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Original Research

Effects of *Thymus vulgaris*, *Euphorbia hirta* and *Alium sativum* as Feed Additives on the Growth Parameters and Semen Characteristics of Kabir Chicken Roosters

Emmanuel Takor Ojong[1*], Felix Ngwese Ebwekoh[2], Joseline Motsaa Sob[3], Jean Paul Toukala[4], Kenneth J. N. Ndamukong[5] and Christian Keambou Tiambo[6]

[1]Ph.D Student, Department of Animal Science, Faculty of Agriculture and Veterinary Medicine, University of Buea, Buea, CAMEROON
[2]Masters Graduate, Department of Animal Science, Faculty of Agriculture and Veterinary Medicine, University of Buea, Buea, CAMEROON
[3]Ph.D student, Department of Animal Production, Faculty of Agronomy and Agricultural Sciences, University of Dschang, CAMEROON
[4]Assistant Lecturer, Department of Zoology and Animal Physiology, Faculty of Science, University of Buea, CAMEROON
[5]Professor, Department of Animal Science, Faculty of Agriculture and Veterinary Medicine, University of Buea, Buea, CAMEROON
[6]Post-Doctoral Scientist, Center for Tropical Livestock Genetics and Health CTLGH, International Livestock Research Institute ILRI, Nairobi, KENYA

*Corresponding Author: emmanuelojong91@gmail.com

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Abstract

This study was to evaluate the effects of Allium sativum, Thymus vulgaris and Euphorbia hirta on the growth and semen characteristics of Kabir chicken roosters. 160 roosters were randomly distributed into 8 groups which respectively received a commercial antibiotic 0.5g/L H2O, a basal diet alone or with 0.75% and 1.5%Euphorbia, 0.5% and 1.0%Thyme, and 0.5% and 1.0%garlic powders. Feed intake (FI), weights gain (WG) and feed conversion ratio (FCR), were recorded weekly. Carcass and organ weights (OW) were evaluated at the 12th week of the study. Semen evaluation was done from the 20th week of the study. The WG was positively affected by the treatments (P<0.05) during the first seven weeks of the study. The FI, FCR, Carcass, OW and Semen parameters, were not significantly affected by the treatments. It is concluded that, the incorporation of some feed additives enhanced growth of roosters with no negative effects on the semen profile.

Keywords: Feed Additives, Feed Intake, Kabir Chicken, Semen Characteristics

Introduction

Poultry industry occupies an important position in the provision of animal protein to man and generally plays a vital role in the national economy as a revenue provider (Ndaleh *et al.,* 2014) Poultry production in Cameroon in general has grown at a rate of about 7 % annually, having reached approximately 135,000 tons in 2015 (GIZ, 2018). The production rates are however constrained by day-old chick supply, and the affordability of some inputs like feed and veterinary products. Cameroon poultry consumers are sensitive to domestic origin of meat, and their meat is always consumed as Sauce, fumed, fried, roasted and grilled (Dupraz and Awono, 2009). The large size and handsome appearance of Kabir chickens make them a source of pride, especially among the rural folks. As reported by LPF (2009), Kabir chicken is better as compared to other locally adapted breeds because of its rapid growth, good body conformation and efficient feed conversion ratio, tolerance to disease and heat stress, and laying performances. It has a "native" taste and texture. When cross-bred with native chicken, the Kabir qualities are retained in the new breed. Feeding cost is low since Kabir chickens can also survive by themselves (Reneecilia, 2017). They can be raised in the same manner as "native chickens". Kabir chicken raising can be implemented as an alternative livelihood development project aimed at benefiting needy families and communities (LPF, 2009). Kabir layer can lay 23eggs/cycle. Kabir does natural brooding and thus should be encouraged to brood (Reneecilia, 2017). Eggs of Kabir chickens are low in cholesterol (Franklin, 2013). According to Keambou *et al.* (2014), the improvement of local chicken productivity will be highly beneficial in the relief of the socio-economic and nutritional status of the farmers.

To improve the economic status of poultry farmers, researchers revolutionized the application of feed and water additives by focusing on organic or natural supplements instead of using synthetic medicaments (Zeweil *et al.*, 2006). Athanasiadou *et al*. (2007) reported that plants and herbs extracts used in animal feed are compounds of plant origin which are incorporated into animal feed to enhance their productivity through the improvement of digestibility, nutrient absorption, and control of microbial flora in the animal's gut. Poultry eggs and meat production has been sustained with the use of antibiotics and growth promoters (NOAH, 2001). Garlic, thyme, and Euphorbia plant as feed supplements have recently been reported to exert a wide range of beneficial effects on the production performance of broilers and laying hens (Khan *et al*., 2012). The ban placed by the European Union on the long-term use of commercial antibiotics at sub-therapeutic levels for growth promotion in livestock production has necessitated the search for available cheap and efficient alternatives (Ngantu *et al.*, 2016).

