ASSESMENT OF GROWTH PERFORMANCE OF COBB 500 BROILERS STRAIN AT *GIC DE SAHEL* POULTRY FARM, YAOUNDE, CENTER REGION OF CAMEROON.

A Dissertation presented in partial fulfillment of the requirement in view of obtaining a Professional Master Degree in Animal Production.

BY

DECLARATION OF AUTHENTICITY

I, **TATA CYRIEL DANLAMI** hereby declare that this dissertation is a record of my research effort, carried out in the Center region of Cameroon, under the supervision of **Dr. MUBE KUIETCHE Hervé** lecturer at the Faculty of Agronomy and Agricultural Sciences, Annex Bafia (FASA-AB) from the University of Dschang (UDs). It has not been presented before or elsewhere in application for a MSc degree award or its equivalent. All borrowed information has been duly acknowledged by means of references.

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Signature: _____ Date: _____

IMMEMORIAL.

To my late parents,

Mr. Oumarou Danlami

And

Ishatou Danlami of blessed memory

DEDICATION

TO MY SOUMTOUS BEAUTY,

MY LOVELY WIFE.

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LIST OF ABBREVIATIONS

UISTY: University Institute of Science and Technology of Yaoundé.

MINEPIA: Ministry of Livestock, Fisheries and Animal Industries.

FAO: Food and Agricultural Organization of the United Nations.

SAVI: Industrial Poultry Exhibition show or trade fair.

IPAVIC: Cameroon poultry farmers association or syndicate.

DSV: Directions of Veterinary Services.

HIPA; Highly Pathogenic Avian Influenza Virus.

CRD: Chronic Respiratory Disease.

OIE: *Organization International des Epizooties*

ONDAPB: National office for the development of poultry and small ruminants.

CDI: Central Development Industries.

SIFAC: National inter-professional poultry farmers of Cameroon.

FASA: Faculty of Agronomy and Agricultural Sciences.

BW: Body weight.

FCR: Feed Conversion Ratio.

IBDL: Infectious Bursal Disease Long Action vaccine.

IBD: Infectious Bursal Disease.

GIC: *Groupe D'initiatifs commun.*

COBB: Cross Breed of Broilers.

DOC: Day-Old Chicks.

SPC**:** Société *des Provenderies du Cameroun*.

ABSTRACT

Growth performance in broiler production is the major cause for concern by the farmer, from the time of receiving the day-old chick. As there is no common test use for the veracity for a better performance of day-old chick, the key is to better manage the various factors affecting broilers growth performance to maximize profit and or prevent lost (in feed, medications, vaccination, manpower, fuel and mortality). This study on the assessment of the growth performance of COBB 500 broiler stain at *GIC de Sahel* poultry farm Tsinga-Village in Mfoundi division of the center region of Cameroon was carried out from February to July 2023 with the aim of improving the growth performance of COBB 500 broiler by assessing the factors affecting production performance at *GIC de Sahel* poultry farm. With the survey done by practically involved in it onsite, working with a mean production capacity of 8000birds on two batches, for data collection method, on growth performance it was done randomly selecting the broilers with different sizes and measured their weight per week and the average taken to calculate feed intake, feed conversion ratio(FCR) and body weight gain. The data on management practices and the economics aspects of the farm were collected by a survey observation using questionnaire. The following results were obtained, the average weight of the birds gotten at the end of the production was 2.57kg lower than the standard average weight of 4.0kg for COBB 500 broiler at the ages of 35-45days.100% of the poultry roofing system to aid in temperature and humidity regulation were not taken into account due to 0.0% no zootechnician consultation before the implantation of the poultry house. 100% heating source of day-old chick is with firewood, and 80.7% of stocking density done. Respecting the feed timing, sizes with age of broiler were 84.3% and 96.1% feed form is grinding particles feed. Auto-medication and prescription were done by the farmer during diseases outbreak and 18.9% hygienic, biosecurity measures use with footbath. Disposal of death birds and used saw dust observed at 34.9%. with the increase in the prices of raw material for broiler feed up to 24000frs at SPC and no standard market price for broiler, the farm turned to produced their own feed which the quality of the crude protein, premix (concentrate) and other feed raw material ingredients cannot be tested at the level of the farm for authenticity.

Keywords: Assessment, Growth performance, cobb 500 Broiler strain**.**

INTRODUCTION

The efficiency of broiler production has increased enormously in recent years and can be attributed to advancement in the area of breeding, management, nutrition and disease control (Dalton., 2022).

Broiler meat is vastly consumed worldwide (FAO,2008). In 2016 the world production was nearly 90million metric tons (Statista, 2017). The genetic selection for fast growth and weight gain to which broiler chicken have been subjected in the last decades has led to birds more vulnerable to environmental factors. Therefore, tropical regions with intense solar radiation, high temperature and high humidity, tend to lead to losses due to heat stress and consequently discomfort and lack of welfare (Maria *et al*., 2005; Marchini *et al*., 2016). The return to capital in broiler production is in its growth performance to attained market size at a short and required days of 45 to 60 days. The genetic engineering of broiler chicken breeding programs has achieved levels never reached by any other animal species, making the chicken meat sector efficient in producing protein of high biological value. Selecting characteristics for better performance, resulted in improvement in feed efficiency and weight gain, modifying the growth curve and the nutritional requirement of the broiler strains (Rishikesh Pathak *et al*., 2015).

In Cameroon, the poultry sector contributes by one percent to the gross domestic product (GDP) of the national economy. It generates a net profit of 15 billion CFA francs and the consumption of chicken meat is 2kg/ capita/ year (MINEPIA 2012). Thus, remains a significant component of food security and plays an important role in generation of income and saving of the poorest families (Fassill *et al*., 2010). An average revenue per year per household of about 100 000 FCFA was reported by Teleu and Ngatchou (2006).

Feed is a major component, affecting net return from the poultry because cost of the feed accounts about 65 to 70 % for broiler production and is a major factor which affects the production cost (Srivastava *et al*., 2013). The energy content of feeds like groundnut cake, maize and wheat can be increased by various processing techniques like grinding, cooking and reconstitution. The seed is quite digestible and palatable; which gives more energy than cereals on equal weight basis when fed to the flock (Nesheim *et al*., 1979). Dietary protein is a major source of body protein. Poor quality or imbalanced protein can create metabolic stress which reduced growth performance. Protein enhances muscle building and vitamins A, D and E supplements will prevent the deficiency diseases, reduce stress and mortality rate (Swain and Johri, 2000; Sahin *et al*., 2001 and Wijtten *et al*., 2010). The optimal combination of conditions or factors for broilers performance is seldom if

ever realized, information which might have been considered adequate at the time it was obtained may soon become outdated. To continue to increase the efficiency of performance in broiler production, frequent reevaluation of management factors must be made and better practices developed. With all these the broiler poultry need to attained market size at 45 to 60days but this is usually exceeded incurring lost by the farmer. In other hand, the prices of raw materials for feed production has increase too sharply, and this hugely impact return. For broilers farmers especially for meat producer, to improve the final body weight of chicken meet to the standard market weight with shorter period will be an ideal situation.

Based on the above thoughts, our general objective was to improve broiler production through the reduction of mismanagement practices in poultry farms.

The specific objectives of the study were as follow;

- characterize the poultry farm, the GIC de Sahel broiler farm in Yaoundé;
- analyzed the COBB 500 Broiler production performance compared to the standard recommendations;
- determine the cost of production.

CHAPTER ONE: LITERATURE REVIEW

:

1.1 History of the poultry sector in Cameroon

The semi-intensive poultry system husbandry started some 70years ago, to boast this all-important poultry sector the government of Cameroon created the inter-professional poultry production Association of Cameroon (IPAVIC) in 2006. All Africans francophone countries, Cameroon inclusive directed her interest to create institution for this development, and then to boast the production of her local's industries involved in poultry husbandry. Hence before this, were the creations of other institutes as concerned the poultry industries as the history unfolds below.

The creation of a poultry sector in 1981 called the National office for the development of poultry and small ruminants (ONDAPB). With this created by the government of Cameroon set to give a modernized poultry husbandry sector in the country.

The mission of (ONDAPB) was to vulgarized and promote the poultry husbandry sector and small ruminant farming and also to trained farmers. This mission was however precise and limited. But the objective of the government of Cameroon toward its creation to favored an emergence in the private sector to boast the poultry business.

The global economic crisis in the 80's makes it difficult for the Cameroon government as well as its international partner to 100% finance this institution then she turned to the private business operators to take over in 1993 but transfers its training programs to be done by MINEPIA.

Difficulties to coordinate, manage and runs its affairs with respect to its members and also to reach out to small local grassroots, poultry farms holders it was reformed into an integrated part of IPAVIC.

All to boast the poultry sector in Cameroon, a regional seminar was organized in 1992 in Yaoundé by the Central Development Industries (CDI) they brought forth a decision to create a national syndicate for farmers in the poultry sector, appreciated by many Cameroonian poultry farmers presents.

In 1996 these huge poultry farmers syndicate was created, called the National inter-professional poultry farmers of Cameroon (SIFAC). This give rise to an industrialized poultry sector with the production of day-old chick and poultry feeds.

All these also had its limitations and short coming to meet the demand of small farm holders, their number, benefits, and proper representation on a whole with its difficulties it was transformed into

IPAVIC in 2006 to better advocate for the interest of all involved in the poultry business in Cameroon. (SAVI, MINEPIA.2014).

1.2 Conceptualization of livestock systems

They are distinguishably two global types of poultry production systems in Cameroon; traditional or backyard and modern or semi-industrialized systems.

- ✓ Traditional poultry farming, is mostly practiced in the rural areas. The village setting made it characterized by natural reproduction of chicks, its resistances to hash conditions, bases for genetics amelioration disposition, its vulnerable to major viral diseases like Newcastle and its production is mostly for family consumption or excess is taken to the market to sell in order to supplement household needs.
- ✓ Industrialized or modernized poultry farming, is well developed and situated mostly in urban or peril-urban zones principally in Yaoundé and other regional headquarters with more city dwellers and the presence of hotels. Its development is made possible thanks to the presence of day-old chick which substitute local production of chicks due to the installation of many modern incubators.

In 2004, a codification elaborated by the (FAO, 2008; GUEYE, 2008) on the basics of many characteristics with respect to their level of biosecurity measures put in place. (Table 1). The different poultry production sectors are classified as follows;

Sector 1; Industrialized, system and integrated with a high level of biosecurity measure set up and the poultry/ by-product are sold in an organized commercial manner. (For example, a broiler farm with a modern exploitation of all in and all out with a classified biosecurity measure put in place).

Sector 2; A commercial system of poultry husbandry with a moderate level of livestock production and a moderate biosecurity measure set up and the sales of poultry and its products done habitually. (e.g. a poultry farm in confinement and not in contact with other birds or wild animals. Here production is permanently going on).

Sector 3; A commercial poultry farm oriented with a low level of minimal biosecurity level put in place and the poultry/ products are sold at the level of live poultry market. (E.g. an exploitation of layer in battery cage system, with other birds out of poultry house; a poultry farm with its birds having access to open air livestock husbandry.

Sector 4; Traditional poultry husbandry and a minimal or no biosecurity measure put in place and the poultry / products are locally consumed.

TABLE 1: CLASSIFICATION OF POULTRY HUSBANDRY BY FAO (2008)

Sectors	**Poultry production sectors**			
	Industrial	Commercial		Traditional
	Integrated	Level of Biosecurity measures		Background production
		High	Low	
Characteristic of sectors	Sector 1	Sector 2	Sector 3	Sector 4
Level of biosecurity	High	Moderate	Low	Minimal
Commercial outlets	Exportation and urban	Urban/ rural	Urban/rural	Rural
Depending on the input of the market	High	High	High	Low
Depending on good road network	High	High	High	Low
Implantation	Peripheral capital cities and big towns	Locations are peripheral capital cities and in big towns	Small cities and in rural area	Everywhere especially distance areas and enclaves villages
Poultry productions systems	Confinement	Confinement	Confinement, bedding or semi confinement.	Especial in open air
Poultry housing	Close	Close	Close/open	Open
Contact with other poultry	No	No	Yes	Yes
Contact with ducks	No	No	Yes	Yes
Contact with other birds	No	No	Yes	Yes
Contact with other domesticated wildlife	No	No	Yes	Yes
Treatment and veterinary control	Has own proper veterinarian	Pays for veterinary services when needed.	Pays for veterinary services	Irregular, depends on public veterinary services(state)

Supply of veterinary medicines and vaccines	Market	Market	Market	Market/state
Source of technical information	Multinationals and its partners branches	Drugs retailers and its outlets	Drugs sale persons and their outlets	Vulgarised states or NGO services.
Financial sources	Banks and personal funds	Banks and personal funds	Banks and private aids	Personal funds, from public/ NGO and banks
Level of feed security in poultry production systems.	High	Good	Good	Good/Low

Source*:* FAO (*2008*)

1.2.1 Traditional poultry production systems

This is basically an extensive production system. It is an old system based on small flocks in backyard and of minimum production inputs. The birds are mainly of local, native type (indigenous) that roam the farms or village freely in search of feed (the birds draw their food in the nature). These birds are occasionally provided with home grown grains. They usually have minimum shelter. This system of production exists in most developing countries and could account for up to 50 to 80% of the total eggs (Reddy, 1991). The amount of meat and eggs produced by scavenging chickens is not known. However, due to the growth characteristics of these birds, it could only account for house-hold consumption, not making the base for commercial production. This traditional breeding of birds is characterized by the lack of profitability constraints. It is done in the open without pens. As backyard poultry ownership becomes increasingly popular, owners must be properly educated about how to keep their flocks healthy; thus, more veterinarians must be capable of providing this education and/ or veterinary care. Purchasing chicks and poultry from a reputable hatchery or breeder is recommended to get a good start and prevent future problems. This is because the breeder has a reputation to protect over the years for producing chicks and hence has a disease prophylaxis program in place and routinely follow-up.

