



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(8): 180-184
© 2023 TPI
www.thepharmajournal.com
Received: 08-06-2023
Accepted: 11-07-2023

Bhavya Pal
Department of Animal
Production, Rajasthan College of
Agriculture, MPUAT, Udaipur,
Rajasthan, India

Siddhartha Mishra
Department of Animal
Production, Rajasthan College of
Agriculture, MPUAT, Udaipur,
Rajasthan, India

Keshram Meena
Department of Animal
Production, Rajasthan College of
Agriculture, MPUAT, Udaipur,
Rajasthan, India

Dashrath Singh Chundawat
Department of Animal
Production, Rajasthan College of
Agriculture, MPUAT, Udaipur,
Rajasthan, India

Corresponding Author:
Bhavya Pal
Department of Animal
Production, Rajasthan College of
Agriculture, MPUAT, Udaipur,
Rajasthan, India

Effect of dietary supplementation of Ashwagandha (*Withania somnifera*) on growth performance of broiler chicks

Bhavya Pal, Siddhartha Mishra, Keshram Meena and Dashrath Singh Chundawat

Abstract

The study was undertaken to evaluate the effect of dietary supplementation of ashwagandha (*Withania somnifera*) on growth performance of broiler chicks. One hundred sixty straight run day-old coloured broiler chicks were used in a completely randomized design in 4 treatments with 4 replicates, each consisting of 10 chicks. The basal diet (control) comprising maize, soya deoiled cake deoiled rice bran was supplemented with ashwagandha root powder at 0.5, 1.0 and 1.5% of the diet in three dietary treatment groups. The birds were maintained under deep litter under standard management practices and the effect of supplementation was studied on body weight, body weight gain, feed intake and feed conversion ratio in broiler chicks. The body weight, weekly body weight gain or overall body weight gain was significantly ($p < 0.01$) higher in group fed ashwagandha powder at 0.5% as compared to other treatments. The overall body weight gain was also significantly higher ($p < 0.01$) with supplementation of ashwagandha powder at 0.5% level. The dietary group with ashwagandha powder at 0.5% had lowest feed conversion ratio, the feed efficiency was higher in all the groups supplemented with ashwagandha as compared to control groups. It may be concluded from the present study that supplementation of ashwagandha powder at 0.5% is beneficial in terms of body weight gain, and feed conversion efficiency in broiler chicks.

Keywords: Ashwagandha, broiler, feed intake, feed conversion ratio and body weight gain

Introduction

Meat production from poultry accounts for about 50% of total meat production in the country (BAHS, 2019). Poultry farming carries a pivotal position in current Indian economy and has evolved as a commercial business oriented enterprise. The total poultry population in the country has increased by 16.81% over the previous census i.e. 2012 (BAHS, 2019). In India, the poultry population as per 20th livestock census is 851.81 million. The total poultry population in Rajasthan has registered a phenomenal increase of about 80% over last livestock census and the current poultry population of Rajasthan is about 14.62 million, however, it is only 1.72% of poultry population of India. Rajasthan holds 17th rank in poultry population (Economic survey 2020-21).

Feed is a major component, affecting net return from the poultry industry, as more than 75% of the total expenditure in terms of cash is spent on poultry raising. Various types of antibiotics and chemical substances are used as feed supplements to increase production parameter. These agents may produce many adverse effects like stress, toxicity and immune suppression if fed inappropriate quantities. Recently, the restriction of the use of these harmful chemical substances shifted towards the herbal substances of produce to optimise feed efficiency productivity.

Withania somnifera commonly called as 'ashwagandha' or 'winter cherry'. Ashwagandha contains many active principles such as withanolides, somnitalglucose, inorganic salt, withanone, di-hydroxykaempferol-3 and rutosides (Murthy *et al.*, 2009 and Pal *et al.*, 2012) [12, 14]. These active principles have been reported to possess immunomodulatory, general tonic, and hepato-protective, anti-stress, growth promoter and antioxidant properties (Kushwaha *et al.*, 2012; Varma *et al.*, 2012) [9, 19] beside antibacterial anti-fungal properties (Punetha *et al.*, 2010) [15]. Feeding of *Withania somnifera* (ashwagandha) root powder improves growth rate, feed consumption, feed conversion efficiency and lower mortality rate in broiler chicks (Mishra and Singh, 2000) [11].

