



RESEARCH PAPER

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Performance of broilers given oregano (*Origanum vulgare*) extract as drinking supplement

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Abstract

The concern regarding the use of natural remedies as an alternative substance for antibiotics in improving performance and health promoters has caught much interest. Thus, the study aimed to determine the performance and profitability of broilers supplemented with *oregano* extract. Two hundred forty head day-old broiler chicks were distributed at random in five treatments replicated six times following the Tukeys's Honest Significant Difference (HSD) Test. *Oregano* extract was incorporated into drinking water as a supplement at 2.5, 5.0, 7.5, and 10ml per liter of water for 21 days. Supplementation of *oregano* extract in the drinking water significantly affected the broiler performance in terms of final weight and gain in weight but comparable performance on feed and water consumption, feed conversion ratio, and mortality rate of broilers. The addition of *oregano* extract in the drinking water of broilers significantly affected the profit above feed, medicine, and cost of broilers. The addition of *oregano* extract at a rate of 2.5 to 10ml/liter of water can be used as a supplement to the performance of broilers as a substitute for commercial antibiotics.

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Introduction

Antibiotics have been used to destroy the growth of microorganisms or bacteria (Mehdi *et al.*, 2018) to improve animal health and food safety. However, to avoid possible risks in animal production as well as customer safety, antibiotic growth promotants in poultry diets were banned. Researchers now find a natural alternative that has a similar beneficial effect that is safe and available. Herbal and botanical medicine involves the practice of promoting plant products derived directly from plants. Nowadays, traditional herbs-based therapy is gaining more attention in humans and animals worldwide. Poultry production is the most intensive farming among livestock sectors especially in the areas of nutrition, management, disease control, genetic improvement, organization of dietary supplements, and treatment of emerging pathogens, that's why, poultry production is in need of sustainable therapeutic that aids on production with no residual effect, low cost, availability and free from the threat of antibiotic resistance.

Natural remedies have been used instead of synthetic antioxidants to delay lipid oxidation in foods that improve their quality and nutritional value such as the antioxidant activity of plant extract and natural compounds to improve meat quality since they are simple and cost-effective such as *oregano*. The concern regarding the use of alternative substances for antibiotics as growth promoters and health promoters has caught much interest (Schulze *et al.*, /EP2170100A1). According to Mehdi *et al.* (2018), antibiotics have long been used as growth promoters and to fight bacterial infections in poultry production. However, antibiotic residues have been found in poultry meat, which are considered risk to human health. Therefore, researchers are searching for natural alternatives to antibiotics to improve poultry production like *oregano* as a supplement for broilers in extract forms.

Oregano is a perennial herb grown for 3-4 years belonging to the genus *Origanum* (*Origanum vulgare*). Carvacrol and thymol are the most important components of *oregano* which inhibit the growth of bacteria and may aid food preservation.

It may also contain hundreds of additional chemical constituents including linalool, gamma-terpinene, p-cymene, and terpinene-4-ol, and scents of the different species and subspecies (Herb Society of America, 2005). It also contains amounts of volatile oils, trace amounts of alkaloids, flavonoids, tannins/polyphenols, and saponin (Phyto chemical testing results (College of Pharmacy, LORMA Colleges, San Fernando City, La Union). *Oregano* extracts are used in animal nutrition as appetite, stimulants, and as treatment or prevention of certain pathological conditions as antioxidants (FrAnKIC *et al.*, 2009).

Material and methods

Research Design

The study was laid out using the Randomized Complete Block Design (RCBD). The following five treatments were randomly and replicated six times:

T₀ - Commercial antibiotic + electrolytes (Control)

T₁ - 2.5ml *oregano* extract per li of water

T₂ - 5.0ml *oregano* extract per li of water

T₃ - 7.5ml *oregano* extract per li of water

T₄ - 10ml *oregano* extract per li of water

Materials and procedures

A. Preparation of *Oregano* Extract

Fresh *oregano* leaves were gathered from the Poultry project of DMMMSU-NLUC, Bacnotan, La Union, Philippines where the research was conducted. *Oregano* leaves were cleaned and washed with water then blended using an electric blender. The *oregano* extract was strained in a clean cheesecloth and stocked in clean containers then stored at room temperature. *Oregano* extract was added to plain water following the specific levels in each treatment during the brooding period of 21 days.

Birds in a control group were provided with commercial antibiotics containing chlortetracycline /hydrochloride, vitamin A + B₁₂ for the brooding period (14 days), and electrolytes (niacinamide, magnesium chloride, potassium chloride, sodium acetate, sodium chloride, glucose) in the drinking water for 7days.