Antibiotic resistant strains of bacteria have increased the concern about the potential public health problems, and food safety is more seriously considered than before (Sharifi *et al*., 2013). Poultry nutritionists are being challenged to develop an alternative for antibiotic growth promoters (AGP) and this has increased the search for alternative feed supplies. This study was aimed at evaluating the effects of some feed additives on the growth parameters and semen parameters of Kabir chicken roosters. this research will help to close the gap between the demand and the supply of poultry meat and eggs, since every farmer will be able to produce poultry meat and eggs cheaply by using natural plants which are readily available and cheap as compare to commercial antibiotics (which some bacteria are resistant to) use as growth promoters. As reported by Peters *et al*. (2004), the assessment of semen characteristics of chicken gives an excellent indicator of their reproductive potential and has been reported to be a major determinant of fertility and subsequent hatchability of eggs. Garlic and thyme have been chosen for this research based on Stahl-Biskup and Saez (2002) and Rehman and Munir (2015) who demonstrated that they may be of great benefit and value, especially for broilers and growers, because of their antibacterial, anti-inflammatory, antiseptic, antiparasitic and immunomodulatory properties. Euphorbia has also been recommended for this study because of its therapeutic indications in traditional medicine, like diseases of the digestive and respiratory systems (Khan *et al*., 1980). Since these plants have been proven to have some effects on the growth performances of chickens, *Thymus vulgaris* (Thyme) and *Alium sativum* (garlic) are readily available in the local markets of Cameroon. They're cultivated in the locality of Buea and its neighboring villages. *Euphorbia hirta* is available around the surroundings of Buea. Since Euphorbia is not consumed but commonly used by human in ethnophamacopeia, it makes it available throughout the locality. The antibiotics that have been used for chicken has resulted to the accumulation of toxic chemicals in the products, which are subsequently harmful to the consumers. Also, antibiotic resistant strains of bacteria have increased the concern about the potential public health problems, and food safety is more seriously considered than before. This has necessitated the study of natural and locally available products like garlic, thyme and euphorbia as an alternative to the commercial antibiotic as antibiotic, growth promoter and for the improvement of rooster fertility. The general objective of the study was to evaluate the effect of garlic, thyme and euphorbia feed additives on the growth parameters, carcass and semen characteristics of Cameroon Kabir chicken roosters, while

the specific objectives were; to evaluate the effects of euphorbia, garlic and thyme on growth performance and carcass characteristics of Cameroon Kabir chicken roosters, to investigate the effects of garlic, thyme and euphorbia on semen characteristics of Cameroon Kabir chicken roosters.

Materials and Methods

Study Site

The study was carried out in the Buea subdivision, Fako Division, South West Region of Cameroon. Buea is located at the foot of mount Cameroon and is very rich in vegetation. The soil is rich in nutrients from volcanic ash and allows the cultivation of various crops such as garlic, thyme, tomatoes, cabbage, okra, pepper, corn, cocoyam, yams, cassava, plantains, beans, vegetable and even some cash crops such as palm trees, cocoa and banana while the main livestock Activities are; Poultry and pig production. It has two seasons, the rainy season which runs from April to September, and the dry season that runs from October to March. Mean monthly temperatures range from 21-24℃ and annual rainfall range from 3000-5000mm. The research experimental farm is located at 521m above sea level at latitude 4° 09' 22.89" N and longitude 9° 18'12.89" E. The experimental period covered both the dry and rainy seasons (February to March and April to June 2017, respectively).

Table 1: Composition and chemical characteristics of basal diets used

Composition	**Grower (2800Kcal)**	**Reproduction (2700Kcal)**
Corn	48	52
Wheat brand	26	25.5
Cotton seed cake	8	3
Soybean cake	5	3
Fish meal	2	3
Bone meal	3.5	7
Shellfish powder	5	1
Premix5% (*)	5.0 (1)	5.5(1)
Palm oil	2	0
Total (kg)	**100**	**100**
Crude protein (%)	17.51	15.38
Metabolizable energy (Kcal/kg)	2866.02	2723.78
Calcium (%)	2.11	3,45
Phosphorus (%)	0.69	0,69
Lysine (%)	0.82	0,72
Methionine (%)	0.3	0,29

Preparation of Plants and Animals

Thyme and garlic were purchased from the local markets, while euphorbia was collected in Buea and surroundings. The plants were dried in an electric oven (Memmert) starting at a temperature of 50°C, which was progressively increased to 60°C within a period of three days (Ngantu *et al.*, 2016). Dried samples were ground to powder using a hammer mill, transferred to separate and labeled plastic bags, sealed and stored at room temperature until used. Eight weeks Kabir chicks were provided by the Association of Farmers and Breeders of Kevin Foto Dschang (AEKDS), Cameroon. They were raised in an intensive system using battery cages. The One hundred and sixty 8-weeks old Kabir chicken roosters were kept in disinfected cages. On arrival, their average weight was 1159.00grams. They were given anti-stress and water and then acclimatized for two weeks. After the acclimatization period their average weight was 1282.11grams

Diets and Experimental Design

All the roosters were tagged on the leg (using scotch tapes tags), weighed using an electronic balance (with a

sensitivity of 0.01), and randomly allocated to eight treatment groups (Table 3), in two replicates each (10 birds per replicate). Each bird served as an experimental unit. The birds were given fresh cool and clean water each morning and had access to feed *ad libitum*. After the two weeks of acclimatization, the birds were fed with the experimental diets for 16 weeks and then subjected to a semen collection exercise for another four weeks. The chickens were maintained under natural lighting cycle throughout the experimental period. They were weighed weekly and FI was evaluated weekly. The grower feed was administered to the roosters for 12weeks, then the reproduction feed.

