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The Effect of Adding Two Different Concentrations of Dates Molasses to the Drinking Water on Some Hematological and Biochemical Features in Broiler Chicken

Mohanad fadhl hussain Al-musodi[1], Mustafa Hadi Hamid[2], Ali Hashim Subeh[3]

[1]Orcid= 0000-0002-0778-5344

[1,2,3] Animal Department, Agricultuire college, Kerbala University, Iraq.

ABSTRACT: This study was conducted in the animal field at the college of Agriculture, Karbala University to study the effect of adding date molasses in two different concentrations to the drinking water of broiler on blood and biochemical qualities , 120 birds were taken from the Rose series and randomly distributed to three groups of equal number, molasses was added to the drinking water of birds of the second group by 3% and to the drinking water of the third group by 6% while 0% was added to the drinking water of the first group of the control group, The red and leucocytes counts ,the differential count of leucocytes , the packed cells volume and Hemoglobin, as well as the lipid profile (TC ,TG, HDL ,LDL , vLDL), liver function enzymes (ALT,AST) and blood proteins were measured , There was no significant effect of date molasses on the number of Erythrocytes and leucocytes count and the differential count of leucocytes while the percentage of Packed cells volume and hemoglobin increased significantly $p<0.05$ in the second and third groups compared with the control group, and And in contrast liver function, lipid profile and blood proteins were not affected significantly by adding molasses to drinking water.

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Corresponding Author: Mohanad fadhl hussain Al-musodi

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INTRODUCTION

Raising broiler chickens on an intensive commercial basis requires large and expensive quantities of food, especially sources of protein, amino acids, vitamins, and minerals. The entire above are not considered sufficient sources of energy that the bird needs for growth. Oils and their vegetable sources, such as yellow corn, are considered the most important source of energy for humans and animals, and here the factor of competition with... Humans need food energy sources, so it is necessary to search for other energy sources that are outside of human use as a food source **(Ndelekwute et al ., 2010**), (**Ravindran and Blair ,1993**), so other alternatives must be searched as a source of energy. In addition to yellow corn, including molasses, which is considered one of the products of the manufacture of sugar from cane, dates, or honey (**Curtin 1983**), molasses is important in feeding animal herds because of its nutritional and physical properties and its palatability by animals **(Habibu et al ,2014)**, although giving molasses in a high dose can lead to undesirable complications in pheasants, such as cases of diarrhea. In broiler birds, lime is used in their dry food as an additional source of energy, and it is added to the drinking water of broiler chicks as well (**Ndelekwute et al, 2010**). Molasses is defined as the last byproduct obtained from the repeated processes of centrifugation, evaporation, and crystallization of Dates and sugarcane juices during the manufacture of sucrose. These days, molasses comes in a variety of forms, but molasses is any liquid feed component that has an excess of 43% sugar. There are notable differences in the component distribution of molasses among different nations**.(Jamir et al., 2021**), Date molasses is taken out of the sump and sold, usually for human consumption, based on cleanliness and quality. Compared to date syrup made by extraction and boiled on farms, in a semi-industrial setting, or on an industrial scale, this product is of lower quality **(Ramadan, 1998)**

Molasses which is a waste product of the date industry and is considered a carbohydrate source with a high energy level (**Waldroup.W.(1981):),** and it dissolves well in liquids, including drinking water (**Oruwari et al.,1999**) Sources indicate that molasses contains energy estimated at 3000 kilochlories per kg. Therefore, adding molasses to chicken diets increased body weight, weight gain rate, and food intake rate, and the feed conversion rate improved in birds that added molasses to drinking water (**Hajer**

2007). and the dressing ratio of broiler chicken carcasses increased **(Kadhim et al ., 2019).** and improved liver and kidney functions. **(Attia and Al-Harthi , 2015**), and increased blood hemoglobin concentration and the percentage of agglutinated cells (**Ezihe and Dagih ,2018),** and also improved the level of immune system cells **(Habibu et al ., 2014).,**

The blood count is important in describing the health and nutritional status of animals (**Gupta et al., 2007**) The differential count of white blood cells is also a sensitive indicator of the health status of animals and describes the extent of their exposure to various stresses during the period of intensive and closed rearing (**Rajalekshmi *et al*., 2014)** The differential count also describes the state of the animals' immune system and its efficiency (**Dietert et al .,1996).** Fats are oxidized in an unhealthy way due to the influence of free radicals that are released naturally in the body because of metabolic processes of destruction and construction, interference through food, or the influence of toxins and chemicals that reach the bodies of animals. These free radicals lead to the destruction of cells by destroying the cellular membrane by oxidising the fats in it (**Evans and Halliwell, 2001),** so they increase. Or some parameters of the lipid profile of the blood decrease **(Singh et al., 2013).**

Therefore, this study aimed to determine the effect of adding date molasses to drinking water on some other blood and physiological characteristics in broiler chickens.

