



## EFFECT OF DIFFERENT BREEDING TYPE ON DESIRABLE AND UNDESIRABLE BEHAVIORAL TRAITS OF BROILER CHICKENS

Maha M. Hassan <sup>1</sup> and S. M. Abdulateef <sup>\*2</sup>

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<sup>1</sup> College of Agriculture, University of Anbar, Iraq.

<sup>2</sup> College of Education for Pure Sciences, University of Anbar, Iraq.

\* **Corresponding author:** Prof. Dr. Salwan M. Abdulateef, College of Education for Pure Sciences, University of Anbar, Iraq.

Email: [ag.salwan.mahmood@uoanbar.edu.iq](mailto:ag.salwan.mahmood@uoanbar.edu.iq)

**Abstract:** This study was conducted in the poultry fields of the Department of Animal Production / College of Agriculture at the University of Anbar in order to study the effect of the different breeding type on the desirable and undesirable behavioral traits of broiler chickens through the use of roosting behavior, sand bedding, theater system and some other breeding methods and to reveal which is better in increasing welfare. And knowing its effect on behavioral and physiological productive traits. 120 ROSS 308 birds were used, with an average weight of about 40 gm, as they were randomly distributed to six treatments (T1, a group of rearing inside the hall using the system of free theaters and perches, T2 a group of rearing inside the hall, regular breeding using perches, T3 a group of rearing inside the hall using the system of free theaters, T4 control group (inside the hall regular breeding), T5 rearing group outside the hall using perches, T6 rearing group outside the hall), for each treatment 20 birds and each bird was considered as an experimental unit. In order to apply the natural simulation, the sand floor was used in the free scale treatments (the second treatment ROSS was feeding using the ad libitum free feeding system, the results showed: There is a significant difference ( $P \leq 0.05$ ) in the productive performance in the characteristic of body weight (g), weight gain, relative growth rate, and productive index for T1, T2, and T3 compared to other treatments. There was a significant improvement ( $P \leq 0.05$ ) in the desired behavioral traits, namely walking, cleaning, immobility, and wing flapping, in T1, T2, and T3 treatments compared to another treatment. There was a significant decrease ( $P \leq 0.05$ ) for undesirable behavioral traits in feather plucking and aggressiveness for T1, T2, and T3 compared with another treatment (third and sixth), and the rearing period was 42 days. Lighting and vaccination programs were followed according to the recommendations of the ROSS company's guide.

**Keywords:** Broiler chickens, Breeding systems, Behavioral traits, Poultry welfare and Physiological traits

### 1. Introduction

The new trend began in breeding domestic birds, especially in recent years, towards raising them in a way that simulates the natural, that is, in a more comprehensive sense, that the bird lives as if it were in the natural environment. Furnished cages that resemble and simulate what is found in nature and provide all requirements for birds. It is noted that when birds are placed in them, their vital processes will develop, and thus their production will increase in quantity and quality [1]. The development and manufacture of domestic birds during the previous years led to a lack of knowledge in understanding what

luxury is in raising domestic birds, which made breeders and companies work on the diversity and multiplicity of breeding types, which harm the welfare of domestic birds, which led to a decrease in production and at the same time works to affect the quality The production of meat and eggs [2], on the other hand, new ideas and suggestions began to be generated by educators or some companies about breeding systems for domestic birds, most of which were not studied scientifically and took a wide spread among breeders and are adopted on the wrong basis in poultry farming It does not provide any level of luxury, which led to a setback in the production of poultry, whether in terms of meat or eggs [3]. [4] indicated that the use of different breeding methods leads to the best well-being of the birds and thus gives the strongest production, as the addition of environmental enrichment tools (visual, structural, and plastic) stimulates the birds to increase their movement and physical activity, and thus an improvement in the level of well-being, which leads to an increase Secretion of nerve stimuli and thus improves the productive performance of domestic birds [5].

Therefore, this study aimed to test different types of broiler breeding by simulating nature and to reveal which is better in increasing welfare and to know its effect on behavioral performance.

