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Effect of Shatavari (*Asparagus racemosus*) supplementation on production indices of broiler chicken

Ramesh Kumar, Devender Singh Bidhan, Ravi Kumar, Vikramjeet Singh, Suresh Kumar Chhikara and Harish Kumar Gulati

Abstract
The present study investigated the effect of dietary supplementation of Shatavari on the energy efficiency ratio (EER), protein efficiency ratio (PER), performance index (P.I) and production number (P.N) of broiler chicken. Two hundred and twenty-five, day old unsexed broiler chicks were randomly allotted to 5 treatments with 3 replicates, each consisting of 15 chicks. The treatments included the control group (T_1 - basal diet) and four groups with basal diet mixed with Shatavari powder @ 0.5% (T_2), @ 1% (T_3), 1.5% (T_4) and @ 2% (T_5) in feed, respectively. The results revealed that PER and EER values of broilers at 21st and 35th day remained significantly better ($P<0.05$) in T_3 as compared to T_4 and T_5 treatments. At 42nd day, PER and EER values showed that treatment T_3 was significantly differ ($P<0.05$) from treatment T_1, T_4 and T_5. The mean P.I values of broilers at 21st day, were significantly higher ($P<0.05$) in T_3 treatment as compared to T_4 and T_5 treatments. At 28th day, mean P.I value of T_3 treatment was significantly higher ($P<0.05$) than T_5 treatment. At 35th day, treatment T_3 was significantly differ ($P<0.05$) from T_4 and T_5, also significant difference was observed between treatments T_2 and T_5. At 42nd day, the trend in effect on mean P.I values were similar and treatment T_3 was significantly differ from treatments T_1, T_2, T_4 and T_5. The mean P.N values of broilers at 42nd day of the experiment were significantly higher ($P<0.05$) in T_3 treatment as compared to T_1, T_4 and T_5 treatments whereas non-significant difference was observed between T_1, T_2, T_4 and T_5 treatments.

Keywords: Shatavari powder, broiler chicken, production indices

Introduction
Poultry population in the India has increased by 12.39% over the previous census and the total poultry in the country is 729.2 million numbers in 2012 (Livestock Census, 2012) [16]. Feed supplement or additive is a substance or mixture used in minor quantity other than basic feed ingredients in order to complement certain nutrients for improving performance of birds (Narhari 1992) [19]. In the past, the major growth promoters were antibiotics as antibiotic growth promoters (AGP) have been helpful in improvement of growth performance and feed conversion ratio in poultry (Miles *et al*., 2006; Dibner and Buttin, 2002 and Izat *et al*., 1990) [17, 9, 13]. However, constant treatment of poultry by antibiotics may result in residues of these substances in poultry products and bacterial resistance against treatments in the human body. Due to such threats to human health, use of antibiotics in poultry is banned in many countries (Owens *et al*., 2008; Alcicek *et al*., 2004; Botsoglou and Fletouris 2001 and Hinton, 1988) [20, 1, 5, 12]. On the other hand, use of Non–Antibiotic growth promoters (NAGP) is commonly regarded as favourable alternatives to AGP in poultry production. The main advantage of NAGP over AGP is that they usually do not bear any risk regarding bacterial resistance or undesired residues in meat. Addition of NAGP to feed of poultry may have a number of beneficial effects, including rapid development of a healthy gut microflora and stabilization of digestion along with improved feed efficiency. NAGP include predominantly organic acids, probiotics, prebiotics, synbiotics, phytogenics, feed enzymes and immune stimulants. Among these alternatives, phytogenics are drawing much attention now-a-days.
Shatavari (*Asparagus racemosus*) is the one of the most commonly used herb in traditional medicine due to the presence of steroidal saponins and sapogenins in various part of the plant (Krishana *et al.*, 2005) [15]. Traditionally it is used as a health tonic (Pandey and Nighantu, 1998) [21] and common Indian home remedy used as rejuvenator, promoter of strength, breast milk and semen (Dash, 1991) [8].

