

RESEARCH PAPER

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Zootechnical performance and economic profitability of sasso broiler chickens reared under a semi-automatic production system in Burkina Faso**Bernadette Yougbaré^{*1}, Arnaud Stéphane Rayangnéwêndé Tapsoba¹,****Fatogoman Téophile Sanou², Clément Kaboré³, Amadou Traoré¹**¹*Centre National de la recherche Scientifique et Technologique (CNRST), Institut de l'Environnement et de Recherches Agricoles (INERA), Département Productions Animales (DPA), Ouagadougou, Burkina Faso*²*Ministère de l'Agriculture, de l'Eau, des Ressources Animales et Halieutiques (MAERAH), Ouagadougou, Burkina Faso*³*Centre Universitaire de Ziniaré/Université Joseph Ki-Zerbo, Ouagadougou, Burkina Faso***Key words:** Sasso broiler chicken, Zootechnical performance, Economic profitability, Semi-automatic production system, Burkina Faso**Received:** June 20, 2026**Accepted:** July 24, 2026**Published:** August 06, 2026**DOI:** <https://dx.doi.org/10.12692/ijb/29.2.35-44>**ABSTRACT**

Improving poultry productivity is a major challenge for enhancing food security and farmers' incomes in Burkina Faso. This study aimed to evaluate the zootechnical performance and economic profitability of a flock of Sasso broiler chickens reared under a semi-automatic production system. A descriptive study was conducted from July 1 to October 1, 2023, at the SYA farm located in Soulgo, Ziniaré Municipality, Burkina Faso. A total of 750 one-day-old Sasso chicks were monitored over a 48-day production cycle. The evaluated zootechnical parameters included body weight, average daily gain (ADG), feed intake, and mortality rate. Economic performance was assessed based on production costs, revenues, and profit margin. Data were entered and processed using Microsoft Excel 2024 and subjected to descriptive statistical analysis, including the calculation of means, frequencies, percentages, and economic indicators. Mean body weight increased from 36.71 g at placement to 1,023 g at 48 days, corresponding to a total weight gain of 986.29 g. The overall average daily gain was 20.54 g/day, while the mean feed intake reached 46.35 g/bird/day. The cumulative mortality rate was 8%, with most losses occurring during the finishing phase. Total production costs amounted to 1,339,555 CFA francs, whereas total revenue reached 1,735,000 CFA francs, resulting in a net profit of 395,445 CFA francs, equivalent to 573.11 CFA francs per bird sold. These findings indicate that rearing Sasso broiler chickens under a semi-automatic production system can be economically profitable when feeding practices, flock management, and health monitoring are effectively controlled. This study provides baseline information for improving semi-intensive poultry production systems in Burkina Faso.

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INTRODUCTION

Poultry production is one of the fastest-growing livestock sectors worldwide due to its significant contribution to food security, human nutrition, and household income. Poultry meat is an important source of high-quality animal protein, and its production continues to increase in response to population growth, urbanization, and changing dietary patterns (FAO, 2013; USDA, 2024). In developing countries, poultry farming also plays a crucial role in employment generation and poverty reduction.

In sub-Saharan Africa, the poultry sector represents a key driver for improving the availability of animal protein and supporting rural livelihoods. However, poultry productivity remains constrained by several factors, including the high cost of feed, limited availability of quality production inputs, infectious diseases, inadequate biosecurity measures, and restricted access to veterinary services (Dione *et al.*, 2025). These constraints directly affect bird growth, survival, and ultimately the profitability of poultry enterprises.

In Burkina Faso, poultry farming is an important component of livestock production systems and contributes substantially to household income as well as to the supply of meat and eggs to local markets. Production systems range from traditional scavenging systems to semi-intensive and intensive operations. Despite this diversity, productivity remains below its potential due to technical, nutritional, and health-related constraints (Ouédraogo *et al.*, 2015; Dione *et al.*, 2025).