Table 2: Proximate analysis for experimental diet

Parameters	Grower Diet	Reproductive Diet
% Dry matter (DM)	89.9	92.9
Ash (%DM)	21.2	23.2
Crude protein (%DM)	16.1	14.9
Crude Cellulose (%DM)	4.9	4
Fat(%DM)	2.8	1.8
Carbohydrate (% DM)	49.8	56.8
ME (Kcal/Kg DM)	2899	2799

Table 3: Experimental diets

Experimental treatments	No. of Chickens	Plant Powder (g)	Basal Diet(g)	Final Diet (g)
Treatment 1: Euphorbia 0.75%	20	7.5	992.5	1000
Treatment 2: Euphorbia 1.5%	20	15	985	1000
Treatment 3: Thyme 0.5%	20	5	995	1000
Treatment 4: Thyme 1.0%	20	10	990	1000
Treatment 5: Garlic 0.5%	20	5	995	1000
Treatment 6: Garlic 1.0%	20	10	990	1000
Treatment 7: Positive control	20	0.5g Oxykel80 WP/1L H_2O	1000	1000
Treatment 8: Negative control	20	0	1000	1000

Evaluation of Growth Parameters

The weights and body measurements of the chickens were taken every Saturday of each week, and the weight gain (WG) per week calculated as:

$$\text{Weight gain} = \text{Current weight} - \text{Previous weight}$$

The length of the comb, barb, beak, head, tarsus, and diameter of the thigh was measured using a vernier caliper, while the length of the body, wing, and neck was measured using a measuring tape. The feed consumption per week was determined by weighing the feed (using an electronic balance) before giving the birds and weighing the leftover after each day's feeding. The feed conversion ratio was calculated each week as follows:

$$\text{Feed Conversion Ratio} = \frac{\text{feed intake}}{\text{body weight gained}}.$$

$$\text{Feed Efficiency Ratio} = \frac{1}{\text{FCR}}$$

Evaluation of Carcass Parameters

At the end of the study, six roosters per replicate were slaughtered for carcass analysis. The carcass and organs like pancreas, liver, lungs, caecum, kidney, heart, and gizzard were weighed using an electronic balance and data recorded on a sheet prepared for that purpose.

Semen Collection and Ejaculation Assessment

All the roosters for each treatment were subjected to a training period of 21 days for ejaculation using the double hand lumber massage method (Burrow and Quinn, 1937). They were then given a resting period of one week, after which they were left to ejaculate at 72-hour intervals (Etchu *et al*., 2013). The male phallus erected with tumescence respond, at this time the cloaca was gently squeezed (making sure the animal is not wounded to cause blood coming out to mix with the semen) to extract semen through the external papillae of the vas deferens, collecting the semen in Special tubes with leads. Altogether four ejaculations were made for each rooster; all the ejaculations were done between the hours of 7:00am and 10:00am, as recommended by Frandson (1986). Upon collection information was recorded on the semen volume (to the nearest 0.01 ml), sperm concentration, pH, sperm progressive motility, live to dead ratio, and abnormality were evaluated following the method of Opayemi *et al*. (2014).

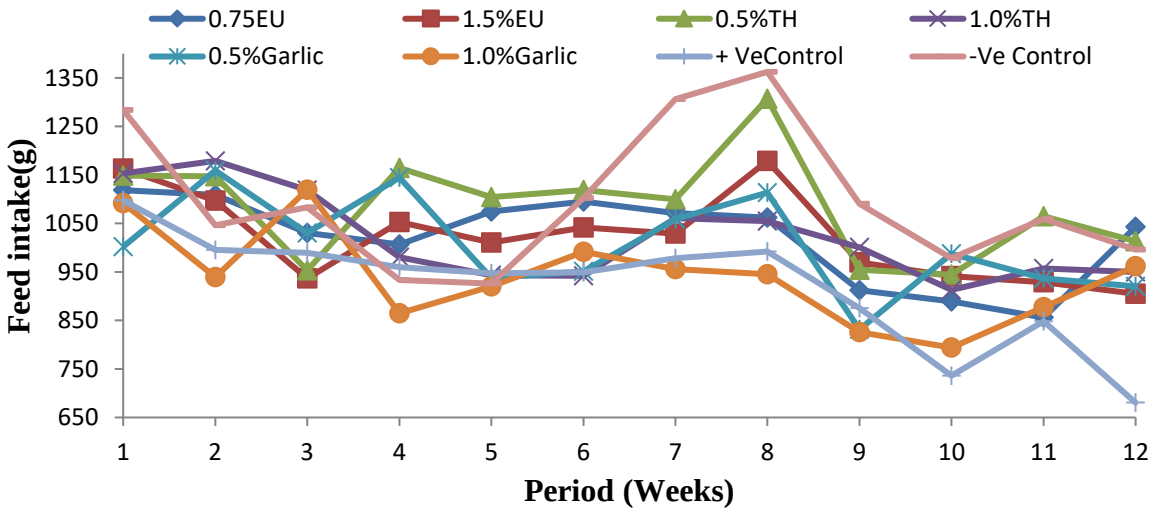
Statistical Analyses

All the data collected were subjected to analysis of variance (ANOVA) at $P<0.05$. Where differences were significant, Duncan multiple range tests were used to separate means. All statistical analyses were performed using the Statistical Package for Social Sciences software (SPSS, IBM version 21.0).

