



Original Article

Evaluation of the zootechnical performance of broiler chicken at the level of different types of breeding in Algeria

Lamari Sara

Department of Agronomy, University of Ferhat Abbas (Sétif 1)19000, Algeria

ARTICLE INFOR

Article history:

Received 19 Novembre 2022

Revised 13 March 2023

Accepted 24 April 2023

Keywords:

Broiler chicken;
Growth parameters;
Breeding type.

ABSTRACT

The objective of this work was to study the influence of livestock farming type on the performance of broilers chickens (COBB 500 strains) in the semi-arid region of Sétif in Algeria. It has been determined the zootechnical parameters of chickens (live weight (g), Average daily gain, Consumption Index, Mortality) for control of livestock farming type. Indeed, the growth of broiler chickens was influenced by livestock farming type; the live weight and the average daily gain respectively were linked to livestock farming type ($p < 0.05$). Whereas the consumption Index was close to the meaning ($p=009$). Broiler chickens of larges breeders had more growth performance with heavy carcasses ($2872, 22 \pm 251,39$ g), the more the average daily gain ($61,94 \pm 7,23$ g/day), and better consumption index ($1,76 \pm 0,16$) at 47 days of age. The mortality rate, in fact, is high and exceeds 10%. The efforts must be concentrated on equipping buildings, hygiene rules and health programs, strengthening the training of the human factor to obtain the best performance from the broiler chicken: a low mortality rate, better weight growth and an improved consumption index

Faculty of Natural Sciences and Life, University of El Oued. 2023

1. Introduction

The strategy for the development of animal production pays more and more attention to poultry which, by its short cycle and the quality of its proteins, gives it a significant advantage over red meats, the fodder supply of which constitutes a limiting factor [1].

In Algeria, as in most developing countries, the main objective since independence has been to meet the population's galloping food needs, particularly animal protein, as quickly as possible. However, the poultry sector has established itself in Algeria by implementing incentive poultry policies to reduce the perception of animal proteins in Algerian food models [2]. Although, sustainability is not easy to define. It is a complex phenomenon, which includes the integration of zootechnical, economic, social, health and environmental dimensions of production in each socio-economic context.

The functioning of the poultry sector remains below international standards [3], and this situation has led to additional production costs and influences consumer

prices. Each year, the poultry industry is marked by chronic price instability. The success of this sector and the satisfaction of market demand which is constantly growing, have led the producer to reconcile the quality and the price of chicken to produce a maximum of chicken meat for a minimum of food during the phase breeding. This option requires the improvement of breeding methods (chicks, food, etc.), slaughter conditions and hygiene and prophylaxis. However, the development of this sector encounters major basic constraints constituted by the lack of adequate breeding infrastructure, the lack of hygiene, the poor management of breeding and certain pathologies persist and therefore constitute an obstacle to development in Algeria [4].

Our study aims to assess the level of control of poultry farming, through the study of the zootechnical performances obtained at the level of two types of broiler farms to meet the market demand of the semi-arid region in Algeria.

* Corresponding author : Lamari Sara Tel.: 213.796 009 373

E-mail address: lamarisara@gmail.com

Peer review under responsibility of University of El Oued.

DOI : <https://doi.org/10.57056/ajb.v4i1.107>

2. Materials and Methods

2.1. Animals

The study was conducted in 19 private farms located in the southern region of Sétif during a period which extends from March to May 2021. The breeders used the COBB 500 strain due to its resistance to diseases and interesting zootechnical performances.

The food was ensured by purchasing the food from private suppliers while its storage was done in a bag protected from humidity and temperature. Foods: starter, grower and finisher were used. The experiment took place in buildings with areas of 250 to 1200 m², it related to a workforce that varies from 2000 to 13000 subjects and a population density of 9.96 ± 2.57 subjects /m². An average temperature of 30°C and humidity equal to 51% were recorded during the study. Sanitary prophylaxis measures (hygiene, crawl space, etc.) and prophylaxis have been respected to avoid and prevent the appearance of possible pathologies.

