



Changes in Palatability of Poultry Feed Using Garlic, Ginger and their Combination

Utsav Lamichhane^{1*}, Saroj Regmi² and Ramasish Sah³

¹Agriculture and Forestry University, Rampur, Chitwan, Nepal

²Animal Nutrition and Fodder Production, Agriculture and Forestry University, Rampur, Chitwan, Nepal

³Department of Livestock Production and Management, Agriculture and Forestry University, Rampur, Chitwan, Nepal

*Corresponding Author: Utsav Lamichhane, Agriculture and Forestry University, Rampur, Chitwan, Nepal.

Received: August 27, 2018; Published: October 11, 2018

Abstract

Feed is one of the most important parameters of the poultry husbandry. Its palatability depends on the different ingredients used in the poultry feed. A feed trail was done in the farm of Agriculture and Forestry University, Rampur, Nepal to access the change in the palatability of the poultry feed using garlic, ginger and their combination. The use of garlic and ginger as growth promoter is an interesting and emerging concept. Thus, the trial aims to find the degree of acceptance of the feed supplemented with garlic and ginger by the poultry. Feed with different concentration of the garlic, ginger and their combination were given, and the weekly refusal was taken to obtain the exact amount of feed consumed. Each treatment was replicated four times and the overall weekly consumption of the feed was calculated and analyzed. In the trail, the overall weekly consumption of feed was found significantly ($P < 0.05$) highest (1.302 ± 0.03 Kg) in the poultry treatment given with basal diet supplemented with 0.5% garlic and 0.5% ginger (T_4). Statistics showed similarities in result in the treatment fed with basal diet with 1% garlic and 1% ginger (T_5). Also, the analyzed result significantly ($p < 0.05$) showed minimum weakly feed consumption (1.208 ± 0.01 Kg) in the control treatment (T_1) which was standard basal feed without supplementation of garlic and ginger. Acceptance of the feed supplemented with ginger and garlic was significantly higher, suggesting positive response for the use of garlic and ginger as growth promoter in the poultry feed.

Keywords: Poultry Feed; Garlic; Ginger

Introduction

Feed additives can be nutritional or non-nutritional substance that improves the nutrient availability in the feed eventually minimizing the cost of feed. As an alternative of the artificial growth promoter, natural growth promoters like prebiotics, probiotics, symbiotic, enzymes, plant extracts etc. can be used to feed the broilers [1]. Garlic, ginger can be potential alternatives for the common artificial growth promoters like antibiotics [2]. Garlic chemically contains allin, ajoene, diallyl polysulfides, vinylthiols, S-allylcysteine and enzymes, saponins, flavonoids and Maillard reaction products. Garlic is much more potent than any other in the onion family [3]. The sulphyl group in the cytosol is responsible for its biochemical effects. And the thiosulphate group in the garlic is responsible for its antibacterial activities [4]. Likewise, the characteristic ginger smell is from the volatile oils that consists of zingrone, shogaols and gingerols [5]. There compounds are

responsible for the growth promotion, antibiotics activity and antioxidant property. The availability and cultivation of garlic and ginger is beneficial for the use in the poultry feed. Garlic can be cultivated easily year-round in mild climate [6]. It can grow in wide range of soil condition and pH. It is cultivated by planting individual cloves in the ground [7]. Not only in the terai region it can be cultivated in the colder regions, but the cloves should be planted deep in the soil to prevent freeze [8]. Nepal ranks 5th in the ginger production [9].

Material and Method

Location of study

The feed trail was conducted in the poultry farm of Agriculture and Forestry University, Rampur, Chitwan, Nepal which lies at 9.8 km South-West from Bharatpur, headquarter of Chitwan district and site at 27° 37' North latitude and 84° 25' East longitude.

