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Effect of addition date molasses or/ and ascorbic acid with/without feeding method in some productive performance of broiler chickens Ross 308

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Abstract. This experiment was conducted determine the effect of dates molasses, ascorbic acid and feeding method on growth performance and carcass characteristics in broiler chickens. A total of 480 one day-old broilers Ross 308 were randomly allotted to 8 experimental groups in a complete randomized design. Basic treatments were divided initially at time of hatching, a- early feeding group which had a free access to water and diet from direct time of post hatching until 6 weeks, this group contained 240 chicks which distributed into 4 subgroups with 4 replicates/ subgroups. The 1st subgroup was fed basal diet (control), the 2nd subgroup was fed basal diet plus 1000 ml of dates molasses /l of drinking water. The 3rd subgroup was fed basal diet plus 50 g of L-ascorbic acid /l of drinking water. The 4th subgroup was fed basal diet plus 1000 ml and 50 g of dates molasses and L-ascorbic acid, respectively / l of drinking water, b- late feeding group which had free access to water and diet after 12 hours from their reaching to farm until 6 weeks, this group was also contained 240 chicks which distributed into 4 subgroups and 4 replicates/ subgroup with the same feed additives mentioned earlier. All the chickens were reared in the same environmental and management conditions. Growth performance (body weight, weight gain, feed intake, water consumption and feed conversion ratio) were determined on 3 and 6 weeks. Carcass traits (dressing percentage, breast, Thigh and femoral part, abdominal fat), factor of productive efficiency and mortality were assessed on 6 weeks. Growth performance was significantly ($P < 0.05$) improved in the dates molasses and ascorbic acid in both early and late feeding treated broilers compared to the not supplemented control. Dates molasses in water increased the relative weight of dressing percentage, breast and abdominal fat as well as ascorbic acid increased the relative weight of thigh and femoral part. These data suggest that the dates molasses and ascorbic acid may improve growth performance in broiler chickens.

Key words: Growth performance, Dates molasses, L-ascorbic acid, Broiler

Introduction

The most often additives evaluated in poultry nutrition were probiotics, prebiotics, antioxidants and enzymes. Intestinal microflora has significant effects on host nutrition, health and growth



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performance (Barrow, 1992) by interacting with nutrient utilization and the development of digestive system of the host. This interaction is so intricate and depending on positive or negative effects on the health and growth of the chickens (Neish, 2002). Intestinal microflora is a nutritional in fast-growing broiler chickens (Lan et. al., 2005) since an active microflora component may have an increased energy requirement for maintenance and a reduced efficiency of nutrient utilization. Researchers used glucose in field trials (Zrxu et al., 2005 and Xu et al., 2003) and found that using sugar for chicks diet would lead up to development and increase in productive traits. Other researchers obtained the same results when they added fructose sugar to the diets provided to the chickens during experiments when obtained the energy required for maintenance function, growth and other forms of production (Waldroup et. al., 1993 and Xu, 2003).

In Iraq, palm dates is widely grown and used for human consumption beside its use as a major source of energy in animal feeds. Therefore, strategically important to find a new sources of energy for animal feeding (Al-Mosawi, 2016). Also, there are substantial amounts of dates molasses produced cheaply as a by-product of dates production. Dates molasses is capable of yielding large quantities of soluble carbohydrate which can be used as a source of energy in poultry diets (Al-Mosawi 2016).

Ascorbic acid plays a major role in the biosynthesis of corticosterone (Bain, 1996) a primary glucocorticoid hormone involved in gluconeogenesis to enhance energy supply during stress (Frandsen, 1986). However, under critically high ambient temperatures the production of ascorbic acid in broilers is inadequate for optimum performance (Daghir, 1995). Many researchers have reported beneficial effects of ascorbic acid supplements which given either in diets or in drinking water. Supplementation with ascorbic acid has enhanced performance of broiler chickens with reduced stress related response (Pardue and Thaxton, 1984) and improved disease resistance of the birds (Amakye-Anim et al., 2000).

