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Effect of different fortifications of Panchgavya with *Nigella sativa* and *Asparagus racemosus* on growth performance parameters in poultry

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Abstract
In recent times, the scientific research has received a great concern about the use of antibiotics as growth promoter in poultry which leads to emergence of multiple drug resistance. Panchgavya, formulation of cow milk, curd, ghee, urine and dung has been claimed as growth promoter. Similarly indigenous herbs like *Nigella sativa* and *Asparagus racemosus* have been recommended as growth promoter and antibacterial. The present study was conducted to investigate growth promoter activity of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations in poultry. The study was conducted on 96 healthy Narmada Nidhi day-old chicks, divided into 8 groups consisting 12 chicks with 2 replicates each. The diet of birds was supplemented with Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations daily for 56 consecutive days.
It may be concluded that Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations in dietary supplementation for 56 consecutive days improved overall growth performance in birds.

Keywords: Panchgavya, *Nigella sativa*, *Asparagus racemosus*, Narmada Nidhi, growth performance

Introduction
Antimicrobials are used as feed supplement in poultry industry to enhance the growth performance and prevention of diseases in poultry. In last many years great concern has been arisen about the use of antibiotics as supplement at optimum therapeutic level in poultry feed due to emergence of multiple drug resistant bacteria. Due to the use of antibiotics as growth promoters in poultry facing serious criticism now days. There are some important reasons that restrict the use of antibiotics such as the drug residues in meat and the drug resistance in micro-organisms. To reduce the poor performance and the increase susceptibility to diseases resulted from removal of antibiotics from birds diets, attempts were need to find other alternatives in place of antibiotics. In recent years the utilization of growth promoters of natural origin become of an area of interest (Wray and Davies, 2000) [12].
Lots of the antibiotic growth promoter's act by modifying the intestinal flora of poultry, which are associated with poor health and decreased performance of birds. Antibiotics can be replaced by alternatives such as prebiotics, probiotics and botanicals. Recently, Council for Scientific Industrial Research (CSIR), India has identified cow urine distillate for its antimicrobial and antifungal properties (Mathivanan *et al*., 2007) [7].
In Ayurveda mentioned Panchgavya is one such formulation, which are prepared with five components derived from cow viz. milk, curd, ghee, urine and dung and can be used as growth promoters in animals (Dhama *et al*., 2005) [2]. Panchgavya has been claimed to be useful against liver disorders, inflammations, fever and has hepatoprotective and immunostimulant activity in rats. The herb *Nigella sativa* is known as "Kalonji". *Nigella sativa* has been extensively studied for its biological activities and therapeutic potential and it possess wide spectrum of activities like antihypertensive, anticancer, anti-diabetic, antimicrobial, anti-inflammatory, anthelmintic immunomodulatory, diuretic, analgesics, spasmolytic, bronchodilator, renal protective gastro protective, hepato protective and antioxidant properties. Most of the therapeutic properties of this plant are due to the presence of pharmacological active principal thymoquinone, thymol and carvacol (Sarkar *et al*., 2015) [9]. Pharmacologically active constituents of *Nigella sativa* are thymoquinone, dithymoquinone, thymohydroquinone and thymol (Guler *et al*., 2006) [3].
Families Aspragaceae contain a medicinal herb *Asparagus racemosus* which is called as "Shatavari" or "Queen of herbs". *Asparagus racemosus* traditionally used as antiseptic, anti-anti-diarrhoeal, anti-dysenteric and anthelmintic.

This plant is recommended in Ayurveda for prevention and treatment of gastric ulcers, dyspepsia and as a galactogogue. Some ayurvedic practitioners have been successfully employed *Asparagus racemosus* for inflammation, nervous disorder, liver diseases and certain infectious diseases (Sinha and Biswas 2011) [10].