To improve poultry productivity, several improved chicken genotypes have been introduced into West African countries. Among these, the Sasso strain has been widely adopted because of its hardiness, relatively rapid growth rate, and good adaptation to tropical production conditions. It has also been extensively used in crossbreeding programs aimed at improving the productive performance of indigenous chickens while preserving their adaptability to local environments (Bilalissi *et al.*, 2022; Tindano *et al.*, 2025).

Nevertheless, the performance of Sasso chickens is strongly influenced by management conditions. Dzungwe *et al.* (2022) demonstrated that genotype, together with husbandry practices, significantly affects growth performance, mortality, and carcass yield. Furthermore, Dzungwe *et al.* (2024) reported that these differences also result in substantial variations in the economic profitability of poultry enterprises. Likewise, feed quality remains a major determinant of production performance, as feed generally accounts for more than 60% of total production costs (Leeson and Summers, 2005; Koranteng *et al.*, 2022). Under tropical conditions, high ambient temperatures and infectious diseases may further impair growth performance and increase economic losses (Dione *et al.*, 2025; Tindano *et al.*, 2025).

Despite the growing interest in Sasso chicken production across Africa, studies simultaneously assessing both zootechnical performance and economic outcomes under commercial farming conditions remain scarce in Burkina Faso. Such an integrated approach is essential for evaluating the technical and economic viability of this production system and for providing evidence-based recommendations to poultry producers.

Therefore, the present study aimed to evaluate the zootechnical performance and economic profitability of a flock of 750 Sasso broiler chickens reared over a 48-day production cycle in a semi-automatic poultry farm located in Ziniaré, Burkina Faso. Specifically, the study assessed changes in body weight, average daily gain, feed intake, and mortality rate, and evaluated production costs, revenues, and the overall economic profit generated by the production system.

MATERIALS AND METHODS

Study area and study period

The study was conducted between July and October 2023, at the SYA farm located in the village of Soulgo, Ziniaré Municipality, Centre Plateau Region, Burkina Faso. The farm is an agroforestry-livestock enterprise

covering approximately 2 ha, integrating both crop and livestock production activities. The poultry production system was a semi-intensive system with semi-automatic management. The facilities included poultry houses equipped with cage batteries, linear feeders, and automatic drinkers. The farm was also supplied with a solar-powered borehole providing drinking water and a feed mill used for on-farm feed manufacturing.

Animals and husbandry practices

The study involved 750 one-day-old Sasso chicks reared over a 48-day production cycle. Upon arrival, the chicks were placed in thoroughly cleaned and disinfected cage batteries. During the rearing period, stocking density was progressively adjusted by reducing the number of birds per battery as the birds grew, thereby minimizing overcrowding and its potential effects on zootechnical performance. The birds were reared under standard husbandry conditions, with continuous access to feed and drinking water throughout the production cycle. Daily monitoring was performed to record mortality and the main health events observed during the study period.

Feeding management

The birds were subjected to a three-phase feeding program according to their physiological requirements: starter (0-14 days), grower (15-28 days), and finisher (29-48 days) phases. Feed and fresh drinking water were provided *ad libitum* throughout the rearing period. Feed intake was monitored daily by recording the amount of feed offered and refused.

The experimental diets were formulated and prepared directly on the farm using locally available feed ingredients. The diets consisted mainly of maize as the energy source, soybean meal as the protein source, soybean oil to increase energy density, commercial broiler concentrate as a source of vitamins, minerals, trace elements and essential amino acids, common salt (NaCl), and crushed oyster shells as a calcium source.

Each diet was prepared in 20-kg batches according to the physiological stage of the birds. The ingredient composition of the experimental diets is presented in Table 1. All ingredients were accurately weighed using a digital scale and manually mixed until a homogeneous mixture was obtained before being distributed to the birds.

Health management

A prophylactic health program was implemented according to the farm's routine management practices. The program included vaccination against major viral diseases, vitamin supplementation, and the use of anti-stress products during critical periods of the production cycle. The main health interventions applied are summarized in Table 2. Mortality was recorded daily throughout the study period. Around day 35 of the production cycle, a clinical episode compatible with infectious bursal disease (Gumboro disease) was observed and was identified from farm records as the main cause of mortality.

