Veterinary Medicine and Public Health Journal (VMPH)

Volume.4, Issue.1, pp: 10-16 Article 2
Jan (2023)

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Ismail M. Malkawi[a,*], Farah R. Al Qudsi[b], Emilio Cherchiari[c]

[a] Department of Basic Veterinary Medical Science, Faculty of Veterinary Medicine, Jordan University of Science and Technology, P. O. Box 3030, Irbid, 22110, Jordan.
[b] Department of Nutrition and Food Technology, Jordan University of Science and Technology, Irbid, 21121, Jordan.
[c] Department of Research and Development, Animal Wellness Products International, Via per Formigine 45/D, 41051 Castelnuovo Rangone, Italy.

[a] Esmaeel.Malkawi@gmail.com

Received: 1/1/2023 Revised: 22/1/2023 Accepted: 7/2/2023

DOI: https://doi.org/10.31559/VMPH2023.4.1.2

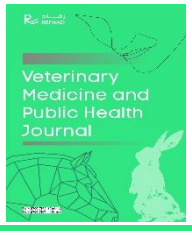
Available online at www.refaad.com
VMPH 4(1) 2023: 10-16
Research Article

www.refaad.com

Veterinary Medicine and Public Health Journal (VMPH)

Journal Homepage: https://www.refaad.com/Journal/Index/7

E-ISSN 2707-7195 | P-ISSN 2707-7187



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[a] Department of Basic Veterinary Medical Science, Faculty of Veterinary Medicine, Jordan University of Science and Technology, P. O. Box 3030, Irbid, 22110, Jordan.
[b] Department of Nutrition and Food Technology, Jordan University of Science and Technology, Irbid, 21121, Jordan.
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*** Corresponding Author:** Ismail M. Malkawi, Email: Esmaeel.Malkawi@gmail.com

How to cite this article: Malkawi, I. M. et al. (2023). Dietary Benefits of MIX OIL® When Used as Feed Enhancer. Veterinary Medicine and Public Health Journal, 4(1), 10-16.

Abstract

Chickens' body weight is essential and reflects the overall health status of the flock, this study aims to investigate the effect of Mix Oil when used as prophylactic in feed on performance, body weight and feed conversion ratio. Trials were performed to test the effect of mix oil as feed additive; groups were assigned based on the diets and addition of mix oil, body weights and FCR values were compared between the groups. The addition of mix oil occasionally increased the body weight, average body weights were close, however, the feed conversion ratio was less than the control group. Based on the data and previous studies, the combination of essential oils of which the MIX OIL is composed from enhancing the body to utilize less feed to achieve an approximate body weight of the control.

Keywords: *mix oil; growth performance; birds' weight; feed conversion ratio.*

1. Introduction

Antibiotics were largely used in poultry feed as prophylactic agents to enhance the growth, feed consumption and utilization, and health status of the animals, however, in 2006 within the European Union, a ban was applied on the prophylactic use of antibiotics due to the growing concerns of the proliferation and transmission of resistant bacteria. since then alternative feed strategies have been applied which included the use of additives derived from plants including their aromatic extracts; these extracts are generally recognized as safe and commonly used in the food industry (Varel, 2002) such characteristics rendered them possible growth performance enhancers for animals (Greathead, 2003).

Essential oils (EOs) and various plant extracts have shown health-promotingactivities in many sectors; their broad antimicrobial activity has been reported (Rota *et al.,* 2004) and recognized them as potential feed additives (Lee *et al.,* 2004). Moreover, studies reported that EOs exhibit hypolipidemic (Srinivasan, 2004), antioxidant (Botsoglou *et al.,* 2004), digestive stimulant (Platel & Srinivasan, 2004), antiviral (Bishop, 1995), antimycotic (Mari *et al.,* 2003), antitoxigenic (Juglal *et al.,* 2002), antiparasitic (Pessoa *et al.,* 2002), and insecticidal (Karpouhtsis *et al.,* 1998) properties as well as inhibition of odour and ammonia control (Varel, 2002).