TABLE 2: EVALUATION OF POULTRY PRODUCTION IN CAMEROON.

years	2004	2005	2008	2010	2015	2021	2022
Parents stock	203000	280000	350000	460000	650000	350000	280000
Day old chicks	250000	350000	650000	650000	800000	300000	350000

Source*:* SAVI (2022)

1.2.1.3 SOCIO-ECONOMIC IMPORTANCE

Tradition poultry husbandry is profitable (financially) despites its low productivity. In this like the sale of eggs and poultry has almost a net profit at times and the use of outlet where this activity is absence or limited. However traditional poultry husbandry constitutes a system to aid accumulate capital. (GUEYE, 2003). The proceeds from the sales of these local poultry is distributed in such a way to benefit directly or indirectly the wellbeing of every member of the family. In all these the meat of local fowl is more delicious and expensive compared to other commercialized meat consumed in Yaoundé.

1.2.1.1 MANAGEMENT PRACTISED OF LOCAL FOWL HUSBANDRY

The rearing of local breed of fowl that are domesticated species called *Gallus gallus*. This local breed of fowl husbandry is practiced in all country. In effect local fowl production is not subjected to much care and attention as compared to broilers poultry production and these local fowl live in open air freely not in confinement. This backyard local fowl husbandry needs limited capital for starter, where different ages and other animals can cohabit together even with wildlife. These birds spent their day scavenging for food and adult birds looks after their offspring and younger ones. They feed on a wide range and variety of foodstuff. They feed on inserts, agricultural by-products and kitchen left overs. At times the chicks could scavenge during their first 2 or 3months of age about 10 to 20g of feed per day with termites included. (Adamad, 1990).

Traditional poultry production is practiced by most rural households throughout the developing world despite the fact that its contribution to livelihoods appears to be of little value when observed by researchers and other outsiders (Kryger *et al.,* 1990).

The "smallholder farming system" refers to the many diverse forms of production found in smallholder societies across the world. Netting, (1993) stated that smallholder farming systems are a particular kind of adaptation to scarcity, smallholders worry first of all about family reproduction and survival.

Smallholder farming systems may be viewed as social systems that are part of the larger-scale in the political and economic context, as well as being part of specific ecological environments (Ellis and Freeman, 2005).

However, there appears to be a remarkable similarity in the role of poultry in (rural) farming systems across regions, agroecological zones and cultures (Gueye, 2000; FAO).

Several attempts have been made to define the characteristics of different poultry production systems. Here is presented the classification developed by Rushton and Ngongi (1998) and the FAO (2008) "sector" classification. Rushton and Ngongi (1998) distinguished types of smallholder poultry production as seen above. local fowl husbandry is also characterized by a rudimentary kind of control. Table 3 shows the characteristics of backyard fowl extensive system of rearing.

TABLE 3: CHARACTERISTICS OF TRADITIONAL POULTRY PRODUCTION BY FAO

Poultry housing	Material used in husbandry	Numbers kept	System of feeding	Production cycle	Husbandry zones	customers	observations
Don't have houses, poultry are reared in cages	Artisanal and inadequate, not standard	Very small from 50-100 birds	If available, no feeding program	Irregular with respect to demand	Rural and peri -urban areas	Neighbours and relatives	Leisure, preside objectives (economic)

Source*:* Traore (2006).

1.2.1.2 PRODUCTION

The greater part of the local fowl produced is for auto consumption (meat, eggs) or for reproduction (Traore, 2006). In rural areas, these local poultry breed represent a principal source of animal protein in the village and not only that the meat is juicy and is highly appreciated by everyone but adds to the fact that its production supports the income level of the developing world (Alder, 2005). Also, these villagers are not in the habit of slaughtering bovines or small ruminants for auto consumption but only during families' ceremonies and religious festivities. (Buldgen *et al*., 1992). Local fowl production or husbandry greatly satisfied the nutritional need of the rural population and also prevent certain diseases caused by malnutrition in general (Buldgen et al., 1992).

1.2.1.3 LARGE SCALE COMMERCIAL SYSTEMS

This is a completely intensive system of poultry production. While more than 90% of chicken meat comes from large-scale commercial farms in the developed and industrialized countries, the figure is less than 50% in developing countries (Reddy, 1991). In intensive systems, birds are reared at high densities and flocks are kept under the same environment and management practices (Silverside and Jones, 1992). In Botswana, 90% of chicken meat comes from the large-scale enterprises. With the growing threat posed by highly pathogenic avian influenza virus (HIPA) in recent years, this have for some time now caused a declined in a once booming sector of the economy and there has been an attempt to classify poultry production according to the level of biosecurity observed and the associated marketing systems (FAO, 2004, FAO/OIE, 2007) as seen above.

1.2.1.4 Concept of socio-economic importance's and characteristics of performance of small and large-scale poultry farming

Different authors have identified a number of factors influencing productivity in poultry production, especially in developing countries. Al -Hassan (2008) points out that, inefficiency in production can result from socio-economic, demographic or environmental factors. However, some of the environmental/exogenous factors such as weather, government policies among others are outside the control of the farmers, and hence their impacts cannot be considered as the causes of the farmers' inefficiency. In view of this, Ali., *et* Byerlee (1991) noted that farm specific efficiency can be influenced by farmers' characteristics (socioeconomic factors) which impact on the managerial skills of the farmer. Such socio-economic characteristics include: the age of the farmer, his/her level of education, number of years of farming experience, access to credit and extension services, contacts and networks, farm size, gender, and engagement in other income generating activities other than poultry farming activities. Education has been defined as the process through which knowledge, skills, attitudes and values are impacted for the purpose of integrating the individual in a given society, or changing the values and norms of a society (Kirui, 2014). Ondersteijn *et al.,* (2003) observed that education level was one of the main factors that improved performance of dairy production in the Netherlands. Also, Andreakos *et al*., (1997) stated that the education level has a substantial effect on the financial performance of agricultural activities. Coelli and Battese (1996) identified age and schooling (level of education) as factors influencing efficiency. The result of their study indicated that the younger farmers were found to be more efficient than their older counterparts. Adetayo and Itebu (2013) pointed out that ages ranging from 21 to 40 years of majority of the respondents were within the economically active age

category and this is in line with Yinusa (1999) who observed that this age bracket contains the innovative, motivated and adaptable individuals.

Nhemachama and Hassan (2007) also found out that farming experience enhanced a farmer's knowledge, information, high skills in farming techniques and management, which improve the technical efficiency of the farmer. Farming experience also enables a farmer to adapt to climatic change, new agricultural practices and ability to spread risk. Also, Kaur *et al.* (2010) conducted their study on technical efficiency of wheat production in Punjab state, India. They used stochastic frontier production to estimate the technical efficiency of wheat production and they found that the mean technical efficiency of wheat production was 87%, 94%, 86% and 87% in semi-hilly, central, south-western and Punjab state as a whole, respectively. The result of their model showed that the technical efficiencies are positively and significantly related to age, education and experience of a farmer and percentage area under the crop. The higher the number of birds owned by a farmer, the better the production performance of the farm. The farmer will experience lower cost of feed since he buys in bulk and also, the byproducts and waste derived from the process will be enormous, which in turn yields income through sales or could be used for crop production respectively. Manure, carcasses, and eggs are just a few examples of the byproducts produced by commercial poultry operations. An operation with 30,000 laying hens can produce 40 tons of manure a month or 480 tons a year. Oji and Chukwuma (2007) carried a study on technical efficiency of small-scale poultry egg production in Imo State of Nigeria and found out that farm size has a significant positive effect on efficiency. They noted that farmers who were not operating at full capacity, increase output by increasing the number of birds reared. Furthermore, a farmer's access to credit also increases his efficiency ability. They noted that farmers who had access to credit were found to be more efficient than those who did not access credit. This could be due to the fact that those who accessed credit were able to increase their level of production and benefit from cost advantages that are associated with economies of large-scale production. The efficiency of large production is an added advantage as compared to small scale production in that both the large broiler production and small scale both attend market size at the same age (45 -60days). This poultry production sector, however offers a means of employment to 1000s Cameroonians directly or indirectly.

1.3 LARGE SCALE PRODUCTION MANAGEMENT

The chicks that are produced locally are reared, in well-equipped modern poultry housing, fed with complete compound feed and also a proper prophylaxis program put in place by veterinarians with respect to the dominant pathogenic agents' presence in the locality. (Fig 1).

FIGURE 1: LARGE SCALE PRODUCTION

Source *:* FAO (2008)

1.3.1 PRODUCTION

There is an increased in large scale production of poultry in Cameroon as compared to the yesteryears with many people now involved in poultry production.

Poultry production has been a means to increase animal protein, to an extent in the form of local breed, the improved exotic breed like brahmas popularly known as 'pantalone' are reared today in many homes since the government banned the importation of frozen chicken since 2005 to boost local production in Cameroon. Importation of frozen chicken was possible because the dietary habits have change tremendously over the years in Europe, with their consumers prefer chicken breasts over the other cut of the birds. Therefore the European meat industry usually exports those parts that are too hard to sell in Europe to developing countries like Cameroon and the health risk involved in the importation of frozen chicken in that no rigid quality control of the cool chain could be ensured and this frequently causing poultry cuts to be contaminated microbiologically posing a severe food safety hazard. In light of the situation protests flared up in Cameroon in the beginning of the 2000s, several civil society organizations mobilized the public raising awareness on the subject and ultimately demanding an import ban for frozen poultry parts. (GIZ, 2005).

1.4 Different breed of poultry found in Cameroon and their characteristics

Breeds are groups of animals of the same species that have certain common characteristics which can be transmitted to their offspring. (Bastianelli et *al.*, 2002).

The follow different breeds of poultry can be found in Cameroon as seen below according to their characteristic we have, local breeds and exotic breeds.

1.4.1 Local breeds of poultry in Cameroon

Indigenous chickens in Cameroon, as in other developing countries, play an important role to the livelihoods of smallholder's families, as the main source of income, meat, egg, social and ritual values. Reports on the diversity of local chicken in Cameroon is restricted to phenotypic data, including adults' body phaneroptic and measurements, weight, eggs characteristics and production performance. (Keambou *et al*., 2007 ; Fotsa *et al*., 2007 ; Keambou *et al*., 2009 ; Keambou and Manieli 2009 ; Hko *et al*., 2009a ; b ; Keambou *et al*., 2010). These chicken populations have been kept over generations, but increasing adoption of commercial hybrids within rural backyards farming is eroding the genetic uniqueness of native breeds (Hosny, 2006), which need to be preserved and improved. From researchers, its observed that the diversity of chicken population in Cameroon is higher than that obtained for local European and Asian chicken breeds (Berthouly *et al.,* 2007), in Chinese native and Pakistani Aseel chicken populations (Chen *et al*., 2004; Babar *et al*, 2012). Further, Cameroonian indigenous chicken population have a comparable level of diversity as Ethiopian and Egyptian counterpart (Nigussie, 2011; Eltanany *et al*., 2010), but have a lower diversity as compared to observations made in the southern china (Yu Ya-Bao *et al*., 2006).

1.5 Different strains of broilers and their zootechnical characteristics.

1.5.1 Hubbard CLASSIC Broiler

They are noted for having fast growth rates, a high feed conversion ratio and low level of activity. These chickens are typically white and are bred specifically for optimal health and size to produce a quality saleable meat for consumers.

Table 4: showing growth performance of Hubbard classic broiler.

Age	Liveweight (as hatched)	Feed conversion ratio
28 days	1.604kg	1.34
35days	2.269kg	1.48
42days	2.2948kg	1.62
49 days	3.609kg	1.76
56days	4.209kg	1.90

Figure 2: Hubbard CLASSIC Broiler

1.5.2 Cobb400 Broiler stock

Cobb400 breed is developed after eight years of intense breeding and selection program. It has a fast growth rates and adopted to tropical climate. They have an early maturity rate with high peck, sustained production and better feed efficiency. With performance specificities for broilers are as follows;

Table 5: Performance characteristics of cobb400 broilers.

