Effect of in Ovo Injection of *Ricinus Communis* Oil on Broiler Chicks Hatching Traits

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Abstract

This study was conducted at Al Anwar Poultry Hatchery in 20-9-2022 and the objective was to conduct research on injecting eggs in hatching with castor oil. The fertilized eggs (egg weight 55+ 2) consisted of three hundred (Ross 308) that were split into four treatments of 75 eggs each proceeded by three replicates of 25 eggs each with treatment conditions as follows: T1: control treatment unsprayed, T2: unsprayed and injected with Nacl (0.3 ml/egg), T3 and, T4 unsprayed and injected with castor oil (0.1 and 0.2 ml/egg respectively). The results were as follows; the hatching percentage and, hatching chicks weight of T1 and, T2 increased significantly ($p \leq 0.05$) compared to T3 and, T4, the percentage mortality of embryos in T3 and, T4 increased significantly ($p \leq 0.05$) compared to T1 and, T2. It is deduced that the difference between T1 treatment and T2, T3 and, T4 treatments in the pipped egg percentage and, lives pipped chick significantly increases ($p \leq 0.05$). The percentage of tonic immobility in T4 versus other treatments and tonic immobility in T3 versus T1 and T2 significantly increase ($p \leq 0.05$). The length of the chick and that of the leg of the chick had significant ($p \leq 0.05$) increase in T1 and, T2 but no increase in T3 and, T4 treatments.

Keywords: In Ovo Injection, *Ricinus Communis*, Broiler Chicks, Hatching Traits, Medical plant toxicity.

Introduction

The use of several medicinal plants most researchers and works utilize a variety of medicinal plants such as castor plant as a natural source of antioxidants, amino acids and so forth, however the overwhelming majority of them are toxic to birds to some degree and extracts or fats of these plant types can be highly toxic to broilers chicken and to poultry in general [2]. Castor oil seed meal (Ricinus communis, L) has been used in the feeding of livestock but one of the most significant constraints which have been cited arise when the feed includes anti-nutritional compounds [3emporpricingfeed]. Defatted castor bean meal has potential in the cattle diets [5]. Castor bean cake contains approximately 32 to 48 percent crude protein and whole seed contains 2.9 to 3.28 kcal/kg real ME, depending upon the level of decortication and deoiling. [6]. Nevertheless, the poultry birds are even more resistant to castor oil seed toxicity, as most animals are responsive to it, It is necessary to re-evaluate such statements, particularly when the subject of interest is a feed ingredient leading to alteration of the blood form. The chemical makeup of the food, the practice executed by the animal and morphological changes in the organisms are the best way to identify the physiological effects of the diets to the animal;

ISSN 2072-3857

therefore castor oil seed will be required to be detoxified, especially when castor oil is not required to serve a major role to the humans. Following the fermentation, however, heat drying can damage useful amino acids, including methionine, to reduce the level of protein in the castor oil seed meal [7]. The castor oil contains several toxic compounds including acetylricinic acid derivatives that may destroy the cell membranes besides disrupting growth and development. These compounds are found in alcohols and castor oil [8]. It is not only important as a technique to give early nutrition to the poultry embryo but also as a technique in determining the toxicity of various compounds to the embryo because the bird embryo is very sensitive to any form of external influence that may result in the death of the living cells [9,\,\10,\,\11,\,\12]. Therefore, the study aims at identifying the effects of adding castor oil in different concentrations into the hatching eggs of broilers and also establish the effect of this on the hatchability and some physical characteristics of the resulting hatchlings.

Methodology

This experiment was carried out in Al-Anwar Poultry Hatchery, December 20, 2022. They were used in three hundred fertilized eggs (Ross 308) and further divided into four treatments (75 eggs each) and then, three replicas (25 eggs each). The average egg weight was (55±2). The following treatments were treated on the amniotic sac: Castor oil (buys at local markets) was injected in the .amniotic sac

.T1: control treatment and control injected

.T2: injection Nacl (0.3 ml/egg)

.T3: injection castor oil (0.1 ml/egg)

.T4: injection castor oil (0.2 ml/egg)

The eggs were injected at 17.5 days of embryonic age by injecting the amniotic sac. The broad end of the egg was sterilized, and then the eggshell was pierced with a piercing tool. An automatic syringe with a 22 mm injection needle was then used. After the injection was completed, the shell opening was sealed with paraffin wax.

According to [9], [10], [11], [12], hatching and physical traits of the chicks were researched. The analysis was done statistically with the help of.[13،14]

Results and Discussion

Hatching Traits

Table 1: shown that the effects of in ovo Injection of ricinus Communis oil on hatching features, in hatching percentage and, hatching chicks weight displayed significant differences (p 0.05) in T1 and, T2 in comparison T3 and, T4, and the percentage of embryo mortality in T3 and, T4 was high in relation to T1 and, T2.

