

## **CHICKEN PERFORMANCE, FEEDING, MAJOR DISEASE INCIDENCE, AND HYGIENE IN TWO LOW-INPUT POULTRY PRODUCTION SYSTEMS IN THE RURAL SECTOR OF FAYOUM GOVERNORATE.**

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### **ABSTRACT**

The current study covered a total of 121 households located in 12 villages within 6 districts in Fayoum governorate. The data was collected during the period from March to August, 2007 through semi-structured interviews with questionnaires. Two systems were identified: 1) the traditional backyard (38% of the sample), and 2) the landless household (34% of the sample). In addition 28% of the sample was classified as small commercial farms. The recent paper discusses only the first two systems since the third system was found to be different in nature, objectives and management level. Most of the chickens (59 %) are dual-purpose, and were less than 6 months and aimed in general at meat production. Low performance is the major phenomenon in the rural poultry production systems where the local chickens attain maturity slowly and laying age is delayed in addition to low hatchability rate and high mortality rate of about 20 %. There was a significant difference ( $P < 0.01$ ) in female age at onset, male weight at sexual maturity, and the Length of production period between traditional and landless poultry production systems in advantage to the first. Household kitchen waste is the main type of feed given to chickens. Equal incidences of disease were observed between the two studied systems. Diarrhea was the major disease. The  $X^2$  test was significant ( $P < 0.05$ ) only with regard to ways of chicken disposal, and incidence of respiratory diseases.

**Keywords:** Low-input Poultry Production Systems, Rural Sector, Fayoum governorate.

### **INTRODUCTION**

The relative adaptation of rural poultry flocks to harsh and primitive management conditions has given them an important role in supplying villagers with animal protein and represented 30% or more of the protein consumed (FAO, 1998). In addition, (Benabdeljelil, 1983; Kazi, 1999; Sonaiya *et al.*, 1999; Guèye, 2000 and Paris *et al.*, 2001) reported that poultry in the rural sector is considered as a sustainable means of income generation for villagers, especially women, and for food security in developing countries. The importance of poultry in income generation for the poor and landless households, in particular, is quite evident when studying the household income structure by income quintile in Egypt (Croppenstedt, 2006). There is, usually, a consumer preference for the products of balady (local) breeds of chickens produced by rural families because of its taste and texture.

These facts highlight the economical importance of poultry production in the rural areas in Egypt. Nearly all families at the village level, even the poor and landless, keep poultry flocks. However, only little is known about the level of management in the rural poultry sector.

The purpose of the present study was to obtain information about the current aspects of rural poultry production under the low-input production systems in Fayoum governorate, and to investigate bird performance, management and feeding practices, through a field survey using a specially designed questionnaire.

## **MATERIAL AND METHODS**

The present study was conducted at the governorate of Fayoum. The selection of households within the study area was done using systematic random sampling techniques. The survey covered 120 households located in 12 villages within 6 districts (each district contains two villages). The data were collected during the period from March to August 2007. Field officers were trained on data collection using a specially prepared questionnaire in the chosen areas. The authors and the officers, then, carried out a preliminary survey through semi-structured interviews to check the fitness and efficiency of the questionnaire. The questionnaire was then improved according to the results of the pre-test.

The detailed questionnaire for collecting baseline data on the low-input poultry production systems included information on nutrition, some performance traits, diseases and hygienic techniques. The collected data were utilized in the present study, and may be readily usable for rural sector development planning (Mallia 1998, 1999).

The computer software (Excel) was used to record the collected data. Data were statistically analyzed (Snedecor and Cochran, 1982). Differences, between the two system means in the performance traits were tested by the Multiple range test as outlined by Duncan (1955). With regard to the differences in the numerical data on incidence of diseases and the frequency of applying management and hygienic practices, the  $X^2$  procedure of hypothesis testing as described by Steel and Torrie, (1980) was applied, using the XL-STAT, 2009. 1.01 program. SPSS version is (2006) computer program for windows was used in calculations.

## **RESULTS AND DISCUSSION**

The present survey revealed that there are three different poultry production systems in the study area:

- 1- The traditional back-yard poultry production system which represented 38% of the total sample, each household owned on the average 1.7 feddan, raise poultry and large animals besides practice crop production. The system is basically a traditional mixed crop/ livestock system
- 2- The landless household poultry production system, where the rural household raises different species of poultry with no cultivated area (34% of the total farmers surveyed).