Experimental birds

200 one day old cobb 500 chicks (average weight 41 grams) were purchased from private hatchery (Anmol feed and Hatchery Pvt. Ltd, Bharatpur, Chitwan). The chicks were group brooded in deep litter system for first 10 days. From 11th day the birds were shifted into the deep litter system trail compartments.

Experimental design

A total of 200, unsexed 10 days old chicks of broiler were randomly divided into five treatment groups with four replicate each having 10 chicks in a Completely Randomized Design (CRD). corresponding feed was given to the treatment group of bird and weekly refusal from each treatment was measured to access the exact amount of feed intake.

Experimental diets

For the first 10 days commercial starter feed which was brought from the market was given. After that the treatment feed was given with the following amount of garlic, ginger and the corresponding number of birds:

Groups	Treatments	Replicates				Total chicks
		R ₁	R ₂	R ₃	R ₄	
T ₁	Basal diet (Control diet)	10	10	10	10	40
T ₂	Basal diet + 1% garlic	10	10	10	10	40
T ₃	Basal diet + 1% ginger	10	10	10	10	40
T ₄	Basal diet + 0.5% ginger +0.5% garlic	10	10	10	10	40
T ₅	Basal diet + 1% garlic + 1% ginger	10	10	10	10	40

Table 1: Amount of garlic and ginger in different treatment of trial feed.

Feed composition

The starter was the commercial feed. The grower and finisher feeds were composed by using the software Feed Bean to meet the

standard nutritional value. The composition of treatment feeds is listed in the tables below.

Ingredients	T1	T2	T3	T4	T5
Maize	45.35	44.35	44.35	44.35	43.35
SBM	40	40	40	40	40
Rice bran	5	5	5	5	5
Animal Fat	6	6	6	6	6
DCP	1.8	1.8	1.8	1.8	1.8
Methionine	0.2	0.2	0.2	0.2	0.2
Lysine	0.05	0.05	0.05	0.05	0.05
Limestone	1	1	1	1	1
Salt	0.25	0.25	0.25	0.25	0.25
Coccidiostat	0.05	0.05	0.05	0.05	0.05
Mineral	0.25	0.25	0.25	0.25	0.25
Livol powder	0.05	0.05	0.05	0.05	0.05
Garlic	0	1	0	0.5	1
Ginger	0	0	1	0.5	1

Table 2: Composition of grower trial feed.

Ingredients	T1	T2	T3	T4	T5
Maize	59.38	58.38	58.38	58.38	57.38
SBM	32	32	32	32	32
Rice bran	0	0	0	0	0
Animal Fat	5.2	5.2	5.2	5.2	5.2
DCP	1.7	1.7	1.7	1.7	1.7
Methionine	0.12	0.12	0.12	0.12	0.12
Lysine	0	0	0	0	0
Limestone	1	1	1	1	1
Salt	0.25	0.25	0.25	0.25	0.25
Coccidiostat	0.05	0.05	0.05	0.05	0.05
Minemeral	0.25	0.25	0.25	0.25	0.25
Livol powder	0.05	0.05	0.05	0.05	0.05
Garlic	0	1	0	0.5	1
Ginger	0	0	1	0.5	1

Table 3: Composition of finisher trial feed.

