RESEARCH ARTICLE Asian Journal of Dairy and Food Research, Volume 44 Issue 5: 880-883 (October 2025)

Effect of Herbal Feed Additives Fenugreek (*Trigonella foenum-graecum*) Seed Powder and Onion (*Allium cepa*) Powder on Haemato-biochemical and Carcass Characteristics of Broilers

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ABSTRACT

Background: The positive effect of fenugreek and onion and their active components on the digestion process has been reported in several studies. The present experiment was conducted to study the effect of supplementation of Fenugreek sees powder and Onion powder on haemato-biochemical and carcass charactistics of broilers.

Methods: Day-old, 210 broiler chicks (Vencobb-400) were randomly allotted to seven treatment groups. The T1 *i.e.,* control group was fed on basal diet, while, group T2 and T3 were supplied with 1% and 2% fenugreek seed powder, respectively. Whereas group T4 and T5 were supplied with 1% and 2% onion powder, respectively and group T6 and T7 were supplied with 0.5% fenugreek seed powder and 0.5% onion powder and 1% fenugreek seed powder and 1% onion powder, respectively in the basal broiler pre-starter, starter and finisher ration.

Result: Haemoglobin, PCV, TEC, TLC, total serum protein and creatinine levels were higher (P<0.01) in T6 group while highest level of blood glucose was found in T6, but the variation was statistically non-significant for blood glucose. Whereas serum cholesterol level was higher (P<0.01) in control group. Non-significant effect was observed on dressing percentage but numerically highest in T6 group and eviscerated weight percentage was higher (P<0.05) in T6 group. The gizzard (P<0.01), heart (P<0.01) and giblet weight (P<0.01) were found statistically higher in T5 and liver weight (P<0.01) was statistically higher in T7 group.

Key words: Broiler, Carcass characteristics, Fenugreek, Haemato-biochemical, Onion.

INTRODUCTION

The poultry industry is one of the most profitable industries, offering the shortest possible time for nutritious meat and eggs for human consumption. In India, the poultry population has increased from 729.21 million to 851.81 million, according to this, the growth rate in poultry production was 16.81% as per 20th Livestock Census (DAHD, 2019). The economics of the poultry industry relies on feed. Considerable attempts have been made over a period of time to reduce production cost by lowering the expenses on feed. Feed additives used to improve feed conversion ratio, growth rate and disease resistance are one of the essential tools.

For over fifty years, the tradition of feeding livestock with sub-therapeutic antibiotic levels has been in use. Use of antibiotics has negative effects on animal health and its production such as residues in tissues, withdrawal period and development of resistance in microorganisms (Botsoglou and Fletouris, 2001). Recently, the focus is on searching for herbal formulations that could be useful for stress relief and contribute to an increase in bird production. For better gains several herbal feed additives have been used effectively in poultry production (Reddy *et al*., 2012).

The positive effect of herbs and their active components on the digestion process has been reported in several studies. The effect of fenugreek as a natural feed additive on broiler chick performance has also been widely observed. Several researchers have showed that the fenugreek have anti-diabetic, anti-microbial, antiparasitic, hypo-cholesterolaemic effects (Al-Habori and Roman, 2002), hypoglycemic, anthelmintic, antibacterial, anti-inflammatory and antipyretic properties (Ahmadiani *et al*., 2001; Basch *et al*., 2003). It contains minerals, B complex, iron, phosphates, PABA (Para- Amino Benzoic Acid), vitamins (A, D), lecithin and choline that help to dissolve cholesterol and fatty substances (Dixit *et al*., 2005).

