BIBLIOGRAPHY

CABINTA, RHEALYN M. MAY 2012. Effect of Supplementing Broiler Ration with Different Levels of Dried Ginger Diet on Some Carcass Characteristics. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted to determine the effect of supplementing broiler ration with varying levels of ginger on the dressing percentage, percent breast muscle, weights of wings, legs and thighs, skin, abdominal fat and weights of liver as percent of body weight. Blood sampling was also done to determine the effect of ginger on the levels of Cholesterol, HDL, LDL, and Triglycerides.

Results showed that adding 5, 10, and 15g of ginger/kg of commercial feeds in the broiler diet had no significant effect on the dressing percentage, percent breast muscle, weights of wings, legs and thighs, skin, abdominal fat, and liver expressed as percent of body weights. The average dressing percentage, breast muscle, wings, legs and thighs, skin, and abdominal fat expressed as percent carcass weight were 72.08%, 26.91%, 11.43%, 30.99%, 10.96%, and 1.77%, respectively. While the average breast muscle, wings, legs and thighs, skin, abdominal fat and liver expressed as percent slaughter weight were 19.34%, 8.12%, 22.24%, 7.86%, 1.28%, and 0.91%, respectively.

As to blood cholesterol, LDL, HDL and triglycerides the levels of which are 3.43mmol (normal), 1.46mmol (normal), 1.95mmol (high), and 0.39mmol (low), respectively. The reference values used are 2.97-7.36 for cholesterol, 1.04-4.04 for LDL, 0.91-1.56 for HDL, and 0.40-1.52 for triglycerides, which are the normal ranges for humans.

Results of the study shows that 5, 10, and 15g ginger/kg of commercial feeds may be added to broiler ration with no adverse effect and that adding 5g ginger/kg of commercial feeds may even lower the levels of blood Cholesterol, LDL, and Triglycerides.

INTRODUCTION

Chicken meat is healthier than other meat sources for human consumption because of its low cholesterol and fat content (Ponte *et al*., 2004), but several studies have been used to decrease the saturated fatty acids and cholesterol content of broiler meat.

Researches on rabbits and rats showed that ginger acted as a hypolipidaemic agent in cholesterol-fed rabbits (Bhandari *et al*., 1998). Akhani *et al*., (2004) also reported that ginger treatment significantly decreased both serum cholesterol and triglycerides. In addition, Fuhrman *et al*., (2000) reported that ginger decreased LDL-cholesterol, VLDL-cholesterol and triglycerides levels in apolipoprotein-E deficient mice. Furthermore, Bhandari *et al*., (1998b) have reported that an ethanolic extract of ginger prevent hypercholesterolemia and development of atherosclerosis in cholesterol-fed rabbits. Bhandari *et al*., (2005) in another study found that, the ethanolic extract of ginger significantly reduced serum total cholesterol and triglycerides and increased the HDL-cholesterol levels; also, the extract can protect tissues from lipid peroxidation and exhibit a significant lipid lowering activity in diabetic rats. The study of Gujaral *et al*., (1978) further revealed that serum and liver cholesterol decreased when ginger was administered to hypercholesterolemic rats.

This study was conducted whether the hypolipidaemic effect of ginger would be observed in the blood cholesterol, LDL, and triglycerides of broilers as reported in previous studies, where feeding a specific amount of ginger to broilers resulted in significantly lower blood LDL and triglycerides.

Results of the study may be used by other researchers as a basis for other related studies.

The study aimed to determine the effect of supplementing broiler ration with 5, 10, and 15g ginger on the dressing percentage, percent breast muscle, weight of wings, legs and thighs, skin, abdominal fat and liver as percent of body weight. Particularly, it aimed for the effect of ginger on the level of triglyceride, cholesterol, HDL, and LDL of the broiler.

The carcass evaluation was done at the Meat Laboratory of Benguet State University, La Trinidad, Benguet. Blood sampling was done at the Benguet General Hospital Laboratory.