3- The small commercial farming system represented (28 %) of the total sample. The poultry owner has marked orientated production besides he raise only one species with large numbers.

The study was concerned with the first two systems, which can be classified as low-input production systems since the third system was found to be different in nature, objective, and technical level. Chickens represent the majority of the species (82% of the birds in the sampled flocks). Local chickens in the traditional system are dual-purpose and 59% of the chickens in this system were less than 6 months. In the landless system 69% of the birds were less than 6 months, and the system was aimed at meat production. These results agree with the findings obtained in Malaysia and Thailand in which about 75% of the chickens in village flocks were less than 6 months of age (Spradbrow, 1993).

#### **Performance features**

Table (1) shows means of the performance traits of the chickens under the studied systems. The study revealed that, chickens under the traditional system have earlier age at onset (5.45 mo.) than those under the landless system (6.00 mo.). The differences among the two production systems were significant ( $P < 0.01$ ). In a study on village chicken characteristics in Guinea, Mourad *et al.* (1997) indicated that on the average, the age at first laying was 180 days. Moreover, (Benabdeljelil, 2001) reported that sexual maturity was reached at about 154 and 168 days for local roosters and hens, respectively

With regard to the average mature body weight, the results showed that the chickens under the traditional system attained the highest weight 1125.75 gm. and 1634.84 gm. for hens and cocks, respectively. Under the traditional system cocks had significantly ( $P < 0.01$ ) higher weight than those under the landless system. These findings are in agreement with (Dessie *et al.*, 2008) who reported that the average mature body weights (> 6 months of age) were 1.1 kg, and 1.34 kg, for local hens, and local cocks, respectively. Heavier body weights were reported by Maphosa *et al.* (2004) who found that average mature body weights of local chickens were 2.45 kg and 1.55 kg for cocks and hens, respectively. Moreover, in south-east Asia, village chickens reach market weight of 1.0 - 1.5 kg at the age of 4 to 5 months (Aini, 1999).

The mean egg production of the chickens raised under the landless system, was slightly more than that under the traditional system (153 and 151, respectively). This agrees with Sonaiya and Swan, 2004 who reported that the balady annual egg production was 151 eggs under village conditions with an average weight of 40 grams. However, (Sonaiya *et al.*, 1999; Aini, 1999 and Guèye, 2000) indicated that under village conditions, the annual egg production per hen ranges from 20 to 100 eggs with an average egg weight ranging from about 30 to 50 g. Rate of lay averaged 78 eggs per hen per year (Benabdeljelil, 2001).

The average egg weights of 42 gm, and 40 gm, were reported for chicken under the traditional and landless systems, respectively. Teketel (1986) and Minga *et al.* (1996) reported that the average egg weight was 36

gm and 41.8 gm with a range of 25 gm to 56 gm, respectively. AACMC (1984) reported that the average local egg weight was around 46 gm.

Productive performance such as, rate of lay, egg weight etc. were generally found to be higher than those reported in Sénégal (Missohou, 1998) or (Cameroun Agbede *et al.*, 1995).

**Table1: Performance traits of chickens under the traditional and landless systems.**

Performance traits	Traditional system	Landless system
Female age at onset (months)	5.45 ± 0.12 <sup>a</sup>	6.00 ± 0.88 <sup>b</sup>
Male age at sexual maturity (months)	6.03 ± 0.06	6.39 ± 0.10
Female weight at onset ( g )	1125.75 ± 26	1082.60 ± 22
Male weight at sexual maturity ( g )	1634.84 ± 31 <sup>a</sup>	1506.52 ± 36 <sup>b</sup>
Eggs / hen / year	151 ± 2.75	153 ± 3.22
Average egg weight (g)	42 ± 0.20 <sup>a</sup>	40 ± 0.31 <sup>b</sup>
Length of production period ( months)	10.00 ± 0.20 <sup>a</sup>	8.86 ± 0.31 <sup>b</sup>
Chick mortality ( % )	19.48 ± 1.59	20.56 ± 1.27
Hatchability ( % )	63.81 ± 1.69	65.30 ± 1.59

Means in the same row having different letters are significantly different (P <0.01).