It is also used for cough, dyspepsia, edema, rheumatism, chronic fevers, aphrodisiac, cooling tonic antispasmodic, diarrhea and dysentery (Nadkarni, 1976) [18]. It is also used for enhancing milk production in freshly parturient and lactating woman (Chopra and Simon, 2000) [16]. The tuberous root of Shatavari (*Asparagus racemosus*) is well known for its galactogogue and anabolic activity (Chopra *et at*., 1956) [7] and it appears in many Ayurvedic preparations as growth promoters and immune-stimulant.

Keeping in view the facts stated above, the present research was conducted to observe the effect of supplementation of Shatavari on the production indices of broiler chicken.

Materials and Methods

The present investigation was conducted for 42 days on two hundred and twenty-five, day old unsexed broiler chicks of Ven-Cobb strain-400 at the Poultry section of the Department of Livestock Production Management, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar, with prior approval by the Institutional Animal Ethics Committee.

The broiler chicks were randomly distributed into five treatment groups each having 45 chicks and each group was further divided into three replicates of 15 chicks each. The treatments included the control group (T_1 -basal diet as per BIS, 2007 specifications) and four groups with basal diet mixed with Shatavari powder @ 0.5% (T_2), @ 1% (T_3), 1.5% (T_4) and @ 2% (T_5) in feed, respectively. The chicks were fed with standard basal diets in three different growth phases i.e. pre-starter (0-7day), starter (8-21day) and finisher (22–42 day). The chicks were routinely vaccinated and reared under strict hygienic conditions maintaining all standard managemental practices including brooding, lighting, litter management, cleaning of feeders and drinkers etc.

Observations recorded

Production indices

1. Performance Index

Performance Index (P.I) was calculated by applying the following formula advocated by Bird (1995) [3]:

$$P.I = \frac{(\text{Body weight Gain})^2}{\text{Feed consumed}}$$

2. Protein efficiency ratio

Protein efficiency (P.E.R) was calculated as suggested by Kamran *et al.* (2008):

$$P.E.R = \frac{\text{Body weight gain (g)}}{\text{Protein intake (g)}}$$

3. Energy efficiency ratio

Energy efficiency (E.E.R) was calculated as suggested by Kamran *et al*. (2008) [14]:

$$E.E.R = \frac{\text{Body weight gain (g) x 100}}{\text{Total ME intake (Kcal)}}$$

4. Production number

Production number (P.N) was calculated as suggested by Euribrid (1994) [11]:

$$P.N = \frac{\text{Average weight gain (g) x percentage livability}}{\text{Days of fattening x FCR x 10}}$$

Statistical analysis

Data obtained were subjected to statistical analysis as per Snedecor and Cochran (1994) [22] using Completely Randomized Design (CRD). All the data were subjected to ANOVA using the General Linear Models procedure of SAS software (SAS Institute, 2003). The mean differences among different treatments were separated by Duncan's multiple range tests. Consequently, a level of (P<0.05) was used as the criterion for statistical significance (Duncan, 1955) [10].

Results and Discussion

1. Performance Index

The weekly performance index (P.I) of broilers fed diets supplemented with Shatavari is presented in Table 1 and depicted in Fig. 1. The mean P.I values of broilers at 7 and 14 days remained non-significantly different in all the treatments. At 21st day, mean P.I value of T_3 treatment was significantly higher (P<0.05) as compared to T_4 and T_5 treatments, whereas non-significant difference was found between treatments T_1 and T_2 as well as in T_4 and T_5. At 28th day, mean P.I value of T_3 treatment was significantly higher (P<0.05) than T_5 treatment, and treatment T_1, T_2 and T_4 were at par from all other treatments. At 35th day, treatment T_3 was significantly differ (P<0.05) from T_4 and T_5, also significant difference was observed between treatments T_2 and T_5 whereas non-significant difference was observed between treatments T_1 and T_2 as well as in T_4 and T_5. At 42nd day, the trend in effect on mean P.I values were similar and treatment T_3 was significantly differ from treatments T_1, T_2, T_4 and T_5 whereas non-significant difference was observed between treatments T_1 and T_2 as well as in T_4 and T_5.

