

ANALYSIS ON IMPROVING THE PROCESS OF GROWING MEAT CHICKEN IN THE CONTEXT OF PRODUCTION OPTIMIZATION

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Abstract

The breeding and management of birds has represented throughout history the main occupation with regard to obtaining as quickly as possible, quantitatively but also qualitatively, valuable animal products high economic. During the study, the technological circuit within the production hall for raising broilers was monitored, in terms of managing microclimate factors in direct correlation with physiological needs of broilers as well as the evolution of hybrids, from the moment of population until reaching the specific marketing age. The proposed objective was to present the advantages of the stage rearing system to the detriment of the classic system, on permanent litter. Although this new model is not very popular among large farms due to the high implementation costs, it offers significant advantages regarding broiler health, microclimate conditions, easier manure disposal operations and shorter time required for preparation. of the rearing rooms until the next population. Ventilation, insulation or heating are the primary parameters regarding the adaptability of the chicks to the exploitation conditions. Neglecting any such factor can jeopardize the smooth running of the activity and can negatively affect biosecurity.

Keywords: resources, chicken, management, ventilation, process

1. INTRODUCTION

In zootechnical practice, the success of modern farms, regardless of the zootechnical sector we are referring to, is influenced by the ability to manage their own resources, capitalize on opportunities, the ability to coordinate the various unfavorable situations and risks that may arise. To achieve performance objectives, the presence and involvement of farmers with a vision focused from the outside inward, willing to take risks and act precociously in the new tendencies of evolution of the external environment, assuming careful research of all components, the effect of application in relation to the market and the production unit, but also the interaction of all these aspects, is necessary. The poultry industry and poultry meat production are essential components of the global food system, with chicken meat consumption continuing to grow significantly in recent years, in direct proportion to the global population growth, with food demand and accessibility increasing in the second half of the 20th century.

In this regard, broiler farming has become an important area of research and development to improve production efficiency and quality, playing a crucial role in meeting global demand. Poultry meat is one of the most important sources of affordable and nutritious animal protein.

The breeding and exploitation of poultry is primarily determined by the need to transform plant products into products of animal origin, the transformation process involving both the consumption of material resources and human labor, determining the increase in the value of zootechnical products.

The performance of poultry farms is influenced by their ability to integrate into their environment, the capacity of

actions to capitalize on opportunities, the power to deal with unfavorable situations and the risks they face. Successful farms must have a vision oriented from the outside inward, the effective reporting to the trends of evolution of the external environment presupposing the careful research of all its components, the interaction between them, as well as their impact on the market and obviously on the activity of the production unit. Therefore, for the production and technology of large quantities of poultry meat, throughout history, traditional extensive breeding has been replaced by industrial exploitation, in order to uniformly satisfy different demands, by applying efficient and rapid management. For the proper functioning of a broiler farm, it is necessary to plan and follow the stages and processes: sanitation of the shelter, preparation and installation of stages, inspection of heating installations and systems, lighting, ventilation and watering, transfer of chicks and stocking of the shelter, examination of the chick population, daily recording of events (sanitary control, feeding and equipment maintenance). All these actions must be carried out by well-trained personnel, capable of managing and intervening immediately when the situation requires it, in order to prevent possible malfunctions in the equipment or systems and to maintain the welfare of the chicks in optimal parameters.

2. MATERIALS AND METHODS

The paper makes an x-ray of the data existing in the specialized literature regarding the raising of broiler chickens. The costs necessary for carrying out the activity of raising chickens have been significantly reduced in the last decades thanks to experimental

techniques and efforts made following zootechnical improvement practices correlated with innovations in the field of genetics. Building a production area in the poultry sector is a complex and important activity, which requires well-organized planning, treated with particular attention to details. Among the aspects considered essential in the management of the stocking and production unit are the sizing of buildings and annexes, lighting, heating and ventilation systems, the design and assembly of grates, the implementation of drinking lines and feeders, as well as waste management systems and general hygiene of the farm premises. Current forecasts support the hypothesis that global chicken consumption is expected to reach 41% of total international meat consumption by 2030.

3. RESULTS AND DISCUSSION

According to the National Institute of Statistics, in 2021 the number of birds slaughtered in industrial units (slaughterhouses) increased by 0.5% compared to 2020, and in terms of meat production the increase was 0.6%. The poultry sector accounts for the largest share in meat production in our country.

Building a production area in the poultry sector is a complex and important activity, which requires well-organized planning. Among the aspects considered essential in the management of the population and production unit are the sizing of buildings and annexes, lighting, heating and ventilation systems, the design and assembly of grates, the implementation of drinking lines and feeders, as well as waste management systems and general hygiene of the farm premises.

Raising broiler chickens in a protected area, in production halls, is a common practice in the modern poultry industry.