It is conceivable that herbal agents could serve as safer alternatives as growth promoters due to their suitability and preference, lower cost of production and reduced toxicity (Mahmood *et al*., 2009) [5]. The Panchgavya formulation and medicinal herbs *Nigella sativa* and *Asparagus racemosus* may serve alternatives as growth promoters in poultry due to their therapeutic efficacy and minimum health hazards.

Material and Methods

Plant material

Roots of *Asparagus racemosus* and seeds of *Nigella sativa* were procured from the Department of Aromatic and Medicinal Plants, Agriculture College, JNKVV, Jabalpur. Roots of *Asparagus racemosus* and seeds of *Nigella sativa* were dried, crushed and used for supplementation of diet in chicks/birds.

Preparation of Panchgavya

The Panchgavya was prepared by using fresh Cow dung (5 parts), urine (3 parts), milk (2 parts), curd (2 parts) and ghee (1 part) obtained from indigenous cow of Livestock Farm Adhartal, Jabalpur along with other ingredients viz. sugarcane juice (3 parts), tender coconut juice (3 parts), ripened banana (12 numbers) and toddy (2 parts) as per the method described by Natarajan (2003) [8]. The fresh Cow dung was thoroughly mixed with ghee in a wide mouth mud pot and kept for three days. The above mixture was thoroughly mixed once daily. On the fourth day, other ingredients were added to the mud pot and mixed properly. The pot was placed in shade and mixed thoroughly twice a day for 30 days to obtain Panchgavya. After 30days the Panchgavya was ready for experimental use.

Experimental Birds

The study was conducted on a total of 96 healthy Narmada Nidhi day-old dual purpose coloured chicks were procured from All India Co-ordinated Research Project (AICRP) on poultry breeding Farm Adhartal, Jabalpur (M.P) and maintained in deep litter system at project poultry Live Stock Farm (LSF) Adhartal, Jabalpur (M.P). All the experimental birds were kept under constant observations during the entire period of experiment.

Brooding and rearing of chicks

Initially the poultry shed was disinfected with the commercially available disinfectants followed by the cleaning of shed. The complete house was whitewashed and properly fumigated 4-5 days before the start of experiment. The chicks pens were prepared accordingly as per the design of experiment in order to provide separate space for the each replicated groups. The feeders and waterers were cleaned thoroughly and sun dried. Rice husk and saw dust was used as bedding material. During the period of first 3-4 days newspaper were spread over litter material. Every morning and evening the linear chicks feeders were filled with the weighed quantity of experimental diet and residual feed was collected and weighed at end of week. Fresh and clean water was offered during the entire experiment. Uniform conditions of housing, brooding and watering were maintained in all the groups except dietary treatments. A total 96 chicks was randomly divided into eight groups with respective two replicates and placed in pans as per experimental design.

Basal diet of experimental birds

The basal diets consist of 20 per cent CP and 2800 kcal. ME/kg of diet was provided to Narmada Nidhi birds.

Composition of basal diet per 100 kg

S. No.	Ingredients	Quantity per 100 kg basal diet
1.	Maize	62 kg
2.	Rice polish	02 kg
3.	Soya bean	31 kg
4.	Lime stone powder	02 kg
5.	Di-calcium phosphate	300 g
6.	Vitamin + Mineral mixture	2.5 kg
7.	Salt	200 g
	Total	100kg

Design of Experiment

S. No.	Group	Treatment with basal diet	Replicate	No. of birds per replicate	No. of birds per treatment
1	T1	Control	R1 R2	06 06	12
2	T2	Panchgavya @ 7.5 per cent	R1 R2	06 06	12
3	T3	*Nigella sativa* @ 1 per cent	R1 R2	06 06	12
4	T4	*Asparagus racemosus* @ 1 per cent	R1 R2	06 06	12
5	T5	Panchgavya @ 7.5 per cent and *Nigella sativa* @ 1 per cent	R1 R2	06 06	12
6	T6	Panchgavya @ 7.5 per cent and *Asparagus racemosus* @ 1 per cent	R1 R2	06 06	12
7	T7	*Nigella sativa* and *Asparagus racemosus* @ 1 per cent	R1 R2	06 06	12
8	T8	Panchgavya @ 7.5 per cent, *Nigella sativa* and *Asparagus racemosus* @ 1 per cent	R1 R2	06 06	12

Parameters recorded during the experiment

The observations on growth performance and feed intake were recorded on 1st, 2nd, 3rd, 4th, 5th, 6th, 7th and 8th week of the experiments.

