Determining Some Undesirable Behavioral Traits and Their Impact on the Behavioral Performance of Broiler Chicks

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Abstract. This study was carried out on a poultry farm in the department of Animal Production – College of Agriculture - University of Anbar was achieved through two experiments, the first experiment was carried out during the period of 01-12-2020 to 15-12-2020. This experiment aimed to determine the undesired behavior in broiler chicks including fear, gathering, and isolation. Seventy-five unsexed chicks were used that belong to strain Ross 308 with the age of one day. Chicks were randomly distributed to five replications, each replicate contained 15 chicks. The second experiment from 31-01-2021 to 14-02-2021 and remove the undesired behavioral traits which were determined in the first experiment by using the natural stimulator (sound). Also, seventy-five unsexed chicks belonging to the same strain (Ross 308) were used with an age of one day as well as distributed to 5 replicates and each replicate contained 15 chicks. The results showed that there were significant differences between the two experiments in each of the traits of fear, grouping, and isolation due to the natural stimulator (sound) to broiler chicks.

1. Introduction
The broiler chicks are one of the species that are Precocial, as when they hatch, they can rely on themselves for their food, as they are advanced in growth and their body is covered with feathers, they can open their eyes, run and jump very easily [1]. Therefore, their presence with hen is limited only to teaching them some skills that help them complete her life, live and protect them easily. The chicks have the Critical Period, which helps them follow the hen during the hatching. Thus, the disappearance of the hen from the chicks as a result of artificial hatching may cause a situation of Disorder Behavior, which leads to a change in the behavior of the chicks and the creation of a state of fear behavior in the chicks [2]. The emergence of this fear in the chicks caused the generations to transmit this fear generation after generation and create a state of behavior that makes the chicks in the first days of their life farther from each other and afraid, this makes them more anxious and thus leads to confusion of a percentage of the
chicks and makes them isolated and separated from each other more and more especially in the first days of hatching [3]. The first week of the life of broiler chicks in modern breeds is very important due to the speed of their growth and the short period of their rearing, as the first week constitutes about 15-20% of the length of the period of rearing them, and any error that occurs during these first days cannot be corrected, but mistakes must be prevented, as The loss of one gram of body weight at the age of one day leads to a decrease of 100 grams of body weight at the age of marketing [4]. Among the most common mistakes and problems that occur in the early days of the rearing period are behavioral problems such as fear and isolation in distant dark areas and gathering, which reduces their intake of feed and water and thus affects the marketing weight, The emergence of these behavioral problems as a negative side effect of the process of genetic improvement and selection for high productive traits [5]. In the case of natural hatching, the presence of the hen with chicks reduces the exploratory behavior in searching for food by the hen clicking on the ground to find food. In this way, the chicks reach the places of food without effort or effort, but in the case of artificial hatching and breeding in commercial fields, the lack of presence of the hen makes the chicks spend a long time searching for a food source in addition to expending a great deal of energy [6]. Biological stimuli such as sound stimuli may affect cognitive learning, which can play an important role in brain development, nerve formation and sensation [7], Biological stimuli such as sound and light improve the biological processes and morphological changes of chicks and increase their ability to move [8, 9].

This study was suggested to identify some undesirable behaviors in broiler chicks that affect the state of the chicks, make them afraid, anxious and thus affect production, so it can be determined by the use of natural stimuli. The objective of this study is to identify these undesirable behaviors and highlight the natural behaviors, which leads to an improvement in behavioral traits and thus productivity.

