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INDICATORS OF ECONOMIC EFFICIENCY OF GROWING DOMINANT GREENSHELL POULTRY

The article examines the peculiarities of the DOMINANT GREENSHELL egg-laying poultry, in particular, the indicator of laying capacity in floor-level growing. Environmental factors affecting the viability and productivity of chickens have been analyzed. Data of the experiment has been given and such shortcomings of keeping as loss and high specific weight of dirty and broken eggs have been revealed. The components of the cost price and the change in the cost price of finished products in different periods of poultry breeding have been highlighted. On the basis of the conducted experiment, an explanation has been made regarding the impact of production costs on the cost price of eggs, in particular compound feed. The profitability of the production of eggs with a colored shell for floor-level growing has been analyzed and the necessity of selling them in the premium segment has been proved.

Keywords: *DOMINANT GREESHELL; poultry; egg-laying; egg production; cost price; profitability.*
Fig.: 1. Table: 2. References: 22.

Formulation of the problem. Poultry breeding in the egg sector is a promising industry that specializes in selective poultry breeding, feeding and maintenance. The growth of the poultry population and the volume of production is achieved due to selection, automation of production, compliance with veterinary regulations, as well as adaptation to quality standards. The main reason for the dynamic spread of the industry is the increase in demand for eggs due to their economic availability, dietary properties and irreplaceability in the population's diet. The cost and profitability of chicken egg production, and environmental factors that affect these indicators require additional study.

Analysis of recent research and publications. A number of scientific works of Ukrainian scientists of National University of Life and Environmental Sciences of Ukraine are devoted to issues of poultry production technology: V. Borodai, N. Prokopenko, V. Melnyk, etc. The program of improvement of poultry of meat crosses, the methodology of the evaluation system of chickens of egg crosses was justified and practically implemented [5; 7; 13; 14]. Sufficient attention has been paid to the introduction and improvement of meat-type poultry breeding methods, the production of edible eggs, and nanotechnologies in poultry farming by L. Patreva [2; 6; 7; 15].

The breeding and methodological principles of increasing the efficiency of the formation of economic and useful traits of poultry were substantiated by O. Katerynych [8]. Specialists of the State Poultry Research Station of the National Academy of Sciences study a wide range of technological problems of modern poultry farming [12; 21].

M. Yaroshko's research is devoted to the study of feeding and providing water to chickens in the direction of egg productivity [14]. Modern chicken keeping systems were studied by Yu. Ishchenko, O. Riabinina, focusing on cage, floor, and free-range growing [2]. The benefits of genetic selection to improve egg laying stability and egg quality stability were investigated by M. Bain, Y. Nys Y, I. Dunn. Researchers determined that in order to maintain these processes, it is necessary to use a multifactorial analysis, which should take into account the genetics, nutrition and living conditions of the chickens [15]. The issue of sorting day-old chickens was studied by N. Ghosh, S. Rajarshi, determining that there is identification by color and intensity of feathers [19]. Scientific works of J. Mumma are devoted to the peculiarities of physiological stress and the influence of environmental factors on the productivity of laying hens. The author determined the main consequences of the stress reactions of laying hens in the deterioration of digestion and metabolism, immunity and reproduction [21]. Having analyzed the scientific achievements of scientists, the issue of changing the level of laying hens of the DOMINANT GREENSHELL poultry caused special interest and novelty. The issues of cost and profitability of chicken egg production are covered in the scientific works of M. Kains. The author analyzed the stages of production, sorting and labeling, packaging and transportation, methods of selling eggs and etc. [17].

Highlighting unexplored parts of the general problem. An in-depth study should be conducted regarding the cost of finished products and the profitability of production. Firstly, it is necessary to analyze the structure of the cost price, to determine the components with the largest specific weight. Secondly, it is worth paying attention to the profitability of production, taking into account the possibility of selling eggs with colored shells for the premium segment.