Broiler Ration

1. Commercial Chick Booster - for 14 days
2. Commercial Starter Crumble – for 15-35 days

B. Experimental Birds

Two hundred forty head day-old broiler chicks were distributed at random in five treatments replicated six times at 8 birds per replicate and housed in wire cages.

Experimental Cages and Management Practices

The experimental cages were cleaned by brushing the walls and flooring with soap and water and then disinfected with the use of commercial disinfectant following the manufacturer's recommendation to prevent the growth and multiplication of disease-causing microorganisms. Cages were left for 5-7 days to eliminate the odor.

Brooding cages were installed with an electric bulb as a source of heat during the brooding period (14 days). Clean empty bags were placed at the sides of the cages that maintained proper temperature and prevented the birds from exposure to draft. Clean rice hull was provided as beddings and were changed every other day. Strict hygiene and sanitation were properly imposed and observed during the experiment.

Ad libitum feeding was employed in all treatments with pure commercial ration from brooding to 35 days old. A chick booster ration was given to the birds during the brooding period and was shifted to a starter ration thereafter. Mortality was gathered and recorded from brooding to the growing period.

Data Gathered

1. *Gain in weight (kg)*. This was taken by subtracting the initial weight of birds from the final weight.
2. *Final weight (kg)*. This was taken by weighing the bird at 35 days old.
3. *Feed Consumption (kg)*. This was obtained by summing up the daily feed intake of broilers from day-old to 35 days.
4. *Feed Conversion Ratio*. This was computed by dividing the total feed consumed by the total gain in weight.

$$FCR = \frac{\text{Feed Consumed (kg)}}{\text{Total Gain in Weight of Birds (kg)}} \times 100$$

5. *Mortality Rate (%)*. This was computed by dividing the total number of dead birds by the total number of birds at the start of the study of the study multiplied by 100.

Mortality Rate (%) =

$$\frac{\text{Total number of dead birds}}{\text{Total number of birds at the start of the study}} \times 100$$

6. *Water Consumption (li)*. This was taken by summing up the total water consumed from brooding to 35 days of age.

7. *Profit above the feed, supplement, and stock cost (P)*. This was taken by subtracting the cost of feed, medicine, and stock cost from the sale value of birds at the end of the study.

Data Analysis

Data gathered were analyzed using Analysis of Variance of Randomized Complete Block Design and significant differences among treatment means were further tested using Tukeys's Honest Significant Difference (HSD) Test.

Result and discussion

Growth Performance of Broilers

The final weight of broilers is presented in Table 1. The result showed that birds given commercial antibiotics had the heaviest body weight (1.56kg) while birds given 10ml *oregano* extract (1.40kg) had the lightest weight. Analysis of variance was found significant. This implies that the addition of *oregano* extract in the drinking water of broilers affects the final weight.

Comparison among treatment means showed that broilers given commercial antibiotics were significantly heavier which is comparable to those birds given *oregano* extract. The result indicates that at 35 days old, the addition of *oregano* extract in the drinking water enhances the growth rate of broilers. As cited by Ertas *et al.*, 2005 the supplementation of *oregano* extract in drinking water could be a potential natural growth promoter in poultry.

The data on the gain in weight of broilers is presented in Table 1. The highest gain was found in those birds given commercial antibiotics (1.53kg) and birds given 10 ml *oregano* extract gained the least (1.36kg). The analysis of variance revealed significant results. The result implies that the addition of *oregano* extract in the drinking water affects the gain in weight of broilers.

Table 1. Final weight, gain in weight, and feed consumption of broilers as affected by *oregano* extract in the drinking water (kg).

Treatment	Final Weight (kg)	Gain in Weight (kg)	Feed Consumption (kg)
Commercial antibiotic	1.56 ^a	1.53 ^a	2.80
2.5ml <i>oregano</i> extract/li of water	1.42 ^{ab}	1.38 ^{bc}	2.73
5.0ml <i>oregano</i> extract/li of water	1.52 ^{ab}	1.48 ^{ab}	2.79
7.5ml <i>oregano</i> extract/li of water	1.42 ^{ab}	1.38 ^{bc}	2.75
10ml <i>oregano</i> extract/li of water	1.40 ^b	1.36 ^c	2.77
Significance	*	*	ns
cv	4.92%	5.05%	3.44%