## 2. Materials and Methods

A total of 120 one-day-old broiler chicks of the ROSS 308 strain were obtained from a hatchery in Baghdad Governorate, with an average initial weight of 40 g. The chicks were randomly allocated into six treatment groups, with 20 birds per treatment. Each bird was individually numbered and considered an experimental unit. The treatments were classified based on the rearing system as follows:

- Treatment 1: Combined indoor and outdoor rearing system, incorporating indoor and outdoor perches, with river sand used for outdoor rearing and mulching indoors.
- Treatment 2: Indoor rearing system only, utilizing perches and sawdust as bedding.
- Treatment 3: Indoor rearing system with sawdust bedding, combined with outdoor access on river sand, but without perches.
- Treatment 4: Indoor rearing system with sawdust bedding and no perches.
- Treatment 5: Outdoor rearing system with sand bedding and roosts.
- Treatment 6: Outdoor rearing system with sand bedding and no roosts.

The experiment was conducted in the fields of the Animal Production Department of the College of Agriculture / University of Anbar, and the chicks were reared on the ground from the date 10/28/2022, and it lasted for six weeks in a hall divided into 6 sections (Pen).

The birds were reared using a (Pen) system, part of which was in a closed hall with dimensions of 4 x 5 m containing part of it.

There are outlets for this system of internal education and external education (joint) with regard to repeated No. 1, 2, 3, and 4. As for repeaters 4 and 5, in which education is external only, before starting the experiment, the process of cleaning the hall and outdoor places with water and detergents was done for several times, and it was evaporated with four million After all windows and ventilation openings were closed, and they were closed for three days after fumigation, after that the place was well ventilated one day before the arrival of the chicks, temperature and humidity meters were placed in all repeaters, incubators and electric heaters were used, 40-watt lighting lamps were placed, and feeders and manholes were placed Plastic made homogeneously for all replicates, taking into account turning off the light at some times of the night and day during the second week, so that the chicks return to rest. The floor was covered with sawdust with a thickness of 6 cm for some of the internal breeding, while the external was furnished with sand with a thickness of 5 cm.

studied traits:-

Behavioral measurements

The behavioral characteristics of broiler chickens were measured according to what is shown in the table below and as indicated by [6], [7].

Behavior Describe the behavior

desirable behaviours

Walking

Walking Birds walk quickly or lightly back and forth like exercise

cleaning

Preening Maintenance behavior found in birds that involves using the beak to lay down feathers, intertwining feathers that have become detached, preening the feathers, and keeping an eye on external parasites.

Inertia

Immobility Birds lie on perch and laid to one side with wings while head resting on the ground or erect; The eyes may be open or closed and the bird may be standing or lying down.

Wing flapped

Wing flapping

Wings moving up and down, idiosyncratically or as if in flight, and wing flapping is often a sign of how happy they are.

Feather picking

pick A behavior related to playing behavior, which is the selection and removal of some damaged or unwanted feathers on the body.

unwanted behaviours

pluck

Feather picking Birds begin to pluck their feathers, and this is generated from a lack of comfort, well-being, or the presence of a source of stress.

hostile

Aggressiveness A bird may also express behaviors that are negative or detrimental to its well-being, when frustrated or frightened.

### 3. Results and discussion

behavioral traits

The first period is desirable and undesirable traits

Figure A 3 for the first period of the desirable traits shows that there is a significant superiority in the proportion of desirable behavioral traits in the first period of age (1-14) if treatment T1 excels in the characteristic of walking if it reaches (13.3), followed by treatment T3 which reaches (12.3). ) on the rest of the transactions. The T1 treatment excelled in immobility when it reached (13.8), followed by the T3 treatment, which amounted to (12.2) over the rest of the treatments. Treatment T1 excelled in wing flapping when it reached (8.1), followed by treatment T3 which amounted to (7.7) over the rest of treatments. The T1 treatment excelled in dust bathing when it reached (9.1), followed by the T3 treatment, which reached (8.1) over the rest of the treatments. The T1 treatment excelled in preening when it reached (9.2), followed by the T3 treatment, which reached (8.7) over the rest of the treatments. The T1 transaction excelled in the characteristic of (pecking) when it reached (5.4), followed by the T3 transaction, which amounted to (4.8) over the rest of the transactions.