Body weight

The body weight was recorded individually and replicate-wise on weekly basis to obtain body weight gain till eight weeks of age of each treatment groups by using electronic weighing balance in the morning time before feeding. Each bird was kept on the platform of balance and reading was recorded when the bird became totally stable.

Feed intake

Weekly feed consumption of experimental Narmada Nidhi birds was recorded replicate-wise on the basis of feed offered daily and left over feed recorded at the end of that week. The consumed feed was determined by subtracting the left over feed from the offered feed during the whole week.

Feed Efficiency Ratio (FER)

Feed efficiency ratio was calculated on the basis of body weight gain and feed consumption on weekly basis of experiment. FER was calculated by using following formula.

$$FER = \frac{\text{Body weight gain (g)}}{\text{Feed consumption (g)}}$$

Performance Index (PI)

The performance index was calculated as per the formula proposed by Bird (1955).

PI = Body weight gain (g) × Feed efficiency ratio

Results and Discussion

The results of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on body weight of Namada Nidhi birds have been depicted in table 01 to 04. The observations have been recorded at weekly interval for period of 56 days. The findings indicated a significant improvement in body weight of birds at 6th, 7th and 8th week of experiment with all treatments. Dietary supplementation of Panchgavya improved body weight of birds gradually from 6th to 8th week, however an increase in body weight on 7th and 8th week was found maximum among various treatment groups. The results further indicated that dietary supplementation of all treatments improved body weight which was maximum in Panchgavya treated birds, followed by *Asparagus racemosus* and combination of dietary supplementation of Panchgavya, *Nigella sativa* and *Asparagus racemosus* on 8th week of experiment.

Table 1: Effect of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on weekly body weight (g) in birds

Group	Treatment with basal diet	Day old	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week
T1	Control	36.91^{a}± 0.53	65.16^{a}± 2.08	133.75^{c} ±4.47	210.75^{d} ±8.81	338.80^{a}± 12.80	436.80^{a}± 16.90	593.50^{e}± 17.40	782.70^{e}± 17.90	0973.80^{e}± 30.30
T2	Panchgavya @ 7.5 per cent	36.91^{a}± 0.37	73.33^{a}± 2.21	157.08^{ab}± 5.18	245.60^{ab} ±11.50	374.30^{a}± 17.90	492.80^{a}± 23.10	672.00^{ab}± 24.40	952.00^{a}± 21.80	1254.20^{a}± 19.40
T3	*Nigella sativa* @ 1 per cent	37.08^{a}± 0.39	64.50^{a}± 2.66	143.58^{bc}± 6.52	220.80^{cd} ±11.50	349.30^{a}± 16.60	456.80^{a}± 20.00	613.60^{de}± 13.20	862.80^{cd}± 20.40	1111.10^{d}± 23.30
T4	*Asparagus racemosus* @ 1 per cent	37.00^{a}± 0.44	69.08^{a}± 2.66	149.58^{ab}± 6.13	228.83^{abcd}±9.31	367.20^{a}± 14.90	476.00^{a}± 18.70	654.90^{abcd}±12.70	918.40^{ab}± 14.60	1205.80^{ab}±19.80
T5	Panchgavya @ 7.5 and *Nigella sativa* @ 1 per cent	36.83^{a}± 0.47	69.75^{a}± 2.12	163.00^{a}± 4.60	241.00^{abc} ±7.07	377.30^{a}± 11.90	480.70^{a}± 14.40	630.10^{bcde}±12.50	876.10^{bcd}± 22.50	1129.80^{cd}±30.10
T6	Panchgavya @ 7.5 and *Asparagus racemosus* @ 1 per cent	38.08^{a}± 0.77	66.75^{a}± 2.35	152.17^{ab}± 4.81	224.42^{bcd} ±5.55	361.08^{a}± 6.78	464.67^{a}± 8.89	621.90^{cde}± 14.80	829.30^{de}± 16.30	1122.70^{cd}±21.40
T7	*Nigella sativa* and *Asparagus racemosus* @ 1 per cent	38.16^{a}± 0.50	67.58^{a}± 2.93	160.25^{a}± 5.13	243.17^{abc} ±7.83	369.20^{a}± 10.10	459.80^{a}± 25.20	662.30^{abc}± 18.90	895.70^{bc}± 22.50	1172.40^{bcd}±22.30
T8	Panchgavya @ 7.5, *Nigella sativa* and *Asparagus racemosus* @ 1 per cent	37.50^{a}± 0.39	69.41^{a}± 1.99	157.25^{ab}± 3.63	248.92^{a} ±4.65	375.75^{a}± 6.08	491.58^{a}± 8.18	677.60^{a}± 10.20	926.30^{ab}± 12.70	1183.70^{bc}±23.30