Assessment of growth performance, feed intake and mortality

Body weight was measured at regular intervals using a 5-kg capacity hanging scale. These measurements were used to determine the mean body weight of the birds at different ages during the production cycle. Average daily gain (ADG) was calculated to assess the growth rate of the birds using the following equation:

$$\text{ADG (g/day)} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{Rearing period (days)}}$$

ADG was calculated for the overall production cycle and for each production phase. Feed intake was estimated as the difference between the quantity of feed offered and the quantity of feed refused and was expressed as grams per bird per day (g/bird/day). Mortality rate was calculated as the ratio of the total number of dead birds during the production cycle to the initial flock size, using the following equation :

$$\text{Mortality rate (\%)} = \frac{\text{Number of dead birds}}{\text{Initial flock size}} \times 100$$

Table 1. Composition of experimental diets prepared per 20 kg batch

Dient	Starter (0–14 days)	Grower (15–28 days)	Finisher (29–48 days)
Maize (kg)	11.20	12.10	12.90
Soybean meal (kg)	7.10	6.00	5.00
Soybean oil (kg)	0.70	0.80	1.00
Commercial broiler concentrate (kg)	0.60	0.60	0.60
Crushed oyster shells (kg)	0.20	0.40	0.40
Common salt (NaCl) (kg)	0.20	0.10	0.10
Total (kg)	20.00	20.00	20.00

Table 2. Vaccination and health management program applied during the broiler production cycle

Age of birds	Health intervention	Target disease/management practice
Day 1	Vaccination	Infectious bronchitis (IB)
Day 7	Vaccination	Newcastle disease (ND)
Day 14	Vaccination	Infectious bursal disease (IBD; Gumboro disease)
Day 21	Booster vaccination	Newcastle disease (ND)
Day 28	Vaccination	Fowl pox
Throughout the production cycle	Vitamin supplementation and anti-stress products	Nutritional and stress management
Daily	Clinical monitoring and mortality recording	Health surveillance
Day 35	Clinical disease episode observed	Suspected infectious bursal disease (Gumboro disease)

Economic analysis

The economic evaluation was based on the production costs and revenues generated during the production cycle. Production costs included the purchase of day-old chicks, feed expenses, veterinary costs, labor costs, and equipment depreciation. Revenue was obtained from the sale of broiler chickens and poultry manure produced during the rearing period. Net profit was calculated as the difference between total revenue and total production costs. The average production cost per bird sold was obtained by dividing the total production cost by the number of birds marketed, whereas the average profit per bird sold was calculated by dividing the net profit by the number of birds sold.

Data processing and analysis

The data were entered, checked, and analyzed using Microsoft Excel® 2024. The analyses were exclusively descriptive. Quantitative variables were summarized using means, whereas qualitative variables were presented as frequencies and percentages. Economic results were expressed in terms of production costs, revenues, and profit margins.

No inferential statistical analysis was performed because the study involved a single commercial flock

without a control group or experimental replicates. Consequently, the findings should be interpreted as a descriptive assessment of the zootechnical and economic performance observed under the specific management conditions of the study farm.

Ethical considerations

This study was conducted under routine management practices on a commercial poultry farm (SYA Farm). No experimental procedures causing pain, distress, or unnecessary handling were performed beyond standard husbandry practices. Data were collected as part of the farm's routine zootechnical monitoring. All animal management procedures were carried out in accordance with animal welfare principles.

RESULTS

Growth performance of sasso broiler chickens

The mean body weight of the Sasso broiler chickens increased steadily throughout the rearing period (Table 3). At placement, the chicks had an average body weight of 36.71 g, which increased to 121.51 g at day 8, 208.05 g at day 16, 346.35 g at day 24, 567.45 g at day 32, and 723.00 g at day 40, reaching 1,023.00 g at the end of the 48-day production cycle. The total body weight gain recorded during the study period was 986.29 g.