Figure B3 for the first period of undesirable traits shows that there is a significant superiority in the proportion of undesirable behavioral traits in the first period of life (1-14) if treatment T1, T5 and T6 excel in Feather Pecking if they reach (0) over the rest. transactions. The T1 treatment excelled in aggressiveness if it reached (0) over the rest of the treatments.

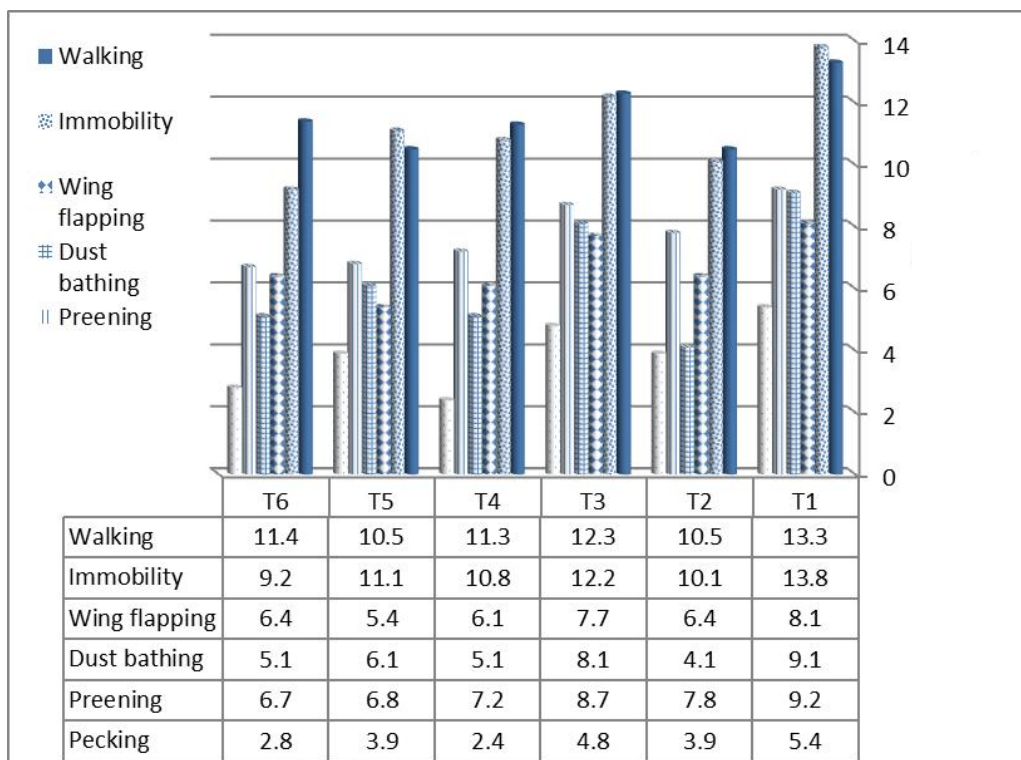


Figure A (3) The effect of breeding type on some desirable behavioral traits for the first period (1-14 days)

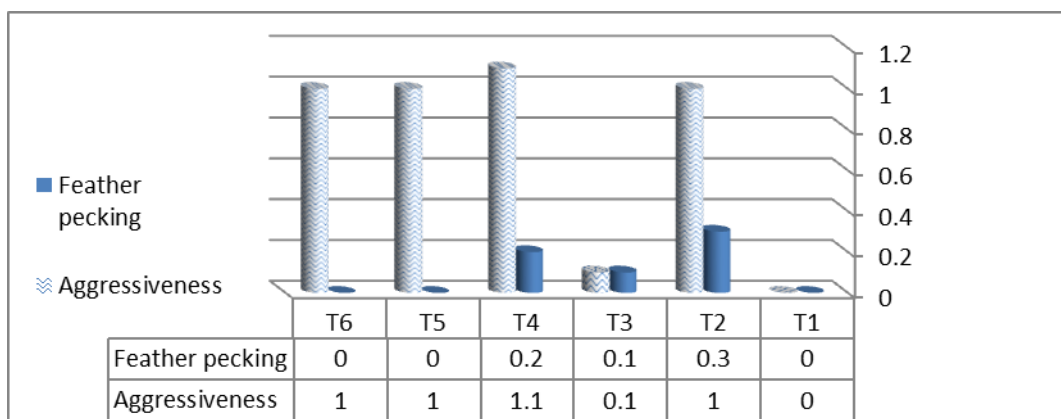


Figure B (3) Effect of education type on some undesirable behavioral traits for the first period (1-14 days)

