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Effect of using some medicinal plant oils on productive performance of broilers. A Review Article

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ANNOTATION

Antibiotics have been used for decades in poultry diet to reduce disease infections and improve their productive performance, This may lead to the emergence of antibiotic-resistant bacterial strains and the accumulation of these antibiotics residues in animal products that have negative effects on human health, This prompted organizations to attend their use in diets mixtures and the trend towards commercial diets additives of plant origin, including Medicinal plants and their essential oils ,It has antimicrobial properties because it contains many active compounds such as Thymol and Eugenol. In addition, medicinal plants contain other biological components such as phenolic compounds, tannins, and organic acids such as mineral salts, vitamins, and enzymes. Medicinal plant oils also contain a high percentage of unsaturated fatty acids that increase the efficiency of absorption and metabolism of nutrients present in the diet, this in turn, leads to improved production traits represented by live body weight, weight gain, feed consumed, and the feed conversion plant.

KEYWORDS: Argan oil; Black seed oil; flax oil; sunflower oil; sweet almond oil; fatty acids; productive traits; broiler chickens.

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تأثير استخدام بعض الزيوت النباتية الطبية على الأداء الإنتاجي لفروج اللحم

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تعليق توضيحي

أُستخدمت المضادات الحيوية لعقود في تغذية الدواجن لتقليل الإصابة بالأمراض وتحسين أدائها الانتاجي، مما قد يؤدي إلى ظهور سلالات بكتيرية مقاومة للمضادات الحيوية وتراكم بقايا هذه المضادات في المنتجات الحيوانية التي لها تأثيرات سلبية على صحة الإنسان مما دفع المنظمات إلى حضر استخدامها في الخلطات العلفية والاتجاه نحو الاضافات العلفية التجارية ذات المنشأ النباتي ومنها النباتات الطبية وزيوتها العطرية ،اذ انها خصائص المضادة للميكروبات نضرا لاحتوائها على العديد من المركبات الفعالة مثل الثيمول والإيغونول. اضافة الى احتواء النباتات الطبية على مكونات بيولوجيا أخرى مثل المركبات الفينول والتيانينات والأحماض العضوية مثل الأملاح المعدنية والفيتامينات والإنزيمات. كما تحتوي الزيوت النباتات الطبية على نسبة عالية من الأحماض الدهنية غير المشبعة التي تعمل على زيادة كفاءة الامتصاص وتمثيل المواد الغذائية الموجودة في العليقة، وهذا بدوره يؤدي إلى تحسين سمات الإنتاجية المتمثلة بالوزن الجسم الحي، وزيادة الوزن، والعلف المستهلك، ومعامل التحويل الغذائي.

الكلمات المفتاحية: زيت الارغان، زيت بذور الحبة السوداء، زيت الكتان، زيت زهرة الشمس، زيت اللوز الحلو، الاحماض الدهنية، الصفات الانتاجية، فروج اللحم.

INTRODUCTION

The progress and civilizational development that is taking place in the world and the accompanying cultural and health awareness in the selection of food of good quality with high protein content, this leads to an increase in demand for poultry meat because of its high nutritional value due to the high protein content, which ranges between 25-35%. % in cooked meat compared to the protein percentage in cow and sheep meat, which ranges between 21-27% and 20-24%, respectively, which is lower than the protein percentage in poultry meat (Al-Fayyad et al., 1989). Medicinal plants, aromatic herbs, spices, and extracts of these herbs, Which are called (photogenes) are considered one

of the safe alternatives that have been used since ancient times, as well as in traditional folk medicine for many peoples, It has proven its effectiveness in medical treatments for humans, and the most important content of these medicinal plants and their essential oils are other biological components such as phenolic compounds, tannins, organic acids, vitamins, mineral salts, and enzymes (Alarcon-Rojo et al., 2017). Medicinal plant oils also contain pathogenic microbiology growth compounds and antioxidant compounds (Nychas, 1995; Tuley, 1996; Ultee et al. 2002; Kempaiah et al. 2002; Christaki et al. 2004). As the addition of plant oils to broiler diets leads to raising the energy level in the diet, as well as increases the palatability of feed and improving the feed conversion factor (Makki, 2004, Wenk, 2006, Lee and others, 2004 and Acamovic, 2005). It must be noted that plant oils contain many long-chain unsaturated fatty acids, and that their addition leads to carcasses characterized by containing these acids, such as linoleic and linolenic (Al-Naimi et al., 2009).

The importance of research and its objectives:

The importance of research lies in evaluating the use of medicinal plant oils in broiler diets:

1 -Study of the chemical composition of medicinal plant oils.

