

## Research Article

### CONSTRAINTS TO SUSTAINABLE LAYERS PRODUCTION IN SHIKAN LOCALITY, SUDAN

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#### ABSTRACT

This study was conducted between November 2020 and February 2021 to find out the impact of obstacles to raising layer chicken. The study relied on two types of sources, which is preliminary information collected using a questionnaire for a group of farms in Elobied city using a random sample of 20 farms. Secondary information from previous studies references bulletins and reports, to obtain the results of the research and achieve the study objectives. The SPSS statistical program was used for analyzing the obtained data in form of frequency tables and percentage. The results were concluded that 100% of the breeders raised chickens at the production age (four months). The effect of climate on chickens and methods of mitigations were impact by springs with water a forestation, and tarpaulins. It has become clear that the cages system was the most used breeding system. The most problems facing most of targeted chicken farms was the high price of feeding. Based on the results, the study concluded raising poultry must be applicable on cages which were suitable with the hot weather in tropical and sub tropical zones. Also a financing program for productive families will help in manage the high prices of poultry feeding stuffs. Poultry infectious diseases must be controlled by providing a curative prevention of viral, worms and external parasites.

**Keywords:** Poultry, layer hens, production patterns in Sudan, constraints

#### INTRODUCTION

Poultry farming is one of the projects that achieve continuous high profits due to the large demand for poultry and its products in the local and international markets. Chicken farms are considered permanently productive farms, due to the increase in consumption of their products daily. Also, projects based on poultry farming are classified as one of the successful commercial projects because they depend on a group of processes that contribute to the development of poultry production and increasing its quantity over time, which leads to the success of the project in achieving its goal, especially with the continuous demand for poultry farm products through individual orders or that depend on commercial deals between poultry farmers (Gilbert. 2019). When establishing any project for poultry production, the area must be selected and the location accurately determined, and this is only done through scientific study. The construction available at the station and the prices of these simple and remaining materials for the area on which the farm will establish must be studied. The labor type and available expertise, and that the farm to be established is close to the marketing centers and the availability of water and electricity in the area (Al-Habashi, 1996). Poultry farming is the breeding of domestic birds such as turkeys, chickens, ducks, and geese in order to produce meat and eggs as food and produce feathers for industrial and commercial purposes. Poultry is raised in large numbers, and chickens take the largest part. More than 50 billion chickens are raised annually as a source of food, whether for eggs or meat. Chickens raised to produce eggs called laying hens, and those raised for meat are called broilers. (Compassion in world farming poultry, 2014). Poultry economically is at the forefront of farm animals which producing the food that humans need as a quick source of animal protein at prices commensurate

with the low-income and characterized by rapid reproduction due to the short life cycle and high production efficiency, which makes it achieve a rewarding return on capital investment. Chickens are mainly raised to obtain white meat or obtain eggs. Egg production comes first and meat production is in second place in poultry production. The age at which the hen begins producing eggs varies from one breed to another, and the ways of care and feeding that are provided to the hen during its different stages of life until it begins to produce eggs. So the productive process requires high experience in dealing with chickens, whether in the incubation period or in the rearing period or during the production period. (Al-Wali, 2015) The development of poultry industry in Sudan with the passage of years, poultry farming has evolved from primitive home breeding to following intensive breeding and care systems. There is no complete record of the development of the poultry industry in Sudan, but the beginning was in the year 1926. Between 1926- 1950, Wyandotte chickens, an American breed, were imported by a British sponsor, and a booklet (Poultry Breeding in Sudan) appeared by A. A. McCleary. Also, the first Harson electric hatchery was introduced with capacity of 150 eggs/day. In 1950-1960 the first batch of chicks was imported from England and its number was 200 chicks to the poultry unit in Khartoum North, and other units were established in Wad Madani, El Obeid and White Nile. (Al-Wali, 2015). In 1960 - 1970 the Faculty of Agriculture at the University of Khartoum began establishing a mini unit as a nucleus for teaching poultry science. The poultry unit was also established in Koko (the current poultry research unit), and it became a center for extension services and research that assist in the poultry industry development in Sudan. During this period, the number of units established in major cities was increased. And the farms around Khartoum increased from 10 to 80 farms. In 1970 - 1980, the idea of raising poultry in closed pens began and the experiment began in Emile Carnation grazing in Berry, and the purpose of it was to provide day-old chicks and stop importing poultry products. (Al-Wali, 2015).

