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Evaluation of Meat Quality and Carcass Characteristics of Broiler Chickens as Affected by Feed Withdrawal with Electrolytes Added to Water

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Abstract:- Electrolyte mitigated the effect of fasting usually done before slaughtering process. Based on results using two-way ANOVA in a complete randomized design out of Ninety (90) heads of marketable broiler chicken fasted in 0-hour, 24-hours, and 48-hours in drinking water with and without electrolyte. Eventually, fasting affected the live weight, dress weight, liver weight. Digestive tracts were significantly affected by levels hour of fasting while not significant on initial live weight and dressing percentage. The main effects of water treatments were significant on total live weight loss, and to the total percentages of live weight loss of chicken. Mean values of meat pH and cooking loss were statistically significant by levels of hour fasting. Sensory qualities scored using 5-point hedonic scales were all comparable. In all carcass, meat quality, and sensory parameters, hour fasting had no interactions (*P* >0.05) with drinking water except the texture of meat and overall acceptability. Broilers off-feed up to 48 hours have positive responses in meat pH, cooking loss with moderate acceptability in sensory taste favored to consumers but a monetary loss to growers. Electrolyte provision in water negatively affects live weight therefore not recommended. A further trial should be performed in a larger sample and a longer electrolyte treatment.

Keyword:- *Feed Withdrawal, Fasting, Electrolyte, Broiler, Sensory, Water Intake, Carcass Characteristics, and Meat Quality.*

I. INTRODUCTION

Fasting of marketable broilers before slaughter is a standard management practice that has been used by the poultry growers for decades. The purposes of having birds withheld from feeds are; 1) reduction of fecal excretion and external cross-contamination during delivery, 2) to lessen the fecal contaminants of poultry carcasses that will happen during evisceration procedures (Bilgili & Hess, 1997; May, Lott, & Deaton, 1990; Papa, 1991; Northcutt, Savage, & Vest, 1997) and 3) to protect consumers against meat-borne diseases and economic losses.

Several studies proved that fasting before slaughter significantly affects carcass quality. The longer the animal has withdrawn from feeds the more weight loss is observed due to excretion of fecal matter in digestive track (Wabeck, 1972; Veerkamp, 1978) and because of the removal of water from the body due to the metabolic process of body tissues in obtaining energy for maintenance (Salmon, 1979). Meanwhile, a lower percentage of carcass recovery for unfasted broiler compared to broiler that has been withdrawn from feeds before slaughter because the 0 fasted chicken had higher live weight but of lower carcass yield due to the removal of full intestinal content (Castroverde, Olarve, & Cruzana, 2010).

Fasting for 24 hours or longer glycogen in the liver may be completely depleted. Liver weight decreases with an increasing number of hours fasting. Castroverde, Olarve, & Cruzana, (2010) reported that higher weight of intestinal tract and residual gut fill were found in chicken with zero fasting hour compared to fasted broilers due to gastrointestinal content that is still intact since they have not fasted.\

With regards to meat pH and water holding capacity, (Ngoka & Froning, 1982) feed withdrawal has a significant effect on meat final pH, water holding capacity (WHC), live weight and moisture content of broiler muscle over the fed group. Castroverde, Olarve, & Cruzana, (2010) observed that zero fasted broiler chicken has lower water retention capacity compared to broilers fasted for 24 hours.

Feed fasting time was not significant to the color of breast and thigh meat but feed withdrawal time more than 6 hours resulted in a remarkable and significant reduction in meat tenderness of the bird's breast muscle (by 3.3 kg/g) (Kotula & Wang, 1994). Fasting did not alter the flavor attribute; nonetheless, meat from birds at 0 h fasting was darker and redder. Diet has a significant effect on the sensory profile (Lyon, Smith, Lyon, & Savage, 2004).

Withdrawal from feeds before slaughter is very stressful to animals such that the pre-slaughter period is well recognized as the extremely traumatic time of an animal's life (Grandin, 2000; 1997). The idea of supplementing electrolytes to poultry before slaughter, before and after transportation, processing and under environmental stress has been associated with the possibility that carcass yield and meat quality could be maintained if not improved. Electrolytes have been used under adverse conditions to induce water consumption and to maintain proper balance in body fluid.