REVIEW OF LITERATURE

Medicinal herbs such as garlic and ginger have been reported to possess lipid-lowering effects. Exploitation of lipid lowering agents of garlic and ginger may be used as a measure to reduce levels of serum cholesterol, triacylglycerol and abdominal fat pad of broiler chickens (Ademola *et al*, 2009)

In addition, phytochemical reports have shown that the main constituents of ginger are Gingerol, Shagaols, Zingerone and Paradol. It was reported that 6-gingerol and 6-shogaol are the major Gingerol and Shogaol present in the rhizome (Comell and McLachlan, 1972). Sharma and Shukla (1977) reported a significant blood glucose lowering effect of ginger juice in diabetic and non-diabetic animals. Ahmed and Sharma (1997) also reported a significant hypoglycemic activity in rats after administration of ginger extract. Akhani *et al*. (2004) reported that ginger pretreatment inhibited streptozotocin hyperglycemia and hypoinsulinaemia. Moreover, Bhandari and Grover (1998) reported the blood glucose and blood urea were lowered after administration of ethanolic extract of ginger in diabetic rats. Ginger acts as a hypolipidaemic agent in cholesterol-fed rabbits (Bhandari *et al*., 1998). Akhani *et al*. (2004) reported that ginger treatment significantly decreased both serum cholesterol and triglycerides. Fuhrman *et al*. (2000) additionally reported that ginger decreased LDL cholesterol, VLDL-cholesterol and triglycerides levels in apolipoprotein-E deficient mice.

As well, Bhandari *et al*. (1998) have reported that an ethanolic extract of ginger prevent hypercholesterolemia and development of atherosclerosis in cholesterol fed rabbits.

Bhandari *et al*. (2005) found that, the ethanolic extract of ginger significantly reduced serum total cholesterol and triglycerides and increased the HDL-cholesterol levels; also, the extract can protect tissues from lipid peroxidation and exhibit a significant lipid lowering activity in diabetic rats. Keeping in view the significant important of ginger this research study was conducted to investigate the effect of ginger on the blood biochemistry parameters of broiler.

Zhang *et al*. (2009) stated that all broilers appeared healthy and no mortality occurred throughout the entire experimental period and supplementation of ginger powder at the level of 5g/kg to diet tended to increase growth rate of broilers and increased carcass yield without affecting feed intake or feed conversion rate. Inclusion of ginger in the diet at this level enhanced oxidative stability, but lowered cholesterol, concentrations in the serum of broilers.

MATERIALS AND METHODS

The different materials used in the study are the following; 16 broilers at 42 days old, slaughtering materials which were knives or blades, basins, weighing scale, blood collection vials and syringes for the blood sample, pen and record book for written account.

This study made use of birds used in the growth study previously conducted. Treatments used in the growth study were 0g ginger or pure commercial feeds as T_0, 5g ginger/kg of commercial feeds for T_1, 10g ginger/kg of commercial feeds for T_2, and 15g ginger/kg of commercial feeds for T_3. One broiler of approximately 1.9 kg live weight was selected from each of the replicates in the growth study.

Before slaughtering, the birds were fasted for 12 hours. After fasting, the birds were weighed individually and blood samples were taken for testing the amount of triglyceride, cholesterol, HDL and LDL.

In collecting blood samples, the following steps were done; 1) The bird/s was placed on the table, setting it on its side. 2) Wings were lifted up and feathers parted along the wings. 3) Needle was placed at the slight angle, against the brachial vein. 4) Vein was punctured and slowly withdrew blood. 5) Needle was removed and pressure was applied to the vein for a few seconds. Vials were filled 1/2 or almost full (Fig.1) 6) The samples were brought to the laboratory within one hour.

After slaughtering, carcass (Fig. 2), wings (Fig. 5), legs and thighs (Fig. 4) were weighed with skin, while breast muscle was weighed without skin and bone (Fig. 3). Skin (Fig. 7), abdominal fat (Fig. 6), and liver (Fig. 8) were separated and weighed individually.

