Commercial Herbitol on the Feed Efficiency and Blood Composition of Broiler an Analytical View

Author's Details:

[(1)] **Abdullah Sethar D.V.M., M. Sc (Honors)** from Pakistan and Ph.D from England, UK. Deputy Project Director,Sindh Agricultural Growth Project (Livestock Component) World Bank Assisted, Government of Sindh, Hyderabad-Sindh,[(2)]**M.Ali Bhatti,** Assistant Professor IBA-Sulkkur [(3)]**Dr. Gul Hassan Sethar**-Consultant PhysicianAl- Amiri Hospital Kuwait city, Kuwait [(4)]**Dr. Nargis Khan**-Senior Registrar Medicine Department Dow University of Health Sciences, Karachi

Abstract: *The current research investigates Commercial Herbitol on the Feed Efficiency and Blood Composition of Broiler an analytical view. It was revealed that Average feed intake in groups A, B, C and D was 4050, 4044, 4077 and 4130 g/bird; water intake was 7936.5, 8189.8, 8196.7 and 8264.9 ml/bird; live body weight was 1916.7, 1960, 2070 and 2200.7 g/bird; FCR was 2.11, 2.06, 1.97 and 1.88; carcass weight was 1277.3, 1303.3, 1310 and 1393.3 g/bird; dressing percentage was 0.58, 0.58, 0.60 and 0.62%, respectively. Weight of liver in group A, B, C and D was 2.45, 2.59, 2.45 and 2.34 g/bird; weight of heart was 0.61, 0.61, 0.61 and 0.62%, weight of spleen was 0.08, 0.07, 0.07 and 0.07%; weight of gizzard was 1.21, 1.22, 1.12 and 1.42%, respectively. Average hemoglobin count in groups A, B, C and D was 9.2, 10.7, 10.73 and 10.9 g/dl; packed cell volume was 22.23, 24.50, 23.33 and 24.73 g/dl; red blood cell count was 3.6, 3.86, 4.1 and 4.11 g/dl; white blood cell was 9747, 10233, 10200 and 10370 g/dl; glucose was 191.33, 192, 198.33 and 206 g/dl; total protein was 3.33, 3.46, 3.53 and 4.03 g/dl; cholesterol was 117.67, 121.67, 118.33 and 124 g/dl; serum glutamic pyruvic transaminase was 244.67, 250, 253.33 and 260 g/dl, respectively. Hence, from group A, B, C and D, the net profit remained Rs. 8.4, 6.2, 15 and 25.8/bird, respectively. It was concluded that economically the broiler managed in group D (Herbitol @6ml/litre water) proved to be more profitable as compared to rest of the treatment groups and control group.*

Key Words: *Commercial, Herbitol, Feed Efficiency, Blood Composition, Broiler.*

Introduction: Hematology normally contains the full blood count and the organs which are responsible for blood formation. The full blood count includes red blood cells, platelets, packed cell volume, hemoglobin, white blood and the red blood cell; mean cell volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration (West and Haines, 2002). Sajid *et al*. (2015) observed that supplementation of herbal products showed significant effect against the on the immune response of broilers against various infectious diseases. Herbal medication showed significant effects on blood glucose and red blood cells (RBC), but showed non-significant effect on hemoglobin, white blood cells (WBC), cholesterol and packed cell volume (PVC), in their conclusion, herbal supplementations in broiler showed positive effect on immunity, performance and blood parameters. The composition of herbitol is composed of Dextrose, Ginger ext; Allium ext; Vinigar,Clove oil, Belladonna, safrol ₊ biochemic salts. Herbitol is used mainly for growth promotion and for constipation. Keeping in view the above facts, present study is plan to investigate the effect of commercial herbal compound (Herbitol) on the feed intake and blood hematology of broiler chicken.

Data Collection Methodology

The floor space was provided ½ sq. ft. per broiler during brooding period and 1 sq. ft. during lateral stage of rearing. The shed was initially washed with water and later on washed with phenyl disinfectant. The shed was left to dry for 24 hours.

Litter

The wooden dust was dried in sun light and used as a litter material. The lime stone was mixed at the rate 2 percent as disinfectant. The litter was used as a two inch thick layer for comfort to chicken.