** All means in a column followed by the same letter are not significantly different at 0.05 level (Tukeys's HD Test)

Comparison among treatments means that birds given commercial antibiotics gained the highest weight which is comparable to those birds given 5ml *oregano* extract. A better gain in weight may probably be due to the good nutritional value present in *oregano* extract which might improve the weight gain. It may be concluded that the addition of combined bioactive components of *oregano* to plain water can be used as an alternative to commercial antibiotics. The present study is close to the findings of De Moraes *et al.* (2014) that the potential of *oregano* at 0.5g/kg improved the growth performance and carcass composition. Mohiti *et al.* (2015) also found in their study that *oregano* supplementation had increased body weight gain thus improving feed conversion ratio. Table 1 presents the feed consumption of broilers as affected by *oregano* extract which ranged from 2.73 to 2.80kg. The analysis of variance revealed insignificant results. This implies that the addition of *oregano* extract in the drinking water did not influence the palatability

of broilers. The reason might depend on the preparation of *oregano* leaves and levels added as a supplement to broilers. Puvaca *et al.* (2013) mention that the application of phyto-genic depends on the presence of active components, levels of preparations, source, genetics, and the composition of the bird's diet. Petrolli *et al.*, 2012 concluded that the use of herbal extract incorporated in the broiler's diet promotes performance similar to the use of commercial antibiotics. Sadighe *et al.*, 2012, also found that adding 0.5% level of herbal extract in broiler diets increased feed intake. The beneficial bioactive components of herbal plants may stimulate the appetite and feed intake of broilers.

Table 2. Feed conversion ratio, water consumption, and broilers' mortality rate are affected by *oregano* extract in the drinking water.

Treatment	Feed Conversion Ratio	Water Consumption (li)	Mortality Rate (%)
Commercial antibiotic	2.04	1.69	1.25
2.5 ml <i>oregano</i> extract/li of water	1.80	1.68	1.25
5.0 ml <i>oregano</i> extract/li of water	1.89	1.75	1.25
7.5 ml <i>oregano</i> extract/li of water	2.01	1.70	1.25
10 ml <i>oregano</i> extract/li of water	1.86	1.67	1.25
Significance	ns	ns	2.50
cv	7.21%		

** All means in a column followed by the same letter are not significantly different at 0.05 level (Tukeys's HD Test)

Feed conversion ratio of broilers as affected by *oregano* extracts presented in Table 2 which ranged from 1.80 to 2.04. Broilers given *oregano* extract had lower feed efficiency to produce a kilo gain in weight as compared to broilers given commercial antibiotic + electrolytes; however, the analysis of variance disclosed no significant result. The result implies that the addition of *oregano* extract in the drinking water did not affect the feed conversion ratio of broilers which concurs with the study of Fakhim *et al.*, 2013, supplementation of herbal extract in the drinking water had no significant differences in terms of FCR in between the different treatments (0, 0.25, 0.5, 0.75 and 1%).

Likewise, Paneri *et al.*, 2005 found no significant differences in hen performance given *oregano* essential oil (50 and 100 mg/kg) on the feed conversion ratio, thus, the addition of *oregano* extract at different treatments in the drinking water of broilers may use as natural alternative growth promotants in broilers and so help feed costs in broiler especially as it is quite inexpensive and it is abundantly available.

The water consumption of broilers as affected by *oregano* extract in the drinking water is shown in Table 2. The water consumption ranged from 1.67 to 1.75 liters per head for 35 days. Analysis of variance revealed insignificant results. This implies that the addition of *oregano* extract did not affect the water intake of the broiler. Although, water regulates body temperature, digestion of food, and elimination of wastes (Jacob 2015).

Mortality represents a major economic loss in broiler production and may rise due to disease, predation, or high temperature. Table 2 presents the mortality rate of broilers as affected by *oregano* extract in the drinking water which ranged from 1.25 to 2.50%. Analysis of variance disclosed no significant result. The mortality rate is at industry-acceptable level which is 4%. (<https://www.fao.org /3/Y4628E /y4628e03.htm>)

Profit Above Feed, Medicine, and Stock Cost

Profit above the feed, medicine, and stock cost of broilers is presented in Table 3. Birds given commercial antibiotics had the highest profit with a total of ₱ 49.72 and the lowest were those birds given 10ml *oregano* extract (₱30.69). The analysis of variance revealed significant results. This implies that the addition of *oregano* extract to the drinking water affected the profit of broilers.

Comparison among treatments means that birds in the control group gain the highest profit which is comparable to those birds given 5 ml *oregano* extract. Supplementation of herbal extract improved the performance of birds and better performance means lower costs and it is expressed in terms of daily gain, feed conversion ratio, and mortality rate (Omar *et al.*, 2016) thus increasing the profit of broilers.

Table 3. Profit above feed, medicine, and stock cost of broilers as affected by *oregano* extract (PhP).