Mean values in the same column and same row bearing different superscripts differ significantly (^{a,b,c,d,e,}, p≤0.05)

Table 2: Effect of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on weekly feed intake (g)/ bird/ day

Group	Treatment with basal diet	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week
T1	Control	8.45	10.53	15.77	17.79	28.95	30.59	33.69	36.30
T2	Panchgavya @ 7.5 per cent	8.03	15.65	20.11	23.80	28.21	34.57	43.21	48.98
T3	*Nigella sativa* @ 1 per cent	6.78	10.29	17.97	22.02	29.22	30.41	39.34	44.10
T4	*Asparagus racemosus* @ 1 per cent	7.26	11.72	18.80	23.57	27.26	34.34	41.07	47.73
T5	Panchgavya @ 7.5 per cent and *Nigella sativa* @ 1 per cent	7.67	12.97	20.11	23.33	27.44	32.61	37.02	42.26
T6	Panchgavya @ 7.5 per cent and *Asparagus racemosus* @ 1 per cent	7.44	15.47	19.04	23.80	29.64	34.28	39.04	41.19
T7	*Nigella sativa* and *Asparagus racemosus* @ 1 per cent	8.45	13.92	18.92	23.57	27.50	35.59	37.61	42.73
T8	Panchgavya @ 7.5 per cent, *Nigella sativa* and *Asparagus racemosus* @ 1 per cent	8.75	16.42	21.13	23.51	29.88	33.03	42.61	49.76

Statistically non-significant

Table 3: Effect of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on weekly Feed Efficiency Ratio (FER) in birds