Brooding

During brooding period (1-3weeks), proper temperature was maintained i.e. 90-95^{o}F during first week by using electric brooder fitted with 40/60 watt electric bulb. At first day sugar was offered to chicks for flushing.

Feeding

The feed and water were offered *ad libitum*. Two drinkers and two feeders were provided to each group. The feed and water refusal from each group was weighed and measured daily in the morning.

Lighting

The 24 hours lighting was provided throughout experimental period and bulbs were hanged at the height of eight feet in the shed.

Vaccination

The following vaccination program was followed:

Days	Vaccines	Route
1st -3rd	N.D+I.B	E D
10th -12th	I.B.D	E D/ D W
16th -27th	H.P.S	Sub cut.1/2 cc
22st	I.B.D	D/W
28th	N.D	D/W

Note: N.D=Newcastle disease. **I.B=**Infectious bronchitis. **I.B.D=**Infectious bursal disease. **H.P.S**=Hydro pericardium syndrome. **E/D=**Eye drop**. D/W=**Drinking water

Parameters

The following parameters were recorded

Live body weight: After arrival of day old broiler at Poultry Experimental Station, individual chicks were weighed by using electric weighing scale and later broilers were weighed at the completion of each week.

Feed intake: Feed was provided *ad libitum* to the broiler twice a day and refusal of feed was collected from feeders of each group and weighed and finally consumed feed was calculated daily. For this practice, the following formula was used:

Feed intake (g/b/d) = Total feed offered – Total feed refused

Water intake (ml)

Fresh water was provided to the broiler twice a day. Refusal of water was collected, measured and subtracted from the water offered and finally consumed water was recorded by using the following formula:

Water intake (ml/b/d) = Total water offered (ml) – Total water refused (ml/group/d)

Feed conversion ratio (FCR)

Feed conversion ratio was calculated on the basis of total feed consumed by a broiler bird for gaining one kg weight. Thus, the feed conversion ratio is actually the feed consumed by the average broiler for achieving one kg live body weight.

$$FCR = \frac{\text{Total feed intake}}{\text{Total live body weight}}$$

Following parameters was performed in the Department of Veterinary Physiology and Biochemistry, Faculty of Animal Husbandry and Veterinary Sciences, Sindh agriculture university Tandojam.

Parameter	Method/Kits
Haemoglobin	Sahli Method
Erythrocyte Sedimentation Rate	Westergren Method
Differential leukocyte count	Haemocytometer method
Glucose	Trinder"s Method
Total Protein	Human Kit
Cholesterol	Revised Method.
Serum Glutamic Pyruvic transaminase	Reitman Frankel method

Economics: The economics was calculated from the following formula

Net Returns = income – expenditure

Blood profile (hemoglobin, packed cell volume, red blood cells, white blood cells, glucose, total protein, cholesterol and serum glutamic pyruvic transaminase)

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Haemoglobin	Sahli Method
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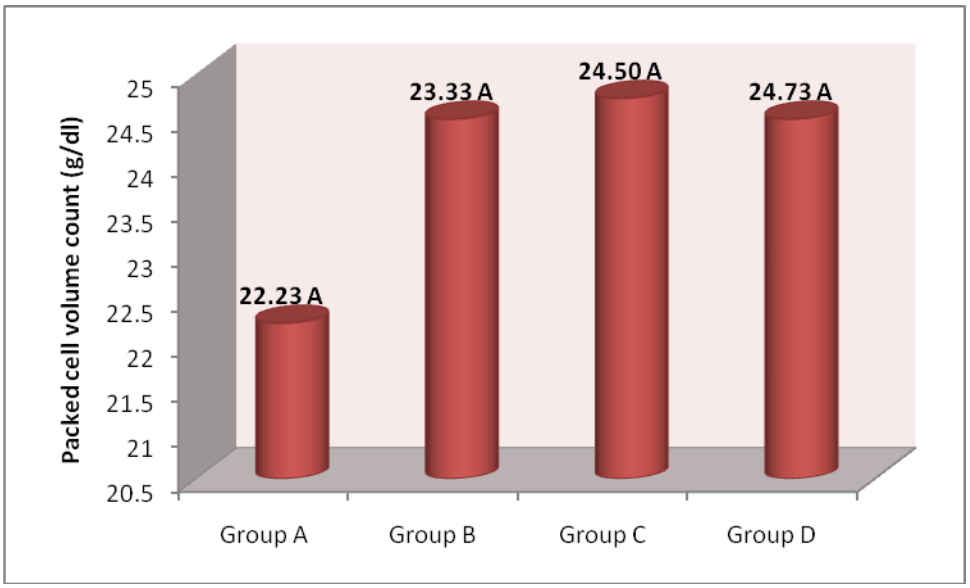
Differential leukocyte count	Haemocytometer method
Glucose	Trinder"s Method
Total Protien	Human Kit
Cholesterol	Revised Method.
Serum Glutamic Pyruvic transaminase	Reitman Frankel method

