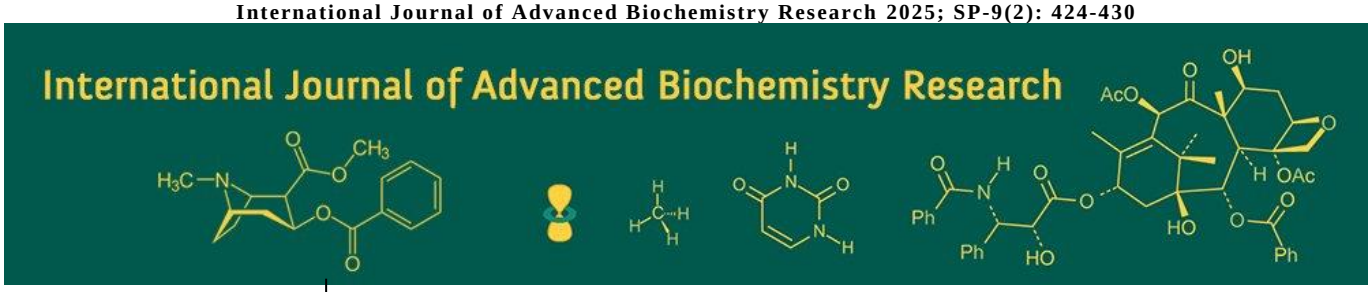

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Effect of phytobiotic herbal immune booster (Sreeni herbal and Vasanthu Sanjeevani plus) on performance, immunity, carcass, sensory evaluation of broilers

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Abstract
The aim of this experiment was to study the effect supplementation of Sreeni herbal (SH) and Vasanthu Sanjeevani plus (VSP) on the growth performance, carcass characteristics, immune status in broiler chicken from day old to 6 weeks of age. 400-day old broiler chicks individually weighed and randomly distributed into 5 dietary treatments with 16 replicates per treatment and each replicate had 5 birds. The first group was kept as a control (T_1) and given the basal diet without antibiotic, second group (T_2) was fed T_1 with antibiotic, T_3 BD + SH Solid gel form thoroughly mixed in feed, T_4-BD + VSP Liquid gel form added to water and T_5 BD + VSP + SH (Moring Sreeni Herbal in feed and evening VSP in water). The results indicated that supplementation of SH (T_3), VSP (T_4) and SH + VSP (T_5) groups resulted in significantly (p<0.05) higher body weight gain and better feed conversion ratio (FCR) compared to control and antibiotic groups at 42 d of age. However, there was significant difference was noticed among SH, VSP and their combination groups in terms of body weight gain and FCR. Supplementation of different dietary groups did not show any significant (p>0.05) effect on feed intake and various slaughter parameters (giblet weight and breast weight) of broilers. However, supplementation of SH, VSP and SH +VSP groups significantly increased the dressing percentage, humoral immune response to NDV titers and Sensory quality parameters compared to other groups. Supplementation of SH (T_3) and SH +VSP combination (T_5) groups significantly increased visible yellowish pigmentation of the skin and leg when compared to VSP (T_4), control and antibiotic groups. Hence, sreeni herbal and vasanthu sanjeevani plus may be used to produce herbal chicken without using any antibiotics in broilers.

Keywords: Broilers, Sreeni herbal, Sanjeevani plus, body weight, FCR, immunity, carcass

1. Introduction
Since the ban imposed on antibiotics usage by EU the current trend in poultry production is aimed at reducing the use of antibiotic growth promoters. The increased awareness among consumers for the poultry products without antibiotic residue encouraged the utilization of suitable alternatives for antibacterial compounds. Herbs and spices have appetizing and stimulatory effects in the digestion process by increasing production of digestive enzymes and juices, which stimulates digestion and peristaltic motion, thus improves feed efficiency (Rajeshwari & Andallu, 2011 and Naeemasa *et al*., 2015) [28, 23]. Thus, the use of medicinal plants and herbs in poultry diets for animal production and health has become more popular worldwide as an alternative to antibiotics (Huyghebaert *et al.* 2011) [14].
Sreeni herbal (SH) and Vasanthu Sanjeevani plus-VSP is a unique blend of natural herbs which consists of ashwagandha, turmeric, aloevera, giloy, amla, tulasi, fenugreek, bhringraj, karanja, cinnamon etc. Sreeni Herbal & Vasanthu Sanjeevani Plus are ammonia free, chemical free and known to improve weight, better feed conversion rate (FCR), immunity and gut health.