EOs are complex mixtures of terpenoids (linalool, geraniol, thujanol, borneol, menthol, citronnillol, -terpineol) and hydrocarbons (e.g. phenols as thymol, carvacrol, eugenol, gaiacol, and aromatic aldehydes as cinnamaldehyde, cuminal and phellandral) (Dorman & Deans, 2000), these components when combined have shown to produce beneficial effects than when separated (Gill *et al.,* 2002).Several studies provided data regarding the heath promoting effects of essential oils on broilers Basmacioglu et al. (2004) reported a quarter reduction in feed conversion ratio along after adding Oregano essential oil in broilers diet; Lee et al. (2003) reported a similar reduction in feed conversion ratio when thymol was used in diets.

Mix Oil ® is –mainly- a combination of three essential oils (thyme, eucalyptol and oregano) in particular amounts. This study was conducted to evaluate the effect of Mix Oil ® when used as a feed additive on the feed conversion ratio, growth performance, and general health status of broilers.

2. Materials and Methods

2.1. Mix Oil ®Composition

3% Eucalyptus Oil, 2% Oregano Oil, 0.5% Thyme Oil (AWP, Italy) along with a water phase adjuvant were used to formulate the MIX OIL ®.

2.2. Diet preparation

Three diets were formulated all of which were based on soybean-maize meal, Diet 1 was formulated according to Aviagen guidelines, Diet 2 was formulated with matrix, Diet 3 was formulated with matrix and supplemented with Mix Oil ®at 200g/1000kg, Table 1.

Table (1): Diet formulations for trial 1

Analyte	Diet 1	Diet 2	Diet 3
Crude protein %	20. 62	20.61 (20.55)	20.61 (20.55)
Fats %	8.02	7.31 (7.31)	7.31 (7.31)
Crude fibre %	3.66	4.05 (4.05)	4.05 (4.05)
AMEn Kcal/kg	3,050	3,050 (2,955)	3,050 (2,955)
Lysine dig. %	1.16	1.16 (1.44)	1.16 (1.44)
Methionine + Cystine dig %	0.92	0.92(0.904)	0.92 (0.904)
Total calcium %	0.92	0.92 (0.918)	0.92 (0.918)
Available Phosporus %	0.42	0.42 (0.418)	0.42 (0.418)

In vivo trials

Trial 1

One day-old Ross 308 female chickens (Local Supplier, Italy) were housed in 12 boxes of 16 birds each (4 boxes/group), and each group was fed on a different diet. Weight was measured on days 15, 32 and 45 of the trial followed by feed conversion ratio.

Trial 2

Broilers were arranged in cages as in trial 1, until day 15 of the trial, all broilers were fed on a commercial diet (Table 2) then from day 16 to day 38, chickens were fed on the selected diets (Table 3). Weight was measured on day 15 and day 38 of the trial followed by feed conversion ratio.

Table (2): Commercial diet for trail 2

Analyte	Basic diet for all groups
Crude protein %	22. 62
Fats %	8.02
Crude fibre %	3.48
AMEn Kcal/kg	3,000
Lysine dig. %	1.24
Methionine+ Cystine dig. %	0.93
Total calcium %	0.93
Available Phosporus %	0.44

Table (3): Diet formulations for trial 3

Analyte	Diet 1	Diet 2	Diet 3
Crude protein %	20.04	20.04 (20.00)	20.04 (20.00)
Fats %	8.02	7.40 (7.31)	7.40 (7.31)
Crude fibre %	3.66	4.15 (4.05)	4.15 (4.05)
AMEn Kcal/kg	3,130	3,130 (3,034)	3,130 (3,034)
Lysine dig. %	1.10	1.10 (1.09)	1.10 (1.09)
Methionineb + Cystine dig %	0.85	0.85 (0.83)	0.85 (0.83)
Total calcium %	0.87	0.87 (0.869)	0.87 (0.869)
Available Phosporus %	0.415	0.415 (0.412)	0.415 (0.412)

3. Results

Trial 1

Average weights of chickens were measured at day 15 day 32 and day 45, at day 32 the weight of the control group (fed on diet 1) was 1748g the matrix no Mix oil group (fed on diet 2) was 1680 and the matrix with Mix oil group (fed on diet 3) was 1755g (Fig 1).