Onion bulbs possess numerous organic sulphur compounds including Trans-S-(1-propenyl) cysteine sulfoxide, S-methylcysteine sulfoxide, Spropylcycteine sulfoxides and cycloallicin, flavinoids, phenolic acids, sterols

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How to cite this article: Yadav, K.M., Joshi, M., Sharma,S.K., Shende, K.A., Gurjar, M.L., Meel, M.S. (2025). Effect of Herbal Feed Additives Fenugreek (*Trigonella foenum-graecum*) Seed Powder and Onion (*Allium cepa*) Powder on Haemato-biochemical and Carcass Characteristics of Broilers. *Asian Journal of Dairy and Food Research*. **44(5):** 880-883. doi: 10.18805/ajdfr.DR-1904.

Submitted: 28-02-2022 **Accepted:** 22-06-2022 **Online:** 15-07-2022

including cholesterol, stigma sterol, b-sitosterol, saponins, sugars and a trace of volatile oil compounds mainly of sulphur compounds. Most of the plant components contain compounds with proven antibacterial, antiviral, antiparasitic, antifungal, antihypertensive, hypoglycemic, anti-thrombotic, anti-hyperlipidemic, anti-inflammatory and antioxidant properties. Therefore, the present study was carried out to investigate the effect of herbal feed additives such as fenugreek (*Trigonella foenum-graecum*) and onion (*Allium cepa*) in different dietary levels in broiler chicks to improve the performance of broilers.

MATERIALS AND METHODS

The present experiment was conducted during 2021 at Poultry unit of College of Veterinary and Animal Science, Navania, Vallabhnagar, Udaipur (Rajasthan) on two hundred ten (210) unsexed, apparently healthy, day-old (VENCOBB-400) broiler chicks of same hatch purchased from Kewal Ramani Hatcheries Pvt. Ltd. Ajmer. The wing bands were placed and the chicks were individually weighed before starting of experiment. The broiler chicks were equally and randomly divided into seven dietary treatments groups (T1-T7) and each dietary group was replicated to 3 subgroups (R_1-R_3). Thus, each dietary group consists of 30 chicks distributed into 3 replicated pens of 10 chicks each. The ISO certified basal feed in the form of broiler pre- starter, broiler starter and broiler finisher was procured from feed distributer "Udaipur Kukkut Utpadak Sahkari Samiti Ltd.", Udaipur (Rajasthan) in sufficient quantity. Fenugreek Seeds and Onion Bulbs were procured from local market of Sikar (Rajasthan) in sufficient quantity. The seeds of fenugreek were then sun-dried and ground to pass through 1mm sieve and onion bulbs were pilled, chopped, dried and ground to pass through 1 mm sieve in Department of Animal Nutrition and stored in air tight plastic containers for further use. The T1 *i.e.*, control group was fed on basal diet, while, group T2 and T3 were supplied with 1% and 2% fenugreek seed powder, respectively. Whereas group T4 and T5 were supplied with 1% and 2% onion powder, respectively and group T6 and T7 were supplied with 0.5% fenugreek seed powder and 0.5% onion powder and 1% fenugreek seed powder and 1% onion powder, respectively in the basal broiler pre-starter, starter and finisher ration. Fenugreek seed powder and onion powder were mixed with basal feed and used for feeding of experimental broiler chicks. Feed and water were supplied *ad libitum*.

For estimation of haemato-biochemical parameters about 3 ml blood samples was collected from randomly selected birds from each replication (nine birds/treatment) at 42nd day of experiment. Blood haemoglobin and PCV was estimated by Sahli's haemoglobinometer and micro-haematocrit methods, respectively. Total erythrocytes count (TEC) and total leukocytes count (TLC) was carried out manually through haemocytometer as per standard method of Benjamin (1978). The treatment wise serum samples were analysed for glucose, total protein, creatinine and cholesterol was estimated by using commercial test kits as per manufacturer's protocol. At the end of trial, two birds from each replicate were weighed individually and slaughtered to record the data on carcass characteristics and organ weights. The dressed weight was expressed as per cent of live weight and eviscerated weight was expressed as percentage of pre-slaughter weight. The organ weight was expressed in the percentage. The data obtained to all the parameters were subjected to ANOVA as per Snedecor and Cochran (1994). The significance of mean difference was tested by Duncan's new multiple range test (DNMRT) as modified by Kramer (1957).