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There are two ways to raise poultry, either on the ground breeding or rearing within batteries or cages (Qamar and Sami, 1984). In the case of raising birds directly on the ground, a mattress of suitable thickness is used on the floor. This system is often used in open wards, which are rely on natural ventilation through ventilation windows along the walls of the dormitory. One of the advantages of this system is its low costs and not being directly affected by the outage of direct current. But its disadvantages are low ventilation efficiency (Sultan and Gabriel, 2005). Breeding in batteries and cages, birds are raised in cages inside the dormitory. This system has become widespread. It is used in the incubation and care of birds in breeding cages, and then transferred to the production batteries (Sultan and Gabriel, 2005). Many factors affect the ability of chickens to produce eggs economically, and it is necessary to start with good, fully-grown chickens, as the growth conditions greatly affect the productive qualities during the egg-laying stage. Once the hen is begins to produce eggs, its ability to do so depend on. Suitable environment temperature and humidity affects the number of eggs laid by the bird. Light activates certain hormonal glands and thus increases egg production. The precise regulation of daily light hour's availability for the bird is an important factor in maintaining the maximum production of eggs and natural daylight must be enhanced with artificial light during certain seasons of the year. Laying hens must be well fed and the diet must be balanced to maintain the herd nutritionally and to reach the optimum body weight. In addition, the maximum number of eggs must be produced at the lowest cost of food. Regardless of the level of care provided to the chickens, a certain amount of mortality will occur. Some poultry breeders pass a mortality rate of  $\frac{1}{2}$  per month, that is, for every 200 chickens in the house, one loses one, and the moderate rate is 1% or less per month. This loss cannot be avoided due to some reasons such as disease such as Lymphatic paralysis, respiratory infection and predation. Usually egg production does not begin to decline until the housing temperature reaches 27°C, while the egg size decreases at temperatures higher than 24°C, and the rate of food conversion decreases when the housing temperature rises above 16°C (Qamar and Sami, 1984). People who try poultry farming for the first time face a number of difficulties, the most important of which are: a. Lack of experience in dealing with viral and bacterial diseases that affect poultry, which leads to large numbers of death due to the absence of appropriate medical care: b. the un-using of the appropriate type of feed for poultry or the use of an inappropriate type that does not provide any nutritional benefits to poultry may lead to a weakness in its size, which may result in its death: c. Neglecting the permanent maintenance of the places from where chickens feed and water were obtained, which leads to their complete spoilage and the failure to benefit from them in providing appropriate food for poultry: d. Failure to follow up the maintenance of the electric source on the farm or the instability of an electric source, which resulted in poultry death due to the lack of proper electrical lighting. (Gilbert, 2019). Sudan's Poultry production is increasing from year to year, whether from eggs or poultry meat, as it turns out that Sudan's egg production in the year 2018 is about 150 million eggs and from poultry meat about 20 tons. The production increased until it reached in the year 2019 about 1089 million eggs and about 31 tons of poultry meat. The rate of increase in this period in egg production is 28% and in meat production is 55%. Despite the significant increase in the production of eggs and poultry meat, Sudan is still in the stage of self-sufficiency. There is no significant export of eggs and poultry meat, as all poultry production goes to local consumption. We find that the average per capita consumption in the period 2018-2019 ranges between 36-37 eggs per person per year and about 1 kg of poultry meat (Abdul Latif, 2021). It indicates that the average per capita consumption of poultry products in Sudan is less than the average per capita consumption in developed countries. The average per capita consumption of eggs in Sudan is about one kg, while the

