

Effect of Herbal Medicine Supplementations (Arsilvon Super, Bedgen40 and Hepa-cure Herbal Medicines) on Growth Performance, Immunity and Haematological Profile in Broilers

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Abstract The experiment was conducted at Poultry Research center University of Agriculture Faisalabad to evaluate the Arsilvon super, Bedgen40 and Hepa-Cure herbal medicines on broiler performance, immunity and hematology. For this study one hundred eighty day old broiler chicks were purchased from local hatchery and were reared in a group for one week. After one week, one hundred twenty broiler chicks of middle weight range were picked up randomly and divided into 12 experimental units (10 chicks/each). These units were allotted to 4 groups A, B, C, and D such that A group served as control without any supplementation, group B was supplemented with Arsilvon super @1ml/L, group C was supplemented with Bedgen40 @ 0.5ml/4L, and D was supplemented with Hepa-cure @ 1ml/L in drinking water. Supplementation of herbal medicine exhibited significant ($P < 0.05$) effects on weight gain, Feed Conversion Ratio and non-significant effect on feed consumption ($P > 0.05$). Supplementation of herbal medicines showed significant treatment effect against the Newcastle disease but non-significant effect against the Infectious bursal disease. 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.

Keywords Herbal Medicines, Broiler, Feed Conversion Ratio, Newcastle Disease, Infectious Bursal Disease, Blood Profile

Poultry sector is passing through a period of using antibiotics for the treatment of diseases and also as growth promoters but it leads to the production of antibiotic resistant cells [12] due to residual effect of antibiotics. It was estimated that 4500 tons of antibiotics used in the world as growth promoter per year. Approximately 80% of domestic animals have been fed with synthetic (antibiotics) compounds for the purpose of medication and as growth promoter. There have been much more discussions on the utilization of antibiotics in the world. There is need to find more efficient alternatives or combinations of different alternatives for maintaining health and improving performance of poultry and other livestock species. Phyto-genic compounds are the groups of feed additives that have been reported to possess a potential for growth enhancement of poultry due to presence of a number of pharmacologically active substances. They are supposed to enhance feed intake, activate digestive enzymes and stimulate immune function.

Antibiotic growth promoters (AGP) have been very helpful to enhance the growth performance and feed conversion ratio of poultry birds [19]. However, constant use of antibiotics in poultry may result in residual effects in poultry products which may cause the bacterial resistance against treatments in human body. Due to these deleterious effects to human health, use of antibiotics in poultry was completely banned by European Union since 2006 [25]. At present prevalent infectious diseases are major problem to the whole world which causes the financial failure to the poultry owners and farmers. In addition, other factors in which vaccination failure, infection by immune-oppressive diseases, and misuse of antibiotics can cause immunodeficiency.

After the ban on antibiotics by European Union in 2006 in poultry, there was need to find the alternatives or

1. Introduction

replacement to antibiotics. Many feed additives such as prebiotics, probiotics, symbiotic, organic acids and herbal growth promoters are used as replacement of antibiotics having the activity against pathogenic microorganism and to enhance the growth of useful microorganism [7].

The history of herbs is too long as the mankind; these plants were used from the beginning of the world. Many wars have been fought and lands occupied for the purpose of plants and herbs, and even at yet human continuous depend on exotic species for many of our latest medicines and chemicals [27]. Recently, many countries tended to minimize or prohibit the chemical components due to deleterious side effects on both animals and human. So, it is important to use natural promoters [15].

Photogenic feed additives are supposed to help regular digestion while improving performance along with various other way of action including reducing bacterial colony counts and fermentation products, decreasing the activity of gut associated lymphatic system, boosting pre- cecal nutrient digestibility, and keeping anti-oxidative properties. Limited research found which structured to growth promoting effects of photogenic feed additives in poultry. However, Buchanan *et al.* (2008) stated that broiler chicken fed diets having plant extract blends had minimum feed conversion ratio, increase weight gain, and maximum breast yield [6]. Windisch *et al.* [36] completed a broad review about phytogenic feed additives and planned modes of actions of these products.

Herbs, plant extracts and species can be valuable alternatives for the health and nutrition of the chicken. They have a wide range of activities such as stimulation of feed intake and endogenous secretions or have antimicrobial, coccoidiostatic or anathematic activity. Plants have evolved a wide range of secondary metabolites. Most of the active secondary metabolites of the plant with classes of isoprene byproducts, flavonoides and a large number of mixtures have advised functions as alternative to antibiotics or as antioxidants in vivo as well as in feed.

