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Reproductive Performances of a Cameroonian Dual-Purpose Local Chicken Strain Fed Pelleted Diets Containing Graded Levels of Cassava and Sweet Potato Meal as an Energy Substitute for Maize

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ABSTRACT

The continuous rising price of maize due to an increasing competition between humans and livestock requires palliative measures to sustain animal production. cassava-sweet potato meal combination can be used as a substitute for maize in feeding chicken. This study aimed at improving poultry productivity through the enhancement of the reproductive performances of Cameroon Kabir chickens fed pelleted diets of graded levels inclusion of cassava-sweet potato meal as an energy substitute for maize.315 Kabir chickens (270 hens and 45 rosters) of 23 weeks of age, were randomly allocated to five treatments T1, T2, T3, T4 and T5 with graded levels of cassava-sweet potato meal as energy substitute for maize, and eggs were collected for the evaluation of laying performances and characteristics. Fertility and hatchability were also evaluated across four successive batches of incubations. The eggs' weight was significantly (P<0.05) different between treatments at weeks 2, 4, 5 and 12, highly significant (P<0.01) at week 9, and very highly significant (P<0.001) at week 6, 7, 8 and 10. The highest number of eggs laid, egg weight and mass were recorded in chicken receiving 25% (T2) replacement of maize with cassava and sweet potato meal, followed by T4 (75%), T5 (100%), T3 (50%) while T1, receiving control diet without cassava and sweet potato meal performed less for all the parameters. Generally, the trend of the feed conversion ratio was decreasing with increasing the inclusion level of cassava and sweet potato meal. The egg index showed significant differences in weeks 6 and 12, while week 2 showed high significant difference between the treatments. T2 (25%) recorded the highest fertility, while animals receiving control ration without maize substitution recorded the highest hatchability. In general, incorporation of 25% of fifty-fifty percent weight to weight of cassava and sweet potato meal can be recommended for reproduction in chicken without affecting neither the hatchability nor the physical characteristics of the eggs, though hatchability will require better attention.

Key words: Reproduction, Local chicken, Cameroon, Cassava-sweet potato

INTRODUCTION

According to FAO (2014), WFP (2016) and FAO (2018), cereal prices have risen more than their five-year average in Africa. There is an increasing competition for maize between humans and livestock populations, requiring palliative measures to be taken. With the present trend of rising prices of animal feedstuff, greater attention is being paid to the search for safe and cheap alternative and locally available feedstuff, by-products from agriculture and industry, especially in the rural areas of the developing countries where farmers cannot afford the

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expensive commercial feed for livestock (Okereke, 2012; World Economic Forum, 2018).

Cassava and sweet potato can be used as a substitute for maize at high level in diets for all species of livestock, provided that they are supplemented with a nitrogen source (Heuze et al., 2015) and sulphur amino acids such as methionine and cysteine. Their fibre contents are also low, which makes cassava roots highly digestible for livestock.

Cassava and sweet potato products have been used in feeding chicken (Ladokun et al., 2007; Adewolu, 2008; Nguyen et al., 2010; Afolayan et al., 2012; Etchu et al., 2013; Khalid et al., 2013; Oyewumi,2013; Beckford and Bartlett, 2015) with limited levels of inclusion. However, no work has been done yet, on using a combination of cassava and sweet potato as energy substitute for maize to produce pellets for chicken production in Cameroon.

Apart from the hydrocyanic acid content, one of the greatest limitation in the use of cassava or sweet potato root meal is their dustiness causing crop impaction and irritation of the respiratory tract of animals, but feed pelleting could be a solution (Chhay et al., 2003; Ukachukwu, 2005). Furthermore, transformation of mash feed into pellets reduces feed wastage with an added advantage of improving digestibility and ease of incorporation of additives and drugs when necessary.

Cassava and sweet potato are potential substitutes for energy source which are not fully explored in animal feed in Cameroon. On the other hand, though the banning of imported frozen chicken has boosted poultry production in Cameroon, indigenous species are underutilized, probably due to their low productivity. The Cameroon Kabir chicken is a dual purpose locally adapted strain, phenotypically comparable to it common indigenous relatives but with superior performances in term of meat and egg production. It also displays good adaptability to low input production systems. Its meat and eggs have better organoleptic characteristics and most appreciated by consumers. It can be used to boost the productivity of the family poultry farming in rural Africa.