Therefore, the present study was undertaken to study the effect of ashwagandha (*Withania somnifera*) root powder on growth performance of broiler chicks.

Materials and Methods

Experimental birds and diets

One hundred sixty straight run day-old chicks of coloured broiler were procured from Hatchery of Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, Udaipur. The chicks were randomly divided into 4 treatment groups with 4 replications of 10 chicks in each replication and fed one of the four treatment rations up to 8 weeks. The dietary treatments comprised of T₁ (basal diet), T₂ (basal diet with 0.5% ashwagandha root powder), T₃ (basal diet with 1% ashwagandha root powder) and T₄ (basal diet with 1.5% ashwagandha root powder). Basal diet consisted yellow maize, soybean de-oiled cake, de-oiled rice bran and vitamin premix.

Traits studied

Body weight and body weight gain

Weekly body weight of broiler chicks in various of treatment groups was recorded from day old to eight weeks. The weekly body weight gain of broiler chicks was calculated by subtracting live weight of previous week from that of current week in grams.

$$\text{Weekly body weight gain (g)} = \text{Current week body weight (g)} - \text{Previous week body weight (g)}$$

Feed intake and Feed Conversion Ratio

The daily feed intake was measured in each treatment group for the experimental period. Total feed offered and residue thereof was weighed to calculate feed intake.

$$\text{Feed intake (g)} = \text{Feed offered during the current day (g)} - \text{Feed leftover at the next day (g)}$$

The cumulative weekly feed intake was calculated by adding the daily feed intake for the said week. Feed conversion ratio was estimated at weekly interval as well as for the entire growth period up to 8 weeks of age. Feed conversion ratio was calculated by using following formula.

$$\text{Feed Conversion Ratio} = \frac{\text{Feed consumption per bird per week (g)}}{\text{Body weight gain per bird per week (g)}}$$

Results and Discussion

Body weight and body weight gain

The data with respect to weekly body weights of coloured broiler chicks from day old up to 8 weeks of age are presented in Table 1. The perusal of data revealed that the mean body weights at 8 week of age were significantly highest ($p < 0.01$) in T₂ followed by T₃, T₄ and lowest in T₁ group (Table 1). The weekly body weight increased with the advancement of age.

Table 1: Effect of supplementation of ashwagandha root powder on weekly body weight (g) in broiler chicks

Age (Week)	T ₁	T ₂	T ₃	T ₄	SEm	CD
0	41.73±0.56	42.90±0.26	41.53±0.25	41.95±0.38	0.36	NS
1	82.98 ^b ±1.45	84.13 ^b ±0.67	85.05 ^{ab} ±0.58	86.63 ^a ±0.94	0.78	2.41*
2	209.43 ^d ±3.47	245.63 ^a ±3.35	229.23 ^c ±3.53	238.53 ^b ±3.67	0.51	2.21**
3	374.77 ^c ±2.93	437.75 ^a ±2.71	427.73 ^b ±2.95	427.53 ^b ±3.30	0.27	1.15**
4	583.32 ^d ±2.50	667.00 ^a ±2.98	639.80 ^b ±2.08	634.58 ^c ±2.06	0.56	2.43**
5	801.39 ^d ±1.72	918.43 ^a ±3.34	854.35 ^b ±2.03	843.08 ^c ±2.34	0.55	2.37**
6	1036.84 ^d ±1.70	1233.18 ^a ±14.9	1114.10 ^b ±2.65	1078.84 ^c ±2.82	5.17	22.33**
7	1292.09 ^d ±1.99	1587.53 ^a ±2.27	1424.34 ^b ±1.72	1335.29 ^c ±20.11	6.69	28.89**
8	1561.62 ^d ±1.64	1962.08 ^a ±1.31	1768.58 ^b ±3.49	1615.91 ^c ±28.09	10.25	44.28**

* $p < 0.05$, ** $p < 0.01$

Means bearing different superscripts in a row differ significantly.

The overall mean body weight gain was significantly highest ($p < 0.01$) in T₂ followed by T₃, T₄ and lowest in T₁ (Table-2).

It was observed from the above data that the body weight gain was increased with the advancement of weeks.