The results showed that chick mortality in the landless system (20.56 %) was higher than that of the traditional system (19.48 %). However, both systems suffer high mortality which may be due mainly to the mismanagement during the incubation period. About 95% and 90% of the surveyed cases in the traditional and landless system, respectively used primitive ways of warming: sun in the morning and palm need boxes covered with any scraps of cloth at night. Under village conditions (Khalafalla *et al.*, 2000) reported chick mortality of 25% in Sudan. Mortality rates among young birds reached 46% to 76% in Morocco (Benabdeljelil, 2001). It was suggested that improvements in raising conditions in association with efficient sanitary programs would reduce mortality losses and increase productivity.

Although the study did not investigate, in particular, the cause of chick mortality, it is likely that predators and diseases ,mismanagement, lack of fresh water, improper feeding were among the major reasons (Aini, 1990, Pandey, 1992 and Dipleolu, 1998). Once the chicks attain the age of 31-40 days, mortality were greatly reduced unless there is an outbreak of viral disease or an epidemic disease.

The bulk of rural poultry flocks remain in the hands of small village owners who sell small quantities of their eggs and birds to improve their income. The villagers raise chickens for egg and meat production and for subsequent hatching of eggs. Broodiness is a common characteristic of the native chicken. Although broodiness is a hindrance for egg production (Pampin and Ruiz, 1998 and Prasetyo *et al.*, 1985), the broody hen can carry up to twenty chicks (Martin, 2001). Hatching the chicks with a very low cost, and high hatchability can improve poultry production efficiency.

Hatchability is affected mainly by hygienic and incubation conditions in the nests, egg quality, nutrition of the breeding hen, genetic factors, storage temperature, care, quality of eggs , humidity and diseases (Hyre1962, Byng and Nash, 1962, Simkova, 1962, Gringer 1964, Laxi1964, Reddy *et al.*, 1965,

Austic 1990, Sainsbury, 1992 and Kabilika,1999). Crossbreeding improves hatchability by 5 to 20 % in most crosses (Ragob *et al*, 1957 ).

The mean hatchability was, nevertheless, low especially in the traditional system being 63.81% and 65.30% in landless system. The following hatchability rates (percent) have been reported in Chad: 65 (Aklobessi *et al*, 1992) and 30 to 70 (Provost and Boredon, 1968), and in Morocco 78 (Benabdeljelil, 2001).

Low production is the major phenomena in the rural poultry production systems where the local birds attain maturity slowly and laying age is delayed as also the weight gained. The productivity of village chickens production systems in general and the free-range system in particular is known to be low (Gunaratne *et al.*, 1993; Guèye, 1998). Farmers in general do not really benefit from advances in technology. Most of them lack access to important inputs, such as commercial feeds, high quality stock, and extension services (Lambio *et al.* 2003; Conroy *et al.*, 2005 and Chang *et al.* 2006).

Rural households are often not interested in extension service or new technology for several reasons. Firstly, there is little incentive for them to actively seek improvement because there is little to gain from a very small production base. Secondly, they may not have the financial resources (own or credit) to invest in any improvement even if they want to. Illiteracy and low education are additional barriers to adoption (de Castro *et al.* 2002). According to the former statement, the first step in improving the rural sector maybe through directing the rural small farmers to be more market-oriented or by encouraging the small- or semi-commercial system.

#### **Diseases and hygiene**

The collected data revealed that the high percentage of disease incidence are in the landless system (54%) followed by the traditional (50%). Farmers in these systems use traditional medications locally available such as, onion, garlic, , paprika and other substances in treating their birds. About 36% and 40% of the farmers in the traditional and landless systems, respectively use these means in treating and protecting their poultry. In both systems, 24 % and 20 % of the farmers stated that there is no place for isolation, and only 16 % and 30 % said that they bury dead birds in pits (Table 2).

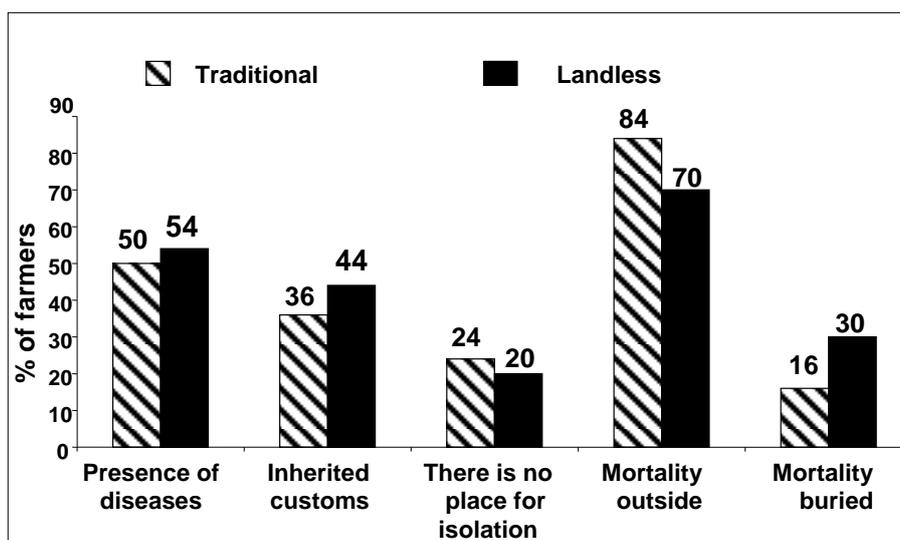
**Table (2): Main features concerning hygiene and diseases under the different production systems (%).**

