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Effect of Different Sounds on Some Traits of Broiler Chick's Meat

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Abstract

This study was conducted This study was carry out at the field of the Department of Animal Sciences, College of Agricultural Sciences, Sulaimani University - Iraq, for study the effect of sound on meat traits and quality of meat. The chicks gotten from hatchery Kasha in the Taslojha. The sounds treatment choosing as follows: Control (T1 without sound), Movement of Feet (T2), Soft Sound Hens (T3), Chicks Care (T4) and hatched chicks, straight run (n = 160), were randomly distributed among, 4 treatments, with 4 replicates (2 male –2 female) per treatment and 10 chicks per replicate .The chicks exposure to sound from 1 day to 14 day old after hatching for 15 minutes. The results show: a significant difference ($p<0.05$) of experimental treatments (T2, T3 and T4) in moisture, protein, Fat, Ash, Water holding capacity (WHC) and pH percentage for thigh and breast compare with control treatment (T1). A significant difference ($p<0.05$) of experimental treatments (T2, T3 and T4) in on non-essential amino acids and essential amino acids in the thigh and breast.

Introduction

Through the previous little years, the conception of food has undergone a essential transformation, as its care and influence, to become more importance on human health. Poultry husbandry systems have been affected by consumer's priorities, The chicken rearing without using antibiotics or artificial chemicals will get more attention. After the rising request of consumers who are most sensitive, to the ethical and cultural side of nourishment from animal origin, there is ever-growing interest headed for animal friendly agricultural systems, which can develop animal well-being in addition to pledge specific criteria about eating safety, nutrition, and sensory properties *[1]*. The E.C Regulation 1538/91 has realize conversion and marketing standards, for poultry meat produced using stand by farming systems (inside/barn-raised, free area, traditional free area, and free range), while organic poultry production has been planned from 1999 onward (EC Regulation 1804/9); *[2]*. Factors that have boost this evolution include the incredible stream effect of the media on public opinion on the relevance between diet and health, the increasing life expectancy of the people, with major concern about disease prevention, the consumer perception of risk and influence on buying behavior, is a key issue for the alternate benefit of both consumers and food industry *[3]*. The connection between intake of meat and health problems to people , such as fatness, cardiovascular, and cancer diseases, this lead to a lowering of red meat consumption. during the years, the poultry industry is differented and become suitable to assembly the consumer request of meat products. with regard to nutritional sides and health, poultry meat suitable the current consumer demand for a low fat meat *[4]*. But there is an increasing demand to get better its nutritional value and the animal well-being with appropriate dietary methods *[5]*. In the poultry farmer, the greatly of meat products which reaching to the food shop are

produced with broiler raise under dense status, These broiler chicken from genotypes that have been chosen for fast growth and feed efficiency and are preserved in closed poultry houses and have a strict environmental control *[1].* The parents of birds will learn the chicks to discover food in their environment and discovery between possibly harmful items and those are safe to consume, this is achieved through the hen vocalizing, to help their chicks to find food using visual displays as a pecking, consequently, these actions enable chick to find feed and water, also will make the chick more safe, reduces the exploratory behavior of the chick, and so reduces the energy used in feed searching, and shifted to growth *[6]* In the modern breeding and the development of operation hatching, the chicks hatched and bred away from hen, so it can't hear the vocalizing of the hen; and the relations between parents and progeny were interrupted , therefore, the researchers tried to maximize these relations through hearing the chicks to some acoustic actions to minimize time expenditure for searching of brooding area and comfortable zone to the chicks , consequently, storage energy that often lose in these actions *[7],* this will change from some characteristic of chicken meat *[8],* Chloupek et al., (2009) *[9]* that suggests exposed chickens to high levels of sound for 10 min (at 80 and 100 dB) at the slaughterhouse will increases chickens plasma corticosterone level, and increase in the ratios of heterophil to lymphocyte within the blood of chicken were noticed with the sounds of vehicles 90 dB. *[10]*. The poultry house environments lack to acoustic stimuli that birds might use to find feed and water, therefore, chicks lost for some hours in brooding area searching for feed and water, so they lose their initial first week weight and influence on characteristic of chicken meat, Some researchers has showed that hen calls can attract chicks to brooding area and minimize the periods of searching feed, but to our knowledge no earlier study has conducted on different types of sounds to test the hypothesis of attracting chicken, so the objective of this study it's using three different sounds in chicken field and measures some characteristic of chicken meat for improve the quality of meat.