Packed cell volume

Analysis of variance (ANOVA) reported non-significant (P<0.05) difference in packed cell volume of broilers among the groups. All-pair-wise (LSD) test indicated that there was no significant variation in packed cell volume between treatment groups B, C, D with control group-A, respectively. The result (Figure-9) indicated that average packed cell volume in groups A, B, C and D was 22.23, 24.50, 23.33 and 24.73 g/dl, respectively. Maximum packed cell volume of 24.73 g/dl were noted in group D where the bird fed on Herbitol level of 6 ml / liter of water as compared to group B (24.50 g/dl) where the birds fed on Herbitol level of 2 ml / liter of water. The average packed cell volume further decreased to 23.33 g/dl in group C where the bird fed on Herbitol level of 4 ml / liter of water. Minimum packed cell volume (22.23 g/dl) was recorded for group A (control) where the birds do not fed on Herbitol compound.

The results reveal that broilers in group D received highest hemoglobin count as compared to broiler in group B, C and A, respectively.



Normal range : 30.73 – 35.80 g/dl

: **Packed cell volume count (g/dl) of broiler fed on various level of commercial Herbitol compound.**

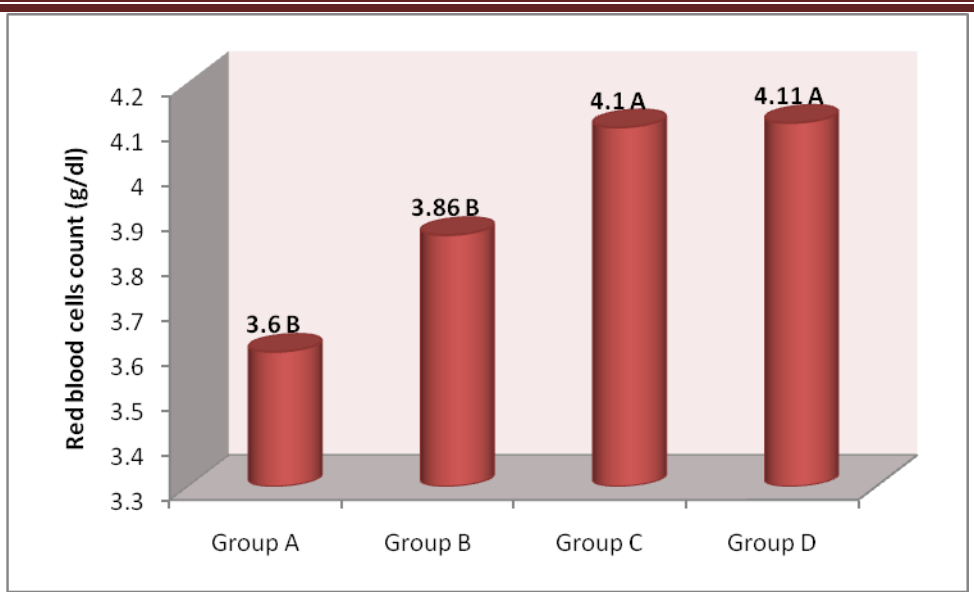
S.E.±	0.8884
LSD 0.05	1.2563
P-value	0.2463NS

The values in column matching with similar alphabets did not differ significantly at probability level of 0.05**.**

Red blood cells

Analysis of variance (ANOVA) reported significant (P>0.05) difference in red blood cell count of broilers among the groups. All-pair-wise (LSD) test indicated that there was significant variation in red blood cell count between treatment groups B, C, D with control group-A, while non-significant difference in red blood cells among groups C with D and A with B, respectively.