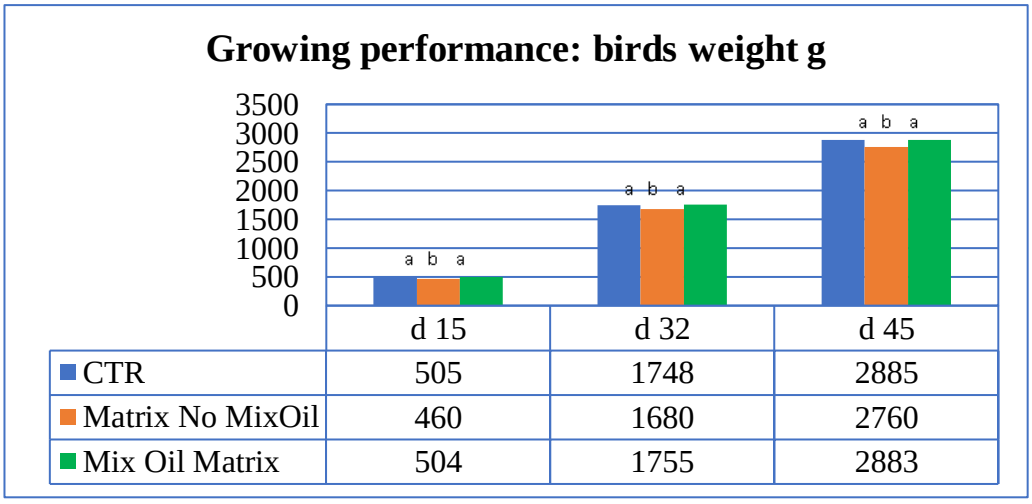

Fig (1): Growing performance on average birds weight (g)at day 15 day 32 and day 45between the control group (fed on diet 1) and matrix no ix oil (fed on diet 2) and matrix with mix oil (fed on diet 3), the letters (a, b, c) represent statistical significant differences with a p-value less than 0.05 calculated by t-test.

Feed conversion ratio was measured on day 32 of the experiment, for the control group (fed on diet 1) the FCR was 1501, for the matrix no Mix Oil was 1580 (fed on diet 2) and for the Mix Oil matrix (fed on diet 3) was 1491 (Fig 2).

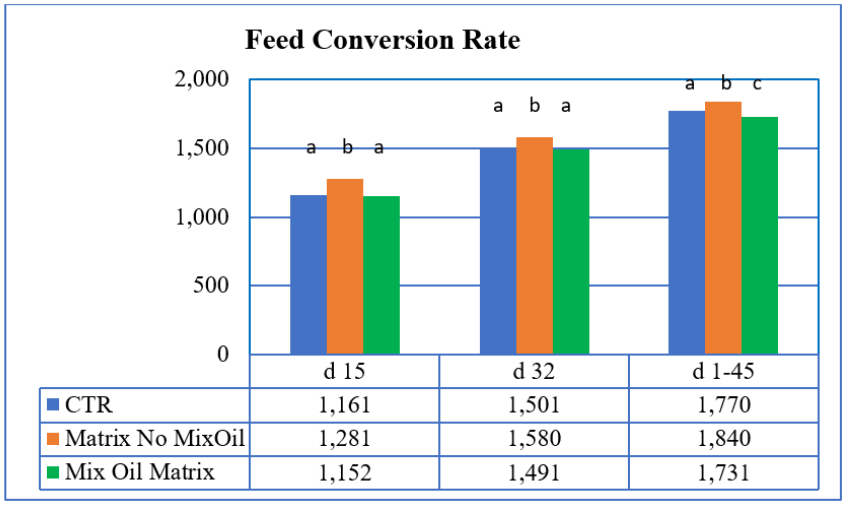

Fig (2): Feed conversion ratio at day 15 day 32 and day 45between the control group (fed on diet 1) and matrix no mix oil (fed on diet 2) and matrix with mix oil(fed on diet 3), the letters (a, b, c) represent statistical significant differences with a p-value less than 0.05 calculated by t-test.