Table 1: Effect of Shatavari on mean performance index of broilers

Time period (days)	Treatments				
	T_1	T_2	T_3	T_4	T_5
0-7	43.18 ± 1.64	43.05 ± 0.64	43.83 ± 0.02	42.12 ± 0.91	41.51 ± 0.77
0-14	98.10 ± 3.05	100.11 ± 1.88	104.02 ± 3.85	96.72 ± 1.17	93.51 ± 5.01
0-21	229.22^{ab} ± 1.92	231.04^{ab} ± 1.71	236.05^{a} ± 2.99	225.03^{bc} ± 1.96	221.63^{c} ± 2.40
0-28	441.04^{ab} ± 3.83	442.49^{ab} ± 3.54	450.06^{a} ± 6.78	434.77^{ab} ± 4.86	430.79^{b} ± 5.63
0-35	699.49^{abc} ± 8.58	704.40^{ab} ± 4.70	722.55^{a} ± 8.54	681.47^{bc} ± 10.77	675.41^{c} ± 6.93
0-42	943.40^{bc} ± 12.60	951.10^{b} ± 5.72	981.16^{a} ± 9.97	917.59^{cd} ± 9.42	912.26^{d} ± 0.89

Values are means ±standard errors.

Means bearing different superscripts differ significantly (P<0.05) row wise.

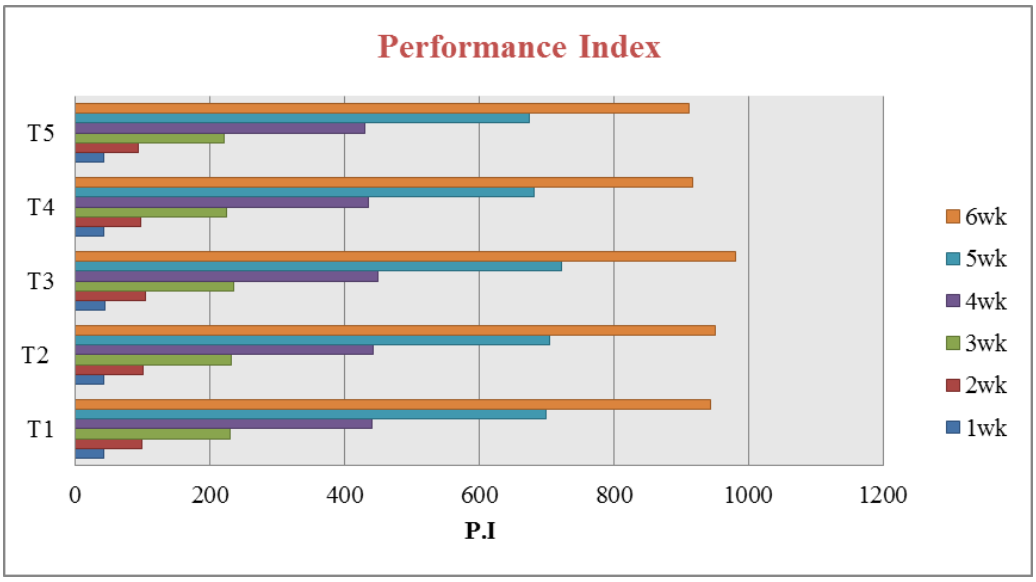

Fig 1: Effect of Shatavari on mean performance index (P.I) of broilers

2. Protein efficiency ratio (P.E.R)

The treatment means of protein efficiency ratio (P.E.R) showing significance of Shatavari supplementation have been shown in Table 2 and the same is depicted in Fig. 2. The mean P.E.R values of broilers at 7, 14 and 28 day period remained not significantly different in all treatments. The mean P.E.R values of birds at 21st and 35th day remained significantly better ($P<0.05$) in T_3 as compared to T_4 and T_5 treatments whereas non-significant difference was observed between treatment T_1 and T_2 as well as T_4 and T_5. At 42nd day, comparison of means showed that treatment T_3 was significantly differ ($P<0.05$) from treatment T_1, T_2, T_4 and T_5 whereas non-significant difference was observed between treatment T_1 and T_2 as well as T_4 and T_5.

