International Journal of Veterinary Sciences and Animal Husbandry

**ISSN:** 2456-2912
VET 2023; 8(4): 376-379

www.veterinarypaper.com
Received: 16-05-2023
Accepted: 25-06-2023

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# Economics and effect of ashwagandha (*Withania somnifera*) root powder on mortality of kuroiler chicks

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**Abstract**
An experiment was conducted to find the effect of Ashwagandha (*Withania somnifera*) root powder on mortality of Kuroiler chicks. Total one hundred and twenty, day old Kuroiler chicks were used on a completely randomized design in four treatments with three replicates comprising of 10 chicks in each. $T_1$ (control) had standard ration as per BIS 2007; $T_2$ ration was supplemented with 5g Ashwagandha root powder /kg feed; $T_3$ ration was supplemented with 10g Ashwagandha powder /kg feed and $T_4$ ration was supplemented with 15g Ashwagandha powder /kg feed. The chicks were reared in brooder house under standard management practices from day-old to 56 days of age. For further analysis, chick's feed consumption and body weight were noted at weekly intervals. $T_3$ group had the highest benefit cost ratio (1.81), followed by $T_2$ (1.78), $T_1$ (1.71), and $T_4$ (1.58). The mortality throughout the experimental period of 8 weeks was 5.83% shown that the supplementation of Ashwagandha as a feed additive has not shown any significant effect on mortality rate of Kuroiler chicks. From this study it can be concluded that Kuroiler chicks supplemented with 10g Ashwagandha root powder/ kg feed may perform well in terms of economic benefits.

**Keywords:** Ashwagandha, benefit cost ratio, Kuroiler chicks, mortality

## 1. Introduction
The term 'Poultry refers to all domesticated avian species that includes chicken, ducks, quails, turkeys. geese, guinea fowl, pigeons, emu etc. Christian missionaries in India were the first to introduce and promote scientific poultry raising. One of India's fastest-growing agricultural sectors right now is poultry. The total egg production in the country is 129.60 billion numbers with 3rd in the world's egg production. Meat production from poultry is 4.78 million tonnes contributing about 51.44% of total meat production i.e. 9.29 million tonnes with 8th rank in the world's meat production (Anonymous, 2022) [2]. Percentage share of GVA of agriculture and allied sector to total economy is 20.20% in 2020-21. (Anonymous, 2020-21) [1]. During the 2020-21, the country exported 2,55,686.92 million tonnes of poultry products to the world for a total value of Rs. 435.53 crores/58.70 USD million. (Anonymous, 2020-21) [1]. Due to the fact that the majority of expenses are made on feed, feed consumption has a greater impact on the net return from poultry. Over time, numerous efforts have been made to reduce feed costs. Kuroiler is a dual purpose hybrid breed of chicken developed by the Kegg farms group in Gurgaon, Haryana. In order to boost growth performance and feed conversion ratio in chicken, antibiotics were utilized as growth promoters. (Izat *et al*., 1990; Dibner and Buttin, 2002 and Miles *et al*., 2006) [7, 3, 10]. Herbal growth promoter consumption improves broiler performance by boosting live weight gain and lowering feed conversion ratio. (Prasad and Sen, 1993 and Samarth *et al*., 2002) [18, 21]. Herbal plants can be added to the animal's diet in order to increase net return and minimize the harmful effects of synthetic feed additives on the health of both animals and consumers. Herbal feed additives enhance body weight and weight gain, improve ability of chicken in converting feed mass into the desired output, prolong their life and decrease their mortality. Ashwagandha, also known as Indian ginseng, poison gooseberry, and winter cherry, is one of these herbal plants. It belongs to solanaceae family. It is widely cultivated in arid areas of tropical and subtropical regions and has advantageous medicinal qualities. (Mirjalili *et al*., 2009) [11]. Bioactive substances found in ashwagandha include polyphenols, flavonoids, with anolides, and alkaloids. (Mishra *et al*., 2000) [12].

The primary alkaloid found in the plant's roots and leaves is withanine. In addition to playing a crucial role in decreasing blood sugar, serum cholesterol, stress-induced gastric indigestion, and ulcers, the herb Ashwagandha is said to have antioxidant, anti-stress, anticoccidial, immunomodulatory, and antilipidemic effects (Mushtaq *et al*., 2012) [15], In addition to having antibacterial and antifungal qualities (Punetha *et al*., 2010) [19]. The objectives of this study were to evaluate the possible improvement in overall performance and to find safe, cheep and efficient natural growth promoter for kuroiler chicks.

## 2. Materials and Methods

To examine the impact of ashwagandha feeding on performance and mortality of Kuroiler chicks from day old to 56 days of age, a total of 120, day old Kuroiler chicks were obtained from the department of Livestock Production and Management. The chicks were separated into four treatment groups, each consisting of 30 chicks and three replicate groups, each consisting of 10 chicks. As indicated for various treatments, ashwagandha root was sun-dried, then ground into a fine powder and combined at the proper concentration in feed.

