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Organoleptic Qualities of Broilers Fed Diets Containing Different Inclusion Levels of Common Salt

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Abstract
This study aimed at evaluating the effect of different common salt inclusion levels on organoleptic qualities of broilers. A total of one hundred and forty-four (144) day old chicks were randomly allotted to four treatment groups and each subdivided into three replicates with twelve (12) birds per replicate. Four experimental diets were formulated (T_1, T_2, T_3, T_4). T_1 (control) had no dietary common salt, treatments T_2, T3 and T4 0.25, 0.50 and 0.7 % inclusion of common salt respectively. Each treatment group of birds was assigned to one of the four (4) experimental diets in a completely randomized design and the experiment lasted for nine weeks. Data were collected on organoleptic qualities. Results of organoleptic qualities showed significant differences ($p<0.05$) among treatments except for connective tissue amount and off-flavor characteristics. Birds on T_3 were juicer, tenderer, better flavored and higher hedonic score rating followed by birds placed on T_4 diets. It is therefore concluded that meat samples from birds fed the diet containing 0.50% and 0.75% salt inclusion level were judged by the panelist to be juicer, more tender, better flavored as well as higher in degree of likeness (hedonic rating) on a nine points category rating than meat from birds fed 0.00% and 0.25% dietary salt inclusion levels

Keywords: Organoleptic qualities, common salt, broilers

Introduction

Sodium is an essential nutrient known to influence several aspects of normal animal growth. Sodium and Chlorine, along with potassium, are the electrolytes required in greatest amounts by birds. They play important role in the acid-base. The optimum dietary balance of these minerals makes for good chicken performance. In intensively raised fast-growing chickens, an adequate intake of dietary sodium has a beneficial influence on feed consumption and the growth rate of birds (Borges *et al.,* 2004). Sodium works for the regulation of osmotic pressure and protection against excessive loss of body fluid. The permeability of cells and the sustenance of normal muscle irritability are additional functions of sodium (Nobakht, 2005). It is also needed for absorption of amino acids and sugars in the small intestine, hence the utilization of digested protein and carbohydrates is diminished with an insufficiency of this cation (Mushtaq, 2010). Likewise, both sodium and chloride, aid in the nutrient passage and waste removal in cells.

Dietary deficiency of sodium will lead to acid-base imbalance, reduced cardiac output, growth reduction, increased feed conversion ratios, gonadal dormancy, bone softening, corneal keratinization, decreased cellular volume and changes in cellular function (Mushtaq, 2010). Adrenal malfunction which may lead to increased uric acid levels, shock and ultimately death have been linked to sodium deficiency in chicks (Leeson & Summers, 2001). Chickens maintain their blood and tissue sodium homeostasis by excreting excess sodium and conserving short supply in diet (Lesson & Summers, 2001). Though NRC (1994) recommended 0.15-0.20, the growth performance of birds improved when the sodium content of feed was increased from 0.20 to 0.30% (Oviedo-Rondon *et al.,* 2001: Mushtaq *et al.,* 2007). An increase in dietary sodium to 0.30% is reported to improve breast muscle yield, and to reduce abdominal fat deposition (Mustaq *et al.,* 2005). Little information is however available on the effect of dietary inclusion level of the sensory characteristics of the chicken meats.

This work was therefore designed to study the effect of dietary inclusion levels of salt on the sensory properties of chicken meat.

Materials and Methods

This study was carried out in the Poultry Unit of the Teaching and Research Farm of the School of Agriculture and Agricultural Technology, Federal University of Technology (FUTO), Owerri, Imo State, Nigeria. All feed ingredients and experimental birds used for this work were procured from commercial feed vendors in Owerri. Four experimental diets were formulated (T_1, T_2, T_3, T_4). T_1 (control) had zero inclusion level of dietary common salt while treatments T_2, T3 and T4 had 0.25, 0.50 and 0.7 % inclusion of common salt respectively. A total of one hundred and forty-four (144) day old unsexed broiler chicks were used for the experiment, the birds

were divided into four treatment groups with three replicates, each of 12 birds in a completely randomized design. Each group was randomly assigned to one of the experimental diets. All replicates were housed in a pen of similar dimension (4x4ft). Feed and water were provided *ad libitum* for the period of the experiment. All necessary vaccinations and medications were administered to the birds following the management guidelines stipulated by the University Farm. Four broiler starter and four broiler finisher experimental diets were formulated.