average per capita consumption of eggs in the United States is 17 kg, in France 16 kg, South Africa 7 kg, Egypt and Algeria about 3 kg (Abdul Latif, 2001). Although animal production plays an important role in the national economy and economic output, it did not find enough attention in the field of studies related to this sector and the problems it faces, especially egg production. There are many problems and obstacles in poultry production farms, and they are real problems and obstacles resulting from interaction with living organisms that have certain needs of food, water, air, heat and humidity. This study was intended to increase egg production, per capita income through laying hens breeding projects and identifying the constraints and factors that affecting layers production and breeding.

## MATERIALS AND METHODS

### Study area

Shikan locality is lying between latitudes 12.4- 13.6 North, and longitudes 30.3 29.3 East. It is bordered by the Bara locality in the north, Al-Nuhud locality in the west, Umm Rawaba locality in the east, and Al-Daleng locality in the south with an area of 190840 square kilometers (Salama, 2019). Rain quantity in the province ranges between 400-200mm per year. Rain distribution varies during one season, and there is also a difference between the season and the next. (Salama, 2019). The average temperatures are between 28-24°C, with maximum temperatures 32-35°C and smallest degrees 21-17°C. The locality is characterized by the presence of two types of north winds and east winds, which are continental winds in the winter season in mid-October until the beginning of March, and the southwest winds that cause rain, and rainy season often extended from June to October (Salama, 2019). Shikan locality is characterized by loose sandy soil in the northern parts, which is characterized by its weak ability to retain water. The northern parts of the locality include the plains and sandy hills, where different types of weeds grow, such as *Bano*, *Haskanit*, *Umm Samim*, *Al Hanbok* and *Simsim Al-Jamal*. Millet cultivation constitutes 60% of the cultivated area in the locality. In addition to peanuts, which are concentrated in the west of the locality and produce about 30% of the total national production. Sesame is grown in the central region of the state and produces between 25-30% of the national production, in addition to gum Arabic production which represents about 65% of the total national production. Also hibiscus and watermelon seeds which are an average plant, about 40% is grown annually, and it is a cash crop. (Salama, 2002). The locality, in general, is rich in livestock; it poses a great number of camels, sheep, goats and their products, in addition to poultry and its industry in the public and private sectors (Salama, 2019). The traditional rain-fed agriculture represents the most important economic activities in Shikan locality. While irrigated agriculture is practiced in a very specific range in the gardens of fruits and vegetables around the Khiran stream. Grazing is considered the second profession after agriculture among most of the tribes spread in the locality. Animals depend on natural pastoral resources and grazing is usually practiced around the villages on small areas. The locality receives large numbers of nomads and semi-nomads in the autumn and winter period (ICAR, 2020 and Salama, 2019).

## RESEARCH METHODS

The study relied on two types of information: Primary information: by direct questionnaire. Secondary information: obtained from references of previous studies on poultry production and breeding and its fields development. A sample size of (20) productive families was taken from the total productive families that are located in the city of Al-Obeid in the different neighborhoods. (20) Questionnaires were

designed and distributed to productive families. The target audience reached (20) breeders who own poultry farms, which are small and medium farms.

### Data analysis method

The obtained data were analyzed using descriptive statistics method by finding frequency and percentage tables.

## RESULTS AND DISCUSSION

### Respondents age categories

The results of the study showed 80% of the respondents age's categories were ranged between 20-50 years, as it shown in Table (1). From the reality of the study, it became clear that most of the targets were aged within the productive age groups, which indicates that the targets will work well and this leads to efficiency at work and is reflected positively on production.