Materıals and methods

This study was carried out at the field of the Department of Animal Sciences, College of Agricultural Sciences, Sulaimani University - Iraq. The chicks were gotten from a hatchery in Kasha in the Taslojha area. The sounds treatments choosing as follows: Control (T1 without sound), Movement of feet (T2), Soft Sound Hens (T3), Chicks Care (T4). Hatched chicks were straight run (n = 160), were randomly distributed among 4 treatments, which with 4 replicates: (2 male −2 female) per treatment, and 40 chicks per treatment: (10 chicks/ replicate).

The chicks exposure to sound from 1 day to 14 day old after hatching for 15 minutes per treatment starting from (8 am) and reflecting the transactions each day for canceling the time factor with transfer control treatment (without sound) to the sound test site (Runway Test).

A. Hearing sound:

For hearing the chicks to sound as a regular basis and apart from each treatment for the other has been the establishment of special laboratory for sound consisting of four pens each consisting of a width of 0.75 meters x length of 1 meter, The BL-type headphones were connected 30 cm above ground and the sound source was from a sound recorder at a frequency level of 20-30 dB.

B. Feed and water:

Feed and water are fed directly to the chicks (*ad libitum*) from the first day. The feed was prepared from the Iraqi Kosar Feed Factory in Erbil and in the form of three diets as following: (starter) from 1-10 days, (Growth diet) from the age of 11 - 25 days and (final feed) from the age of 26 - 42 end of the experiment.

C. Studied traits:

Percentage of Moisture, Protein, Fat and Ash content were determined in meat samples as mentions in the Association of Official Analytical Chemists *[11].*The pH of the meat samples was measured accord to *[12]* using a pH meter. Water holding capacity (WHC) was measured accord to *[13].* Amino acid analyses measured according to *[14].*

D. Statistical analysis:

The data reported as means ± SEM and subjected to one-way, using a GLM model in the SAS system (SAS, 9.2) *[15]*, followed by Duncan's multiple-range tests to analyze the differences among all treatments when the F-value was statistically significant ($P < 0.05$).

Results and Discussion

The high demand for poultry meat made researchers provide consumers with the best meat of high quality represented by some characteristics, which are shown in Table (1) that show the effect of different sounds some meat chemical properties of the thigh, there was a significant differences ($p<0.05$) in moisture percentage in meat for experimental treatments (T2, T3 and T4) it was (76. 43, 75.51 and 76.83%) respectively compare with control treatment (T1) it was (74.78%). While there was a significant differences ($p<0.05$) in protein percentage in meat for experimental treatments (T2, T3 and T4) it was (20.35, 21.34 and 20.12%) respectively compare with control treatment (T1) it was (18.67%). However there was a significant decrease ($p<0.05$) in fat percentage in meat for experimental treatments (T2, T3 and T4) it was (1.50, 1.22 and 1.81%) respectively compare with control treatment (T1) it was (2.74%). As for the percentage of ash it was high in control treatment (T1) it was reach (1.23%) compare with experimental treatments(T2, T3 and T4) that have a significant decrease ($p<0.05$) it were (0.89, 0.33 and 0.95 %) respectively. Regarding Water holding capacity (WHC) there was a significant differences ($p<0.05$) for experimental treatments (T2, T3 and T4) it was (54.65, 51.66 and 51.66%) respectively compare with control treatment (T1) it was (42.65%). While there weren't significant differences between experimental treatments (T2, T3 and T4) and control treatment (T1) in percentage pH.

Table- 1: The effect of different sounds some meat chemical properties of the thigh

Treatment	*Moisture*	*Protein*	*Fat*	*Ash*	*WHC*	*pH*
T1	*74.78 b*	*18.67 b*	*2.74 a*	*1.23 a*	*42.65 b*	*6.23*
T2	*76.43 a*	*20.35 a*	*1.50 b*	*0.89 b*	*54.65 a*	*6.14*
T3	*75.51 a*	*21.34 a*	*1.22 b*	*0.33 bc*	*51.66 a*	*6.32*
T4	*76.83 a*	*20.12 a*	*1.81 b*	*0.95 b*	*51.65 a*	*6.32*
SEM	*0.019*	*0.58*	*0.173*	*0.177*	*3.86*	*0.027*
Alpha	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*

(T1 without sound), Movement of Feet (T2), Soft Sound Hens (T3), Chicks Care (T4) and Hatched chicks straight
Means with different letters in the same row are statistically different ($P<0.05$).