There is a variety of herbal based medicines in the markets which are the mixture of different herbs and can be successfully use in poultry. Therefore a project has been planned to evaluate the effect of herbal based products i.e. *Arsilvon super*, *Bedgen 40* and *Hepacure* on growth performance, immune response and hematological response in broilers.

2. Material and Methods

The research project was conducted at Poultry Research Center, University of Agriculture, Faisalabad. Day-old chicks (n=220) were purchased and reared in a groups for seven days as adaptation period. At 8th day of age, these chicks were individually weighed and 120 chicks of middle weight range were selected to be used as experimental birds. The selected chicks were distributed in 12 replicates (10 birds/ replicate) and were further allotted to four treatment groups (A, B, C and D) such that each

group received three replicates. Two rations (starter and finisher) were prepared and fed to the experimental birds. The chemical composition of the experimental rations along with proportion of ingredients (purchased locally) used are presented in Table 1. The starter and finisher rations were fed *ad libitum* to all treatment groups, from 1-21 and 22-35 days of age, respectively. Herbal medicine plan for the experimental birds is shown in Table 2. Each experimental unit of the chicks was reared in a separate pen. The birds were kept under similar managerial conditions like space, light, temperature, ventilation and relative humidity. Fresh and clean water was available to the birds at all the times. All the birds were vaccinated according to the recommended schedule.

The data collected were comprised of initial body weight, weekly body weight gain, weekly feed consumption, feed conversion ratio (feed intake/weight gain), daily water intake, and mortality to check performance of birds. Blood samples (2 birds/ replicate) were collected at 28th and 32th day of age to determine the immune response against the ND and IBD and blood profile (Packed Cell Volume, Hemoglobin level, WBCs count and RBCs count) [18,28]. The results obtained from the trial were statistically analyzed using Analysis of Variance Technique under Completely Randomized Design. Treatment means were compared by Least Significance Difference [31] and economics of production of each treatment was calculated at the end of the trial.

Table 1. Proportion and compositions of ingredients used in experimental rations

Ingredients	Starter Ration (%)	Finisher Ration (%)
Maize	36	35
Wheat	10	10
Rice polish	5	5
Rice broken	5	8
Wheat bran	3	6
Guar meal	3	2
Sunflower meal	6	5
Corn gluten 60%	6	5
Soybean meal	10	10
Fish meal	8	6
Soya oil	3	3
Molasses	3	3
Lime stone	1.16	1.16
Mono & di-calcium phosphate	0.167	0.167
Pre-mix	0.5	0.5
Salt	0.173	0.173
Total	100	100

Chemical composition		
Crude protein	22%	20%
Metabolizable energy	3100 Kcal/Kg	3000 Kcal/Kg
Crude fiber	4.18%	4.55%

Table 2. Herbal medicinal plan

Groups	Treatments
Group A (Control)	Offered drinking water without any supplementation
Group B (Arsilvon super)	Offered drinking water supplemented with <i>Arsilvon super</i> medicine @ 1 ml/L
Group C (Bedgen 40)	Offered drinking water supplemented with <i>Bedgen 40</i> medicine @ 0.5ml/4L
Group D (Hepa-cure)	Offered drinking water supplemented with <i>Hepa-cure</i> medicine @ 1ml/L

Values within the same row which have different superscripts are significantly different (P<0.05)

3. Results

Performance parameters

Statistical analysis of the data did not showed any significant effect of supplementation of herbal medicines on feed intake of broilers. The average weight gain per chicks at the end of trial under treatment A (control), B (Arsilvon super), C (Bedgen 40) and D (Hepa-cure) were 1763, 1915, 1843 and 1906 gm, respectively. The maximum weight gain was observed in B followed by the treatment D, C and A, respectively. Statistical analysis of data revealed that addition of various herbal medicine exhibited significant (P<0.05) effects on weight gain of the birds of all treatment groups as compared to those of control group. The feed

conversion ratio under different treatments i.e. A (control), B (Arsilvon super), C (Bedgen 40) and D (Hepa-cure) were 1.91, 1.68, 1.82 and 1.78, respectively. Best feed conversion ratio was found in B followed by D, C and A respectively. Statistical analysis of data revealed that supplementation of Arsilvon super, Bedgen 40 and Hepa-cure in drinking water offered to broiler exerted a significant (P<0.05) effect on FCR of broilers (Table 3). Up to 35 days of age the overall mortality of chicks under different treatments was also recorded during the study period. The number of birds died under different treatments i.e. A, B, C and D were 1, 0, 0 and 2 respectively.