2. Materials and Methods
The study was conducted for a period of 6 weeks in the Poultry Experimental Station, Department of Poultry Science, College of Veterinary Science, Rajendranagar, Hyderabad.

To conduct the proposed study, 400 day-old commercial (Ven cobb) broiler chicks were procured, wing banded and individually weighed. The birds were categorized into different class intervals according to body weights. Birds with extreme body weight were deleted and distributed uniformly into 80 replicate groups in such a way that each replicate group had similar mean body weight. Out of these 16 replicate groups were randomly allotted to one of the 5 treatment groups. The chicks were reared in battery brooders under standard managemental conditions and fed with iso caloric and iso nitrogenous corn soya-based diets from day old to 42 d of age. Growth trial was conducted in a completely randomized design comprising 5 dietary treatments; each with 16 replicates having 5 chicks in each. The five diets were given in Table 1 and Basal diet composition was given in Table 2.

Weekly body weight, Feed intake and feed conversion ratios were calculated as feed intake per unit bodyweight gain at weekly intervals. The mortality rate was recorded throughout the experiment. On the day of mortality, the leftover feed was weighed for the sake of accuracy in data collection in feed consumption.

Table 1: Dietary treatment groups

Groups	Group Details	Dose and route
T_1	Basal diet (BD) without additive	---
T_2	BD + Antibiotic	BMD @ 500 gm/ton in feed
T_3	BD + Sreeni Herbal Solid gel form	Direction for use: with feed Pre-Mix Day 1. Morning: 25 gms/100 chicks: Evening: 25 gm/100 chicks Day 7. Mor: 50 gms/100 chicks: Eve.50 gms/100 chicks Day 14. Mor: 75 gms/100 chicks. Eve.75 gms/100 chicks Day 21. Mor:120 gms/100 chicks; Eve.120 gms/100 chicks Day28.Mor:150 gms/100 chicks. Eve.150 gms/100 chicks Day 35. Mor:200 gms/100 chicks.Eve.200 gms/100 chicks. Till slaughter.
T_4	BD + Vasanthu Sanjeevani plus-VSP Liquid gel form	Direction for use : with water Day 1-20 ml/100 chicks Day 7-30 ml/100 chicks Day 14-45 ml/100 chicks Day 21-65 ml/100 chicks Day 28-90 ml/100 chicks Day 35-120 ml/100 chicks
T_5	BD + Vasanthu Sanjeevaniplus + Sreeni Herbal	Moring sreeni herbal in feed (Half of the dose of T_3) and evening Sanjeevani plus in water (Half of the dose of T_4)

Table 2: Basal Diet (BD) Composition

Ingredient	Pre-starter	Starter	Finisher
Maize	55.5	58.5	59.5
Oil	2.8	4	5
Soyabean meal	37.8	33	30
Stone grit	1.4	1.45	1.1
DCP	1.75	1.75	2.17
Salt	0.4	0.42	0.42
Threonine	-	-	0.001
DL-Meth	0.17	0.2	0.19
Lysine	0.14	0.16	0.17
TMM	0.1	0.1	0.1
AB2D3K	0.02	0.02	0.02
B Comp	0.025	0.025	0.025
Choline	0.1	0.1	0.1
Toxin binder	0.1	0.1	0.1
Nutrient composition (Calculated values)			
ME (kcal/kg)	3020	3105	3150
Crude protein (%)	23.05	20.98	19.61
Lysine (%)	1.29	1.21	1.12
Methionine (%)	0.50	0.49	0.48
Calcium (%)	0.90	0.90	0.98
Available phosphorous (%)	0.43	0.42	0.48

*AB2D3K provided per kg diet: Vitamin A 20000 IU, Vitamin B2 25 mg, Vitamin D3 3000 IU, Vitamin K 2 mg.