MATERIALS AND METHODS

The experiment was conducted in the hall of the poultry field belonging to the college of Agriculture, Karbala University, and the chicks were raised in breeding cages. The field was washed well and sterilized by fumigation using permanganate and formalin at a concentration of 40%. The field was closed for 48 hours after which it was emptied of gas, and 12 cages were used for the experiment in each cage10 birds.

The chicks were randomly weighed, distributed to the incisors, taught, and vaccinated at one day of age by spraying a mixed vaccine (ND/IB ATR clon30 Intervet type). The Newcastle ND vaccine was then returned at the ages of 30, 20,10 lassota, clon30, and clon30, respectively, with drinking water. Chicks were vaccinated against Gumboro disease with drinking water, at the age of 13 days. The chicks were fed freely Ad- Libitum for the duration of the experiment. 120 chicks of meat birds used the Rose breed, divided into 3 rice groups with 3 repetitions in each group. Molasses was added by 3% to the water of the second group and 6% to the drinking water of the third group, while nothing was added to the drinking water of the first group (the control group).

Table 1: The chemical composition of molasses

Sequencing	Chemical material	Quantity
1	Moisture	25.35%
2	protein	4.52%
3	Ash	6.84%
4	Fiber	0.22%
5	Fat	0.16%
6	Sucrose	34.16%
7	glucose	8.26%
8	potassium	11.73%
9	sulphates	9.03%

Blood samples were taken from the jugular vein of the birds at the end of the breeding period. 5 ml of blood was withdrawn and distributed in two tubes, one of which contained a coagulant used to calculate erythrocytes count , leucocytes count ,haemoglobin, Packed cells volume Pcv and differential counting of leucocytes , and the other empty blood serum was separated from them and used to measure the lipid profile, liver enzymes, and blood proteins.

Erythrocytes and leucocytes count

The Hemocytometer counting method was used and a special Natt and Herrick solution was used to dilute the cells in the blood of birds Sorbents specific to each type of cell have been used, where the blood is drawn to the mark (0.5) and the dilution solution to the mark (101) and the dilution becomes 200 in the case of red blood cells .In the case of counting white blood cells, the blood is drawn to the mark (0.5) and the dilution solution to the mark (11) to become the dilution coefficient (20) and then counted in the traditional way according to the method(**Campbell,1988.).**

Differential counting of leucocytes %

The blood smear worked by placing a drop of the blood to be examined on one end of the glass slide and then placing the slide cover in front of the drop of blood at an angle of 45. Then quietly pull out for the purpose of making a puppet smear. The slide was then left to dry. It was then dyed using Wright stain dye. After that, It washed and left it to dry.

The swab was examined after drying under the oil lens, where 100 leucocytes cells were counted, and the types of leucocytes were differentiated according to the specifications of each cell and depending on the method. (**Burton and Harrison , 1969).**

Packed cells volume PCV%

The pterygoid vein was pricked with a needle and blood was drawn by a capillary tube (Heparin zed cab. Tube) . Then one end of the tube is sealed with artificial clay. Capillary tubes are placed in a centrifuge (hematocrit) 12000 rpm / min for a period of (5) minutes. the result reading by using the ruler for a separate hematocrit reader blood reader)) according to the method of (**Campbell 1988**.)

Measurement of haemoglobin concentration:

Transferred the haemoglobin to Ciano mathemoglobin using a Solution Drabkin's, where he took 20 microliters of blood, mixed it with 5 ml of solution, and left it for 5 minutes for the purpose of reaction and haemoglobin transformation, then put it in a centrifuge at 2500 rpm for 5 minutes, after which the result was read using a spectrophotometer at a wavelength of 540 Nm. Where zero is the device using the Drabkin's solution, depending on the method (**Varely and Bell,1980**).

Determination of the total protein level in the blood serum

The Biuret Method mentioned in **Wotton (1964**) was used, where it is based on the interaction of copper ions present in the biuret reagent with protein peptides in a base medium and a complex violet-colored composition.

Determination of Serum albumin g/dl

The concentration of albumin in the blood was measured by the **Rodkey (1965)** developed method,

Determination of serum globulin g/dl .

The concentration of globulin in the blood was measured by reducing the total protein from the concentration of albumin, according to **(Ghanim et al., 2016).**

Determination of serum Total Cholesterol con. mg/dl.