Group	Treatment with basal diet	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week
T1	Control	3.34^{c} ±0.22	6.51^{b} ±0.42	4.88^{a} ±0.34	7.20^{b} ±0.34	3.38^{a} ±0.23	5.12^{a} ±0.20	5.61^{a} ±0.46	5.26^{a} ±0.46
T2	Panchgavya @ 7.5 per cent	4.53^{a} ±0.24	5.35^{c} ±0.22	4.40^{a} ±0.46	5.40^{b} ±0.47	4.20^{a} ±0.19	5.18^{a} ± 0.23	6.48^{a} ±0.29	6.16^{a} ±0.39
T3	*Nigella sativa* @ 1 per cent	4.04^{abc}±0.35	7.68^{a} ±0.53	4.29^{a} ±0.32	5.83^{b} ±0.30	3.67^{a} ±0.17	5.15^{a} ± 0.48	6.33^{a} ±0.43	5.62^{a} ±0.22
T4	*Asparagus racemosus* @ 1 per cent	4.41^{ab}±0.33	6.86^{ab}±0.34	4.21^{a} ±0.20	5.86^{b} ±0.46	3.99^{a} ±0.35	5.21^{a} ± 0.47	6.41^{a} ±0.30	6.02^{a} ±0.46
T5	Panchgavya @ 7.5 and *Nigella sativa* @ 1 per cent	4.29^{ab}±0.26	7.19^{ab}±0.22	3.87^{a} ±0.18	5.84^{b} ±0.23	3.76^{a} ±0.21	4.58^{a} ± 0.25	6.64^{a} ±0.53	6.04^{a} ±0.44
T6	Panchgavya @ 7.5 and *Asparagus racemosus* @ 1 per cent	3.85^{abc}±0.29	5.52^{c} ±0.17	3.79^{a} ±0.21	5.74^{b} ±0.14	3.49^{a} ±0.30	4.58^{a} ± 0.28	5.31^{a} ±0.32	7.12^{a} ±0.38
T7	*Nigella sativa* and *Asparagus racemosus* @ 1 per cent	3.48^{c} ± 0.30	6.65^{b} ±0.17	4.38^{a} ±0.19	5.34^{b} ±0.17	3.29^{a} ±0.68	5.69^{a} ± 0.52	6.20^{a} ±0.62	6.47^{a} ±0.76
T8	Panchgavya @ 7.5, *Nigella sativa* and *Asparagus racemosus* @ 1 per cent	3.64^{bc} ±0.24	5.30^{c} ±0.11	4.33^{a} ±0.09	5.39^{b} ±0.10	3.87^{a} ±0.20	5.63^{a} ± 0.20	5.83^{a} ±0.31	5.17^{a} ±0.34

Mean values in the same column and same row bearing different superscripts differ significantly (^{a,b,c}, p≤0.05)

Table 4: Effect of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on weekly Performance Index (PI) in birds

Group	Treatment with basal diet	1st week	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week
T1	Control	099.00^{a} ±12.00	467.30^{c} ±58.10	396.60±55.60	945.50^{a}±90.20	348.40^{a}±44.30	817.4^{a} ±61.90	1142.0^{a}±149.00	1092.00^{a}±161.00
T2	Panchgavya @ 7.5 per cent	170.40^{a}±17.50	456.80^{c} ±39.40	438.10^{a}±97.20	754.00^{a}±105.0	509.90^{a}±47.90	950.3^{a} ±78.30	1857.0^{a}±167.00	1949.00^{a}±273.00
T3	*Nigella sativa* @ 1 per cent	120.40^{a}±21.50	640.00^{a} ±92.90	352.90^{a}±56.70	772.00^{a}±86.70	405.70^{a}±38.30	888.00^{aa} ±107.0	1660.0^{a}±240.00	1422.00^{a}±114.00
T4	*Asparagus racemosus* @ 1 per cent	150.90^{a}±23.10	568.00^{abc}±57.40	342.80^{a}±32.50	869.00^{a}±148.00	471.50^{a}±62.10	1018.00^{a}±157.00	1732.0^{a}±152.00	1842.00^{a}±267.00
T5	Panchgavya @ 7.5 and *Nigella sativa* @ 1 per cent	147.10^{a}±18.60	677.70^{a} ±44.60	310.20^{a}±30.10	810.80^{a}±69.70	403.00^{a}±46.50	708.6^{a} ±71.80	1750.0^{a}±271.00	1616.00^{a}±226.00
T6	Panchgavya @ 7.5 and *Asparagus racemosus* @ 1 per cent	117.40^{a}±19.80	476.60^{bc} ±32.00	283.40^{a}±31.00	790.50^{a}±41.00	393.00^{a}±62.80	752.60^{a} ±97.50	1146.0^{a}±138.00	2156.00^{a}±239.00
T7	*Nigella sativa* and *Asparagus racemosus* @ 1 per cent	110.80^{a}±18.10	621.50^{ab} ±32.50	371.50^{a}±31.60	681.10^{a}±43.50	438.70^{a}±50.60	1261^{a} ±273.00	1611.0^{a}±234.00	2069.00^{a}±479.00
T8	Panchgavya @ 7.5, *Nigella sativa* and *Asparagus racemosus* @ 1 per cent	122.00^{a}±18.00	472.40^{c} ±20.80	399.70^{a}±17.40	687.20^{a}±27.30	462.80^{a}±46.40	1062.7^{a} ±73.70	1496.0^{a}±162.00	1395.00^{a}±185.00