Results and Discussions

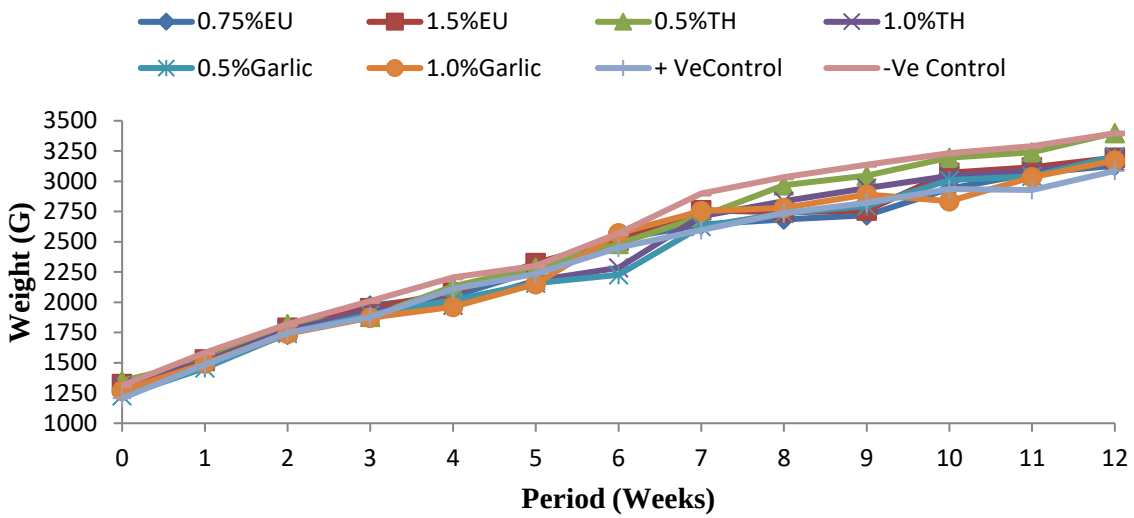
Feed Intake and Growth Rate

Figure 1 shows the average weekly feed intake per chicken in the different treatment groups during the study period. The results from the study (except for week 10) revealed that there were no significant differences in the feed intake between the treatments. These results are consistent with those of Tucker (2002) who reported that dietary herbal growth promoters have no significant effect on feed intake on broilers. The results in the different treatments in this study (except for week 10 in the positive control) fall within the range (745.03 to 2662.35g/week) observed by Ngantu *et al*. (2016). Figure 2 shows the mean weekly growth rate of chickens fed with different treatment diets. The weight of the chicken increased progressively during the 12 weeks' period of the study. There was no significant difference in the weight evolution between the treatment groups during the study. All the roosters were growing at a similar rate, with exponential growth during the first three weeks.



EU= Euphorbia power, TH= Thyme power, +ve control= positive control, -ve control= negative control, SD= significant difference

Figure 1: Average weekly feed intake by kabir rooster fed on the different treatment diets during the study

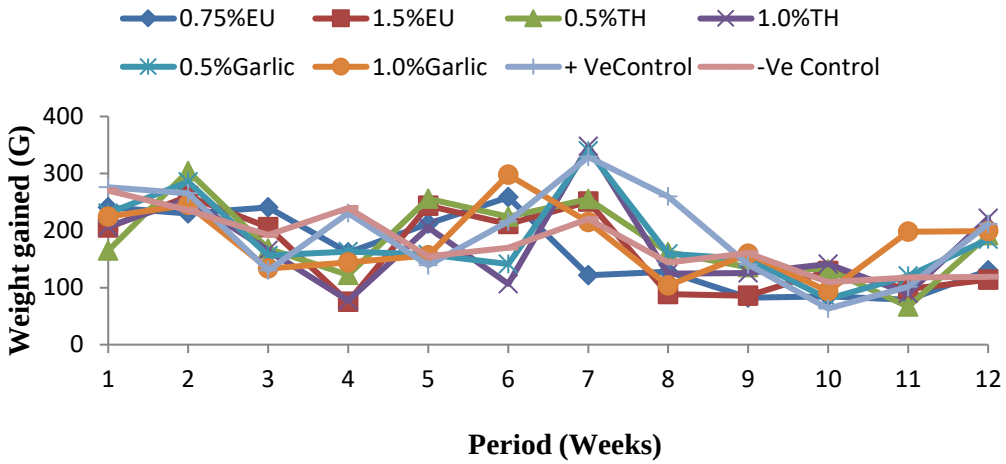


EU= Euphorbia power, TH= Thyme power, +vecontrol= positive control, -vecontrol= negative control, SD= significant difference

Figure 2: Weight evolution in Kabir roosters fed on different treatment diets

Weekly Weight Gain (WG) and Average Feed Conversion Ratio (FCR)

Figure 3 shows the average weekly WG per chicken in the different treatment groups. It was discovered that there were significant differences in WG between the treatments in the first seven weeks of the study (except for week 2), and no significant differences in the last five weeks of the study. There was a significant difference in the first week of the study which was between 0.5% TH and positive control (P= 0.0016), and also between 0.5% TH and negative control (P< 0.0002). There were also significant differences in week three (P= 0.0162), week 4 (P= 0.0103), week five (P= 0.0013), week six (P= 0.0028), and week seven (P < 0.0001). In week seven there was a highly significant difference (P< 0.0001), with 1.0% TH, 0.5% garlic, and positive control having the highest WG (347.67 g, 340 g and 329 g respectively). These results suggest that in the last five weeks the roosters were in their peak growth phase. This is following what was reported by INRA (1989) who confirmed that most of the nutrients assimilated at this stage are principally oriented for body maintenance and less for growth.



EU= Euphorbia power, TH= Thyme power, +vecontrol= positive control, -vecontrol= negative control, SD= significant difference

Figure 3: Average weekly weight gain per chicken in each treatment during the study

The results in the first seven weeks except week 2 are in agreement with the report of Jamroz and Kamel (2002), who observed that herbs and herbal products had a significant positive effect on weight gain in broilers. The results in the first seven weeks (except week 2) are not in agreement with that of Ngantu *et al*. (2016), who investigated

the effects of *Euphorbia hirta* and *Thymus vugaris* powders on performance and haematological parameters of the Kabir chicken and reported no significant differences in WG.

Table 4 shows the average FCR per chicken in the different treatment groups. There was no difference in the FCR between the treatments. The FCR ranged from 6.41 to 8.58 (Table 4). This is in line with that reported by Ngantu *et al*. (2016) where no significant differences were observed in FCR in Cameroon Kabir chicken fed Thyme and Euphorbia. However, the values in this study are higher than those reported in their work (which ranged from 3.03 to 4.48). The high values in this study may be since older chicks (8 weeks) were used in the study unlike those of Ngantu *et al*. (2016) who used day old chicks.