Age	Liveweight	Feed conversion ratio.
35days	1.925kg	1.58
42days	2.550kg	1.70

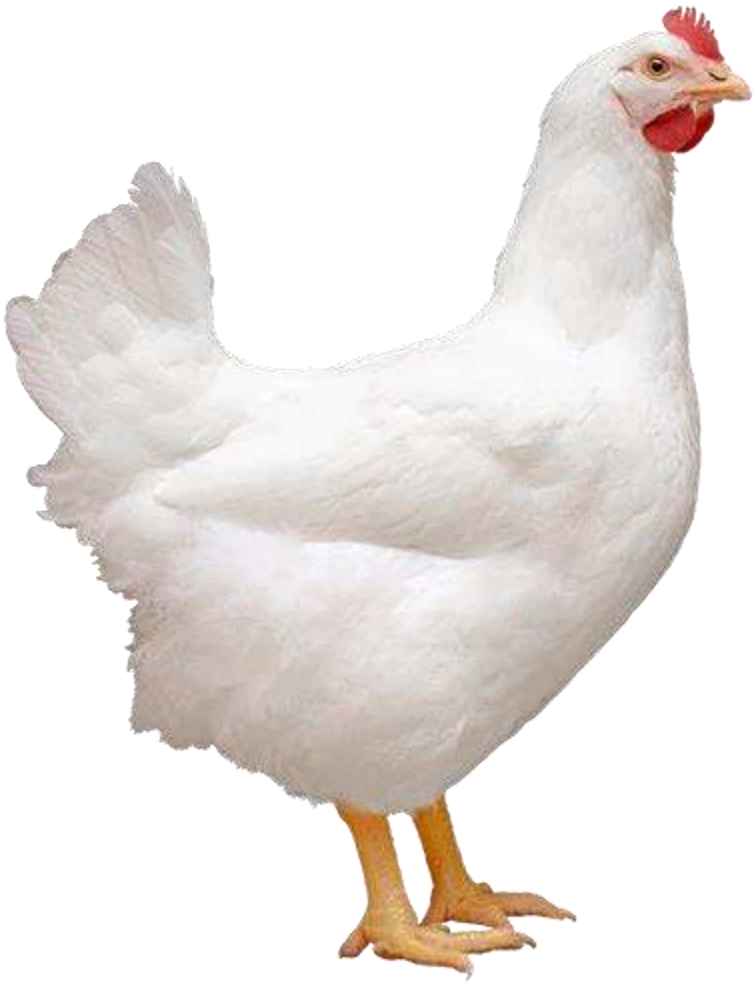

Figure 3: Cobb400 Broiler stock

1.5.3 Cobb 500 broiler stock

Cobb500 broiler is one of the world's most popular commercial meat chicken breeds (Dessie Abera, *et al* 2017).

The cobb500 broiler is a modern commercial breed characterized by a fast-initial growth and competitive breast meat yield at various processing ages when compared to other broilers commercial strains presently grown around the world (Coneglian *et al*., 2010).

The cobb500 broiler is distinguished by its snow-white plumage, these broilers as if on selection are large, massive and the difference in weight is minimal among males and females. The skin is naturally yellow, increases the presentation. They are suitable for slaughter at the age of 30-45 days. Weight ranges from 1.5 to 2.5kg. 73% of meat is obtained from one bird. Weight gain increases rapidly over a period of 11 weeks. Later there is a decline.

The have the following characteristics of zootechnical importance.

- Lower cost of live weight produced.
- Superior performance on lower cost of feed rations.
- Most feed efficient.
- Excellent growth rate.
- Best broiler uniformity for processing.
- Competitive breeder.
- Resistance to diseases.

Advantages of COBB500 (Cross Broiler Breed 500)

- ✓ Efficient growth
- ✓ Uniformity (sprouting poultry flock is uniform for all individuals)
- ✓ Low cost of production of chicken meat.
- ✓ At the bottom of a white meat obtained maximum

Table 6: Performance of cobb500 broiler.

Age	Live weight	Feed conversion ratio
28days	1.783kg	1.65
32days	2.200kg	1.83
35days	2.521kg	1.94
42days	3.278kg	2.20

Figure 4: Cobb500 broiler stock

1.5.4 Arbon Acres Broilers stock

This breed was originally a family farm, started by Italian immigrant Frank Saglio. He started raising chickens in abandoned piano crates. Arbon Acres are a cross between Cornish and white rock chickens. They have an excellent conformation and tender breast meat. They are able to reach a live body weight of 2793g at 6weeks and a live body weight of 4374g at 8 weeks. At 6 weeks of age, they have an average daily weight gain of 93g and an average daily weight gain of 79g at 8weeks of age under good conditions. They are small family run chicken farm that has been in business for 5 generations, the chicken is raised on pasture and fed organic feed which means they are healthier. The have a fast growth rate and a better feed conversion ratio which makes them to be used as the grandparent's stock for most broilers strains of chicken.

1.5.5 Ross 308 Broilers strains

The Ross 308 is recognized globally as a broiler that will give a consistent performance in the broiler house. Integrated and independent farmers value the growth rate, feed efficiency and robust performance of Ross 308. The Ross 308 is a slow feathering broiler stock. Ross 308 attained market size at 6 to 8 weeks depending on the quality of management and feeding possible when its day-old chicks are produced under high biosecurity, hygienic environment and from high quality parents' stocks.

Table 7: Growth performance of Ross 308 broiler strain.

Age	Live weight (from hatched)	Feed conversion ratio
28days	1.501kg	1.40
32days	1.863kg	1.48
42days	2.809kg	1.68
45days	3.901kg	1.74
56days	4.061kg	1.96

Figure 5: Ross 308 Broilers strains

The type of broiler chicken is a type of chicken featured race as a results of a cross from the chicken that has high productivity, especially in meat production (Mulyantini *et al*.,2011). Other type strain broilers with good productivity on the market, including the following strains below:

- CP 707
- Hyline
- Sussex
- ISA brown
- Hypeco
- Brono Kim cross
- Missouri
- Hybro
- Sharver Starbo
- Super 77
- Tegel 70
- Wonokoyo,
- Ross Marshall
- Lohman
- Euribird

The benefits of keeping broilers are:

- providing animal protein needs,
- provide job opportunities,
- investment,
- fulfill the needs of the family, and
- the form of feces that can be used for fertilizer as additional income from farming of broiler chickens.

1.6 Factors affecting the growth, production performance of Broilers

The factors that affect production performance are both exogenous and the broiler bird strains its self. Exogenous factors are those government policies and external environmental factors that the broilers farmers have nothing to do with them as far as their performance is concerned. These factions affecting broilers production performance are as follows;

1.6.1 Stocking density or stocking rate

The stocking density or stocking rate is simple the number of birds a meter square of land can hold in a specific time period without degradation with broiler its standard is 8-10birds per m^2.

The stocking density is expressed better in terms of kg of body weight per meter square instead of the numbers of birds per m^2 because it considers the age and the genetic progress. Broiler chickens at high stocking density reduce the body weight and decreases the feed intake slightly. Therefore, the feed conversion adjusted to similar body weight is elevated as stocking density increases. Moreover, as compared to low stocking density bird at high stocking density present less breast meat yield, lower feathering covering, more skin scratches and higher footpad dermatitis and generate more heat output and litter moisture. Besides, because crowding birds drink more water might impact on litter moisture and footpad dermatitis negatively. However, a consistence trend indicates that birds with less space died more. Supported this pattern the broiler chicken in a crowded flock diminish the immunoglobulin affecting the immune system negatively. Even more broiler chicken under heat stress might die more at increase stocking densities (Sandro Cerrate, 2021).

1.6.2 Ventilation and house temperature

Probably the most important non-dietary factor influencing feed conversion is the ambient temperature of the poultry house. Chickens are homeotherms (warm-blooded) meaning they maintain a relatively constant body temperature regardless of the environmental temperature. Broilers perform best when there is minimal variation in house temperature over a 24-hour period of time. There is a tradeoff between energy provided by feed or fuel, and the most economical temperature will depend on the relative prices of the two.

Ventilation is the exchange of air between the inside and the outside of a poultry house. The main function of a ventilation system is to maintain adequate oxygen levels while removing carbon dioxide, moisture, dust and odor. During hot period ventilation also is important for removing heat. To archive an effective ventilation system for poultry house, consider both house placement and house design.

- **House Placement;** the location of a poultry house can have an impact on the effectiveness of its ventilation system. In northern areas it is very cold much of the year, the house should be position to reduce the amount of north wind exposure. In southern areas where heat is an issue, the house should be positioned to take advantage of maximum southern prevailing winds to help provide as much natural ventilation as possible.
- **House Design;** an effective natural ventilation system in a poultry house relies on the law of physics to generate air movement. In particular two important concepts are the fact warm air rises and warm

air holds more moisture than cold air. In summer the chimney effect causes natural ventilation to occur in a poultry house that has a ridge or eave opening in the ceiling. A constant flow of air exists if the outside temperature is cooler than the temperature at bird level inside the building. (see fig 6). During cold seasons the amount of fresh air brought in should be sufficient to allow for adequate air exchange. The incoming air enter through the roof of the building and warms as it drops towards the floor (see fig 7). because the warmed air picks up moisture, the ventilation system must include a method for removing this air from the building to allow the air flow cycle to continue. (Jacquie ,2020).

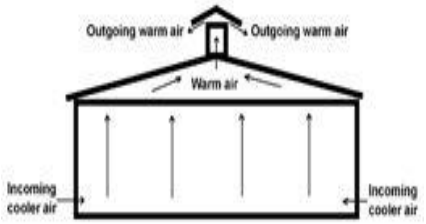

Figure 6: Concept of summertime ventilation: David Frame, Utah State University

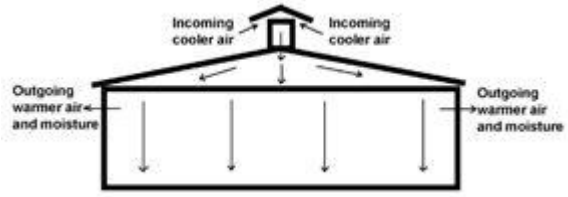

Figure 7: Concept of wintertime ventilation. Source: David Frame, Utah State University

1.6.3 Light

Light is considered as one of the most predominant environmental factors for birds. Many physiological and behavioral processes are regulated through it and it can also affect growth rate. It is important for sight both visual acuity and color discrimination. Light help the birds to establish rhythmicity and synchronize many essential functions, including body temperature and various metabolic steps that enhance feeding and digestion. Actually, nutrient concentration, feed form and light act independently and also interactively. Light also stimulates secretory patterns of hormones that have a role in growth, maturation and reproduction. Especially, light has an impact on pineal gland and help in synchronization of circadian rhythm and inhabiting melatonin release. The rhythm circadian helps the birds to optimize their metabolism, physiology and behavioral pattern. (Prasanna Pal *et al.,* 2019).

1.6.4 Feed Supply (Nutrition)

In term of cost, feed is the most important input for intensive poultry production, and the availability of low-priced, high-quality feeds is critical for the expansion of the poultry industries. For maximum performance and good health, poultry need a steady supply of energy, protein, essential amino acids, minerals, vitamins and, most importantly, water. Recent advances in poultry nutrition have focused on three main areas:

- Developing an understanding of nutrient metabolism and nutrient requirements;
- Determining the availability of nutrients in feed ingredients; and
- Formulating least-cost diets that bring nutrient requirements and supply together.

Practical poultry diets are formulated from a mixture of ingredients, including cereal grains, cereal by-products, fats, plant protein sources, vitamin and mineral supplements, crystalline amino acids and feed additives. Increasing costs and decreasing supplies of traditional feedstuffs (due in part to food-feed competition and population growth) are expected to affect the future expansion of poultry production. This highlights the urgent need to make greater use of a wide range of alternative feeds (e.g. insect meals, food waste, agro-industrial byproducts) and to use fewer human-edible components in poultry diets. The use of most alternative feedstuffs is currently negligible, owing to constraints imposed by nutritional, technical and socio-economic factors. In many circumstances, feed resources are either unused and wasted, or used inefficiently.

A major nutritional problem in developing countries is the biological and chemical contamination of poultry feeds, which may have serious consequences on bird performance and the safety of poultry products for humans. Of the potential contaminants, mycotoxins are the most widespread, particularly in hot, humid conditions, and mycotoxin decontamination must be a part of feeding strategies. (FAO,2023).

Figure 8: Serving feed to broilers (student on internship)

1.6.5 Broiler Strains (Chick quality)

Day -old chicks are the end product of the hatchery industry and form an important starting material for the broiler farm. (Decuypere *et al*.,2007).

Chick quality can be affected by breeder genetics, breeder flock age, and breeder flock health. Furthermore, after the eggs is laid, nest hygiene and storage conditions at the breeder farm affect egg quality, embryo viability and chick quality. Breeder farm management determines partly whether a hatchery can deliver perfect day-old chickens. (Inge Van Roovert-Reijrink, 2013).

Either quantitative or qualitative traits can be used for the measurement of chick quality. The quantitative traits are namely chick weight, chick yield, chick length and chick feather length. Qualitative traits include the vitality of the chicks, the quality of their navel, their beaks, yolk uptake, leg confirmation and joints. (Aydin *et al*., 2013) Chick should be gotten from reputable breeder farm, that have gotten a name, brand to protect their poultry industries and hence produced quality chicks. (Djanet Ould-Ali *et al*.,2022). However day-old chick quality has proven to be a difficult and subjective matter to define. (Hilke *et al*.,2008).

For farmers, these chicks have to perform well, which is translated in high viability, high growth rate, high breast meat yield and low feed conversion. A good day old-chick is hence a crucial hinge between the hatchery and the broiler farm. (Decuypere *et al.,*2007).

Nutritional and environmental conditions influence broiler flock performance, besides these factors, other less-well-understood factors, such as incubating egg characteristics, affect the embryonic life of chicks. (Kokou *et al*., 2004).