The present study was carried out to determine the effect of date molasses and ascorbic acid supplementation as well as their combination on some productive performance for broilers at early and late feeding program.

Materials and methods

The experiment was performed with broiler chicks Ross-308 which purchased from commercial hatchery and reared at the Poultry Research Farm of the Al-Furat Al-Awsat Technical University. They were reared under optimal conditions from 1st d until 6th week of age. Chicks were fed isonitrogenous and isocaloric diets for starter and finisher periods (Table 2), the feed and water were offered *ad libitum* throughout whole experiment period. A total 480 were assigned into 2 basic groups:

A-early feeding group which had a free access to water and diet from direct time of post hatching until 6th weeks, this group contained 240 chicks which distributed into 4 subgroups and 4 replicates/ subgroup. The 1st subgroup was fed basal diet (control), the 2nd subgroup was fed basal diet plus 1000 ml of dates molasses /l of drinking water. The 3rd subgroup group was fed basal diet plus 50 g of L-ascorbic acid /l of drinking water. The 4th subgroup was fed basal diet plus 1000 ml and 50 g of dates molasses and L-ascorbic acid / l of drinking water.

B- late feeding group which had free access to water and diet after 12 hours from their reaching to farm until 6th weeks, this group was also contained 240 chicks which distributed into 4 subgroups and 4 replicates/ subgroup (Uni and Ferket, 2003) with the same feed additives as mentioned earlier. Finally, the experiment included 8 treatments but the basic treatments were divided initially at time of hatching. The arrangement of the experiment was based on this following schema:

Table 1. shows experiment schema

Treatments	Number of chicks	
	Early feeding	Late feeding
L-ascorbic acid	60	60
Date molasses	60	60
Mixture	60	60
Control	60	60

Dates molasses was added to water as liquid obtained from Food Canning Company, Karbala/Iraq. Qualitative composition of dates molasses is glucose 35.5%, fructose 27.9%, protein 1.2%, minerals 2.2% including potassium, calcium, magnesium, phosphorus, sulphur, iron and vitamins (A and B1). L- ascorbic acid (Dox-al, Pharma/ Italy) was added to drinking water as powder purchased from local market. Both additives were added to ordinary drinking water and served to birds daily. Also, both of these additives were solved, mixed and prepared in big plastic container every 2 days to keep its chemical purity and prevent the oxidation process.

Table 2. Ingredients and composition of experimental diet

Ingredient (%)	Starter diet	Finisher diet
	1 day-3 weeks	4-6 weeks
Yellow corn	53.50	56.00
Wheat	10.00	12.00
Soybean meal (44%)	35.00	30.00
Vegetable oil	0.50	1.00
Limestone	0.50	0.50
L-Ascorbic acid premix	0.25	0.25
Salt	0.25	0.25
Total	100	100
	Calculated composition	
¹ ME (Kcal /Kg)	2960	3120
Crude protein (%)	22.90	20.34
Calorie: protein ratio	129.25	153.39
Calcium (%)	1.03	0.86
Phosphorus available (%)	0.44	0.43
Ether extract (%)	1.76	1.85
Crude fiber (%)	3.42	3.33
Lysine (%)	1.34	1.18
Methionine + Cystine (%)	1.00	1.2

¹ME = Metabolizable energy

Body weight (BW) and weight gain (WG) of birds from each group were individually recorded to the nearest gram at the 1st day of life and weekly from the 1st to 6th week of age. Feed intake, water intake and the feed conversion ratio were calculated every week for each replicate in groups. Mortality was recorded as it occurred and percentage mortality was determined at the end of the study. Before slaughtering time, feed and water withdrew for 8 hour and 2 birds randomly chosen from each replicate and individually weighed. After plucking and eviscerating, carcasses were weighed and dissected (proportions of breast, thigh, femoral, and abdominal fat) and their percentages were calculated based on hot carcass weight. In addition, dressing percentage without giblets was

calculated. Statistical analysis was performed using (SAS 2014) and statistically significant differences observed among treatment were separated using the Duncan's multiple range test.