Table 2: Effect of supplementation of ashwagandha root powder on body weight gain (g) in broiler chicks

Age (Week)	T ₁	T ₂	T ₃	T ₄	SEm	CD
1	41.25 ^b ±1.11	41.23 ^b ±1.02	43.53 ^{ab} ±0.40	44.68 ^a ±0.92	0.82	2.52*
2	126.46 ^d ±4.36	161.51 ^a ±2.75	144.18 ^c ±4.00	151.91 ^b ±4.15	0.96	4.14**
3	165.34 ^d ±1.07	192.12 ^b ±1.17	198.50 ^a ±0.70	189.00 ^c ±0.53	0.64	2.78**
4	208.55 ^c ±0.68	229.25 ^a ±0.38	212.07 ^b ±1.19	207.05 ^c ±1.26	0.78	3.38**
5	218.07 ^b ±0.87	251.43 ^a ±0.68	214.55 ^c ±0.84	208.50 ^d ±0.53	0.80	3.47**
6	235.45 ^c ±0.49	314.75 ^a ±17.38	259.75 ^b ±0.75	235.76 ^c ±0.82	5.40	23.35**
7	255.25 ^c ±0.30	354.35 ^a ±16.62	310.24 ^b ±0.93	256.45 ^c ±22.69	9.22	39.83**
8	269.53 ^c ±0.35	374.55 ^a ±1.10	344.24 ^b ±1.79	280.62 ^c ±8.49	5.26	22.27**
Overall gain	1519.90 ^d ±1.53	1919.18 ^a ±1.64	1727.06 ^b ±3.83	1573.96 ^c ±27.76	10.21	44.11**

* $p < 0.05$, ** $p < 0.01$

Means bearing different superscripts in a row differ significantly.

The weekly body weights observed in the present study are lower as compared to the body weights observed by Jyotsana *et al.* (2018) [6], on supplementation of ashwagandha while Nagar *et al.* (2021) [13] on feeding ashwagandha and Shatavari and Singh *et al.* (2017) [16] on supplementation of ashwagandha and selenium. The lower body weights in

broiler observed in the present study may be attributed to genetic constitution. The body weights at 6th week of age in commercial broilers were higher than in the present study. The body weight at 6 weeks of age was significantly lower in present study as compared to the observation recorded by Kale *et al.* (2016) [7] and Jyotsana *et al.* (2019) [5] who have

reported the higher body weights.

Jyotsana *et al.* (2018) [6] reviewed the effect of supplementation of ashwagandha root powder on growth performance of broiler chicks. The research workers have used different levels of ashwagandha root powder i.e. 0.25, 0.5, 0.75, 1.0, 1.25 and 1.5 percent of powder of the total diet on growth performance of broiler chicks up to 6 weeks of age in commercial broiler raised up to six weeks, It has been reviewed that the ashwagandha root powder was found to be beneficial when supplemented at 0.5 to 1.5% of total ration with varying proportions. However, in the present study the supplementation at 0.5% rate was found to be most effective in terms of weekly body weight or body weight gains. The body weight showed declining trend beyond 0.5% level of supplementation, however the supplementation of ashwagandha was found to be beneficial when compared to the control where there was no supplementation.

Jyotsana *et al.* (2018) [6] found that the mean body weight gain up to 6 weeks of age was highest at supplementation level of 1% followed by 0.75 and 0.5% ashwagandha root powder, however in the present study the higher mean body weight

gain up to 8 weeks of age was found at 0.5% level of supplementation and it declined thereafter. Nagar *et al.* (2021) [13] reported higher body weight gains at 6 weeks of age on supplementation of ashwagandha (0.5%) alone or in combination with Shatavari @ 0.25% each. On the contrary, Dhenge *et al.* (2018) [4] reported significantly lower mean body weights than observed in the present study on supplementation of ashwagandha at 0.5%.

Feed intake

The feed intake expressed in terms of g per chick per day increased with the advancement of age irrespective of dietary treatments (Fig-1). The weekly cumulative feed intake was recorded for birds in different treatment groups and the data with respect to weekly feed intake are presented in Table-3. The weekly feed intake was significantly highest (P<0.01) in T₂ followed by T₃, T₁ and lowest in T₄ (Table-3). It was found that the supplementation of ashwagandha root powder at different levels did not have a negative effect on feed intake in broiler chicks rather it increased feed intake.