2.2. Zootechnical performance

Data relating to zootechnical performance were collected and recorded at 15 days of age, and at the end of each experimental period (for sale), according to [5].

The live weight (g) of the 24 broilers taken at random. It was measured after 15 days of breeding and at the end of each breeding phase; the latter constituted the weight for sale.

Consumption Index (CI) corresponds to the ratio between the quantity of food ingested and the live weight per chicken (equation 1)

$$CI = (\text{amount of feed ingested during a period (g)}) / (\text{Live weight per chicken during a period (g)})$$

Average daily gain (ADG) by g/day, was determined by the difference in the average weight of the final and initial chicken during a period considered (equation 2).

$$ADG \text{ (g/day)} = (\text{Final average weight (g)} - \text{initial average weight (g)}) / (\text{The duration of the rearing phase})$$

Mortality (MORT), during the study period, was expressed as a percentage (equation 3). The daily mortality record was carried out on the day of the event, by removing the dead broilers found.

$$MORT \text{ (\%)} = (\text{Number of dead subjects}) / (\text{Initial number of subjects}) \times 100$$

Feed ingested (g) or food consumption was assessed according to the stock used by each breeder throughout a strip.

The age at sale corresponded to the production time of each tape.

2.3. Statistical analysis

The mean and standard deviation are calculated, and tests of normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene's test) were performed for all parameters. Normalizing logarithmic transformations are used when the distribution of the variables studied is abnormal. A non-hierarchical (VL) classification method that uses the distribution of central tendencies statistics is performed to identify the different classes of broiler farms [6]. The difference between the 2 groups concerning the variable Number of broilers per bands. Both classes were classes of larges breeders (class 1) and small breeders (class 2) with $1 > 4000$ subject/bands and $2 < 4000$ subject/bands, respectively.

To determine livestock farming type effect on broiler growth performance, one-way ANOVA was used, and the means were compared by LSD test at 5%. The type of analysis of variance was chosen based on the nature of the variables. The Kruskal Wallis test was used in cases where the normality and homogeneity of the data were not assured. All the analyses were carried out by the SPSS package program, version 21 software.

3. Results and Discussion

3.1. Livestock management

All herd management parameters are recorded synthetically in Table 1. Although half of the buildings surveyed were of the greenhouse type while the other are solid and the ventilation is 73.7% static and 26.3% dynamic. On the contrary, in the central region of Algeria, the ventilation was static in all the farms studied [7,8].

The majority of the soil structures of the farms visited were clay-based (89.47%) which used wood chips as bedding while the remaining 11% used straw. Our results were contradictory with those of Cherifi 2008 which announced buildings with concrete floors in the 3 centers studied (Blida, Rouiba and Corso). The clay floor was preferred most often for economic reasons, while concrete floors for ease of disinfection and simplification of work.

It is important to note that the nature of the walls will depend on the insulation of the buildings. For this, 42.11% of the buildings surveyed were solid constructions, either in breeze blocks or bricks and concrete bound by mortars (Table 1).

Each of these structures has its advantages and disadvantages, cinder block is a very easy to find material but it is poorly resistant to humidity. On the other hand, the brick is stronger than the block and offers great resistance but two to four times more expensive than the block.

All of the small farms use straw fairly (10.5%) but the large breeders used only wood shavings (47.36%) as litter most of the time. On the other hand, in 73.7% of the farms studied, the ventilation was static in the small breeders

(47.36%) most often due to a lack of equipment. Thus, the state of hygiene was not satisfactory.

Table 1: Livestock management

	larges breeders (%)	Small breeders (%)	Total (%)
Ventilation			
Dynamic	21.05	5.26	26.3
Static	26.32	47.36	73.7
litter			
wood chips	47.36	42.10	89.5
straw	0	10.5	10.5
floor structure			
Clay	47.36	42.10	89.5
Concrete	0	10.5	10.52
Type of Wall			
Cinder block, brick, and concrete	26.32	15.79	42.11
Plastic and Polystyrene	21.05	36.84	57.9

3.2. Evaluation of the zootechnical performance of broiler chickens in both types of farming

The results in Table 2 indicated the effect ($p < 0.05$) of livestock farming type on the zootechnical performances of broiler chickens. Indeed, the growth of broiler chickens was influenced by livestock farming type, the live weight and ADG respectively were linked to the livestock farming type ($p < 0.05$). Whereas, CI was close to the meaning ($p=0.09$).

