Effect of Adding Different Levels of Nutmeg Powder and Oxytetracycline to the Diets on the Productive Performance of Broiler (Rose 308)

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Abstract

This experiment was conducted in the poultry farm of the Animal Production Department / College of Agriculture / University of Anbar, for the period from 1/12/2020 until 11/1/2021 for (42 days), where the Nutmeg Powder and Oxytetracycline were added to the diet from one day to the end of the experiment. Furthermore, in the experiment, 195 unsexed chicks (308 Ross) were used at age of one day with an average weight of 40g, and were randomly distributed to 5 treatments by 3 replicates per treatment, each replicates contained 13 chicks. The treatments included the following: • T1 Control • T2 Adding Oxytetracycline of 200 mg per Kg feed • T3 Nutmeg of 2 g per kg feed • T4 Nutmeg of 4 g per kg feed • T5 Nutmeg of 6 g per kg feed. The results showed that significant differences occurred between treatments in the body weight and weight gain during the sixth week, there was a significant increase (P≤0.05) for T3 compared with T4, and it did not differ significantly compared with other treatments. this indicates that the level of Nutmeg of 2 g per kg feed led to achieving the best average body weight and weight gain of broiler. while there were no significant differences in feed intake rate and feed conversion Ratio.

Key Words: Nutmeg Powder, Oxytetracycline, Productive Performance, Broiler.

DOI Number: 10.14704/nq.2022.20.8.NQ44190 **NeuroQuantology 2022; 20(8): 1759-1764**

Introduction

Due to technological advances in the poultry industry through the application of feeding, breeding, and improvement programs, this has resulted in the production of a breed of birds with low immunity which it contributed to the increased use of antibiotics (Jasim and Nafea, 2021). The use of antibiotics to improve growth and performance has become a threat to human health because of their toxic effects and the generation of resistant bacteria that made them useless in addressing the disease (Ogle, 2013 and Burton and Farrent, 2010) which prompted specialists to find safe alternative materials that contribute to stimulating growth and eliminating common pathogens (bacteria and fungi) such as nutmeg (Ravindran and Kallupurackal, 2001). The Nutmeg (*Myristica fragrans*) is an Indonesian plant from an evergreen tree that is widely cultivated in the tropical regions of the world and southern India. It has a strong aroma and sweet taste and is widely used as a spice in kitchens. It is an aromatic plant (Periasamy et al, 2016) and has an effective role as an antioxidant and an antimicrobial. It is anti-inflammatory (Morita et al, 2003; Olaleye et al, 2006; Agbogidi and Azagbaekwe, 2013; Periasamy et al, 2016 and Vangoori et al, 2019) and is effective in relieving pain, regulating digestion, improving sleep, promoting brain health and reduce levels of harmful cholesterol, provide protection for the liver and regulate blood pressure levels (John Staughton, 2020). Abo and Ayansola (2019) observed that adding nutmeg seed extract to broiler drinking water at different levels led to a significant improvement in the body weight and weight gain rates and gave similar results with the antibiotic.

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Yusri Sapsuha et al, (2021) showed that the addition of alcoholic extract of nutmeg seeds to broiler diets led to a significant improvement in the average body weight, feed consumption, and food conversion rate at 35-day. Because of the scarcity of research related to adding nutmeg powder in raw form in Iraq to broiler diets, the study aimed to search for the effect of adding levels of nutmeg powder compared to Oxytetracycline to broiler diets on productive performance and determine the best level of addition.

Material and Methods

This experiment was conducted in the poultry farm of the Animal Production Department / College of Agriculture / University of Anbar, for the period from 1/12/2020 until 11/1/2021 for (42 days), where the Nutmeg Powder and Oxytetracycline were added to the diet from one day to the end of the experiment. Furthermore, in the experiment, 195 unsexed chicks (308 Ross) were used at age of one day with an average weight of 40g Belgian origin, from the Al-Rafidain hatchery, located in Abu Ghraib, and were randomly distributed to 5 treatments by 3 replicates per treatment, each replicates contained 13 chicks. The treatments included the following: • T1 Control • T2 Adding Oxytetracycline of 200 mg per Kg feed• T3 Nutmeg of 2 g per kg feed • T4 Nutmeg of 4 g per kg feed • T5 Nutmeg of 6 g per kg feed. The birds were fed on a starter, growth and finisher diet (Table 1), and the recommended health and preventive program was followed by the specialized veterinarian for the duration of the rearing period. The chicks were weighed at the end of each week individually, where calculate the following traits were calculated as follows: • Live body weight rate = Birds total weight at the end of the week / the bird's number at the end of the week •Weight gain = Average body weight at the end of the week - average body weight at the beginning of the week (Al-Fayadh and Naji 1989) • Feed intake = Amount of consumed feed during the week the number of live birds at the end of the week• Feed conversion ratio = Amount of consumed feed the / weight gain rate of the birds.