The result (Figure-10) indicated that average red blood cell count in groups A, B, C and D was 3.6, 3.86, 4.1 and 4.11 g/dl, respectively. Maximum red blood cell count of 4.11 g/dl were noted in group D where the bird fed on Herbitol level of 6 ml / liter of water as compared to group C (4.1 g/dl) where the birds fed on Herbitol level of 4 ml / liter of water. The average red blood cell count further decreased to 3.86 g/dl in group C where the bird fed on Herbitol level of 2 ml / liter of water. Minimum red blood cell count (3.6 g/dl) was recorded for group A (control) where the birds do not fed on Herbitol compound. The results reveal that broilers in group D received highest hemoglobin count as compared to broiler in group C, B and A, respectively.



Normal range : 2.06 – 3.17 g/dl

Figure 10: Red blood cells count (g/dl) of broiler fed on various level of commercial Herbitol compound.

S.E.±	0.0471
LSD 0.05	0.1087
P-value	0.0434*

The values in column matching with similar alphabets did not differ significantly at probability level of 0.05**.**

White blood cells

Analysis of variance (ANOVA) reported significant (P>0.05) difference in white blood cell count of broilers among the groups. All-pair-wise (LSD) test indicated that there was significant variation in white blood cell count between treatment groups B, C, D, with control group-A, respectively. The result (Figure-12) indicated that average white blood cell count in groups A, B, C and D was 9747, 10233, 10200 and 10370 g/dl, respectively. Maximum white blood cell count of 10370 g/dl were noted in group D where the bird fed on Herbitol level of 6 ml / liter of water as compared to group B (10233 g/dl) where the birds fed on Herbitol level of 2 ml / liter of water. The average white blood cell count further decreased to 10200 g/dl in group C where the bird fed on Herbitol level of 4 ml / liter of water. Minimum white blood cell count (9747 g/dl) was recorded for group A (control) where the birds do not fed on Herbitol compound. The results reveal that broilers in group D received highest white blood cells count as compared to broiler in group B, C and A, respectively.

Results

The herbal supplement Herbitol possesses numerous properties due to the inclusion of wide variety of herbal compounds in it. There are several aspects of this compound which have been studies so far. Herbitol may affect feed intake, water consumption, live body Weight, feed efficiency, blood composition and carcass weight.

Feed consumption

Spices and herbs of various plants extract have appetizing, digestion stimulating, antimicrobial properties, which increase the feed intake (Abdulmanan *et al.*, 2012). Our study showed statistically insignificant difference in feed intake amongst the groups, however, figuratively there was higher feed consumption in broilers of group D as compared to broiler in group C, A and B, respectively .. Onu (2010) reported no significant (P>0.05) difference in the feed consumption of the birds amongst the treatments. However, the inclusion of garlic as a sole agent numerically reduced the feed intake of the birds which is not surprising since garlic has a pungent odour due to the Allicin which is an extremely odoriferous compound (Cavallito and Bailey, 1994) that can adversely affect feed

intake. . The similar findings have been reported by Cullen *et al*., 2005 who reported that garlic has organoleptic properties that are responsible for the decrease in feed consumption (). The sense of taste is an important factor in determining the selection of food by animals (Baldwin, 1976) while the importance of olfaction is also recognized (Forbes, 1995). Bird's sense of smell is heavily sensible to feed intake like other monogastric animals (Mellor, 2000). Elagib *et al*. (2013) reported that the highest concentrations of garlic powder in feed decreases the feed intake. Thus these are the major factors which adversely affect the feed intake of broiler at a considerable level intake Moreover ,there are some other studies which have also reported that ginger extracts can also decrease over all feed intake in broilers (Herawati ,2006) . This is in contradiction with the reports of Goodarzi *et al.,* (2014); Mahmoodi *et al.,* (2014); Mohamed *et al.,* (2014); Aguilar *et al*., (2013); Fayed *et al.,* (2013) who reported that inclusion of herbal compound as supplementation in broiler ration improves the feed intake.. This result was contrary to that done by ginger containing diets had an overall lower feed intake ($p>0.05$) compared to control diets which had significantly the highest feed intake rate.. The herbs having antibacterial qualities, which decrease the level of harmful bacterial count of gut, result in higher feed efficiency and thus higher weight gain.(Bedford, 2000).