Table 4: Average feed conversion ratio in chicken on the different treatment diets

Parameter	Mean±SEM								
	0.75% EU	1.50% EU	0.50% TH	1.00% TH	0.50% Garlic	1.00% Garlic	+ Ve Control	-Ve Control	SD
FCR	8.58±1.02	7.90±1.01	8.05±1.13	7.82±0.88	8.06±0.85	6.41±0.46	7.57±0.46	7.7±0.4	NS

FCR= feed conversion ratio, SEM= standard error of mean

Table 5: Mean feed efficiency

Parameters	0.75%EU	1.5%EU	0.5%TH	1.0%TH	0.5%Garlic	1.0%Garlic	+Ve Control	-Ve Control
Feed Efficiency	0.12	0.13	0.13	0.13	0.12	0.15	0.13	0.13

Weekly Body Measurements

All the body measurements increased with time in all the treatments as seen in Figures 4 to 12. There were no differences (P> 0.05) in the body measurements of the chicken between the treatments. The body measurements such as the beak length, head length, neck length, thigh diameter, tarsus length, body length, and wing length (Figures 6, 7, 8, 9, 10, 11, and 12 respectively) had a similar trend in the growth evolution curve. This shows that neither the feed additives nor the commercial antibiotics affected the body measurements of the Kabir chicken roosters.

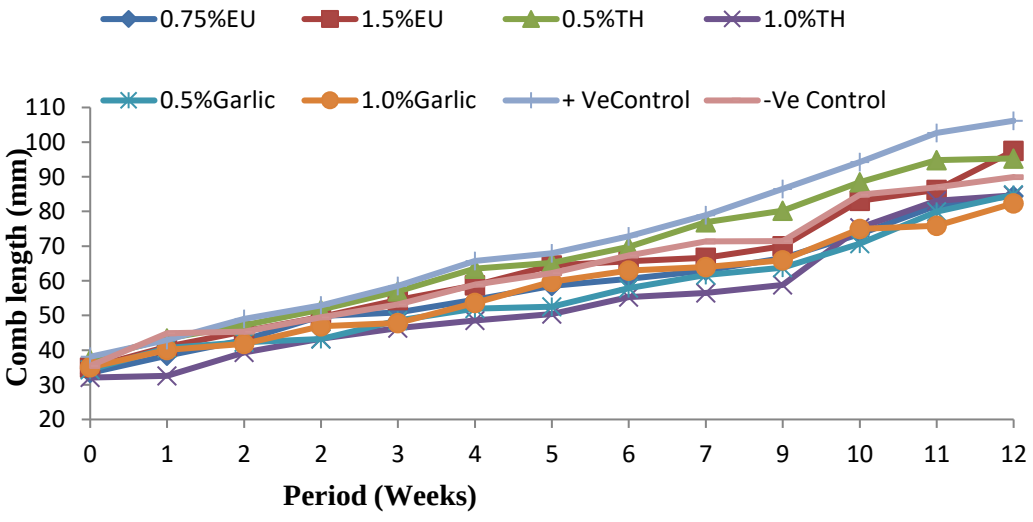


Figure 4: Average weekly comb length per chicken in each treatment during the study

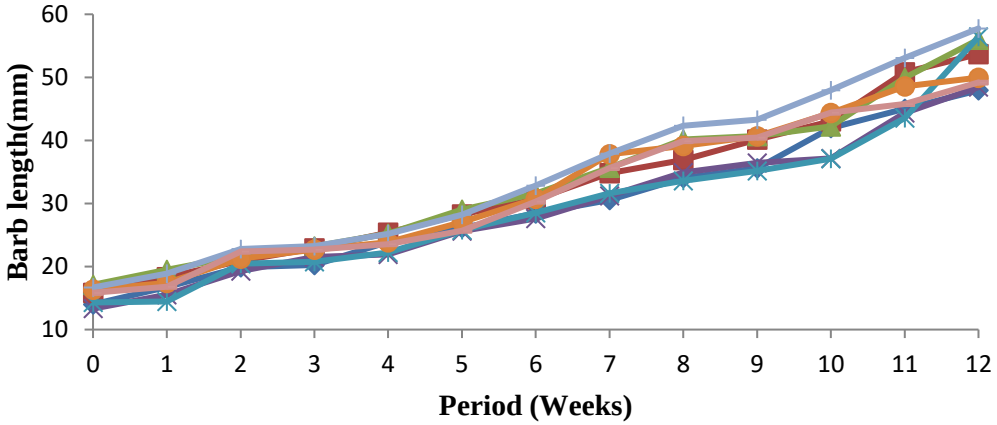


Figure 5: Mean barb length evolution per chicken in each treatment during the study

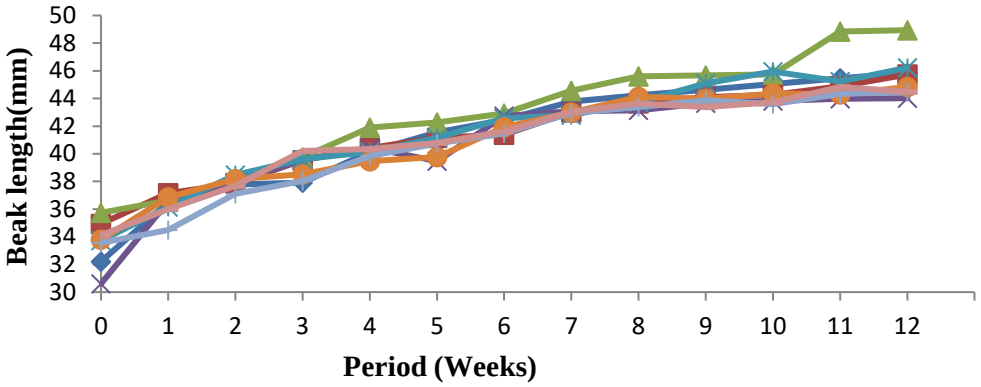


Figure 6: Mean beak length evolution per chicken in each treatment during the study