The purpose of the article. To analyze indicators of vital activity and bearing of cross of DOMINANT GREENSHELL poultry for floor-level growing. To investigate the factors that most affect the cost of eggs and offer measures to increase the profitability of production.

Presentation of the main material. The world and domestic scientific community are interested in the features of chicken egg production. Among the outstanding scientists one should mention M. Tyller, who studies molecular genetics. The scientist's current research is related to the study of the selection of final hybrids that lay blue and green eggs. This latest innovation studies the performance of laying hens that were obtained by crossing Leghorn chickens (*Gallus domesticus*) and Legbar chickens (*Gallus domesticus*). Among the main breeds can be identified Sussex, White Leghorn, Brown Leghorn, Rhode Island White, Rhode Island Red, Andalusian blue, Plymouth Rock Chicken. All sublines of these breeds are determined by genetic markers, which makes it possible to obtain final hybrids with defined parameters and eggs with a shell from white to dark brown in color [20].

The uniqueness of the DOMINANT GREENSHELL poultry is the ability to lay eggs with a blue and olive-green shell (Fig. 1).

Modern research has established and confirmed experimentally that bird eggs get the color of the shell due to pigments. For example, marsh, green, turquoise and blue colors are given by the biliverdin pigment, which is a product of the breakdown of red hemoglobin. Scientists claim that solar radiation has two directions of harmful action for the embryos developing in them. First, infrared rays absorbed by the shell can cause overheating. Second, ultraviolet light, penetrating inside, is able to interfere with important processes of embryogenesis. The blue color of the shell allows you to effectively fight these problems, preventing ultraviolet rays from harming the embryo [11].

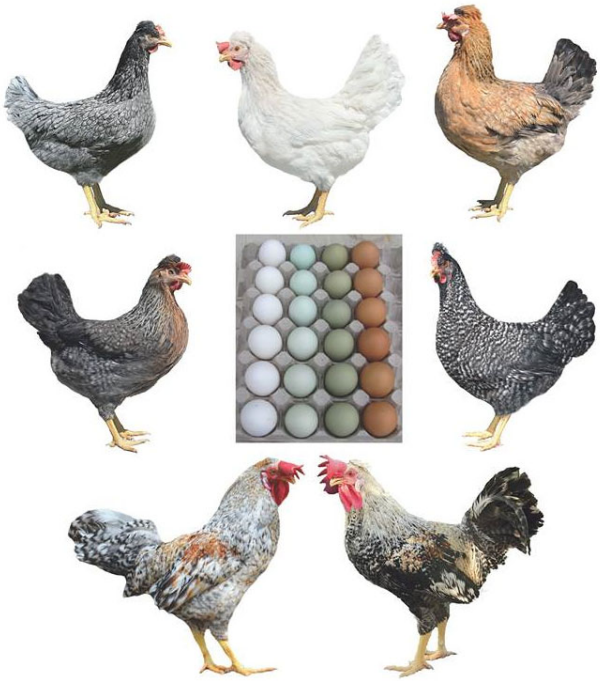

Fig. 1. DOMINANT GREENSHELL

Source: [8].

Araucana birds were used for selection work during the breeding of this unique line (Araucana) [16]. Chickens of this breed have a calm character, adapt well to the conditions of the external environment and are endowed with good health, they start laying eggs early. The eggs of these chickens are of medium size, but the laying rates are high [22]. In addition to the unique color of the shell, the advantages of this breed, among others, are early maturation, the high survival rate of offspring and vitality of adults. Chickens easily tolerate climate change and sudden temperature fluctuations, and their health and egg-laying are not affected by molt and weather changes.

As a result of crossing Araucana birds with European chickens, crosses with high indicators of productivity and viability were obtained. It is worth noting that the blue color of the shell turned out to be a dominant feature. Blue eggs are obtained as a result of crossing white chickens with representatives of Araucana. The olive-green shell is the result of crossing with hens that lay brown eggs.

The cross DOMINANT GREENSHELL with high indicators of viability, laying and quick adaptation to the conditions of keeping is recognized by many households in the territory of the European Union and Ukraine.