1.6.6 Health (Diseases and culling)

Poultry disease, regarded as one of the crucial factors affecting poultry production performance, has restricted the development of the poultry industry for a long period. Although researchers and breeders have conducted a lot of work in disease prevention and control, such as disease-resistant breeding, immune-related products and enhancement of routine measure, the outbreak of poultry disease is still inevitable, which will not only cause huge economic losses, but some zoonotic infectious diseases may also endanger human life.(Pengguuang *et a*l., 2022).

The general health of a flock influences feed conversions. Sick broilers do not perform well. Closely observed for early signs of disease and treat broilers quickly and properly. Used carefully vaccines and medication on veterinary doctor's prescription, since reactions caused by improper administration can adversely affect weight gain and feed conversion. Eliminate, as early in the grow-out as possible, broilers that have no chance of making it to market.

Obviously, an unhealthy broiler is likely to have poor feed efficiency. The main reason for this is that feed intake is reduced, and so again proportionally more feed is directed towards maintenance. With enteric diseases there can be more subtle changes in feed utilization because various parasites and microbes can reduce the efficiency of digestion and absorption of nutrients. A broiler with sub-clinical coccidiosis is not likely to absorb nutrients with optimum efficiency, because the oocytes will destroy some of the cells lining the gut. More recently the phenomenon of so-called 'feed-passage' has been observed in broilers. Undigested feed particles are seen in the excreta, and so consequently feed efficiency will be affected. The exact cause of this problem is unknown, but is most likely the consequences of a microbial challenge. (UK. Ag extension work, 2021).

1.6.7 Litter Quality (Management)

Litter conditions significantly influence broiler performance and, ultimately, the profits of growers and integrators. Litter is defined as the combination of bedding material, excreta, feathers, wasted feed, and wasted water or in broiler house, litter serves to absorb moisture, dilute fecal material, and provide insulation and cushion between the birds and the floor. Because birds are in constant contact with litter, litter conditions will significantly influence bird performance and ultimately the profits of producers and integrators.

Controlling litter moisture couple with the use of litter amendments can help growers manage litter quality. Proper litter management helps to improve in-house air quality. (Casey *et al.,*2017).

Litter quality has been related to broiler performance, behavior, welfare, dust and ammonia (NH3) emissions. Drier litter leads to a reduction in NH3 emissions and reduces the formation of foot- and hock lesions. However, maintaining good litter quality is often challenging. (M. Brink *et al*.,2022).

An effective bedding material must be absorbent, lightweight, inexpensive and non-toxic. Ideal materials will have high moisture absorption and release qualities to minimize litter caking. In addition, a bedding material must be compatible as a fertilizer or soil amendment after it has served its purpose in the broiler house.

Many products have been used as bedding. The quality and quantity of bedding materials can vary greatly from one region to another. Table 8 lists various materials that have been tried with at least some degree of success and briefly discusses the advantages and disadvantages of particular litter sources.

Table 8: Advantages and disadvantages of various litter material.

Pine shavings and sawdust	Preferred litter material but becoming limited in supply and expensive in some areas
Hardwood shavings and sawdust	Often high in moisture and susceptible to dangerous mould growth if stored improperly prior to use
Pine or hardwood bark	Similar to chips or shavings in moisture absorption capacity. Medium-sized particles preferred
Rice hulls	A good litter material where available at a competitive price. Young chicks may be prone to litter-eating (not a serious problem).
Peanut hulls	An inexpensive litter material in peanut-producing areas. Tends to cake and crust but can be managed. Susceptible to mould growth and increased incidence of aspergillosis. Some problems with pesticides have been noted in the past
Sand	Field trials show comparable performance to pine shavings. Long-term reuse potential with de-caking. More difficult to maintain suitable floor temperatures during cold-weather brooding. Need ample time and ventilation prior to brooding to ensure dryness.
Crushed corn cobs	Limited availability. May be associated with increased breast blisters.

Chopped straw, hay or corn Stover	Considerable tendency toward caking. Mould growth can also be a disadvantage.
Processed paper	Various forms of processed paper have proven to be good litter material in research and commercial situations. Tendency to cake with increased particle size. Top dressing paper base with shavings may minimize this problem. Careful management is essential.

1.6.8 Water supply

water is needed for bird's consumption, reducing air temperature (including evaporative cooling) and facility sanitation. Broilers consume approximately 1.6 to 2.0 times as much water as feed on a weight basis.

Water is a critical nutrient in bird metabolism and nutrition. From a physiology perspective, water consumed by birds is used for nutrient transportation, enzymatic and chemical reaction in the body, body temperature regulation and lubrication of joints and organs. There is a strong relationship between feed and water consumption; therefore, water can be used to monitor flock performance. When birds are not distributed evenly between the front and back of the house it increases the competition for feed and water space. Thus, combined with the extra heat from excessive numbers of birds, can reduce bird performance. (Fairchild and Casey, 2015).

1.6.9 Feed wastage and feed deprivation

Placing too much feed in the chick feeders results in feed wastage and contributes to an inferior feed conversion. To prevent excessive loss of feed, add small quantities of feed to the feeder lids by running the automatic feeders frequently for short periods. This will stimulate the chicks to eat more often. Also, this will encourage the chicks to feed from the automatic feeding equipment quickly.

Feed deprivation can occur during the growing period and contribute to an inferior feed conversion. This often occurs the first time the automatic feeding system is raised. Be careful not to raise the feeders too early and/or too high during the production cycle. Early feed deprivation will result in uneven growth, causing poor uniformity. (Tony, 2022).

1.6.10 Feed sizes and form

Common feed forms in animal feed are pellets, crumbles or mash. However, in the broiler industry, pellets and crumbles are mainly used. Physical feed form is considered to have a very significant impact on broiler growth and feed intake (Dozier *et al*.,2010). Feed form and feed particle size of cereals require a significant amount of attention when producing broiler feed. Today, commercial feed mills are producing different forms of broiler feed for birds at different ages (Jahan *et al*., 2006). While feed processing to change feed form increases the cost of feed it can be balance out by improved performance. Many researchers report that broiler fed pelleted diets have BW and improved feed conversion than those fed mash feed, and today pelleting has become a common processing method widely employed by the feed manufacturers to improve farm animal performance. Compared with mash, pellets enhance bird performance by decreasing feed wastage, alleviating selective feeding, destroying pathogens, improving palatability and increasing nutrient digestibility. One disadvantage is that pelleting cost about 10% more than producing mash feed. (Jahan *et al*.,2006).

With regard to feed particle size, one traditional view was that a smaller particle size would be associated with a larger surface area of the grain, possibly resulting in higher digestibility in poultry due to greater interaction with digestive enzymes in the gastrointestinal tract. (Preston *et al*.,2000). In more recent years, however, it is thought that a large particle in size aided by some structural components is beneficial to gizzard functions and gut development (Hetland *et al*.,2002; Svihus *et al*.,2004; Choct,2009).

1.6.11 Prophylaxes control (vaccination and biosecurity measures)

Over the years, antibiotic growth promoters (AGP) have been used to control pathogens and preserve intestinal integrity and enhance production indicators for broilers. The performance improvement because of AGP is associated with modification of the intestinal microbiota. AGP promotes a balance in the microbial population, as it reduced the number of toxin-producing microorganisms in intestinal lumen, in addition to acting as anti-bacterial and direct anti-inflammatory agent. However, some countries have banned the use of AGPs because of the risks to human health caused by residues in the animal products, as well as the possibility of including bacterial resistance. (Paula Pires *et al*., 2022).

Poultry vaccines are widely applied to prevent and control contagious poultry diseases. Their use in poultry production is aimed at avoiding or minimizing the emergence of clinical disease at farm level, thus increasing production performance (Marangon *et al*.,2007).

Biosecurity refers to procedures used to prevent the introduction and spread of disease-causing organisms in poultry flock. Because of the concentration in size and location of poultry flocks in current commercial production operations and the inherent disease risks associated with this type of production, it is imperative that poultry producers practice daily biosecurity measures. Developing and practicing daily biosecurity procedures as best management practices on poultry farms will reduce the possibility of introducing infectious diseases such as Avian Influenza and Exotic Newcastle as well as many other (Brain, 2020).

1.7 Growth, performance of COBB 500 Broilers

1.7.1 Mortality rate

Mortality rate is a measure of the frequency of occurrence of death in a defined population during a specified interval. Morbidity or mortality measures are often the same mathematically; it's just a matter of what you choose to measure, illness or death. The average or daily mortality rate means the number of broilers that have died in the house on the same day including those that have been culled either because of disease or other reasons. To archived a low mortality rate in broiler production is guided by good management practices. At the broiler farm, the weekly mortality rate changes through time. According to Heier *et al*. (2002), the average weekly cumulative mortality during the first week was 1.54 and 0.48% a week during the remainder of the grow-out period.

1.7.2 Daily feed intake

According to the breeding company, broiler consume 1003g and 1836g feed respectively up to 21 and 28 days with corresponding feed conversion ratio values of 1.31 and 1.46 respectively (COBB 500, commercial broiler management guide, 2004). Feed consumption is a variable phenomenon and is influenced by several factors such as strain of broiler, energy content of the feed, ambient temperature, density of broiler in the shed, hygienic conditions and rearing environment. A broiler chicken will eat about 1kg starter, 1.5kg of grower and 1.5kg of finisher marsh (4kg in total) to reach market weight. A broiler would consume an average of 4 ± 4.25kgfrom day old to the end of 45days (6weeks). So, 1000 broilers would consume 80 ± 85bags of feeds for 45days.

1.7.3 Daily Weight gain and body weight

The average daily weight gain is simply the rate of weight gain per day over a specified period of time. Broiler chickens have the genetic potential for significant weight gain over a short period. Weighting just 40 ± 2g at day old, can achieve a weight of about 2800g within 42days, with an average daily weight gain of $64\pm6g$. Bolton et al (1972) reported that increasing stocking density results in a reduction in body weight gain over a range of 10-27 birds\m^2. The stocking density for this breed is 8-10broiler/m^2.

1.7.4 Feed conversion ratio and live weight

Feed efficiency is simply expressed as the feed conversion ratio (FCR), representing the ratio between feed intake and body weight. Feed conversion ratio is simply the amount of feed consumed by the broiler to produce muscles (poultry meat). Broilers are quite efficient and can achieve feed conversion ratios in the 1.5 to 1.9 range. That would mean with every kilogram and a half of feed, the broiler grows 1kg. The feed conversion ratio in broilers is affected mostly by the non-dietary factor, ambient temperature. (Ethan, 2022).

1.7.5 The economic aspect of cobb500 broiler production

There is no price list for poultry products in Cameroon. Prices fluctuate according to the law of supply and demand. Demand is strong during festive periods (end of year, Easter, Tabaski, etc.). The problem of chick shortage in this sub-sector is due to less production capacity of hatcheries (currently operating at 55% of their actual capacity) than to the quality and quantity of chicks than to the quality and cost of feed, which is currently very expensive (≈15000- 22,000 FCFA for a 50 kg bag of feed) due to the unavailability of maize (≈250-350 FCFA/kg). An increase in the price of inputs of more than 70%, pushing the cost of broiler production of broiler production to 2700 F/Bird (MINEPIA. 2009). Similarly, the presence of numerous small-scale producers with varying degrees of mastery of breeding techniques and a weak marketing circuit contribute to price fluctuations. A survey conducted by the FAO (2006) reveals that the price per kg of chicken varies from 1,500 to 1,800 per kg in Cameroon.

CHAPTER TWO: MATERIALS AND METHODS

2.1 Study site

This study was conducted in GIC de Sahel, in Yaoundé urban council area in the center region and the political capital of Cameroon, found in the southern Cameroon plateau of the Argo ecological zones of Cameroon (Figure 15). It is located within 3°52'N latitude and longitude 11°31'E. It has a high temperature of 20- 28 °C between January to May and a low temperature of 19, -26^{0}c between July-December, that is, an average annual temperature of 21.1^{0}c. It has an annual rainfall of 2064mm per year. Many people come to live and work in Yaoundé with its enormous opportunities and social amenities, also it's an important industrial center especially for timber, agriculture is another important economic factor with regard to the region most important cash crop, cocoa and poultry for livestock production or husbandry.