Table (1) that show the effect of different sounds some meat chemical properties of the breast, there was a significant differences ($p<0.05$) in moisture percentage in meat for experimental treatments (T2, T3 and T4) it was (75. 50, 76.18 and 76.73%) respectively compare with control treatment (T1) it was (73.31%). While there was a significant differences ($p<0.05$) in protein percentage in meat for experimental treatments (T2, T3 and T4) it was (20.72, 20.24 and 20.80%) respectively compare with control treatment (T1) it was (18.85%). However there was a significant decrease ($p<0.05$) in fat percentage in meat for experimental treatments (T2, T3 and T4) it was (1.01, 1.06 and 1.50%) respectively compare with control treatment (T1) it was (2.59%). As for the percentage of ash it was high in control treatment (T1) it was reach (1.77%) compare with experimental treatments(T2, T3 and T4) that have a significant decrease ($p<0.05$) it were (0.91, 0.86 and 0.74 %) respectively. Regarding (WHC) there was a significant differences ($p<0.05$) for experimental treatments (T2, T3 and T4) it was (44.67, 44.42 and 44.65%) respectively compare with control treatment (T1) it was (32.63%). While there weren't significant differences between experimental treatments (T2, T3 and T4) and control treatment (T1) in percentage pH.

Table- 2: The effect of different sounds some meat chemical properties of the breast

Treatment	Moisture	Protein	Fat	Ash	WHC	pH
T1	73.31 b	18.85 b	2.59 a	1.77 a	32.63 b	5.98
T2	75.50 a	20.72 a	1.01 bc	0.91 b	44.67 a	5.54
T3	76.18 a	20.24 a	1.06 bc	0.86 b	44.42 a	5.52
T4	76.73 a	20.80 a	1.50 c	0.74 b	46.65 a	5.43
SEM	0.143	0.133	0.122	0.044	22.96	0.0006
Alpha	0.05	0.05	0.05	0.05	0.05	0.05

(T1 without sound), Movement of Feet (T2), Soft Sound Hens (T3), Chicks Care (T4) and Hatched chicks straight
Means with different letters in the same row are statistically different (P<0.05).

Figure (1) show the effect of different sounds on non-essential amino acids in the thigh, there was a significant differences (p<0.05) in aspartic acid, glutamic acid, glutamine, glycine, histidine, arginine, alanine, proline, tyrosine and cysteine percentage in meat for experimental treatments (T2, T3 and T4 µg/ml oil) respectively compare with control treatment (T1 µg/ml oil).

Figure (2) show the effect of different sounds on essential amino acids in the thigh, there was a significant differences (p<0.05) in isoleucine, leucine, phenylalanine, lysine, methionine, valine, threonine and tryptophan percentage in meat for experimental treatments (T2, T3 and T4 µg/ml oil) respectively compare with control treatment (T1 µg/ml oil).