RESULTS AND DISCUSSION

Haematological parameters

There was highly significant difference in the mean values of various haemato-biochemical parameters in the different treatment groups (Table 1). The highest ($P<0.01$) values of haemoglobin, packed cell volume (PCV), total erythrocyte count (TEC) and total leukocyte count (TLC) were 10.05, 28.31, 3.07 and 20.64, respectively and found in T6 group. Lowest value of haemoglobin was observed to be 8.40 in T3 group, whereas lowest packed cell volume was recorded as 24.92 in control group. Lowest value of total erythrocyte count was observed as 2.80 in control group and T2 group both, whereas lowest value of total leukocyte count was found to be 10.55 in group T4 (Table 1).

Biochemical parameters

There was highly significant difference in the mean values of biochemical parameters *viz*. total serum protein, creatinine and serum cholesterol except blood glucose (Table 2). The blood glucose level in different treatment groups were statistically non-significant. Blood glucose level was numerically highest in T6 group (235.35) and lowest (225.50) in control group. The total serum protein and creatinine levels

Table 1: Effect of fenugreek seed powder and onion powder on haematological parameters in broiler chicks.

Parameter	Treatment groups							SEM
	T1	T2	T3	T4	T5	T6	T7	
Hb** (mg/dl)	8.60^{de}	8.75^{d}	8.40^{e}	9.10^{c}	9.65^{b}	10.05^{a}	9.72^{ab}	0.115
PCV** (%)	24.92^{e}	25.10^{de}	25.25^{d}	26.45^{c}	26.80^{bc}	28.31^{a}	27.25^{b}	0.220
TEC** (million/cumm)	2.80^{c}	2.80^{c}	2.83^{bc}	2.89^{b}	2.98^{ab}	3.07^{a}	3.03^{a}	0.050
TLC** (thousand/ cumm)	13.28^{e}	11.31^{f}	16.50^{d}	10.55^{f}	17.51^{c}	20.64^{a}	19.58^{b}	0.305

Means with different superscripts in a row differ significantly.

Table 2: Effect of fenugreek seed powder and onion powder on biochemical parameters in broiler chicks.

Parameter	Treatment groups							SEM
	T1	T2	T3	T4	T5	T6	T7	
Blood glucose (mg/dl)	225.50	228.72	227.18	229.55	230.85	235.35	232.10	2.617
Total serum protein** (g/dl)	3.55^{e}	3.78^{d}	3.69^{d}	3.98^{c}	4.13^{b}	4.25^{a}	4.07^{bc}	0.033
Creatinine** (mg/dl)	0.32^{c}	0.34^{b}	0.33^{bc}	0.34^{b}	0.38^{a}	0.40^{a}	0.35^{b}	0.007
Serum Cholesterol** (mg/dl)	134.20^{a}	128.10^{b}	125.15^{bc}	128.78^{b}	123.95^{c}	117.05^{d}	122.60^{c}	1.397

Means with different superscripts in a row differ significantly.

Table 3: Effect of fenugreek seed powder and onion powder on carcass evaluation parameters (% of live weight) in broiler chicks.

Carcass (%)	Treatment groups							SEM
	T1	T2	T3	T4	T5	T6	T7	
Dressing	66.23	68.59	67.21	68.23	69.83	70.98	69.86	1.267
Eviscerate weight*	63.80^{b}	65.04^{ab}	63.36^{b}	64.07^{b}	65.25^{a}	66.81^{a}	66.72^{a}	0.745

Means with different superscripts in a row differ significantly.

Table 4: Effect of fenugreek seed powder and onion powder on organ weight (%) in broiler chicks.