** Vitamin B-Complex provided per kg diet: Riboflavin 25 mg, Vitamin B1 1 mg, Vitamin B6 2 mg, Vitamin B12 40 mg, and Niacin 15 mg.

***Trace mineral provided per kg diet: Manganese 120 mg, Zinc 80 mg, Iron 25 mg, Copper 10 mg, Iodine 1 mg.

2.1 Slaughter Parameters

At the end of growth trial one bird from each replicate weighing nearer to the mean body weight of the respective treatment was selected and slaughtered. The selected birds were fasted overnight with free access to water and slaughtered by cervical dislocation and allowed for complete bleeding for 5 to 7 minutes. Then removed the neck, feet and skin. Birds were eviscerated manually to take viscera, pancreas and immune organs such as thymus, spleen and bursa of Fabricius. The Dressing body weight, giblet yield (liver, heart and gizzard), intestines weight and weight of edible body parts were weighed with the help of electronic weighing balance. Relative weights of organs were expressed as the percent ratio of organ weight to the live body weight of the bird.

2.2 Immunity Parameters

Blood samples were collected on 3rd and 6th week of age for estimation of ND titers. Haemagglutination inhibition (HI) activity to New castle disease (ND) in serum was estimated and the antibody titers (log_2) were measured by following the standard procedure (Wegmann and Smithies, 1966) [36].

2.3 Meat Quality Parameters

2.3.1 Proximate Analysis: The proximate analysis (Dry matter, Crude protein, Crude fat and Total ash) of meat samples was performed as per the procedures described by AOAC (2012) [2].

2.3.2 Sensory Evaluation: The sensory attributes such as appearance, flavor, texture, juiciness and overall acceptability of the meat samples were evaluated using an 8

point descriptive scale (Keeton, 1983) [19]. In the 8 point scale, scores from 5 to 8 were considered acceptable and scores from 1 to 4 were considered unacceptable. The panel consisted of minimum of 6 trained and experienced members of the institute, who were familiar with the characteristics of the meat. The fresh meat samples were cooked in water bath for 20 minutes at 80ºC by adding salt (0.5% by weight of sample). These coded samples are then served at room temperature in separate sensory evaluation booths. Water was served for cleansing the mouth between samples analysis.

2.3.3 Shear Force Value (SFV): For estimating the warner Bratzler shear force value the meat sample first packed in low density polyethylene bags and sealed properly so as to avoid entry of water then the packed sample cooked in water bath for 10 to 20 minutes at 80ºC. After cooking, the meat samples were made into cores and the cores from each sample were sheared across the length of the meat sample. These sample cores were placed under the V-notched shear blade of the Texture analyzer (Tinius Olsen, HIKF, United Kingdom). Cores were sheared perpendicular to the fiber orientation to measure the shear force. The peak shear force was recorded in newtons (N) and the average value from the three cores was recorded.

2.3.4 pH: The pH of meat sample was estimated following the method of Trout *et al*., (1990) [35]. Five grams of sample was blended with 45 ml of distilled water using Ultra Turrax Tissue Homogenizer (IKA digital ULTRA-TURRAX, Model T-25, Germany) for one minute. The pH was recorded by immersing the glass electrode of digital pH meter (Eutech Instrument, Cyberscan, Singapore Model) into the homogenate. The pH of the sample was measured with the pH meter, which was calibrated with buffer solutions of pH 4, 7 and 14 as per user manual instructions to avoid errors.

