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APPROPRIATE USE OF ENVIRONMENTAL ENRICHMENT FOR BROILER CHICKENS

Abstract The intensive system of poultry production is marked by the restriction of the natural behaviors of the animals, which causes significant losses to the welfare of the animals and the production. Animal welfare is defined as the ability of the animal to interact and live well in its environment or the way animals cope with the conditions in which they live, and must be, within scientific standards, healthy, comfortable, well nourished, safe, able to express innate behavior, and not suffer from unpleasant states, such as pain, fear and distress. Environmental enrichment is an alternative to modify the physical or social environment of the animals, improving the quality of life, providing conditions closer to the ethological needs and making the environment richer. It is necessary that there is an adequate choice of objects to be used as environmental enrichment, since in some cases, the animals may lose interest or not be interested. The objective of this review was to clarify the importance of environmental enrichment for the welfare of broilers housed in intensive systems and productivity in the face of market challenges. It was concluded that environmental enrichment promotes the improvement of animal welfare, and its use aims to reduce negative stimuli, presentation of unnatural behaviors and allow the expression of natural behaviors. Thus, the analysis of facilities, ambience and behavior is essential in reducing pain and discomfort of chickens.

Keywords: Animal welfare, productivity, PET bottles, poultry, perches.

UTILIZAÇÃO ADEQUADA DE ENRIQUECIMENTO AMBIENTAL PARA FRANGOS DE CORTE

Resumo *O sistema intensivo de produção de aves é marcado pela restrição dos comportamentos naturais dos animais. Bem-estar animal é definido como a capacidade do animal de interagir e viver bem em seu ambiente ou a forma como os animais lidam com as condições em que vivem, e deve ser, dentro de padrões científicos, saudável, confortável, bem nutrido, seguro, capaz de expressar comportamento inato, e não sofrer de estados desagradáveis, como dor, medo e angústia. Uma das formas de garantir o bem-estar animal é enriquecer o ambiente e uma alternativa é o enriquecimento ambiental, que é uma alternativa para modificar o ambiente físico ou social dos animais, melhorando a qualidade de vida, proporcionando condições mais próximas das necessidades etológicas e tornando o ambiente mais rico. É necessário que haja uma escolha adequada dos objetos a serem utilizados como enriquecimento ambiental, pois em alguns casos, os animais podem perder o interesse ou não se interessar. O objetivo desta revisão de literatura foi esclarecer a importância do enriquecimento ambiental para o bem-estar de frangos alojados em sistemas intensivos e a produtividade diante dos desafios do mercado. Conclui-se que o enriquecimento ambiental promove a melhoria do bem-estar animal e seu uso visa reduzir os estímulos negativos, apresentação de comportamentos não naturais e permitir a expressão de comportamentos naturais. Assim, a análise das instalações, do ambiente e do comportamento é essencial na redução da dor e do desconforto das aves.*

Palavras-chaves: *Bem-estar animal, produtividade, garrafas PET, aves, poleiros.*

Introduction

The intensive production of poultry has been marked by its ability to restrict animal behaviors, since it does not allow natural behaviors to be performed, generating stress situations (HEMSWORTH et al., 1989). Within the environment where an animal is inserted, there are several challenges that exert important pressures on them (JOHNSON; MCGLONE, 2007), resulting from the behavior of social hierarchy, the restrictive space and the bioclimatology of confinement.

When housed, in a certain breeding system, it is necessary that factors such as growth levels, optimal physiological and behavioral functioning are evaluated, according to the way animals behave when they relate to the environment and the influence of stress caused by it, allowing more adequate assessments of animal quality of life (MANTECA et al., 2013).

The lack of adequate environmental resources and inadequate management can determine changes in behavior, leading to losses in animal welfare and production (SARUBBI, 2010). Animal welfare involves physical and psychological perceptions in a range of characteristics and can be classified on a scale that varies between very good and very bad (BROOM; MOLENTO, 2004).

The evaluation of behavior is among one of the most practical and non-invasive methods of analysis of the welfare of chickens (POLETTO, 2010; DUPJAN et al., 2008). Behaviors defined as unusual, such as cannibalism, self-mutilation, excessive aggression indicate poor welfare conditions in birds (BROOM; MOLENTO, 2004). Thus, the evaluation of animal welfare is laborious because it involves intrinsic and extrinsic aspects of the animals and can be evaluated from behavioral, physiological and sanitary aspects (CANDIANI et al., 2008; ZANELLA, 1996).

In this context, environmental enrichment emerges as an alternative to improve the quality of the environment of confined animals, from various stimuli, that are capable of offering psychological and physiological welfare, with the stimulation of typical behaviors of the animals (VASCONCELOS et al., 2015). Environmental enrichment improves welfare, allowing the presentation of typical behaviors of the species, acting on the physical and psychological development of the animals (FOPPA et al., 2014), and is currently classified according to the activity it performs within confinement, which are classified as social, occupational, physical, sensory and nutritional (BLOOMSMITH et al., 1991).