Purposely, this study was conducted to determine the optimum feed withdrawal period with electrolyte addition in water before and during fasting with hopes to minimize yield losses, improve carcass traits and quality while taking care of the consumer's acceptability**.**

II. MATERIALS AND METHODS

A total of ninety (90) heads of 28-29 days old commercial broiler of almost similar weight were selected randomly and divided into 2 groups (group 1: water; group 2: water w/ electrolyte).

The birds in every group were further divided into 3 sub-groups (sub-group 1: 0-h fasting; sub-group 2: 24-h fasting; sub-group 3: 48-h fasting) replicated 3 time having 5 birds each to start the six-day trial conducted at Surigao State College of Technology-Mainit Campus (SSCT-Mainit) Poultry House.

The electrolyte treatment in water was done three days before fasting until slaughter time using Hydrite (ORS) by Amherst Lab. Inc. at a ratio of 1 pack (4.1 g) per 300 ml water. Water intake before and during fasting was recorded accordingly.

Water in plastic containers was securely tied in every cage wall. The initial and final live weight of birds were carefully noted before and after feed withdrawal.

To make the slaughtering process simultaneous, the birds under 48-h fasting from each group were treated on day-1 and fasted on day-4, followed by 24-h fasting on day 2 fasted on day-5, while 0-h fasting on day-3 until day-6. All birds were simultaneously slaughtered on day-6. Before slaughter, birds were assessed for the final weight at slaughter.

Two chicken close to average per cage were slaughtered simultaneously. The head was dislocated, eviscerated, and evaluated the warm carcass weight and intestinal tract before they were transported to SSCT-Mainit Campus Food Laboratory and chilled for two hours at 0.5 0C before the preparation of meat samples for analysis.

The following parameters were calculated using the formula:

Water intake = Water offered – Water remained
Live weight loss = Pre-fasting weight – Post-fasting weight
% live weight loss = Pre-fasting weight/Post-Fasting weight x 100
Dressing percentage = hot carcass weight/Post-withdrawal weight x 100
Residual gut fill = Digestive tract full – Digestive tract full empty

The meat pH of chicken breast meat in each sample was measured in duplicate by a Digital pH Meter (PH-108). Beforehand, the pH-meter was calibrated using standardized buffers of pH 4.0, 6.9 as mentioned by (Siekmann *et al.*, 1985). Approximately 10 g of ground meat was mixed with 100 ml distilled water and blended for 30 seconds at a high speed and pH meter electrode was immediately inserted after the blended sample was poured into a clear glass.

Cooking loss percentage determination was done by oven-cooking of breast meat samples. The 10 g samples were subjected to a maximum oven temperature of 150 ^{0}C for 1 hour and were let to cool for 30 minutes until the temperature became normal.

The weight of raw and cooked samples was recorded. The following equations were used to determine the percentage cooking loss:

Cooking loss % = Weight of raw meat – Weight of cooked meat / Weight of raw meat x 100

Meat sensory attributes viz. odor/aroma, appearance, texture, taste, juiciness, and overall acceptability were scored by panel evaluators (untrained) using the five-point hedonic scale. Approximately 10 g each of coded samples were steamed for 30 minutes (no seasoning and spices) and placed in disposable plastic cups ready for evaluation by 10 panelists composed of faculty, staff, and students of SSCT-Mainit Campus done in the college food laboratory. Before tasting, the panel evaluators were oriented and provided score sheets for the basis of scoring using the five-point scale namely: 5- extremely acceptable, 4- moderately acceptable, 3- acceptable, 2- moderately unacceptable, and 1- unacceptable. During the evaluation, the panellists were provided with drinking water.

Data gathered was subjected to statistical analyses using two-way ANOVA in CRD using SPSS version 20 to determine statistical difference effects and interactions between hour fasting and drinking water with and without electrolyte on the water intake, meat quality, carcass traits, and sensory attributes of broiler chicken. To determine homogeneity, Tukey HSD was used at a 5% level of significance.

III. RESULTS AND DISCUSSION

Effects of levels of hour fasting and electrolyte in drinking water on water intake of broiler chickens prior to and during feed withdrawal are presented in Table 1. Neither before nor after feed withdrawal, the water intake of broiler was significantly affected by different levels of hours fasting but not significant in drinking water and interaction effects of hour fasting*drinking water ($P > 0.05$). Below is the complete illustrations, see table 1, table 2 and table 3.