2. Materials and Methods

This study was conducted into two parts, the first was to determine what are the behavioral problems in chicks and the second how to solve these problems using natural stimuli (sound of hen). This experiment was carried out in the fields of the Department of Animal Production/ College of Agriculture/ University of Anbar for a period of 14 days, from 1/12/2020 to 15/12/2020, using 75 one-day-old birds from unsexed broilers of (ROSS 308) strain. Randomly to five replicates of 15 birds for each replicate, as each replicate was colored in a different color than the other replicate, no treatment was used in this experiment. The behavior of chicks was monitored by surveillance cameras, and behavioral data were taken at six different times of the day (2 am, 6 am, 10 am, 2 pm, 6 pm and 10 pm). The birds were raised in a semi-enclosed pen of 3×4 dimensions. Provide all the requirements of regular rearing. Behavioral traits were studied as follows:

The fear behavior was studied by observing the situation in which the chicks of each repeater are present at different times of the day when observing the chicks, we counted the number of isolated chicks, that is, located at the corners of the field and recorded them, considering that they were very afraid. Chicks that are a little far from the corner were considered Medium afraid, and those that are farther away from the corner are a little afraid. As for the chicks that are spread out, far from the corners and walls, they are considered natural and not afraid, this is what was applied to each repeater (color) and at each of the specified times to take Data per day during the trial period [10, 11].

The behavior of the gathering was studied by calculating the shape of the assembly and the number of chicks presents in it for each replicate. When the number of chicks is less than five, it is considered normal and not gathering, when the number is from five to ten chicks, it is considered a little gathering, when the number of chicks present in one place is from ten to fifteen, it is considered medium gathering, and when
the number of chicks present in one place is more than fifteen, it is considered densely gathering, this is what was applied to each repeater (color) and at each of the specified times to take data per day during the trial period [10, 11].

The approach and distance behavior was studied by counting the number of chicks present in four locations of the field. The number of chicks close to the wall, the number of chicks that are slightly farther from the wall, the number of chicks that are a medium distance from the wall, which are in the middle of the distance between the wall and the middle of the field, and the number of chicks that are in the middle of the field, and this is what was applied to each repeater (color) and at each of the specified times to take data per day during the trial period [10, 11].

The second experiment is a solution to the problem that appeared in the first experiment of the study, the experiment aimed to study the use of natural stimuli (sound) when raising broiler chicks and to know the extent of their impact in reducing undesirable behaviors, This experiment was carried out in the fields of the Department of Animal Production - College of Agriculture - University of Anbar for a period of 14 days for the period from 31/1/2021 to 13/2/2021 using 75 one-day-old unsexed broilers of the strain (ROSS 308). Randomly distributed into five repetitions of 15 birds for each repeater, and the color of each repeater was a different color from the other. During this experiment, the chicks were exposed to the natural stimulus (sound), which is the hen chicken voice, by using a headset (mini speaker), hanging above the feeder at a height of 50 cm. The sound source is a voice recorder with a frequency (20-30dB) as the sound is played every four hours once for an hour (2 am, 6 am, 10 am, 2 pm, 6 pm, 10 pm), the second experiment was carried out in the same field in which the first experiment was conducted and by following the same steps as the first experiment in terms of providing the conditions of the experiment in terms of management and provision of feed and water, the method and the same measured behavioral data.

The Chi-Square statistical test for non-parametric traits was used to find out the extent of differences between the observed and expected values, and the data were analyzed using the statistical program SPSS, as well as using the Excel program to display the results [12].

3. Results and Discussion

Figure (1) show comparing the percentage of fear during the first week of the study before and after exposure to the natural stimulus (sound) that there is a significant difference in the percentage of very fear for the experimental chicks amounted to 66.7% before exposure to the natural stimulus (sound), while the percentage of fear after exposure to the stimulus became The natural (sound) ratio was 33.3%. As for the medium fear ratio, it is noted that before exposure to the natural stimulus it was 57.1%, while the ratio after exposure to the natural stimulus (sound) became 42.9%. From the same figure, we note that the percentage of a little afraid before exposure to the natural stimulus (sound) was 80%, while the percentage after exposure to the natural stimulus (sound) became 20%, and the percentage of those who were not afraid was equal before and after exposure to sound and amounted to 50% for each.
Figure 1. Shows the percentages of fear during the first week in both experiments