Mean values in the same column and same row bearing different superscripts differ significantly (^{a,b,c}, p≤0.05)

Table 02 presented the data of dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations on feed intake in birds from 1st to 8th week. The effect of dietary supplementation of various treatments did not change feed intake of birds among various treatments and it was found statistically non-significant.

The data presented in table 01,02,03 and 04 clearly indicated an overall improvement in production performance of birds treated with Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations. The body weight of birds significantly improved in all treatments on 6th, 7th and 8th week and the similar trend was observed in different treated groups. The data revealed that dietary supplementation of Panchgavya exhibited an overall improvement in growth performance including live body weight and feed intake of birds. The report of Dhama *et al*. (2005) [2] also indicated growth promoter activity of Panchgavya in animals which supports the present findings.

The improvement in cumulative body weight gain and feed intake was observed with indigenous herbs; *Nigella sativa* and *Asparagus racemosus.* Many reports have been cited in scientific literature regarding growth promoter activity of *Nigella sativa* and *Asparagus racemosus*. The work of Mahmood *et al.* (2009) [5] indicated growth promoter activity of *Nigella sativa* in Broilers who stated that 1 per cent of *Nigella sativa* supplementation in poultry ration exhibited significant improvement in live body weight of birds. Sarkar *et al.* (2015) [9] also reported better growth performance of birds supplemented with *Nigella sativa* which also substantiate the finding of present study. The gain in body weight of birds supplemented with 1 per cent of *Nigella sativa* has also been reported by Guler *et al.* (2006) [3].

In the present study, significant increase in live body weight of birds appeared on 6th, 7th and 8th week in various treatments and similar patterns of improvement of live weight in broilers treated with *Nigella sativa* has been indicated by Jahan *et al.* (2015) [4]. They further stated that dietary supplementation of *Nigella sativa* did not alter body weight at initial stages of experiment which increased significantly on 8th week of experiment.

Asparagus racemosus, another indigenous herb used in the present study also improved live body weight and feed intake in birds. The beneficial effects of *Asparagus racemosus* in poultry diet has been reported by Mane *et al.* (2012) [6] who also found that supplementation of 1 per cent *Asparagus racemosus* in poultry diet showed significant effect on body weight and feed intake in broilers.

An improved body weight and feed intake in birds supplemented with *Nigella sativa* and *Asparagus racemosus* may be contributed to better absorption of nutrients present in gut and also due to bioactive components of these two medicinal herbs. The improvement in weight gain of birds with *Nigella sativa* and *Asparagus racemosus* may probably be due to inhibition of growth of intestinal bacteria such as

Staphylococcus aureus and *Escherichia coli* and therefore the load of bacteria in intestine is reduced which leads to more absorption of nutrients from gut and hence improved gain in body weight has been recorded.

Conclusions

- The dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations improve the body weight of birds which was maximum with Panchgavya, followed by *Asparagus racemosus* and *Nigella sativa*.
- Growth performance parameters Feed Efficiency Ratio (FER) and Performance Index (PI) were also improve in all treatment groups as compared to control group.
- The dietary supplementation of Panchgavya, *Nigella sativa*, *Asparagus racemosus* and their combinations improved overall growth performance in birds.

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