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Effect of sprayed different concentrations of *Moringa oleifera* leaves extract on broiler breeder hatching eggs

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Abstract

This research aimed to study the impact of spraying different Concentrations of Moringa oleifera leaves Extract on Broiler Breeder Hatching Eggs. The results cleared that, at 18th day the egg weight ranged from 60.50 in the group treated with 5 % M. Water extract to 62.16 gm in control group. While, the egg losses observed in group 4 that, treated with 2 % M. water extract that was 20.56 % at 21st day. The higher hatchability % of total eggs showed in control group that was 69.70 %. While, the hatchability % of fertile eggs showed a higher percentage in group 5 that treated with 5 % M. Water extract that was 99.02 %. The higher percentage of dead embryo observed in control group that was 9.10 % and the lower level observed in the group 2 that treated with 2 % M. Alchole exteract that was 5.46 %. The total aerobic bacteria counts at 18th day of incubation showed a lower level in group 5 that treated with 5 % M. water extract that was 7.88. while, the activity of chicks and in abnormal chicks increased in group that treated with 5% M. Water extract that was 8.96 % and 2 % respectively. Overall, the higher concentration of Alchole extract of *M. olifera* , increased the weight of hatching eggs with a reduction in total egg losses,% of the eggs. While, the higher concentration of the water extract of M. olifera improved the hatchability % a reduction in total aerobic counts on the egg shell and improved chick quality and activity.

Keywords: *Moringa oleifera*, extraction, hatching eggs

Introduction

Eggs and hen meat account for 35.56% of the global human animal protein requirement [1]. Given the advances in consumption of animal merchandise in developing countries, consumption of chicken products is anticipated to increase by 3.9%, with beef and pork taking 2nd and 2nd place, respectively.9% and 2.4% by using 2020 [2]. To meet this demand, a large manufacturing of day-old chicks is required. The goal of the hatchery is to attain a high brood yield of very desirable quality day-old chicks in order to maximize profitability [3]. broilers are an necessary source of protein and proper source of earnings in countries with food shortages because, in addition to the

fast circulation of capital and the increasing quantity of people eating these products, broiler researchers have therefore used some strategies to improve production, maintain bird fitness and reduce mortality with medicinal flora in powder form or in ingesting water or by injecting their extracts into hatching eggs as a partial replacement for poultry feed due to the excessive prices of non-medicinal uncooked materials [4].

The quality of the poultry depends on the quality of the hatching eggs, which depends in phase on the nutritional content [5] pointed out that the chick embryo starts offevolved to absorb vitamins via the amniotic fluid on the fifteenth day of incubation and found that, in addition to the incubation conditions, the nutrient content material of the hatching egg also has an have an effect on on hatchability and the quality of the egg. Chicken. Based on these results, an investigation used to be conducted to enhance incubation performance by using supplying hatching eggs with exogenous nutrients. In fact, [6] stated improved hatchability with in ovo administration of amino acids. According to countless studies [7, 8], Moringa oleifera is full of vitamins (carbohydrates, proteins, amino acids, vitamins, and minerals) and can be utilized as animal feed.

The leaves of the Moringa tree are characterized by using high dietary and medicinal value, as they contain giant amounts of nutritional vitamins and minerals, it is also an outstanding source for amino acids, fatty acids and antioxidants [9,10]. One of the traits of the alcoholic extract of moringa leaves is that it has different residences depending on the kind of solvent used to extract the active ingredients contained in moringa leaves [11].