Figure 1. Collected blood samples

Figure 2. Weighing of the carcass

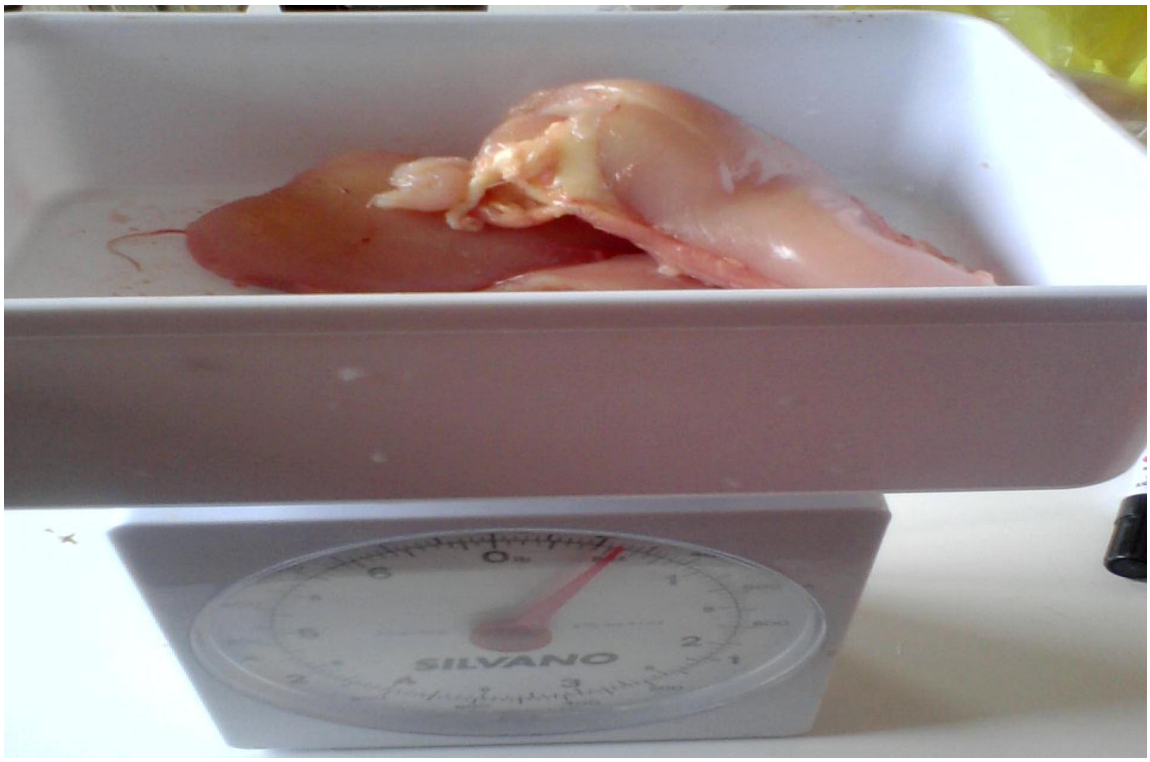

Figure 3. Weighing of the breast muscle without skin and bone

Figure 4. Weighing of legs and thighs

Figure 5. Weighing of wings

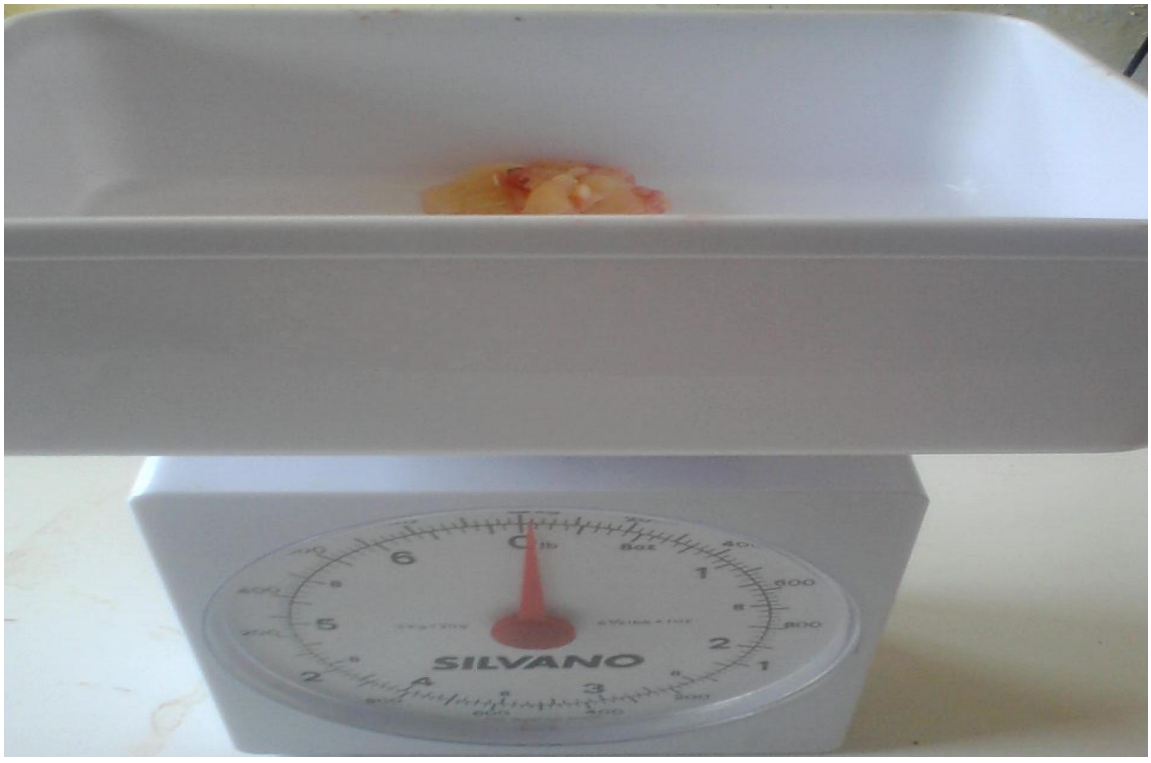

Figure 6. Weighing of the abdominal fat

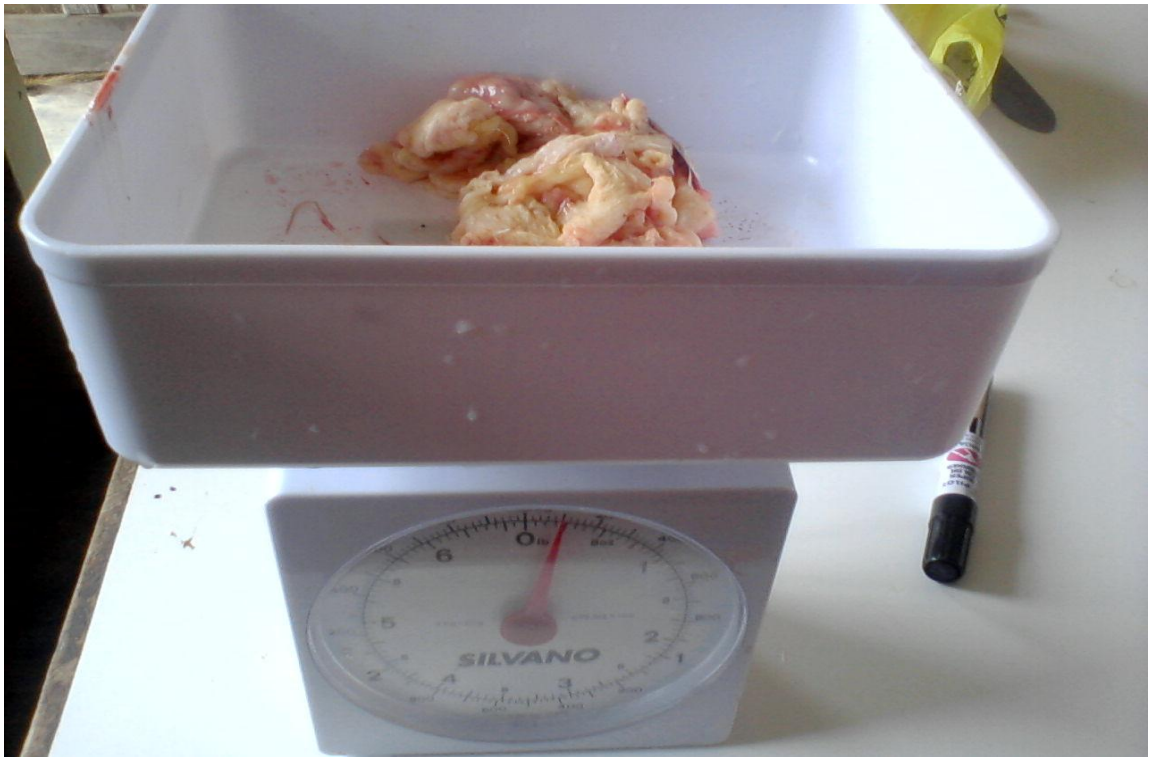

Figure 7. Weighing of the skin

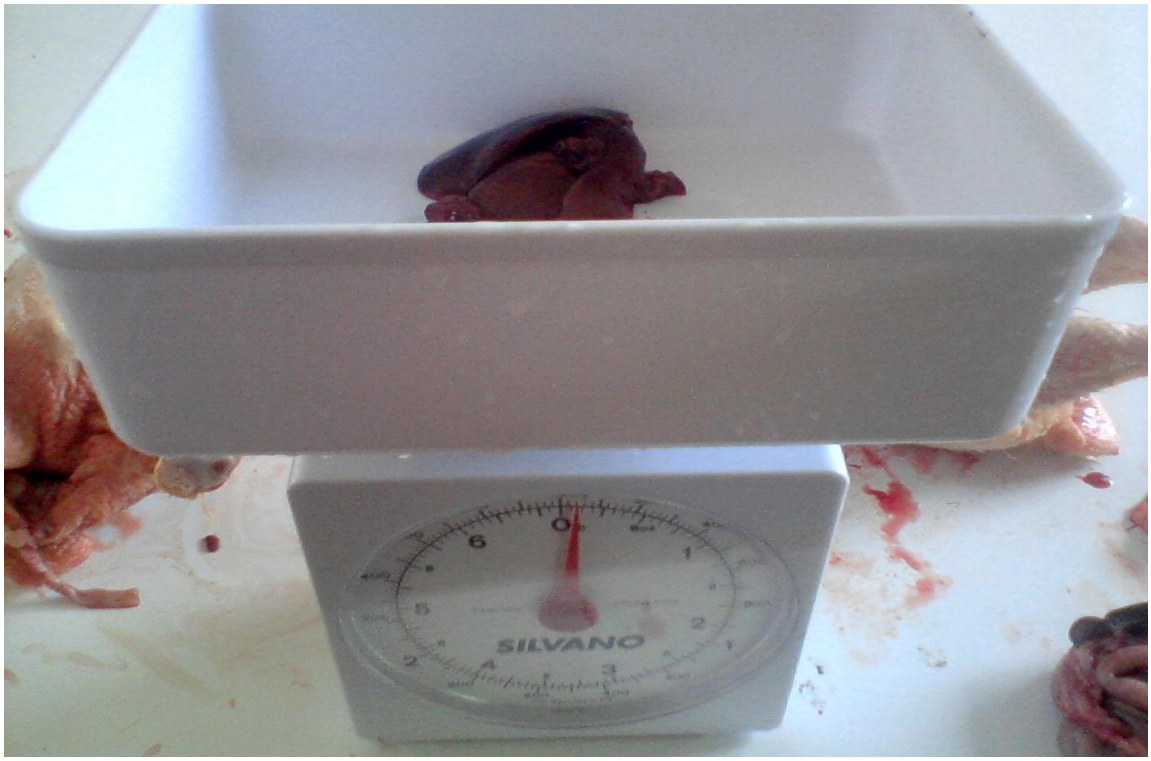

Figure 8. Weighing of the liver

Data Gathered

1. Slaughter weight (kg). This was obtained by taking the weight of each of the birds at 42 days old.

2. Carcass weight (kg). This was obtained by taking the weight of the carcass without entrails, head and feet.

3. Weight of breast muscle (g). This was obtained by weighing the breast muscle removed from each carcass.

4. Weight of legs and thighs (g). This was obtained by weighing the legs and thighs removed from each carcass.

5. Weight of wings (g). This was obtained by weighing the wings removed from each carcass.

6. Skin weight (g). This was obtained by weighing the skin removed from each carcass.

7. Abdominal fat (g). This was obtained by weighing the abdominal fat.

8. Liver weight (g). This was obtained by weighing the liver.