Results and discussion

Results obtained from the table 3 showed that there were no significant differences in body weight at age of 3rd weeks in early feeding when compared between control and experimental groups, but there were significant differences in body weight at age of 3rd weeks in late feeding when compared between control and experimental groups. Higher body weight was in date molasses while lower was in control group. Table 3 also showed that there were significant differences in body weight at age of 6 weeks, higher body weight was in mixture group (date molasses and L-ascorbic acid), while lower was in control group in both early and late feeding. Effect of addition date molasses, L-ascorbic acid and feeding method in weight gain showed in table 3. There were significant differences in weight gain at age of 3rd weeks in early feeding when compared between control and experimental groups, higher weight gain was in mixture group (date molasses and L-ascorbic acid), while lower was in control group. Also there were significant differences in weight gain at age of 3rd weeks in late feeding, higher weight gain was in date molasses group while lower was in control group. Table 3 showed that there were significant differences in weight gain at age of 6th weeks, higher weight gain was in mixture group (date molasses and L-ascorbic acid), while lower was in control group in both early and late feeding. This may be due to the fact that the date molasses contains nutritional energy because it contains a high percentage of total sugars exceeding 61%, mineral salts and scarce elements. It also contains large quantities of thiamine, riboflavin and niacin vitamins (Chaira, 2007). This results are agreed with those researchers (Zrxu et. al., 2005 and Xu et. al., 2003) when used glucose in field experiments, used this sugar at rates ranging from 5 to 8 g per kg for chicks diet from one day to 40 days and found that adding it to the feed would lead up to development and increase in productive traits. The results of the present study are similar to those of Jaffar and Blaha (1996) who obtained increase about 10,9 % in body weight of broiler supplemented with ascorbic acid at 20 mg/bird/day in drinking water during acute heat stress (29 - 43°C) and (40 - 85%) relative humidity. Early nutrition means creating a beneficial microbial balance within the gastrointestinal tract at an early age and preventing the exposure to pathological injury. Lohakare et al. (2005) stated that greater weight gain found in chicks fed supplement ascorbic acid. Result is disagreed with Wu et. al., (1999) who pointed out that the use of high percentages of sugars had a negative effect on production performance and explained

that high levels of sugars in the diets provided to the chickens caused diarrhoea and thus affected their productive performance.

Table 3. Effect of addition date molasses, L-ascorbic acid and feeding method in body weight and weight gain of broiler chickens Ross 308 at 3 and 6 weeks of age (Mean \pm standard error)

Body weight, g / 3 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	17.43 \pm 654.7 a	33.86 \pm 633.3 a	23.76\pm644.0 AB
Date molasses	23.54 \pm 745.7 a	23.43 \pm 720.7 a	67.86\pm733.2 A
Mixture	43.87 \pm 798.8 a	56.86 \pm 598.8 c	34.87\pm698.8 A
Control	32.71 \pm 627.5 ab	43.87 \pm 576.7 c	76.52\pm602.1 B
Average	34.87\pm706.6 A	42.87\pm632.3 B	
Body weight, g / 6 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	36.86 \pm 2037 ab	37.82 \pm 1964 c	34.22\pm2000 A
Date molasses	34.87 \pm 2188 a	35.97 \pm 2007 b	65.98\pm2097 A