Table 2: Effect of Shatavari on mean protein efficiency ratio (P.E.R) of broilers

Time period (days)	Treatments				
	T_1	T_2	T_3	T_4	T_5
0-7	2.64 ± 0.03	2.62 ± 0.03	2.64 ± 0.00	2.60 ± 0.03	2.58 ± 0.03
0-14	2.69 ± 0.02	2.72 ± 0.04	2.76 ± 0.05	2.67 ± 0.02	2.63 ± 0.07
0-21	2.57^{ab} ± 0.01	2.58^{ab} ± 0.01	2.61^{a} ± 0.02	2.54^{bc} ± 0.01	2.52^{c} ± 0.01
0-28	2.67 ± 0.02	2.67 ± 0.02	2.70 ± 0.02	2.65 ± 0.02	2.64 ± 0.02
0-35	2.67^{ab} ± 0.02	2.67^{ab} ± 0.01	2.71^{a} ± 0.03	2.61^{b} ± 0.03	2.60^{b} ± 0.01
0-42	2.61^{b} ± 0.02	2.62^{b} ± 0.01	2.67^{a} ± 0.02	2.56^{c} ± 0.02	2.55^{c} ± 0.00

Values are means ±standard errors.
Means bearing different superscripts differ significantly ($P<0.05$) row wise.

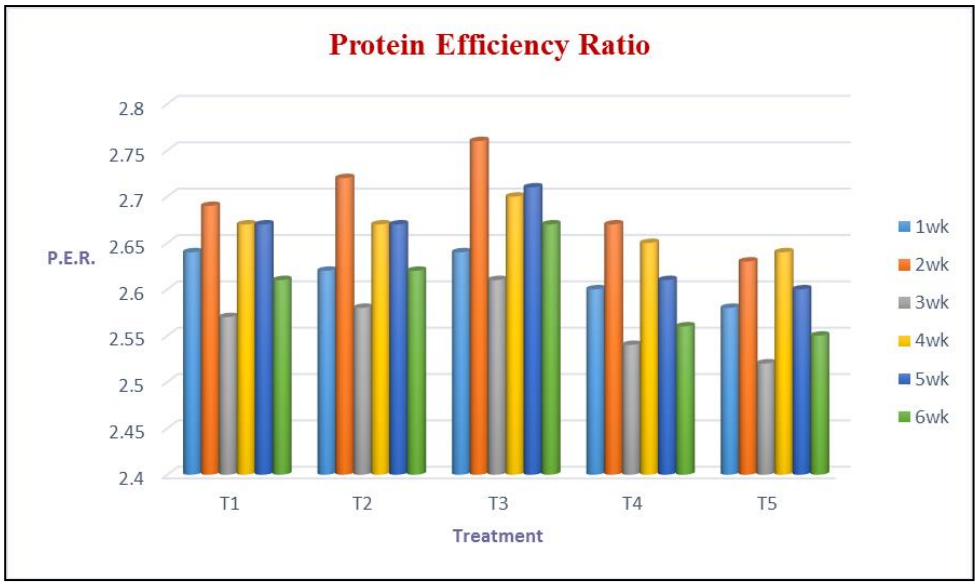

Fig 2: Effect of Shatavari on mean protein efficiency ratio (P.E.R) of broilers

3. Energy efficiency ratio (E.E.R)

The treatment means of energy efficiency ratio (E.E.R) showing significance of Shatavari supplementation have been shown in Table 3 and depicted in Fig. 3. The mean E.E.R

values of broilers at 7, 14 and 28 day period remained not significantly different in all treatment groups. The mean E.E.R. values of birds at 21st and 35th day remained significantly better ($P<0.05$) in T_3 as compared to T_4 and T_5 treatments whereas treatment T_1 and T_2 exhibited statistically comparable differences from each other. At 42nd day, comparison of means showed that treatment T_3 was significantly differ ($P<0.05$) from treatment T_1, T_4 and T_5 whereas non-significant difference was observed between treatment T_4 and T_5.