The second period is desirable and undesirable traits

Figure A 4 for the second period of the desirable traits shows that there is a significant superiority in the proportion of desirable behavioral traits in the second period of age (15-28 days) if treatment T1 excels in the characteristic of walking if it reaches (11.6) to come after treatment T3 which reached ( 10.7) on the rest of the transactions. Transaction T1 excelled in immobility when it reached (23.4), followed by transaction T3, which reached (23.0) over the rest of the transactions. Treatment T1 excelled in wing flabbing when it reached (7.1), followed by treatment T3 which amounted to (6.7) over the rest of treatments. The T1 treatment excelled in dust bathing when it reached (11.7), followed by the T3 treatment, which reached (6.9) over the rest of the treatments. The T5 treatment excelled in preening when it reached (9.8), followed by the T4 treatment, which reached (9.6) over the rest of the treatments. Transaction T1 excelled in the characteristic of (pecking) when it reached (3.4), followed by transaction T3 and T5, which reached (2.2), over the rest of the transactions.

Figure B4 for the second period of undesirable traits shows that there is a significant superiority in the proportion of undesirable behavioral traits in the second period of age (15-28) if treatment T1, T3 and T4 excel

in Feather Pecking if they reach (0) over rest of the transactions. The T1 treatment excelled in aggressiveness when it reached (.10) over the rest of the treatments.

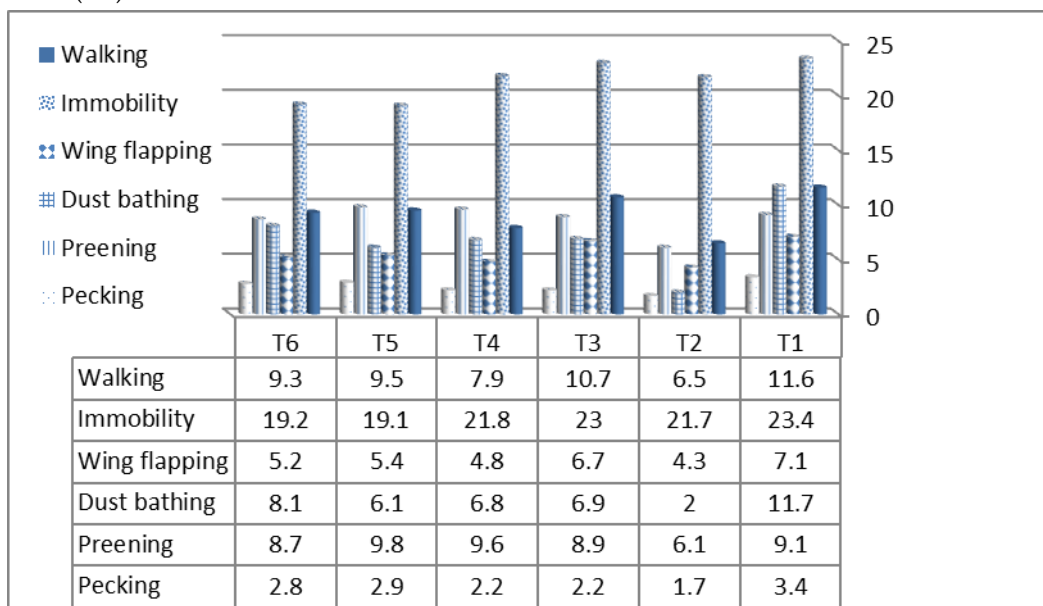


Figure (4) A The effect of breeding type on some desirable behavioral traits for the second period (15-28 days)

