles increased significantly during postmortem aging. L* values exhibited an increasing trend during post mortem storage from 33.95 at day 0 to 37.66 at day 9. This increase was due to enhanced protein disintegration which ultimately resulted in increased scattering of light. Due to moisture evaporation, dry aged beef exhibited lower L* values (Dikeman *et al.*, 2013).

a* (Redness) Value

The a* values of different treatments varied from 13.96 on day 0 to 17.52 on day 9. The maximum value of a* was observed at T_5 while the minimum value was observed at T_0. Mancini and Ramanathan, (2014) studied the effects of aging on beef color intensity and stability. The a* values of the rump were significantly affected by the aging method. Borgogno *et al.* (2015) studied the color parameters of meat and reported that the intensity of redness a* increased numerically, which was a significant effect on treatments.

b* (Yellowness) Value

The b* values of different treatments varied from 7.05 on day 0 to 9.23 on day 9. The maximum value of b* was observed at T_5 while the minimum value was observed at T_0.

Table 3- Mean ± Std. Dev. values for L*, a*, and b* of vacuum aged buffalo meat

Treatments	L*	a*	b*
T_0	30.22 ± 0.03^{c}	13.96 ± 0.04^{e}	7.05 ± 0.08^{d}
T_1	31.29 ± 0.02^{e}	14.76 ± 0.04^{d}	7.15 ± 0.04^{d}
T_2	33.72 ± 0.07^{d}	16.05 ± 0.05^{c}	7.89 ± 0.05^{c}
T_3	34.25 ± 0.06^{c}	16.87 ± 0.03^{bc}	8.36 ± 0.03^{bc}
T_4	34.49 ± 0.02^{b}	17.05 ± 0.03^{b}	8.89 ± 0.03^{ab}
T_5	35.45 ± 0.03^{a}	17.52 ± 0.05^{a}	9.23 ± 0.02^{a}

Texture Profile Analysis

Textural properties of meat include hardness, chewiness and tenderness. Hardness, chewiness and juiciness are the ultimate effects of the water removal and tenderness due to enzymatic activities during the aging process in meat (Jaurez *et al.*, 2010). Texture profile of vacuum aged buffalo meat samples was assessed using texture analyzer. The highest mean value of texture was demonstrated at T_0 that was 6.52 and the lowest value was 4.96 at T_5. Canto *et al.* (2016) studied the textural properties of aged buffalo meat and found similar results of texture analysis.

Table 4- Mean ± Std. Dev. value for texture of vacuum aged buffalo meat

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Online ISSN 3007-3197
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http://amresearchreview.com/index.php/Journal/about

Treatments	Texture
T_0	6.52±0.05[a]
T_1	6.16±0.07[b]
T_2	5.76±0.08[c]
T_3	5.45±0.04[cd]
T_4	5.14±0.04[de]
T_5	4.96±0.03[e]

Thiobarbituric Acid Reactive Substances (TBARS)

MDA is an oxidative product produced by the oxidation of unsaturated fatty acids (Faustman *et al*., 2010). After the completion of respective aging period, TBARS assay was performed on each treatment and compared to the control group. The highest mean value of TBARS was demonstrated at T_5 that was 0.75 mg MDA/kg and the lowest value of TBARS was found to be 0.50 mg MDA/kg. Filgueras *et al*. (2010) studied the oxidative stability of meat by assessing malonaldehyde values of different treatments and found similar results in the range of 0.6 to 1.02.

Total Volatile Basic Nitrogen (TVBN)

Total volatile basic nitrogen is associated with proteolysis in meat and is often used as an indicator of meat spoilage. TVBN values ranged from 8.15 to 13.94 mg/100 g of meat. The maximum value was detected on day 9 at T_5 and that was 13.94 mg/100 g of meat. The minimum value, 8.15 mg/100 g, was recorded on day 0 at T_0. The results of this study were in line with the results of Jaspal *et al.* (2022). The increase in TVBN content is primarily attributed to the protein degradation reactions initiated by meat spoilage bacteria and endogenous enzymes, which include deamination and decarboxylation of free amino acids, resulting in the accumulation of ammonia and amine, and other basic nitrogenous substances (Ji *et al.*, 2021).