Table 3: Effect of Shatavari on mean energy efficiency ratio (E.E.R) of broilers

Time period (days)	Treatments				
	T_1	T_2	T_3	T_4	T_5
0-7	20.74 ± 0.20	20.59 ± 0.25	20.78 ± 0.01	20.47 ± 0.21	20.30 ± 0.23
0-14	19.38 ± 0.15	19.58 ± 0.30	19.91 ± 0.34	19.25 ± 0.12	18.91 ± 0.49
0-21	18.52^{ab} ± 0.10	18.56^{ab} ± 0.09	18.79^{a} ± 0.09	18.30^{bc} ± 0.08	18.16^{c} ± 0.10
0-28	16.71 ± 0.10	16.69 ± 0.14	16.85 ± 0.11	16.56 ± 0.13	16.48 ± 0.11
0-35	16.66^{ab} ± 0.13	16.70^{ab} ± 0.08	16.93^{a} ± 0.16	16.34^{b} ± 0.22	16.25^{b} ± 0.06
0-42	16.31^{b} ± 0.13	16.36^{ab} ± 0.05	16.67^{a} ± 0.12	15.97^{c} ± 0.13	15.93^{c} ± 0.02

Values are means ±standard errors.
Means bearing different superscripts differ significantly ($P<0.05$) row wise.

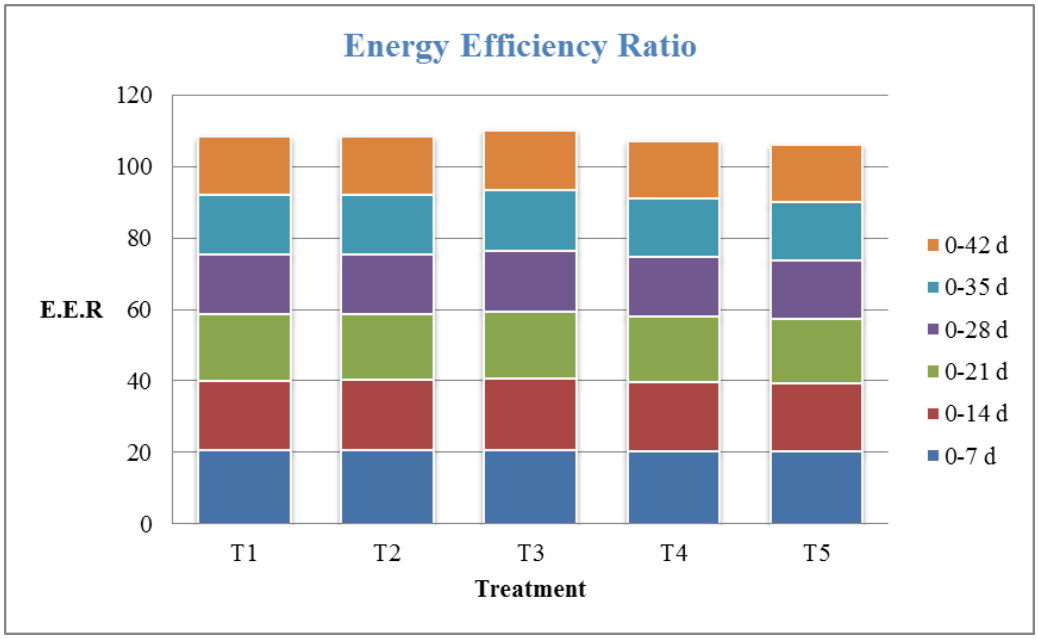

Fig 3: Effect of Shatavari on mean energy efficiency ratio (E.E.R) of broilers

4. Production Number (P.N)

The weekly production number (P.N) of broilers fed diets supplemented with Shatavari is presented in Table 4 and depicted in Fig. 4. The mean P.N values of broilers at up to 35th day of the experiment period remained non-significantly different in all treatment groups. At 42nd day of experiment, the mean P.N values of T_3 treatment were significantly higher ($P<0.05$) as compared to T_1, T_4 and T_5 treatments whereas non-significant difference was observed between T_1, T_2, T_4 and T_5 treatments. The mean values ranged from 97.73 (T_5) to 101.83 (T_3), 82.55 (T_1) to 90.75 (T_3), 111.73 (T_5) to 117.26 (T_3), 146.09 (T_1) to 155.10 (T_3), 186.62 (T_5) to 205.84 (T_3) and 201.71 (T_5) to 219.90 (T_3) during 1, 2, 3, 4, 5 and 6 weeks, respectively.