Statistical Analysis

Data were analyzed based on a completely randomized design by using the General Linear Models Procedure in SPSS (2020). Pens were treated as the experimental unit. Significant differences among treatment groups were further analyzed using Duncan's multiple-range test (Duncan, 1955). A significant level of $P \leq 0.05$ was implemented.

Table 1. The diets used in the experiment and the calculated chemical composition

Components	Starter diet (1-11 day)	Growth diet (12-21 day)	Finisher diet (22-42 day)
corn	30	29.7	42
wheat	23	27	19.5
Soya bean meal	35.65	31.5	26.5
Protein conc.	5	5	5
Oil	4.2	5	5.5
Limestone	1.2	1.12	1.05
DiCa Ph.	0.6	0.45	0.2
DL-Methionine	0.2	0.13	0.1
L-Lysine	0.05	0.0	0.05
salt	0.1	0.1	0.1
Calculated chemical composition			
Crude protein%	22.8%	21.49%	19.47%
Metabolizable energy (Kcal/kg feeding)	3001	3095	3207
Fibers	2.85	2.80	2.65
Fat	6.52	7.37	8.10
Lysine	1.44	1.29	1.19
Methionine+ Cysteine	1.10	0.99	0.91
Ca%	0.96	0.89	0.79
Available p%	0.47	0.44	0.39

* Brocorn-5 special W protein concentrate produced by (WAFI BV ALBLASSERDAM HOLLAND) crude protein 40%, crude fat 5%, crude fibers 2.20%, moisture 7.13%, ash 28.32, Calcium 4.50%, phosphorous 2.65%, available phosphorous 4.68%, Lysine 3.85%, Methionine 3.70%, Methionine + Cysteine 4.12%, Tryptophan 0.42%, Threonine 1.70%, Metabolizable energy 2107, Selenium 2.30%, copper 4%.
** The chemical composition values were calculated according to N.R.C (1994)
***The diets were created based on the 2009 ROSS company manual.

Result and Discussion

- *Average Body Weight*

Table (2) shows the Effect of adding Nutmeg and Oxytetracycline to the diet on average body weight (g) for the broiler. It is also clear that there were no statistically significant differences between the treatments for the first, second, third and fifth weeks of the experiment. in the fourth week there was a significant increase ($P \leq 0.05$) for treatment T1 compared with treatment T5, and it did not differ significantly compared with other treatments. And in sixth week there was a

significant increase (P≤0.05) for treatment T3 compared with treatment T4, and it did not differ significantly compared with other treatments. this gives an indication that the level of Nutmeg of 2 g per kg feed led to achieving the best average body weight. These results were in agreement with Sapsuha et al, (2021) Who found that adding levels of nutmeg extract (0.5, 1, and 1.5 ml/kg) to the broiler diet led to a significant improvement (P≤0.05) in the mean body weight at the age of 35 days,and These results were not consistent with Ukpong (2019) who found a significant improvement (P≤0.05) in daily body weight gain, feed conversion ratio,and protein efficiency by the addition *of Monodora myristica* into the diets at 0.25, 0.5, 0.75,and 1.0% inclusion. Also, the results did not differ with Adu et al., (2020), who found that adding 0.25% of nutmeg extract to broiler ration led to a significant improvement (P≤0.05) in the average body weight at the age of 35 day.

Table 2. Effect of adding Nutmeg and Oxytetracycline to the diet on average body weight (g) for broiler (average± standard error)

Treatments / weeks	T1	T2	T3	T4	T5	Significance level
1nd week	126.36± 3.83	124.67± 9.82	134.33± 3.48	129.00± 4.04	125.33± 7.84	N.S**
2nd week	326.59± 15.10	316.33± 13.69	320.00± 1.53	320.67± 8.25	330.33± 16.42	N.S
3rd week	683.00± 45.39	662.00± 23.50	679.33± 5.70	692.33± 4.67	658.67± 16.27	N.S
4th week	1215.67± 42.05 a	1137.57± 19.90 ab	1166.33± 8.95 ab	1164.33± 19.94 ab	1089.67± 36.99 b	*
5th week	1798.00± 89.32	1834.33± 58.05	1770.00± 19.86	1748.67± 56.98	1747.33± 59.66	N.S
6th week	2456.33± 102.51 ab	2404.00± 30.99 ab	2475.00± 16.56 a	2259.33± 75.41 b	2362.67± 11.70 ab	*

**N.S.: Not significant at significant level (P≤0.05).
*a, b, c: The different letters within a single row indicate a significant difference between the treatments at a significant level (P≤0.05). T1: control, T2 Adding Oxytetracycline of 200 mg per Kg feed, T3 Nutmeg of 2 g per kg feed, T4 Nutmeg of 4 g per kg feed, T5 Nutmeg of 6 g per kg feed.