2.4 Statistical Analysis
The data were analyzed using General Linear Model procedure of Statistical Package for Social Sciences (SPSS, version 20) by one way analysis of variance and comparison of means was done using Duncan's multiple range test and significance was considered at $p<0.05$. All the statistical procedures were carried out as per the procedures of Snedecor and Cochran (1989) [32] by programming and processing in computer.

3. Results and Discussion
3.1 Body Weight Gain
The data on body weight gain as influenced by different dietary treatments are shown in Table 3 (phase wise and overall performance data). During starter (15-28 d) phase, significantly ($p<0.05$) higher body weight gain was recorded in sreeni herbal (T_3) and antibiotic (T_2) groups followed by sanjeevani plus (T_4) and sanjeevani + sreeni combination groups compared to control. During finisher (29-42 d), there was no significant ($p>0.05$) difference among sreeni herbal (T_3), sanjeevani plus (T_4) and sanjeevani + sreeni combination (T_5) groups but they had significantly ($p<0.05$) higher body weight gain compared to antibiotic (T_2) and control (T_1) groups. However, there was no significant ($p>0.05$) difference was recorded among different dietary treatments during prestarter (0-14 d) phase.

During the overall experimental period (0-42 d), chicks fed on all test diets (T_3 to T_5) exhibited significantly ($p<0.05$) higher body weight gain (0-42 d) compared to control (T_1) and antibiotic (T_2) groups. The highest cumulative body weight gain was recorded in sreeni herbal (2663 g) and sanjeevani plus (2657 g) groups followed by sanjeevani + sreeni combination (2614 g). However, the lowest weight gain was recorded in control (2510 g) and antibiotic (2568 g) groups. These findings are in agreement with Tingare *et al*., (2023) [34], Gowri *et al*., (2023) [11], Jain (2021) [16], Jyotsana *et al*., (2019) [18], Gohel *et al*., (2019) [9] who observed significantly increased body weights of broilers with the supplementation of turmeric, amla, giloy, ashwagandha and combination of tulsi & aloevera, respectively. Increase in body weight might be attributed to antioxidant properties of ashwagandha (Ziauddin *et al*., 1996) [37], amla (McDowell, 1989) [21], enhanced secretions of digestive enzymes by curcumin present in turmeric (Platel and Srinivasan, 2000) [26], anabolic properties of giloy (Singh *et al*., 2018) [31] and bioactive components present in aloevera and fenugreek.

Table 3: Effect of VSP and sreeni herbal supplementation on body weight gain (g) of broiler chicken

S. No	Diets	Pre-starter (0-14 d)	Starter (15-28 d)	Finisher (29-42 d)	Cumulative BWG (0-42 d)
T_1	Control	383	995^{c}	1131^{b}	2510 c
T_2	Antibiotic	392	1040^{a}	1136^{b}	2568^{b}
T_3	Sreeni Herbal	393	1035^{a}	1235^{a}	2663^{a}
T_4	Sanjeevani plus	389	1021^{ab}	1247^{a}	2657^{a}
T_5	Sanjeevani plus + Sreeni Herbal	387	1008^{bc}	1218^{a}	2614^{ab}
SEM		3.571	4.165	9.062	10.824
N		16	16	16	16
P-value		0.916	0.002	0.001	0.001

Values bearing different superscripts within a column are significantly ($p<0.05$) different

3.2 Feed Intake
The ANOVA revealed that there were no significant ($p>0.05$) differences in feed intake among different dietary treatments during starter (15-28 d), finisher phase (29-42d) and also during overall (0-42 d) experimental period. However, diets showed significant ($p>0.05$) difference in feed intake during the pre-starter (0-14 d) period. Significantly ($p<0.005$) higher feed intake was recorded in T_3 and T_5 when compared to other groups. The feed intake values at 42 d of age ranged between 4189 g to 4272 g (Table 4). Similar to this study, Singh *et al*. (2018) [30], Patil *et al*. (2014) [25], Islam *et al*. (2020) [15] and Gupta *et al*. (2018) [12] supplemented turmeric, amla, aloevera and giloy, respectively to the broilers and discovered no significant difference in feed consumption of birds. However, on contrary to the present finding, Chowdhary *et al*. (2021) [7]

stated that there was significant increase in feed intake of broilers supplemented with 0.6% turmeric+0.4% garlic and Gowri *et al*. (2023) [11] observed improved feed intake in broilers supplemented with amla juice through water.