This study is aimed at contributing to family poultry productivity by evaluating the reproductive performances of Cameroon Kabir chickens fed on pelleted diets containing graded levels of cassava and sweet potato meal as an energy substitute for maize.

MATERIALS AND METHODS

The study was carried out at the Green Gold Agro-Venture experimental farm, located in Buea-Cameroon (4° 10’ 57” N and 9° 18’ 40.55” E). A total of 315 Kabir chickens (270 hens and 45 rosters) of 23 weeks of age, were randomly allocated to five treatmentsT1, T2, T3, T4 and T5 are defined as follows:

T1:100% maize, no substitution of Cassava and Sweet Potato Meal (CASPM), control diet.

T2: 25% replacement of maize with CASPM (50% cassava and 50% sweet potato meal by weight)

T3: 50% replacement of maize with CASPM (50% cassava and 50% sweet potato meal by weight)

T4: 75% replacement of maize with CASPM (50% cassava and 50% sweet potato meal by weight)

T5: 100% replacement of maize with CASPM (50% cassava and 50% sweet potato meal by weight)

Animals within the treatments were balanced for weight within each sex, each treatment having 63 Kabir chickens in three replications of 18 hens and 3 roosters each. The composition and bromatological values of the diets are summarized in the table 1. The various diets were then pelletized to 6 mm in diameter at 80°C for five minutes, allowed to cool down, sun dry, then packaged into pre-labelled bags and stored in a dry environment.

Table 1. Formulation of various diets using the least costful ingredients

Treatments / Ingredient	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)
Maize	54	40.5	27	13.5	00
Cassava	00	6.75	13.5	20.25	27
Sweet potato	00	6.75	13.5	20.25	27
Wheat bran	16	15	14	10	08
Soya bean cake	07	07	08	08	10
Fish meal	03	04	05	08	08
Palm kernel	06	05	05	05	06
Oyster shell	07	07	07	05	07
Bone meal	02	03	02	05	02
Layer concentrate	05	05	05	05	05
Total	100	100	100	100	100
Calculated bromatological composition					
Energy (Kcal/kg)	2796	2769	2779	2731	2719
Protein (%)	16.68	16.04	16.07	16.42	16.32
Fat content (%)	3.89	3.59	3.33	3.14	2.77
E/P ratio	167.63	172.63	172.93	166.32	166.61
Lysine (%)	0.75	0.75	0.79	0.87	0.88
Methionine (%)	0.29	0.29	0.29	0.31	0.30
Calcium (%)	4.16	4.60	4.38	4.95	4.70
Phosphorus (%)	0.89	1.07	0.96	1.56	1.09

E/P ratio = Energy/Protein Ratio

The chicken houses were disinfected using the conventional protocol in force in poultry farms in Cameroon, and the floor was covered with a deep litter of wood shaving. Water and feed were offered ad libitum, and each chicken house was provided with laying nests. The prophylaxis plan was that applied to layers. The adaptation period lasted for 3 weeks, during which chickens had received the control pelleted diet.

During the laying period, eggs were collected early in the morning and at 3:00 pm. They were cleaned, the internal and external characteristics immediately evaluated using a sample of them, and the remaining stored in labelled trays for a maximum of seven days for incubation. The parameters included concerned laying performances, characteristics of eggs, fertility and hatchability. Fertility and hatchability were evaluated across four successive batches of incubations.

Statistical analysis

All the data collected were analysed using Microsoft excel and Graph PadInStat version 3.10. The data was analysed using the following systematic approach. The data were submitted to one-way analysis of variance for the comparison of means at 95% confidence interval, and Duncan multiple range test was used for separation of these means in case of significant difference.

RESULTS

The reproductive performances of Kabir chickens had been significantly (P<0.05) affected by the treatments.

Evolution of eggs weight

The evolution of eggs weight laid of Kabir chickens fed the diets containing graded levels of CASPM as an energy substitute for maize is summarized in table 2.

No significant (P<0.05) difference in egg weight was observed in week one and three across the treatments. However, at weeks 2, 4, 5 and 12 and 6, 7, 8 and 10 egg weight was significantly higher (P<0.01) and (P<0.001) respectively. The highest number of eggs laid, egg weight and mass (table 3) were recorded with chicken fed diet T2 containing 25% replacement of maize with CASPM, followed by T4 (75%), T5 (100%), T3 (50%) while T1, receiving no substitution performed less for all the parameters. Generally, the feed conversion ratio was found to decrease with increasing inclusion level of CASPM, but not in a regular trend, with T1 having the highest one, followed by T3, T2, T5 and T4 respectively. Table 3 presents the number of eggs laid, mean egg weight, egg mass and Feed Conversion Ratio (FCR) during the experimental period.