Water intake

Water is one of the most important nutrient which is involved in the vital physiological functions of the body.. Its consumption depends on the intake of type of feed or feed supplement available in the water.Our study showed remarkably higher water intake in broilers of group D as compared to birds of group C, B and A, respectively. There was significant difference in water intake among the treatment and control group. Similarly findings of Aguilar *et al.,* (2013); Fayed *et al.,* (2013) Goodarzi *et al.,* (2014); Mahmoodi *et al.,* (2014); Mohamed *et al.,* (2014); concluded that supplementation of herbal products in broiler had adverse effects on water intake. Nweze and Ekwe (2012) reported that the reduction of water intake is due to the higher concentration of Ocimum basilicum (Basil Herb), because of the presences of substances like, camphor, thymol and methyl cinnamate, which affected the taste of the water and hence resulted in decreased water consumption. Similarly other reports has also shown that salt and other substance affect the water consumption of broiler chicks (Bozin *et al*., 2006).

Live body weight

Live body weight was extremely higher in broiler of group D as compared to broiler in group C, B and A, respectively. This effect is attributed to the fact that the susceptibility of pathogenic gram positive bacteria to the antibacterial components of garlic and ginger are higher than that of the physiological desirable intestinal bacteria (Reeds *et al*., 1993; Cullen *et al*., 2005). This observation is in line with the findings of Shi *et al*., (1999) and Javandel *et al*., (2008). However, this observation contradicts the reports of Omage *et al*., (2007), Ademola *et al*., (2004) and Horton *et al*., (1991) who reported that the inclusion of ginger and garlic did not improve the weight gain of broilers. Onu (2010) reported that there were significant ($p<0.05$) difference in the weight gain of the birds among the treatment groups. Birds fed garlic and ginger supplemented diets recorded the highest body weight gain. There was a numerical increase in weight of birds fed garlic and ginger mixture. Birds fed unsupplemented diet had significantly ($P>0.05$) lowest body weight gain. The numerical improvement achieved with mixture of garlic and ginger is in line with the reports of Ahmed and Sharma (1997) who reported a numerical increase in body weights of rats fed a mixture of ginger and garlic. Similarly, Ademola *et al*. (2009) reported a numerical increase in final body weight and weight gain of broilers fed a mixture of garlic and ginger. Alloui *et al.,* (2007) used herbs in broiler flock and reported that plant extracts worked as growth promoters for broiler growth and immune system. Barreto *et al.* (2008) stated that effect of plant extracts on broiler growth and showed that there was no positive effect of the tested plant extracts on live performance or in organ morphometric. Zuzana *et al.,* (2008) reported beneficial usage of herbs as alternatives to antibiotic growth promoters. David *et al.,* (2010) tested selected herbal dietary supplements on the growth performance and carcass quality of broiler chicken and revealed that replacing antibiotic growth promoters with herbal supplements has beneficial effects on the growth performance and carcass yield of broiler chicken. Vijay *et al.,* (2010) studied the efficacy of supplementation of herbal Methionine and concluded that it improved growth performance and carcass traits in broilers .Hence administration of herbal products in commercial ration of broilers improves the growth performance, feed efficiency, carcass traits and developes immune system of birds. Additionally herbs decrease mortalityand increase meat protein. Tiago *et al.,* (2010) evaluated the effect of feeding herbal extracts for broilers on performance and other related parameters and found that herbal extracts incorporated into diets replaced antibiotics without compromising the metabolize energy of diets by improved performance in broilers. Galib and Noor (2010) added mixed herbal products in broiler ration for 6 weeks of experimental period and reported that there were productive and physiological changes in broilers due to the administration of herbal products. The weekly live body weight and mortality rate were positively influenced. Zafar *et al.,* (2011) suggested that Livol (Herbal Polysaccaride) can effectively stimulate the body weight gain, immunity of broiler chicks and potentially can be ameliorator against various vaccines.