2 -Study of the contents of plant oils of saturated and unsaturated fatty acids.

3 -Study of the effect of medicinal plant oils on the productive qualities of broilers.

1-THE STUDY PRESENTS TO:

Argan oil - sweet almond oil - flax oil - sunflower oil - black seed oil.

1.1. Argan Oil:

Argan oil extracted from the fruits of the argan tree (Argania spinosa (L) skeels) (Charrouf et al., 2002). This plant is endemic to southwestern Morocco and Algeria (Msanda et al., 2005). It is widespread in arid and semi-arid regions (Ngger et al., 2006). These trees can live up to 250 years (Atifi et al., 2016). The production of this oil exceeded from 2010 to 5000 tons (El Monfalouti et al., (2011). It is possible to benefit economically from these trees by exploiting all parts of the plant, such as wood as firewood, and extracting oils from fruits and leaves as diets (Aboughe-Angone et al., 2008, El Aich et al., 2007) . Argan oil is characterized by a high percentage of unsaturated fatty acids, especially oleic acid by 47.7% and linoleic acid by 29.3% (Rahmani, 2005). Argan oil is useful for treating high cholesterol and atherosclerosis (Bellakhdar, 1997 and Moukal, 2004). Table No. (1) shows the percentages of common fatty acids (saturated and unsaturated) in argan oil, as found by some researchers.

Table 1. Percentage of fatty acids in argan oil

Fatty acid	number of carbon atoms	Vingering et al(2010)	Rueda et al(2014)	Haloui et al(2015)
Myristic	14:0	0.2	0.02	0.16
Palmitic	16:0	11.9	6.37	13.30
Palmitoleic	16:1	0.1	0.48	0.20
Margric	17:0	0.1	0.05	0.09
Stearic	18:0	-	1.78	5.53
Oleic	18:1	43.8	66.69	46.05
Linoleic	18:2	33.3	23.9	32.65
Archidic	20:0	0.4	0.11	0.36
Linolenic	18:3	0.1	0.14	0.13
Gadoleic	20:1	0.4	-	0.35
Beheinc	22:0	0.1	0.07	0.10
Lignoceric	24:0	0.0	0.03	0.03
Saturated Fatty Acid		17.6	8.79	19.73
Mono unsaturated Fatty Acid		44.8	67.1	46.57
Poly unsaturated Fatty Acid		33.5	24	32.98
Poly unsaturated Fatty Acid n-3		0.1	0.14	-
Poly unsaturated Fatty Acid n-6		33.3	23.9	-

1.2. Sweet Almond Oil:

(Prunsayglaus almonds) is a type of nuts that are divided into two types: sweet almonds (Pruns amygdalus dulcis) and bitter almonds (Pruns amygdalus amara) (Monaghan, 2008). Almond plant is found in the Mediterranean regions, California, and northwestern Mexico (FAO, 2015). The oil is extracted from sweet almonds by 50% (Soler et al., 1988). The importance of the almond plant has increased in recent years because it is rich in unsaturated fatty acids, as it contains oleic acid by 65%,Which thus has positive effects on cholesterol and cardiovascular diseases (Kodad et al., 2004, Ahrens et al., 2005, Sathe et al., 2008).). Table No. (2) shows the percentages of common fatty acids (saturated and unsaturated) in sweet almond oil, as found by some researchers.

Table 2. Percentage of fatty acids in sweet almond oil

Fatty acid	number of carbon atoms	Tvrzicka et al (2011)	Karatay et al (2012)	Orsavova et al(2015)
Myristic	14:0	-	-	0.07
Palmitic	16:0	7	5.34	6.8
Palmitoleic	16:1	2	0.70	0.53
Margric	17:0	-		0.05
Stearic	18:0	2	0.85	2.3
Oleic	18:1	69	74.46	67.2
Linoleic	18:2	17	17.89	22.8

Archidic	20:0	-	0.75	0.09
Linolenic	18:3	-	-	-
Gadoleic	20:1	-	-	0.16
Beheinc	22:0	-	-	-
Lignoceric	24:0	-	-	-
Saturated Fatty Acid		9.0	6.17	9.3
Mono unsaturated Fatty Acid		69	57.16	67.9
Poly unsaturated Fatty Acid		-	18.65	22.8
Poly unsaturated Fatty Acid n-3		-	-	0.0
Poly unsaturated Fatty Acid n-6		17	-	22.8

1.3.Flax Oil:

Flax oil is extracted from Linum Usitissimum flax seeds, and the percentage of oil in flax seeds ranges between 36-40% (Bayrak et al., 2010 and El-Beltagi et al., 2007). The most important countries producing flax oil are Canada, Argentina, the United States of America, China, India, and Aruba (Lideflt, 2007 and Markt, 2007). Flax oil is a rich source of unsaturated fatty acids, especially linolenic and linoleic acid, which are 40-60% and 10-30%, respectively (Daun et al., 2003; Nykter et al., 2006). One of the health benefits of flax oil is the reduction of cardiovascular diseases (Goyal et al., 2014). Table No. (3) shows the percentages of common fatty acids (saturated and unsaturated) in flax oil, as found by some researchers.