**Table 1:** Treatments detail

| Groups | Treatment |
|---|---|
| $T_1$ | Control (Standard chick Ration)-as per BIS (2007) Specifications |
| $T_2$ | $T_1$ + Ashwagandha root powder in feed @ 0.5% |
| $T_3$ | $T_1$ + Ashwagandha root powder in feed @ 1.0% |
| $T_4$ | $T_1$ + Ashwagandha root powder in feed @ 1.5% |

In the brooder house of the college poultry farm, the chicks were raised in rigorous, hygienic conditions. To prevent the gathering of chicks, the corners of the brooder house were rounded with cardboard. On the first two experiment days, the thickness of the bedding material (sawdust) was kept at 2 inches, and then it was increased by 0.5 inches on 15$^{th}$ and 30th day of the experiment. All of the crumbled chick feed was given to the chicks on a regular basis ad-libtum according to BIS (2007) specifications. At first, the feed was provided by laying newspapers on the ground, but after three days, a horizontal feeder was used to feed the chicks until they were two weeks old. The chick feeder was used after two weeks and was kept up throughout the entire duration of the experiment. The feeders were placed at the birds' shoulder level and were only partially filled (two third) to reduce feed waste. Throughout the whole study period, chick waterers were used to provide free access to clean, fresh drinking water to the chicks. On the fifth and twelfth days of the trial, the chicks administered intra-ocular vaccinations against NCD (F1 strain) and IBD. Standard management procedures, including brooding, appropriate lighting, litter raking, cleaning of feeders and waterers, etc., were implemented.

### 2.1 Statistical analysis

Using a Completely Randomized Design (CRD), the data were statistically analyzed in accordance with Snedecor and Cochran (1994) [23]. ANOVA was performed on all the data using the General Linear Models method. Duncan's multiple range tests were used to differentiate the mean difference between various treatments. The standard for statistical significance was set at a level of ($p$<0.05) (Duncan, 1955) [4].

## 3. Results and Discussions

### 3.1 Benefit cost ratio (BCR)

The cost of producing Kuroiler chicken, taking into account the price of chicks, the cost of Ashwagandha, the amount of feed eaten, the cost of labor, and the cost of vaccines up to the age of 8 weeks, is shown in Table 3. Each treatment group in the experiment began out with 30 chicks. Kuroiler's initial purchase cost was Rs. 32.00 per chick. The cost of feed was calculated at Rs. 26.4 per kilogram of feed. For each chick, the anticipated costs for vaccination and labor are Rs. 4.00 and Rs. 8.60, respectively. Ashwagandha bought from local market @ 300 rupees per kilogram. The data showed that the $T_3$ treatment had the highest benefit cost ratio (1.81), which was followed by $T_2$ treatment (1.78), $T_1$ treatment (1.71), and $T_4$ treatment (1.58), respectively. The cost of feed was 8.83% cheaper in the 1.0% Ashwagandha supplemented group ($T_3$) than in the control group, and this was the main reason in the rise in the benefit-cost ratio in the $T_3$ treatment even after the cost of the Ashwagandha supplementation was taken into account. These outcomes support the findings of Hossain *et al.* (2014) [6] who found that the control group's benefit-cost ratio was significantly ($p$<0.05) lower than that of the group supplemented with garlic, ginger, black cumin, cinnamon, and chilli. Eevuri and Putturu (2013) [5] also noted that broiler feed treated with tulsi, turmeric, amla, and aloe vera decreased feed costs from 6.2 to 13.5%. Reddy *et al.* (2012) [20] and Molla *et al.* (2012) [14] both reported similar observations. Tazi *et al*. (2014) [24] revealed that broilers supplemented with 1% black pepper had a profitability ratio of 1.45. The findings of Singh *et al*. (2015) [22], the 1.5% whole bulb garlic powder supplemented group had a significantly (P<0.05) superior benefit cost ratio than the other treatment groups.

**Table 2:** Benefit Cost Ratio (Per Chick) of Kuroiler Chicks under Different Treatments

| Parameters | Treatments | | | |
|---|---|---|---|---|
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ |
| **Average weight (kg)** | 1.13 | 1.16 | 1.21 | 1.14 |
| Average feed consumption (kg) | 3.21 | 3.08 | 3.03 | 3.24 |
| Expenditure | Inputs Cost (Rs/chick) | | | |
| Chick | 32.00 | 32.00 | 32.00 | 32.00 |
| Ashwagandha | 00.00 | 04.62 | 09.09 | 14.58 |
| Feed | 87.74 | 81.31 | 79.99 | 85.54 |
| Labour | 08.60 | 08.60 | 08.60 | 08.60 |
| Vaccine | 04.00 | 04.00 | 04.00 | 04.00 |
| Total cost | 132.34 | 130.53 | 133.68 | 144.72 |
| Income | Output (Rs/chick) | | | |
| sale of bird (live weight) 200/kg | 226 | 232 | 242 | 228 |
| Benefit cost Ratio (BCR) | 1.71 | 1.78 | 1.81 | 1.58 |