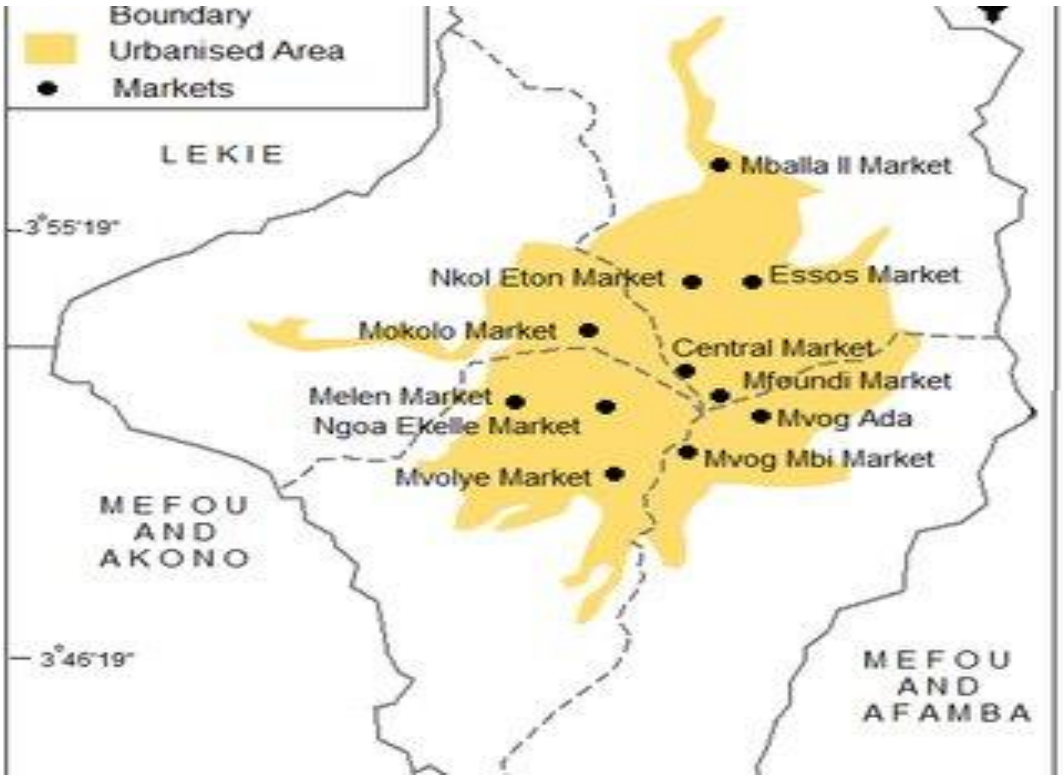

FIGURE 9: MAP OF THE STUDY AREA.

2.2 History of the GIC de Sahel broiler farm

The *GIC de Sahel* was created in 2011 and became legally recognized on 13 February 2016 with a registration number of N^{0}CE\GP\003\11\29748. Its headquarters is at Emana with the poultry farm at Tsinga-Village neighborhood in Yaounde, 1 sub-division in the Mfoundi division of the center region. This common initiative group has 5 members, amongst them are 4 men and 1woman. The *GIC de Sahel*

has a layer and broiler farm. The broiler farm has a production capacity of 5000 to 10000birds per production cycle. The production system is that of the deep litter type, with water provided from an underground (forage) automatic water system to reduce the use of man-power hence reduced cost of production. They solicited for funding from the animal development project (PRODEL) from MINEPIA and its was granted for the construction of the poultry house and the water system. The *GIC de Sahel* has the following activities on different production sites.

- Production of broilers at Tsinga-Village.
- Production of table eggs at Ezizang, Lekie Division.
- Fattening of broilers
- Fowl droppings.

These activities undertaken by these common initiative members over a period of 12years has made them to acquire experience. The group has as vision to increase its production capacity in the coming years and also, it's a product of mutation of GIC ROSE for dynamization of the group by its member.

2.3 Birds Management (chick's suppliers)

This study was carried out on two batches of Cobb 500 birds of size of 8000 and 10000 respectively. Birds were purchased at day old in SPC/ AGROCAM hatchery.

2.4 Techniques of broiler production in the farm

2.4.1 Production system.

The *GIC de Sahel* broiler farm practices intensive poultry production system with deep bedding liter floor house employed. Here the birds come in-contact with their droppings and so a saw dust (wood shelving) is used to absorbed the fecal content, making the birds cleaned, free and not stacked with their dropping as seen on photos (2A and 2B). After brooding at 21days the wood shelving is replaced after every 2-3weeks.

Photos 1: Intensive system, deep lilted system (saw dust)

2.4.2 Housing and facilities.

The broiler farm has a surface area of 1500m^2 with three poultry building, a brooding house and two flattening or growing poultry houses as a section of the house shown-on photo(2C). The brooding housing are covered with plastic bags during the day with a heating source, firewood (artificial brooding), or after the space for brooding will be enlarged as the chicks ages. The following materials are present in the farm;

- ✓ **Drinkers.** There are 3liters drinkers for chicks at 0-15days, with a drinker for 25chicks. At this age the chicks don't occupied a larger surface area (stocking density) but with time the 3l drinkers are replaced with the 10liters drinkers. As the grow the occupied a larger surface area with a drinker for 10- 15birbs (photo 2A and 2B shows the drinkers respectively), with water provided from an underground system (wall, using an electric pump).

Photos 2: 3liters and 10liters drinkers with the broiler house

- ✓ **Feeders (photos 3A and 3B);** the broiler farm has semi-automatic feeder for older birds and trays and the day-old chick's cartoons are cut and used as feeders at 1st age.

Photos 3: Semi-automatic and tray feeders

2.4.3 Feeding

The broiler farm of *GIC de Sahel* uses starter marsh, grower marsh and finisher marsh feed produced from a nearby feed milling site and at time renounce poultry feed producing company SPC with its recent increased in feed prices have been a setback for the farm. But the farm has its feed formulae that its uses to compound its feeds. The table below shows its feed formula with the respective birds ages and duration of the different feed types.

- **Starter marsh;** given to the birds first after a pre-starter marsh feed given for a period of one week. The starter marsh formula used were represented on table 9 and 10.
- **Growth marsh feed;** this was given after the starter marsh, for a period of about 13days. The table shows its feed propositions.
- **Finisher Marsh;** the final feed type given to the bird before which they are taken to the market, at either 45 or 55days.

Table 9: The feed formulae used at the farm with age of birds and duration of feed type

Primary feed ingredients	**Quantity for 1ton(kg) and ages(days).**		
	Starter marsh (0-22)	Grower marsh (23-30)	Finisher marsh (31-45)
Maize	582	607	643
Soya beans cake	250	225	150
Groundnut cake	105	115	167
Conc techna 20%(premix)	25	20	20
Palm oil	20	20	20
Bone meal	18	13	\

Table 10: Feed formulation of commercial feeds used in feeding birds at GIC de Sahel broiler farm (SPC)

	Quantity		
Analysed composition	**Starter**	**Grower**	**Finisher**
Crude protein (%)	20.5	19	18
Energy (kcal kgG1)	3000	3150	3250
Crude fat (%)	6.5	9	8
Crude fiber (%)	5.5	5.5	5.5
Calcium (%)	0.9	0.75	0.65
Moisture (%)	10	10	10

Feed is given, early in the morning by 6am and during the afternoon by 2pm but much is given to last longer, with water changed at midday when the sun is over head, the water is hot and the broiler can consume it. The photos (4A and 4B).

Photos 4: feed been served to birds, (provenderie Société Nkam)

2.4.4 Sanitary health protection.

- **Biosecurity measures.**

The is a bit isolation from the hustle and bustle of the town. The worker stays on site and do cleaning of the broiler farm surrounding from time to time. At the entrance of the broiler house is disinfectant solution kept in a plastic bucket for foot dipping before entering the farm with 2 permanent laborer and the rest of GIC members also work at the temporary.

Photo 5: foot dipping into a disinfectant solution at the entrance of the broiler house

- **Vaccination**

Vaccination of birds against Newcastle disease and infectious bronchitis are done at the GIC de Sahel broiler farm at day 8 together with vaccine against gumboro. Revaccination of diseases against Newcastle diseases, infectious bronchitis and infectious bursal disease are done on day 15, and finally gumboro only done on the 28day.IBDL, that is gumboro long action vaccines is only given on the 14th day. (Photo 6).

Photos 6: vaccines used at the *GIC de Sahel* broiler farm

The vaccination calendar is well established with respect to the epidemiological realities of the locality where there is GIC de Sahel broiler farm, as presented on table 11.

Table 11: show the vaccination calendar at GIC de Sahel Broiler farm.

Vaccines	Diseases	Ages indicated
Avinew.	Newcastle disease	Day, 8 and 15
CEVA BIL	Newcastle disease and infectious bronchitis	Day, 8 and 15
CEVA GUMBOL	Infectious bursal disease	Day,8, 15 and 28
Bur 706	IBD	Day,8, 15 and 28
CEVA IBDL	IBD, or BURSITIS	Day 14 only.
HIPRAVIAR B1\H120	Newcastle and infectious bronchitis.	Day 8 and 15
CEVA NEW	Newcastle disease	Day, 8 and 15
CEVA BRON.	Infectious bronchitis	Day, 8 and 15

- **Treatment of diseases**

The presence of broiler in any broiler production farm over time comes with avian diseases. At the *GIC de Sahel* farm the following pathologies were observed via post mortem diseases (Table 12).

Table 12: shows the dominant avian pathologies at *GIC de Sahel* broiler farm

Pathologies	Etiologies	Total (%).
Newcastle diseases	paramyxovirus	20.5
Infectious bursal diseases	Birnavirus	19.0
Coccidiosis	Eimeria spp	22.0
Chronic Respiratory diseases.	Mycoplasma gallisepticum	18.0
Infectious coryza	Avibacterium paragallinarum	6.0
Salmonellosis	Salmonella spp	11.0
Swollen head disease	Avian pneumovirus	3.5

Photos 7: administering oxytetracycline pure in feed against watering dropping

The *GIC de Sahel* broiler farm, suffers from diseases outbreak notable viral infections like the Newcastle disease and the immunosuppression infectious bursal disease that have a huge negative impact on production performance at the farm on a score of 100% represent 20.5 and 19% respectively. The protozoan causing infection coccidiosis were observed at 22% at the farm, with the chronic respiratory disease a call for concern at farm shows 18%.

2.5 Data collected and study parameters

To carry out the study, a broiler farm that produces more batches of broiler per year of at least 1000birds was selected based on their importance, longevity, size of production capacity and experiences in Yaoundé.

2.5.1 Management practices, on factions affecting broiler performance. The data on management practices affecting broiler performance was collected by the use of an elaborated survey questionnaire based on observation (see Annex 1).

2.5.2 Growth performance parameters.

The growth performance of broilers was evaluated by recording body weight gain, feed intake, and feed conversion ratio (FCR).

Feed consumption (FC) or feed intake (FI): it is the quantity of feed consumed within a specific period. It is calculated thus:

$$\text{Feed intake (FI)} = \frac{\text{Quantity of feed distributed in each given period (kg)}}{\text{Number of subjects(broilers) in that given period.}}$$

- **Average live weights (LW) and the evolution of weight gain:** measuring the weight was done weekly in order to evaluate the live weight. The weight gained was obtained by the differences between consecutive measured weight. The live weight was obtained using the formula below:

$$\text{LW} = \frac{\text{Total weight of the measured surjects(broilers)}}{\text{Total number of the surjects (broilers) measured.}}$$

- **Feed conversion ratio (FCR):** It is used to measure the feed efficiency or the feed conversion ratio in a given production cycle. The formula uses to calculate the growth phase in production performance is given below:

$$\text{FCR} = \frac{\text{Quantity of feed consumed (g)}}{\text{Average weight gained (g).}}$$

- **The rate of Morbidity (RM):** It is the number of live surjects (broilers) in a given production. It is calculated by using the formula below:

$$\text{RM} = \frac{\text{Number of live surjects (broilers) in the growth phase}}{\text{Number of surjects (broilers) initially present or death.}}$$

2.5.3 Cost of production.

The production cost refers to all the expenses incurred in the process of creating and delivering a product or service. In simple terms, is the sum of all expenses necessary to produce and sell a product or service. The cost of production was calculated by summing the cost of day-old chicks, feeds, labour, electricity and veterinary drugs/ vaccines. To get the profit gotten by the farm the sell minus the cost of production (expenses).

Cost of production (CP) = Sum total of all expenses incurred

Profit (P) = Sells of broilers − Expenditure on production.

2.6 Data Analysis

Data collected on the broiler farm were introduce into Microsoft Excel for classification and codification. They were further subjected to descriptive statistics using SPSS 2010. Results obtained were expressed in form of relative frequencies in percentages. The quantitative data on growth parameters was compared to the standard Cobb 500 recommendations using t-test at 5% significant level.

CHAPTER THREE: RESULTS AND DISCUSSION

3.1 Farms organisation in GIC Sahel

3.1.1 Broiler House (apparatus) parameters at GIC de Sahel poultry farm

The housing system and its parameters in the *GIC de Sahel* broiler farm is represented on table 13.

Table 13: Housing parameter of the *GIC de Sahel* broiler farm represented in scores (percentages).

Parameters	Modality(score)	Total (%).
Ventilation from the walls not roofing systems	YES	100
	NO	0.0
Heating method for day old chicks, firewood from other sources of heating like charcoal, lights, lamps or radian gas methods systems.	YES	100
	NO	0.0
Humidity	YES	0.0
	NO	100
Carry capacity, or density (stocking rate)	YES	80.7
	NO	19.3
Wind direction (direction of the dominant wind)	YES	73.7
	NO	26.3
Topography	YES	35.8
	NO	64.2
Water system available at the farm, modern water system	YES	100
	NO	0.0
The source of DOC, produces quality chicks and respecting heating duration of 21days.	YES	62.0
	NO	38.0
Plastic bags used in covering the broiler farm, 24|7	YES	70.6
	NO	29.4

It appears from this table that, the *GIC de Sahel* broiler farm was constructed with little respect of the roofing method of ventilation but rather on the sides (walls) of the building with excess spacing to better allow air current circulation (ventilation) in the broiler house.

This shows that the construction of the broiler house was done by the owner with little or no zootechnical consultancy. Consulting a zootechnician before implanting a broiler farm, will enable the structure to take into considerations zootechnical apparatus such as, dominant wind current directions, humidity and ventilation (temperature regulation). A Farmer don't take much consideration on housing parameters in broiler production.