Table 2: Effect of livestock farming type on zootechnical performances of broiler chickens

	Class1 (9) M ± SE	Class2 (10) M ± SE	p
Age (days)	47.1±1.96	45.8±4.59	0.49 ^{ns}
ADG (g/day)	61.94±7.23 ^a	54.70±7.46 ^b	0.04 [*]
live weight (g)	2872.2±251.4 ^a	2580.0 ±319.0 ^b	0.04 [*]
CI	1.76±0.16	1.61±0.21	0.09 ^{ns}
MORT(%)	10.6±6.64	10.1±4.2	0.90 ^{ns}

a, b Different letters in the same column express significantly different values, ^{ns}: non-significant difference; ^{*}: significant difference at $p < 0.05$. **ADG**: Average daily gain, **CI**: Consumption Index, **MORT**: Mortality. **Class 1**: large breeders (> 4000 subject/bands, **Class 2**: small breeders (< 4000 subject/bands), **M**: Mean, **SE**: Standard Error.

3.2.1. Live weight (g)

The results of the analysis of variance indicated that the live weight for the sale of broiler chickens was affected by the livestock farming type ($p < 0.05$, Table 2). Broiler

chickens of large breeders achieved heavy carcasses (2872.2±251.4 g) at 47 days of age, compared to chickens of small breeders (2580.0±319.0 g) at 46 days of age.

The weight we observed was acceptable compared to the production time. This can be explained by the feed quality; the quantity of food and the efficiency of the food formula and the control of zootechnical parameters that influence weight gain [9].

Indeed, our results were better than that of [10] in the Ain Defla region (Algeria) which recorded a weight of 2580g in 57 days, significantly higher than that of [11] (2200g/subjects at 58 days) in the Bouira region (Algeria) in 2020 and from [2] to Béjaia in 2020 (2.51 kg at 58 days).

The age at slaughter in some countries was much lower than that of our study (46 days), for example in England (2013), the Netherlands (2013), Germany (2013) and France (2016). This is respectively (38,40, 37 and 35.6) [12,13]. These results were the consequences of a good mastery of breeding practices, feeding and the use of efficient animals in the semi-arid region.

3.2.2. Average daily gain (ADG)

According to the results of Table 2, the ADG is dependent on the livestock farming type. The more breeding was large (> 4000 subject/bands), the more the ADG (61.9±7.23 g/day) at 47 days of age, compared to other broiler chickens (54.70±7.46g/day) at 46 days of age in other breeding. This parameter is directly related to age and weight.

Our results were better compared to the results obtained by [10] at Ain Defla estimated at 45.09 (g/d). However, [14] reported a lowest average ADG of 46.50 g/day in 59 days and highest ADG of 50.14 g/day in 51 days between separate groups of farmers in the region of Tizi Ouzou (Algeria). Large breeders (> 4000 subjects/bands) are the most affluent and the most efficient. But, these performances remain below what is indicated by certain authors such as [15] who recorded an ADG of 66.7 g/day during a rearing period of 41 days, and [16] who recorded an ADG of 59.87 g/day for the same period of time.

3.2.3. Consumption Index (CI)

Results of table 2 showed that CI recorded a tendency ($p = 0.09$). Comparative analysis indicated that broilers chickens in large farms had CI (1.76 ± 0.16) better than their contemporaries in small farms (1.61 ± 0.21).

The consumption indices in large and small farms were 1.76 and 1.61 respectively (Table 2) they were better than the one recorded in Ain Defla (2.34) and with that exposed by [17], who observed consumption indices of 2.56; 2.29 and 2.89 at different comfort temperature (5°C; 28°C; 31°C) in Viçosa, Brasil. Ours results are the consequences of a good mastery of husbandry practices, feeding and the use of efficient animals.