Immune Response

The average values of ND antibody titer under different treatments A (control), B (Arsilvon super), C (Bedgen40) and D (Hepa-cure) were 74.66, 277.33, 256 and 320, respectively. The maximum value of ND antibody titer was found in treatment D followed by B, C and A respectively. Statistical analysis of the data showed that supplementation of herbal products Arsilvon super, Bedgen 40 and Hepa-cure in drinking water showed a significant (P<0.05) effect on antibody titer against ND in broilers. However, addition of different herbal products (Arsilvon super, Bedgen 40 and Hepa-cure) did not show any significant effect on antibody titers against Infectious bursal disease in broilers (Table 4).

Table 3. Evaluation of herbal Medicine Arsilvon Super, Bedgen 40 and Hepa-cure on weight gain, feed consumption and feed conversion ratio of broilers during 2-5 weeks

Variables	Treatment				SEM	P value
	A (Control)	B (Arsilvon super@ 1ml/L)	C (Bedgen40@ 0.5ml/4L)	D (Hepa-cure @1ml/L)		
Number of Birds	30	30	30	30		
Initial body weight (g)	160	155	157	161		
Final body weight gain (g)	1923 ^b	2070 ^a	2000 ^{ab}	2067 ^a	34.66	
Weight gain (g)	1763 ^b	1915 ^a	1843 ^{ab}	1906 ^a	35.11	0.008
Feed consumption (g)	3364	3224	3354	3401	38.59	0.635
Feed conversion ratio	1.91 ^c	1.68 ^a	1.82 ^b	1.78 ^{ab}	0.047	0.006
Mortality	1	0	0	2		

Values within the same row which have different superscripts are significantly different (P<0.05)

Table 4. Antibody titer of broilers against Newcastle and Infectious Bursal disease supplemented with Arsilvon super, Bedgen 40 and Hepa-cure herbal medicines

Variables	Treatment				SEM	P Value
	A (Control)	B (Arsilvon super @ 1ml/L)	C (Bedgen 40 @ 0.5ml/4)	D (Hepa-cure @1ml/L)		
Newcastle disease	74.66 ^b	277.33 ^a	256 ^a	320 ^a	32.74	.009
Infectious Bursal disease	256	181.33	236	320	31.13	.538

Values within the same row which have different superscripts are significantly different (P<0.05)

Table 5. Hematological values of broilers supplemented with Arsilvon super, Bedgen 40 and Hepa-cure herbal medicines

Variables	Treatments				SEM	P Value
	A (Control)	B (Arsilvon Super @ 1ml/L)	C (Bedgen 40 @ 0.5ml/4L)	D (Hepa-cure @ 1ml/L)		
Blood Glucose (mg/dl)	166.66 ^b	153.66 ^a	129 ^a	149.66 ^a	12.86	.002
Cholesterol(mg/dl)	174.33	164.33	154.33	170	4.13	.393
Hemoglobin (g/dl)	9.63	9.73	8.73	11.26	0.62	.603
Red blood cells (RBC's x10 ⁶ /μL)	2.44 ^a	2.05 ^a	1.20 ^b	2.32 ^a	0.17	.018
White blood cells (WBC's x 10 ³ /μL)	12926	15073	12926	14993	4.63	.105
Packed cell volume (PCV %)	30.20	30.37	25.68	34.25	2.09	.617

Hematology

Statistical Analysis of the data revealed that addition of commercial herbal products in drinking water, significantly ($P<0.05$) decreased blood glucose levels of the birds. The mean values of blood glucose under different treatments A (control), B (Arsilvon super), C (Bedgen40) and D (Hepa-cure) were 166.66, 153.66, 129 and 149.66 mg/dl, respectively. Statistical Analysis of the data revealed non-significant effect of herbal medicines on cholesterol level, hemoglobin, packed cell volume and white blood cell count in broilers. However, analysis of variance of the data exhibited significant ($P<0.05$) effect of herbal medicines supplementation on red blood cell count in broiler.