Mixture	14.87±2487 a	46.86±2047 ab	56.87±2267 A
Control	47.73±1850 c	36.97±1900 c	45.85±1875 B
Average	34.87±2140 A	24.867±1979 B	
Weight gain, g / 3 week			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	72.86±612.2 b	34.98±590.8 c	65.98±601.5 B
Date molasses	65.98±703.2 a	35.86±678.2 b	67.99±690.7 A
Mixture	65.98±756.3 a	87.98±556.3 c	56.98±656.3 AB
Control	56.98±585.0 c	96.8±534.2 c	56.98±559.6 C
Average	34.98±664.1 A	56.98±589.8 B	
Weight gain, g / 6 week			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	106.5±1994 b	116.9±1921 b	156.8±1958 AB
Date molasses	136.9±2145 a	156.9±1964 b	169.0±2055 A
Mixture	71.8±2444 a	140.0±2004 a	145.8±2224 A
Control	198.6±1807 c	126.8±1857 c	106.8±1832 B
Average	156.8±2098 A	138.8±1937 B	

The different characters vertically and horizontally (average) and within the box (overlaps) indicate significant differences between the traits at the probability level (0.05 P)

Effect of addition date molasses, L-ascorbic acid and feeding method on feed intake of Ross 308 broilers were shown in table 4. There were significant differences between control and experimental groups. In early and late feeding at age of 3rd and 6th weeks higher feed intake was in mixture group (date molasses and L-ascorbic acid), while lower feed intake was in L-ascorbic acid group. Results obtained showed that there were significant differences in water consumption between control and experimental groups, higher water consumption was in mixture group (date molasses and L-ascorbic acid), while lower was in control group in early and late feeding at 3rd and 6th week respectively. Addition of date molasses led to increase palatability of feed and water by birds and thus reflected on the rate of increase in body weight and weight gain according to findings of (Ammerman, et. al., 1989). Result of study is agreed with result of Al-Mosawi (2016) who used date palm juice in broiler diets and found significant improvement (P = 0.05) in feed consumption average.

Table 4 showed that there were no significant differences in average between control and experimental groups in feed conversion efficiency of Ross 308 broilers at age of 3rd and 6th weeks. This finding was consistent with the findings of (Waldroup et al., 1993, Hlchen et al., 2003 and Zrxu et al., 2005) who confirmed that adding sugars at different rates did not lead to significant differences in feed conversion efficiency. The result of the study is disagreed with Biggs et al. (2007) who noted that the addition of sugars to the diets resulted in a significant improvement in the feed conversion efficiency.

Table 4. Effect of addition date molasses, L-ascorbic acid and feeding method on feed intake, water consumption and feed conversion efficiency of Ross 308 broilers at age of 3 and 6 weeks (Mean ± standard error)

Trait	Feed intake, g/ 3 weeks		
	Early feeding	Late feeding	Average
L-ascorbic acid	119.8±1076 b	111.5±965 c	89.36±1020 B
Date molasses	106.3±1298 a	118.8±1179 ab	104.5±1238 A
Mixture	109.0±1353 a	76.38±1043 b	118.6±1198 A
Control	105.0±1154 ab	87.17±1037 b	109.9±1095 B
Average	110.5±1220 A	99.49±1056 B	

Feed intake, g/ 6 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	123.87±3141 c	76.981±2999 c	144.91±3070 B
Date molasses	176.96±3543 a	187.98±3223 a	109.92±3383 A
Mixture	193.97±3656 a	188.78±3126 ab	123.58±3391 A
Control	186.97±3241 b	98.981±3056 b	124.98±3148 B
Average	69.54±3395A	176.98±3101B	
Water consumption, ml/ 3 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	23.98±574 c	67.98±544 c	23.98±559 B
Date molasses	26.98±735 a	67.98±714 a	23.54±724 A
Mixture	87.57±685 b	87.98±623 b	45.65±654 A
Control	98.76±532 c	78.98±501 c	78.98±516 B
Average	23.87±631 A	23.87±595 B	
Water consumption, ml/ 6 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	213.1±1192 a	212.2±1001 b	99.98±1096 B
Date molasses	156.8±1176 a	119.3 ±1083 b	110.2±1129 A
Mixture	200.8±1153 a	123.9±1074 b	113.9±1113 A
Control	210.9±1154 a	118.7±1054 b	124.4±1104 A
Average	119.9±1168 A	11.98 ±1053 B	
Feed conversion efficiency,/ 3 week			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	0.01± 1.57 ns	0.27±1.56 ns	1.56±1.60 NS
Date molasses	0.01±1.65 ns	0.11±1.64 ns	0.25±1.64 NS
Mixture	0.12±1.49 ns	0.03±1.55 ns	0.11±1.52 NS
Control	0.15±1.79 ns	0.45±1.65 ns	0.01±1.70 NS
Average	0.02± 1.61 NS	0.17±1.60 NS	
Feed conversion efficiency,/ 6 week			