Results

Treatments	Week					Overall
	1 (18 th)	2 (25 th)	3 (32 th)	4 (39 th)	Total	
T ₁ (Control)	0.543 ± 0.01 ^a	1.032 ± 0.03 ^a	1.233 ± 0.02 ^b	2.022 ± 0.01 ^b	4.830 ± 0.05 ^b	1.208 ± 0.01 ^b
T ₂ (BD + 1% garlic)	0.495 ± 0.01 ^d	0.948 ± 0.04 ^b	1.435 ± 0.09 ^a	2.186 ± 0.13 ^{ab}	5.064 ± 0.19 ^{ab}	1.266 ± 0.05 ^{ab}
T ₃ (BD + 1% ginger)	0.523 ± 0.02 ^c	0.961 ± 0.04 ^b	1.438 ± 0.07 ^a	2.095 ± 0.10 ^{ab}	5.017 ± 0.16 ^{ab}	1.254 ± 0.04 ^{ab}
T ₄ (BD + 0.5% garlic + 0.5% ginger)	0.523 ± 0.01 ^c	0.994 ± 0.02 ^{ab}	1.443 ± 0.06 ^a	2.246 ± 0.11 ^a	5.207 ± 0.13 ^a	1.302 ± 0.03 ^a
T ₅ (BD + 1% garlic + 1% ginger)	0.530 ± 0.03 ^b	1.031 ± 0.04 ^a	1.451 ± 0.06 ^a	2.193 ± 0.13 ^a	5.205 ± 0.25 ^a	1.301 ± 0.06 ^a
Grand Mean	0.523	0.993	1.400	2.149	5.065	1.266
F value	3.622	4.509	8.626	2.710	3.367	3.367
Probability	< 0.05*	<0.05*	< 0.01**	< 0.05*	< 0.05*	< 0.05*
SEM	0.01	0.01	0.02	0.03	0.05	0.01
LSD	0.001	0.047	0.095	0.1651	0.256	0.256
CV%	3.50	3.68	4.56	5.04	3.36	3.36

Table 4: Mean weekly cumulative feed consumption (kg/bird/week) of Cobb 500 fed diet supplemented with different level of garlic and ginger.

Means in column with different superscript differ significantly by LSD ($P < 0.05$), where CV: Coefficient of Variation, SEM: Standard Error of Mean, LSD: Least Significant Difference, *, ** = Significant at 0.05 and 0.01 Probability Levels Respectively, \pm = Standard Deviation of Mean.

Analysis of Variance (ANOVA) showed that the overall weekly feed consumption was recorded significantly ($P < 0.05$) highest (1.302 ± 0.03 kg) in treatment fed basal ration supplemented with 0.5% garlic and 0.5% ginger (T₄) which was statistically similar with T₅ (basal diet with 1% garlic and 1% ginger). Similarly, significantly ($P < 0.05$) minimum weekly feed consumption (1.208 ± 0.01 kg) was recorded in control group (T₁) whereas treatments T₂ (basal diet with 1% garlic) and T₃ (basal diet with 1% ginger) were in between T₄ and T₁.

Similar result was also observed in overall mean daily feed consumption. This result was similar to the findings of Oladele, *et al.* [10], Isa [11] Mansoub and Myandoab [12] who showed that feed intake was higher in garlic supplemented broilers as compare to control group. The results agree with the findings of Herawati and Marjuk (2011) and Mohamed, *et al.* [13] who noticed that use of ginger powder in the broilers diet had a significant positive effect on feed consumption of broiler chicks. However, Songsang, *et al.* [14] observed there were no significant differences ($P > 0.05$) in feed intake among treatments receiving diet supplemented with garlic [15-35].

Discussion

The feed trial showed higher feed palatability in the experimental feed with supplementation of garlic and ginger than the basal diet feed.

Palatability of feed depends upon the response of taste buds and the response of nervous system (brain) towards the feed. In the case of poultry, the number of taste buds is significantly less than in the mammals. So, the feed rejection merely occurs in poultry unless the putrefaction or any rational damage occurs to the feed. According to USDA nutrient database ginger and garlic are rich in vitamins like thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), folate (B9), vitamin C, vitamin E and minerals like iron, magnesium, manganese, phosphorus, potassium, sodium, zinc etc. These available nutrients play vital role in the energy balance, growth promotion, immunity, detoxification, repairing of damage tissue and antioxidation. Due to these all boost provided to the body the nervous system might provide positive response towards the intake of the feed. That can be the good reason for the higher palatability of the feed supplemented with ginger and garlic over basal diet feed.