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Treatment	Water Intake[a]	Water Intake[b]
Hour fasting		
0 hour	2450.25[c]	0.00
24 Hours	1880.00[b]	203.83[a]
48 Hours	1504.33[a]	512.00[b]
Drinking water		
With	2051.83	250.44
Without	1837.89	226.78

Table 1:- Daily water intake of broiler before and after feed fasting
Legend: Water intake[a] Before feed withdrawal, Water Intake[b] After feed withdrawal.
Values within the same column with the same superscript are not significantly different ($p > 0.05$).

Parameters	Hour fasting			SE	Drinking water		SE
	0hr	24hr	48hr		with	Without	
Live weight (Initial)	1455	1369.17	1314.17	57.03	13.8	1379.33	46.55
Live weight loss @ 24hr FW	00.00	103.33[b]	108.33[b]	6.07	77.77	63.35	4.95
Live weight loss (total)	00.00	103.33[a]	173.33.00[c]	7.22	101.66[a]	82.77[b]	5.89
% live wt. loss @ 24hr FW	00.00	7.56[b]	8.18[b]	0.35	5.71[a]	4.78[b]	0.28
% live wt. loss @ 48hr FW	00.00	00.00	5.40	0.109	1.93	1.67	.089
% live wt. loss @ (total)	00.00	7.56[a]	13.14[b]	0.48	11.19[a]	9.51[b]	0.089
Live weight (Final)	1455.00[b]	1265[ba]	1140[a]	53.67	1278.89	1295.56	43.82
Warm carcass weight	989.17[b]	865.83[ba]	796.58[a]	42	868.33	898.06	34.29
Dressing percentage	67.98	68.31	69.57	1.1	67.89	69.36	0.83
Liver weight	30.83[b]	26.41[a]	24.00[a]	1.07	28.11	26.07	0.88
Gut weight (full)	185.58[c]	154.50[b]	124.17[a]	5.31	157.61	151.89	4.33
Gut weight (empty)	152.08[b]	138.25[b]	111.58[a]	5.19	136.56	130.06	4.24
Residual gut fill	33.50[b]	18.25[a]	12.58[a]	1.96	21.06	21.83	1.6

Table 2:- Summary of means and standard error of various carcass characteristics as affected by levels of hours fasting and drinking water. Values within the same row with the same superscript are not significantly different ($p > 0.05$)

Treatment	Meat pH	Cooking loss
Hour fasting		
0 hour	5.54[b]	57.60[a]
24 Hours	6.09[ba]	54.15[ba]
48 Hours	6.42[a]	51.00[b]
Drinking water		
With	6.57	54
Without	6.03	54.41

Table 3:- pH and cooking loss of broiler breast meat
Values within the same column with the same superscript are not significantly different ($p > 0.05$)

In the study, the water intake of the chickens was measured from the amount of water given less the water remained daily. Based on the results, the total water intake before fasting was highest in 0-h fasted followed by 24-h fasted while lowest total water consumption in 0-h fasted chickens in 3 days before feed withdrawal. The average values differences among 0-h, 24-h, and 48-h fasting were all significant to each other.

Meanwhile, water intake by broiler at fasting was significantly lesser than water intake before feed withdrawal. The 48-h fasted chickens consumed significantly higher total values over the 24-hour fasting chickens during fasting regime. No water consumption was noted in 0-h fasted chickens.

➤ *Carcass Characteristics*

The mean summary of the effects of different levels of hour fasting and drinking water on carcass characteristics of broiler chicken is shown in Table 2. All of the parameters of carcass characteristics except initial weight and dressing percentage were significantly influenced by levels of hours fasting while significant effects by drinking water treatments on the total and % total live weight-loss parameters. No hour fasting*drinking water interactions were noted.

The total live weight loss and % total live weight loss significantly higher in 48-h fasted over the 24-h fast. No live weight losses observed in 0-h fasting chickens. While data on drinking water treatments showed significantly higher total live weight loss and % total live weight loss in with electrolyte chickens over the without electrolyte or plain water group.

With regards to the warm carcasses, the highest harvest value was noted in 0-h fasted chickens while 48-h fasted was the lowest. The warm carcass weight value of 24-h fasted showed that it was not statistically significant to 0-h and 48-h fasted groups. The statistical results of warm carcasses, as well as the weight of birds at slaughter data, were homogenous in the pattern (Table 2).