Trait	Early feeding	Late feeding	Average
L-ascorbic acid	0.01±1.75 ns	0.15±1.63 ns	0.15±1.69 B
Date molasses	0.12±1.84 ns	0.23±1.73 ns	0.15±1.79 AB
Mixture	0.43±1.78 ns	0.17±1.87 ns	0.12±1.83 A
Control	0.23±1.97ns	0.14±1.94 ns	0.13±1.95 A
Average	0.13± 1.81 NS	0.13± 1.80 NS	

The different characters vertically and horizontally (average) and within the box (overlaps) indicate significant differences between the traits at the probability level (0.05 P). NC: Not significant

Effect of addition date molasses, L-ascorbic acid and feeding method on factor of productive efficiency were shown in table 5. there were significant differences in factor of productive efficiency between control and experimental groups, higher factor of productive efficiency at age 6th weeks in early feeding was in mixture group (date molasses and L-ascorbic acid) while lower was in control group. In late feeding higher value was in ascorbic acid group while lower was in control group. This may be due to the superiority of this group to the high vitality of birds in this group and lack of mortality within it compared to the rest of the treatments. In general, according to the results of the research that the use of date molasses in meat type chicken gave positive results in the performance of production first and gave an economic index superior to the free of date molasses. Ascorbic acid could be implicated in these observations because it is associated with the conversion of body proteins and fat into energy for production and survival through increased corticosterone secretion (Bain, 1996). Ascorbic acid enhances secretion of corticosterone and thus could be a useful in counteract the stress. Result is agreed with the finding of Al-Mosawi (2016) who refer that significant improvement (P 0.05) in production index when used date palm juice in broiler diets.

Table 5 also showed that there were no significant differences between control and experimental groups in a total mortality at 6th weeks in early feeding, but there were significant differences in a total mortality at 6th weeks in late feeding, higher mortality was in control group while lower was in L-ascorbic acid and mixture group (date molasses and L-ascorbic acid). The feed additives especially the date molasses within water which is provided on the first day of the arrival of the chick had importance in strengthening the body energy and resistance to pathogens. Ascorbic acid could play a role in taking part in the synthesis of leukocytes especially phagocytes and neutrophils which play a role in the defines system of the chickens (Null, 2001). This result is agreed with result of Vathana et al. (2002) who pointed out that ascorbic acid supplements up to 40mg / bird / day led up to increase performance and reduce the mortality rates of broiler chickens. David and Brake (1985) found that ascorbic acid supplementation in broiler diet reduced mortality by 14.6% during heat stress.

Table 5. Effect of addition date molasses, L-ascorbic acid and feeding method on factor of productive efficiency and total mortality of Ross 308 broilers at age of 6 weeks (Mean ± standard error)

Trait	factor of productive efficiency, 6 week		
	Early feeding	Late feeding	Average
L-ascorbic acid	87.28±276.1 a	99.98±286.2 a	87.19±281.2 A
Date molasses	98.98±282.0 a	67.98±263.1 b	87.97±272.6 AB
Mixture	87.93±331.7 a	99.91±250.4 b	89.09±291.0 A
Control	68.34±223.5 c	67.87±233.1 c	89.98±228.3 B

Average	67.98±278.4 A	87.98±258.2 B	
	Total mortality %, 6 week		
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	0.00±0.00 c	0.00±0.00 c	0.00±0.00 B
Date molasses	0.00±0.00 c	0.02±1.66 b	0.00±0.83 B
Mixture	0.00±0.00 c	0.00±0.00 c	0.00±0.00 B
Control	0.00±0.00 c	0.07±5.00 a	0.02±2.50 A
Average	0.00±0.00 B	0.01±1.66 A	

The different characters vertically and horizontally (average) and within the box (overlaps) indicate significant differences between the traits at the probability level (0.05 P).