Conclusion

The trail showed significant ($P > 0.05$) increase in the palatability of the poultry feed while using garlic and ginger. That delivers positive impact of natural growth promoting herbs over the costly artificial growth promoters. Yet, for the commercial use of garlic and ginger as growth promoter requires more research like this. Concluding, the trail guides a new aspect in the poultry feed industry for the use of organic product as growth promoter.

Acknowledgement

We would like to express our gratitude to Prof. Dr. I.P. Dhakal, Vice-Chancellor, AFU; Prof. Dr. Sharda Thapaliya, Dean, FAVF, AFU; Prof. Dr. Naba Raj Devkota, Director, Directorate of Research and Extension; Prof. Dr. Bhuminand Devkota, HOD, Department of Therigenology; Asst. Prof. Dr. Nirajan Bhattarai HOD, Department of Animal Breeding and Biotechnology; Prof. Dr. Hom Bahadur Basnet, HOD, Department of Veterinary Microbiology and Parasitology; Prof. Dr. Asso. Prof. Dr. Dipesh Chhetri, Director, Veterinary Teaching Hospital; Asso. Prof. Dr. Krishna Kafle, HOD, Department of Theriogenology, IAAS, Paklihawa. We would like to acknowledge Prof. Dr. Mohan Sharma, Prof. Dr. Ram Prasad Poudel. We are indebted to Sachita Pokharel, Namrata Ghimire, Kriti Poudel, Subash Sapkota, Roshan Ghimire, Kiran Bhandari, Naveen Pant, Mandeep Pokharel, Yasaswi Subedi, Pradip Bartaula. We are also indebted to our colleagues, seniors, juniors, farmers who cooperated with us during the study.

Bibliography

- Borazjanizadeh M., *et al.* "The Effect of Clove and Oregano on Economic Value of Broiler". *Journal of Animal and Veterinary Advances* 10 (2011): 169-173.
- Asghar A., *et al.* "Economics of broiler production in Mardan division". *Journal of Rural Development and Administration* 32 (2000): 56-65.
- Rafe A and Nadjafi MS. "Physicochemical characteristics of garlic (*Allium sativum* L.) oil: Effect of extraction procedure.
- Farbman KS., *et al.* "Antibacterial activity of garlic and onions: a historical perspective". *The Pediatric infectious disease journal* 12.7 (1993): 613.
- An K., *et al.* "Comparison of different drying methods on Chinese ginger (*Zingiber officinale* Roscoe): Changes in volatiles, chemical profile, antioxidant properties, and microstructure". *Food Chemistry* 197 (2016): 1292-300.
- "Garlic". The Royal Horticultural Society, London, UK (2017).
- Small Farm News Archive". Sfc.ucdavis.edu. Archived from the original on March 13, 2007.
- The Cult of the Cloves". *New York Times*. September 29, (2010).
- Ginger Production in 2016, FAOSTAT
- Oladele OA., *et al.* "Effects of dietary garlic (*Allium sativum* L.) supplementation on body weight and gut morphometry of commercial broilers". *International Journal of Morphology* 30.1 (2012): 238-240.
- Isa KJJ. Performance and lipid profile of broilers fed two medicinal plants (Doctoral dissertation) (2011).
- Mansoub NH and Nezhady MAM. "The effect of using thyme, garlic and nettle on performance, carcass quality and blood parameters". *Annals of Biological Research* 2.4 (2011): 315-320.
- Mohamed AB., *et al.* "Effect of ginger (*Zingiber officinale*) on performance and blood serum parameters of broiler". *International Journal of Poultry Science* 11.2 (2012): 143-146.
- Songsang A., *et al.* "Effect of garlic (*Allium sativum*) supplementation in diets of broilers on productive performance, meat cholesterol and sensory quality". In Conference on International Research on Food Security, Natural Resource Management and Rural Development, University of Hohenheim, Tropentag (2008).
- Ademola SG., *et al.* "Serum lipid, growth and haematological parameters of broilers fed garlic, ginger and their mixtures". *World Journal of Agricultural Sciences* 5 (2009): 99-104.
- Ahmad S. "Comparative efficiency of garlic, turmeric and kalongi as growth promoter in broiler. M. Sc. (Hons.) Thesis, Department Poultry Sciences, University of Agriculture, Faisalabad, Pakistan (2005).
- Aji SB., *et al.* "Effects of Feeding Onion (*Allium cepa*) and Garlic (*Allium sativum*) on Some Performance Characteristics of Broiler Chickens". *Research Journal of Poultry Sciences* 4 (2011): 22-27.
- Canogullari S., *et al.* "The effects of dietary garlic powder on performance, egg yolk and serum cholesterol concentrations in laying quails". *Czech Journal of Animal Science* 55 (2010): 286-293.
- Cardozo PW., *et al.* "Effects of natural plant extracts on ruminal protein degradation and fermentation profiles in continuous culture¹". *Journal of animal science* 82 (2004): 3230-3236.
- Chinnah AD., *et al.* "Antigen dependent adjuvant activity of a polydispersed β -(1, 4)-linked acetylated mannan (acemannan)". *Vaccine* 10.8 (1992): 551-557.