The weekly evolution of eggs' diameter and length was significantly (P<0.05) affected by the dietary treatments (table 4 and 5). No significant difference (P<0.05) was observed on egg length for week 1, 3, 4, 5, 8, 9 and 12 among treatments, and for the diameter only for weeks 3 and 4. However, egg length was significantly (P<0.05) higher at the 2nd, 6th, 7th and 9thweek for chickens fed diets T1, T2, and T3compared to the rest of the treatments. At week 11, egg length was significantly (P<0.05) higher for chickens fed diets T2, T3 and T4 compared to treatments T5 and the control (T1). Table 6 displays values of egg index of Kabir chicken's fed pelleted rations containing graded levels of cassava and sweet potation inclusions as energy substitute for maize. No significant (P<0.05) difference was observed among treatments for egg shape index for the 1st, 3rd, 4th, 5th, 7th, 8th, 9th, 10th and 11th weeks. However, egg shape index was significantly (P<0.05) higher in the2nd week with T4 and T5, in the 6th week with T2 and T3 and 12thweek with T3, T4 and T5.

The egg fertility of the Kabir chicken fed pelleted diets containing graded levels of CASPM meal is presented in table 7. All the treatments had shown a mean fertility level of greater than 80%. Treatment T2 recorded the highest mean % fertility, followed by T4, T3, T5 and T1. It was noted that there were no marked differences in fertility between the treatments. What about CV?

Table 2. Evolution of eggs weight by Kabir chickens fed pelleted diets containing graded levels of cassava and sweet potato meal as an energy substitute of maize in Cameroon

Weeks \ Egg Weight (g)	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)	*P* Value
Week 1	45.8±0.89	49.2±1.59	50.4±3.12	62.31	*No record*	0.23
Week 2	48.0±2.20^{b}	52.2±1.20^{c}	47.8±0.69^{b}	47.6±0.30^{b}	44.8±1.01^{a}	0.01*
Week 3	51.9±0.51	55.2±3.58	50.4±0.45	48.6±1.20	48.4±1.35	0.15
Week 4	52.1±2.00^{b}	52.3±1.62^{b}	48.8±0.78^{a}	49.2±1.08^{a}	47.5±0.83^{a}	0.043*
Week 5	52.4±1.92^{b}	52.0±1.26^{b}	51.7±1.00^{ab}	50.5±2.18^{ab}	48.3±0.81^{a}	0.024*
Week 6	55.6±0.12^{b}	53.3±1.07^{b}	51.5±1.39^{ab}	49.8±0.44^{a}	48.5±0.93^{a}	0.0003***
Week 7	55.9±1.48b	56.9±1.88^{b}	56.3±1.16^{b}	51.5±0.67^{ab}	49.1±0.70^{a}	<0.0001***
Week 8	54.9±1.41^{b}	55.3±0.39^{b}	55.4±1.78^{b}	51.1±0.88^{ab}	49.4±0.60^{a}	<0.0001***
Week 9	52.3±1.42^{ab}	55.6±0.52^{b}	54.6±1.16^{b}	50.7±0.79^{a}	50.0±1.34^{a}	0.0016**
Week 10	53.8±1.08^{ab}	56.2±0.43^{b}	55.4±1.84^{b}	50.7±1.05^{a}	50.4±0.86^{a}	<0.0001***
Week 11	45.4±1.46^{a}	57.1±1.89^{c}	52.4±3.25^{b}	51.5±1.11^{b}	46.4±1.01^{a}	0.0016**
Week 12	50.4±0.81^{a}	55.4±0.66^{b}	52.5±1.17^{ab}	53.4±0.88^{ab}	No record	0.021*
Mean egg weight	51.6 ± 1.15	54.2±1.34	52.3±1.48	51.4±0.88	48.3±0.94	--
CV	2.23	2.47	2.83	1.71	1.94	--

*P< 0.05, **P< 0.01, ***P< 0.001, ^{abcd} Treatments within a row (week) having the same letter are not significantly different, no record; indicates periods where no eggs were collected before onset of laying and during the resting period (confirm by observation of some hens molting and others brooding), CV= coefficient of variation

Table 3. Total eggs laid, mean egg weight and egg mass of Kabir chickens fed on pelleted diets containing graded levels of cassava and sweet potato meal as an energy substitute of maize in Cameroon