Figure (2) shows the percentage of fear in the second week of the experiment before and after exposure to the natural stimulus (sound), as there is a significant difference in the percentage of very fear for the experimental chicks amounted to 100%, while the percentage of fear after exposure to the natural stimulus (sound) was 0.0%. Concerning the medium afraid percentage, it is noted that the number of chicks before exposure to the natural stimulus was 100%, while the percentage after exposure to the natural stimulus (sound) was 0.0%. From the same figure, note that the percentage of chicks before exposure to the natural stimulus (sound) was 100%, while the percentage was Little after exposure to the natural stimulus was 0.0%, while the percentage of those who were not afraid before exposure to the natural stimulus (sound) was 28.6%, while the percentage after exposure to the natural stimulus was 71.4%.

Figure 2. Shows the percentages of fear during the second week in both experiments
The presence of chicks with the hen is an instinctive trait, so when the hen is not present in the artificial hatching, a feeling of fear is generated in the chicks because of their feeling that there is no one to take care of them [8]. The feeling of comfort and safety for the chicks when they hear the stimulating sound of the hen leads to the secretion of opioids from the brain cells by the effect of hearing the natural stimuli (sound) that work to relax and numb and thus work the chicks to get closer to the sound that they feel safe and therefore stay longer periods near the sound Her favorite, and this is what he mentioned [13, 14]. Opioids have an important role in forming social bonds, increasing the approaching behavior, increasing feelings among young chicks associated with learning, and strengthening the bonds of the imprinting process. From what was mentioned above, it can be concluded that the problem of fear of chicks can be solved by using natural stimuli such as the hen voice or any sound that contributes to the feeling of comfort and safety for the chicks, and accordingly the chicks can be safer and more comfortable [15, 16].

Figure (3) show the rate of gathering for the first stage of the experiment before and after exposure to the natural stimulus (sound) that there is a significant difference in the percentage of very gathering for the experimental chicks amounted to 72.7%, while the percentage of gathering after exposure to the natural stimulus (sound) was 27.3% As for the medium gathering, it is noted that chicks before exposure to the natural stimulus were 57.1%, while the ratio after exposure to the natural stimulus (sound) was 42.9. From the same figure, we note that the percentage of a little gathering before exposure to the natural stimulus (sound) was 66.7%, while the percentage after natural exposure (sound) was 33.3%, and the percentage of not gathering was 11.1% before exposure to the natural stimulus (sound), while it became The ratio after exposure to the natural stimulus was 88.9%.

![Figure 3. Shows the gathering behavior in the first week of the study in both experiments](image)

Figure (4) shows the percentage of gathering in the second week of the experiment before and after exposure to the natural stimulus (sound), as there is a significant difference in the rate of very gathering, as the percentage of the very gathering was of 100%, while the percentage of this trait was after exposure to the natural stimulus (sound) was 0.0%. The medium gathering rate, it is noted that the ratio before exposure to the natural stimulus was 100%, while it became 0.0% after exposure to the natural stimulus.
From the same figure, noted that the percentage of a little gathering before exposure to the natural stimulus (sound) was 71.4% while this percentage after exposure to the natural stimulus became 28.6%, as for the non-gathering, it was 13.3% before exposure to the natural stimulus (sound), while after exposure to the natural stimulus, the percentage became 86.7%.

Figure 4. Shows the gathering behavior in the second week of the study in both experiments

The gathering of chicks in one place is considered an undesirable behavioral trait, because it indicates the presence of one of the factors that contribute to the fear or distance of the chicks, such as the presence of anxiety or the presence of weather conditions such as cold, and all these cases make a proportion of the chicks distant and isolated and gather among themselves in the form of blocks [17]. Therefore, this gathering works to cause some physical and psychological damage to the body, for example, causing scratches or wounds in the body of the chicks, which eventually leads to the emergence and development of an undesirable behavioral condition, which is the behavior of predation and cannibalism which leads to the mortality of many chicks [18]. From observing the above figures, it appears that there is a change in the gathering of chicks, and this may explain as a result of the natural stimuli that may have contributed to the removal or cancellation of the state of behavioral disorder in the chicks and the cancellation of the compulsive phase that the chicks go through and which they believe that something will harm them or prey on them and thus break this characteristic of gathering and be Chicks return to normal [19].