System	Presence of diseases	Inherited customs	No available place for isolation	Mortality disposal	
				Outside	Buried
Traditional	50	36	24	84	16
Landless	54	44	20	70	30

Figure (1) demonstrates that the percentage of farms of the traditional system had less incidence of diseases, and showed less keeping of inherited customs as compared to the farmers in the landless system. Birds' health in the rural sector is not guaranteed (fluctuated) because of the absence of

disease control programs, inavailability of sanitary measures, and shortage of medical treatment. This can be due to cultural, technical, or economic factors.

Table (3) summarizes major disease incidence. Diseases included diarrhea (59%, 58 %) and respiratory diseases (23%, and 12%) for the traditional and landless systems respectively. The greenish/bloody diarrhea and coughing are likely part of Newcastle disease's signs. ND was considered the most devastating and prevalent disease of chickens in the rural sector in many African countries (Chabeuf, 1990; Bell, 1990, Chrysostome, 1995; and Yongolo, 1996). Family poultry production suffers from the constraints of disease, particularly Newcastle disease. Newcastle Disease (ND) is regarded as the principle factor limiting rural poultry production in Africa (Awan, 1994). ND can typically kill up to 80% of the household poultry in Africa (Spradbrow, 1993). Mites represented only minor disease incidences in the traditional and landless systems of 8% and 3%, respectively as shown in Table (3).

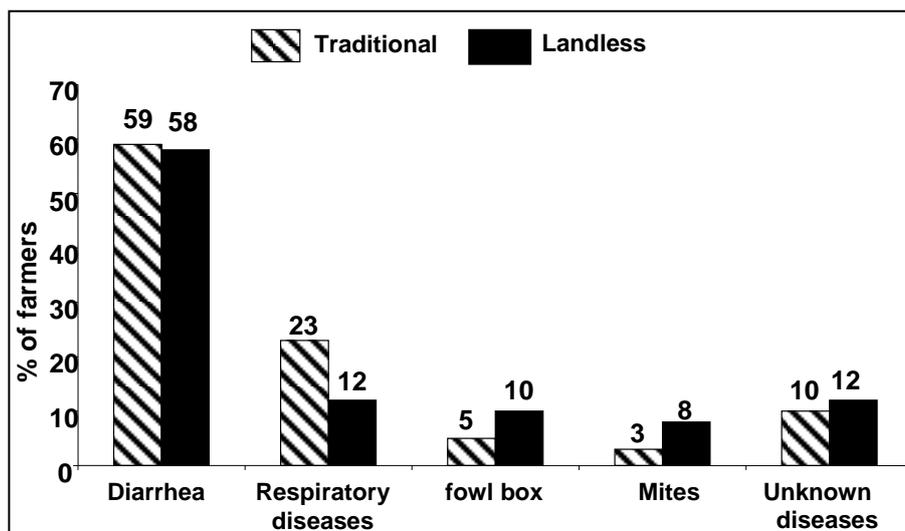


**Figure (1): Main features concerning hygiene and diseases under the different production systems.**

**Table (3) Types of diseases under the different production systems.**

System	Disease type %				
	Diarrhea	Respiratory diseases	Fowl box	Mites	Unknown diseases
Traditional	59	23	5	3	10
Landless	58	12	10	8	12

As shown in Fig. 2 slightly, higher percentage of chicken diarrhea was observed in farms of the traditional system. Percentage of farms showing respiratory diseases was double as much in the traditional system as in the landless system.