The data on dressing percentage in all levels of hours fasting and drinking water together with hour fasting*drinking water effects showed no differences ($P > 0.05$)

The highest liver weight was observed in 0-h fasted chickens while in the 0-h fasted chickens, the liver weight did not vary from the other two groups. The group which had the lowest liver weight was observed in the 48-h fasted chickens.

In the digestive tract of broiler chicken, the 0-h fasting were all highest among digestive tracts (full, empty, and residual gut fill) parameters and 48-h fasted chickens were lowest in the foregoing. The digestive tracts (full) of 24-h fasted was statistically different to both 0-h and 48-h fasted, while the digestive tract (empty) was comparable to 0-h and significant to 48-h fasted chickens. Moreover, the residual gut fill of 24-h fasted chickens was statistically significant to 0-hr but comparable to 48-h fasted chickens.

➤ *Meat Quality*

The meat quality data of broiler chicken are presented in Table 3. There were significant effects of hour fasting on the pH and cooking loss of broiler chicken breast meat while no effect in drinking water as well as interactions between factors. The data showed the highest meat pH in 48-h fasted while 0-h fasted was the lowest. However, value differences in meat pH of 24-h fasted were comparable to the other two groups.

The cooking loss values were inversely correlated with meat pH. The group gained the highest pH had the lowest values of cooking loss. The result reflected, that 48-h fasted were highest in pH but observed lowest cooking loss while the 0-h fasted which had the lowest pH gained the highest loss during cooking while the 24-h fasted remained in the equilibrium.

➤ *Sensory Characteristics*

The summary of sensory attributes in different hours fasting and drinking water with and without electrolytes are shown in Table 4. All attributes viz. odor/aroma, appearance, texture, taste, juiciness, and overall acceptability were similar to the effects of feed withdrawal and provision of water with and without electrolytes ($P > 0.05$), but hour fasting*drinking water interacts on the meat texture and overall acceptability ($P < 0.05$).

DISCUSSIONS

Consumption of water by broiler was significantly different before and after feed fasting. The intake of water was considerably higher before the feed was removed when compared to the intake of water during fasting. The result manifests that feed deprivation declines water consumption activity. Drinking water activity and feed intake are closely related, such that if the feed is not available will surely affect water intake. In the study, the higher water intake before feed fasting was observed in 0-h fasted chickens from day 1-3, consumed water followed by 24-h fasted while the 48-h fasted chickens were lowest in consumed water Table 1. This was probably due to the disparity of chicken sizes. The 48-h fasted were slightly smaller in sizes since they were treated and fasted ahead from the other two groups. This confirms that the amount of water intake is relatively proportional to the size of the animal wherein the larger the size of an animal the higher is the demand for dry matter intake. The demand for water is dependent on the amount of dry matter taken. Degen, et al., (1991) stated that the ratio of water consumption and dry-matter intake (DMI) is relatively constant at approximately 2:3 for turkey. Fairchild and Ritz, (2009) reported, the recent water consumption for chicken normally ranges from 1.6 to 2.0 times that of feed intake.

Similarly, the water intake behavior in drinking water groups of chickens was higher before feed withdrawal while lower at fasting. Nevertheless, the differences in consumed values were not significant. Borges et al., (2000) observed an increased intake of water in broilers chicken supplemented with 1.0 percent KCl from day 21 onwards. It is established that supplementation of drinking water or in diet form with electrolytes improved the intake of water in birds reared in heat stress surroundings (Ahmad et al., 2008). In our case, the no effect of electrolyte addition on water intake of broiler before and after fasting may be due to the acceptability of the dissolved electrolyte solutions in water.

However, though not significant, the data revealed higher water intake in the electrolyte group than the plain water group throughout the trial period.