Table 3. Mean body weight of sasso broiler chickens during the 48-day rearing period

Age (days)	Mean body weight (g)
8	121.51
16	208.05
24	346.35
32	567.45
40	723.00
48	1,023.00

Table 4. Average daily gain of sasso broiler chickens according to the production phase

Production phase	ADG (g/day)
Starter	10.70
Grower	22.45
Finisher	28.47
Overall	20.54

Table 5. Mean feed intake of sasso broiler chickens according to the production phase

Production phase	Feed intake (g/bird/day)
Starter	19.28
Grower	50.45
Finisher	69.33
Overall	46.35

Table 6. Mortality rate of sasso broiler chickens according to the production phase

Production phase	Mortality (%)
Starter	2.26
Grower	0.00
Finisher	5.73
Total	8.00

Table 7. Main economic indicators of the sasso broiler flock

Indicator	Value
Initial flock size	750
Birds marketed	690
Variable production costs (CFA francs)	1,041,305
Equipment depreciation (CFA francs)	268,250
Labor costs (CFA francs)	30,000
Total production costs (CFA francs)	1,339,555
Total revenue (CFA francs)	1,735,000
Net profit (CFA francs)	395,445
Production cost per bird sold (CFA francs)	1,941.38
Profit per bird sold (CFA francs)	573.11

Average daily gain

Average daily gain (ADG) increased progressively throughout the different production phases (Table 4). The ADG was 10.70 g/day during the starter phase, 22.45 g/day during the grower phase, and 28.47 g/day during the finisher phase. The overall mean ADG for the entire rearing period was 20.54 g/day.

Feed intake

Mean feed intake increased with the age of the birds (Table 5). It averaged 19.28 g/bird/day during the

starter phase, 50.45 g/bird/day during the grower phase, and 69.33 g/bird/day during the finisher phase.

The overall mean feed intake throughout the production cycle was 46.35 g/bird/day. However, the available data did not allow a reliable estimation of the feed conversion ratio.

Mortality

A total of 60 birds died during the 48-day production cycle, corresponding to an overall mortality rate of

8.0% (Table 6). Mortality reached 2.26% during the starter phase, 0.0% during the grower phase, and 5.73% during the finisher phase.

According to the farm records, the main causes of mortality were an outbreak of Gumboro disease (infectious bursal disease) and congenital deformities observed in some chicks.

Economic performance

The variable production costs amounted to 1,041,305 CFA francs, to which 268,250 CFA francs of equipment depreciation and 30,000 CFA francs of labor costs were added, resulting in a total production cost of 1,339,555 CFA francs (Table 7). Revenue was generated primarily from the sale of 690 broiler chickens at 2,500 CFA francs per bird, yielding 1,725,000 CFA francs, in addition to 10,000 CFA francs obtained from the sale of ten bags of poultry manure. Consequently, the total revenue amounted to 1,735,000 CFA francs. The difference between total revenue and total production costs resulted in a net profit of 395,445 CFA francs. The average production cost was estimated at 1,941.38 CFA francs per bird sold, whereas the average profit reached 573.11 CFA francs per bird marketed.

DISCUSSION

The present study aimed to evaluate the zootechnical performance and economic profitability of a flock of Sasso broiler chickens reared under a semi-automatic production system in Burkina Faso. The results showed a steady increase in body weight, average daily gain (ADG), and feed intake throughout the production cycle, an overall mortality rate of 8%, and a positive economic return. These findings confirm that the Sasso strain can be successfully reared under semi-intensive production systems while highlighting the health constraints that may negatively affect production performance.

Body weight growth and average daily gain

The mean body weight reached 1,023 g at 48 days of age, corresponding to a total body weight gain of 986.29 g. This trend reflects the continuous growth of

the birds throughout the production cycle. Likewise, the progressive increase in ADG, from 10.70 g/day during the starter phase to 28.47 g/day during the finisher phase, illustrates the physiological acceleration of growth as the birds matured.