Figure (5) shows the percentage of approach behavior in the first week of the experiment before and after exposure to the natural stimulus (sound), as it is noted that there is a significant difference in the percentage of very approach behavior for the experimental chicks. The percentage of medium approaching the walls was 75% before exposure to the natural stimulus (sound). While this percentage after exposure to the natural stimulus (sound) became 25%, as for the percentage of little approach behavior was noted that it was 66.7% before exposure to the natural stimulus and after exposure to the natural stimulus it became 33.3%, and for the medium approach behavior, it is noted that the percentage was equal before and after exposure to the natural stimulus (sound) 50% for each of them. From the same figure, we note
that the normal ratio (not approach) before exposure to the natural stimulus (sound) was 20%, while the ratio after exposure to the natural stimulus became 80%.

![Figure 5](image)

**Chi-Square =6.26**

**Before**  
**Approach** 75  **Medium Approach** 66.7  **Little Approach** 33.3  **Not Approach** 20

**After**  
**Approach** 25  **Medium Approach** 50  **Little Approach** 50  **Not Approach** 80

Figure 5. Shows the approach and distance behavior in the first week of the study in both experiments.

Figure (6) show the rate of approach behavior in the second week of the experiment before and after exposure to the natural stimulus (sound) that there is a significant difference in the ratio of very approach behavior for the experimental chicks. For the trait, it was 100% before exposure to the natural stimulus (sound), while the ratio was after exposure to the natural stimulus (sound) 0.0%. However little approach behavior, it is noted that the ratio was also before exposure to the natural stimulus 100%, while the ratio after exposure to the natural stimulus (sound) was 0.0%, and from the same figure, note that the ratio of the medium approach behavior was before exposure for the natural stimulus (sound) 83.3% and after exposure to the stimulus it became 16.7%, while the percentage of normal approach behavior (not approach) was 25.3% before exposure to the natural stimulus (sound), while the percentage after exposure to the natural stimulus became 74.7%.
The percentage of approach and distance behavior from the wall or distant, dark places is one of the behaviors of chicks that stimulate the presence of an inherited psychological factor through their exposure to some pressures such as fear, strong noise, strong lighting, unbalanced diet, or their sense of danger that threatens them, here, a case of hereditary stress syndrome is generated, thus making the chicks always in a state of anxiety, fear and isolation [20]. The reason for the increase in the number of times of approaching natural stimuli (sound) is due to the role of sound in influencing the chicks, as the natural stimulus works to modify the position of the chicks and helps to improve their brains and nervous system and to modify their sensory Cognition [21]. By this, the chicks can produce a reaction in response to the natural stimulus, the preferred sound that they feel when they hear it with comfort and reassurance and feel that they are close to the hen [22]. This leads the chicks to feel that there is a chicken hen that will take care of them and protect them, and thus the chicks rest and relax, and then the chicks become more active and the motor ability increases, the behavior of the chicks develops, and their feeling of comfort and relaxation increases when they hear the appropriate sound because of the development of her brain, as the development of the brain increases the biological processes in the body [23, 24].

4. Conclusion

Through the current study, the undesirable behavioral traits (fear of gathering and isolation) were detected and known in broiler chicks, some undesirable behavioral parameters that affect the health and production of chicks have been identified, thus, it was modified using natural stimuli (sound) and this led to a high improvement in the welfare and health of the chicks, which was reflected in an improvement in the behavioral performance of the chicks.
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