The broiler houses roofing systems don't take into considerations the ventilation to be make possible from the roof, including the height of the building (air movement) 100%, but does on the sides since the broiler house are open, for ventilation. The (score) percentage for respecting the stocking rate

(carrying capacity) were 80.7%. from the different types of artificial brooding systems of day-old chick employed, the *GIC de Sahel* broiler farm uses firewood 100% to brood its chicks, dues to its availability, and affordability. The placement of the farm building with respect to the wind directions 78.7% and a maximum period of covering the wall of the building with polythene bags 70.6%.

3.1.2 Feeding

The results obtained from the surveyed *GIC de Sahel* broiler farm as nutrition is concerned were presented on the table 14.

Table 14: Feeding program of GIC de Sahel broiler farm

Variables	Mode (scores)	Total (%).
Respecting ages and timing for giving pre-starter marsh, growth and finisher marsh feeds.	YES	84.3
	NO	15.7
Mostly grains feed given and not pelleted feeds in the form of granules with vitamins.	YES	96.1
	NO	3.9
Sizes of the grains with respect to the ages of the broilers.	YES	74.8
	NO	25.2
Feed supply timing per day (present of feed in feeder all the time)	YES	64.1
	NO	35.9
Source of feed company (reputable feed company like SPC)	YES	71.8
	NO	28.2
Respecting numbers of feeder with number of broilers in the farm.	YES	63.1
	NO	36.9
Water supply method and number of drinkers per number of broilers in the farm	YES	80.2
	NO	19.8
Feed additives notable antibiotics, anti-coccidiostats and vitamins minerals.	YES	37.6
	NO	62.4

From the Tables 14, pelleted pre-starter marsh (chick care) were imported from Holland and given the first 7days before fed with starter marsh feed are mostly grains 84.3%, with 74.8% grains sizes respecting the ages of the broilers. Feed supply was not *ad libitum* but 64.1%, with water supply at 80.2% due to present of a water supply making it easier. Feed incorporated with antibiotic, anti-coccidiostats and vitamin mineral were given 37.6%.

3.1.3 Prophylaxes program applied in GIC de Sahel Broiler farm

There was no strategic prophylaxis program (disease control) put in place at the *GIC de Sahel* broiler farm apart from vaccination and limited biosecurity measures (Table 15). They don't seek for expertise out of their own expert and it experience in implementing a well-defined prophylaxes calendar in the farm. The *GIC de Sahel* broiler farm believed in its experiences acquired over the year to replace the services of a veterinarian(zootechnician) due to it many years in the broiler production business. Educational practices and longevity (experience gained with time) were not the same, so one can't replace the other.

Table 15: Prophylaxis management program of GIC de Sahel broiler farm

Variables	mode	Total (%).
Feet dipping or foot bath placed at the entrance of the broiler house. At the door of the poultry house.	YES	18.9
	NO	81.1
Treatment of birds presenting clinical signs of infectious diseases.	YES	67.1
	NO	32.9
Uses of antibiotic without prescriptions from veterinary doctors upon proper diagnoses done.	YES	100
	NO	0.0
Disinfections of poultry house before the introduction of a new batches of broiler.	YES	57.1
	NO	42.9
Proper vaccination calendar respected with vaccination against Newcastle, infectious bronchitis and infectious bursal disease done on day 7, 14 and on 28days only gumboro vaccines done.	YES	100
	NO	0.0
On site clothing for the broiler farm only. With Savon for washing of hands and feet's before and after farm works.	YES	64.1
	NO	35.9
Traders visit farm to buy birds, with vehicles, touches birds before buying them.	YES	64.4
	NO	35.6
Veterinary doctor intervention in the farm for disease diagnosis and treatment.	YES	0.9
	NO	99.1

Quarantine, routine antibiotic, anti-coccidiosis, anti-helminthic follow-up.	YES	0.6
	NO	99.4
Presences of wild birds, local fowl in the farm, no program put in place to combat their asses into the farm.	YES	80.2
	NO	19.8
All- in and all- out policy respected in the farm.	YES	100
	NO	0.0
Regular vet visit during vaccination and change in feed.	YES	0.0
	NO	100
Frequent bedding change program respecting every 2weeks after 21days old. (after brooding)	YES	66.4
	NO	33.6
Disposal management of dead birds and old saw dust used as bedding materials.	YES	34.9
	NO	65.1

The GIC de Sahel broiler farm has a foot bath as a biosecurity measure of just 18.9% applicable, with limited veterinarian intervention on the day of chick arrival and only when need be 0.9%. There was no proper prophylaxis control on the use of antibiotic administration by a veterinarian prescription.

Disinfection of the broiler farm before and after a new batches of production commerses was limited only where the last batch had a high level of mortality 57.1%. Farm was asses by wild birds, and local fowl 80.2% with a limited management program on the disposal of dirt and dead birds 34.9%.

3.1.4 Hygienic conditions of the GIC de Sahel broiler farm

At the GIC de Sahel broiler farm, onsite shoes and clothing were seldomly clean (washed), washing of drinkers and disinfection of person at the entrance was limited in practiced and was not effectively done 50% and 62.5% regularly wash the drinkers when birds' droppings were, on it attracting flies hence a means of transmitting diseases. The quality and duration of action of the disinfectant solution matters, in order to produce a better sanitary result. Old bedding material and dead birds were not well or properly disposed, of but given to the farm's guard dog to eat. 62.5% of the deep litter management practice placing new saw dust on old once's, building up ammonium gas, exposing the birds to respiratory infectious like chronic respiratory diseases (CRD) caused by the etiology mycoplasma gallisepticum. After the production cycles the old bedding material are drop at the GIC maize farm as

manure or sold. Vide sanitaire(disinfection) was done after every production cycle and usually extended for a month depending on the mortality rate of the previous batch of broiler poultry.

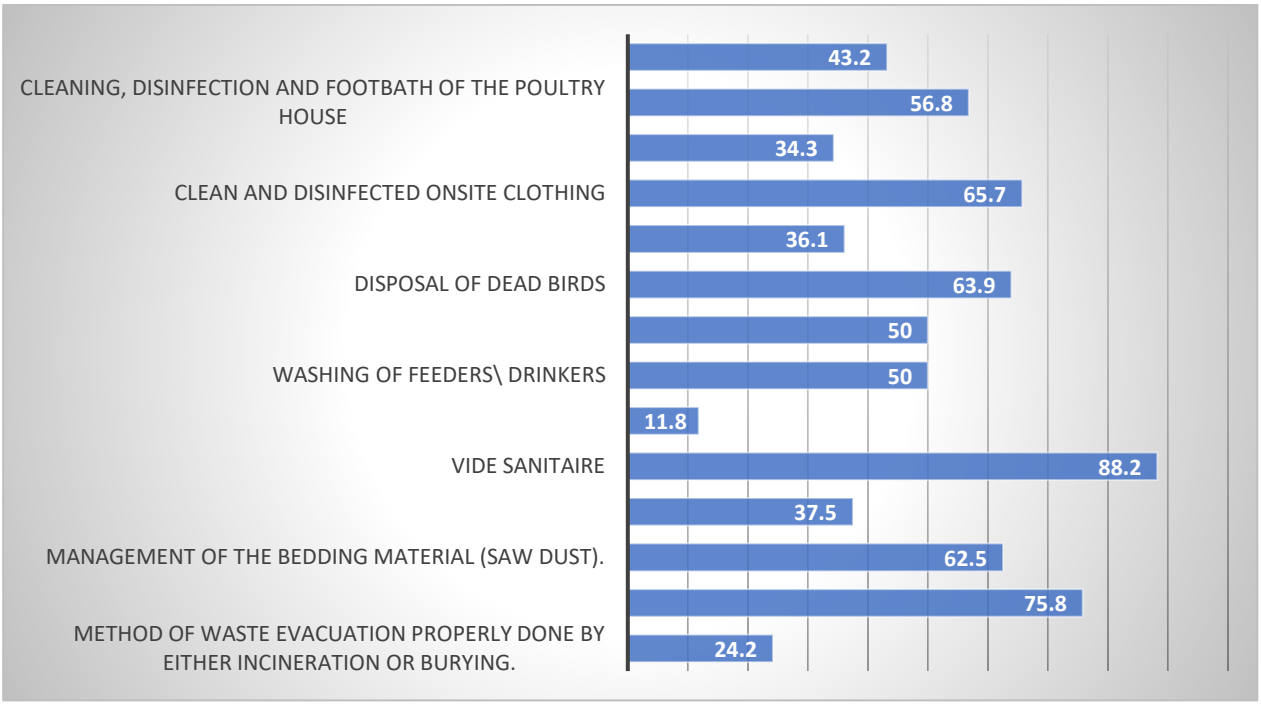

Figure 10: Hygienic conditions of the GIC de Sahel broiler farm (litter management**,** ammonium build up, feeder and drinker sanitary states)

3.1.5 Vaccination and Biosecurity methods applied in the GIC de Sahel broiler farm

- Personal Hygienic practises, and means of transportation

Workers at the broiler farm stayed on side to better limit the introduction of infectious diseases into the farm, but during sales traders comes onsite and select the birds they want with respect to their weight, touches and appreciated them before buying. Transportation is by means of the trader's car, from the farm to the market without any disinfestation carried out on the farm (Table 16).

Table 16: Hygienic conditions at the GIC de Sahel Broiler farm.

Equipment	Mode(score)	Total (%)
No used of wooden cages, proper washing of drinkers and feeder after stained with birds' droppings.	YES	0.0
	NO	100
Plastic cages are used to transport birds around the neighbourhood, market from the farm.	YES	100
	NO	0.0
Disinfestations of cages frequently after used in transporting these birds.	YES	16.5
	NO	83.5
Middle men, negotiators don't get into the farm with their cars.	YES	73.6
	NO	26.4
Respecting of barriers or restrictions from people getting into the broiler farm.	YES	60.2
	NO	39.8
Dumping of dropping appropriately at the GIC de Sahel broiler farm.	YES	33.1
	NO	66.9

Observed generally, no wooden cages were used to transport birds, 100% use plastic cages, cleaning, washing of feeders and drinkers done. 66.9% dump dropping in an inappropriate manner in a farm around the poultry farm. The trader verifies the health status of the bird before buying.

The figure below represents the level of personal hygiene in the farm

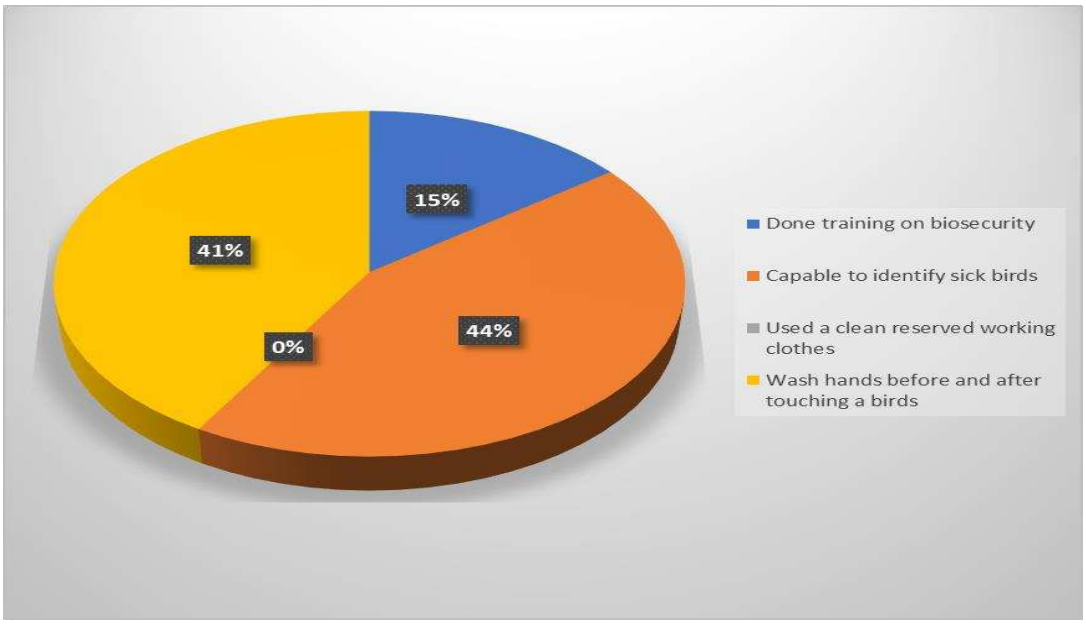

Figure 11: Personal hygienic measures in the farm

The figure revealed that household buyer gets in to the broiler farm and the GIC de Sahel farmer have attained, workshop and seminars on biosecurity, 31.6% organized by veterinary pharmaceutical companies like CEVA, LAPROVET, CAPHAVET, HUVEPHARMA, MERIAL, COOPHAVET. And 94.7% shows the workers on the farm are capable of identifying sick birds. Majority (89.5%) of laborers washed their hands and feet with Savon after working in the farm and also touching these birds, but they don't use reserved uniform (clothing) kept only to carry out these operations.

3.2. Analysing the growth performance of COBB 500 broiler at GIC de Sahel

The growth performance of the COBB500 birds at GIC de Sahel poultry farm are resumed on table 13 and figure (16-19). From table 13, it emerges that there was a significant difference ($p<0,05$) between the GIC and standard value for growth parameters, exception for feed intake which was statistically comparable ($p>0,05$).