Table 5- Mean ± Std. Dev. values for TBARS and TVBN of vacuum aged buffalo meat

Treatments	TBARS	TVBN
T_0	0.50±0.03[d]	8.15±0.04[e]
T_1	0.52±0.05[d]	11.32±0.07[d]
T_2	0.62±0.07[c]	12.25±0.02[c]
T_3	0.65±0.06[bc]	13.53±0.03[b]
T_4	0.69±0.02[ab]	13.80±0.06[a]
T_5	0.75±0.03[a]	13.94±0.05[a]

Mineral Content

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This study assessed the concentrations of Calcium (Ca), Iron (Fe) and Zinc (Zn) in buffalo meat, before and after aging, as these minerals upon consumption, are involved in a lot of developmental activities despite being source of energy. In buffalo meat, calcium, iron and zinc range from 10 to 12 mg/100 g, 3 to 4 g/100 g and 4 to 5 mg/100 g of meat.

Calcium

The maximum value of calcium was 8.69 mg/100 g which was observed on day 0 at T_0. The minimum value of calcium was 7.74 mg/100 g which was observed on day 9 at T_5. A non significantly decreasing trend was observed among the values of all treatments with minimum variations. The results indicated that there was not a significant difference between the calcium concentration of fresh meat and the test samples aged for respective duration. Terzano *et al.* (2005) studied the impact of wet aging on mineral content of beef and came up with similar results.

Iron

Buffaloes are termed as the draft animals, owing to relatively higher storage of iron as compared to cattle. Iron being a part of hemoglobin, plays a crucial role by ensuring the provision of oxygen to body muscles for efficient working. Due to the higher concentrations of iron present, buffalo meat is deemed to have higher concentration of myoglobin protein. Tajik *et al.* (2010) studied the impact of post mortem wet aging on buffalo meat and reported a slight decrease in iron content with prolonged aging without significantly affecting the nutritional profile.

Zinc

The maximum value of zinc was 4.29 mg/100 g which was observed on day 0 at T_0 while the minimum value was 3.43 mg/100 g which was observed on day 9 at T_5. The results indicated that there was a non significant difference between the zinc concentration of fresh meat and the test samples aged for respective duration. The results of this study were found to be in line with the results of Zhang *et al.* (2019).

Table 6- Mean ± Std. Dev. values for calcium, iron and zinc content of vacuum aged buffalo meat

Treatments	Calcium	Iron	Zinc
T_0	8.69 ± 0.21^a	2.61 ± 0.1^a	4.29 ± 0.08^a
T_1	8.52 ± 0.15^a	2.49 ± 0.21^a	4.13 ± 0.15^a
T_2	8.33 ± 0.22^a	2.35 ± 0.08^a	3.86 ± 0.19^a
T_3	8.15 ± 0.14^a	2.16 ± 0.3^a	3.71 ± 0.21^a
T_4	7.88 ± 0.19^a	2.04 ± 0.2^a	3.55 ± 0.07^a
T_5	7.74 ± 0.2^a	1.89 ± 0.07^a	3.43 ± 0.11^a

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Microbial Analyses of Vacuum Aged Buffalo Meat

Total Plate Count (TPC)

The highest mean value was demonstrated at T_5 that was found to be 1.69 and the lowest value was 1.48 at T_0. A slight increase in microbial count was observed from day 0 to day 9. Wet aging is often regarded to increase the number of microorganisms due to the enclosure of meat sample in a package. The results of this study were in accordance with the results of Zerabruk *et al*. (2019) who compared the microbiological assessment of meat after wet and dry aging of buffalo meat.