Table 4: Effect of VSP and sreeni herbal supplementation on feed intake (g) of broiler chicken

S. No	Diets	Pre-starter (0-14 d)	Starter (15-28 d)	Finisher (29-42 d)	Cumulative Feed intake (0-42 d)
T_1	Control	460[b]	1534	2277	4272
T_2	Antibiotic	463[b]	1554	2248	4266
T_3	Sreeni Herbal	488[a]	1528	2221	4237
T_4	Sanjeevani plus	465[b]	1533	2218	4218
T_5	Sanjeevani plus + Sreeni Herbal	481[a]	1521	2186	4189
SEM		2.621	5.299	13.480	17.660
N		16	16	16	16
P-value		0.001	0.371	0.273	0.557

Values bearing different superscripts within a column are significantly (p<0.05) different

3.3 Feed conversion ratio (FCR)

Statistical analysis on FCR values revealed significant (p<0.05) difference among different dietary treatments during finisher (29-42 d) phase and during overall (0-42 d) period. But there was no significant (p>0.05) difference was noticed among different dietary treatments during prestarter (0-14 d) and starter (15-28 d) phases (Table 5). During the finisher (29-42 d) phase, significantly (p<0.05) better FCR was recorded in sreeni herbal (T_3), sanjeevani plus (T_4) and sanjeevani + sreeni combination group compared to control and antibiotic groups.

During overall period (0-42 d), Supplementation of sreeni herbal (T_3), sanjeevani plus (T_4) and sanjeevani + sreeni combination (T_5) significantly (p<0.05) improved the feed conversion ratio during overall period (0-42 d) compared to control and antibiotic groups. The best FCR was recorded with sreeni herbal (1.59) and sanjeevani plus (1.59) and sanjeevani + sreeni combination (1.60), whereas poor FCR was noticed with control (1.70) and Antibiotic (1.66) groups (Table 5). Similar results were observed in a trial conducted by Singh *et al*. (2018) [31] supplemented broilers with graded levels of giloy stem powder, Islam *et al*. (2020) [15] who observed effect of aloe vera and amla on broilers performance and Gohel *et al*. (2019) [9] who supplemented aloevera and tulsi in combination. However, Parvin *et al*. (2021) [24], Patil *et al*. (2014) [25] and Joshi *et al*. (2015) [17] did not find any significant difference in feed conversion ratio of birds which fed turmeric, amla and giloy, respectively. Improved FCR might be attributed to active phytochemical components present in chosen additives (SH & VSP) which might have stimulated the digestion system in poultry and improved the absorption, thereby FCR.

Table 5: Effect of sanjeevani plus and sreeni herbal supplementation on phase wise feed conversion ratio (FCR) of broiler chicken

S. No	Diets	Pre-starter (0-14 d)	Starter (15-28 d)	Finisher (29-42 d)	Cumulative FCR (0-42 d)
T_1	Control	1.20	1.54	2.02[b]	1.70[b]
T_2	Antibiotic	1.18	1.50	1.99[b]	1.66[b]
T_3	Sreeni Herbal	1.25	1..48	1.80[a]	1.59[a]
T_4	Sanjeevani plus	1.24	1.50	1.78[a]	1.59[a]
T_5	Sanjeevani plus + Sreeni Herbal	1.24	1.51	1.80[a]	1.60[a]
SEM		0.018	0.008	0.019	0.010
N		16	16	16	16
P-value		0.742	0.157	0.001	0.001

Values bearing different superscripts within a column are significantly (p<0.05) different

3.4 Mortality

It was observed that all the mortality occurred only during prestarter phase (0-14 d), which was primarily due to unabsorbed yolk condition. However, the mortality rate was within the acceptable range and no specific disease outbreak was recorded. None of the groups showed any adverse signs or behavioral changes during the course of the study.