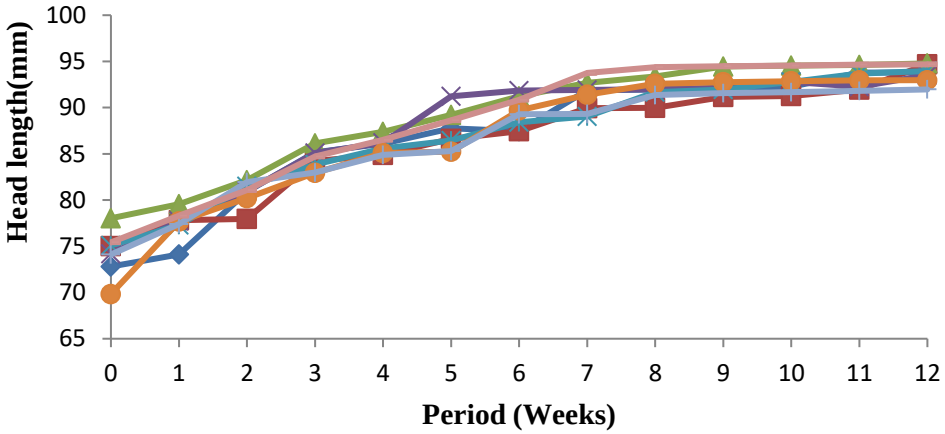


Figure 7: Mean head length evolution per chicken in each treatment during the study

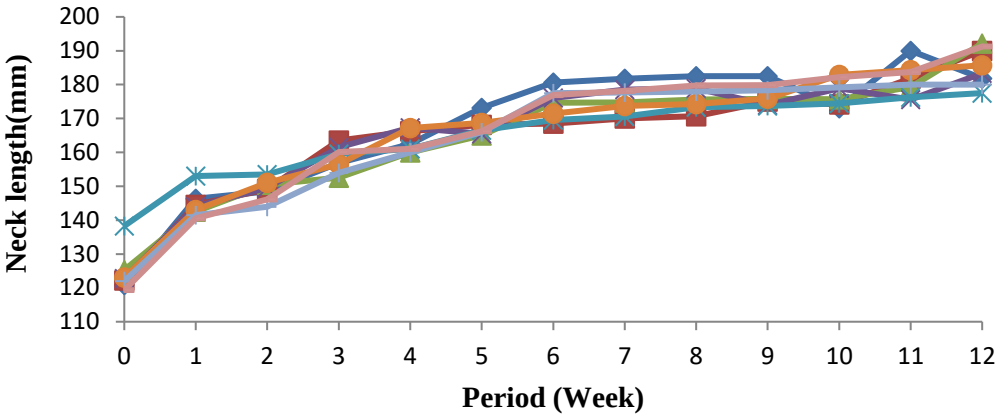


Figure 8: Mean neck length evolution per chicken in each treatment during the study

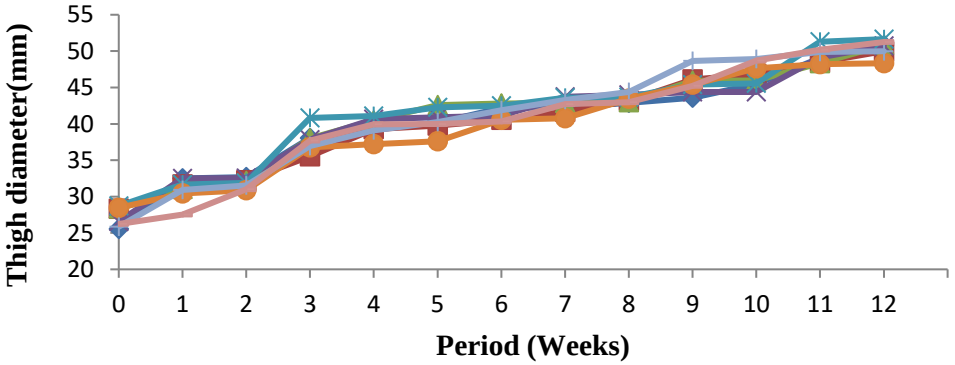


Figure 9: Mean thigh diameter per chicken in each treatment during the study

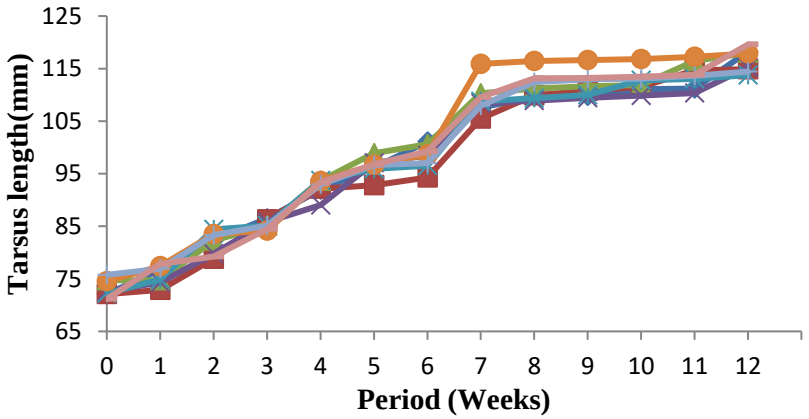


Figure 10: Mean tarsus length evolution per chicken in each treatment during the study