This method derives from the awareness of its numerous advantages, including: protection against external factors, predators or diseases, control of temperature, humidity, light intensity, and a more efficient increase in productivity.

Therefore, the design of the production hall aims to create spaces exclusively intended for birds (the breeding hall), and the internal organization of the shelter, feeding and watering conditions, the delimitation of buffer rooms, as well as storage spaces for various technical objects, installations or equipment.

Before starting the actual construction, the geometric parameters corresponding to the building must be taken into account, necessary for the smooth running of the activity over a long period of time, so that the initial investment has an innovative character, anticipating new trends in the industry by developing methods to minimize future interventions, carried out in order to align and modernize technologies, buildings and equipment to new market standards: openings, heights, elements related to walls, windows, floors or roofs.

The built area of the analyzed farm's shelter is 400 m, production capacity of 20-25 heads/ m up to the age of 3-4 weeks.

The foundation measures 60 cm deep and 40 cm high.

The body structure is made of metal profiles, with support pillars supported on the reinforced concrete foundation every 4 meters.

The closure and covering are made of sandwich panels, with a length of 19 meters and an opening of 8 meters. Among the interior finishes we can mention the concrete floors and stages, the lighting fixtures or the PVC joinery.

The panels measure 220 cm high at the ends and 250 cm at the top. For better thermal insulation, a 4 cm thick polyurethane foam coating was applied on top of them. The growth and development of broiler chickens takes place on the stage, not on the litter. The reasoning derives from the need to avoid the risk of the appearance and development of contact dermatitis on the chest, knee joints or soles of the feet or damage to the plumage, thus aiming to promote aspects related to the health and appearance of the chickens. Against the background of new trends at European level, modern solutions for the maintenance of chickens intended for meat production have been approached in intensive systems in our country. The grills are suspended on a metal structure made of rectangular pipe covered in a zinc film.



Figure 1. Installation of the stages

In poultry farming, ventilation is a defining microclimate factor that decisively influences the well-being of birds. It has a significant impact on air quality, temperature and humidity inside the house. The more deficient the ventilation, the more the health and performance of broilers is affected.

Inside the house, a pleasant microclimate must be ensured, the proportion of oxygen in the air should be close to that of atmospheric air (21%). This phenomenon occurs due to the excess heat and humidity regime or the presence of suspended dust particles. Harmful gases in shelters are produced either directly, as a result of the metabolic processes of the birds, or indirectly as a result of the fermentation of solid or liquid droppings in the litter.

Exceeding the permissible limit of carbon dioxide in the shelter (5 times the proportion existing in atmospheric air) leads to various disturbances of the respiratory

system, to changes in the epidermis and mucous membranes, as well as to a reduction in appetite.

As a result of the fermentation processes of the droppings, significant accumulations of ammonia occur at the upper level of the shelter, 1.5 m above the floor, but if the air humidity registers higher than normal values, the presence of ammonia is also felt by the birds. In the case of traditional models of permanent litter rearing, in which straw, sawdust, shavings or other hygroscopic materials with special moisture absorption qualities were placed on the entire surface of the floors, these required repeated maintenance interventions or even replacement from time to time. Various causes: deterioration of the birds' plumage or legs, contamination with bacteria, viruses or parasites, increased risk of mortality due to coccidiosis.

Traditional litter is the main source of ammonia present inside poultry farms, and its quality contributes directly proportionally to the amount of ammonia volatilized and emitted from inside the house.

Therefore, the regime of the air flow introduced or removed through the intakes with the help of fans directly influences the quality and friability of the litter. Ammonia is formed by the action of microbial enzymes as a result of the degradation of feed proteins not digested by chickens and uric acid.

Following the physical characteristics of the litter, referring specifically to friability or the presence of crust, humidity and the effectiveness of ventilation systems directly dictate the quantitative level of ammonia emissions.

During the growth period, the porosity of the litter decreases due to the accumulation of richer layers of manure.



Figure 2. Growing on the ground

Therefore, inside the halls of the poultry farm, stages were installed for raising chickens, suspended grills with a role in ensuring and maintaining health and promoting a qualitative physical appearance from a commercial point of view.