3.5 Immunity Parameters

Supplementation of SH, VSP and their combination diets significantly (p<0.05) increased the relative weights of bursa, spleen and thymus compared to control (T_1) and antibiotic (T_2) groups (Table 6). These findings are in agreement with Badran (2020) [4] who found improved bursa of Fabricius weight by supplementing curcumin. However, Qasem *et al*. (2015) [27] and Mandal *et al*. (2017) [20] did not find any significant effect on lymphoid organ weights on supplementation of turmeric and amla, respectively.

The data on humoral immune response was evaluated in terms of antibody response to ND vaccine at 3rd and 6th week of age using serum HI activity. The mean log2 titer values were significantly (p<0.05) higher in sanjeevani plus (T_4) and sanjeevani + sreeni combination group followed by sreeni herbal (T_3) compared to control (T_1) and antibiotic (T_2) groups at 3 weeks of age. Among all the treatments, significantly (p<0.05) higher NDV titers were recorded in sreeni herbal (T_3) group during 6th week of age. The NDV titer values in other groups were intermediate and higher than control and antibiotic during 6th week of age. These findings are in agreement with Bhardwaj *et al*. (2012) [6] who supplemented giloy to the broilers, Badran (2020) [4], Sugiharto *et al*. (2021) [33] and Abou *et al*. (2014) [1] supplemented turmeric to the broilers. However, adding supplements of turmeric and giloy to the broilers did not have any appreciable effects on HI titres, according to Fallah and Mirzaei (2016) [8] and Govind *et al*., (2022) [10],

respectively. Improved immunity might be attributed to antimicrobial, immuno-modulatory, anti-stress properties of plant extracts present in Sreeni herbal and Sanjeevani plus.

3.6 Carcass Parameter

The analysis of variance revealed that all the treatment groups failed to exert any significant (p>0.05) influence on slaughter parameters like giblet weights, breast weight, liver, heart and gizzard and giblet yield except dressing percentage and abdominal fat percentage (Table 7). Supplementation of sreeni herbal (T_3), sanjeevani plus (T_4) and sanjeevani + sreeni combination (T_5) groups significantly increased the dressing percentage compared to control and antibiotic groups. Supplementation of all test diets (T_3 to T_5) significantly reduced the abdominal fat percentage compared to control and antibiotic groups. Among all the treatments, lowest abdominal fat percentage was noticed in sreeni herbal (T_3) group. In agreement with the present study, Hussein (2013) [13], Mondal *et al*. (2015) [22] and Parvin *et al*. (2021) [24] found significantly improved dressing percentage and decreased abdominal fat percentage by turmeric supplementation, and Abou *et al*. (2023) [1] and Gupta *et al*. (2018) [12] found the same with amla and giloy supplementation in the broilers. Increase in dressing percentage might be attributed to anabolic and antioxidant properties of curcumin, tinosporine and ascorbic acid present in turmeric, giloy and amla, respectively. Decrease in abdominal fat percentage might be attributed to hypolipidemic property of turmeric, amla, aloevera, cinnamon, ashwagandha, fenugreek and giloy.

Supplementation of sreeni herbal (T_3) and sanjeevani + sreeni combination (T_5) groups significantly increased visible yellowish pigmentation of the skin and leg when compared to sanjeevani plus (T_4), control and antibiotic groups. The meat does not show any undesirable color or flavor characteristics. The yellow pigmentation of the skin and leg is due to the better absorption of the curcuminoids from sreeni herbal group.