The peculiarity of the Dominant cross is that at the age of one day, a hen and a rooster can be distinguished by the color or density of their feathers. Hens have thick feathers, and roosters have thin ones. For example, GS-902 can distinguish between a hen and a rooster by the color of their feathers, the hen is brown and the rooster is yellow. GS-300 and GS-959 differ in the density of feathers, the chicken has longer and thicker feathers on the ends of the wings, and the rooster has sparse feathers. It should be taken into account that day-old chicks are divided into hen and rooster only from their parents. Other lines are not divided by these characteristics.

To study the level of laying, special attention should be paid to the feeding ration, lighting and warmth, conditions of keeping.

Feeding chickens is the key to their high productivity. So, with the correct preparation of the diet and providing the bird with everything necessary, chickens can lay eggs throughout the year. The diet for laying hens should consist of whole grains and a crushed

mixture of cereals, feed of plant and animal origin, as well as vitamins and minerals. Grain fodder in whole and milled form is the basis of poultry feeding. They are easily absorbed by the body and are well eaten by birds. In the diet of birds, depending on the species and age, grains take 60-75 %.

The structure of feed varies depending on the species, age and direction of poultry productivity. For young laying hens of the DOMINANT GREENSHELL the composition of compound feed is selected taking into account their physiological needs: wheat – 33 %, corn – 17.9 %, soybean cake – 25 %, sunflower cake – 18 %, bran – 2 %, limestone – 1.5 %, premix – 1 %. It should be noted that the protein content of feed for young birds is 19.6 %. The composition of feed for poultry growth differs in content: wheat – 47 %, corn – 17.4 %, sunflower meal – 17 %, soybean meal – 12 %. The protein content is reduced to 17.5 %. Complete feeds and concentrates are produced for poultry. Digestibility of granular feed is 2-3 % higher than crumbly [7].

When raising day-old chickens, it is recommended not to limit the amount of compound feed and monitor the availability of water. The approximate consumptions of compound feed are: 1 week – 11 g, 2 – 17 g, 3 – 24 g, 4 – 29 g, 5 – 34 g, 6 – 38 g, 7 – 41 g, 8 – 44 g. The daily requirement of compound feed for one adult chicken is 120-125 g and for a rooster –135-140 g. In the price cost structure of finished products, up to 70 % is accounted for by the fodder component.

GREENSHELL chickens are small in size and mature early. Their live weight is 1.8-2.2 kg, egg production is up to 300 eggs per year, the weight of eggs at the beginning of laying is 40-50 g, and at the age of one year - 55-60 g. With the onset of molting, egg-laying decreases for 2-3 weeks (sometimes this period is extended to 2 months or more), and then resumes. When studying the level of egg production capacity, it is necessary to take into account the influencing factors (Table 1).

Table 1

Influencing factors on egg production

No.	Factor	Expression	Effects
1	Photoperiodism	There is a fluctuation in the intensity of metabolism and energy; there is periodic molting of the bird.	When the illumination of a poultry house decreases, the laying capacity of the bird decreases, but the size of the egg increases slightly. With excessive lighting of the room, the laying capacity increases, but the size of the eggs decreases.
2	Feeding	For each type of bird, depending on the age, there is an optimal daily rate of complete feed. The feed should be balanced in terms of exchangeable energy, amino acids, microelements and vitamins.	Underfeeding or overfeeding reduces egg production.
3.	Stress	Noise, change of environment, overheating or hypothermia, disease, influence of parasites	Reduce the egg-laying capacity, negatively affect the vital activity indicators of chickens.

Source: [3].

Modern crosses of meat and meat-egg poultry have a powerful genetic potential designed for maximum productivity. However, not all poultry enterprises are able to implement it. Laying hens demonstrate the highest productivity only in a poultry house in which comfortable conditions are created, and all parameters of the microclimate correspond to the age and physiological state of the bird.