Effect of addition date molasses, L-ascorbic acid and feeding method on dressing percentage at 6th weeks of Ross broilers are shown in table 6. There were significant differences between control and experimental groups, higher dressing percentage was in date molasses while lower was in control group in both early and late feeding. In early and late feeding higher breast weight was in date molasses group while lower was in L-ascorbic acid group. The weight of thigh and femoral part at 6th weeks are in table 6. Higher weight of thigh and femoral part was in mixture group (date molasses and L-ascorbic acid) while lower was in control group. There were significant differences between control and experimental groups in abdominal fat, in early and late feeding higher abdominal fat was in date molasses group while lower was in control group. This is due to the fact that the high energy ratio or increased concentration in date molasses may contribute to positive affect on carcass of broiler and increased fat deposition in birds better than in control, which have less energy concentration than other groups. Lohakare et al. (2005) revealed that the dressing percentage was significantly higher in ascorbic acid supplemental groups as compared with the non-supplemented one.

Table 6. Effect of addition date molasses, L-ascorbic acid and feeding method on dressing percentage, breast, thigh and femoral part and abdominal fat of Ross 308 broilers at age of 6 weeks (Mean ± standard error)

Dressing percentage, (%) 6 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	12.87±74.3 b	11.98±74.1 b	23.98±74.2 AB
Date molasses	18.09±76.8 a	12.09±75.8 a	25.98±75.8 A
Mixture	16.98±75.3 a	16.09±74.3 b	23.98±74.8 A
Control	21.98±73.6 bc	21.98±72.9 c	21.98±73.25 B
Average	17.98±74.75 A	17.98±73.52 B	
Breast, g/ 6 weeks			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	1.87±24.2 a	2.98±22.0 a	6.98±23.6 C
Date molasses	1.54±25.5 a	2.65±24.6 a	7.98±25.05 A
Mixture	1.54±24.6 a	2.54±23.4 a	8.98±23.5 C
Control	1.97±25.1 a	3.98±23.7 a	8.98±24.4 B
Average	1.54±24.85 NS	6.98±23.42 NS	
Thigh and femoral part, g / 6 week			
Trait	Early feeding	Late feeding	Average
L-ascorbic acid	5.98±35.7 a	5.98±32.4 a	12.98±34.05 A
Date molasses	7.56±34.4 ab	17.9±32.2 a	18.98±33.8 AB
Mixture	13.54±36.0 a	8.09±33.3 a	11.98±34.1 A
Control	12.98±33.3 b	9.98±31.4 a	11.87±32.3 B
Average	12.9±34.8 A	15.98±32.32 B	

Trait	Abdominal fat g, / 6 week		Average
	Early feeding	Late feeding	
L-ascorbic acid	0.01±0.78 c	0.03±0.89 c	0.01±0.83 C
Date molasses	0.08±2.90 a	0.04±2.96 a	0.01±0.81 C
Mixture	0.06±1.74 b	0.02±1.95 b	0.01±1.84 B
Control	0.09±0.78 c	0.03±0.85 c	0.01±2.9 A
Average	0.02±1.55 B	0.01±1.66 A	

The different characters vertically and horizontally (average) and within the box (overlaps) indicate significant differences between the traits at the probability level (0.05 P). NC: Not significant

It was conclude that addition of date molasses and L-ascorbic acid in the drinking water in early and late feeding led up to improve live body weight and weight gain and increased feed intake and water consumption with improvement of carcass characteristics of Ross 308 broilers.

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