### 3.2 Mortality rate

Throughout the experiment, the chicks were routinely watched for abnormal behavior and mortality. Dead chicks' post-mortem results were recorded. Table 7 shows the recorded mortality percentage. The overall mortality was 5.83% during the entire duration of the experiment, with control ($T_1$) treatment having the greatest rate of death (10%), while $T_3$, $T_4$ treatments showed a mortality rate of 3.33%. Due to the effects of Ashwagandha supplementation, no lesion could be detected at postmortem, which is that match the findings reported by Omar *et al.* (2016) [16], Kayath *et al*. (2022) [9], Eevuri and Putturu (2013) [5]. Similarly, Mishra and Singh (2000) [12] reported that the control group had the highest mortality. *Withania somnifera*, *Asparagus racemosus*, and *Mucuna pruriens* are herbal feed additives that have been closely observed by Pandey *et al*. (2013) [17] to have reduced mortality rates in chicks than the other groups. Joshi *et al*. (2015) [8] examined the effects of dietary additions of guduchi

(*Tinospora cordifolia*) stem powder and Ashwagandha (*Withania somnifera*) root powder and found that both reduced death percentages in supplemented groups compared to controls.

**Table 3:** Mortality of Kuroiler Chicks under Different Dietary Treatments

| Treatment | Chicks taken | Weeks of experiment | | | | | | | | Total mortality | Mortality % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | | |
| T1 | 30 | 1 | - | 1 | - | 1 | - | - | - | 3 | 10.00 |
| T2 | 30 | - | - | 1 | 1 | - | - | - | - | 2 | 6.66 |
| T3 | 30 | - | 1 | - | - | - | - | - | - | 1 | 3.33 |
| T4 | 30 | - | - | 1 | - | - | - | - | - | 1 | 3.33 |
| Total | 120 | | | | | | | | | 7 | 5.83 |

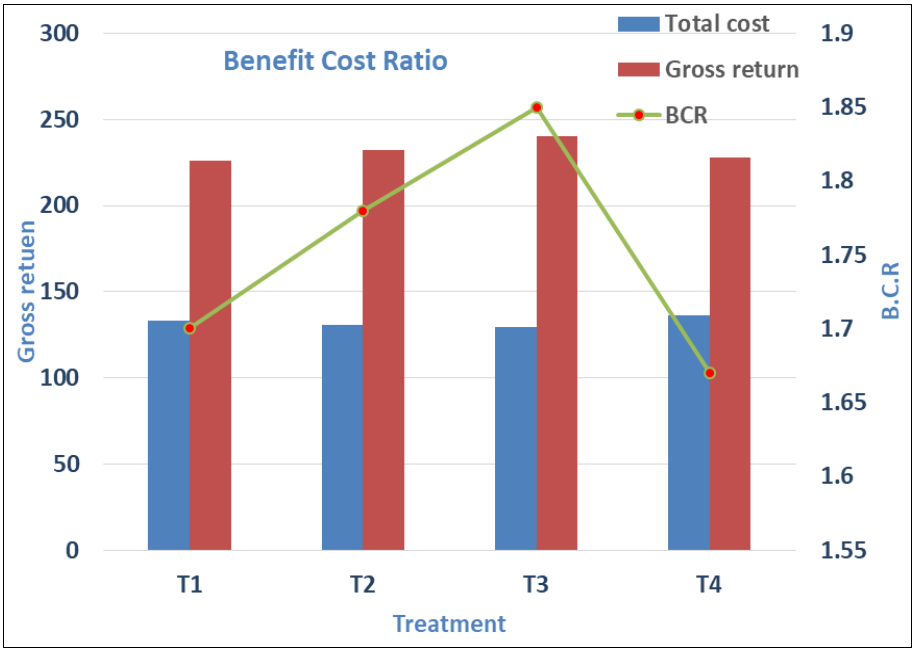


**Fig 1:** Benefit cost ratio of kuroiler chicks under different treatments

## 4. Conclusions

Thus, it concluded that the supplementation of ashwagandha root powder @ 10g/kg feed level was found advantageous in improving growth and reducing feed cost and mortality than control group results better benefit cost ratio was observed that perform well in terms of economic benefits.

## 5. Acknowledgement

The Department of Livestock Production Management and S.K.N. Agriculture University, Jobner, who provided the lab space, advice, and financial support, are gratefully acknowledged by the authors.

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