Due to lack of research on impact of spraying moringa leaf extract and its effect on egg characters and its hatchability efficiency. This learn about aimed to examine the impact of spraying different Concentrations of Moringa oleifera leaves extract on broiler breeder hatching eggs

Materials and Methods

Experimental Design

This study was conducted in Evan commercial hatchery in Erbil Governorate / Kurdistan Region, Iraq. A total of 825 eggs with a mean of 67.93±0.63 g from 54-weeks old Ross-308 Broiler breeders were collected in sterile conditions, then randomly dispersed among five groups before incubation, and sanitized at the 1st day , 10th days and 18th days of incubation the division of transactions was as follows:-

1. Control group without being sprayed under Treatment 1 (T1).
2. Treatment 2 (T2): A 2% concentration of alcoholic extract of dried moringa leaf powder was sprayed over hatching eggs.
3. Treatment 3 (T3): Spraying 5% alcoholic extract of powdered dried moringa leaves onto hatching eggs.
4. Treatment 4 (T4): 2% water extract of powdered dry moringa leaf was sprayed onto hatching eggs.
5. Treatment 5 (T5): 5% water extract of powdered dry moringa leaf was sprayed onto hatching eggs.

The traits measured were:

1. Hatchability of total eggs% = No. of hatched chicks/ No. of total eggs X 100 [12].
2. Hatchability of total fertile eggs% = No. of hatched chicks / No. of fertile eggs X 100 [12].
3. Chick quality at hatch was measured according to [13] as in Table (1)

Table (1) : Chick quality measurement according to the system

Scores	Characteristics	Parameters
Activity	Good	6
	Deficiency	0
Down and appearance	Dry and spotless	00
	Wet	8
	Wet and Filthy	0
Retracted yolk	Normal	01
	The yolk is huge and has tough, tensile characteristics.	0
Eyes	Free and brilliant	06
	Open, not bright	8
	Closed	0
Legs	Regular legs and toes	06
	One infected leg	8
	Two infected legs	0
Navel	Completely closed and clean	01
	Not closed and not discoloured	6
	Not closed and discoloured	0
Leftover membrane	No membrane	01
	Small membrane	8
	Large membrane	4
	Enormous membrane	0
Leftover yolk	No yolk	06
	Little yolk	01
	Massive yolk	8
	Gaint yolk	0

4-Eggshell Microbial Count

The swab samples were collected on area of 2 cm2 for each egg per treatment under aseptic conditions on the surface of eggshell at first day before incubation and 18th days before setting in incubator, and immediately transported to the laboratory, Sala-haddin University, College of Education, Microbiology lab, according the method of

the researcher [14]. After serial dilution from an initial 10-1 dilution to 10-7, a 100 ul of each dilution was plated on MacConkey agar, and Salmonella Shigella agar to counting of total aerobic bacteria, and Salmonella, respectively. Colonies were counted after the incubation time, and the findings are reported in log10 CFU/mL.

Incubation and Hatching

Eggs were numbered sequentially and weighed before being placed in an incubator set at 37.5°C or 55% relative humidity. On day 18 of hatching, the eggs were transferred to an incubator for hatching. She then completed her final 3 days of incubation in an incubator at 37.2°C and 65% relative humidity prior to hatching. We estimated the effects of moringa extract from embryonated eggs fertilized egg weight, egg weight loss rate, and hatchability.

Statistical Analysis

One-way ANOVA analysis was used by SPSS/PC+ version 27 software to evaluate the data through using the Means and standard error were included in the results of summary statistics [15]. The use of Duncan's test enabled the determination of significant differences between the various parameters at 0.05 levels[16].

Results and Discussion

Effect of different treatments of *Moringa oleifera leaves* on Egg weight at different period of production

The results observed in Table (2) indicated the Moringa oleifera leaf extract did not significantly affect egg weight (g) at different periods of production ($P > 0.05$). The results showed that, the egg weight decreased steadily from zero day, 18th and 21st days of experiment.

The results cleared that, at the zero day the egg weight ranged from 66.46 in group 3 that treated with 5 % M. alchole extract to 69.66 in control group. While, its level at 18th day the egg weight ranged from 60.50 in the group treated with 5 % M. Water extract to 62.15 gm in control group and at the 21st day, where the egg weight ranged from 47.40 gm in group 4 that treated with 2 % M. water extract to 49.96 in in group 3 that treated with 5 % M.alchole extract. This results indicated that, the higher concentration of alchole extract of M. olifera , followed by the higher concentration of water extract of M. olifera preserve the constituents of the eggs and so preserve the egg weight similar to the constituents of the normal fresh eggs so, it can improve the egg hatchability.