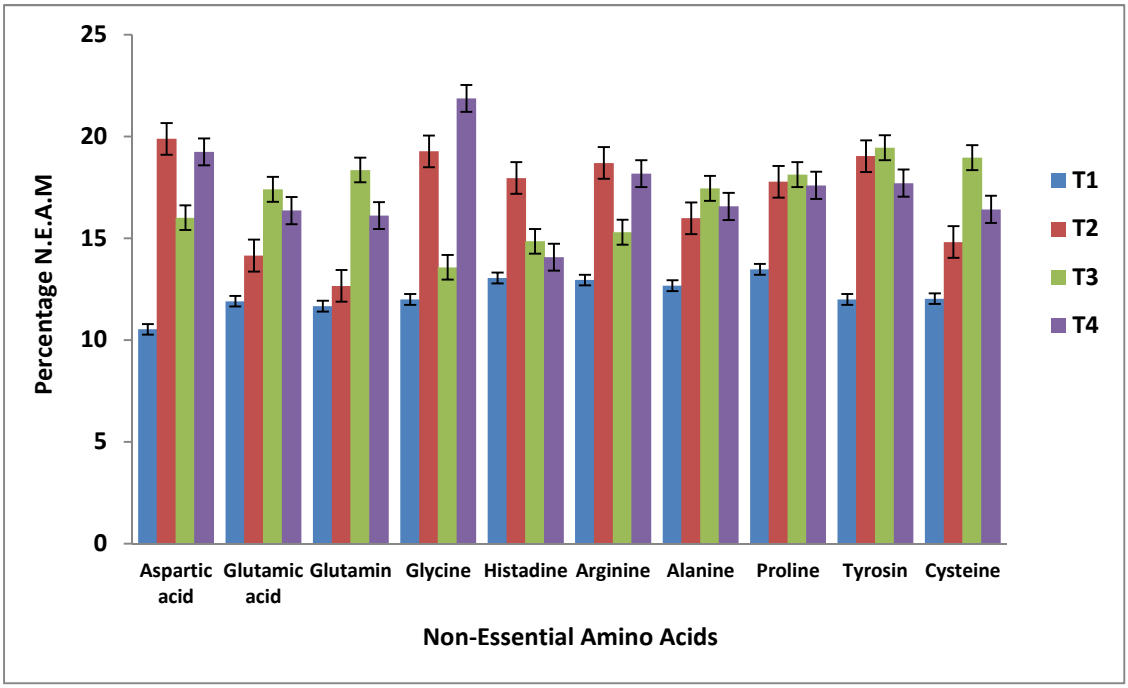

Figure-1: The effect of different sounds on non-essential amino acids µg/ml oil in the thigh

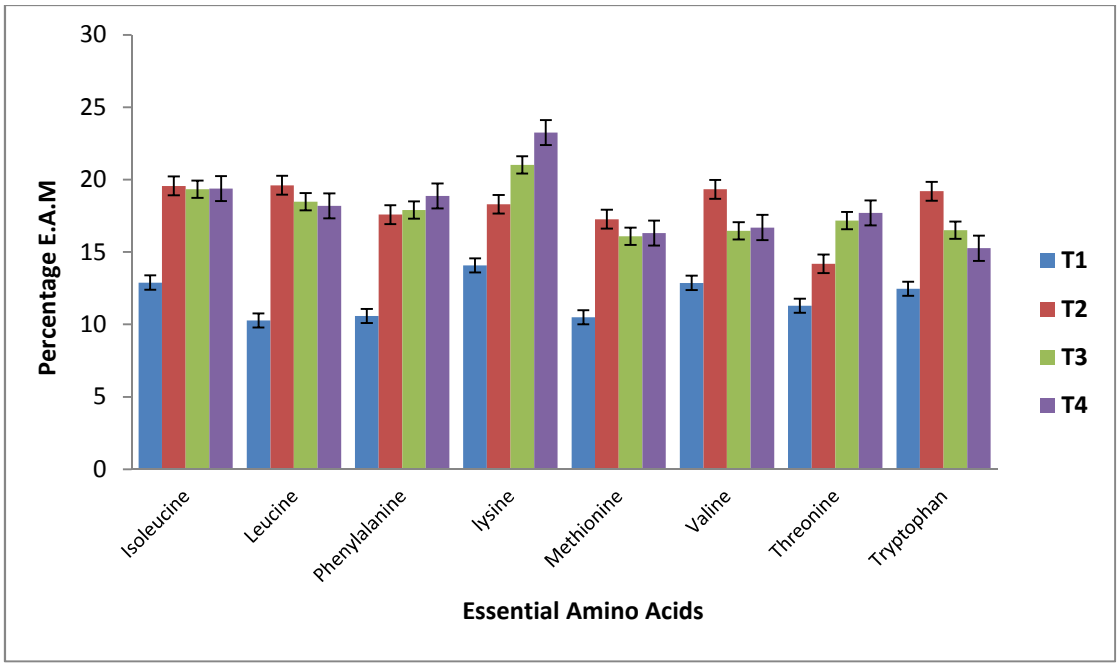

Figure-2: The effect of different sounds on essential amino acids µg/ml oil in the thigh

Figure (3) show the effect of different sounds on non-essential amino acids in the breast, there was a significant differences ($p<0.05$) in aspartic acid, glutamic acid, glutamine, glycine, histidine, arginine, alanine, proline, tyrosine and cysteine percentage in meat for experimental treatments (T2, T3 and T4 µg/ml oil) respectively compare with control treatment (T1 µg/ml oil).

Figure (4) show the effect of different sounds on essential amino acids in the breast, there was a significant differences ($p<0.05$) in isoleucine, leucine, phenylalanine, lysine, methionine, valine, threonine and tryptophan percentage in meat for experimental treatments (T2, T3 and T4 µg/ml oil) respectively compare with control treatment (T1 µg/ml oil).