Table 17: Showing the growth performance of Cobb 500 broiler at *GIC de Sahel* farm

Parameters	Batch 1	Batch 2	Mean	Standard	*P*
Number of Broilers	8000	10000	13000	/	/
Feed intake (Kg/Chicken)	7.51	7.48	7.49±0.02	7.6	0.07
Live body weight (Kg/Chicken at 45days)	2.45^{a}	2.68^{a}	$2.57±0.15^{a}$	4.0^{b}	0.03
FCR	2.80^{b}	2.98^{b}	$2.89±0.12^{b}$	1.6^{a}	0.04
Average daily gain (g/Chicken)	68^{a}	71^{a}	$69.50±2.12^{a}$	80^{b}	0.03

*a,b, means along the same row with dissimilar superscripts differs significantly ($p<0.05$)

3.2.1 Evaluation of feed intake

As noted in the table 13, the total feed intake was not significantly different ($p>0,05$) between GIC Sahel and Standard recommendation for Cobb 500. However, the mean feed consumption (feed intake) of the two batches (7.49g/broiler) gotten from this studied was slightly lower than the recommended value for this strain (7.6g/broiler). This value is slightly lower than that obtained by Ripon Kumar Dutta *et al* (2012) for the same breed (Cobb 500) Feed intake has no significantly changed with that of the standard value could be due the outcome (result) of the quality of feed which is seen only in the corresponding weight gain in the birds as a measure of the feed standard. The birds at GIC de Sahel farm, were fed with marsh (grind) feed that leaves behind nutritive elements in the feeders in powder

form that's difficult to be picked by the anatomic beak mouth of broilers and also the maize grained that were bigger in sizes was left unconsumed in the feeders (feed milling companies usually commit these errors in not respecting the feeds sizes, with ages of broilers couple with the raised in price of maize incurring a high cost of production).

The weekly evolution of feed intake is illustrated in figure 16.

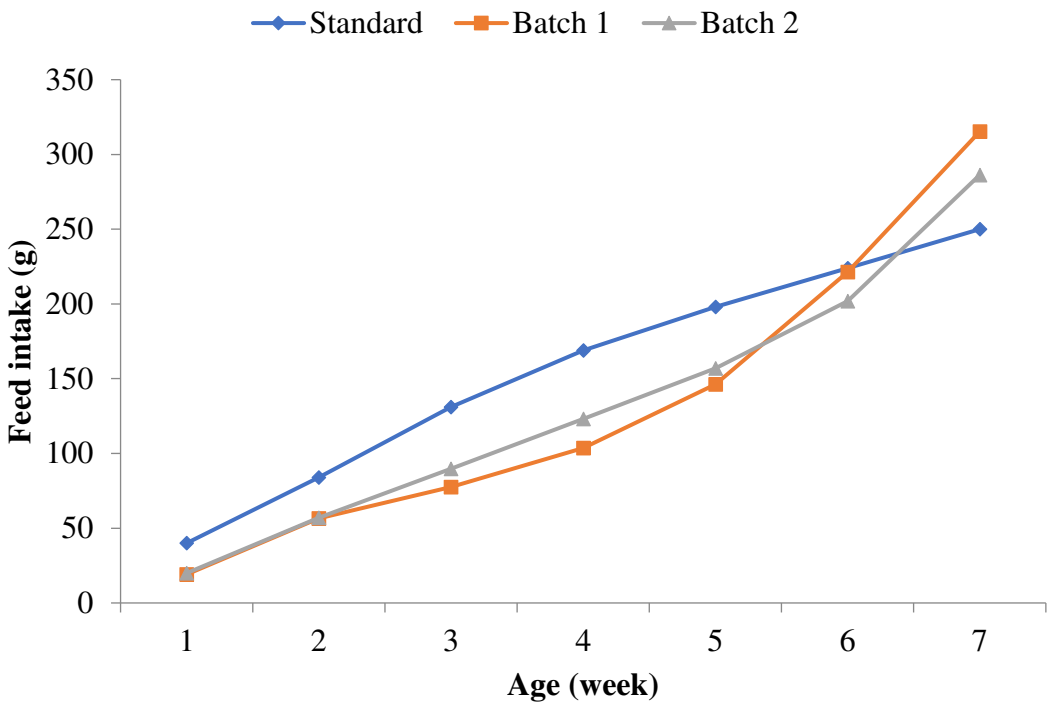

Figure 12: Weekly evolution of feed intake in COBB500

It appears that, throughout the first 6 week of the rearing period the standard curve was over the one obtained in the GIC Sahel. During the last week (week 7).

This feed consumption value was due to watering droppings at the 6th week leading to wet litter materials (saw dust) and reduced feed intake at the farm.

Feed intake of Cobb 500 commercial broiler for this study under Tsinga-Village condition was slightly different to the target feed intake of the breed. But was higher than the average values reported by Hascik *et al.* (2010) for the same breed (figure 12). The average daily weight gain in this study was lower than the target performance of the breed. This could be related to difference in nutritional

specifications designed to help achieve these targets, light control, temperature, ventilation, water quality and/or prevalence of diseases.

3.2.2 Evaluation of live body weight

Live body weight of Cobb 500 commercial broiler under Tsinga-Village condition are presented Table 17 and figures 13.

The mean live weight of the batches was recorded to be 2.57kg lower than the standard live weight of cobb500 at *GIC de Sahel* broiler farm but Shahidullah et al (2008); Habib et al (2009) obtained live weight values higher than this on supplementary feed like blood meal and commercial feed not only increased the growth performance of broiler chicks but also enhanced the growth and feed conversion efficiencies significantly.

But the average daily weight gain was lower than the target up to 5th week and slightly improved for the last 3 weeks of the experiment. The main reason for the higher daily weight gain from 6-8th weeks of age could be related with higher feed intake of the birds in this period of time.

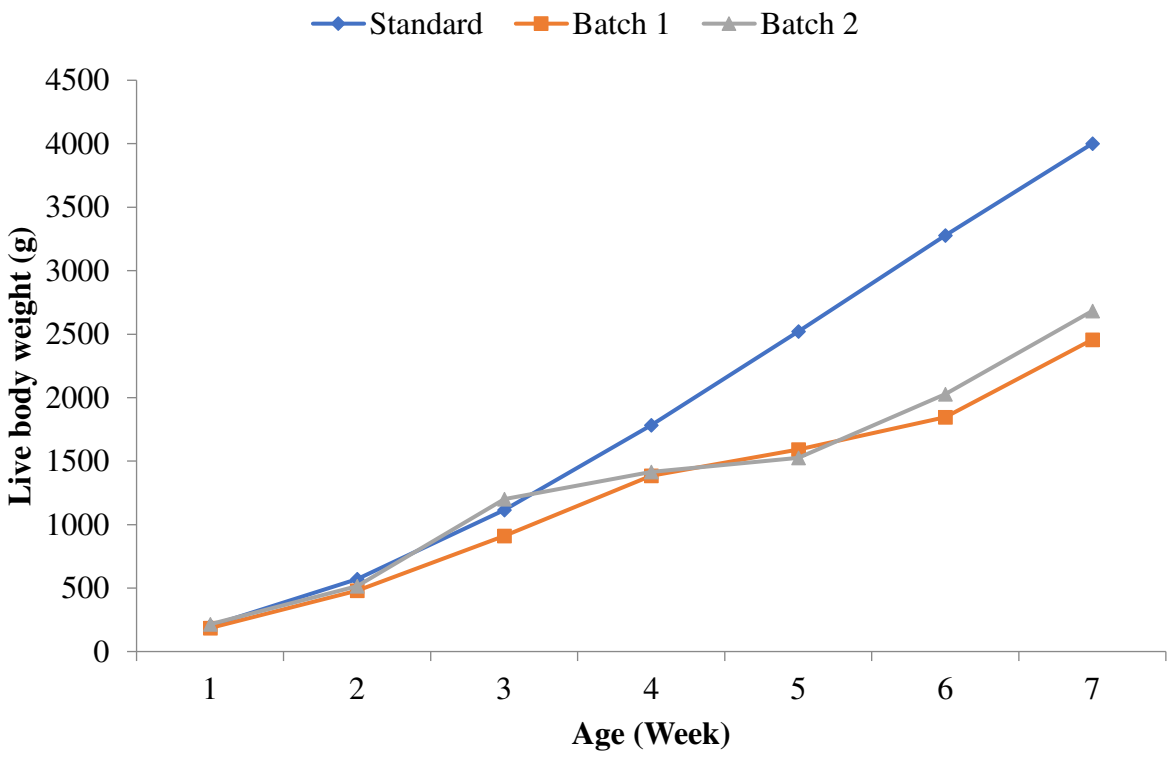

Figure 13: Evolution of live body weight with respect to age

The better growth performance indicates that hot humid environments like Tsinga-Village were conducive to produce broilers given that appropriate feeding and other management practices are followed. Comparisons of mean live body weight of Cobb 500 commercial breed in this study with breed performance targets showed that the mean live weights were lower than the target values of the breed. This could be associated with discrepancies of management practices.

This value was lower at the farm due to no adequate supplementary feed and not fed ad libitum but rational.

3.2.3 Evaluation of average daily gain

The average daily weight gain recorded in GIC Sahel was significantly lower ($p<0.05$) than Cobb 500 recommendations of 30g weight gain in the 1st week, at 2nd to 4th week daily gain of 50-60g. However, this value was found to be higher than the previous batches for the same breed of 80g weight gained at 4th week. The average daily weight gain turned to increased on at a constant rate from the 4th -7th week (figure 14). The differences might be attributed to nutrition, management and environmental variations, the quality and quantity of the protein source.

This value was lower at the farm due to no adequate supplementary feed and not fed ad libitum but rational. The graph shows COBB500 birds gains weight rapidly within the 1st week, it continues still the 4th and 5th week been slightly constant and then increases up to the 6th and 7th weeks with breed weight already attained and hence need feed just for maintaining the weight gain.

In fact, successful broiler production is dependent upon supplying the birds with feed of the highest achievable quality, in terms of ingredients used, processing procedures applied as well as the form in which the diet is presented to broilers (Arbor, 2009).

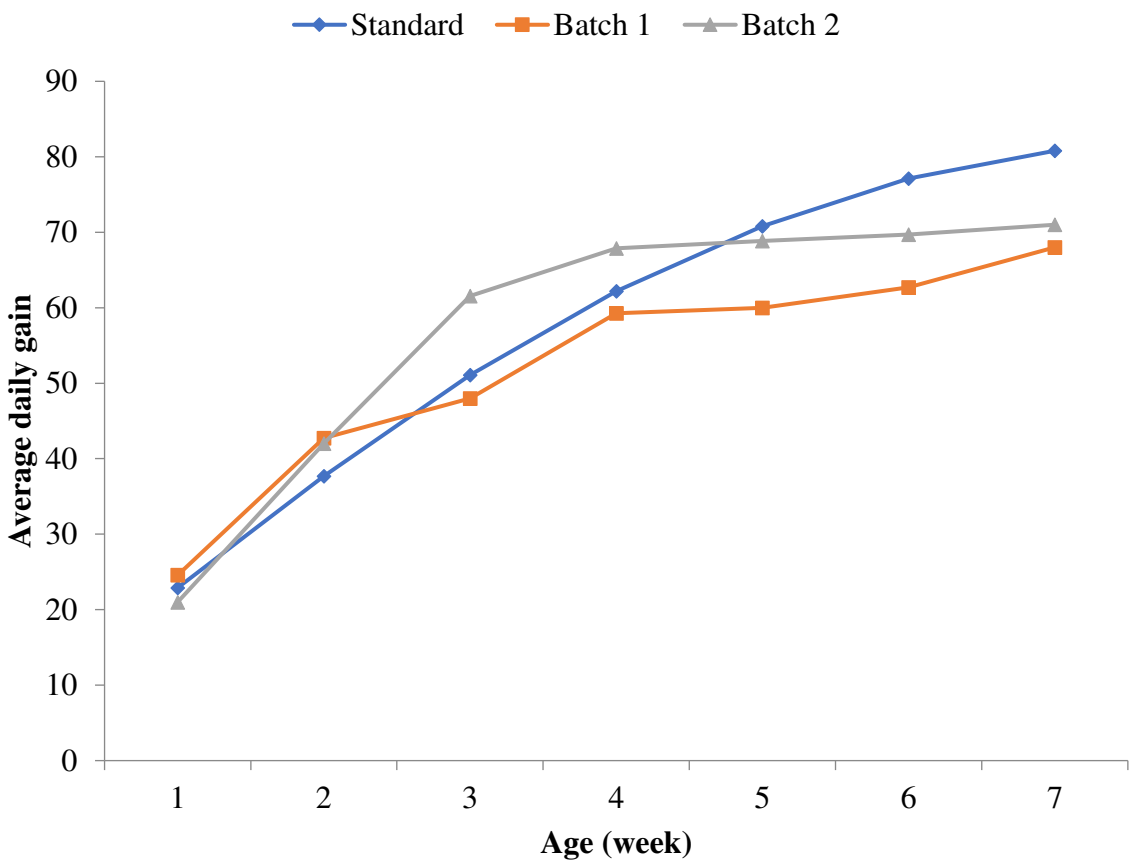

Figure 14: Shows a graph of daily weight gain against ages of broiler batches compared with the nor normal

The growth performance of broiler at GIC de Sahel broiler farm, shows disparity with the supplementary standard weight of cobb500. The weight gained of broiler is affected by a series of factors that have been numerated above for a proper comparative study with that of the normal. The growth performance rate was recorded at interval where diet was changed, from starter, grower and finisher diet. At day 7 the average weight was 180g, day 30 shows 950g and at 55days they were weighting 3500g.