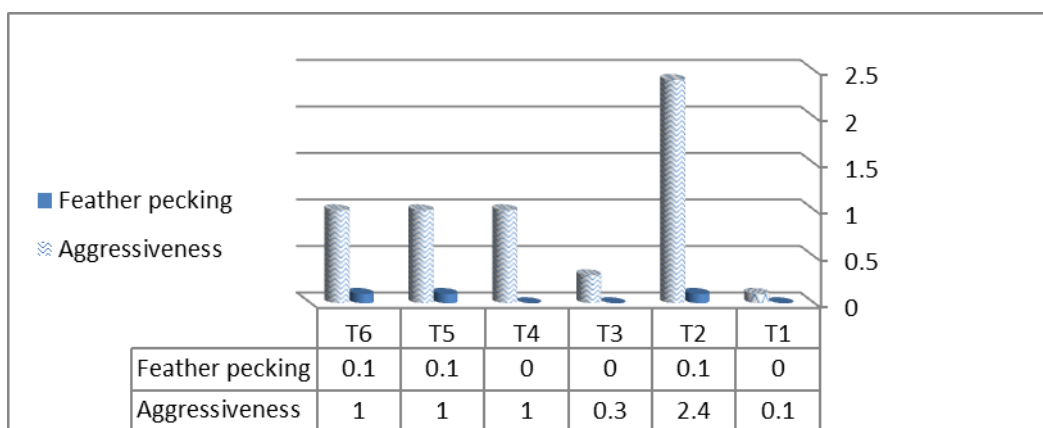


Figure (4) B Effect of breeding type on some undesirable behavioral traits for the second period (15-28 days)

The third period is desirable and undesirable qualities

Figure A 5 for the third period of desirable traits shows that there is a significant superiority in the proportion of desirable behavioral traits in the third period of age (29-40 days) if treatment T6 and T5 excel in walking trait if they reach (11.3) and (10.5). sequentially on the rest of the transactions. The T2 transaction excelled in immobility when it reached (35.5), followed by the T3 transaction, which amounted to (32.5) over the rest of the transactions. Treatment T6 excelled in wing flapping when it reached (7.4), followed by treatment T5 which amounted to (5.4) over the rest of treatments. The T6 treatment excelled in dust bathing when it reached (8.1), followed by the T4 treatment which reached (7.1) over the rest of the treatments. The T2 treatment excelled in preening when it reached (12.1), followed by the T3 treatment, which reached (11.3) over the rest of the treatments. The treatment T3 and T2 excelled in the characteristic of pecking if they reached (13.2) and (11.0) respectively over the rest of the treatments.

Figure B5 for the third period of undesirable traits shows that there is a significant superiority in the proportion of undesirable behavioral traits in the third period of age (29-42) if treatment T1, T3, T5, and T6 excel in Feather

Pecking if they reach (0) over rest of the transactions. The T1 treatment excelled in aggressiveness if it reached (0) over the rest of the treatments.