FCR

Birds of group B convert feed into body mass efficiently as compared to broiler of group C, B and A, respectively. There was significant difference in FCR among the treatment and control group. Onu (2010) reported that birds fed supplemented diets recorded higher ($P<0.05$) feed conversion ratio than the control. The improved feed efficiency observed in birds fed garlic and ginger

supplemented diets suggests that the antimicrobial action of garlic and ginger may be sufficient to inhibit microbial fermentation (Ankri and Mirelman, 1999) .Moreover, according to Reeds *et al*., (1993), rapidly growing young animals, the gastro intestinal tract and the skeletal musculature draw the same limited supply of nutrients and compete for the deposition of nutrients. Moreover,as much as 6% of the net energy in animal diet can be lost due to bacterial utilization of glucose in the small intestine (Vervaeke *et al*., 1979) and these bacteria require amino acids in relatively similar proportional amount as the animals (Hays, 1978). When garlic and ginger were added there may have been a nutrient sparing effect, therefore improving feed conversion ratio. Similarly ,Chattopadhyay *et al.,* (2006) achieved better feed conversion ratio as compared to commercial diet by using herbal methionine .Tiago *et al.,* (2010) and Galib and Noor (2010) reported that feed conversion ratio were significantly and positively influenced by administration of herbal products in broiler diet.

Carcass weight

Carcass weight were higher in broilers of group D as compared to broiler in group C, B and A, respectively. There was significant difference in carcass weight among the treatment and control group. The body weights are inter-related with the carcass weight. There is an evidence to suggest that herbs, spices and various plant extracts have appetite and digestion stimulating properties and antimicrobial effects (Kamel, 2001). These results agree with the work of Lee *et al*. (2004), who found that adding the cinnamon to the diet of broilers improved their growth performance. For example, carvacrol present in these herbal planets has stimulatory effects on pancreatic secretions that increases the secretions of digestive enzymes and thus more amounts of nutrients like amino acids can be digested and absorbed from the digestive tract and thereby improve carcass traits. These results are in line with the findings of Chowdhury *et al.,* (2009) and Mahmoodi *et al.,* (2014); they reported that higher carcass weights were found in chicks when fed the herbal compound as feed additives. These results are in line with the findings of Chowdhury *et al.,* (2009) and Mahmoodi *et al.,* (2014); who reported that higher carcass weights were found in chicks when fed the herbal compound as feed additive

Dressing percentage

Dressing percentage was remarkably higher in group D as compared to broiler in group C, B and A, respectively. There was significant difference in dressing percentage among the treatment and control group. This is in close agreement with Fayed *et al.,* (2013); Patel *et al.,* (2013); Mohamed *et al.,* (2014) who indicated that adding herbal compound in water / feed resulted maximum dressing percentage of broiler reared for 42 days of flock. Dressing percentage is a calculated value from the body weight gain and carcass weight, improvement in these traits leads to the improvement in the dressing percentage value.

Organs weight

There was no significant variation in weight of liver, heart, spleen and gizzard among the treatment and control groups. Onu (2010) reported that the organs weight evaluated were not significantly ($P>0.05$) influenced by the dietary treatments and did not follow a definite pattern that can be attributed to treatment effect. The addition of ginger and garlic at 0.25% did not affect the development of the organs. This implies that this level is appropriate for the birds and that the test diets did not contain any appreciable toxin. According to Bone (1979) abnormalities in the weights of the internal organs like liver, kidney and gizzard arise because of increased metabolic rate of the organs in attempt to reduce toxic elements or anti-nutritional factors to non-toxic metabolites. It is pertinent to mention here that the weight of carcass, abdominal fat, liver and pancreas is related to the live weight at slaughter. Except for abdominal fat, carcass yield and relative organs weight were not markedly affected by dietary treatments. These results are agreement with those reported by Aji *et al*. (2011) and Goodarzi *et al*. (2013). In another experiment, carcass and organ characteristics of broilers fed diets containing garlic were not affected by experimental treatments (Gbenga *et al*., 2009). Spices and their extracts have lipotropic effects. Some of the active components in spices affect lipid metabolism through fatty acid transportation. This can increase the lipid utilization and decrease abdominal fat (Cross and *et al*, 2007).