9. Blood results. Blood samples were brought to the Benguet General Hospital laboratory for blood analysis.

Data Computed

1. Dressing percentage (%). This was obtained by dividing the carcass weight by the slaughter weight multiplied by 100.

2. Percent skin (%). This was obtained by dividing the weight of the skin by the carcass weight multiplied by 100.

3. Percent breast muscle (%). This was obtained by dividing the breast weight by the carcass weight multiplied by 100.

4. Percent leg and thigh (%). This was obtained by dividing the leg and thigh weight by the carcass weight multiplied by 100.

5. Percent wing (%). This was obtained by dividing the weight of the wing by the carcass weight multiplied by 100.

6. Percent abdominal fat (%). This was obtained by dividing the weight of the abdominal fat by the carcass weight multiplied by 100.

7. Percent liver (%). This was obtained by dividing the weight of the liver by the slaughter weight multiplied by 100.

RESULTS AND DISCUSSION

Slaughter, Carcass Weight and Dressing Percentage

Slaughter and carcass weight of birds at 42 days old fasted for 12 hours is shown in Table 1. Mean slaughter and carcass weights of birds were 1.92kg and 1.38kg, respectively was obtained. Statistical analysis found no significant differences among treatment means.

The average dressing percentage obtained in this study was 72.08% as shown in Table 1. Analysis of variance showed no significant difference in the dressing percentage of birds given 5, 10 and 15g ginger/kg of commercial feeds. The dressing recovery of the birds obtained in this study was higher than the industry standard which is 69% according to Ibarra (1983), may be attributed to the fact that dressed weights were obtained immediately after slaughter, while in the case of Ibarra, dressed weight was obtained after chilling, about 2-3% decrease in weight was observed.

Table 1. Slaughter, carcass weight and dressing percentage of birds fed with varying levels of ginger

TREATMENT	SLAUGHTER WEIGHT (kg)	CARCASS WEIGHT (kg)	DRESSING PERCENTAGE
0g Ginger or pure commercial feeds	1.93	1.36	70.78
5g Ginger/kg of commercial feeds	1.93	1.39	72.21
10g Ginger/kg of commercial feeds	1.93	1.38	71.87
15g Ginger/kg of commercial feeds	1.90	1.38	73.47

Weight of Breast Muscle as Percent of Slaughter and Carcass Weight

Presented on Table 2, the average weight of breast muscle expressed as percent of slaughter weight and carcass weight were 19.34% and 26.91%, respectively. Statistical analysis showed no significant differences between treatment means which implies that the birds gave a yield of the same amount of breast muscle. This also signifies that feeding broilers with 5, 10 and 15g ginger/kg of commercial feeds had no effect on the development of breast muscle.

Weight of Skin as Percent of Slaughter and Carcass Weight

Table 3 shows the obtained results of skin weights as percent of slaughter and carcass weight. The average weight of skin expressed as percent of slaughter weight and carcass weight were 7.86% and 10.96%, respectively. Birds given 15g ginger/kg of commercial feeds has the highest weight as expressed in carcass weight which is 12.22% and birds given 5g ginger/kg of commercial feeds being the lowest having 9.94%. Statistical analysis revealed no significant differences in both percent slaughter and carcass weight.

Table 2. Weight of breast muscle as percent of slaughter and carcass weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF BREAST MUSCLE AS PERCENT OF SLAUGHTER WEIGHT (%)	WEIGHT OF BREAST MUSCLE AS PERCENT OF CARCASS WEIGHT (%)
0g Ginger or pure commercial feeds	19.20	27.14
5g Ginger/kg of commercial feeds	18.55	25.65
10g Ginger/kg of commercial feeds	19.63	27.29
15g Ginger/kg of commercial feeds	19.99	27.55