At the end of the feeding trials, two birds whose live weights were closest to the mean live weight of each replicate were randomly selected from each replicate. The birds were starved for 24 hours but the water was provided *ad libitum*. The birds were individually weighed and slaughtered by severing the jugular vein and were allowed to bleed to death in a vertical position. After bleeding to death, the carcasses were scalded in hot water, dressed and eviscerated and then stored in a refrigerator. After 48 hours of refrigerated storage (7-10 ˚C), samples weighing about 50 g were cut from the drumsticks of each carcass and carefully labeled. They were then individually wrapped in polythene bags and cooked under steam for 30 minutes. The samples were then cooled to ambient temperature in stainless steel food containers.

They were then served to a panel of trained assessors drawn from the 500 level students of Department of Animal Science and Technology, FUTO. The panelist was told to masticate the samples and score it for tenderness, juiciness, connective tissue amount, flavor intensity and degree of likeness using a 9 point category rating as described by AMSA (1978).

Results and Discussion

The results of sensory evaluation of meats from birds fed different levels of dietary salts are shown in Table 1. Significant differences were found in all parameters evaluated except for the amount of connective tissue. Meat samples from birds fed the diet containing 0.50 and 0.75% salt inclusion level were judged by the panelist to be juicer, more tender, better flavored as well as higher in degree of likeness (hedonic rating) on a nine points category rating than meat from birds fed 0.00% and 0.25% dietary salt inclusion levels. Since dietary salt intake enhanced their water intake as well as high water retention, it must have contributed to their meats being tenderer. However, sensory value scores for samples did not increase further after 0.50 % inclusion level.

Table 1: The effect of different salt inclusion levels on organoleptic qualities.

Parameter	0.00%	0.25%	0.50%	0.75%	SEM
Juiciness	5.60^{b}	5.00^{b}	6.90^{a}	6.10^{b}	0.46
Tenderness	5.60^{b}	5.50^{b}	7.40^{a}	6.80^{a}	0.36
Connective tissue	6.00	5.20	6.10	6.90	0.62
Flavor	5.50^{b}	4.40^{b}	5.80^{a}	6.00^{a}	0.45
Hendonic Score	5.80^{a}	5.10^{b}	6.40^{a}	6.00^{a}	0.41
Off-flavor characteristics	5.13	5.00	5.75	4.75	0.45
Off-flavor intensity	5.13^{a}	5.50^{a}	4.38^{a}	3.38^{b}	0.55

^{abc} Means within the same row bearing different superscripts are significantly different ($p<0.05$)

Note: The 9 points category rating scale was used

Tenderness/juiciness/flavor/hedonic rating/off-flavor rating

9 - Extremely tender/juicy/flavored/like extremely/off-flavored

8 - Very tender/juicy/flavored/like very much/highly off-flavored

7 - Moderately tender/juicy/flavored/like moderately/off-flavored

6 - Slightly tender/juicy/flavored/like slightly/off-slightly/off-flavored

5 - Neither tender nor tough/juicy nor dry/flavored nor unflavored/like nor dislike/off-flavored nor not off-flavored.

4 - Slightly tough/dry/unflavored/dislike slightly/not off-flavored

3 - Moderately tough/dry/unflavored/dislike moderately/not off-flavored

2 - Very tough/dry/unflavored/dislike very much/highly not off-flavored

1 - Extremely tough/dry/unflavored/dislike extremely/not off-flavored

Conclusion and Recommendations

It can be concluded that an increase in salt level up to 0.50% in broiler diet resulted in meats that are juicer, tenderer, better flavoured as well as higher in the degree of likeness as shown by the panelists. It can be recommended that salt inclusion in the diets of broilers up to 0.50% level is beneficial to broilers.

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