- *Average Weight Gain*

Table (3) shows the Effect of adding Nutmeg and Oxytetracycline to the diet on average weight gain (g) for the broiler. It is also clear that there were no statistically significant differences between the treatments for the first, second, third, and fifth weeks of the experiment. in the fourth week, there was a significant increase (P≤0.05) for treatment T1 compared with treatment T5, and it did not differ significantly compared with other treatments. in the sixth week and for a period of 1-6 weeks, there was a significant increase (P≤0.05) for treatment T3 compared with treatment T4, and it did not differ significantly compared with other treatments. this gives an indication that the level of Nutmeg of 2 g per kg feed led to achieving the best average weight gain (g). These results were in agreement with Sapsuha et al, (2021) Who found that adding levels of nutmeg extract (0.5, 1, and 1.5 ml/kg) to the broiler diet led to a significant improvement (P≤0.05) in the weight gain at the age of 35 days. Also, the results did not differ from Adu et al., (2020), who found that adding 0.25% of *Myristica fragrans* seed meal and Syzygium aromatic leaf meal composite mix (1:1) to the broiler diet led to a significant improvement (P≤0.05) in the average weight gain at the age of 1-56 days.

Table 3. Effect of adding Nutmeg and Oxytetracycline to the diet on average weight gain (g) for broiler (average± standard error)

Treatments / weeks	T1	T2	T3	T4	T5	Significance level
1nd week	84.42 ± 4.17	84.20 ± 9.71	93.39 ± 3.17	87.70 ±3.77	82.74 ±7.31	N.S**
2nd week	200.23± 12.03	191.67 ±4.33	185.67 ±4.98	191.67± 10.35	205.00± 8.74	N.S
3rd week	356.41± 32.37	345.67± 12.14	359.33± 5.55	371.67± 4.18	328.33± 11.35	N.S
4th week	532.67± 37.10 a	475.57± 8.82 ab	487.00± 9.29 ab	472.00± 15.37 ab	431.00± 40.08 b	*
5th week	582.33± 54.50	696.77± 38.82	603.67± 25.37	584.33± 47.88	657.67± 82.91	N.S
6th week	658.33± 17.84 ab	569.67± 27.06 ab	705.00± 36.07 a	510.67± 66.73 b	615.33± 53.82 ab	*
1-6 weeks	2414.39± 102.69 ab	2363.53± 30.95 ab	2434.05± 16.82 a	2218.04 ± 75.35 b	2320.08± 12.50 ab	

**N.S.: Not significant at significant level (P≤0.05).
*a, b, c: The different letters within a single row indicate a significant difference between the treatments at a significant level (P≤0.05). T1: control, T2 Adding Oxytetracycline of 200 mg per Kg feed, T3 Nutmeg of 2 g per kg feed, T4 Nutmeg of 4 g per kg feed, T5 Nutmeg of 6 g per kg feed.

Feed Intake Rate

Table (4) shows the Effect of adding Nutmeg and Oxytetracycline to the diet on feed intake rate (g) for the broiler. It is also clear that there were no statistically significant differences between the treatments for the first, fifth sixth week and for a period of 1-6 weeks of the experiment. in the second week, there was a significant increase (P≤0.05) for treatment T1 compared with treatment T2, T3, and T4 and it did not differ significantly compared with T5. It is also clear that there were in the third week there was a significant increase (P≤0.05) for treatment T1 compared with treatment T2 and T5 and it did not differ significantly compared with other treatments. in the fourth week there was a significant decrease (P≤0.05) for treatment T1 compared with other treatments. this gives an indication that the level of Nutmeg of 2,4and 6 g per kg feed led to achieving the best feed intake rate (g) in the fourth week. These results were in agreement with Adu et al., (2020), who did not find any significant differences between treatments of nutmeg in feed intake of broiler at the age of 1-56 days. These results were not consistent with Sapsuha et al, (2021) Who found that adding levels of nutmeg extract (1.5 ml/kg) to the broiler diet led to a significant improvement (P≤0.05) in the feed intake rate at the age of 35 days. Hartanto et al. (2013) have not seen any significant differences in the feed consumption rate between treatments when using two levels of nutmeg oil (250 and 500 ppm) / kg feed compared to the control treatment.