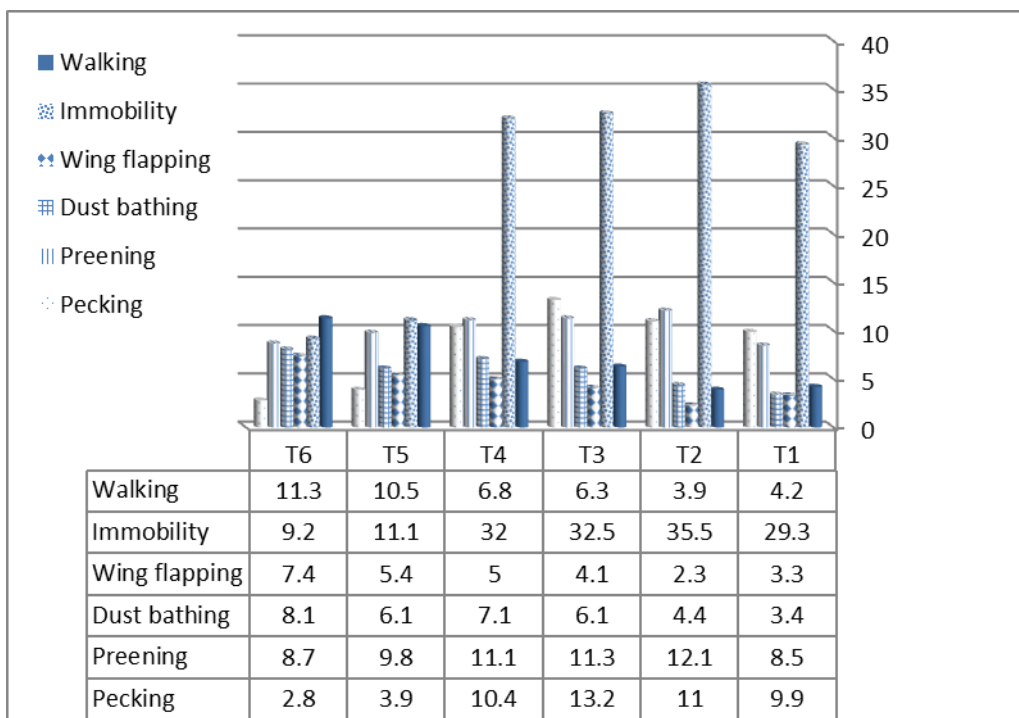


Figure (5) A The effect of breeding type on some desirable behavioral traits for the third period (29-42 days)

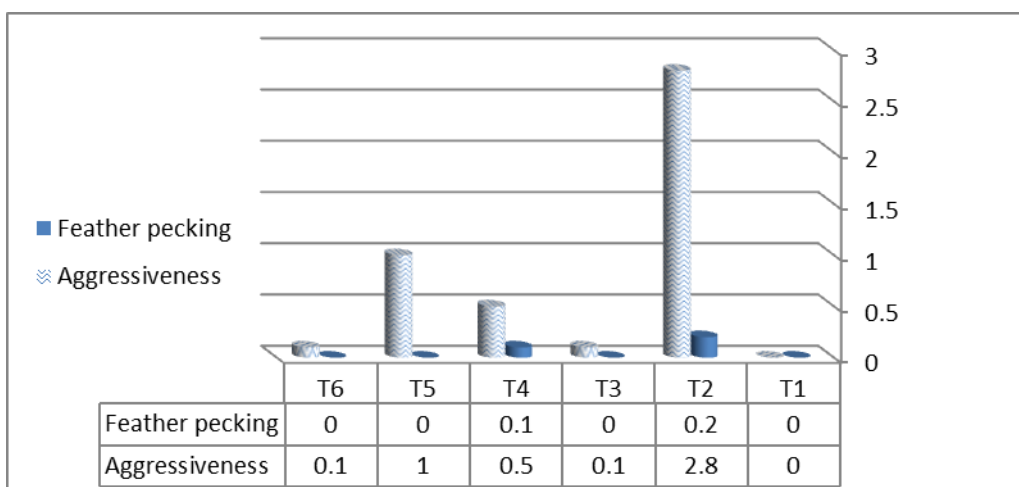


Figure (5) B Effect of breeding type on some undesirable behavioral traits for the third period (29-42 days)

Walking is considered one of the desirable characteristics, as the birds in the free range showed the highest levels of natural behavior and rest, as well as the standards of feeding, drinking, and walking were higher than the intensive system, as it was stressful for the birds [8]. The intensive system causes lack of walking and lack of comfort due to the number of birds in a specific place, as well as the intensive system causes an increase in humidity and temperature, which leads to an outbreak of diseases among birds, causing lack of production and losses for the breeder [9], in contrast to the free range system that It leads to an increase in comfort for the animal, which is definitely reflected in the breeder’s yield, as it will reflect the animal’s sense of well-being. And that the cause of grazing and free running helps to raise the level of the happiness hormone and the secretion of opioids for the body, which have an effective role in animal welfare, and this leads to an increase in animal consumption, which leads to an increase in production [10].

The locomotor activity and the ability of the bird to search for food work to improve the behavioral and productive characteristics and increase the body weight of the birds, and the presence of perches works on the well-being of the birds and improves the quality of meat, and the absence of perches (immobility) causes problems in the growth of leg bones [9], and cartilage Which leads to deformities in walking due to the bird sitting for a long time on the mattress, and when sitting for a long time, the droppings on the mattress cause skin lesions in the legs [11].

Ground education provides comfort to the birds, which leads to the practice of comfortable behavior as a result of the number of birds balanced with space, such behavior as walking, escaping, and wing flapping, while cage breeding restricts the movement of birds [12].

It seems that the availability of litter consisting of sand has stimulated the birds to search and increased their activity [13].