Table 3. Percentage of fatty acids in flax oil

Fatty acid	number of carbon atoms	Tvizicka et al (2011)	Rueda et al (2014)	Ivanova et al (2016)
Myristic	14:0	-	-	0.07
Palmitic	16:0	5	5.88	5.72
Palmitoleic	16:1	-	0.03	-
Margric	17:0	-	0.02	0.06
Stearic	18:0	4	3.10	5.81
Oleic	18:1	21	20.50	0.02
Linoleic	18:2	16	15	11.58
Archidic	20:0	-	0.06	0.19
Linolenic	18:3	53	55.2	56.08
Gadoleic	20:1	-	0.04	0.10
Beheinc	22:0	-	0.05	0.15
Lignoceric	24:0	-	0.10	0.03
Saturated Fatty Acid		9	9.20	12.06
Mono unsaturated Fatty Acid		21	20.6	20.02
Poly unsaturated Fatty Acid		-	70.2	67.80
Poly unsaturated Fatty Acid n-3		53	55.2	56.14
Poly unsaturated Fatty Acid n-6		16	15	11.66

1.4. Sunflower Oil:

Helian Thus Annus sunflower is an oilseed crop that belongs to the Compositae family and grows in several regions around the world (Nadeem et al., 2014). Sunflower oil ranks fourth after soybean, palm, and rapeseed (Nadeem et al., 2014). Sunflower seeds contain a high percentage of oil, ranging from 40-50% (Lopez et al., 2000, Monotti, 2004). Sunflower oil is a valuable food commodity because it contains a high percentage of unsaturated fatty acids, especially linoleic acid (AOCS, 1997 and Arshad et al., 2012). Table No. (4) shows the percentages of common fatty acids (saturated and unsaturated) in sunflower oil, as found by some researchers.

Table 4. Percentage of fatty acids in sunflower oil

Fatty acid	number of carbon atoms	Tvrzicka et al(2011)	Rueda et al(2014)	Orsavova et al(2015)
Myristic	14:0	-	0.05	0.09
Palmitic	16:0	7	4.98	6.2
Palmitoleic	16:1	-	0.10	0.12
Margric	17:0	-	0.04	-
Stearic	18:0	5	3.24	2.8
Oleic	18:1	19.0	53.11	28.3
Linoleic	18:2	68.0	37.8	62.2
Archidic	20:0	-	0.10	0.21
Linolenic	18:3	1	0.10	0.16
Gadoleic	20:1	-	0.04	0.18
Beheinc	22:0	-	0.03	-
Lignoceric	24:0	-	0.20	-
Saturated Fatty Acid		12	8.65	9.4
Mono unsaturated Fatty Acid		19	53.2	28.3
Poly unsaturated Fatty Acid		-	38.1	62.4
Poly unsaturated Fatty Acid n-3		68	0.28	0.2
Poly unsaturated Fatty Acid n-6		1	37.8	62.2

1.5. Black Seed Oil:

Black seed (Nigella sativa) is a member of the Ranunnclaceae family and is a herbaceous plant native to the Mediterranean region. It is likely native to Western Asia (Benkaci-Ali, et al. 2013). Black seed seeds are characterized by their very dark black color, thin, crescent-shaped, and have a bitter, pungent taste. They are traditionally used for treatments related to body functions such as respiratory system health, stomach and intestinal health, kidney and liver functions, circulatory system, and the immune system for treatments of asthma, cough, bronchitis, headaches, rheumatism, Fever, influenza and eczema (Ahmad et al. 2015 and Burits et al. 2000). Nigella sativa seeds contain an oil percentage ranging from 28 to 36% and consist mainly of unsaturated fatty acids, which are

arachidonic, eicosadienoic, linoleic, and linolenic, and saturated fatty acids, which include palmitic, stearic, and myristic 13. Seed oil contains compounds such as cholesterol, Campesterol, stigmasterol, β-sitosterol, alpha-spinasterol, (+)-citronellol, (+)-limonene, p-cymene, citronellyl acetate, carvone, nigylone, archidic, linolenic, linoleic, myristic, oleic, palmitic and palmitoleic acids and 14 fatty acids. The seed oil contains fixed oils such as linoleic acid (55.6%), oleic acid (23.4%), and palmitic acid (12.5%) and volatile oils such as trans-anethole (38.3%), p-cymene (14.8%), limonene (4.3%). and carvone (4.0%) (Nickavar et al. 2003). Table No. (5) shows the percentages of common fatty acids (saturated and unsaturated) in black seed oil, as found by some researchers.