Table 3: Effect of supplementation of ashwagandha root powder on feed intake (g/chick/week) in broiler chicks

Age (Week)	T ₁	T ₂	T ₃	T ₄	SEm	CD
1	77.63 ^{ab} ±0.91	73.76 ^c ±0.25	78.37 ^a ±0.15	75.71 ^{bc} ±0.06	0.60	2.58 ^{**}
2	197.68 ^b ±0.98	227.50 ^a ±0.88	195.67 ^b ±0.66	227.27 ^a ±3.22	1.78	5.53 ^{**}
3	210.26 ^c ±0.48	260.24 ^a ±0.76	245.47 ^b ±0.99	255.19 ^a ±4.10	2.16	6.72 ^{**}
4	312.20 ^d ±3.27	391.83 ^a ±1.92	366.19 ^b ±1.68	322.68 ^c ±0.31	1.28	5.53 ^{**}
5	396.92 ^c ±0.57	490.21 ^a ±1.06	465.90 ^b ±0.94	370.06 ^d ±0.35	0.57	2.45 ^{**}
6	524.32 ^c ±0.85	600.65 ^a ±0.56	563.99 ^b ±0.73	495.67 ^d ±0.60	0.73	3.14 ^{**}
7	508.08 ^c ±0.47	622.69 ^a ±1.98	586.25 ^b ±1.03	485.31 ^d ±0.80	0.62	2.67 ^{**}
8	652.72 ^c ±0.55	670.95 ^b ±1.64	679.44 ^a ±0.81	601.09 ^d ±0.50	0.75	3.23 ^{**}
Total feed intake	2879.80 ^c ±2.21	3337.83 ^a ±2.65	3181.27 ^b ±1.64	2827.80 ^d ±5.74	3.45	10.74 ^{**}

**p<0.01

Means bearing different superscripts in a row differ significantly.

The weekly feed intake increased with supplementation of ashwagandha root powder at different levels in the present study. Similar, observations were also recorded by Kumar *et al.* (2018) on feeding ashwagandha extract, Jyotsana *et al.* (2018) [6] on feeding of ashwagandha root powder, Vasantkumar *et al.* (2014) [18] on supplementation of ashwagandha root powder and extract, Chikwa *et al.* (2018)

on feeding ashwagandha, Shatavari and vitamin E, Singh *et al.* (2017) [16] on feeding of ashwagandha and selenium. Nagar *et al.* (2021) [13] have also reported higher feed intake on supplementation of ashwagandha root powder and shatavari. Mane *et al.* (2012) [10] found no significant effect of supplementation of ashwagandha root powder on feed intake in broiler chicks.

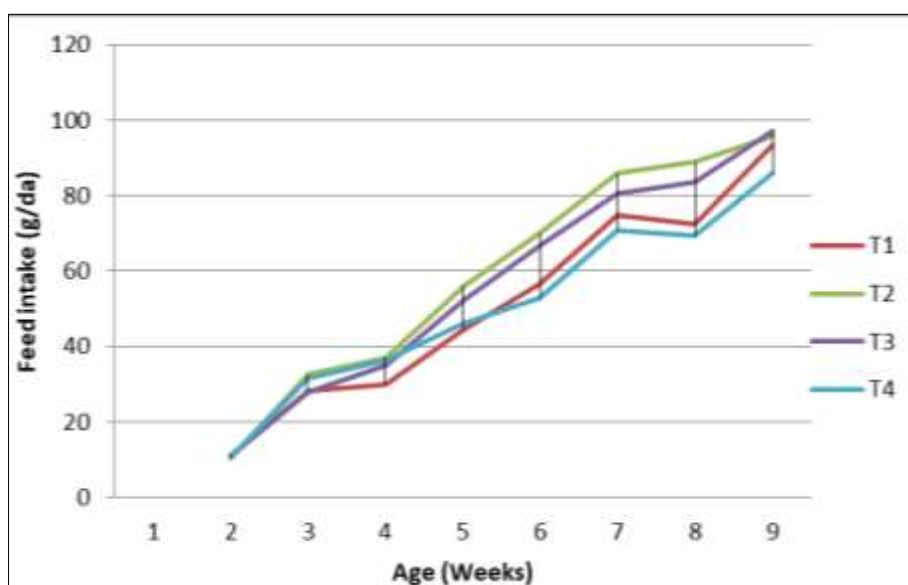


Fig 1: Effect of feeding of ashwagandha on daily feed intake of broilers (g/bird/day)

Feed conversion ratio

The weekly mean feed conversion ratio (FCR) in birds-fed diets supplemented with different levels of ashwagandha root powder is presented in Table 4. The mean overall FCR was significantly lower ($p<0.01$) in T₂ as compared to T₁, however, the difference between T₃ and T₄ was statistically non-significant. The result on overall feed conversion ratio indicates that supplementation of ashwagandha root powder irrespective of at different levels has improved FCR over control, however, it was found to be best in T₂ group.