21. Division. *Journal of Rural Development* 32.3(2000): 56-65.
22. "Ginger". University of Maryland Medical Centre. (2006).
23. Horton GMJ., *et al.* "Effect of dietary garlic (*Allium sativum*) on performance, carcass composition and blood chemistry changes in broiler chickens". *Canadian Journal of Animal Science* 71.3 (1991): 939-942.
24. Ihsan K. "Effect of different levels of Black cumin (*N. sativa*) seeds on the performance of broilers. M. Sc. (Hons.) Thesis, Department of Poultry Sciences, University of Agriculture, Faisalabad, Pakistan (2003).
25. Kyo E., *et al.* "Immunomodulatory effects of aged garlic extract". *The Journal of nutrition* 131.3 (2001): 1075S-1079S.
26. Lewis MR., *et al.* "Effects of dietary inclusion of plant extracts on the growth performance of male broiler chickens". *British Poultry Science* 44 (2003): 43-44.
27. Mansoub NN. "Comparative effect of using zizaphora, garlic and probiotic on performance and serum composition of broiler chickens". *Annals of Biological Research* 2.3 (2011): 373-378.
28. Onibi GE., *et al.* "Response of broiler chickens in terms of performance and meat quality to garlic (*Allium sativum*) supplementation". *African Journal of Agricultural Research* 4.5 (2009): 511-517.
29. Onu PN. "Evaluation of two herbal spices as feed additives for finisher broilers". *Biotechnology in Animal Husbandry* 26 (2010): 383-392.
30. Oregano on economic value of broiler chickens' diet under hot weather of Khuzesta. *Journal of Animal and Veterinary*.
31. Pati P., *et al.* "Effect of inclusion of ginger (*Zingiber officinale*) waste meal in the diet on broiler performance". *Indian Journal of Animal Nutrition* 32 (2015): 305-309.
32. Sarica S., *et al.* "Use of an antibiotic growth promoter and two herbal natural feed additives with and without exogenous enzymes in wheat based broiler diets". *South African Journal of Animal Science* 35 (2005): 61-72.
33. Tollba AAH. "Using some natural additives to improve physiological and productive performance of broiler chicks under high temperature condition. 2. Black cumin (*Nigella sativa*) or garlic (*Allium sativum*)". *Egyptian Poultry Science* 23 (2003): 327-340.
34. Vidyarthi VK., *et al.* "Effect of herbal additives on the performance of broiler chicken". *Indian Veterinary Journal* 87 (2010): 258-260.
35. Wankar A., *et al.* "Effect of Neem (*Azadirachta indica*) leaf powder supplementation on growth in broilers". *Veterinary World* 2 (2009).

Volume 2 Issue 11 November 2018

© All rights are reserved by Utsav Lamichhane., et al.