Table 3. Weight of skin as percent of slaughter and carcass weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF SKIN AS PERCENT OF SLAUGHTER WEIGHT (%)	WEIGHT OF SKIN AS PERCENT OF CARCASS WEIGHT (%)
0g Ginger or pure commercial feeds	7.41	10.47
5g Ginger/kg of commercial feeds	7.09	9.94
10g Ginger/kg of commercial feeds	8.05	11.19
15g Ginger/kg of commercial feeds	8.89	12.22

Weight of Legs and Thighs as Percent of Slaughter and Carcass Weight

The average weight of the legs and thighs of the broiler expressed as percent of slaughter weight and carcass weight were 22.24% and 30.99%, respectively. Weight of legs and thighs expressed as percent of slaughter and carcass weight as shown in Table 4 shows no significant differences. This implies that yield in legs and thighs of the broiler given with or without ginger were more or less alike.

Table 4. Weight of legs and thighs as percent of slaughter and carcass weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF LEGS AND THIGHS AS PERCENT OF SLAUGHTER WEIGHT (%)	WEIGHT OF LEGS AND THIGHS AS PERCENT AS PERCENT WEIGHT (%)
0g Ginger or pure commercial feeds	22.50	31.83
5g Ginger/kg of commercial feeds	22.55	31.33
10g Ginger/kg of commercial feeds	21.83	30.42
15g Ginger/kg of commercial feeds	22.07	30.39

Weight of Wings as Percent of
Slaughter and Carcass Weight

Table 5 shows the weight of wings as percent of slaughter and carcass weight. Weight of wings as percent of slaughter weight has the average of 8.12% while 11.43% for the percent carcass weight. Although there is a difference between numerical values, statistical analysis showed that there are no significant differences between treatment means.

Weight of Abdominal Fat as Percent
of Slaughter and Carcass Weight

Birds given 15g ginger/kg of commercial feeds has the highest numerical value with 2.09% in percent carcass weight and birds given 10g ginger/kg of commercial feeds has the lowest with a numerical value of 1.62% (Table 6). Average weight of abdominal fat expressed as percent of slaughter and carcass weight were 1.28% and 1.77%, respectively. Analysis of variance showed that there is no significant difference in treatment means. This entails that supplementing broiler diet with ginger has no effect on reducing the abdominal fat.

Table 5. Weight of wings as percent of slaughter and carcass weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF WINGS AS PERCENT OF SLAUGHTER WEIGHT (%)	WEIGHT OF WINGS AS PERCENT OF CARCASS WEIGHT (%)
0g Ginger or pure commercial feeds	7.92	11.22
5g Ginger/kg of commercial feeds	8.07	11.22
10g Ginger/kg of commercial feeds	7.80	11.28
15g Ginger/kg of commercial feeds	8.68	11.99

Table 6. Weight of abdominal fat as percent of slaughter and carcass weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF ABDOMINAL FAT AS PERCENT OF SLAUGHTER WEIGHT (%)	WEIGHT OF ABDOMINAL FAT AS PERCENT OF CARCASS WEIGHT (%)
0g Ginger or pure commercial feeds	1.17	1.67
5g Ginger/kg of commercial feeds	1.25	1.70
10g Ginger/kg of commercial feeds	1.17	1.62
15g Ginger/kg of commercial feeds	1.53	2.09

Weight of Liver as Percent of Slaughter Weight

As shown in Table 7, control birds has the lowest weight as percent of slaughter weight with 0.78% and both 5 and 15g ginger/kg of commercial feeds has the highest with the same value of 0.96%. Average weight of liver expressed as percent of slaughter weight is 0.91%. Statistical analysis showed no significant differences which implies that supplementing 5, 10 and 15g ginger/kg of commercial feeds has no effect on the liver of the birds.

Table 7. Weight of liver as percent of slaughter weight of birds fed with varying levels of ginger

TREATMENT	WEIGHT OF LIVER AS PERCENT OF SLAUGHTER WEIGHT (%)
0g Ginger or pure commercial feeds	0.78
5g Ginger/kg of commercial feeds	0.96
10g Ginger/kg of commercial feeds	0.95
15g Ginger/kg of commercial feeds	0.96

Levels of Serum Cholesterol, HDL, LDL and Triglycerides

Blood samples were collected before slaughtering and submitted to the laboratory for analysis. Table 8 shows the results of the levels of cholesterol, HDL, LDL, and Triglycerides. Statistical analysis showed no significant difference among treatment means.