Feed conversion is a parameter that indicates the amount of food eaten to produce 1 kg of live weight.

3.2.4. Mortality (MORT)

Results of table 2 reported that the mortality rate was statistically independent of farm type ($p > 0.05$). During our study, we recorded higher mortality rates (10%) among several poultry farmers (Table 2) compared to those recorded by [10] in Ain Defla (9.87%), 4.22 in Bordj Bou Arreridj [18] and 9.75% in Bouira [19].

In poultry farming, high mortality is an indicator of low environmental resistance of chickens.

Our results (at an average temperature of 30°C) were similar to those of [17], in 2018 when the temperatures reached 28°C and 31°C (10.71% and 25% respectively). However, [8] observed lower mortality rates of 6.25% and 3.21% for acclimatized and unacclimatized chickens

respectively. It is known that in hot conditions, mortalities are higher for the heaviest subjects [20].

In the study farms, we noticed a high mortality compared to the standards. This can be explained by the poor environmental conditions. Farms equipped with an evaporative cooling system associated with ventilation have considerably reduced mortality [21]. However, according to [22] in unventilated sheds the birds performed better.

4. Conclusion

Our study concluded that externalize the rearing conditions and obtain the best performance from the broiler chicken namely: a low mortality rate, better weight growth and an improved fuel consumption index, efforts must be concentrated on equipping buildings, hygiene rules and health programs in addition, strengthening the training of the human

Conflict of Interest

The authors declare that they have no conflict of interest

References

1. Cherifi Z. Study of the zootechnical performances of some breeder farms from the Poultry Center Group. *Memory of Magister of the national agronomic institute El Harrach*.2008,107 pages. http://dspace.ensa.dz:8080/jspui/bitstream/123456789/476/1/cherifi_z.pdf.
2. Kirouani L. Performance of poultry farms, broiler segment in the wilaya of Bejaia. *Revue Agriculture*.2020, 11(1) : 68 – 72.<https://revue-agro.univ-setif.dz/documents-agri/Volume11-N1-2020/Performances-elevages-avicoles-segment-poulet-chair-Bejaia.pdf>.
3. Kaci A. The determinants of the competitiveness of Algerian poultry enterprises. *Doctoral thesis. ENSA El Harrach, Algiers*.2014, 274 pages. http://dspace.ensa.dz:8080/jspui/bitstream/123456789/1024/3/kaci_a.pdf
4. Kaci A, Cheriet F. Analysis of the competitiveness of the poultry meat sector in Algeria: attempts to explain chronic destructuring. National School of Agronomics – INA Algiers, Algeria. *New Medit*. 2013 N 2. P11-21. 9. http://www.iamb.it/share/img_new_medit_articoli/939_11_kaci.pdf
5. Cassuce D, Tinôco I, Baêta F, Zolnier S, Cecon P and Vieira M. Thermal comfort temperature update for broiler chickens up to 21 days of age. *Engenharia Agrícola* .2013,33(1): 28-36.[doi: 10.1590/S0100-69162013000100004](https://doi.org/10.1590/S0100-69162013000100004).
6. Brito P, Sousa F, Tavares Pinto S. VL Models in Non-Hierarchical Classification. *Reports of the 12th Meeting of the Société Francophone de Classification*.2005. http://www.sfc-classification.net/IMG/pdf/Actes_SFC05_Montreal.pdf
7. Bachir Pacha M, Triki-Yamani RR, Mohamed Said R, Stella Abdul Hussain M. Evaluation of Animal Performance