According to the report of the European Commission on the state of the poultry industry for 2021, the number of chickens that are not kept in cages is 207.2 million – 52 %. Accordingly, cage keeping makes 44.9 %, floor – 35.6 %, free-walking – 12.8 % and organic – 6.6 % [18]. Non-cage keeping allows chickens to move freely, run and flap their wings – the physiological needs of animals are met.

Every year, the specific weight of free-range housing increases, when chickens can go out into the open space, into the air, and consume a lot of natural plant food. The main role of grazing is to ensure that the bird is in an environment as close as possible to the natural one. Important factors in grazing are also seeds and insects. They affect the health of the bird. For example, the shell of an insect irritates the mucous membrane of a bird's stomach, stimulates digestion and increases the acidity of the stomach - this increases immunity. Bitter herbs increase the secretion of bile, which has a beneficial effect on digestion. Therefore, high-quality grazing plays an important role in poultry health [14].

Thus, with a free-range keeping system, laying hens receive the necessary amount of green feed, which is a source of carotenoids. Natural housing conditions contribute to the strengthening of immunity, accordingly, egg products obtained in such conditions will be more natural and useful [9].

Nowadays, depending on the natural and economic conditions of the farm, producers can use different methods of keeping poultry, but the world is moving to a more organic method of breeding chickens, so they introduce free keeping, increase the territory of the chicken coop and introduce a more natural diet.

When growing DOMINANT GREENSHELL egg-laying poultry, the recommended housing density is observed. For the normal growth and development of day-old chicks, it is necessary to observe the following density of housing: age: 1-4 weeks – density: 25 heads per 1 m^2; 5-10 weeks – 12 heads per 1 m^2; 10-18 weeks – 9 heads per 1 m^2. Age 19-78 weeks – 5 heads per 1 m^2.

The light regime is very important in the process of growing chickens, especially in the winter period, when the light day is very short. In the first week of life, chicks need 23 hours of light per day. In the second week, the number of light hours is almost halved and amounts to 12 hours. At the age of 5-13 weeks – 7 hours, 17 weeks – 10 hours, 19 weeks – 12 hours, 21-25 weeks – 14 hours, 27-31 weeks – 14.5-15.5 hours, 33-37 weeks – 16 hours.

In the first week of cultivation, the recommended maintenance temperature is 32-34 ºC. In the second week – 27-31 ºC. Every next week, you can lower the temperature by 2 ºC, but it shouldn’t be below 18 ºC.

In order to analyze performance indicators, research was conducted on the laying level of hens of the DOMINANT GREENSHELL poultry during February-May 2018. The purpose of the experiment was to detect a change in the level of laying hens. A flock of 40-week-old chickens, 3886 heads, was formed for the experiment. The floor-level growing system on a deep litter, covered with sawdust was applied. The temperature and light regimes in both experiments corresponded to the recommended norms, and the keeping of the birds corresponded to the existing technological requirements.

The analysis of the results of the bearing showed that the floor system of containment has a number of disadvantages. The productivity range was 2426-2903 eggs per month. Peak productivity was 77 %. It is also worth noting the number of dirty and broken eggs, which was 7 % and the loss of chickens was 0.54 %.

The level of laying directly affects the cost of eggs, which is an indicator of the economic efficiency of production (Table 2). The table shows the indicators of keeping 8,000 chickens for 17 months from the day-old chicks to the age of 68 weeks.

According to official sources, the level of profitability of chicken eggs in agricultural enterprises of Ukraine was 5.4-60.9% during 2010-2020 [1]. The level of profitability of production of the studied farm increased by 15-35 % depending on the market situation and consumer demand [10]. It is worth noting that the unusual color, from blue to dark marsh, is a

significant advantage of the eggs of the GREENSHELL poultry. This difference in appearance makes it possible to sell eggs for the premium segment, which is characterized by an increase in the selling price. However, the implementation of such a product requires additional costs for packaging, logistics, and marketing costs when working with supermarket chains. To obtain the planned level of profit, it is necessary to constantly maintain the interest of consumers and ensure high quality of products.