Table 5. Percentage of fatty acids in black seed oil

Fatty acid	number of carbon atoms	Rcnthilaka rathna et al(2018)	Nesrain et al(2021)	Zainab et al(2022)
Myristic	14:0	0.2	0.24	0.14
Palmitic	16:0	11.36	11.10	12.17
Palmitoleic	16:1	-	0.23	0.14
Margric	17:0	-	-	-
Stearic	18:0	2.81	2.60	2.31
Oleic	18:1	17.63	24.6	14.46
Linoleic	18:2	61.25	58.8	57.71
Archidic	20:0	0.19	0.22	0.33
Linolenic	18:3	-	0.24	0.19
Gadoleic	20:1	-	-	-
Beheinc	22:0	-	-	-
Lignoceric	24:0	-	-	-
Saturated Fatty Acid		14.66	-	-
Mono unsaturated Fatty Acid		20.94	-	-
Poly unsaturated Fatty Acid		61.39	-	-
Poly unsaturated Fatty Acid n-3		-	-	-
Poly unsaturated Fatty Acid n-6		-	-	-

2. Effect of medicinal plant oils on the productive qualities of broilers:

Most of the experiments conducted in this field have concluded that the use of medicinal plant extracts in broiler rations leads to a decrease in the rate of feed consumption and thus an increase in the efficiency of the feed conversion factor, while some studies indicated that there is no effect when adding oils to the broiler diet on the productivity indicators. Al-Adhari et al. (2002) found when using four energy sources (vegetable oil powder, sunflower oil, hydrogenated vegetable fat and animal fat), by 5%, observed an increase in the average live body weight of broiler birds fed with vegetable oil powder compared to other treatments. However, there were no significant differences in the rate of weight gain, feed consumption, and feed conversion factor.As shown by Basmacioglu et al. (2004)

that the addition of essential oils of oregano plant and rosemary oils to broiler diets reduces the amount of feed consumed and improves the feed conversion factor and the rate of weight gain. It was also found that when adding cinnamon, thyme, and black seed oils, it improved the feed conversion factor and reduced the amount of feed consumed. Ahmed et al. (2004). Crespo and Esteve-Garcia (2002) observed that when using 10% (beef tallow, olive oil, sunflower oil, and flax oil), they did not find a significant difference in body weight and abdominal fat for all broiler bird treatments. The reference of ELyamany et al. (2008) when they used three sources of oils (flax oil, sunflower oil, and olive oil) and three different percentages of each oil (1.5, 2, and 3)%, respectively, in quail diets, as they noticed that there were few significant differences between the treatments during... The trial period in relation to body weight, weight gain, feed consumed, and feed conversion factor, However, there was a high significant increase in body weight and feed consumed for the treatments containing flax oil, sunflower oil, and olive oil, and in various percentages of oils during the experimental period compared to the control treatment containing poultry fat. As for the feed conversion factor, there are no significant differences between the treatments. There is an improvement in the rate of cleansing and a decrease in the weight of abdominal fat. Smink et al. (2008) found, when they used two sources of energy (palm oil and sunflower oil), at a rate of 4% in the starter diet and 8% in the finishing diet, that there were no significant differences ($P \leq 0.05$) in feed consumption and weight gain, while there was a significant improvement. ($P<0.05$) in the feed conversion efficiency of birds fed sunflower oil for the starter and final diets. Researcher Güçlü and others (2008) conducted a study to determine the effect of different sources of vegetable and animal oils (sunflower oil, sesame oil, cottonseed oil, olive oil, hazelnut oil, soybean oil, and fish oil) at a rate of 4% on the initial and final body weight of quail. Consumed feed and food conversion plants, It was concluded that there were no significant differences between the treatments regarding these characteristics. In an experiment conducted by Nobakht et al. (2011), they compared the effect of using several energy sources sunflower oil, canola oil, soybean oil, and a mixture of soybean oil with canola oil. at a rate of 4%. They did not notice any significant differences in feed consumption or weight gain over the period. Experiment (1-42 days) While there was a significant difference in feed conversion efficiency, the best feed conversion efficiency was for birds fed a mixture of soybean oil and canola oil.As for carcass measurements, the researchers did not notice significant differences. As for the researcher Starčević et al. (2014), they found that when two energy sources were used in feeding broilers, namely flax oil and sunflower oil at a rate of 5%, there were no differences in body weight, daily weight gain, feed consumed, and feed conversion factor between the two treatments. When studying the effect of fresh sunflower oil and sunflower oil used in frying (reuse) on broilers by the researcher Dorra et al. (2014), they concluded that there are no significant differences in body weight, weight gain, feed consumed, feed conversion factor, draining percentage, and abdominal fat percentage. As for the researcher Hanafy et al. (2015),