- in Broiler Farming in the Central Region of Algeria *Bulletin UASVM, Veterinary Medicine*.2011, 68 (1). <http://journals.usamvcluj.ro/index.php/veterinary/article/download/6729/5951>
8. Boudouma D and Tefiel H. Performances of broilers acclimatized and reared in hot conditions in the North of Algeria. *Livestock Research for Rural Development*.2012, 24 (5) 2012.<http://www.lrrd.org/lrrd24/5/boud24080.htm>.
 9. Hubbard C. management guide broiler. 2006. <https://www.winmixsoft.com/files/info/Hubbard%20Broiler%20Management%20Guide.pdf>.
 10. Driouche A, Hamidi L .Inventory of the practice of broiler-type poultry farming in the wilaya of Ain Defla Case of approved farms). *Master's thesis agronomy Khemis Miliana University*.2017, (69 pages).
 11. Kermia S and Ouachem. A Broiler breeding in the Bouira region “Survey and followed ”. Master's thesis University of Bouira. 2020.
 12. FAOSTAT. Production costs for chicken farms flesh live weight (USD/tonne). *FAO Agricultural statistical databases*. 2013. <https://www.fao.org/3/i3531e/i3531e.pdf>
 13. FAOSTAT. Data relating to the agricultural census and agricultural production.2017.
 14. Mouhous A, Guermah H, Djellal F, Kadi S A. Performance and competitiveness of broiler Chicken farms in the area of free trade Agreements: the case of Tizi-Ouzou (Algeria). *V E T E R I N A R I A V O L.2020, 7 0 I S S U E1*.<http://doi.org/10.51607/22331360.2021.70.1.59>.
 15. Koplms FC, Smit MN, Cho M, He L, Beltranena E. 2020. Effect of feeding 3 zero-tannin faba bean cultivars at 3 increasing inclusion levels on growth performance, carcass traits, and yield of saleable cuts of broiler chickens. *Poultry Science* 99, 4958-68. doi.org/10.1016/j.psj.2020.06.034
 16. Cho M, Smit MN, He L, Koplms FC, Beltranena E. 2019. Effect of feeding zero-or high-tannin faba bean cultivars and dehulling on growth performance, carcass traits and yield of saleable cuts of broiler chickens. *J Applied Poultry Res*, 28(4), 1305- 23.
 17. Arcila J C P, Tinoco I F F, Saraz J A O, Rocha K S O, Candido M G L. Zootechnical and physiological performance of broilers in the final stage of growth subjected to different levels of heat stress. *Revista Facultad Nacional. Agronomia. Medellín*. 2018, 71(2): 8469-8476. [doi: 10.15446/rfna.v71n2.71927](https://doi.org/10.15446/rfna.v71n2.71927).
 18. Benlefki 2019 Study of the conduct of broiler breeding in the wilaya of Bordj Bou Arreridj academic master's thesis. Batna 1 University 41 pages. <https://www.calameo.com/books/005976483e15289045233>
 19. Saiki I and Nacef M. Evaluation of the zootechnical and sanitary performance of some broiler farms in the region of "Bouira". *Master's thesis University of Bouira*. 2019, 92 pages.
 20. Abu-Dieyeh Z H M . Effect of chronic heat stress and long-term feed restriction on broiler performance. *International Journal of Poultry Science*.2006. 5: 185-190. <http://www.pjbs.org/ijps/fin553.pdf>
 21. Sartor V, Baeta FC, Luz, ML, Orlando, RC. Sistemas de resfriamento evaporativo e o desempenho de frangos de corte. *Scientia Agricola*.2001, 58(1):17-20. <https://www.scielo.br/j/sa/a/SVMsG6PQ3R7mnCpyk6cwFBM/?lang=pt&format=pdf>
 22. Vigoderis RB, Cordeiro MB, Tinoco IFF, Menegali I, Souza Junior JP, Holanda MCR. Avaliação do uso de ventilação mínima em galpões avícolas e de sua influência no desempenho de aves de corte no período de inverno. *Revista Brasileira de Zootecnia, Viçosa-MG*.2010, v.39, n.6, p.1381-1386.<https://doi.org/10.1590/S1516-35982010000600030>

Recommended Citation

Lamari S. Evaluation of the zootechnical performance of broiler chicken (COBB 500 strains) at the level of different types of breeding in Algeria. *Alger. j. biosciences*. 2023, 04;01:021-025.



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/)