Table 4: Effect of supplementation of ashwagandha root powder on feed conversion ratio (FCR) in broiler chicks

Age (Week)	T ₁	T ₂	T ₃	T ₄	SEm	CD
1	1.89±0.06	1.80±0.05	1.80±0.02	1.70±0.03	0.04	NS
2	1.57±0.05	1.41±0.02	1.36±0.04	1.47±0.07	0.05	NS
3	1.27 ^b ±0.01	1.35 ^a ±0.01	1.24 ^b ±0.01	1.35 ^a ±0.01	0.01	0.04**
4	1.50 ^c ±0.02	1.71 ^a ±0.01	1.73 ^a ±0.02	1.56 ^b ±0.01	0.01	0.03**
5	1.82 ^c ±0.01	1.95 ^b ±0.01	2.17 ^a ±0.01	1.77 ^d ±0.01	0.01	0.03**
6	2.23 ^a ±0.01	1.91 ^b ±0.10	2.17 ^a ±0.01	2.10 ^a ±0.01	0.03	0.14**
7	1.99±0.02	1.76±0.08	1.89±0.01	1.89±0.17	0.06	NS
8	2.42 ^a ±0.01	1.79 ^d ±0.01	1.97 ^c ±0.01	2.19 ^b ±0.01	0.04	0.17**
Overall	1.89 ^a ±0.01	1.74 ^c ±0.01	1.84 ^b ±0.02	1.80 ^b ±0.01	0.01	0.04**

** $p<0.01$

Means bearing different superscripts in a row differ significantly.

The overall FCR was significantly lowest ($P<0.01$) in T₂ followed by T₄ and T₃ and highest in T₁ indicating that the supplementation of ashwagandha root powder has improved feed conversion efficiency compared to control where no supplementation was done. The feed conversion ratio was found to be improved with supplementation of ashwagandha root powder by different research workers. The results obtained in the present study corroborates the findings of Kumar *et al.* (2018) on supplementation of ashwagandha powder, Singh *et al.* (2017) [16] found similar results on feeding ashwagandha and selenium to broiler chicks. Nagar *et al.* (2021) [13] have also reported better feed conversion efficiency in broiler chicks on supplementation of ashwagandha root powder alone or in combination of Shatavari. Singh *et al.* (2017) [16] found significant effect of ashwagandha powder alone or in combination of selenium on feed conversion ratio. Jyotsana *et al.* (2018) [6] have also reported better feed conversion ratio on supplementation of ashwagandha root powder, however in contrary to the present study the best FCR was found on supplementation at 0.75 to 1.0%. Vasantkumar *et al.* (2014) [18] found that the feed conversion ratio was superior on supplementation of ashwagandha extract as compared to ashwagandha root powder indicating the efficacy of active ingredient in active form as compared to powder.

Conclusion

It may be concluded that feeding of ashwagandha root powder at 0.5% of total feed is beneficial in terms of body weight gains and feed conversion efficiency in broiler chicks.