Nevertheless, the growth performance observed in this study was lower than that reported in several experimental studies conducted on Sasso chickens or their crossbreeds (Bilalissi *et al.*, 2022; Dzungwe *et al.*, 2022; Dzungwe *et al.*, 2024). This discrepancy may be attributed to several factors. Growth performance depends not only on the genetic potential of the birds but also on feed quality, stocking density, environmental conditions, health status, and the level of technical management practiced on the farm (NRC, 1994; Leeson and Summers, 2005). Unlike controlled experimental trials, the present study was conducted under commercial farming conditions, where environmental and health-related challenges may limit the expression of the birds' genetic potential.

Furthermore, the high ambient temperatures commonly encountered in tropical environments are known to reduce feed intake and increase the energy expenditure required for thermoregulation, thereby limiting growth performance (Leeson and Summers, 2005). Nevertheless, the performances recorded in the present study are comparable to those reported in several semi-intensive poultry production systems in West Africa, where nutritional and health constraints remain major limiting factors (Tindano *et al.*, 2025; Dione *et al.*, 2025).

Feed intake

Mean feed intake increased from 19.28 g/bird/day during the starter phase to 69.33 g/bird/day during the finishing phase. This progressive increase is consistent with the physiological development of broiler chickens, whose nutritional requirements rise as body weight and muscle tissue develop.

Similar trends have been reported by Koranteng *et al.* (2022) and Dzungwe *et al.* (2024), who demonstrated

that feed intake in Sasso chickens increases progressively until slaughter age. Feed formulation also plays a key role in determining production performance. Diets adequately balanced in energy, protein, essential amino acids, and minerals promote efficient nutrient utilization and support optimal growth (NRC, 1994; Leeson and Summers, 2005).

The feed conversion ratio (FCR) was not included among the study results because the available data were insufficient to reliably validate its calculation.

Mortality and health status

The overall mortality rate of 8% observed in the present study was higher than the levels generally reported for well-managed commercial broiler farms, where mortality usually remains below 5%. Most deaths occurred during the finishing phase, coinciding with a clinical episode consistent with Gumboro disease (infectious bursal disease).

Gumboro disease is widely recognized as one of the major causes of economic losses in commercial poultry production because of its immunosuppressive effects, which increase birds' susceptibility to secondary infections and impair production performance.

The observations made in the present study are consistent with the findings of Dione *et al.* (2025), who identified infectious diseases, inadequate biosecurity measures, and limited access to veterinary services as major constraints affecting poultry production in Burkina Faso.

Congenital deformities observed in a few chicks also contributed to flock losses. Such abnormalities may result from genetic factors, incubation conditions, or the quality of day-old chicks at placement. However, given their relatively low frequency, their contribution to the overall mortality rate appears to have been limited.

Strengthening biosecurity measures, ensuring strict compliance with vaccination schedules, improving the

health quality of day-old chicks, and implementing early disease surveillance remain essential strategies for reducing mortality and improving poultry production performance (Tindano *et al.*, 2025).

Economic performance

The economic analysis showed that the production system generated a net profit of 395,445 CFA francs, corresponding to 573.11 CFA francs per bird marketed, despite an overall mortality rate of 8%. These findings indicate that rearing Sasso broiler chickens under a semi-automatic production system can be economically profitable under the prevailing production conditions in Burkina Faso, provided that major production costs and health-related losses are effectively controlled. Similar findings have been reported in several African countries, where the profitability of broiler production is closely associated with technical performance and efficient cost management (Dzungwe *et al.*, 2024; Getahun *et al.*, 2026; Yirdaw *et al.*, 2026).

Feed costs accounted for the largest proportion of total production costs, which is consistent with previous reports. In broiler production, feed generally represents 60-70% of the total production costs, making feed formulation and the cost of feed ingredients the primary determinants of farm profitability (NRC, 1994; Leeson and Summers, 2005; FAO, 2013). Similar observations were reported by Koranteng *et al.* (2022) and Koranteng *et al.* (2026), who demonstrated that improving the nutritional quality of diets simultaneously enhances growth performance, feed efficiency, and the economic returns of Sasso broiler production.

The present findings are also consistent with those of Getahun *et al.* (2026), who reported that the strategic incorporation of locally available feed ingredients into Sasso T44 diets in Ethiopia improved both zootechnical performance and economic returns.