Administration of Moringa oleifera leaf extract to chick embryos affected embryo improvement and post-hatch increase overall performance in a variety of ways.This outcomes agreed with these of [17] the place they found that, cure of embryo with 50 µg/ml/eggs of Moringa extract enhance the physique weighta and livability and hatchability of than the manage chickens. Also, they found that, therapy of chicks with MO50 had the easiest relative yolk weight, suggesting that chick physique weight used to be related with elevated yolk sac weight, as pronounced by means of [17].

The impact of Moringa olifera on the weight of the chick and the weight of the yolk is attributed to the reality that the growing moringa olifera awareness extract that limit the the use of of yolk as an electricity supply by using the chick embryo. Furthermore, the decrease relative hatching muscle mass of chickens hatched from eggs administered moringa extract in contrast to the manage team suggests that administration of moringa extract on the 18th day of incubation extended the use of power to help the Hatching procedure negatively affected. In addition[18] confirmed that Moringa oleifera leaves contain excessive amounts of saponins, which can inhibit lipid metabolism in animals, ensuing in low yolk sac utilization and excessive relative weight [19]. The fantastic relationships between the weight of yolk sac and the attention of M. olifera extract agreed with the effects [20, 21, 22].

Table (2): Effect of different treatments of *Moringa oleifera leaves* on Egg weight at different period of production

Treatment	Egg weight (g)		
	Zero day	18th Day	21st Day
Control	69.66±0.80a	62.16±0.49a	49.20±0.98a
T2 % 2 M.Alchole exteract	67.83±2.16a	60.80±0.46a	47.93±1.61a
T3 % 5 M.alchole extract	66.46±0.35a	62.60±0.10a	49.96±0.49a
T4 %2 M. water extract	67.96±1.21a	60.56±1.0a	47.40±0.75a
T5 % 5 M. Water extract	67.50±1.02a	60.50±1.10a	47.73±0.80a
P.value	0.131	0. 092	0. 128

Means inside the identical column of special litters are considerably one of a kind at ($P < 0.05$)

Egg loss % at different period of storage among different concentrations of sprayed *M. olifera* extract

The results observed in Table (3) indicated that, the % of egg loss at the period from 0 – 21 day higher than the losses % at the period from 0 – 18 day. The higher egg weight loss percentage observed in group 4 that treated with 2 % M. water extract where the losses was 7.40, followed by % of egg weight losses in control group where the egg weight losses was 7.50 %. While, the lower % of egg weight losses observed in group 3 that treated with 5 % M. alchole extract where the egg weight losses was 3.86 % and in group 5 that treated with 5 % M. Water extract where the egg weight losses % was 7 %.

While, the egg losses during the period from 0 – 21 day indicated that, the higher egg weight losses observed in group 4 that, treated with 2 % M. water extract that was 20.56 %, followed by its losses in control group that was 20.46 % and in group 2 that treated with 2 % M. Alchole exteract was 19.90 % and in T5 % 5 M. Water extract was 19.76 and the lower losses % observed in group 3 that treated with 5 % M. alchole extract that was 16.50 %.

This results indicated that, the higher concentration of alchole extract of *M. olifera* , followed by the higher concentration of water extract of *M. olifera* preserve the constituents of the eggs through decreasing the losses level from egg shell through decreasing level of evaporation and so preserve the egg weight with reduction of losses level and so the constituents of the eggs similar to the constituents of the normal fresh eggs so, it can improve the egg hatchability.

These results were consistent with those of researchers [23] who reported that 70% methanol solvent was the most effective solvent concentration to inhibit the enzymes elastase and hyaluronidase in moringa leaf methanol extracts. This destroys the aerobic bacteria in the egg shell. Also, [24], reported that, Moringa oleifera leaf extract especially methanolic extract decrease the evaporation of the liquid contents of the eggs through the destruction of bacteria and also, through reducing the widith of the pores of the egg shell so, it will reduce the losses of the eggs.