The percentage of pipped eggs and live pipped chicks percentage (table 2) showed significant increase (p 0.05) in T1 treatment as compared to T2, T3 and, T4 treatments.

ISSN 2072-3857

Table 1: Effect of in Ovo Injection of *Ricinus Communis* Oil on Hatching Traits			
Treatments	Hatching percentage %	Embryo mortality percentage %	Hatching chicks weight (gm)
T1	83.33±1.32 a	16.67±0.75 b	37.28±1.13 a
T2	82.22±0.92 a	17.78±1.00 b	36.89±0.95 a
T3	72.22±1.24 b	27.78±2.10 a	34.66±0.35 b
T4	70.00±1.72 b	30.00±2.36 a	34.10±0.52 b
Significant	*	*	*
*(p≤0.05).			

Table 2: Effect of in Ovo Injection of *Ricinus Communis* Oil on Hatching Traits			
Treatments	Pipped egg percentage %	Live pipped chicks percentage %	Dead pipped chicks percentage %
T1	33.33±2.10 a	4.33±2.00 a	29.00±3.36 a
T2	18.75±1.75 b	1.33±1.08 b	17.42±3.42 b
T3	12.00±2.73 b	2.33±0.91 b	9.67±1.36 c
T4	15.38±1.98 b	1.77±0.25 b	13.61±2.21 bc
Significant	*	*	*
*(p≤0.05).			

1- Chicks Physical Traits

Table 3: shown that the effect of in ovo Injection of Ricinus Communis oil on the physical characteristics, abnormal chick T4 had significant increase (p=0.05) compared with other treatments and T3 had significant increase (p=0.05) compared with T1 and T2, T3 tonic immobility significant increase (p=0.05) and, T4, when compared with T1 increase and T2 treatment.

The chick length and the T1 and T2 treatments are found to have significant increases (p≤0.05) in length and, chick leg length (table 4).

Table 3: Effect of in Ovo Injection of *Ricinus Communis* Oil on Chicks Physical Traits		
Treatments	Abnormal chicks percentage %	Tonic immobility (mint)
T1	1.33±0.71 c	2.36±0.09 b
T2	2.70±0.53 c	1.56±0.36 c
T3	13.84±3.27 b	5.46±0.51 a
T4	17.18±2.69 a	4.96±0.07 a
Significant	*	*
*(p≤0.05).		

ISSN 2072-3857

Table 4: Effect of in Ovo Injection of *Ricinus Communis* Oil on Chicks Physical Traits

Treatments	Chick length (mm)	Wing length (mm)	leg length (mm)
T1	15.42±0.13 a	3.22±1.20	4.11±0.07 a
T2	16.63±0.17 a	3.11±3.00	4.23±0.03 a
T3	14.66±0.21 b	3.16±1.58	3.66±0.09 b
T4	14.11±0.19 b	3.10±2.07	3.51±0.11 b
Significant	*	N.S	*

*($p \leq 0.05$).

The primary constituent of castor oil is ricinoleic acid (about 85-95%), a hydrogenated sake fatty acid that carries a hydroxyl group and shows powerful biological activity in the body cells and promotes uterine contractions among the mammals [15]. The decreased hatchability and physical appearances of the chicks in the T3 and T4 treatments could be attributed to the derivatives of ricinoleic acids disrupting the fine biological processes of yolk production or distribution in embryonic cells and hence may prevent normal growth of eggs or embryo [16]. Ricinoleic acid is also an irritant and cytotoxic acid and damages embryonic cell membranes and loss of minerals, which results in alteration of cellular osmotic pressure. This is the reason why the percentage of abnormal chicks was high in the treatments which involved the castor oil injection. Moreover, the ricinoleic acid accelerates oxidative stress suppressing embryonic cell proliferation and differentiation because of the growth of free radicals and malformation of rapidly developing tissues (heart, liver and, nervous system). The cell permeability will lead to the reduction of nutrients into cells, hence, decreasing the organogenesis and tissue growth, which will impact the ATP levels and lower the energy needed to support embryonic development.[18]

Conclusion

The findings reveal that not every medicinal plant is useful to poultry as in the case of the castor plant that is castor oil. The findings demonstrated that all the examined traits dropped considerably, which is the evident impact of the active compounds present in the castor oil that lowered the hatching rate, quality of the hatched chicks. The present research paper suggests that further experimentation using broiler chickens in farm and the histological research about the liver of birds fed with castor oil be conducted in order to establish the level of harmfulness when it comes to live broiler. It is recommended not to use castor oil in the early feeding of chicken embryos due to its clear harm to embryo growth and development.

ISSN 2072-3857

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ISSN 2072-3857