In trial 1, average weights of the matrix no mix oil group were less than the control at all three points; the reduction in weights came along with an increased FCR. The average weights of the matrix with mix oil were less than the control group at day 15 and day 45 but more than the control at day 32; the FCR was less than the control group at all days. (Table 4).

Table (4): Summarized data of trial 1

Trial 1										
Day	Control Group		Matrix No Mix Oil				Matrix With Mix Oil			
	Weight	FCR	Weight	Difference	FCR	Difference	Weight	Difference	FCR	Difference
15	505g	1,161	460g	-45g	1,281	120	504g	-1g	1,152	-9
32	1748g	1,501	1680g	-68g	1,580	79	1755g	7g	1,491	-10
45	2885g	1,770	2760g	-125g	1,840	70	2883g	-2g	1,731	-39

Trial 2

Until day 15 average weight of the three groups were 582, 584 and 582 for the control, matrix no Mix Oil and matrix Mix Oil, respectively, at day 38 average weights were 2567g, 2474g and 2575g for the control, matrix no Mix Oil and matrix Mix Oil respectively (Figure 3). FCR values were 1553, 1.644 and 1523 2575g for the control, matrix no Mix Oil and matrix Mix Oil respectively (Fig 4).

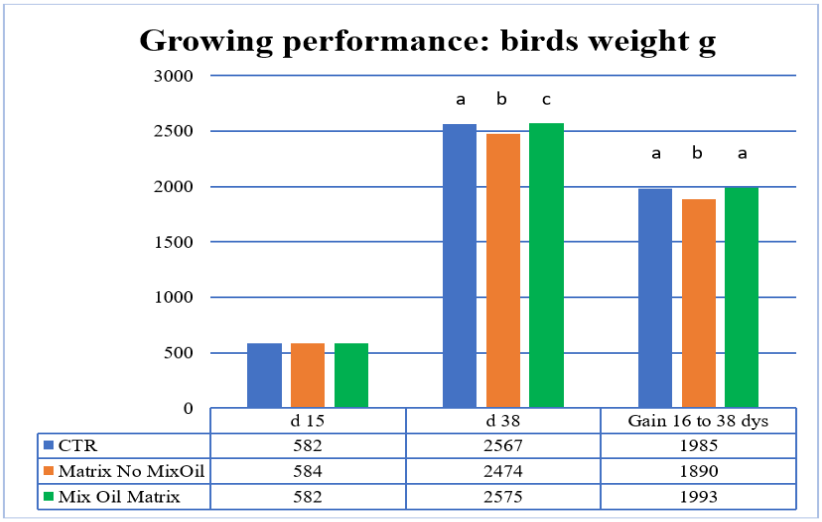

Fig (3): Growing performance on average birds weight (g)at day15 day 38 between the control group (fed on diet 1) and matrix no ix oil (fed on diet 2) and matrix with mix oil (fed on diet 3), the letters (a, b, c) represent statistical significant differences with a p-value less than 0.05 calculated by t-test.