**Table 1. Respondents age categories**

| Age range    | No        | %          |
|--------------|-----------|------------|
| 20-30        | 9         | 45         |
| 30-50        | 7         | 35         |
| Above 50     | 4         | 20         |
| <b>Total</b> | <b>20</b> | <b>100</b> |

### Respondents' educational level

The result of the study showed that the educational level of the targeted audiences is varies. Respondents whom have a university degree reached 70% as it shown in Table (2). From the reality of the study, it became clear that the target breeders are the educated groups, which leads to the adoption of advanced technology.

**Table 2. Respondents' educational level**

| Education      | No        | %          |
|----------------|-----------|------------|
| Illiterate     | 2         | 10         |
| High secondary | 2         | 10         |
| Graduate       | 14        | 70         |
| Post Graduate  | 2         | 10         |
| <b>Total</b>   | <b>20</b> | <b>100</b> |

### Respondent's main occupations

The study showed that the main occupations of the targets were housewife, government employee, self-employment, trade at rates of 40%, 30%, 25%, 5%, respectively, as shown in Table (3). Through the study, was found that the highest percentage recorded by the housewife was 40%, and it may be for the availability of sufficient time.

**Table 3. Respondents' main occupations**

| Main occupations    | No        | %          |
|---------------------|-----------|------------|
| Housewife           | 8         | 40         |
| Government employee | 6         | 30         |
| Self-employment     | 5         | 25         |
| Trade               | 1         | 5          |
| <b>Total</b>        | <b>20</b> | <b>100</b> |

### Profitability of poultry farming

It was clear from the results of the study that most of the breeders (90%) found raising chickens are profitable as shown in Table (4). This, in turn, leads to the ninth in poultry farms and thus leads to

increased production and it is positively reflected on the consumer rate.

**Table 4. Profitability of poultry farming**

| Poultry farming | No        | %          |
|-----------------|-----------|------------|
| Profitable      | 18        | 90         |
| Not Profitable  | 2         | 10         |
| <b>Total</b>    | <b>20</b> | <b>100</b> |

### Breeding System

The results showed that the cage system is the most used system where it used by 60% of poultry breeders, as shown in Table (5). It has been confirmed that the cages system is the most widely used, which indicates its efficiency.

**Table 5. Poultry breeding System**

| Breeding System | No        | %          |
|-----------------|-----------|------------|
| Open            | 1         | 5          |
| Housing         | 7         | 35         |
| Cage            | 12        | 60         |
| <b>Total</b>    | <b>20</b> | <b>100</b> |

### Age of chicken at start of project

The results of the study showed that all the target groups raised chickens at the age of 4 months by 100% as shown in Table (6). The study indicated that all the poultry raised were at the age of production 4 months in order to enter a profit at the beginning of the project and to avoid the period of care, which is a material expenditure without production.

**Table 6. Age of chicken at start of project**

| Age                | No        | %          |
|--------------------|-----------|------------|
| Less than 4 months | 00        | 00         |
| 4 months           | 20        | 100        |
| More than 4 months | 00        | 00         |
| <b>Total</b>       | <b>20</b> | <b>100</b> |

### Mortality rate

Through the results of the study, it was clear that the mortality rates of the majority of the target audience farms are low, as shown in Table (7). The study showed that the mortality rate are low, which is a normal rate, and this is attributed to the good education and care of farm owners. 2020

**Table 7. Mortality rate**

| Mortality rate | No        | %          |
|----------------|-----------|------------|
| High           | 1         | 5          |
| Middle         | 6         | 30         |
| Low            | 13        | 65         |
| <b>Total</b>   | <b>20</b> | <b>100</b> |

### Medicines given to poultry

The study showed that the medicines given to chickens are vitamins, calcium and anthelmintic, and that these medicines are available and inexpensive as shown in the Table 8. Where the poultry is in good health and this is reflected in the production of eggs so that they are good, healthy and conform to quality and specifications standards.