Parameter \ Treatments	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)
Total eggs laid	204	441	294	432	414
Mean egg weight (g)	51.6 ± 1.15	54.2±1.34	52.3±1.48	51.4±0.88	48.3±0.94
Egg mass (kg)	10.5±0.23	23.9±0.59	15.4±0.43	22.2±0.38	20.0±0.39
FCR	5.10	2.82	3.39	2.46	2.51

FCR = food conversion ratio

Table 4. Diameter of Kabir eggs fed pelleted diet containing graded levels of cassava and sweet potato meal as an energy substitute of maize in Cameroon

Weeks \ Egg Diameter (cm)	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)	*P* Value
1	3.9±0.02	3.98±0.01	4.10±0.07	4.38	*No record*	0.014*
2	4.08±0.03[b]	4.10±0.03[b]	3.90±0.69[a]	4.05±0.02[ab]	4.00±0.03[a]	0.028*
3	4.11±0.009	4.17±0.07	4.10±0.08	4.06±0.03	4.02±0.06	0.76
4	4.12±0.05	4.15±0.05	4.02±0.03	4.11±0.02	4.01±0.05	0.24
5	4.15±0.04[ab]	4.17±0.03[b]	4.12±0.03[ab]	4.09±0.06[a]	4.02±0.03[a]	0.042*
6	4.21±0.02[b]	4.22±0.03[b]	4.19±0.02[ab]	4.06±0.02[a]	4.03±0.03[a]	<0.0001***
7	4.19±0.04[b]	4.27±1.88[b]	4.23±1.16[b]	4.15±0.04[ab]	4.05±0.03[a]	<0.0001***
8	4.19±0.04[b]	4.24±0.01b	4.23±0.05[b]	4.11±0.02[ab]	4.07±0.03[a]	0.0003***
9	4.15±0.03[b]	4.35±0.10[b]	4.19±0.04[b]	4.09±0.02[a]	4.17±0.09[b]	0.0006***
10	4.14±0.02[b]	4.24±0.01[b]	4.23±0.06[b]	4.11±0.03[b]	4.09±0.04[a]	0.0002***
11	3.93±0.03[a]	4.36±0.08[c]	4.17±0.85[b]	4.11±0.03[b]	3.81±0.20[a]	0.0005***
12	3.96±0.02[a]	4.22±0.01[b]	4.12±0.06[ab]	4.14±0.02[b]	No record	0.0029**
Mean egg diameter	4.09±0.03	4.21±0.2	4.13±0.26	4.12±0.02	4.03±0.06	--
CV	0.73	4.75	6.29	0.48	1.48	--

*P< 0.05, **P< 0.01, ***P< 0.001, [abcd] Treatments within a row (week) having the same letter are not significantly different**,** no record; indicates periods where no eggs were collected before onset of laying and during the resting period (confirm by observation of some hens molting and others brooding, CV = coefficient of variation

Table 5. Length of Kabir eggs fed pelleted diet containing graded levels of cassava and sweet potato meal as an energy substitute of maize in Cameroon

Weeks \ Egg Length (cm)	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)	*P* Value
1	5.32±0.08	5.56±0.14	5.44±0.21	5.90	*No record*	0.42
2	5.52±0.02[b]	5.50±0.09[b]	5.68±0.12[b]	5.17±0.04[ab]	5.04±0.15[a]	0.02*
3	5.49±0.04	5.57±0.16	5.54±0.05	5.25±0.08	5.35±0.07	0.08
4	5.54±0.09	5.43±0.05	5.43±0.04	5.36±0.05	5.40±0.05	0.31
5	5.45±0.11	5.39±0.05	5.50±0.04	5.27±0.12	5.36±0.03	0.06
6	5.69±0.02[b]	5.42±0.03[b]	5.43±0.05[b]	5.40±0.03[a]	5.36±0.03[a]	0.009**
7	5.64±0.06[b]	5.58±0.07[b]	5.57±0.05[b]	5.38±0.05[a]	5.34±0.02[a]	<0.0001***
8	5.61±0.08	5.43±0.10	5.54±0.06	5.44±0.04	5.38±0.04	0.056
9	5.49±0.11	5.48±0.03	5.56±0.04	5.41±0.05	5.40±0.04	0.18
10	5.59±0.06[b]	5.56±0.03[b]	5.58±0.05[b]	5.38±0.05[a]	5.41±0.05[a]	0.0072**
11	5.22±0.01[a]	5.58±0.02[b]	5.41±0.12[ab]	5.52±0.05[b]	5.32±0.04[a]	0.0012**
12	5.59±0.09	5.58±0.06	5.45±0.033	5.54±0.04	No record	0.64
Mean egg length	5.51±0.06	5.51±0.07	5.51±0.07	5.42±0.05	5.34±0.05	--
CV	1.09	1.27	1.27	0.92	0.94	--