Live weight loss refers to the weight shrinkage by broilers during feed withdrawal. A significant higher live weight loss and % live weight loss was noticed in 48-h fasting chickens when compared to 24-h fasting while 0-h or unfasted chicken groups recorded no weight loss. A clear evidence that the longer the animal has withdrawn from feeds the more weight loss is observed due to excretion of fecal matter in digestive track (Wabeck, 1972; Veerkemp, 1886) and because of the removal of water from the body due to the metabolic process of body tissues for energy maintenance (Salmon, 1979). Broilers' weight loss after the first 6 hours fasting is largely due to the decrease in the content of the digestive tract (Veerkemp, 1986). Beyond 6 hours of fasting, moisture and nutrients are drawn from reserved nutrients and body tissues. For our study, it showed 8.18 % weight loss on the first 24 hours of fasting and 5.40 % weight loss after 48 hours of feed withdrawal (Table 2).

Electrolyte provision in water before and after feed withdrawal negatively affects live weight loss and % live weight loss of broiler chickens. The study shows higher total live weight loss and % total live weight loss in electrolyte treated group compared to plain water group (Table 2), which opposed to the findings of Rahi, Afrin, Howlider, & Ali, (2015) KCl in drinking water during hot and humid summer had no effect ($p>0.05$) on growth and meat quality characteristics of broilers except feed conversion ($p<0.05$) at different target weights.

Contrary to the Rahi, Afrin, Howlider, & Ali, (2015) findings, the apparent negative effect of electrolyte treatment on live weight in this proceeding may be the consumed electrolyte retained in the extracellular compartments were rapidly excreted along with the emptying of digestive tract contents because the birds undergo fasting. The potassium excretion is rapid during the early part of fasting and then tappers off to a constant level of about 10 to 15 mEq/day. Similarly, excretion of sodium is also triggered early in feed withdrawal, continuously decline to between 1 and 15 mEq/day, losses that remain even through extended withholding caloric intake (Weinsier, 1971).

Treatment	Odor	Appearance	Texture	Taste	Juiciness	Overall Acceptability
Hour fasting						
0hr	4.33^{ns}	3.83^{ns}	3.53^{ns}	3.76^{ns}	3.80^{ns}	3.73^{ns}
24hr	3.93^{ns}	3.83^{ns}	3.60^{ns}	4.02^{ns}	3.83^{ns}	3.53^{ns}
48hr	3.80^{ns}	3.73^{ns}	3.83^{ns}	4.20^{ns}	3.93^{ns}	3.60^{ns}
Drinking water						
With	4.02^{ns}	3.80^{ns}	3.73^{ns}	3.97^{ns}	3.83^{ns}	3.70^{ns}
Without	3.82^{ns}	3.75^{ns}	3.75^{ns}	3.56^{ns}	3.71^{ns}	3.53^{ns}

Table 4:- Summary of sensory attributes in different hours fasting and drinking water with and without electrolyte
$^{ns:}$ Not significantly different $P > 0.05$