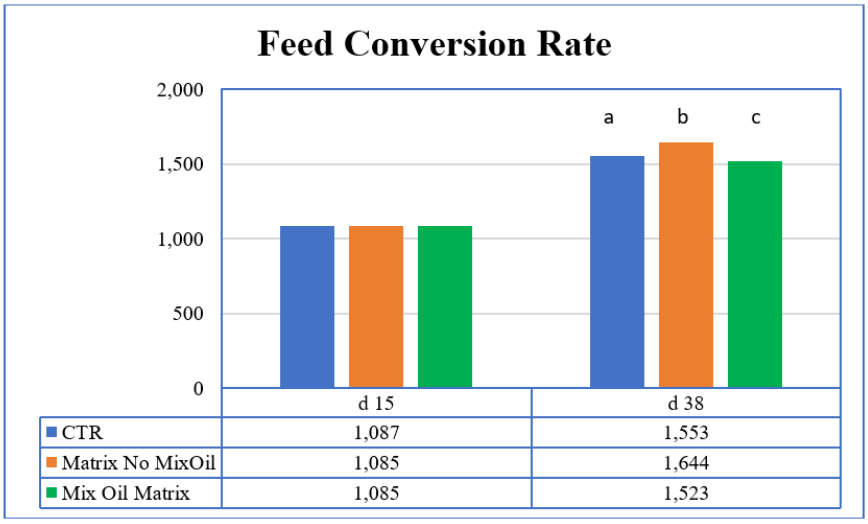

Fig (4): Feed conversion rateday 15 day 38 between the control group (fed on diet 1) and matrix no ix oil (fed on diet 2) and matrix with mix oil (fed on diet 3), the letters (a, b, c) represent statistical significant differences with a p-value less than 0.05 calculated by t-test.

In trial 2, average weights between all groups at day 15 were ~584; at day 38 the weight of the matrix no mix oil group was lower than the control group, however, the FCR in the same group was higher than the control group. The weight of the matrix with mix oil group was more than the control group combined with a decreased FCR value (Table 5).

Table (5): Summarized data of trial 2

Trial 2										
Day	Control Group		Matrix No Mix Oil				Matrix With Mix Oil			
	Weight	FCR	Weight	Difference	FCR	Difference	Weight	Difference	FCR	Difference
15	582g	1,087	584g	2g	1,085	-2	582g	0g	1,085	-2
38	2567g	1,553	2474g	-93g	1,644	91	2575g	8g	1,523	-30

4. Discussion

Mix Oil consists from a diverse variety of bioactive components of plant extracts which has a vital role in animals' feeding. Some common herbs have shown different consequences of animals include digestion and performance. In the mean study, data shows increased body weight in the groups that fed on a diet supplemented with Mix Oil in comparison with the control group; other studies showed an increased body weight when feed was supplemented with EO blends (Alcicek *et al*,. 2004; Hernandez *et al.*, 2004) and one study reported an increase when feed was supplemented with thyme extract (Sarica *et al.*, 2005). The beneficial effect of the Mix Oil on digestion could be explained by influencing regeneration of microbiota balance as well as developing absorption (Mountzouris *et al.*, 2011). In certain breed of chicken, oregano has a significant effect on feed conversion ratio (Bampidis *et al.*, 2005).

Feed conversion ratios was less for the group that fed on a diet supplemented with Mix Oil; many studies reported a reduced feed intake combined with somewhat increased body weight (Botsoglou *et al.*, 2002a; Lee *et al.*, 2003; Hernández *et al.*, 2004; Shanmugavelu *et al.*, 2004; Jang *et al.*, 2007).The overall growth performance enhanced with Mix Oil supplementation, and this is occurred by the action of the essential oil on improving the immunity of the chicks. Consequently, healthy immunity can improve utilization of nutrients and boost the growth (Su *et al.*, 2021).

5. Conclusion

The addition of MIX OIL to feed has produced a similar body weight to the control, however, with less feed consumption, nevertheless, the general health status of the broilers (data not shown) appeared to be at high in comparison with the control as the broilers were more active and alert. The use of this combination of essential oils (MIX OIL) in feed will improve animals' health, but how will different combinations improve the health

more?, what would be the effect in case of diseases. More research is needed.

5.1. Acknowledgments

Conflict of interest: No conflict of interest was declared.

Author's contributions

Ismail M. Malkawi[4]: Writing – original draft, review and editing, **Farah R. Al Qudsi**[5]: Writing – original draft, review and editing.

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