Before the production halls are populated, they must be equipped at least 24 hours in advance to ensure the

optimal functionality of the assemblies and subassemblies, the drinking lines, the replacement of the drinkers, the integrity of the grates, the uniform dispersion of heat, the undifferentiated distribution of the feeders relative to the surface unit, the supply of feed, the regulation of the light intensity, etc. These works are performed in advance and with great care so as not to expose the chicken flocks to various disturbing factors. The transfer of chicks from the incubation stations to the intensive farming farms is carried out in cardboard boxes with holes on the sides and lid. Each box usually contains 100 chicks. Overcrowding during transport or cooling during loading and unloading can lead to unwanted losses among the flock. Therefore, it is mandatory to travel in vehicles specially designed for the transport of live animals, equipped with a system for maintaining constant temperature and humidity in the cargo compartment. After transport, the chicks must be distributed evenly within the rearing room by qualified personnel. Without delay, it must be checked whether the broilers are consuming water and feed, and in case of reporting behavioral irregularities caused by various injuries among the animals, evacuation takes place. Before introducing the chicks into the hall, it is necessary that the drinkers have already been filled for at least 2-3 hours so that the water reaches the ambient temperature in order to avoid the possible occurrence of enteritis. In the case of feed, the practice is the opposite, it must be fresh, distributed simultaneously with the stocking, to avoid the phenomenon of oxidation. Immediately after the chicks are first given food and water, they are hungry, which means that they should eat and fill their gizzards. Estimating a full gizzard at key moments after stocking is a good method of determining the development of appetite and of verifying that the entire flock of chicks has discovered the food and water. The degree of gizzard filling should be monitored for the first 48 hours, but the first 24 hours are the most important. An initial check 2 hours after stocking will indicate whether the chicks have found food and water. Subsequent checks should be made 8, 12, 24 and 48 hours after arrival on the farm to estimate the development of appetite. To do this, samples of 30-40 chicks should be selected from 3-4 different locations in the house. In chicks that have found food and water, the goiter will be full, soft, and rounded. If the goiter is full but you can still feel the texture of the crack, it means the bird has not yet consumed enough water. The first week or acclimation week is also the most important of the entire calendar of a series of chicks, because it contributes to the adaptation of the birds to the new conditions, while developing their digestive, respiratory and locomotor systems.

4. CONCLUSIONS

Poultry breeding and management has historically represented the main occupation for obtaining as quickly as possible, quantitatively and qualitatively, animal products with high economic value.

Monitoring the technological circuit within the production hall in terms of directing microclimate factors

in direct correlation with the physiological needs of broilers as well as the evolution of hybrids, from the moment of population until reaching the specific marketing age.

The proposed objective was to present the advantages of the stage rearing system to the detriment of the classic system, on permanent bedding. Although this new model is not very popular among large farms due to the high implementation costs, it provides significant advantages regarding the health of broilers, microclimate conditions, facilitating manure disposal operations and shortening the time interval required to prepare the rearing rooms until the next population. Ventilation, insulation or heating are the primary parameters regarding the adaptability of the chickens to the operating conditions. Neglecting any such factor can jeopardize the smooth running of the activity and can negatively affect biosecurity.

5. REFERENCES

- [1] Deep, A.,C. Raginsky, Schwean-Lardner K., Fancher B.I., Classen H.L., 2013. „Minimum light intensity threshold to prevent negative effects on broiler production and welfare”, British Poultry Science, Vol. 54, pp. 686-694
- [2] Ellis David E., Paul W. Hadley,2010 „Integrating Sustainable Principles, Practices, and Metrics Into Remediation Projects”, Wiley Interscience,.
- [3] Marl W. Dunlop, Patrick J. Blackall, Richard M. Stuetz,2015 “Water addition, evaporation and water holding capacity of poultry litter”, Science of The Total Environmnet, Volume 538, pp. 979-985.
- [4] H.A. Olanrewaju, J.P. Thaxton, W.A. Dozier III, J.L. Purswell, W.B. Roush, S.L Branton, 2006 “A review of lighting programs for broiler chickens”, International Journal of Poultry Science, Vol. 5, pp 301-308
- [5] Gavrilesco D.,2006 “Agricultura și spațiul românesc din perspectiva dezvoltării durabile”, Academia Română, Institutul de Cercetări Economice, Institutul de economie Agrară, Editura București,Volumul 2.
- [6] E.M. Shepherd, B.D. Fairchild,2010. “Footpad dermatitis in poultry”, Vol. 89, Poultry Science, University of Georgia, 2010, pp. 2043-2051
- [7] Stephen R. Collett, 2012 “Nutrition and wet litter problems in poultry”, Animal Feed Science and Technology, Volume 173, pp. 65-75.
- [8] Sistani.K.R., G.E Brink, S.L McGowen, D.E Rowe, J.L oldham, 2003 “Characterization of broiler cake and broiler litter, the by-products of two management practices”, Bioresource Technology, Volume 90, pp. 27-32.
- [9] D.J. Wood.D.J., B.J Van Heyst,2016 “A review of ammonia and particulate matter control strategies for poultry housing”, Transactions of the ASABE, Volume 59, 2016, pp. 329-344
- [10] Niels Finn Johansen, Karen Marghrete Balle, Leonard Constantin Stafie, Adrian Cristinel Greculescu, Mihai Călin Mașinistru,2010 “Sisteme de adăpost pentru păsări. Standarde de fermă”, Danish Agricultural Advisory Service.