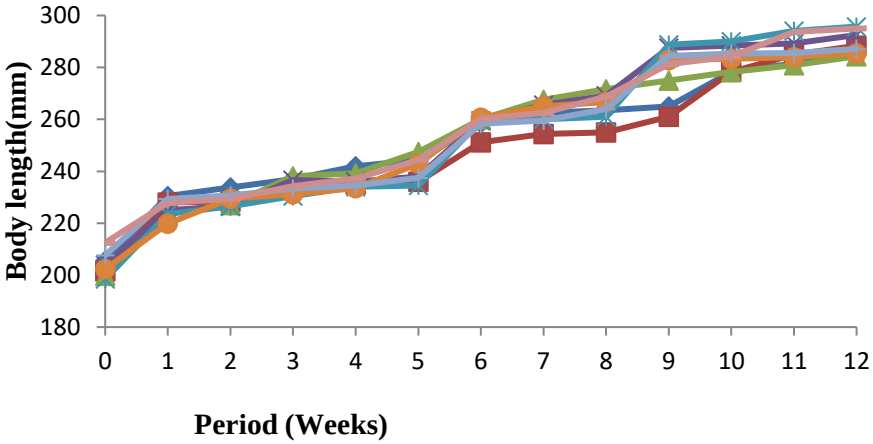


Figure 11: Mean body length evolution per chicken in each treatment during the study

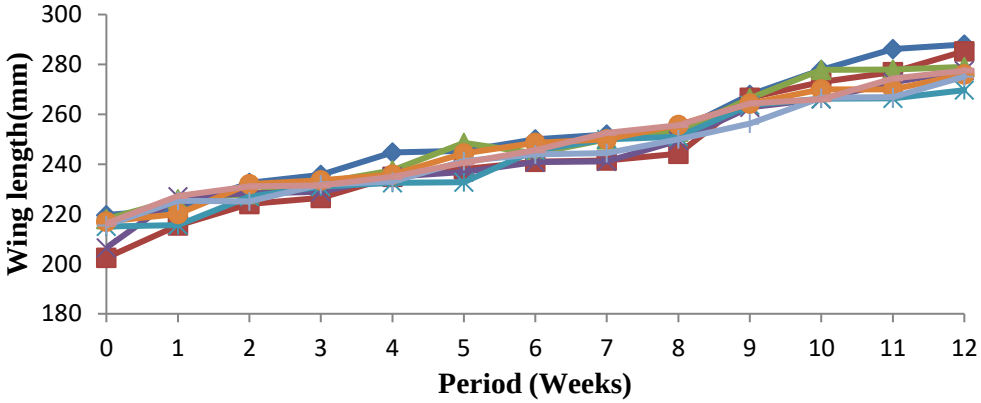


Figure 12: Mean wing length evolution per chicken in each treatment during the study

Carcass and Relative Organ Weight

The mean carcass and relative organ weights for the various treatments are shown in Table 6. There were no significant differences in the mean carcass and relative organ weights between the different treatments. The higher carcass weight in 1.0% garlic may be as a result of the fact that garlic has positive effects on the carcass of rooster. The relative heart weight, spleen weight, and lung weight recorded in this study were not significantly affected by the different treatments, this shows that plants and the commercial antibiotics had no influence on this organs, causing the organs to carry out their normal physiological function hence growth performance was not affected, this is similar to the findings of Ngantu *et al*. (2016) carried out on 45 days old Kabir chicken. They also agreed with the results of Onibi *et al*. (2009) who observed that garlic supplementation had no significant effects on major carcass components and organ characteristics. The liver, gizard, pancreas and caecum which helps during the digestion period where not affected by the treatments, hence the growth performance was not affected since all the internal body parts were not affected by the plant powders since the organs carried their normal physiological functions. Radwan *et al*. (2008) observed a similar trend with laying local hens on feed supplemented with 0.5% oregano and 0.5 or 1.0% Curcuma longa.

Semen Parameters

The semen characteristics as influence by the different treatments are shown in Table 7. The results obtained from the examination of the ejaculate revealed that the feed additives had no significant (P> 0.05) influence on semen characteristics. The semen volume ranged from 0.23 to 0.45ml, pH ranged from 6.60 to 7.95, mass activity ranged from 2 to 4, individual motility ranged from 78.67 to 85.00%, concentration ranged from 6.30×10^9 to 12.60×10^9, percentage live sperm count ranged from 97.17 to 99.00%, percentage dead sperm count ranged from 1.00 to 2.83%, and percentage abnormal sperm count ranged from 1.00 to 4.17%. All the values fall within the standard arrange. As these values have been reported by different authors. The volume of the ejaculate (except for 1.0% garlic treatment) was similar to that observed by Pornjit *et al*. (2013) who reported similar findings on the quality of Thai

native cocks with an average volume of 0.328 to 0.342 ml. The high volume of semen ejaculated in roosters on 1.0% garlic as an additive and the low volume in the positive control can be attributed to the influence of feed additive (garlic) and the antibiotic (oxytetracycline 80%) respectively. Though there were no significant differences, the feed additives probably influenced semen volume, with oxytetracycline having a negative effect. The acidic values observed in roosters on euphorbia treatment can be due to the addition of the euphorbia powder in the basal diet.