Organ weight (%)	Treatment groups							SEM
	T1	T2	T3	T4	T5	T6	T7	
Liver**	1.46^{d}	1.52^{c}	1.47^{d}	1.52^{c}	1.59^{b}	1.61^{b}	1.65^{a}	0.013
Heart**	0.32^{e}	0.35^{cd}	0.34^{d}	0.36^{c}	0.40^{a}	0.39^{ab}	0.38^{b}	0.004
Gizzard**	1.18^{e}	1.24^{d}	1.28^{d}	1.34^{c}	1.50^{a}	1.47^{ab}	1.45^{b}	0.014
Giblet**	2.96^{d}	3.11^{c}	3.09^{c}	3.22^{b}	3.49^{a}	3.47^{a}	3.48^{a}	0.033

Means with different superscripts in a row differ significantly.

were found highly significant (P<0.01). Highest values of total serum protein and creatinine were found to be 4.25 and 0.40, respectively in T6 group while lowest total serum protein and creatinine were found to be 3.55 and 0.32, respectively in T1 group. Similarly, Abdel-Azeem (2006) and Toson and Latif (2021) observed significant increase in total serum protein level in broilers fed fenugreek seed powder supplemented diet. The increase in total serum proteins might be due to the fact that fenugreek seeds can directly stimulate the thyroid gland and contribute to increased serum protein content (Hassan, 2000). The statistical analysis revealed highly significant (P<0.01) effect of feeding of fenugreek seed powder and onion powder in different treatment group on serum cholesterol. However highest value of serum cholesterol was found in T1 group and lowest was found in T6 group. Abdel-Azeem (2006); Abbas (2010); Mamoun *et al.* (2014); An *et al.* (2015) and Toson and Latif (2021) also observed significant reduction in serum cholesterol level in broilers fed fenugreek seed powder and onion powder supplemented diet as compared to control group. The decrease in serum cholesterol level may be due to the presence of saponins and resins in fenugreek seeds (such as hemicelluloses, mucilage, tannin and pectin) that inhibit bile acid, help lower LDL-cholesterol and inhibit intestinal cholesterol absorption, thereby reducing blood cholesterol levels (Petit *et al.,* 1995).

Carcass charactistics

There was non-significant effect of supplementation of fenugreek seed powder and onion powder on dressing per cent whereas significant (P<0.05) effect was observed on eviscerated percent. The highest value of dressing per cent was recorded to be 70.98% in T6 group similarly, highest eviscerated percentage was also recorded in T6 group as 66.81%. The lowest dressing percent was recorded (66.23%) in control group whereas lowest eviscerated per cent was found in T3 group (63.36%) (Table 3).

The relative weight of liver, heart, gizzard and giblet was significantly higher (P<0.01) in broilers fed fenugreek seed powder and onion powder as feed additive in the ration. Highest weight of liver was recorded to be 1.65% in T7 group while highest heart, gizzard and giblet weight was recorded to be 0.40%, 1.50% and 3.49%, respectively in T5 group (Table 4). Similar findings were recorded by Yassin *et al.* (2020). They reported significant increase in liver weight in fenugreek seed powder supplemented group as compared to control group. Similarly, Yesuf *et al.* (2017) reported significant difference in gizzard weight in broiler fed diet supplemented with of fenugreek seed powder as compare to control. Yesuf *et al.* (2017) and Tewari *et al.* (2020) also reported significant improvement in giblet weight (%) in broilers fed fenugreek seed powder supplemented diet as compared to control.

CONCLUSION

The present feeding trial on herbal feed additive fenugreek (*Trigonella foenum- graecum*) seed powder and Onion (*Allium cepa*) powder alone and in combination indicated

their potential in the ration of broiler chicks as far as haemato-biochemical parameters and carcass characteristics are concerned. Present study concluded that inclusion of 0.5% fenugreek seed powder and 0.5% onion powder with basal diet is very effective and could be a viable suggestion for worth, while raising of broilers for meat production.

Conflict of interest

All authors declare that they have no conflict of interest.

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