Table (3): Egg loss % at different period of storage among different concentrations of sprayed *M. olifera* alcoholic extract

Treatment	Egg weight loss (%)	
	0-18th day	0-21st day
Control	7.50±0.40a	20.46±0.80a
T2 % 2 M.Alchole exteract	7.03± 2.21a	19.90±3.73a
T3 % 5 M. alchole extract	3.86±0.44a	16.50±0.25a
T4 %2 M. water extract	7.40±0.95a	20.56±0.46a
T5 % 5 M. Water extract	7.00±2.00a	19.76±0.43a
P.value	0. 129	0.158

Means inside the identical column of special litters are considerably one of a kind at ($P < 0.05$)

Effect of different concentrations of sprayed M. olifera leaf extract on Hatchability % and dead embryo:

The results observed in Table (4) indicated that, the hatchability % differ significantly ($P < 0.05$) among different treatments of sprayed Moringa olefera leaf extract %.

The higher hatchability % of total eggs cleared that, the higher hatchability % observed in control group that was 69.70 %, followed by its level in group 2 that treated with 2 % M. Alchole exteract that was 66.06 % and its level in group 5 that treated with 5 % M. Water extract that reached to 58.18 and the lower hatchability % observed in the group 3 that treated with 5 % M. alchole extract that was 53.49 % and group 4 that treated with 2 % M. water extract that was 49.09 %. However, the hatchability % of fertile eggs showed a higher percentage in group Group 5 that treated with 5 % M. Water extract that was 99.02 % , followed by the group . treated with 5 % M.alchole extract that was 93.07 % and in the group 2 that treated with 2 % M. Alchole exteract as it was 92.58 %. While, the lower hatchability % of fertile eggs observed in the group 4 that treated with 2 % M. water extract that was 92.19 % and the lower hatchability % observed in control group that was 88.42 %.

The higher percentage of dead embryo observed in control group that was 9.10 %, followed by group 2 that treated with 2 % M. Alchole exteract that was 5.46 %, followed by group 4 that treated with 2 % M. water extract that was 4.26 %. While, the lower dead embryo observed in the group 3 that treated with 5 % M. alchole extract that was 4.23 % followed by the group 5 that treated with 5 % M. Water extract that was 0.60 %.

The consequences indicated that, the greater hatchability percent finished with the the usage of of greater attention of water extract of M. olifera accompanied by using the Alchole extract of M. olifera leafs.

The highest hatchability completed in crew 5 might also be due to the excessive electricity availability for the duration of the hatching process. The decrease in relative weight of the yolk sac of chickens in the 5 team at height hatch can be defined through the extended lipid metabolism ensuing in excessive electricity manufacturing required for hatching. It can be assumed that the in ovo administration of moringa extract dose-dependently inhibits or stimulates lipid metabolism. In addition, [25] validated the utilization of glycogen at some point of the hatching process. In fact, after detachment of the choriallantoid membrane in the course of extrusion, oxygenation and lipid degradation are restricted. From this stage, the brood muscle consumes solely glucose from glycogen shops [26], grows prior to interior puncture, and loses weight upon hatching [27,25].

Moringa extract consists of materials that, in accordance to [24], desire the storage of glycogen in the liver greater than in the sphincter muscle tissues after in ovo injection.In this study, the discount in hatching muscle mass confirms the findings of [24] who suggested a discount in hatching muscle mass when turkey eggs had been fed in ovo with exogenous carbohydrates.

Table (4): Hatchability & of total eggs and fertile eggs and % of dead embryo among different concentrations of sprayed *M. olifera* leaf extract

Treatment	Hatchability %		Dead embryo
	Hatchability of total eggs (%)	Hatchability of fertile eggs (%)	
Control	69.70±3.03 a	88.42±0.46 b	9.10±0.0 a
T2 % 2 M.Alchole exteract	66.06±6.06 ab	92.58±2.33 b	5.46±1.83 ab
T3 % 5 M.alchole extract	53.94±3.97 bc	93.07±2.01 b	4.23±1.61 bc
T4 %2 M. water extract	49.09±1.82 c	92.19±2.07 b	4.26±1.23 bc
T5 % 5 M. Water extract	58.18±1.81 abc	99.02±0.98 a	0.60±0.60 c
P.value	0. .333	0.208	0. 053

Means inside the identical column of special litters are considerably one of a kind at ($P < 0.05$).