*P< 0.05, **P<0.01, ***P< 0.001,[abcd] Treatments within a row(week) having the same letter are not significantly different, no record; indicates periods where no eggs were collected before onset of laying and during the resting period (confirm by observation of some hens molting and others brooding, CV = coefficient of variation

Table 6. Egg shape index of Kabir chicken fed pelleted diet containing graded levels of cassava-sweet potato meal as an energy substitute of maize in Cameroon

Weeks \ Egg shape index	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)	*P* Value
1	73.3±0.00	71.7±2.82	75.3±2.43	74.2±0.00	*No record*	0.72
2	73.9±0.95^{ab}	74.7±3.29^{ab}	68.8±4.74^{a}	76.3±5.22^{b}	79.6±6.25^{c}	0.037*
3	74.8±1.25	75.2±3.49	74.2±6.03	77.4±2.81	75.9±5.85	0.51
4	74.4±1.31	76.4±2.70	74.1±3.07	76.8±2.50	74.5±5.86	0.25
5	76.2±2.41	77.4±2.47	75.1±3.01	77.9±5.19	74.9±4.18	0.21
6	74.1±0.60^{a}	77.9±2.04^{b}	77.2±1.41^{b}	75.1±3.11^{ab}	75.2±3.34^{ab}	0.01*
7	74.4±2.23	76.6±1.75	75.8±1.61	77.2±4.59	75.7±0.00	0.11
8	74.7±2.80	78.5±4.71	76.3±1.53	75.7±2.83	75.8±4.05	0.19
9	76.8±3.43	79.5±7.29	75.4±1.68	76.2±2.40	77.2±6.33	0.17
10	74.1±1.24	76.3±2.50	75.9±1.99	76.5±1.90	75.6±4.00	0.13
11	75.3±0.60	77.9±6.32	77.0±1.88	74.4±1.15	71.7±8.90	0.07
12	70.9±2.78^{a}	75.7±3.19^{b}	75.7±2.25^{b}	74.7±2.32^{b}	No record	0.02*
Mean egg length	74.4±1.63	76.5±3.54	75.1±2.63	76.0±2.83	75.6±4.88	--
CV	2.19	4.63	3.50	3.72	6.45	--

*P<0.05, **P< 0.01, ***P< 0.001, [abcd] Treatments within a row(week) having the same letter are not significantly different, No record; indicates periods where no eggs were collected before onset of laying and during the resting period (confirm by observation of some hens molting and others brooding), CV = coefficient of variation

Table 7. Percentage fertility of Kabir eggs fed pelleted diet containing graded levels of cassava and sweet potato meal as energy substitute of maize in Cameroon

Batches \ % Fertility	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)
1	74.0	84.6	90.0	88.9	94.4
2	100.0	100.0	75.0	84.6	90.5
3	100.0	92.3	88.9	88.2	58.3
4	50.0	87.5	100.0	93.3	100.0
Mean	81.0±24.0	91.1±6.7	88.5±10.3	88.8±3.57	85.8±18.7
CV	29.7	7.37	11.6	4.02	21.8

CV = coefficient of variation

Table 8. Yolk characteristics of Kabir chicken fed pelleted diet containing graded levels of cassava and sweet potato meal as an energy substitute of maize in Cameroon

Parameters \ Treatments	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)	*P* Value
Weight (g)	15.39±0.34	16.29±0.35	16.56±0.50	14.94±0.64	15.90±0.48	0.13
Length (mm)	43.43±1.09	41.80±2.21	43.40±0.94	37.21±2.55	37.29±3.45	0.16
Width (mm)	10.09±0.90	10.48±0.53	10.30±0.58	10.49±0.92	12.07±0.35	0.20
Yolk index	23.39±9.20	27.03±10.47	24.12±6.52	29.22±14.57	29.26±12.6	0.47