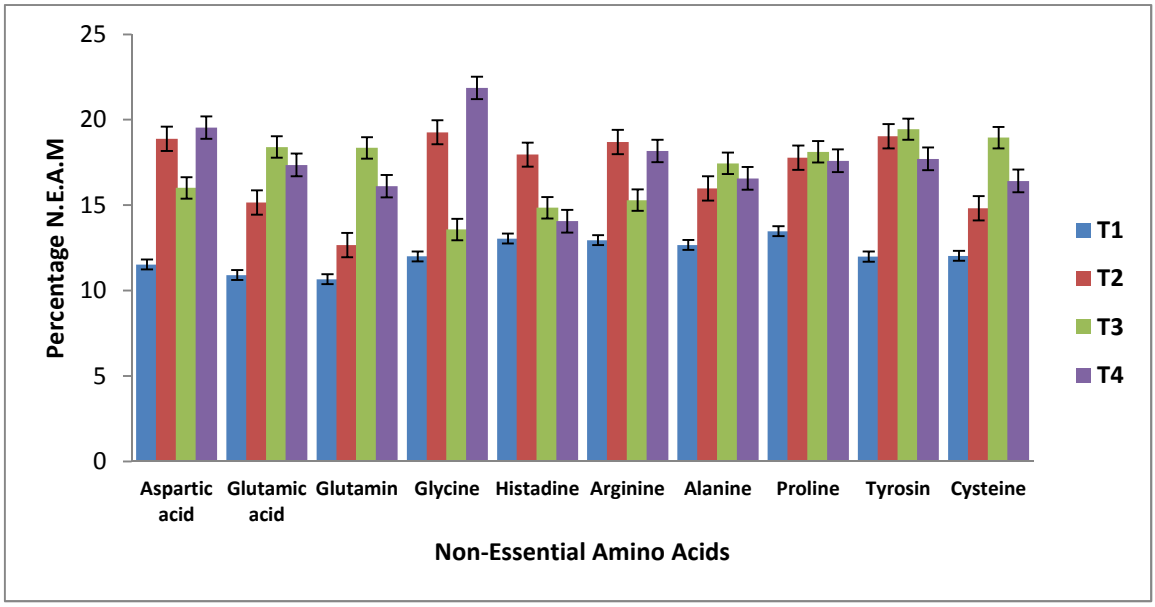

Figure- 3: The effect of different sounds on non-essential amino acids µg/ml oil in the breast

In this study, we observed the effects of sounds on broiler chicks and their meat, and these effects were positive or negative depending on the type of sound. When heard for the first time, new noises can induce a feeling of fear in chicks, as noted by Barnard (1983) *[16]*, which raise the concentration of the stress hormone known adrenocorticotropic hormone (ACTH). Next, the hormone corticosterone is secreted, and its main function is to assemble proteins, fat and glucose during difficult situations to make energy available to the brain, heart, nervous system and skeletal muscles *[17].* The corticosterone secretion will influence on quality of meat during change the muscles due to contraction of muscle fiber, thus tension of myosin and actin filaments Therefore, we observed differences in the meat traits due to there were not stress and fear, this gave the birds more and more of welfare and this will improving from their meat, *[18]*. The high level of plasma corticosterone in birds is not only indicative of impaired well-being, but it also has an effect on the quality of meat *[19]*. The increased in corticosterone concentration is correlating with a higher hue value, indicating, that the meat becomes lighter and less red in color. Consequently, very high stress levels in broiler chicken may do the production of paly thigh meat *[20]*. A stress induced increase in plasma fat level is also unwanted with regard to the quality of meat *[10]*. Meat quality maybe too be influenced by preslaughter management exercise *[21].* The increased output and secretion of epinephrine and glucocorticoids in birds, which exposed to ante mortem stressors can impact postmortem metabolism and meat quality *[1]*. An increase in corticosterone concentration is correlating with a higher hue value. This indicate, that meat turn into lighter and less red in color. The very high stress levels in chicken maybe cause production of paly thigh meat. Whether or not this color alteration can be detected by a consumer is not known. The reason for the relationship between the stress level and color of thigh meat is not clear, though there was no difference in the total heme concentration because of treatments *[22]*. This increase the elements in meat so there was high value in ash and fat for control treatment compare with experimental treatments at semi time will decrease moisture which is reflected on water holding capacity.

The sounds will reduction in fear and anxiety did not only result from habituation but from hen vocalizations, which play an important role in quieting chicks and making them less fearful. Green less (1993) *[23]* noted that chicks become more active and relaxed if exposed to hen vocalizations or the sound of feeding, which led to improved feed consumption *[24]*thus will improving form their meat *[9].* In addition, hen vocalizations may decrease exploratory behavior, which reduces the amount of energy expanded to search for food and leaves more for growth *[25]*. Increase of welfare in birds made them increased the food intake, so this led to increased protein for complete the biological process, for this there was increasing in protein level in experimental treatments, so this led to increased amino acid in meat.

In conclusion: conclude that exposing chicks to their favorite sound will improve meat and consequently, improve consumption the meat by customer through hearing the chicken to sound will increasing welfare and improve meat quality.

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