The total concentration of cholesterol was measured using a special kit from the Spinreact company and according to the method described by **(Allian, 1974),**

Determination of Triglyceride (TG) mg/dl:The concentration of triglycerides in the blood serum was measured using a kit from a Spinreact company and according to the method mentioned by**(Fossati and Prencipe, 1982).**

Determination of High-Density Lipoprotein (HDL-C) mg/dl

The concentration of high-density lipoproteins in the blood serum was measured using a kit from a Spinreact company and according to the method mentioned by**(Tietz, 1995**).

Low density lipoprotein (LDL-C) concentration. mg/dl:

According to (**Buritus and Ashwood,(1999).**) the concentration of low density lipoproteins was measured using the following relationship

LDL-c con. (mg/dl) =Total cholesterol – (HDL-c + vLDL-c)

Determination of very Low-Density Lipoprotein-C (mg/dl).

The concentration of very low density lipoproteins was measured with a triglyceride concentration of 5, according to(**Buritus and Ashwood,(1999**).

vLDL- c concentration (mg/dL) = T G / 5.

Determination of alanine Aminotransferase (ALT) U/L activity

The ALT enzyme was measured by following the method used by **Wroblewski and Ladue, (1956)**.

Determination of alanine Aminotransferase (ALT) U/L activity

The AST enzyme was measured by following the method used by (**Jain, 1986).**

Statistical analysis

The data of the study were statistically analyzed using the ((Statistical Analysis System) SAS program, one way ANOVA, minimally significant variations (LSD) To evaluate significant differences between means, post hoc tests were run; a value of $P < 0.05$ was deemed statistically significant. **(SAS, 2010)**.

RESULTS AND DISCUSSION

Blood picture:

The percentage of Packed cells volume PCV% and the concentration of hemoglobin in the birds of the second and third treatment groups increased significantly ($P<0.05$) compared with the control group. As is noted in Table 2

Table 2 :The effect of treatment on blood picture. Means±Stderr.

Parameters / Groups	Pcv %	Hb (g/dL)	WBCs (cell x10^3µL)	RBCs (cell x10^6 µL)
Control	26.30± 1.18 b	7.77± 0.10 b	53.66± 1.54	46.16± 1.88
G2(3% molasses)	29.86± 0.14 a	8.95± 0.20 a	51.83± 0.57	46.20± 1.03
G3(6% molasses)	30.53± 0.27 a	9.17± 0.05 a	52.80± 0.23	45.40± 1.38
Lsd	2.44	0.469	3.321	5.114
P (VALUE)	0.05	0.5	n.s	n.s

Leucocytes differential count %.

As noted in Table 3, there are no significant (P>0.05) differences in the differential count of leucocytes cells and H/L ratio in all groups of the experiment**.**

Table3: The differential count of white blood cell (%) means ±Stderr.

Parameters / Groups	Hetr%	H/L	Mono.%	Basio.%	Esiono.%	Lympho.s%
Control	28.20± 0.11	o.44±0.11	6.63± 0.14	0.70± 0.02	0.67± 0.19	63.80± 0.11
G2(3% molasses)	27.66± 0.20	0.42±0.24	6.80± 0.34	0.74± 0.02	0.75± 0.14	64.05± 2.48
G3(6% molasses)	28.66± 0.08	0.45±0.31	6.70± 0.40	0.72± 0.01	0.74± 0.13	63.18± 1.73
Lsd	1.4984	0.08	1.1024	0.0788	0.5449	6.0541
P (VALUE)	n.s	n.s	n.s	n.s	n.s	n.s

In the prevention of health management and nutrition procedures, the percentage of Packed cell volume PCV% is influenced by several factors, including age, gender, physiological state, and nutrition. The reason for the significant increase in the percentage of Packed cells volume can be attributed to the effect of molasses **(OKe et al ,2007)** Due to its role in increasing and improving the nutritional value of the bird and improving the condition of erythrocytes , Molasses maintains blood parameters within the normal range, prevents anaemia, and increases blood cell manufacturing processes because it contains significant proportions of iron, zinc, and copper **(Ezihe and Dagih ,2019**).