Table 2

Key indicators of keeping chickens

Cost item	MIN	MAX	Comments
Combined fodder, UAH/head per day	2.13	14.25	At day age, the cost of feeding is 2.13 UAH/head per day, before the start of egg laying it increases to 14.25 UAH/head per day with an increase of 40 % when the bird reaches the age of 28 weeks or more.
Number of eggs, pcs. per month	40 000	180 000	Egg-laying begins at the age of 18-20 weeks. The highest laying rates are typical for hens aged 22-48 weeks.
Cost of 1 egg, UAH	1.05	4.73	The cost of eggs is highest at the beginning of egg laying and lowest at the peak of hens' productivity.

Source: [8].

Conclusions. Based on the analysis of the genetic features of the DOMINANT GREENSHELL cross, we can conclude that there are significant advantages at all stages of cultivation. At the age of one day, it is possible to differentiate a rooster and a hen by the color and the density of their feathers. At the age of 18-20 weeks, chickens begin to lay eggs. Based on the results of the experiment, it can be concluded that the analyzed cross has a high genetic potential for productivity, demonstrates intensive laying when reaching 42 weeks of age.

Housing conditions are an influential factor on viability and bearing capacity. In floor-level growing, the resulting rate of laying is 5-10% lower than in cage keeping. This is due to a higher percentage of loss, chickens are more active, have access to a large open space and contact each other.

In order to achieve the greatest economic effect from egg production, it is necessary to carefully organize promotion and sales, since these are the stages that determine the final result of profitability. With the successful sale of eggs with a colored shell for the premium segment, there is a probability of increasing the profitability of production by 20-30%. So, it can be concluded that the meat-egg cross DOMINANT GREENSHELL has a list of advantages compared to other kinds of chickens, and the unique color of the shell allows to create interest among consumers and the necessary level of demand.

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ПОКАЗНИКИ ЕКОНОМІЧНОЇ ЕФЕКТИВНОСТІ ВИРОЩУВАННЯ КУРЕЙ DOMINANT GREENSHELL

У статті досліджено особливості кросу DOMINANT GREENSHELL. Особлива увага приділена питанням особливостей життєдіяльності та показникам продуктивності курей різного віку. Перевагою даного кросу є можливість сортування добових курчат на півника та курочку за кольором та щільністю пір'я у добовому віці. Це значно спрощує процес виробництва, дозволяючи планувати кількість несучок на півнів. Детально проаналізовано та наведено структуру комбікорму для добових та дорослих курей, пояснено зміну в пропорції зернових культур залежно від фізіологічних потреб птиці. Наведено точні дані щодо вимог птиці у споживанні комбікормів та води.

Виділено три ключові фактори, що впливають на несучість курей. Науково підтверджено, що фотоперіодизм, раціон годівлі та стрес найбільше впливають на кількість та розмір яєць. Висвітлено виробничий дослід вирощування курей за підлогового утримання, виявлено такі недоліки, як падіж та високу питому вагу битих та брудних яєць. За результатами спостереження наведено дані щодо споживання комбікорму, витрат ветеринарних препаратів, рівня несучості та собівартості яєць у різні періоди росту та розвитку курей. Витрати комбікорму варіюються від 2.13 грн/голову в добовому віці до 14,25 до початку яйцекладки. Собівартість яєць становить 1,05-4,73 грн/шт. Проаналізовано показник собівартості яєць зі кольоровою шкаралупою та доведено необхідність їх реалізації для преміум сегменту. Аргументовано можливість збільшення рентабельності виробництва на 15-35 % в залежності від ринкової ситуації та споживчого попиту. Теоретично досліджено та практично підтверджено, що крос DOMINANT GREENSHELL наділений високими показниками життєздатності та несучості є економічно вигідним для підприємств галузі птахівництва.

Ключові слова: *DOMINANT GREESHELL; кури; несучки; виробництво яєць; собівартість; рентабельність.*
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