Table 4: Effect of Shatavari on mean production number (P.N) of broilers

Time period (days)	Treatments				
	T_1	T_2	T_3	T_4	T_5
0-7	100.81 ± 2.85	100.46 ± 1.44	101.83 ± 0.20	98.87 ± 1.61	97.73 ± 1.49
0-14	82.55 ± 3.62	89.46 ± 2.13	90.75 ± 2.89	85.86 ± 1.71	82.57 ± 5.43
0-21	112.28 ± 3.57	115.20 ± 3.00	117.26 ± 5.61	112.69 ± 2.76	111.73 ± 2.09
0-28	146.09 ± 1.25	149.39 ± 1.54	155.10 ± 4.58	151.15 ± 5.83	150.30 ± 5.57
0-35	192.02 ± 3.11	199.33 ± 10.12	205.84 ±11.85	188.50 ± 9.51	186.62 ± 6.85
0-42	203.24^{b} ± 2.74	210.47^{ab} ± 6.17	219.90^{a} ± 4.69	202.24^{b} ± 4.33	201.71^{b} ± 3.80

Values are means ±standard errors.
Means bearing different superscripts differ significantly ($P<0.05$) row wise.

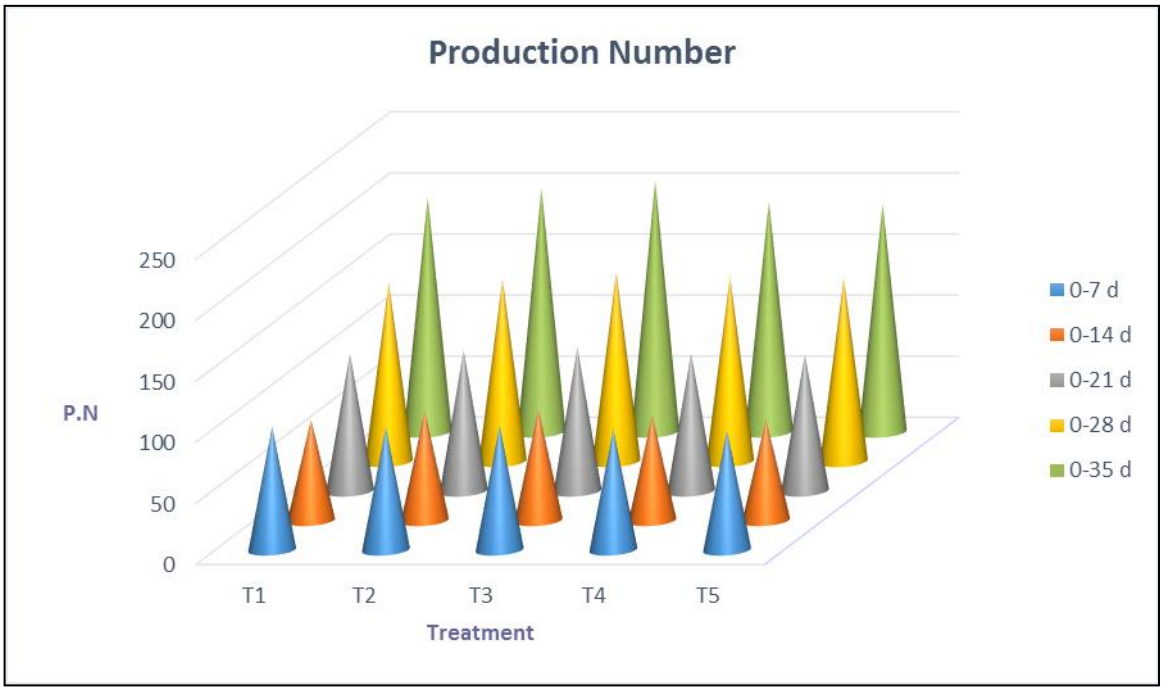

Fig 4: Effect of Shatavari on mean production number (P.N) of broilers

The above findings were in agreement with the study of Anurag Dwivedi (2013) [2] and Srivastava *et al*. (2013) [23]. They concluded that highly significant ($P<0.01$) effect of supplementation of 1% Shatavari in broiler ration on cumulative performance efficiency were there. These values although, calculated indirectly but were in accordance with the facts that Shatavari supplementation improves feed utilization, facilitate better nutrient absorption, improves gut health and strengthen the immune system.