Acknowledgement

The authors would like to acknowledge the help in the form of birds and experimental feed in the AICRP on Poultry Breeding project used for the present study. The author is thankful to the Dean, Rajasthan College of Agriculture and Head, Department of Animal Production for all facilities.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Annual Report. Department of Animal Husbandry and Dairying Ministry of Fisheries, Animal Husbandry and Dairying Government of India; c2022-2023.
- Ansari JZ, Haq A, Yousaf M, Ahmad T, Khan S. Evaluation of different medicinal plants as growth promoters for broiler chicks. *Sarhad Journal of Agriculture*. 2008;24(2):323-330.
- Chikwa K, Atkare SS, Bhardwaj JK, Nema RP. Herbal response of Shatavari, Ashwagandha root powder and Vitamin E on performance of colour broiler. *The Pharma Innovation Journal*. 2018;7(8):508-510.
- Dhenge SA, Shirbhate R, Wankar A, Khandait V. Effect of dietary supplementation of Ashwagandha (*Withania somnifera*) and Kalmegh (*Andrographis Paniculata*) on growth performance and immune status in broilers. *International Journal of Agriculture Sciences*. 2018;10(24):7634-7636
- Jyotsana Kumar P, Berwal RS. Effect of Ashwagandha (*Withania somnifera*) root powder supplementation on the production performance in broilers. *The Pharma Innovation Journal*. 2019;8(10):82-85.
- Jyotsana RS, Singh S, Chhikara S, Sheoran N, Tewatia BS, Maan NS. Dietary inclusion of Ashwagandha (*Withania somnifera*) root powder on growth performance and metabolizability in broilers. *The Pharma Innovation Journal*. 2018;7(6):425-430.
- Kale VR, Wankhede SM, Patil CS, Share AA. Effect of supplementation of *Withania somnifera* (Ashwagandha) root powder as feed additive on performance and blood biochemicals of broilers. *Indian Journal of Animal Research*. 2016;50(1):53-56.
- Kumar KP, Reddy VR, Prakash MG. Amelioration of heat stress induced oxidative damage in broilers by supplementing Ashwagandha (*Withania somnifera*) extract during summer. *The Pharma Innovation*. 2018;7(3):591-596.
- Kushwaha S, Betsy A, Chawla P. Effect of Ashwagandha (*Withania somnifera*) root powder supplementation in treatment of hypertension. *Studies on Ethno-Medicine*. 2012;6(2):111-115.
- Mane AG, Kulkarni AN, Korake RL, Bhutkar SS. Effect of supplementation of Ashwagandha (*Withania somnifera*) and Shatavari (*Asparagus racemosus*) on growth performance of broilers. *Research Journal of Animal Husbandry and Dairy Science*. 2012;3(2):94-96.
- Mishra SJ, Singh DS. Effect of feeding root powder of *Withania somnifera* (L.) Dunal. (Ashwagandha) on growth, feed consumption, efficiency of feed conversion and mortality rate in broiler chicks. *Bioved*. 2000;11(1):79-83.
- Murthy SM, Mamatha B, Shivananda TN. Phytochemistry and medicinal uses of *Withania somnifera* (L.) Dun. *Biomed*. 2009;4:123-129.
- Nagar A, Neeraj Pandey R, Singh AK, Thakur R. Impact of dietary supplementation of Shatavari (*Asparagus racemosus*) and Ashwagandha (*Withania somnifera*) Root Powder on Performances in Broilers. *Journal of Animal Research*. 2021;11(2):333-339.

14. Pal A, Mahadeva N, Khanun F, Bawa AS. *In-vitro* studies on the antioxidants assay profiling of root of *Withania somnifera* L. (Ashwagandha) Dunal: Agriculture Conspectus Scientificus. 2012;77(2):95-101.
15. Punetha A, Muthukumaran J, Hemrom AJ, Nagarajan A, Jayakanthan M, Durai S. Towards understanding the regulation of rubber biosynthesis: insights into the initiator and elongator enzymes. Journal of Bioinformatics and Sequence Analysis. 2010;2(2):001-010.
16. Singh VP, Sahu DS, Kumar S, Chauhan HS. Effect of dietary supplementation of Ashwagandha (*Withania somnifera*), Selenium and their Combination on production performance of broiler chicken. Trend in Bioscience Journal. 2017;10(19):3597-3602.
17. Snedecor GW, Cochran WG. Statistical Methods. Iowa State University Press, Ames; c1994.
18. Vansanthakumar P, Pangayarselvi B, Sasikumar P, Chanrasekaran D, Doraisamy KA, Purushothaman MR. Performance of broilers fed Asgwagandha (*Withania somnifera*) incorporated diets during summer season for alleviating heat stress. Indian Journal of Animal Research. 2014;49(3):333-335.
19. Varma N, Kataria M, Kumar K, Saini J. Comparative study of L-asparaginase from different cytotypes of *Withania somnifera* (L.) Dunal and its purification. J Nat. prod. Plant. Resours. 2012;2:475-481.