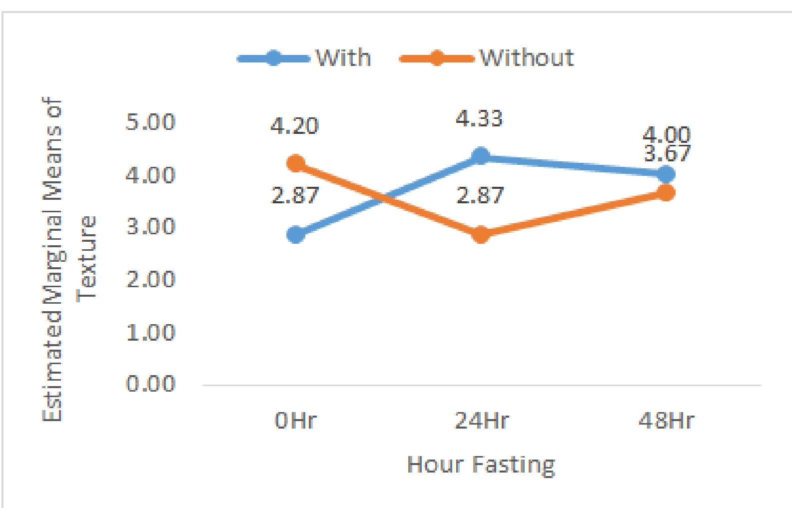

Fig 1:- Levels of scores for meat texture

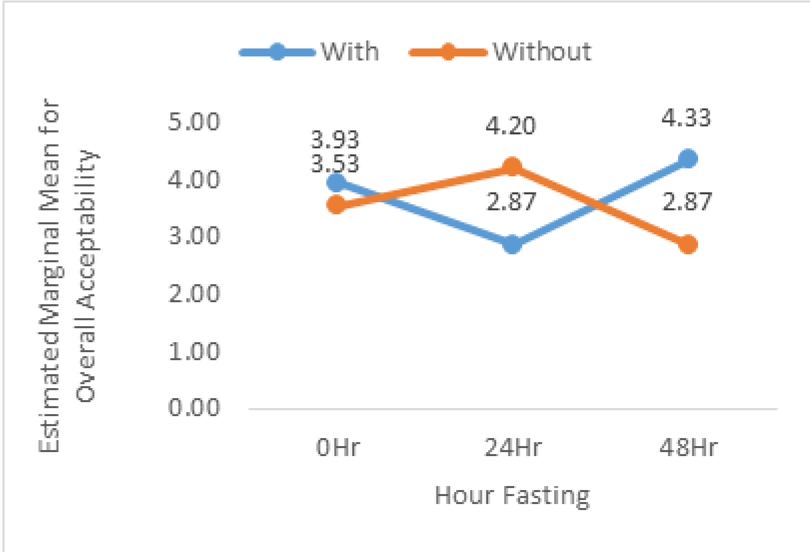

Fig 2:- Levels of scores for overall acceptability

Higher carcass weight was noted on 0-hr fasting compared to 24-h fasted and 48-h fasted chickens which were anticipated due to apparent higher live weight before slaughter (Table 2). However, dressing percentage as the relationship between the carcass weight and its live weight before slaughter was not affected by hour fasting. The recent findings supported the study Saffle & Cole (1960) that dressing percentage was not significantly affected by fasting when using off-feed weights. While the not significant effect of drinking water with electrolyte in this trial was probably following the earlier findings of Rahi, Afrin, Howlider, & Ali, (2015) KCl in water during hot and humid summer was not significant ($p>0.05$) on growth and meat yield characteristics of broilers except feed conversion ($p<0.05$) at different target weights. Similarly, (Souza et al., 2002) did not mention any effect of potassium chloride supplementation on carcass response or abdominal fat. Our case, though comparable in between water groups, it was observed that the electrolyte treated chickens had lower dressing percentage than plain water. This probably due to rapid excretion of sodium and potassium during fasting before it was absorbed in the muscle tissues that will form part of the carcass.

The liver may almost be depleted of glycogen if they have fasted for more than 24 hours or longer. A remarkable lowest liver weight values in 48-hours fasted in this trial probably due to the relatively smaller sizes of the liver in proportion to their body weight plus the massive glycogen depletion by feed withdrawal and post-partum glycolytic activities.

Warriss, et al (1993) reported that the weight of liver, glycogen reserve, and concentration of circulating glucose significantly reduced after long feed fasting.

Electrolyte provision in water did not counter the effect of fasting on liver weight shrinks in this trial. This report upheld the claims of Koreleski, Świątkiewicz, & Arczewska, (2010) that levels of K and Na not significant on breast meat yield, abdominal fat content in the carcass quality and relative weights of liver and heart. The result showed that the electrolyte treated chicken group had a slightly higher weight of the liver over the water group (Table 2).

Remarkable highest digestive tracts (full) was observed from non-fasted chickens while lower in the fasted group because of the presence of fecal matter and undigested food. Castroverde, Olarve, & Cruzana, (2010) observed that higher weight of intestinal tract and residual gut fill were found in chicken with zero fasting hour compared to fasted broilers due to gastrointestinal content that is still intact since they have not fasted. Electrolyte supplementation in drinking water before and during fasting together with interactions showed no significant effect on digestive tracts (full, empty, and residual gut fill).

The rate and levels of pH reduction are the main determining factors of meat quality (Van Laack, 2000). A higher pH of meat was detected in 48-h fasted followed by 24-h and 0-hr fasting chickens. These affirm the findings of Ngoka and company (1982), feed withdrawal has a significantly altered meat final pH, water retention capacity, live weight and moisture content of turkey breast muscle when compared to the fed group. Our study found a significant pH decline in non-fasted chicken probably because of high glycogen levels at slaughter because they were unfasted. Ultimate pH is determined largely by levels of muscle glycogen at death. Glycogen in muscles is converted into lactate and energy. The formation of lactate declines pH (Greaser, 1986).