Their study showed that optimized feed formulations increased profit per bird while reducing feed costs. Likewise, Shuma *et al.* (2026) demonstrated that the

best economic performance was achieved when diets provided an appropriate balance between feed ingredient costs and growth efficiency, confirming that feed management remains the main driver of profitability in broiler production.

The mortality recorded during the finishing phase likely reduced the potential profitability of the enterprise. Economic losses associated with mortality are particularly important during the final stage of production because birds have already consumed most of the feed and incurred the majority of production costs. Similar observations were reported by Wolde *et al.* (2021), Dzungwe *et al.* (2022), and Tindano *et al.* (2025), who identified mortality as one of the major factors limiting the economic performance of improved chicken production systems in Africa.

Studies conducted in Burkina Faso have further shown that improving biosecurity measures, disease prevention programs, and husbandry practices contributes to reducing health-related losses and sustainably increasing farm productivity (Ouédraogo *et al.*, 2015; Dione *et al.*, 2025).

These findings emphasize the importance of rigorous flock health management to maintain both zootechnical performance and economic profitability. Finally, the positive net profit obtained in the present study confirms that the economic performance of a poultry enterprise depends not only on zootechnical performance but also on the efficiency of technical and financial management. Reducing feed costs, improving bird survival, and optimizing management practices remain the main strategies for sustainably increasing the profitability of poultry farms in Burkina Faso, as also highlighted by Yirdaw *et al.* (2026) and Dzungwe *et al.* (2024).

Implications for poultry production systems in Burkina Faso

The findings indicate that rearing Sasso broiler chickens under a semi-automatic production system can ensure steady growth performance while generating a positive economic return. However, the

success of this production system depends largely on the producer's ability to simultaneously optimize zootechnical performance, minimize health-related losses, and effectively control production costs.

Recent studies conducted in Burkina Faso suggest that improved chicken genotypes and their crossbreeds possess greater production potential than indigenous chicken populations. However, this potential does not necessarily translate into improved economic performance when mortality rates remain high or when husbandry practices are suboptimal.

In this context, efforts to improve poultry productivity should be accompanied by strengthened biosecurity measures, enhanced disease prevention programs, improved feed quality, and regular monitoring of technical and economic performance indicators. Routine monitoring of body weight, feed intake, mortality, and production costs would enable farmers to rapidly identify factors that may compromise farm profitability.

Study implications and future perspectives

The present study provides original information on the zootechnical performance and economic profitability of a flock of Sasso broiler chickens reared under commercial conditions in a semi-automatic production system in Burkina Faso. The findings constitute a valuable baseline for characterizing this production system and for improving poultry management practices under local production conditions. Further investigations involving multiple production flocks and different farming systems would help confirm these findings and provide a better understanding of the influence of management conditions, feeding practices, and farm characteristics on the performance and profitability of Sasso broiler production.

CONCLUSION

This study evaluated the zootechnical performance and economic profitability of a flock of Sasso broiler chickens reared for 48 days under a semi-automatic production system in Burkina Faso. The results showed a steady growth pattern, with a final mean body weight of 1,023 g,

an overall average daily gain of 20.54 g/day, and a mean feed intake of 46.35 g/bird/day. Despite a cumulative mortality rate of 8%, mainly recorded during the finishing phase, the production system generated a net profit of 395,445 CFA francs, corresponding to 573.11 CFA francs per bird sold.

These findings demonstrate that rearing Sasso broiler chickens under a semi-automatic production system can be economically profitable when feeding practices, flock management, and health monitoring are effectively implemented. They also highlight the importance of strengthening biosecurity measures, disease prevention, and technical management to improve zootechnical performance and reduce economic losses.

This study provides baseline information on the performance of Sasso broiler chickens under the production conditions of Burkina Faso and contributes to a better understanding of semi-intensive poultry production systems. Further studies involving multiple production flocks and different farming conditions would help consolidate these findings and assess the influence of management practices, feeding strategies, and farm characteristics on the performance of Sasso broiler chickens.

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