***Escherichia coli* Count**

The strains of *Escherichia coli* were not detected in all of the treatments including the control group. The occurrence of *E. coli* in meat might be due to the contact of intestinal bacteria with meat during removal of digestive tract. Anyhow, with good handling practices, its contamination can be avoided.

Table 7- Mean ± Std. Dev. values for TPC and *E. coli* of vacuum aged buffalo meat

Treatments	TPC	*E. coli*
T_0	1.48 ± 0.11^{b}	-ve
T_1	1.52 ± 0.07^{ab}	-ve
T_2	1.57 ± 0.21^{ab}	-ve
T_3	1.61 ± 0.03^{ab}	-ve
T_4	1.64 ± 0.04^{ab}	-ve
T_5	1.69 ± 0.05^{a}	-ve

Sensory Analysis

Consumer acceptability is very important for any kind of new development or value addition in a food product. Therefore, sensory evaluation evaluates the consumer's acceptance as it is the basic priority of any industry in formulating new products.

Flavor

Flavor is significantly influenced by the age, sex, breed and nutritional profile of the animal. The mean values of flavor ranged from 6.51 to 7.26.The highest mean value of flavor was demonstrated at T_5 that was found to be 7.26 and the lowest value was 6.51 at T_0. A significant variation was reported between T_0 and T_5.

Tenderness

Tenderness of meat has been regarded the most essential feature of meat texture in terms of consumer's acceptability. The disintegration of these essential proteins by endogenous enzymes

Overall Acceptability

The maximum mean value was demonstrated at T_5 that was found to be 7.26 and the minimum value was 6.58 at T_0. A significant variation was reported among all the treatments. Treatment T_5 showed the best results of overall acceptability as compared

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http://amresearchreview.com/index.php/Journal/about

to other treatments.

Ishihara *et al*. (2013) analyzed effects of different preserving methods on the quality as well as sensory attributes of buffalo meat. The study elaborated that different drying and storage methods overall affected sensory properties of meat. Overall acceptability of the aged meat samples was more for wet aging method as compared to dry aging. The results of this study were comparable to the results of Sabikhi *et al.* (2017) who studied the impact of wet aging on palatability characteristics of buffalo meat.

Table 8- Mean ± Std. Dev. values for flavor, tenderness, juiciness and overall acceptability of vacuum aged buffalo meat

Treatments	Flavor	Tenderness	Juiciness	Overall Acceptability
T_0	6.51 ± 0.03^{b}	6.56 ± 0.04^{e}	6.44 ± 0.08^{f}	6.58 ± 0.04^{d}
T_1	6.62 ± 0.02^{ab}	6.84 ± 0.04^{d}	6.53 ± 0.04^{e}	6.63 ± 0.07^{d}
T_2	6.78 ± 0.07^{ab}	7.03 ± 0.05^{c}	6.80 ± 0.05^{d}	6.85 ± 0.02^{c}
T_3	6.98 ± 0.06^{ab}	7.09 ± 0.03^{c}	7.03 ± 0.03^{c}	7.02 ± 0.03^{ab}
T_4	7.11 ± 0.02^{ab}	7.23 ± 0.03^{b}	7.22 ± 0.03^{b}	7.14 ± 0.06^{ab}
T_5	7.26 ± 0.03^{a}	7.35 ± 0.05^{a}	7.31 ± 0.02^{a}	7.26 ± 0.05^{a}

CONCLUSION

Meat, the flesh of an animal, including organs and palatable tissues, is an indispensable part of the human diet and is preferred among the best nutritious and substantial food choices. Dry aging is a technique in which meat cuts are placed in a vented chamber of the aging, optimized with the adjustable parameters including temperature, relative humidity and air velocity. Vacuum sealed samples are then put in the refrigerator at optimized temperature for the desired period of time. Wet aging is the most prevalent method of post mortem aging owing to a wide spectrum of advantages, including considerable weight loss reduction, extended shelf life, lesser operational cost, and adaptability to automation. This study investigated the impact of vacuum aging on quality, microbial and sensory attributes of buffalo meat.

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