And skin inflammation may have significant effects on the well-being and financial return of the breeder. A study was conducted on sand brushing instead of sawdust in some regions of the United States, where it was noted that sand is useful because it contains a small number of microorganisms. Sand brushing also works (dust bathing and cleaning). Preening) to express more active chicken behaviors and perhaps improve the condition of the leg bones, here the birds, starting from the age of 4-6 days of age, take a mattress bath or a dust bath, for several reasons, the most important of which is that the birds maintain the cleanliness and shine of their feathers, when the bird removes the mattress On his body, the brush permeates his feathers, removing the layer of old fat that stuck to it and anything that has been attached to the feathers, and the distances between the feathers become equal. It is located above the compound area. When the bird presses on it with its beak, its muscles relax and the required oil flows from it, so that the bird will use it to reach its feathers in the process of applying feathers to expel anything stuck to it, such as insects, dust, etc. H. In addition, anointing the feathers with oil prevents their drying and protects them from brittleness. So, the litter box is a healthy phenomenon and is far from what some breeders think is a cholesteroid infection, as it has been shown that sand litter has a good effect on productive performance, reducing mortality and increasing the weight of chicks [14].

Pecking behavior is an instinctive or natural behavior of chickens, as chickens click either on the ground when searching for food or sand baths, or they click feathers on each other, either gently or strongly. The animal itself is the offspring of other animals that live with it, and it is one of the signs that affect the well-being of the organism, for example the density of breeding and crowding in the breeding field that causes discomfort to the organism and thus makes it behave unconventional, for example the emergence of cases of clicking and predation in chickens [15].

[16] indicated that there are some cages that cause undesirable damage to the birds, and one of the disadvantages of this system is that the birds are not free in the cages, that is, they are restricted in movement, and this leads to a reduction in their welfare. [17] found that maintaining the body and the behavior of maintaining the regulation of body temperature and motor performance can be reduced in traditional cages, which leads to a lack of herd efficiency or limitation because chickens naturally prefer more space to accomplish a certain behavior.

Another modern trend used in poultry farming is the use of the Free-Range system, which is a system in which chickens live in the form of open theaters, where the chickens can go out and enter freely, thus giving the birds freedom of movement, a sense of freedom, and an increase in their level of well-being [18]. [19] indicated that the use of this system will calm the birds and reduce the process of predation as well as feather pecking, which is considered an undesirable trait, and makes the birds have a high and relaxed mood and thus an increase in production as a result of an increase in the growth of which energy is directed towards Directly when the birds do not have rest, the feather pecking behavior becomes strong due to the increase in stress hormones, and this

in itself is a major welfare problem because it causes damage and injury to the feathers, which leads to destruction and losses in production and economic returns [20].

The effect of the type of breeding on body weight when increasing the numerical density per square meter on the floor of the barn leads to a decrease in the weight of the chicken. It is known that the phenomenon of predation disease appears in chickens at the age of 1-21 weeks, and this results from the influence of the surrounding environment, the most important of which is the place and the number of the herd. The phenomenon of predatory disease (Aggressiveness) is about chickens pecking at each other on the head and outlet areas, and the appearance of some lacerations and bleeding in those areas [21].