Treatment	Profit (₱)
Commercial antibiotic	49.72 ^a
2.5 ml <i>oregano</i> extract/li of water	32.60 ^b
5.0 ml <i>oregano</i> extract/li of water	43.64 ^{ab}
7.5 ml <i>oregano</i> extract/li of water	33.05 ^b
10 ml <i>oregano</i> extract/li of water	30.69 ^b
Significance	*
cv	23.29%

Conclusion

Based on the result of the study, the following conclusions were derived:

1. The addition of *oregano* extract in the drinking water significantly affected the broiler performance in terms of final weight and gain in weight; comparable performance on feed and water consumption, feed conversion ratio, and mortality rate of broilers.
2. The addition of *oregano* extract in the drinking water of broilers significantly affected the profit above the feed, medicine, and cost of broilers based on live weight.

Recommendation(S)

1. The addition of *oregano* extract at a rate of 2.5 to 10ml/liter of water can be used as a drinking supplement as a substitute for commercial antibiotics.

References

- Ertas ON, Guler T, Ciftci M, Balkilic B, Simsek G.** 2005. The effect of an essential oil mix derived from *oregano*, clove, and anise on broiler production. *International Journal of Poultry Science* **4(11)**, 879-884.
- Fakhim R, Ebrahimnezhad Y, Seyedabadi HR, Vahdatpour T.** 2013. Effect of different concentrations of aqueous extract of ginger (*Zingiber officinale*) on performance and carcass characteristics of male broiler chickens in wheat-soybean meal-based diets. *Journal of Bioscience and Biotechnology* **2(2)**, 95-99.
- Fr An KIČ T, Voljč M, Salobir J, Rezar V.** 2009. Use of herbs and spices and their extracts in animal nutrition. *Acta Agric Slov* **94(2)**, 95-102.
- Jacob J.** 2015. Water requirements of Poultry. https://articles.extension.org/pages/68305/waterrequirements_of_poultry.

Herb Society of America. 2005. Oregano & marjoram. An Herb Society of America Fact Sheet. Available at: <http://www.herbsociety.org/factsheets/oregano.pdf> (Accessed 09 January 2020).

Mehdi Y, Létourneau-Montminy MP, Gauchermil, Chorfi Y, Suresh G, Rouissi T, Godbout S. 2018. Use of antibiotics in broiler production: Global impacts and alternatives. *Animal Nutrition* **4(2)**, 170-178.

Mohiti-Asli M, Ghanaatparast-Rashti M. 2015. Dietary oregano essential oil alleviates experimentally induced coccidiosis in broilers. *Preventive veterinary medicine* **120(2)**, 195-202.

Omar JO, Hejazi A, Badran R. 2016. Performance of broilers supplemented with natural herb extract. *Scientific Research.OJAS.Vol.6.No.1.* <https://www.scirp.org/journal/PaperInformation.aspx?PaperID=62877>.

Paneri F, Nikolakakis I, Giannenas I, Koidis A, Botsoglou E, Dotas V, Mitsopoulus I. 2005. Hen performance and egg quality as affected by dietary oregano essential oil and tocopheryl acetate, supplementation. *International Journal of Poultry Science* **4(7)**, 449-454.

Puvača N, Stanačev V, Glamočić D, Lević J, Perić L, Milić D. 2013. Beneficial effects of phytoadditives in broiler nutrition. *World's Poultry Science Journal* **69(1)**, 27-34.

Schulze HK, Taylor R, Kettunen H, Ouwehand A, Sarinen M, Rautonen N, Peuranen S, Bento M, Tiihonen K. 2010. Animal feed product. Google patent/EP2170100A1. <https://patents.google.com/patent/EP2170100A1/en>

Appendix

Table 1. Qualitative Phytochemical Analysis of Oregano Leaves.

Type of Test	Result
Mayer's Test	(+)
Hager's Test	(+)
Wagner's Test	(+)
Dragendorff's Test	(+)
Molisch Test	(-)
Benedict's Test	(-)
Fehling's Test	(-)
Lead acetate Test	(+)
Alkaline Reagent Test	(+)
Ferric Chloride Test	(+)
Froth Test	(+)
Gelatin Test	(-)
Spot Test	(++)

Legend: (-) negative; (+) trace amount; (++) positive; (+++) highly positive

Remarks: The sample contains considerable amounts of volatile oils and trace amounts of alkaloids, flavonoids, tannins/polyphenols, and saponins. However, the sample does not contain any amounts of carbohydrates, reducing sugars, proteins, or fixed oils.