Several indicators can be used to evaluate the effectiveness of enrichment. Physiological changes can be measured by counting defense cells in the blood, with the heterophil: lymphocyte (H:L) ratio being a reliable indicator of chronic stress in broilers (GROSS; SIEGEL, 1983). The physical state of the birds can be compromised by the presence of claudication, valgus-varus deviations and contact dermatitis. The presence of one of the items mentioned may be related to pain in the affected limb,

compromising the interaction of the birds with the resources available in the environment (SANOTRA et al., 2001; SHEPHERD; FAIRCHILD, 2010).

Knowing the importance of keeping production animals in adequate conditions during their breeding is necessary aiming at the best productivity, this study aimed to discuss the welfare of broiler chickens and the main characteristics of environmental enrichments that help in adapting the environments improving the expression of behaviors and, consequently, the welfare of the chickens.

Desenvolvimento

Welfare of broiler chickens

Farm Animal Welfare Council -FAWC- (1992) defines welfare as the physical and mental state of animals with the right to "five freedoms": 1) hunger and thirst are physiological conditions which the animal must have free access to water and food; 2) to be free from discomfort and to be housed in an appropriate environment; 3) free from pain, injury or disease; 4) freedom to express their natural behavior and 5) to have psychological freedom without fear and anguish.

For OIE (2013) animal welfare is how animals cope with the conditions in which they live, and must be, within scientific standards, healthy, comfortable, well nourished, safe, able to express innate behavior, and not suffer from unpleasant states, such as pain, fear and distress. Thus, to achieve welfare, it is necessary to prevent diseases, provide adequate treatment, shelter, management, nutrition, handling and humane slaughter.

Broom (1991) describes welfare as the ability of the animal to interact and live well in its environment. In a breeding system, it is necessary to evaluate several factors, because animals behave in different ways when they relate to the environment (BROOM, 1988).

Due to various forms of production systems for birds with different technologies, to ensure a good environment for these animals, Abreu and Abreu (2011) report that producers should pay attention to four factors for a good functioning of the systems, which are: knowledge of the physiology of the bird, application of basic concepts of

ambience, bioclimatic knowledge of the region and the detailing of the typification of the systems.

The poultry sector is the one that is being most criticized in relation to animal welfare, due to the creation with high density of birds with reduced space, causing discomfort and stress to these animals (NÄÄS, 2008). The use of bedding and perches would be the best way for the layers to express their natural behavior, thus considerably reducing the stress of the birds (RIBER, 2010)

The birds in alternative systems, characterized by a floor creation, express their natural behavior such as pecking, perching, do not present thermal stress in relation to those of batteries in cages due to their environment (ALVES, 2006).

When housed in a certain breeding system, it is necessary that factors such as growth and reproduction levels, ideal physiological and behavioral functioning are evaluated, according to the way animals behave when they relate to the environment and the influence of stress caused by it, allowing more adequate assessments of animal welfare (Manteca et al., 2013).

Many welfare problems are related to animals being housed in closed environments, which prevents them from expressing their natural behaviors (HÖTZEL; MACHADO FILHO, 2004). Anomalous and stereotyped behaviors can be stimulated by poor environments. Therefore stereotypies can be evident as repetitive behaviors without apparent function as attempts to adapt to the environment (LUDTKE et al., 2014) and their occurrence and frequency are used to evaluate the degree of adaptation of the animal in confined environments (FOPPA et al., 2014).

Commercial birds kept in intensive systems have restricted choice opportunities. The animals' choice options can be increased by increasing the complexity of the environment, thus achieving animal welfare objectives (BIZERAY et al., 2002).

Environmental stimuli that overload the control physiology can reduce adaptation, resulting in stress, modifying the physiology, with increased respiratory rate, decreasing the welfare of the animals (FRASER; BROOM, 1990).

Stress has been considered as the main method of evaluating animal welfare (Ferreira, 2004), seeking to identify factors that may reduce the quality of life within confinement. Animal welfare involves physical and psychological perceptions in a range of characteristics and can be classified on a scale that varies between very good and very bad (BROOM; MOLENTO, 2004).

Measures of animal welfare applied to broilers should involve management measures, sanitary measures and environmental production for obtaining quality meat products. For this, research is needed in the areas of animal welfare, environment, animal behavior and technology (MOURA et al., 2010).

Environmental enrichment for broiler chicken

Environmental enrichment has as its main characteristic to reduce stimuli that generate stress responses and allow the expression of natural behaviors, avoiding the appearance of stereotyped behaviors in confined animals (NEWBERRY, 1995). The term enrichment implies improvements, whether physical, social, food or others, applied as a way of favorably altering the environment (NEWBERRY, 1995).

Behavioral enrichment consists of inserting objects that modify the physical or social environment of the animals, improving the quality of life, providing conditions closer to the ethological needs and making the environment richer (BOERE, 2001). The procedure for modifying the environment, from enrichments, is defined as a series of measures that improve the physical and social environment, with the use of innovative and simple techniques, capable of providing conditions closer to those adequate for the performance of their ethological needs (BOERE, 2001).