4. Discussion

Performance

The present study showed that the supplementation of herbal medicines Arsilvon super, Bedgen 40 and Hepa-cure broilers revealed non-significant effect on feed consumption of broilers. The result of this study are compatible with the findings of Banjo (2012) who did not revealed any significant improvement in feed consumption due to dietary inclusion of *Moringa oleifera* leaf meal in broiler diet when compared with those fed diet without any supplementation (control) [2]. These results are similar with Gadziraye *et al.* (2012) and Ocak *et al.*, (2008) who reported that by the supplementation of ginger, *Moringa olifera* and garlic there was no significant difference in the feed consumption of the broiler among the different treatment. [11,22]

Supplementation of herbal medicines Arsilvon super, Bedgen 40 and Hepa-cure herbal growth promoters improved FCR values in the broilers. Better FCR may probably be due to improved digestibility of nutrients, because herbs and herbal products can control and bound the growth and colonization of several pathogenic and nonpathogenic species of bacteria in chicken gut. This may lead to a better efficiency in the consumption of feed, resulting in improved growth and feed efficiency [3]. The phenolic compounds of nettle like carvacrol and thymol

exhibited considerable antimicrobial and antifungicidal activity [14]. Another probable cause of better FCR may be the good nutritional value of *Azadirachta indica* and *Berberis vulgaris* [32], *Moringa oleifera* [24] and *Cichorium intybus* and *Mentha pepriminta* [5], good nutritional value might have increased weight gain of the birds in the present study. These findings are compatible with those observed by Nidaullah *et al.* (2010), Portugaliza and Fernandez (2012) who reported improved FCR in broilers offered drinking water supplemented with different herbal plants infusion [21,26]. Similarly Wheeler (2006), who fed herbal medicines to broiler chicken and observed better FCR values at the end of the trial [35].

Immunity

Immune system is the most important system of the body that helps to maintain health. It is made up of tissues, lymph nodes and cells, and is principally designed to kill or inhibit the growth of infection causing organisms. When the immune system or defense system of the body does not work properly then chances of disease outbreak increases which may lead to high economic losses. Supplementation of herbal medicines in drinking water significantly ($P<0.05$) increased the antibody titer against ND in the broilers used in this study. The maximum level of antibody titer against ND was in birds of group D offered drinking water supplemented with Hepa-cure may probably be due to the presence of Hypericum perforatum extract a major constituent of Hepa-cure which is known to have antiviral properties that might have reduced in pathogens and thus helped in boosting immunity. Another possible reason of increased level of antibody titer against ND in the birds may be due to increased activity of neutrophils in blood after vaccination, which could play a major role in body immunity production [13]. Similar results have also been observed by Zafar *et al.*, (2011) [37]. Supplementation of herbal medicines in drinking water did not exhibit any significant effect on antibody titer against Infectious Bursal disease in the broilers. The results of the present study are compatible with those observed by Dorman and Deans (2000) and Fallah *et al.* (2013) [8, 10].

Hematology

Supplementation of herbal medicines in drinking water significantly ($P < 0.05$) lowered the blood glucose level of broilers. The reduction in glucose level might be due to the suppressive effect of herbal plants leaf extracts in the commercial products/solutions on glucagon, which otherwise increases blood glucose in chickens, thereby maintaining blood glucose homeostasis. The results of the present study are in agreement with the findings of Saeid *et al.* (2010) who observed significantly decreased serum glucose in broilers supplemented with aqueous extract of ginger @ 0.4 and 0.6% [29].

Supplementation of herbal medicines in drinking water did not exert any significant effect on blood hemoglobin level, cholesterol level, packed cell volume and white blood cell count of birds. Khosravi *et al.* (2008) reported that the addition of nettle extract to a broiler diet had no significant positive effect on total cholesterol [17]. Barazesh *et al.*, (2013) studied the influence of supplementation of ginseng root powder in diet of broilers on blood hematology and found that the level of hemoglobin remained unaffected [1]. Similar findings have also been observed by Toghiani *et al.* (2010) in chicken fed garlic @ 0.3% [33]. Fluctuations in red blood cell value of avian blood are normal phenomenon and may be associated with the physiological status of the birds reported by Ogbe and Affiku (2013) [23].

The results of the present study are similar with those observed by Olugbemi *et al.* (2010) who reported that red blood cell count decreased due to the supplementation *Moringa oleifera* leaf meal in cassava based diet in broilers [24]. Similar findings have been observed by Zanu *et al.* (2012) in chicken fed Neem leaf meal which did not revealed any effect on red blood cell count in broilers [38]. Supplementation of herbal medicines Arsilvon super, Bedgen 40 and Hepa-cure in drinking water did not exhibit any effect on number of WBCs in broilers of treated groups. The results of the present study are compatible with those observed by Sharifi *et al.* (2013) who reported that white

blood cells count was not affected significantly due to the dietary inclusion of a combination of dried herbs (peppermint, cumin, neem and thymol) @ 2g/Kg diet [30]. Findings of Zanu *et al.* (2012) are also in line with those observed in the present study, who reported that various levels of *Thymus vulgaris* extract in drinking water did not show any difference in the white blood cell count in broilers [38].