Conclusion

The present study revealed that Shatavari supplementation @ 1% significantly improved the performance index, protein efficiency, energy efficiency and production number values of broilers than the other treatments.

References

1. Alcicek A, Bozkurt M, Cabuk M. The effect of a mixture of herbal essential oils, an organic acid or a probiotic on broiler performance. S. Afr. J Anim. Sci. 2004; 34:217-222.
2. Anurag Dwivedi. Effect of feeding Shatavari (*Asparagus racemosus*) and Yeast (*Saccharomyces cervisiae*) alone and in combination on the performance of broiler chicks. M.V.Sc. Thesis ((Animal Nutrition), RAJUVAS, Bikaner, 2013.
3. Bird HR. Performance index of growing chickens. Poult. Sci. 1995; 34:1163-1164.
4. BIS. Requirement for chicken feeds. IS: 1374-2007, Manak Bhawan, 9 Bahadurshah Zafar Marg, New Delhi-110001, 2007.
5. Botsoglou NA, Fletouris DJ. Drug Residues in Foods: Pharmacology, Food Safety and Analysis. Marcel Dekker, Inc. Publ., New York, USA, 2001.
6. Chopra D. and Simon D. The Chopra Center. Herbal hand book. New York, NY: Three Rivers Press. 2000; 73-75:219.
7. Chopra RN, Nayar SL, Chopra IC, Asolkar LV, Kakkar KK. Glossary of Indian Medicinal Plants, CSIR, New Delhi. 1956; 28:150-176.
8. Dash VB. Materia Medica of Ayurveda. New Delhi, India. B. Jam Publishers Pvt. Ltd, 1991, 61.
9. Dibner JJ, Buttin P. Use of organic acid as a model to study the impact of gut microflora on nutrition and metabolism. J Appl. Poultry Res. 2002; 11:453-463.
10. Duncan DB. Multiple range and multiple F tests. Biometrics. 1955; 11(1):1-42.
11. Euribrid BV. Euribrid technical information for hybro broilers. Euribrid poultry breeding farms, Boxmeer, The Netherlands, 1994.
12. Hinton MH. Antibiotics, poultry production and public health. World Poultry Sci. J. 1988; 44:67-69.
13. Izat AL, Colberg M, Reiber MA, Adams MH. Effects ofdifferent antibiotics on performance, processing characteristics, and parts yields of broiler chickens. Poultry Sci. 1990; 69:1787-1791.
14. Kamran Z, Sarwar M, Nisa M, Nadeem MA, Mahmood S, Babar ME *et al*. Effect of low-protein diets having constant energy-to-protein ratio on performance and carcass characteristics of broiler chickens from one to thirty-five days of age. Poult. Sci. 2008; 87:468-474.
15. Krishana L, Swarup D, Patra RC. An overview prospects of ethano-veterinary medicine in India. Indian J Anim. Sc. 2005; 75(12):1481-1491.
16. Livestock census, 19th. Ministry of agriculture department of animal husbandry, dairying and fisheries krishi bhawan, New Delhi, 2012, 31-32.
17. Miles RD, Butcher GD, Henry PR, Littell RC. Effect of antibiotic growth promoters on broiler performance, intestinal growth parameters, and quantitative morphology. Poultry Sci. 2006; 85:476-485.
18. Nadkarni AK. Indiaii MateriaMedica. Bombay, India: Popular Prakashan Pvt. Ltd: 1976; I:153-155.
19. Narhari D. Performance promoting ability of Active Forte in broilers. Poult. Advisor. 1992; 25(7):37-38.
20. Owens B, Tucker L, Collins MA, McCracken KJ. Effects of different feed additives alone or in combination on broiler performance, gut microflora and ileal histology. Brit. Poultry Sci. 2008; 49:202-212.
21. Pandey GS, Nighantu KCBP. Chaukhamkha Bharati

Academy: Varanasi, India, 1998, 392-393.
22. Snedecor GW, Cochran WG. Statistical methods, 8th edn. Oxford and IBH Publishing Co., New Delhi, India, 1994.
23. Srivastava SB, Ram Niwas, Singh DP, Bisen B. Impact of herbal based diets on production efficiency of broiler. The Bioscan. 2013; 8(1):119-122.