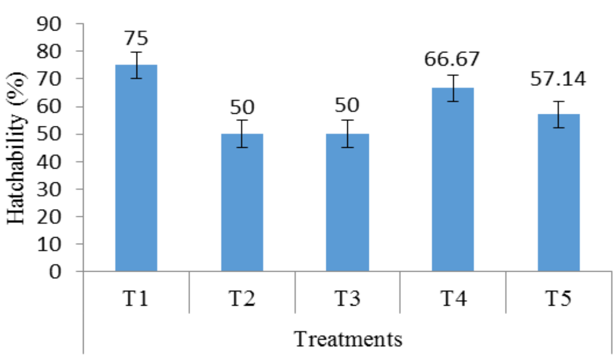

Figure 1. Hatchability of eggs laid by Kabir chickens fed on pelleted rations containing graded levels of Cassava and sweet potato meal as an energy substitute of maize in Cameroon.

Hatchability

The hatchability of eggs from Kabir chicken fed pelleted rations with graded levels of CASPM meal as an energy substitute of maize is presented in figure 1. The control diet had the highest hatchability, followed by T4, T5, T2 and T3. All the groups receiving CASPM meal had fertilities lower than 75%. The yolk characteristics of eggs laid by Kabir chicken fed on pelleted diet containing graded levels of cassava and sweet potato meal as an energy substitute of maize is presented in table 8. Statistical analysis carried on the Kabir egg yolk parameters showed no significant (P<0.05) difference among treatments.

DISCUSSION

The significant (P<0.05) influence on the number of egg laid, egg weight and egg mass as compared to the control diet after substitution of maize with pelleted diets is in agreement with Kana et al. (2015) and May Galon et al. (2017), however it disagreed with the results of Aina and Fanimo (1997) and Salami, Odunsi (2003) and Aderemi et al. (2012) who observed that laying performances of layers decline with increasing levels of cassava root meal in the diet. The differences observed could be attributed to possible differences of the texture of the experimental diets. In fact, it is known that the texture or and the form of presentation of feed significantly affects the digestibility of the feed and in so doing, affecting the production performances. The breed used can also be a determining factor of variation. Of cause, local chicken adapts easier to various feed texture as it is the case in backyard production systems as compared to intensively selected chickens. Further, Kana et al. (2015) in his findings revealed that local chicken could tolerate up to 100% replacement of maize by cassava root meal without any adverse effect on laying performances.

The feed conversion ratio was higher in birds fed control diets. This is in conformity with Becford and Barlett (2015). This feed conversion ration difference ranging from 33.5 to 51.7% according to the level of CASPM could be of significant importance to producers as it could potentially be translated into reducing feed cost.

The mean fertility levels of the incubated eggs for all experimental treatments were all above 80%, but the chicken fed control diet still displayed the least performance, though having the best hatchability confirming that CASPM improves laying performances of chickens without a negative effect on its hatchability. A high fertility is an asset in animal breeding as rapid genetic progress can be achieved through artificial insemination using a roster with a high breeding value.

The hatchability levels of the incubated fertile eggs for all experimental treatments varied from 50% to 75%. T1 had the highest hatchability followed by T4, T5, T3 and T2. This is in conformity to what was reported by King'ori et al., (2010) for Kenyan local chicken eggs hatchability ranging from 66-73%. But also lower than the 80-90% reported for exotic hybrid egg and meat strains according to Moald (2013). Differences in hatchability between different research results can be explained by common environmental effect like the diet but, also the type of incubator used, altitude, temperature or additive genetic effect. Kabir egg yolk analysis was found to be insignificantly different between treatments. This agreed with Aina and Fanimo (1997).

CONCLUSION

The study has shown that the incorporation rate of 25% of fifty-fifty percent weight to weight of Cassava and sweet potato meal can be recommended as a good substitute of maize in the chicken diet raised for reproduction. Irrespective of the incorporation rate, CASPM improves the reproduction performances without affecting the hatchability as well as the physical characteristics of the eggs. Therefore, these diets can be highly recommended pending complementary studies on the cost effectiveness of CASPM-based diets.

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Author's contributions

Christian Keambou, Raquel soares, Frederico and Ndamukong designed, monitored and supervised the study, Vukiesu, Toukala, Tedongmo implemented the farm work, collected organised, analysed the data and drafted the first manuscript. Defang, Hako and Kana did the drafting and review of the manuscript. All the authors edited and approved the manuscript.

Consent to publish

All the authors gave their informed consent prior to their inclusion in the study.

Competing interests

The authors declare that they have no competing interests.

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