**Table 8. Medicines given to poultry**

| Medicine                    | No        | %          |
|-----------------------------|-----------|------------|
| Not available and Expensive | 8         | 40         |
| Available and inexpensive   | 12        | 60         |
| <b>Total</b>                | <b>20</b> | <b>100</b> |

**Periods of the diet**

The results of the study showed that the diet was given to chickens once a day, twice or three times at a rate of 45%, 35% and 20%, respectively. The breeders used the compound ration only at 100%, and the ration was expensive for most of the breeders by 90% as it shown in Table (9). The study indicated that the need to provide adequate feed for each chicken because of its impact on production. Otherwise the optimal diet is the compound diet, and one of the problems that the breeders faced which increase the feed price and thus may lead to a rise in egg prices.

**Table 9. Periods of the diet**

| Period            | No        | %          |
|-------------------|-----------|------------|
| Once a day        | 9         | 45         |
| Twice a day       | 7         | 35         |
| Three times a day | 4         | 20         |
| <b>Total</b>      | <b>20</b> | <b>100</b> |

**Fodder and drinker distribution**

The results of the study showed that the distribution of foddors and drinkers was 1-8 chickens, 1-10 chickens and more than that by 50%, 20%, 30%, respectively, as shown in Table (10). The study indicated that the optimal distribution of food and drink water for every 8 chickens, this provides an opportunity for each chicken to eat enough of its need.

**Table 10. Fodder and drinker distribution**

| Fodder and drinker distribution/chicken | No        | %          |
|---|-----------|------------|
| 1-8 chickens                            | 10        | 50         |
| 1-10 chickens                           | 4         | 20         |
| More than 10 chickens                   | 6         | 30         |
| <b>Total</b>                            | <b>20</b> | <b>100</b> |

**Egg production distribution**

The results of the study confirmed that most of the breeders distribute their production directly from the farm as shown in Table (11). The study indicated through the questionnaire that there is no difficulty in distributing the production and all the produced quantity is consumed, which indicates the success of the breeding project and the arrival of the product directly to consumers.

**Table 11. Production Distribution**

| Egg production distribution | No        | %          |
|-----------------------------|-----------|------------|
| Directly from the farm      | 11        | 55         |
| Transported to markets      | 7         | 35         |
| others                      | 2         | 10         |
| <b>Total</b>                | <b>20</b> | <b>100</b> |

**Climate effect on chicken's production**

All breeders agreed on the effect of climate on layers chicken's production. But they differed in the method of mitigating the impact, as some followed the method of spraying water or a forestation, wind breaks and linoleums, and this leads to mitigating the effects of the climate for chickens (Table 12).

**Table 12. Climate effect on chicken's production**

| Climate effect | No        | %          |
|----------------|-----------|------------|
| Effective      | 20        | 100        |
| Not effective  | 00        | 00         |
| <b>Total</b>   | <b>20</b> | <b>100</b> |

**Labor employment on a farm**

The results of the study showed that the vast majority does not own labor on farms, and who owns employment depends on the area of the farm and the economic level as shown in Table (13). The great number of farm owners (70%) depends on themselves to discharge the burdens of the farm, and this in turn leads to an increase in the profitability for the farm owner.

**Table 12. Labor employment on a farm**

| Category      | No        | %          |
|---------------|-----------|------------|
| Employment    | 6         | 30         |
| No employment | 14        | 70         |
| <b>Total</b>  | <b>20</b> | <b>100</b> |

**Refer to a veterinarian**

The study showed that 80% of the target poultry breeders used the doctor, as shown in Table (13). This in turn reduces the occurrence of diseases and thus leads to increased production.

**Table 13. Refer to a veterinarian**

| Category     | No        | %          |
|--------------|-----------|------------|
| Refer        | 16        | 80         |
| Not Refer    | 4         | 20         |
| <b>Total</b> | <b>20</b> | <b>100</b> |

**CONCLUSION**

Based on the results, the study concluded raising poultry must be applicable on cages which were suitable with the hot weather in tropical and sub tropical zones. Also a financing program for productive families will help in manage the high prices of poultry feeding stuffs. Poultry infectious diseases must be controlled by providing a curative prevention of viral, worms and external parasites.

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