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#### 5. References

- [1] E. C. D. O. Sans, F. A. M. Tuyttens, C. A. Taconeli, P. M. Rueda, J. R. Ciocca, and C. F. M. Molento, "Welfare of broiler chickens reared in two different industrial house types during the winter season in Southern Brazil," *Br Poult Sci*, vol. 62, no. 5, 2021, doi: 10.1080/00071668.2021.1908519.
- [2] J. Webster, *Management and welfare of farm animals : UFAW farm handbook*, vol. 11, no. 5. 2011.
- [3] A. P. O. Souza, F. A. M. Tuyttens, C. A. Taconeli, J. C. Biscarra, and C. F. M. Molento, "Ordinal or visual analogue scales for assessing aspects of broiler chicken welfare?," *Journal of Applied Animal Welfare Science*, vol. 27, no. 3, 2024, doi: 10.1080/10888705.2022.2105648.
- [4] M. S. Zahoor *et al.*, "Effects of mirror and coloured balls as environmental enrichment tools on performance, welfare and meat quality traits of commercial broiler," *Trop Anim Health Prod*, vol. 54, no. 2, 2022, doi: 10.1007/s11250-022-03155-1.
- [5] G. A. Coria-Avila *et al.*, "The Neurobiology of Behavior and Its Applicability for Animal Welfare: A Review," 2022. doi: 10.3390/ani12070928.
- [6] *Poultry behaviour and welfare*. 2004. doi: 10.1079/9780851996677.0000.
- [7] A. L. Geng *et al.*, "Effects of indoor stocking density on performance, egg quality, and welfare status of a native chicken during 22 to 38 weeks," *Poult Sci*, vol. 99, no. 1, 2020, doi: 10.3382/ps/pez543.
- [8] C. W. Van Der Pol *et al.*, "Lighting schedule and dimming period in early life: Consequences for broiler chicken leg bone development," *Poult Sci*, vol. 94, no. 12, 2015, doi: 10.3382/ps/pev276.
- [9] J. A. Mench, J. P. Garner, and C. Falcone, "Behavioral activity and its effects on leg problems in broiler chickens," *Proc. 6th Eur. Symp. Poult. Welf. H. Oester and C. Wyss, ed. World's Poultry Science Association, Zollikofen, Switzerland*, pp. 152–156, 2001.
- [10] B. J. Mtileni, K. A. Nephawe, A. E. Nesamvuni, and K. Benyi, "The influence of stocking density on body weight, egg weight, and feed intake of adult broiler breeder hens," *Poult Sci*, vol. 86, no. 8, 2007, doi: 10.1093/ps/86.8.1615.
- [11] D. and M. M. C. Nelson, *Lehninger Principles of Biochemistry (4th ed.)*, vol. 33, no. 1. 2004.
- [12] D. C. Lay *et al.*, "Hen welfare in different housing systems," *Poult Sci*, vol. 90, no. 1, 2011, doi: 10.3382/ps.2010-00962.

- 
- [13] C. Arnould, D. Bizeray, J. M. Faure, and C. Letterrier, "Effects of the addition of sand and string to pens on use of space, activity, tarsal angulations and bone composition in broiler chickens," *Animal Welfare*, vol. 13, no. 1, 2004, doi: 10.1017/s0962728600026713.
- [14] J. L. Grimes, J. Smith, and C. M. Williams, "Some alternative litter materials used for growing broilers and turkeys," 2002. doi: 10.1079/WPS20020037.
- [15] W. Timberlake and G. A. Lucas, "Behavior systems and learning: From misbehavior to general principles," in *Contemporary Learning Theories: Instrumental Conditioning Theory and the Impact of Biological Constraints on Learning*, 2019. doi: 10.4324/9781315788982-12.
- [16] R. Tauson, "Mortality in Laying Hens Caused by Differences in Cage Design," *Acta Agriculturae Scandinavica*, vol. 35, no. 2, 1985, doi: 10.1080/00015128509435772.
- [17] C. J. Nicol, "Effect of Cage Height and Area on the Behaviour of Hens Housed in Battery Cages," *Br Poult Sci*, vol. 28, no. 2, 1987, doi: 10.1080/00071668708416965.
- [18] T. Z. Sibanda, M. Kolakshyapati, M. Welch, D. Schneider, J. Boshoff, and I. Ruhnke, "Managing free-range laying hens—part a: Frequent and non-frequent range users differ in laying performance but not egg quality," *Animals*, vol. 10, no. 6, 2020, doi: 10.3390/ani10060991.
- [19] V. H. B. Ferreira, V. Guesdon, and L. Calandreau, "How can the research on chicken cognition improve chicken welfare: a perspective review," 2021. doi: 10.1080/00439339.2021.1924920.
- [20] P. C. Glatz, "Effect of Poor Feather Cover on Feed Intake and Production of Aged Laying Hens," *Asian-Australas J Anim Sci*, vol. 14, no. 4, 2001, doi: 10.5713/ajas.2001.553.
- [21] A. L. Hall, "The effect of stocking density on the welfare and behaviour of broiler chickens reared commercially," *Animal Welfare*, vol. 10, no. 1, 2001, doi: 10.1017/s096272860002323x.