Table 6: Carcass and relative organ weights of kabir chicken roosters on different treatment diets

Variables	Treatment ± SEM								
	0.75% EU	1.5% EU	0.5% TH	1.0% TH	0.5% Garlic	1.0% Garlic	+ Ve Control	-Ve Control	SD
Carcass (G)	2523.00±102.65	2276±320.52	2798±158.10	2600.67±86.31	2668.33±88.13	2786.33±129.76	2559.33±323.61	2545±410.80	NS
Liver (%CW)	1.61±0.05	1.89±0.16	1.35±0.05	1.34±0.06	1.31±0.03	0.97±0.43	1.77±0.52	2.02±0.39	NS
Kidney (%CW)	0.29±0.04	0.36±0.08	0.025±0.07	0.23±0.01	0.22±0.01	0.19±0.10	0.26±0.09	0.28±0.08	NS
Gizzard (%CW)	1.74±0.16	1.79±0.29	1.81±0.32	1.99±0.13	1.99±0.27	1.29±0.54	2.04±0.19	2.30±0.41	NS
Heart (%CW)	0.69±0.09	0.74±0.11	0.52±0.02	0.58±0.04	0.74±0.02	0.52±0.24	0.62±0.09	0.85±0.07	NS
Spleen (%CW)	0.12±0.01	0.17±0.04	0.13±0.14	0.14±0.02	0.14±0.01	0.11±0.05	0.17±0.06	0.20±0.02	NS
Pancreas (%CW)	0.16±0.01	0.16±0.02	0.14±0.02	0.17±.01	0.16±0.01	0.11±0.04	0.15±0.02	0.21±0.03	NS
Caecum (%CW)	0.53±0.01	0.52±0.11	0.44±0.02	0.48±0.07	0.42±0.03	0.37±0.20	0.56±0.03	0.48±0.10	NS
Lungs (%CW)	0.60±0.11	0.73±0.11	0.59±0.05	0.56.0.04	0.60±0.04	0.30±0.24	0.59±0.10	0.70±0.11	NS

%CW= percent carcass weight, EU= Euphorbia power, TH= Thyme power, +vecontrol= positive control, -vecontrol= negative control, SD= significant difference

Table 7: Semen characteristics of Kabir chicken roosters on different treatments diet

Parameters	Treatment ± SEM								
	0.75%EU	1.5%EU	0.5%TH	1.0%TH	0.5%Garlic	1.0%Garlic	+ve control	-ve control	SD
Vol(ml)	0.25±0.05	0.23±0.03	0.27±0.09	0.32±0.16	0.45±0.10	0.63±0.28	0.13±0.03	0.35±0.25	NS
pH	6.60±0.20	6.65±0.15	7.30±0.26	7.40±0.60	7.70±0.15	7.67±0.33	7.40±0.40	7.95±0.05	NS
MM	4.00±0.00	3.00±0.00	2.00±0.33	3.00±0.33	3.00±0.33	4.00±0.33	3.00±0.00	4.00±0.50	NS
IM (%)	80.50±4.50	80.50±4.50	85.00±0.00	78.67±3.18	81.67±3.33	81.67±3.33	80.00±5.00	85.00±0.00	NS
Conc ($\times 10^9$)	9.60±1.60	7.75±1.35	7.90±5.90	6.30±0.30	10.45±2.95	6.55±0.05	12.60±3.40	8.65±5.45	NS
Live sperm (% count)	98.50±0.76	98.50±1.04	98.17±0.17	99.00±0.29	98.33±0.33	98.83±0.44	97.17±1.09	97.67±1.33	NS
Dead sperm (%count)	1.50±0.78	1.50±1.04	1.83±0.17	1.00±0.29	1.67±0.33	1.83±1.09	2.83±1.09	2.00±0.58	NS
AS (%count)	3.13±1.92	4.17±2.45	1.67±0.44	1.00±0.29	1.17±0.44	2.33±0.44	2.83±1.09	2.00±0.58	NS

Vol= volume, MM= mass activity, IM= Individual motility, Conc=concentration, AS abnormal sperm

These findings corroborate with those reported by reported by Selvan (2007) in Rock fowls, who indicated that sperm motility ranged from 78.28 to 85.31%, based on the influence of age and dietary protein, calcium, and vitamin E. Similar results were observed by Tabetabaei *et al*. (2010) on Iranian broiler breeder chickens. The high motility rates in a negative control and 0.5% TH indicate that some feed additives had negative influence on the sperm motility. Though there were no significant differences in concentration between the treatments, positive control had a positive influence on the semen concentration. This could have been the cause of the low motility of the semen as compared to negative control where the sperm concentration was lower. 1.0% TH and 1.0% garlic had negative effects on the Sperm concentration when compared to the negative control. It was therefore obvious that feed additives had an influence on the sperm concentration of Kabir chicken roosters. In this study, all the treatments had

similar percentages of live spermatozoa, implying that the feed additives had no influence on the percentage of live spermatozoa of Kabir chicken roosters. The percentage of abnormal spermatozoa counted ranged from 1.0% in the 1.0%TH treatment to 4.17% in the 1.5% EU treatment. When compared with the controls, 1.0% TH had a lower AS (1.00) than the positive and negative controls (2.83 and 2% respectively), while 1.5% EU had the highest AS (4.17%) when compared to the positive and negative controls (2.83 and 2% respectively). This study, therefore, shows that, feeds additives had no influence on spermatozoa abnormality.

Conclusion

Euphorbia, garlic and thyme had a positive influence on weight again implying they can be recommended for use to improve on the weight gain and eventually growth for chicken and other farm animals. Garlic had a positive influence on the carcass weight, hence can be recommended as feed additives to improve the growth performance of chicken and other livestock. There was no significant influence on the semen characteristics of Cameroon Kabir chicken roosters fed with the different plant extracts. Optimizing thyme, Euphorbia and garlic inclusion level in the diet of Kabir chicken roosters will depend on the variable semen quality characteristics, and could be helpful in enhancing their reproductive efficiency.

Conflict of Interests

There is no conflict of interest.

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