Supplementation of herbal medicines did not exhibit any significant effect on PCV value of broilers. These results are compatible with those observed by Kannan *et al.* (2005) who reported that supplementation of oil extract derived from herbal plants (thyme and cinnamon) in drinking water of broilers did not influence their PCV value [16]. Tollba and Hassan (2003) also reported similar observations of addition of polyherbal aqueous extract of black pepper (*Piper nigrum*), nishyinda (*Vitex negundo*) leaves, and cinnamon (*Cinnamomum verum*) in drinking water, in comparison with an antibiotic in broilers [34].

Economics of the production

Average cost of production per broiler kept under different experimental groups (A, B, C and D) was Rs. 224.38, 225.08, 235.93 and 234.045, respectively (Table 6). Labor cost not include in this because the experiment was conducted at Poultry Research Center, University of Agriculture, Faisalabad. Miscellaneous cost was calculated by including the estimated cost of electricity, gas, litter, disinfectants and vaccination which was found to be Rs. 20/bird. The average live weight in experimental groups A, B, C and D was 1.763, 1.915, 1.843 and 1.906 Kg, respectively. The birds were sold on the basis of live weight at the rate of Rs. 130 per Kg. The net profit on per Kg live weight basis was higher in the birds of experimental group which were treated with *Arsilvon Super* as compared to other treatment groups; whereas, the lowest profit was gained from the birds in group C.

Table 6. Data showing economics of broiler production kept under different treatment groups supplementing with herbals medicines in water from 1st to 35th day of age

Variables	Treatment			
	A (Control)	B (Arsilvon super @1ml/L)	C (Bedgen 40 @0.5ml/4L)	D (Hepa-cure @1ml/L)
Chick cost (Rs.)	53	53	53	53
Total feed consumed/bird (Kg)	3.364	3.224	3.354	3.401
Feed cost/Kg (Rs.)	45	45	45	45
Feed cost/bird (Rs.)	151.38	145.08	150.93	153.045
Medicine cost	0	7	12	8
*Miscellaneous charges/ bird (Rs.)	20	20	20	20
Total cost/bird (Rs.)	224.38	225.08	235.93	234.045
Average live weight gain/bird (Kg)	1.763	1.915	1.843	1.906
Sale price/Kg live (Rs.)	130.00	130.00	130.00	130.00
Sale price/bird (Rs.)	229.19	248.95	239.59	247.78
Net profit/bird (Rs.)	4.81	23.87	3.66	13.735

* Miscellaneous includes brooding cost, cost of litter, disinfection and vaccination

The replacement of antibiotic growth promoters with herbal medicines exhibited their effect on profit margin of the broilers. The birds using water supplemented with *Arsilvon Super* fetched the maximum profit in all treatment groups. The results of the present study are in line with the findings of Durrani *et al.* (2008) who reported that supplementation of *Herbal infusion* increased profit margin in broiler when compared to non-supplemented group [9]. Similarly, Zanu *et al.* (2012) reported that dietary inclusion of *Moringa oleifera* leaf meal (MOLM) in the rations was more beneficial in terms of profit margin in broiler production than those fed ration without MOLM supplementation [38]. Behboud *et al.* (2011) also reported a reduction in the cost of feed consumed at higher inclusion level of chicory leaf pulp, which ultimately reduced cost of production of broiler [4].

5. Conclusions

It was concluded from the results of the study that supplementation of *herbal* medicines (Arsilvon super, Bedgen 40 and Hepa-cure) in drinking water revealed better performance in broilers like weight gain, feed consumption, efficiency of feed utilization, stabilization of serum metabolites with better immune response and improved some blood biochemistry.

6. Recommendations

Based upon the results of the study, the birds given water supplemented with herbal medicines showed better performance results along with increased profit margin when they are compared to control groups. Therefore, use of commercial herbal product Arsilvon Superis recommended to be used in broiler production as an inexpensive and efficient herbal growth promoter without any residual or harmful effects, in place of antibiotic growth promoter.

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