Blood profile

Hemoglobin, packed cell volume, red blood cells, white blood cells, glucose, total protein, cholesterol and serum glutamic pyruvic transaminase level were considerably higher in group D as compared to the treatment groups B ,C and group A, respectively. Sajid *et al*. (2015) concluded that herbal medicines revealed significant effects on blood glucose and red blood cells, but showed non-significant effect on cholesterol, hemoglobin, white blood cells and packed cell volume.In conclusion, herbal medicine supplementations in broiler revealed positive effect on performance, immunity and hematological parameters. Onu (2010) reported that there was no significant ($P>0.05$) difference in the haematological indices among the treatments. The values of the PCV, Hb, WBC and RBC fall within the normal range for healthy broiler chickens as reported by Anon (1980) and IACUC (1998). The values for MCHC, MCV and MCH did not differ significantly ($P>0.05$). It can be inferred that the hematological indices were within safety limits for broilers in this experiment. The normal PCV, Hb and other haematological values portray the nutritional status of the broiler chicken and thus indicating adequate nourishment of the birds (Church *et al*., 1984). This also implies that the immune system of the birds was adequate. The numerical differences observed in the PCV, Hb and RBC of birds fed ginger and garlic supplemented diets

suggest that the diets were better utilized and assimilated into the blood stream for use by the birds. The biochemical parameters observed in this study did not differ significantly (P>0.05). Since no sign of anemia or ill-health was observed in all treatment in the course of the experiment, the quality and quantity of the dietary proteins were nutritionally adequate and there was no alteration of normal systemic protein utilization. According to Awosanya *et al.* (1999) blood protein depends on the quality and quantity of dietary protein. Nweze and Ekwe (2012) reported improvement in the hematological indices of finishing broilers fed ocimum extract. Although there was no significant difference in pack cell volume, white blood cells, red blood cells corpuscular haemoglobin concentration and mean cell haemoglobin concentration.However,the presence of extract helped to stabilized the blood components of the birds. The current result is confirmed by Sajid *et al.,* (2015); Saad *et al.,* (2014); Yasar *et al.,* (2012); Rahim *et al.,* (2011) who reported that herbal medicines revealed significant effects on blood glucose and red blood cells parameters , but showed non-significant effect on cholesterol, hemoglobin, white blood cells and packed cell volume. There is a possibility of combined action of these antimicrobial herbs made a remarkable decrease in the amount of intestine microbial colony and thus prevented loss of amino acids which is to be used in the formation of proteinic tissues which increase the breast percentage (Lee *et al.,* 2003).

Conclusions

The results indicated that feed intake was considerably higher in broiler of group D as compared to broiler in group C, A and B, respectively. There was no significant difference in feed intake among the treatment and control group. Water intake was remarkably higher in broiler of group D as compared to broiler in group C, B and A, respectively. There was significant difference in water intake among the treatment and control group. Live body weight was extremely higher in broiler of group D as compared to broiler in group C, B and A, respectively. There was significant difference in live body weight among the treatment and control group. Broilers in group B have maximum capacity to convert feed into body mass more rapidly and efficiently as compared to broiler in group C, B and A, respectively. There was significant difference in FCR among the treatment and control group. Carcass weight were higher in broilers of group D as compared to broiler in group C, B and A, respectively. There was significant difference in carcass weight among the treatment and control group. Dressing percentage was remarkably higher in group D as compared to broiler in group C, B and A, respectively. There was significant difference in dressing percentage among the treatment and control group. There was no significant variation in weight of liver, heart, spleen and gizzard among the treatment and control groups. Hemoglobin, packed cell volume, red blood cells, white blood cells, glucose, total protein, cholesterol and serum glutamic pyruvic transaminase level were considerable at peak level for group D as compared to the treatment groups B & C as well as control group A, respectively. It was concluded that economically the broiler managed in group D (Herbitol @6ml/litre water) proved to be more profitable as compared to rest of the treatment groups and control group.

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