**Figure (2): Types of diseases under the different production systems.**

**Nutrition**

The feed resources vary depending on local conditions and the production system. Cereals, most often obtained from the farmer's own field crop constitute the majority of feeds in the traditional system. However cereals might be purchased in the landless system. The second type of feed stuff was leftovers from the house kitchen. The third were on the farm mixed unbalanced rations. The fourth was farm-grown green forage.

Data concerning types of feedstuff given to poultry by farmers are presented in Table 4. It was obvious that household kitchen waste was the main type of feed given to the chickens by 29% and 32% of the farmers under the traditional and landless systems, respectively.

**Table (4): Type of feedstuffs fed to chickens.**

System	Types of feed %			
	Commercial ration	Homemade ration	Green forage	Kitchen waste
Traditional	18	25	28	29
Landless	18	27	23	32

Concerning the feeds provided by farmers to their chicken, commercial feed was equally provided under both systems. The farmers in the landless system depended on home made rations and kitchen waste while more farmers in the traditional system used green forage from own cultivated land (Figure 3).

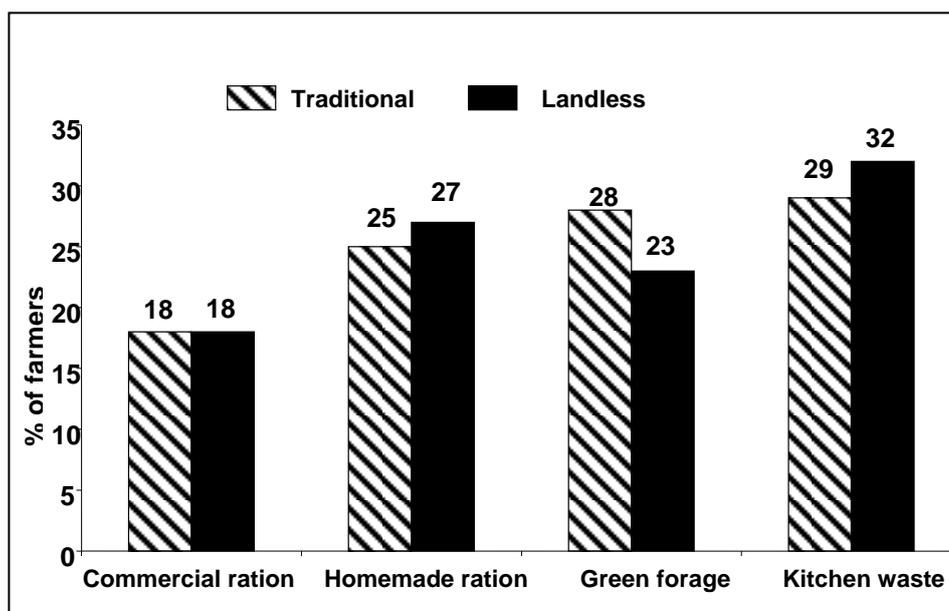


Figure (3): Type of feedstuffs provided by farmers to chickens in the different production systems.

It is worth noting that there are five types of kitchen wastes. Bread leftover is the most important one, as it represented the largest percent in feeding chickens as indicated in Table 5.

Table (5): Type of wastes fed to chickens.

System	Type of wastes				
	Bread leftover	Rice leftover	Macaroni leftover	Vegetable leftover	Bran
Traditional	33	22	11	26	8
Landless	39	19	14	24	4

The challenge to better nutrition is to determine an easy method to estimate the feed intake from each type in order to make a balanced ration, and to find a consistent local supply of feed ingredients (Gunaratne, 1999).