The quality and quantity of the protein source could be the cause of this at the time where the prices of feed ingredients has increased which is in line with (Cheeke, 2005), that Broiler rations should be formulated to supply the correct balance of energy, protein and amino acids, minerals, vitamins and essential fatty acids to allow optimum growth and performance. When formulating broiler diets, the main emphasis is placed on the crude protein (CP), because protein is the critical constituent of poultry diets, and together with the other main nutrients such as carbohydrates, fat, water, vitamins and minerals

are essential for life. Broiler chickens have high protein requirements to meet the needs for rapid growth, carcass composition and overall cost of the finished products (Sklan and Noy, 2003).

The science of nutrition involves providing a balance of nutrients that best meets the need of broilers optimum growth, maintenance, finishing, work, reproduction, and production. Successful broiler production is dependent upon supplying the birds with feed of the highest achievable quality, in terms of ingredients used, processing procedures applied as well as the form in which the diet is presented to broilers (Arbor, 2009)

The better growth performance indicates that hot humid environments like Tsinga-Village were conducive to produce broilers given that appropriate feeding and other management practices are followed. Comparisons of mean live body weight and daily weight gain of Cobb 500 commercial breed in this study with breed performance targets showed that the mean live weights were lower than the target values of the breed. This could be associated with discrepancies of management practices. But the average daily weight gain was lower than the target up to 5th week and slightly improved for the last 3 weeks of the experiment. The main reason for the higher daily weight gain from 6-8th weeks of age could be related with higher feed intake of the birds in this period of time.

3.2.4 Evaluation of feed conversion ratio (FCR)

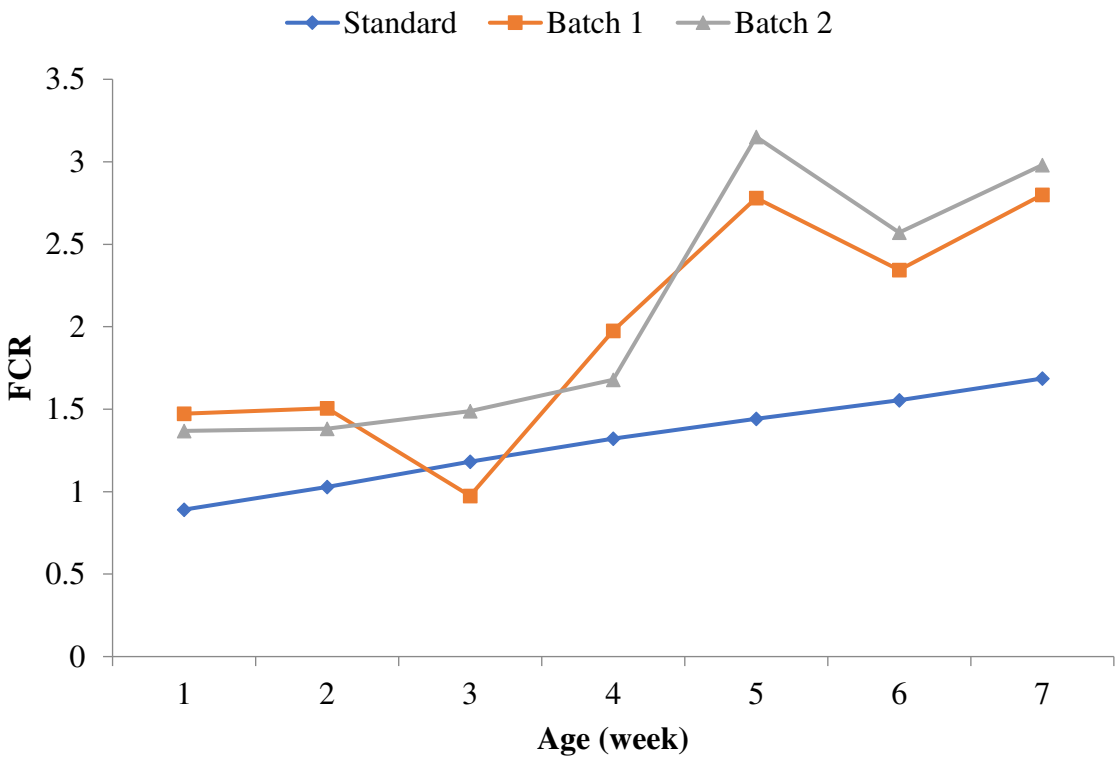

Figure 15: Evaluation of feed conversion ratio against ages of batches compared with the standard.

Feed conversion ratio is the relation between feed intake and product (weight gain or eggs). Lower FCR can be interpreted as a bird being more efficient in converting feed into weigh gain and/ or egg. Reduced FCR yields can have huge financial benefits for the poultry producers (Pollock, 1999), with a full biosecurity practiced by 15% responsible for diseases outbreak leading to FCR lower than the standard recommendations (going beneath the standard on the graph, Fig:15) at 3weeks.

The mean feed conversion ratio for the batches was 2.80g and 2.89g respectively for the cobb500 broiler strain at GIC *de Sahel* poultry farm and this value were higher than the standard values for this breed of 1.6g shows the feed consumed was better reformed to produce poultry meat due to quality of feed ingredient which is similar to what obtained by Eichie1et al.(2015) which state that anti-nutritional properties affects feed efficiency hence growth performance.

3.3 Cost of production

The returned to capital of the *GIC de Sahel* broiler farm was presented on table 14.

Table 18: Economic entries at the *GIC de Sahel* broiler farm

Items	**Cost unit price/FRS**	**Total/FRS**
Day-old chicks	400	3200.000
Feed in 50kg (72bags/1000bags).	21000frs on average cost	12.096000
Veterinary drugs and vaccines	/	248000
Man power(laborer)	Per batch.	150000
Electricity bills	Per batch.	10.000
Firewood for brooding.	Per batch	100.000

Total expenditure on running capital where investment was already done= 15.804000frs.

The mortality rate was calculated to be at 8% reason been limited veterinary expertise and zootechnician consulted, hence with 7360 broilers taken to the market at the cost of 2500frs per broiler by middlemen they collect birds at the farm, then to a total sale of **18.400.000frs.**

Profit on investment was, SALES – EXPENDITURE

18.400.000—15.804000 = 2.596000FRS.

The *GIC de Sahel* broiler farm gains on its poultry production business but if the various factors affecting broiler growth performance are taken into considerations and improved her profit margins could be higher than this.

CONCLUSION, RECOMMENDATIONS AND PESPECTIVE

4.1 CONCLUSION

In line with this study which consist of assessing the growth performance of COBB 500 broiler strain at GIC de Sahel poultry farm, the following conclusions where adopted:

- As concerning the factors affecting growth performance at the GIC de Sahel broilers of the COBB 500 strain, the farmer (owners) don't take much considerations on these factors to better ameliorate her growth performance to attained market sizes at 35-45days thereby maximizing profit like limited extension training on biosecurity 15%, and mostly marsh (grind) feed given at 96.1% turn to lost in fine nutritional elements in feed concentrated. They take more considerations on their experience acquired over the years in COBB500 broiler production to supersede the need for consulting zootechnicians\veterinarians' expertise in nutrition, housing, disease control (prophylaxis) and bedding management (hygienic conditions).
- The study revealed a mean live weight and average weight gain of 2.57kg and 69.50g respectively that is lower than the standard values for cobb500 broiler strain. Without *ad libitum* feed supply method of 64.1%, a stock density hindering growth performance of about 80.7% and a disinfection practised before arrival of day-old chicks at 57.1%, affecting performance.
- The COBB500 strains of broilers produced in the farm is in high demand in Yaoundé and its environ with its steady supply and appreciated performance characteristics, the farm compound its feed here the cost of feed is reduced compared to that of their mother supplier SPC, no consultant fees, do drug prescription on its own and cost on medical prophylaxis reduced thus its return on capital per the economic cost or production cost was at slightly 300frs per chick sold.

4.2 RECOMMENDATIONS

To the GIC de Sahel farmers

- Farm management on factors affecting growth performance should be taken serious for better performance and to maximize profit.
- The implantations of farm houses for broilers should be built with the use of a zootechnician expertise in respecting the environmental factors affecting growth performance.
- Vaccination, drugs administrations and diseases control (prophylaxis) schedules should be done with a veterinarian consultation and prescriptions of drugs.

To the Government

- Every large scale and commercial poultry farm should be assigned to with a veterinarian (zootechnicians, veterinary doctors and veterinary technicians) to follow their routines actives there by reducing unemployment as its been done in Senegal.
- They government should create more projects and programs aimed at training and giving farmers more knowledge in the perception and good practices of poultry farm managements to serve as a good tool in the fight against losses incurred in feed, medications and manpower.
- The government should give out subvention to farmers so as to help them expand production.
- Setup a regulation, as to concerned the price of chicken sold in the market, to be based on weight as the case is with beef, at a time where the prices of poultry feed has skyrocketed. The government can even buy all the chicken when they are ready and sold to super market there by reducing diseases spray and helping the farmer.

4.3 PESPECTIVE

A study on the quality of COBB500 day-old chicks should be carried out at the supplier broiler's parent stock farm of SPC for a better appraisal of this study since the quality of day- old chicks greatly affects the growth performance of broilers. The assessment of biosecurity measures in the poultry farms in centre region should be carry out to avoid cross contamination.

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ANNEX 1

QUESTIONAIRES ON FARM MANAGEMENT PRACTISES.

A. HOUSING PARAMETERS.	YES	NO	Factor effect on growth	Remarks
Ventilation from the walls not roofing system				
Heating method for day old chicks, firewood from other sources of heating like charcoal, lights, lamps or radian gas methods systems.				
Humidity				
Carry capacity, or density (stocking rate)				
Wind direction (direction of the dominant wind)				
Topography				
Water system available at the farm, modern water system				
The source of DOC, produces quality chicks and respecting heating duration of 21days				
Plastic bags used in covering the broiler farm, 24|7				
B. FEEDING PRACTICES.				
Respecting ages and timing for giving pre-starter marsh, growth and finisher marsh feeds.				
Mostly grains feed given and not pelleted feeds in the form of granules with vitamins				
Sizes of the grains with respect to the ages of the broilers.				
Feed supply timing per day (present of feed in feeder all the time)				
Source of feed company (reputable feed company like SPC)				
Respecting numbers of feeder with number of broilers in the farm.				
Water supply method and number of drinkers per number of broilers in the farm				
Feed additives notable antibiotics, anti-coccidiostats and vitamins minerals.				

FARM MANAGEMENT	YES	NO	Effect on growth	Remarks
Feet dipping or foot bath places at the entrance of the broiler house. At the door of the poultry house.				
Treatment of birds presenting clinical signs of infectious diseases.				
Uses of antibiotic without prescriptions from veterinary doctors upon proper diagnoses done.				
Disinfections of poultry house before the introduction of a new batches of broiler.				
Proper vaccination calendar respected with vaccination against Newcastle, infectious bronchitis and infectious bursal disease done on day 7, 14 and on 28days only gumboro vaccines done.				
On site clothing for the broiler farm only. With Savon for washing of hands and feet's before and after farm works.				
Traders visit farm to buy birds, with vehicles, touches birds before buying them.				
Veterinary doctor intervention in the farm for disease diagnosis and treatment.				
Quarantine, routine antibiotic, anti-coccidiosis, anti-helminthic follow-up.				
Presences of wild birds, local fowl in the farm, no program put in place to combat their asses into the farm.				
All- in and all- out policy respected in the farm.				
Regular vet visit during vaccination and change in feed.				
Frequent bedding change program respecting every 2weeks after 21days old. (after brooding)				
Disposal management of dead birds and old saw dust used as bedding materials.				

FARM HYGIENIC CONDITIONS, VACCINATION AND BIOSECURITY.

PARAMETER	YES	NO	Effect on growth	REMARKS
Disposal of death birds				
Cleaning and disinfecting onsite farm clothing				
Washing and feeders and or drinkers				
Disinfection (vide sanitaire)				
Management of bedding material (saw dust)				
Method of waste evacuation done properly by burning or incineration				
Cleaning, washing before disinfection with a footbath at the poultry house				
Done training on biosecurity.				
Capable of identifying sick birds				
Used a clean (washed) farm clothing.				
Washes hands after working and touching birds				

HYGIENIC CONDITIONS OF FARMS USE EQUIPMENTS.

Equipment	YES	NO	Effect on gowth	remarks
No used of wooden cages, proper washing of drinkers and feeder after stained with birds' droppings.				
Plastic cages are used to transport birds around the neighbourhood, market from the farm.				
Disinfestations of cages frequently after used in transporting these birds.				
Middle men, negotiators don't get into the farm with their cars.				
Respecting of barriers or restrictions from people getting into the broiler farm.				
Dumping of dropping appropriately at the GIC de Sahel broiler farm.				

ANNEX 2. (Pictures)


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