Birds given 5g ginger/kg of commercial feeds has the lowest level of cholesterol and LDL with 3.21mmol/l and 1.29mmol/l, respectively which is within the normal range. The reference value used is 2.97-7.36 for cholesterol and 1.04-4.04 for LDL which is the normal range for humans. In the level of Triglycerides both 5 and 10g ginger/kg of commercial feeds has the lowest with the same level of 0.37mmol/l which is low if reference value used is 0.40-1.52 which is the normal range for humans. LDL is often reffered to as "bad cholesterol" and promotes atherosclerosis, as a result lower or atleast normal LDL, cholesterol, and triglycerides is required. Birds given 15g ginger/kg of commercial feeds has the highest level of HDL which is 2.06mmol/l, followed by the control birds with 1.98mmol/l, third would be those given 10g ginger/kg of commercial feeds with 1.92mmol/l and birds given 5g ginger/kg commercial feeds being the lowest with 1.85mmol/l, which is high if reference value used is 0.91-1.56 which is the normal range for humans. HDL is reffered to as "good cholesterol" and appears to retard atherosclerosis, as a result high or atleast normal HDL is required.

Therefore, birds given 5g ginger/kg of commercial feeds has the most desirable outcome wherein according to Zhang et al. (2009) adding 5g ginger/kg commercial feeds to broiler diet lowered the cholesterol concentration in the serum of broilers.

Table 8. Levels of serum cholesterol, HDL, LDL, and triglycerides of birds fed with varying levels of ginger (mmol/l)

TREATMENT	CHOL	HDL	LDL	TRIGLY
0g Ginger or pure commercial feeds	3.62[N]	1.98[H]	1.68[N]	0.42[N]
5g Ginger/kg of commercial feeds	3.21[N]	1.85[H]	1.29[N]	0.37[L]
10g Ginger/kg of commercial feeds	3.41[N]	1.92[H]	1.42[N]	0.37[L]
15g Ginger/kg of commercial feeds	3.49[N]	2.06[H]	1.35[N]	0.41[N]

[N]- Normal; [H]- High; and [L]- Low (if reference value used is for human)
Reference values: 2.97-7.36 (cholesterol); 0.91-1.56 (HDL); 1.04-4.04 (LDL); 0.40-1.52 (triglycerides)

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

The study was performed to determine the effect of supplementing broiler ration with varying levels of ginger on the dressing percentage, weight of breast muscle, wings, legs and thighs, skin, and abdominal fat expressed as percent slaughter and carcass weight and weight of liver as percent of slaughter weight. Particularly, it aimed for the effect of ginger on the level of triglyceride, cholesterol, HDL and LDL of the broiler.

After statistical analysis, it was found out that there were no significant differences in terms of slaughter weight, carcass weight, dressing percentage, weight of breast muscle, legs and thighs, skin, wings and abdominal fat expressed as percent of slaughter weight and carcass weight and weight of liver as percent of slaughter weight. Statistical analysis also showed no sinificant differences on the levels of cholesterol, triglycerides, HDL, and LDL.

Refering to the reference values for humans, the birds given 5g ginger/kg of commercial feeds has the most significant effect on the blood results. This entails that addition of 5g ginger to commercial feeds given to broilers would lower down cholesterol, LDL and triglycerides.

Conclusion

Results of the levels of serum cholesterol, triglycerides, HDL, and LDL from broilers supplemented with 5g ginger/kg of commercial feeds varied from that of broilers given 10 and 15g ginger/kg of commercial feeds.

It is then concluded that use of 5g ginger/kg of commercial feeds to broilers would have a good effect on blood components. In terms of slaughter and carcass quality of the broilers, use of ginger has no effect on the broilers.

Recommendation

Therefore, 5g of ginger is recommended to be given as a supplement in broiler diet to lower down cholesterol and LDL. However, it is also recommended to conduct further study on the levels of cholesterol, triglycerides, HDL, and LDL of broilers not limiting it on testing the serum.

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