they mixed a group of oils in different proportions (20%) sweet almond oil, 10% olive oil, 5% soybean oil, 15% lavender oil, 5% eucalyptus oil, 15% coconut oil, 10% Peppermint oil, 7% sesame oil, 13% citrus oil) with the use of a control diet free of fats or oils. They used three levels of this mixture in the quail diets, which are 0.5 ml, 1 ml and 2 ml while using a control diet free of fats or oils. They concluded that there were no significant differences in body weight between the treatments. The researcher Bandr (2017) conducted a study on the effect of adding two types of vegetable oils to broilers, which are evening primrose oil and grape seed oil, in addition to the control diet without fat or oil. The treatments were as follows: 0.5% primrose oil, 1% primrose oil, 0.5 % grape seed oil and 1% grape oil, and it was concluded that body weight increased significantly ($P \leq 0.05$) in the treatment to which 1% grape seed oil was added. This treatment also excelled in weight gain in the sixth week compared to the rest of the treatments. As for the feed consumed, the percentage of cleansing, and the percentage of abdominal fat. There are no significant differences between the treatments, and as for the food conversion factor, there was a significant improvement for all treatments. The researcher Abd EL-Wahab and Aziza (2017) used a group of oils, which are a 3% mixture of sunflower oil and soybean oil, and this represents the control diet, 2% and 4% of flax oil, 2% and 4% of fish oil, and 2% and 4% of Soybean oil, and they concluded that the treatment to which flax oil was added at a rate of 4% recorded a significant increase in body weight and weight gain. The best food conversion factor was also for the treatment to which flax oil was added at a rate of 2% and 4%, and the best purification rate was in the treatment to which flax oil was added at a rate of 4% compared to the rest of the treatments. The researcher Mariya (2017) also conducted an experiment that fed the chicks as follows: the first treatment (control diet free of fat or oil), the second treatment (4% hydrogenated vegetable fat), the third treatment (4% olive oil), The fourth treatment (4% argan oil), the fifth treatment (4% sweet almond oil), the sixth treatment (4% flax oil) and the seventh treatment (4% sunflower oil) in quail diets. The results were significant differences in body weight and weight gain. Consumed feed and food conversion plants. The results of researcher Demirci et al. (2019) also showed that there was a significant increase in body weight and weight gain and a significant improvement in the food conversion factor when using black seed oil at two levels of 0.5% and 1%, respectively, compared to the control treatment. Researcher Saied et al. (2022) found a significant increase in body weight and an improvement in the feed conversion factor when using black seed oil in broiler diets. Researchers Yaser et al. (2023) also conducted an experiment in which they used seven treatments, which were as follows: the first control treatment, the second and third treatment in

which black seed oil was used (0.80 and 1.60%), respectively, the fourth and fifth treatment in which black seed oil was used at two levels (0.5 and 1). (%) respectively, and in the sixth and seventh treatments, black seed powder was used at two levels (7 and 14)%. The results were a significant improvement in body weight, weight gain, protein and carbohydrate digestion coefficient,

pre-slaughter weight, and carcass weight for the treatments to which black seed seeds, black seed oil, and powder were added Black seed. Oils work to improve the productive qualities of broilers due to their high content of essential fatty acids, especially linoleic fatty acid, which is considered a functional nutrient that has a beneficial effect on the body, in addition to being involved in the synthesis of phosphorylated lipids found in cell membranes. Which affects the metabolism process (Gutbrie and Picciane, 1995). Oils, including black seed oil, contain compounds and nutritional elements necessary for building the body, such as vitamins, mineral salts, fatty and amino acids. Ahmed et al. (2004).

CONCLUSION

We conclude from the above that using of various medicinal plant oils has positive effects on live body weight, weight gain, amount of feed consumed, and feed conversion factor.

1- Using medicinal plant oils that have a positive effect on the productive qualities of poultry.
2- Increase practical and scientific studies to determine the best medicinal plant oils that have a positive impact on production standards .
3- Study the economic feasibility of the oils used in the experiment.

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