Table 7: Effect of VSP and sreeni herbal supplementation on slaughter parameters (% live weight) of broiler chicken

Trt	Diets	Dressing percentage	Giblets weight	Breast weight	liver	Heart	gizzard	Abdominal fat percentage
T_1	Control	64.55^{c}	3.51	23.11	1.63	0.43	1.45	1.95^{c}
T_2	Antibiotic	66.79^{b}	3.29	23.06	1.51	0.38	1.41	2.07^{c}
T_3	Sreeni Herbal	68.53^{ab}	3.50	23.28	1.48	0.44	1.57	1.32^{a}
T_4	Sanjeevani plus	69.32^{a}	3.74	23.18	1.64	0.46	1.64	1.62^{b}
T_5	SH + VSP	68.00^{ab}	3.75	23.32	1.76	0.47	1.53	1.59^{b}
SEM		0.434	0.059	0.331	0.060	0.042	0.014	0.033
N		16	16	16	16	16	16	16
P-value		0.001	0.070	0.999	0.238	0.289	0.182	0.001

Values bearing different superscripts within a column are significantly (p<0.05) different

3.7 Meat quality Parameters

3.7.1 Sensory Evaluation

Color, appearance, flavor, juiciness, tenderness and over all acceptability were significantly (p<0.05) higher in groups supplemented with sreeni herbal (T_3), VSP (T_4) and sanjeevani + sreeni combination (T_5) groups when compared to control and antibiotic, Whereas the values of texture were not affected significantly (p>0.05) by the addition of different dietary treatments (Table 8). The findings in terms of sensory evaluation are in agreement with Bharambe and Garde (2020) [5], who reported significant improvement in appearance, colour, juiciness, tenderness and overall acceptability of meat of broilers supplemented with giloy and fenugreek powder. Improvement in organoleptic characters of the meat could be attributed to the essential oils and phytochemical constituents present in turmeric, amla, aloevera, cinnamon, tulsi, fenugreek and giloy.

3.7.2 Proximate Composition of Breast Meat:

Moisture percentage, dry matter (%), crude fat (%), crude fiber (%), total ash (%) and NFE (%) of breast muscle did not show any significant (p>0.05) difference among different treatments, while crude protein (%) content of breast muscle was increased significantly (p<0.05) in T_3, T_4 and T_5 groups compared to control and antibiotic groups (Table 9). Hussein (2013) [13] on supplementing turmeric to the broilers observed significant improvement in CP% of breast meat sample whereas dry matter, crude ash and crude fat remain unchanged as in agreement with the present finding. Sharma *et al*. (2019) [29] also observed significant improvement in CP% of broiler meat supplemented with phytogenic mixture containing amla, turmeric and ashwagandha. Increase in CP% in meat sample might be attributed to anabolic properties and various amino acids present in the amla, turmeric, ashwagandha, aloevera, fenugreek, tulasi, giloy etc.

3.7.3 Shear Force Value (SFV): The values for shear force on breast meat of broilers were ranged between 4.88 and 6.88 Newtons (Table 10). Supplementation of sreeni herbal, sanjeevani plus and their combination in diet significantly (p<0.05) reduced SFV when compared to birds fed on control and antibiotic groups, while shear force values of birds supplemented with T_3, T_4 and T_5 were similar. Decrease in shear force which implies tenderness in meat might be attributed to essential oils present in botanical feed additives present in Sreeni herbal and sanjeevani plus which might possess tenderizing property.

3.7.4 pH: Table 10 represent pH on 0, 3 and 6 d of storage (4 ± 1^{0} ^{c}). The value of pH on 0, 3 and 6 d. The pH values were significantly (p<0.05) reduced in birds fed with sreeni herbal, sanjeevani plus individually and their combination compared to control and antibiotic groups, while pH values of sreeni herbal, sanjeevani plus and their combination were similar. The present finding is in agreement with Sharma *et al*. (2012) [29], who noticed significant reduction in pH of meat sample of the broiler supplemented with turmeric compared to control. On contrary to the present study, Attia *et al*. (2017) [3] did not find any significant difference in colour, tenderness, proximate analysis and pH of meat sample supplemented with turmeric.