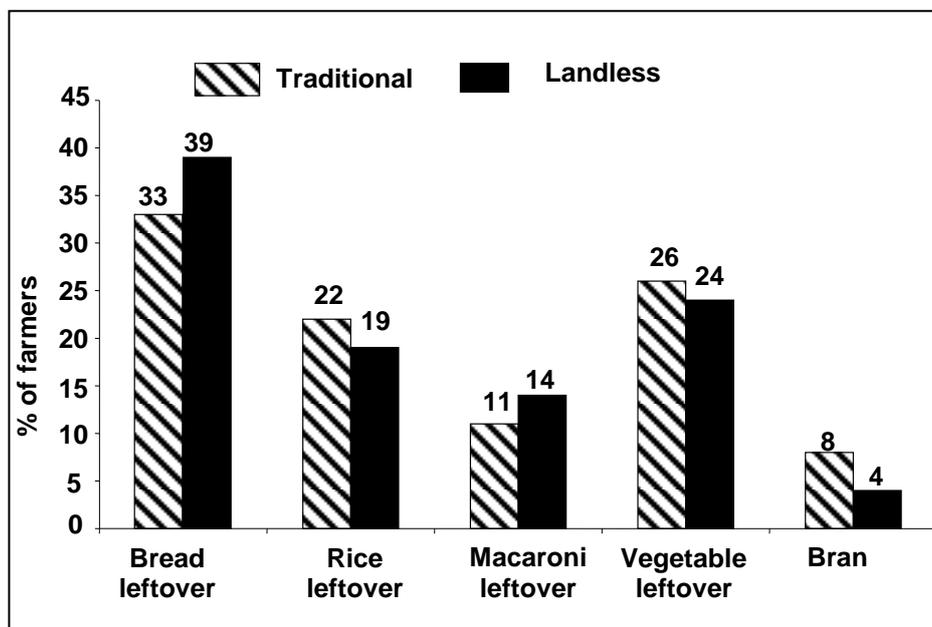
In general, higher percentages of the farms under the traditional system used field crops residues and left-overs, while in the landless system house left-overs were more utilized (Figure 4).

#### The X<sup>2</sup>- test

The X<sup>2</sup> test of hypothesis as outlined by Steel and Torrie (1980) was applied to the results presented in tables 2 to 5. The tables contain enumeration data classified according to a single criterion, and in general involve a discrete variable. Thus, they consist of numbers of individuals falling into well- defined classes, namely yeses or noes in response to a question, or the number of individuals showing a qualitative rather than a quantitative a quantitative character.

The computed values of the test criteria (P) were not significant in all cases, except two, at the level  $\alpha = 0.05$  which lead to accept the null hypothesis is that the proportions are equal. According to Steel and Torrie (1980), acceptance of the null hypothesis offers a reasonable explanation of the existing data.

The null hypothesis was rejected only in the cases of: 1) the way of dead birds disposal (table 2) and, 2) the incidence of respiratory diseases (Table 3).



**Figure (4): Types of waste provided by farmers to chickens in the different production systems**

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### أداء الدجاج وتغذيته ونسبة إصابته بالأمراض الرئيسية والإجراءات الصحية تحت نظامين من نظم إنتاج الدواجن منخفضة المدخلات في القطاع الريفي بمحافظة الفيوم .

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أجريت هذه الدراسة على ١٢١ حيازة منزلية موجوده في ١٢ قرية تابعه لسنة مراكز بمحافظة الفيوم. وقد تم جمع البيانات خلال الفترة من مارس إلى أغسطس ٢٠٠٧، وذلك عن طريق إجراء مقابلات شخصية والإجابة على إستبيان خاص. وقد أمكن تحديد نظامين: الأول نظام الفناء الخلفي التقليدي (الذي بلغت نسبته ٣٨% من العينة)، والثاني النظام المنزلي للمعدمين الذين لا يملكون أي أرض زراعية ( وبلغت نسبته ٢٨% من العينة). هذا بالإضافة إلى نسبة قدرها ٢٨% من العينة تتبع نظام المزارع التجارية الصغيره. وقد تناول البحث الحالي النظامين الأولين فقط بالدراسه، حيث إتضح أن النظام الثالث مختلف عنهما في طبيعته، وأهدافه، ومستوى إدارته. وقد وجد أن معظم الدجاج (٥٩%) ثنائي الغرض ويقل عمره عن ستة شهور وإنه مربى أساسا لإنتاج اللحم. وكانت السمه الغالبة في القطاع الريفي عموما هي إنخفاض الأداء حيث يتأخر العمر عند وضع البيض مع إنخفاض نسبة الفقس ويرتفع معدل النفوق ليصل إلى نحو ٢٠% وكان هناك فروق معنويه عند مستوى ١% بالنسبة للعمر عند بدء وضع البيض، ووزن الذكور عند النضج الجنسي، وطول الموسم الإنتاجي بين النظامين التقليدي والمنزلي في صالح الأول. وإتضح أن مخلفات المطبخ هي الغذاء الأساسي للفقراء في النظام الثاني، وسادت نسبي الإصابه بالأمراض في النظامين، وكان المرض الأكثر شيوعا هو الإسهال. وقد أعطى إختبار مربع كاي نتائج معنويه عند مستوى ٥% بالنسبة لأسلوب التخلص من الدجاج النافق ونسبة حدوث أمراض الجهاز التنفسي.