Hemoglobin is considered an indicator of the ability of red blood cells to transport oxygen in the blood,the concentration of hemoglobin in the two treatment groups increased significantly P<0.05 compared with the control group table 2. The reason for this superiority focuses on the presence of iron, zinc, and copper with good Dun in molasses, which is naturally an acceleration in the construction of hemoglobin, The high percentage of Packed cells volume and hemoglobin in the blood may be due to the effect of molasses, as it increases the palatability of food and improves the digestion coefficient of the feed material(**Kerketta et al .,2017**) in addition to the presence of iron, copper and zinc elements with good chemicals in molasses, which are important nutrients in the Erythropoiesis and this can raise or maintain the numbers of red cells and hemoglobin within normal ranges **(Ezihe and Dagih ,2019**) and hemoglobin is considered as an indicator of the normal level of blood tissue of animals and birds (**Sankar ,2020**) and the leucocytes count , leucocytes differential count and H/L ratio did not differ table 3, this gives an indication that there are no harmful effects of molasses on the health of animals and birds (**Kerketta et al .,2017** and **Mugnai, et al ., 2011)** and these results give predictions However, the addition of molasses to the drinking water of birds has good effects on the blood parameters of birds,

and these results correspond to what was mentioned by (**Islam et al ., 2023**) **Gultemirian et al .,2022)** ,**Ezihe and Dagih, (2019),Habibu et al .,(2014)**and **Fayemi et al .,(2007)** Which indicated an increase in the percentage of backed cells volume PCV and hemoglobin in the blood in birds after palming to drinking water**.**

Lipid profile:

There was no significant (P>0.05) effect of adding molasses to drinking water on the lipid profile in all groups, as noted in Table 4

Table 4: The effect of treatment on lipid profile<means ±Stderr.

Parameters / Groups	TG mg/dl	vLDL mg/dl	TC mg/dl	HDL mg/dl	LDL mg/dl
Control	**51.53± 1.77**	**10.30± 0.73**	**132.28± 1.13**	**21.78± 0.74**	**100.20± 1.70**
G2(3% molasses)	**51.20± 1.70**	**10.24± 0.56**	**134.20± 2.42**	**22.00± 1.07**	**102.01± 1.12**
G3(6% molasses)	**53.00± 4.04**	**10.60±2.1**	**133.30± 1.55**	**23.20± 1.84**	**99.50± 1.19**
Lsd	**9.4539**	**4.6565**	**6.1889**	**4.5258**	**4.7316**
P (VALUE)	**n.s**	**n.s**	**n.s**	**n.s**	**n.s**

The effect of supplementation of date molasses to the drinking water of broiler on total cholesterol, triglycerides, high-density lipoproteins and low-density lipoproteins is shown in **Table 4** , and there was no significant difference between the study groups in the concentration of all parts of the lipid profile of the blood, This result was supported by several studies that indicated that there is no harmful effect of molasses on the lipid profile , that is, there were no pathological effects of molasses on the health status of birds **(Islam et al .,2023**), and no harmful effect on the lipid profile , and this result corresponds to both **(Kioumarsi et al ., 2011)** and **(Cenesiz et al ., 2006)** who indicated that there is no moral effect of molasses on the lipid profile.

Blood protein and Liver function.

The concentrations of total blood protein, albumin, globulin, as well as liver enzymes (ALT ,AST) were not affected by supplementation with molasses in drinking water all study groups, as in Table 5

Table 5: The effect of treatment on liver enzymes and blood protein means ±Stderr.

Parameters / Groups	ALT IU/L	AST IU/L	Globulin g/dl .	Albumin g/dl .	Total Protein g/dl .
Control	**406.36± 3.42**	**122.28± 12.74**	**1.72± 0.40**	**1.62± 0.32**	**3.34± 0.31**
G2(3% molasses)	**409.10± 5.19**	**121.32± 12.08**	**1.84± 0.46**	**1.55± 0.34**	**3.39± 0.22**
G3(6% molasses)	**405.60± 2.71**	**123.40± 13.04**	**1.91± 0.51**	**1.52± 0.34**	**3.43± 0.23**
Lsd	**13.562**	**43.708**	**1.6066**	**1.0821**	**0.9049**
P (VALUE)	**n.s**	**n.s**	**n.s**	**n.s**	**n.s**

The parameters of total blood protein, albumin, and globulin are in equilibrium and within their normal range in broiler ,and this is evidence of the absence of harmful effects on the health of broiler (**Jassim, 2010**) when adding molasses to the drinking water of broilers, and these results correspond to what was found by (**Attia and Al-Harthi., 2015).**

Liver function was represented in current study by measuring the concentrations of two enzymes (ALT ,AST) , which are considered evidence of liver function and protein metabolism in the body **(Ma et al ., 2021**), and were not significant(P>0.05) affected, as is clear in Table 5, In addition, this indicates that the broiler were bred in a suitable environment with good management, in addition to the absence of harmful effects of supplementation of molasses with drinking water to broiler on liver function and protein metabolism (**Osman et al .,2020**) and these results are consistent with the mention of both **(Islam et al., 2022)and (Rahiman and Pool 2016).**

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