Effect of different concentrations of sprayed *M. olifera* alcoholic extract on Total aerobic bacterial counts

The results observed in Table (5) cleared that, the level of total aerobic bacterial counts differ significantly before and after treatment with different concentrations of sprayed M. olifera extract ($P < 0.05$).

The total aerobic bacterial counts before incubation showed a higher level in control group that was 5.72 followed by the group 4 that treated with 2 % M. water extract and the lower total aerobic bacterial counts observed in group 3 that treated with 5 % M. alcoholic extract that was 4.59, followed by group 2 that treated with 2 % M. alcoholic extract that was 4.58 and the lower total aerobic bacterial counts observed in group 5 that treated with 5 % M. water extract that was 4.30.

While the level of total aerobic bacterial counts after treatment with M. olifera extract showed a higher level in control group that was 8.04, followed by the group 3 that treated with 5 % M.alchole extract that was 7.96, and group 2 that treated with 5 % M. alchole extract as it was 7.92, while, the lower level of total aerobic bacterial counts after treatment observed in the group 4 that treated with % 2 M. water extract as it was 7.89 and group 5 that treated with % 5 M. Water extract as it was 7.88.

The results cleared that, the higher concentration of water extract of M. olifera leafs followed by the higher alcoholic extract of M. olifera leafs decrease the level of total aerobic bacteria on the shell egg than the control.

These outcomes have been steady with these [28] the place they observed that the ethanol extract had the best endeavor towards E. coli. In contrast, the aqueous extract confirmed higher undertaking with outcomes ranging from 0.03 to third mg/ml towards a range of strains. The MIC values of Moringa Ag-NPs in opposition to quite a number pathogenic micro organism ranged from 0.05 mg/ml to 0.13 mg/ml and the exercise of the crude aqueous extract ranged from 0.15 to 0.83mg/ml. In case of antifungal activity, the ethanolic extract confirmed the most pastime at 0.04 mg/ml and the minimal at 0.42 mg/ml. However, the aqueous extract confirmed outcomes in the vary of 0.42 at 1.17 mg/ml. Moringa Ag NPs confirmed increased pastime in opposition to one of a kind fungal lines than the crude aqueous extract, ranging from 0.25 to 0.83 mg/mL.The MIC values of the Moringa crude aqueous extract ranged from 0.74 to 3.33 mg/ml. Moringa Ag-NP and its crude aqueous extract can be used to beautify antimicrobial properties.

Table (5): Total aerobic Bacterial counts before and after 18- days of incubation among different concentrations of sprayed M. olifera alcoholic extract

Treatment	Total aerobic Bacteria before Incubation	Total aerobic Bacteria 18 days of Incubation

Control	5.72±0.04 a	8.04±0.00 a
T2 % 2 M.Alchole exteract	4.58±0.15 c	7.92±0.02 bc
T3 % 5 M.alchole extract	4.59±0.14 c	7.96±0.01 b
T4 %2 M. water extract	5.16±0.02 b	7.89±0.01 c
T5 % 5 M. Water extract	4.30±0.17 c	7.88±0.01 c
P.value	0. 149	0. 063

Means inside the identical column of special litters are considerably one of a kind at ($P < 0.05$)

Effect of different concentrations of sprayed *M. olifera* alcoholic extract on chick quality:

The results observed in Table (6) cleared that, the degree of chick quality (Activity and abnormal) chicks differ significantly ($P < 0.05$) among different concentrations of sprayed M. olifera extract ($P < 0.05$).