Cooking loss and pH values were inversely correlated. As the pH decreased, the quality of the final produce increased because the cooking losses were less. Shear values were highly significantly ($P \leq 0.008$) correlated negatively with cooking losses, in dispute to the usual belief that as meat releases more water it becomes harder (Contreras--Castillo, 2007). Similarly, the highest pH of meat value in 48-h fasted visibly the lowest values in the cooking loss in our findings, while lower pH of meat value in the 0-h fasted, appeared highest in cooking loss values (Table 3). A higher ultimate pH (pHu) is related to a darker color, reduced drip loss (higher WHC and WBC) and tougher meat (Warner, 1994; Pearson and Young, 1989).

Apple, Unruh, Minton, & Bartlett, (1993) observed that the administration of electrolytes did not affect lamb carcass quality. Contrary to (Babji, Froning, & Ngoka, 1982) under the conditions of this study, pre-slaughter administering of electrolytes did not prevent changes in muscle characteristics after exposure to pre-slaughter stress. Holding birds at a maximum temperature (38 C) before slaughter produced meat with a lower water holding capacity, pH, cooking yield, and a higher shear value. In our case, the meat pH the electrolyte treated chickens gained slightly higher pH and lower in cooking loss values over the plain water groups, however, differences in values between electrolyte treatment and plain water was not statistically significant ($P > 0.05$).

Sensory

The sensory attributes like odor/aroma, appearance, texture, taste, juiciness, and overall acceptability of steamed broiler meat samples were scored by panelists (untrained) using the 5-point hedonic scale. Comparing the differences among the average scores of different attributes it showed no significant effects by all levels of hour fasting and drinking water (Table 4). Lyon, Smith, Lyon, & Savage, (2004), noticed that fasting did not alter the flavor attribute; nonetheless, meat from birds at 0 h fasting was darker and redder. Diet has a significant effect on the sensory profile.

The higher average scores on odor in 0-hr fasting and taste in 24-hr and 48-hr fasted groups, while higher average score on odor in electrolyte treated group compared to its counterpart the plain water group. This implied that the odor of the steamed broiler meat is moderately accepted by tasters when not fasted and when treated with electrolyte. Similar moderate acceptance results on the taste of steamed chicken meat when fasted in 48-h and 24-h hours respectively. Similarly acceptable scores on appearance, texture, juiciness, and overall acceptability.

Testing on the interactions of these factors, the different levels of hour fasting versus drinking water showed significant interactions in terms of texture and overall acceptability. This then implies that the effect of levels hour fasting on texture and overall acceptability of steamed broiler meat and overall acceptability of broiler breast meat is dependent on treatment in drinking water and vice versa. Figures 1 and 2 show the graphs of these interactions respectively. Further study should be made on sensory of meat to be done by a trained panelist to clearly distinguish differences between sensations. The panelist should be trained for sensory by some training sessions that can help assessors discuss, understand, and select a correct vocabulary to conveniently describe the product to study (Sow et al., 2010).

CONCLUSION

In conclusion, the recent study found the optimum feed withdrawal period of broiler whether with or without electrolyte supplementation before the slaughter could go as far as 48 hours with beneficial effects to the consumers but of monetary loss to poultry growers. Fasting within 24 hours or longer, the bird loses more live weight, dress weight, liver, and empty gut-weight which are economically unfavorable to broiler raisers. Parameters on cooking loss and meat pH revealed that as the number of hours fasting increases, meat pH normalizes and cooking loss decreases which is an indicator of good quality meat sought after by broiler meat buyers. The comparable results of sensory and consumer's acceptability from acceptable to moderately acceptable levels of meat from broiler revealed that the odor, appearance, texture, taste, juiciness and overall acceptability in zero to 48 hours fasted chicken in drinking water with and without electrolyte remain stable and acceptable to the consumers.

However, the provision of electrolyte in drinking water before and after feed fasting negatively affects live weight loss of chickens while minimal positive impact on liver weight, digestive tract (full & empty) and meat pH therefore not sufficient to alleviate the adverse effects of feed withdrawal.

RECOMMENDATION

Further study should be performed in more sample sizes with an increased number of days undergoing electrolyte treatment to fully establish its benefits. Sensory characteristics of broiler meat should be performed by the trained panelist following the international standards for selection, training, conduct and design for a room test for sensory analysis.

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