The reduction of behavioral disturbances, stress, clinical interventions, mortality and the increase in reproductive rates are other important benefits of enrichment (CARLSTEAD; SHEPHERDSON 2000). Enrichment are modifications in the social and physical environment in which animals are inserted that combined with habitat and typical behavior increase quality and prevalence of welfare from health behavior and reproductive performance (BOERE 2001).

According to ABREU et al. (2006), the insertion of toys for heavy layers in enriched cages improves the welfare of these animals from the calmer behavior, but there is no influence on the improvement of production or classification of good eggs in relation to defective ones. For broilers, the insertion of perches as enrichment resulted in improved freedom of behavior in the final third of the birds' lives, however there were no significant effects for the zootechnical parameters evaluated (NORDI et al., 2006). Evaluating the efficiency of enrichment for rabbits, VERGA et al. (2004) indicated differences in playful behavior comparing animals kept in cages with straw and others in conventional cages.

Different indicators can be used to weigh the effectiveness of enrichment. The quantification of defense cells in the blood (heterophil: lymphocyte ratio) is a way of measuring physiological changes, and can be used as an indicator of chronic stress in broilers (GROSS; SIEGEL, 1983). In addition, behavioral assessment is also widely used as a welfare diagnosis.

Among the forms of insertion of environmental enrichments are objects such as pieces of wood, ropes, stones, ladders and tires; or diverse feeding, from different foods than everyday ones such as fruits or vegetables in different forms such as frozen, hanging, cut whole at alternate times, such as late afternoon or night; and sensory enrichments, from essences, with tasting toys, for example, herbs (ALMEIDA et al., 2006; PINHEIRO, 2009; CAMPOS et al., 2010; MENDES et al., 2011) such as fennel or cinnamon.

For broilers, the ideal is the use of perches, chains, platforms, walls, bales of sawdust and hay. According to Zago (2015), the production of broilers in enriched environments does not compromise the zootechnical performance (feed conversion, live weight, carcass and cuts yield) and can be recommended on a commercial scale with the aim of improving the welfare indicator and reducing the incidence of locomotor problems. In addition, the use of environmental enrichment increased the diversity of behavioral expressions, with greater expression of natural behaviors and decreased abnormal behaviors.

Chickens raised in enriched environments show behaviors that indicate better welfare (Vasconcelos et al., 2015). It is important that the toys offered as enrichment are easy to apply and cost little to the producers, such as chains, ropes and PET bottles (Scott et al., 2009; Foppa et al., 2014).

According to Jong and Gunnink (2018), the provision of natural light stimulates the birds to use enrichment objects (bales of sawdust, chains and metal perches), bringing benefits to the behavior of the birds. However, when only the enrichment materials were provided without natural light stimulation, the birds had a prevalence of resting behaviors.

For Sans et al. (2014), environmental enrichment objects such as perches, sandboxes, kale, cabbage, suspended items such as colored balls and bottles increase the behavioral repertoire. Yildirim and Taskin (2017) describe that the use of

enrichment (ball, mirror, dust and perch) improves the welfare of the birds without affecting the performance and weights of the lymphoid organs.

The use of PET bottles as an environmental enrichment object has been employed with positive points in view of its low cost for implementation, as well as its ease of acquisition. Furthermore, the use of this type of material causes less environmental damage, since the reuse of plastic prevents pollution of seas, oceans and soil.

The type of material used in the manufacture of the enrichment object influences the preference of the birds (HESTER et al., 2005 STRUELENS et al., 2008), as well as considering the type of environmental enrichment that is associated with the perception of the birds regarding the shape (WALL; TAUSON, 2007) and the color of the inserted objects, since birds have tetrachromatic vision, that is, they have five photoreceptors of light being four individual and one double cone (BOWMAKER et al., 1997; VOROBYEV; OSORIO, 1998).

Environmental enrichments in blue or green color were more effective in reducing stereotyped behavior in ducks than red or white objects and therefore. This result can minimize feather removal improve feather quality and bird welfare (COLTON; FALEY, 2014).

The choice of environmental enrichment in production systems must be in accordance with the desired effect on the animals' behaviors and their suitability from the producer's perspective (Zwicker et al., 2013). In addition, the introduction of enrichment must be done carefully, to avoid negative effects on the animals' performance that may compromise production and hinder adoption on a larger commercial scale. An example of this is the restriction of the enrichment point that can cause competition, aggression or agitation in groups of animals (Van de Weerd et al., 2013).

The provision of environmental enrichments attenuates the presentation of negative interactions, such as tail biting, stereotyped behaviors and aggression among broilers (GUY et al., 2002; RODARTE et al., 2004). The insertion of balls or small rubber objects reduce idleness, increase positive interactions and playful behaviors of broilers (GUY et al., 2013). However, it is necessary that the insertion of the object be planned, so that it meets the expectation of the species and avoids the frustration of

the animals (MENCH, 1998; VAN de WEERD et al., 2006), causing loss of interest in the object (CAMPOS et al., 2010).

Final Considerations

Environmental enrichment promotes the improvement of animal welfare. Its use aims to reduce negative stimuli, presentation of unnatural behaviors and allow the expression of natural behaviors. Thus, the analysis of the facilities, environment and behavior is essential in reducing pain and discomfort of chickens.

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