Table 4. Effect of adding Nutmeg and Oxytetracycline to the diet on feed intake rate (g) for broiler (average± standard error)

Treatments weeks	T1	T2	T3	T4	T5	Significance level
1nd week	120.7±3 5.96	107.33± 5.46	117.00± 2.65	118.33± 2.03	112.33± 5.21	N.S**
2nd week	329.00± 15.82 a	278.67± 3.84 b	271.67± 1.76 b	271.33 ±2.03 b	282.33± 10.93 ab	*
3rd week	546.00± 17.50 a	478.67 ±20.84 b	507.33 ±9.94 ab	507.00 ±9.07 ab	472.33 ±19.10 b	*
4th week	652.33± 35.18 b	835.33± 22.17 a	828.67± 16.17 a	849.00± 5.69 a	803.67± 31.18 a	*
5th week	1021.33± 2.33	977.00± 24.17	991.67± 32.09	959.67± 64.71	994.00± 3.00	N.S
6th week	1135.33± 31.17	1037.33± 43.21	1063.33± 52.17	999.33± 49.16	1017.00± 88.90	N.S
1-6 weeks	3804.73± 31.88	3714.33± 56.30	3779.67± 40.81	3704.67± 111.88	3681.67± 82.15	N.S

**N.S.: Not significant at significant level (P≤0.05).

*a, b, c: The different letters within a single row indicate a significant difference between the treatments at a significant level (P≤0.05). T1: control, T2 Adding Oxytetracycline of 200 mg per Kg feed, T3 Nutmeg of 2 g per kg feed, T4 Nutmeg of 4 g per kg feed, T5 Nutmeg of 6 g per kg feed.

Feed Conversion Ratio

Table (5) shows the Effect of adding Nutmeg and Oxytetracycline to the diet on the feed conversion ratio for the broiler. It is also clear that there were no statistically significant differences between the treatments for the first, second, third, fifth, sixth week and for a period of 1-6 weeks of the experiment. in the fourth week, there was a significant improvement (P≤0.05) for treatment T1 compared with other treatments. These results were in agreement with Sapsuha et al, (2021), who did not find any significant differences between treatments of nutmeg in feed intake of broiler at the age of 35 days. These results were not consistent with Adu et al., (2020), who found that adding 0.25% of Myristica fragrans seed meal and Syzygium aromatic leaf meal composite mix (1:1) to the broiler diet led to a significant improvement (P≤0.05) in the feed conversion ratio of the period 1-56 days.

Table 5. Effect of adding Nutmeg and Oxytetracycline to the diet on feed conversion ratio (g feed / g weight gain)for broiler (average± standard error)

Treatments weeks	T1	T2	T3	T4	T5	Significance level
1nd week	1.44±0.13	1.30±0.09 1	1.25±0.01	1.36±0.08	1.37±0.07	N.S**
2nd week	1.66±0.18	1.46±0.05	1.46±0.03	1.42±0.08	1.39±0.11	N.S
3rd week	1.57±0.20	1.38±0.03	1.41±0.05	1.36±0.03	1.44±0.06	N.S
4th week	1.24±0.13 b	1.76 ±0.07 a	1.70±0.06 a	1.80±0.07 a	1.910±0.25 a	*
5th week	1.79 ±0.18	1.42±0.12	1.65±0.12	1.66 ±0.14	1.55±0.17	N.S
6th week	1.72±0.02	1.83±0.12	1.52±0.13	2.03±0.29	1.68±0.21	N.S
1-6 weeks	1.58 ±0.06	1.57±0.02	1.55±0.02	1.67±0.03	1.59±0.04	N.S

**N.S.: Not significant at significant level (P≤0.05).

*a, b, c: The different letters within a single row indicate a significant difference between the treatments at a significant level (P≤0.05). T1: control,T2 Adding Oxytetracycline of 200 mg per Kg feed, T3 Nutmeg of 2 g per kg feed, T4 Nutmeg of 4 g per kg feed, T5 Nutmeg of 6 g per kg feed.

These results were in agreement with Hartanto et al., (2019) and it were not consistent with Ukpong (2019) who found a significant ($p < 0.05$) improvement in daily body weight gain, feed conversion ratio, and protein efficiency by the addition of Monodora myristica to the diets at the levels 0.25, 0.5, 0.75 and 1.0%.

The provision of nutmeg crush with level 2g/kg improved the performance of broiler chickens, it stimulates the appetite by adding taste, color, and texture to the feed and protects it from oxidation and microbes (Susheela, 2000). It also increases secretions. Bile, pancreas, and stomach (Esmail, 2004). compound chemicals such as flavonoids and phenols have been reported to promote growth rates and better feed efficiency in broiler due to their ability to remove free radicals and maintain intestinal mucosal integrity (Oloruntola et al 2019). Studies have shown that the nutmeg flesh has materials antibacterial, antiparasitic, and antifungal (Panggabean et al 2019) which can stimulate the growth of beneficial bacteria, deactivate pathogenic bacteria, and regulate metabolism and absorption in the intestine of the broiler (Dhama et al 2015).

Conclusion

The level of Nutmeg of 2 g per kg feed led to achieving the best average body weight and weight gain of broiler. while there were no significant differences in feed intake rate and feed conversion Ratio.

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