The results cleared that, the activity of chicks increased in group that treated with 5% M. Water extract that was 8.96 % followed by the group 4 that treated with 2 % M. water extract as it was 8.36 , while, the activity decreased in control group that was 7.96, group 3 that treated with group 3 that treated with 5 % M.alchole extract that was 7.93 and in group 2 that with 2 % M.Alchole exteract that was 7.40.

While the results cleared, abnormal chicks increased in group that treated with 5 % M. Water extract that was 2 % followed by control group and group 2 that was 1.66. while, the lower abnormal chicks level observed in the group 4 that treated with 2 % M. water extract as it was 1.33 and group 3 that treated with 5 % M.alchole extract that was 0.33.

The consequences cleared that, the greater awareness of water extract of M. olifera leafs accompanied through the greater alcoholic extract of M. olifera leafs degree enhance the satisfactory of lively chicks and also, the nice of peculiar chicks than the manipulate or alcoholic extract of M. olifera leafs.

This effects attributed to the Moringa oleifera is full of vitamins (carbohydrates, proteins, amino acids, vitamins, and minerals) and can be utilized as exact great feed that assist in improvement of chicks organs and chicks growth. Also, the leaves of the Moringa tree are characterised by using excessive dietary as they incorporate giant quantities of nutritional vitamins and minerals, additionally viewed as an incredible supply for amino acids, fatty acids and antioxidants [9,10]. One of the traits of the alcoholic extract of moringa leaves is that it has distinctive residences relying on the kind of solvent used to extract the lively ideas contained in moringa leaves [11] that assist in chick increase and development.

The quality of the chicks was not affected by the administration of Moringa oleifera extract during the period from 18 – 21 day. This results attributed to during the first 18 days of incubation most organs of chicks formed during this period and embryo growth occur at this period while, the period from 18 to 21 most hatching process prepared and occurred at this period [29 , 17]. Therefore, the extract and nutrients

injected or sprayed on day 18 have not any effect on the growth or development of the embryo [30].

The results cleared that, the 5 % M. water extract group showed high values in improvement the quality of chicks this results attributed to the improvement in nutrient metabolism and amniotic fluid absorption [5, 3]. This confirms optimal dietary modification and nutrient uptake at low concentrations of moringa leaves in bird seed [31, 22]. Also, 32 and 33 observed that, although the chicks were not given moringa leaves during the rearing period, the extract given from day 18 of incubation had a significant impact on body weight at 6 and 7 weeks of age. Also, [34] suggests that all embryos received the nutrients provided by Moringa oleifera leaf extract by spray during incubation have a good hatchability percent with improvement of body weight and gain during the first few days of rearing.

Table (6): Chick quality (Activity and abnormal) chicks among different concentrations of sprayed *M. olifera* alcoholic extract

	Chick quality	
Treatment	**Activity of chicks**	**A abnormal chicks**
Control	7.96±0.24 bc	1.66±0.33
T2 % 2 M.Alchole exteract	7.40±0.10 c	1.66±0.88
T3 % 5 M.alchole extract	7.93±0.37 bc	0.33±0.33
T4 %2 M. water extract	8.36±0.08 ab	1.33±0.33
T5 % 5 M. Water extract	8.96±0.39 a	2.00±0.57
P.value	0. 189	0. 072

Means inside the identical column of special litters are considerably one of a kind at ($P < 0.05$

The higher concentration of Alchole extract of M. olifera , improve the egg weight and egg weight losses. Also, the higher concentration of water extract of M. olifera preserve the constituents of the eggs through decreasing the losses level from egg shell and so preserve the egg weight with reduction of losses level, the higher hatchability % achieved with the using of higher concentration of water extract of M. olifera followed by the Alchole extract of M. olifera leafs. The higher concentration of water extract of M. olifera leafs followed by the higher alcoholic extract of M. olifera leafs decrease the level of total aerobic bacteria on the shell egg than the control. the higher concentration of water extract of M. olifera leafs followed by the higher alcoholic extract of M. olifera leafs level improve the quality of active chicks and also, the quality of abnormal chicks than the control or alcoholic extract of M. olifera leafs.

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