Proteolysis caused by bacterial development causes an increase in pH during storage, decrease in pH in the present study in T_3, T_4 and T_5 groups might be attributed to

bioactive principles of botanical feed additives present in Sreeni herbal and Sanjeevani plus i.e. turmeric, ashwagandha, aloevera, amla, fenugreek, giloy etc.

Table 8: Effect of sanjeevani plus and sreeni herbal supplementation on sensory evaluation of broiler chicken

S. No	Diets	Colour	Appearance	Flavor	Texture	Juiciness	Tenderness	Over all acceptability
T_1	Control	6.33^b	5.67^b	5.33^b	5.83	5.50^b	5.50^b	5.67^b
T_2	Antibiotic	6.50^b	5.50^b	5.58^b	4.83	5.83^b	6.00^b	6.17^b
T_3	Sreeni Herbal	7.83^a	7.83^a	7.33^a	6.00	7.67^a	7.83^a	7.67^a
T_4	Sanjeevani plus	7.50^a	7.67^a	7.67^a	6.00	7.17^a	7.67^a	7.33^a
T_5	SH + VSP	7.67^a	7.50^a	7.67^a	6.00	7.67^a	7.67^a	7.33^a
SEM		0.167	0.209	0.227	0.291	0.196	0.225	0.173
N		6	6	6	6	6	6	6
P-value		0.002	0.001	0.001	0.685	0.001	0.001	0.001

Table 9: Effect of sanjeevani plus and sreeni herbal supplementation on proximate composition of breast meat sample in broiler chicken

S. No	Diets	Moisture (%)	Dry Matter (%)	Crude Protein (%)	Crude fat (%)	Crude fiber (%)	Total ash (%)	Nitrogen free extract (%)
T_1	Control	74.34	25.30	21.84^b	9.49	0.33	5.39	2.26
T_2	Antibiotic	73.97	25.77	21.94^b	9.50	0.33	5.30	2.25
T_3	Sreeni Herbal	73.99	25.55	22.97^a	9.28	0.31	5.18	2.36
T_4	Sanjeevani plus	74.20	25.50	23.03^a	9.67	0.38	5.44	2.33
T_5	SH + VSP	73.50	25.51	22.57^a	9.71	0.32	5.56	2.36
SEM		0.148	0.243	0.149	0.228	0.014	0.088	0.033
N		6	6	6	6	6	6	6
P-value		0.495	0.990	0.001	0.987	0.680	0.789	0.764

Table 10: Effect of sanjeevani plus and sreeni herbal supplementation on Shear force value and breast meat pH of broiler chicken

S. No	Diets	Shear force (N)	pH		
			0 day	3 day	6 day
T_1	Control	6.79^b	6.22^b	6.17^b	5.90 c
T_2	Antibiotic	6.87^b	6.23^b	6.15^b	5.85^{bc}
T_3	Sreeni Herbal	5.47^a	6.04^a	6.01^a	5.75^a
T_4	Sanjeevani plus	5.42^a	6.08^a	6.04^a	5.76^{ab}
T_5	SH + VSP	5.40^a	6.07^a	6.06^a	5.80^{ab}
SEM		0.129	0.021	0.016	0.016
N		6	6	6	6
P-value		0.001	0.001	0.001	0.013

4. Conclusion

Finally, it could be concluded that supplementation of sreeni herbal, vasanthu sanjeevani plus and vasanthu sanjeevani plus + sreeni herbal combination can be used as an alternative to antibiotic growth promoter to improve overall performance (body weight gain, FCR, dressing percentage, yellowish pigmentation of the skin, immunity) of broiler chicken. Further, supplementation of sreeni herbal, sanjeevani plus individually and their combination improved the breast meat protein content, meat color, appearance, flavor, juiciness, tenderness and over all acceptability. Hence, sreeni herbal and vasanthu sanjeevani plus may be used to produce herbal chicken without using any antibiotics in broilers.

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