Study of Sensory evaluation and some Physical qualities of Broiler meat fed with Raisins pomace powder

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Abstract

The study aimed to find out the effect of raisins pomace powder additives on the drip and cooking loss, sensory qualities. Broilers were fed on diets containing 0, 10, 20, and 30 grams of raisins pomace powder per kilogram of diet for 5 weeks. There have been significant changes, as the percentage of cooking loss in the breast muscles has decreased, and there has been an increase in relative weight of heart. Raisins pomace powder additives did not affect the percentage of drip loss, nor the percentage of edible giblets (liver, spleen, and gizzard). These levels of raisins pomace powder which studied for the first time have changed the loss of cooking making meat available in a great way by manufacturing, especially the breast muscles used in the manufacture of various products, as well as improving flavor, tender, and completely concealing the unacceptable flavor which is very common in meat chicken in Iraq.

Keywords: chicken flavor, tenderness, broiler, breast muscles, cooking loss.

Introduction

Throughout time, grape has been one of the most significant agricultural products in the globe (22). Grape skin, pulp, and seeds that are not used for juice or wine production are collectively referred to as juice or winemaking (19). Grape pomace represents approximately 20- 50% of the weight of grapes processed (19 and 21). Grapes are also a major source of other nutrients like boron (3), β-carotene and polyphenolic compounds depending on the type of pomace (11). The seeds had a high percentage of fiber, protein, minerals such as Fe and Cu which is the most abundant minerals in grape seed, and phenolic (392.58±1.70mg of GAE/g) (8) and flavonoid (256.16±1.60 mg of QE/g (16) compounds.

Grape pomace can be used as a cheap supply of antioxidant, polyphenols (17) and unsaturated fatty acids for animal feed, minimizing the negative environmental effects of this industry's waste disposal (14). Due to chemical and phenolic properties of red grape pomace, it might be considered as an expanding in available local feedstuffs (20). Where Several study have been shown that the whole grape pomace at inclusion levels of 2.5%,5% and 10% No differences were observed either in breast meat of Japanese quail samples for any of the colour indicators analyzed and drip loss also cooking loss (13). Vitamin E and grape pomace increased the meat's ability for holding water (15). There is limited use grape pomace in poultry feeding. A previous study has shown that 21-day broiler feeding by 3% grape pomace has not made any changes in growth (7). Other study stated that using 5% grape seed in the Penedes chicken did not affect percentages of protein, lipid and ash as well as flavor of meat (12 and 16), while using 5g per kg feed ground dried grape pomace significantly affected tenderness of meat. The current study was created to examine the effects of various concentrations of raisins pomace powder tobroilers diet to improve sensory characteristics and even more flavor and tenderness of breast muscle.

Materials and methods

The research was done in the poultry farm/ Department of Animal Production-in Faculty of Agriculture/ University of Kufa from 29/3/2023 to 3/5/2023, to detect the impact of different levels of raisin pomace powder as feed additives to the broiler diets on the drip and cooking loss, relative weights of edible giblets, and sensory qualities of breast meat.

The chicks were fed three diets which were starter, grower and finisher until the end of the fifth week (Table 1). The four treatments used in the experiment were as follows: T1: Control treatment (without additives). T2: Adding raisins pomace powder 10g/ kg of feed. T3: Adding raisins pomace powder 20g/kg of feed. T4: Adding raisins pomace powder 30g/ kg of feed.

A hundred and twenty of Ross 308 unsexed broiler chicks at the first day of age and average weight of 38 grams provided from Babylon hatchery in Babylon Province/ Iraq were divided randomly into Pens, 3 m^2 for each, and distributed randomly for 4 treatments, 30 chicks for each, and 3 replicates (10 birds per replicate), and reared for fifth week in a closed type house. The floor was covered with 7 cm of sawdust. Plastic drinkers of 5 litters were used per pen. The 38 cm-diameter circular plastic feeder trays were used during the first week of the bird's life then replaced with cylindrical feeders and lifted as the bird progressed. The water and feed were provided *ad-libitum*. The chicks were fed on the starter, grower, and finisher diets as shown in Table (1).

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Table 1. Diets used in the experiment.

Ingredient (%)	Starter diet	Grower diet	Finisher diet
Yellow corn	50.50	54.00	58.00
Soybean meal	36.00	32.00	27.50
Crushed wheat	8.00	8.00	7.00
Premix	2.50	2.50	2.50
Corn oil	1.50	2.00	3.50
Dicalcium Phosphate	0.1	0.1	0.1
Limestone	1.1	1.1	1.1
Salt	0.3	0.3	0.3
Total	100	100	100
Chemical composition			
M.E Kcal/kg	3015	3081	3210
Crude protein%	23.11	21.51	19.58
Ca%	1.102	1.09	1.08
Available P%	0.74	0.72	0.71
C/P Ratio	130.4	143.2	163.9

-Premix: Jordanian-origin, appropriate power 4900 kilo calories/Kg, Crude protein% 18, Fat 1.1,Ca 15-19%, Lys. 9.4%; Aval. P 6.8%; Na 4.8%; Cl5.8%; Methionine 7.8%; Meth+Cys. 7.8%; Thryonin 0.55%.

-Bi-calcium phosphate contains 22% inorganic calcium and 8% inorganic phosphorus.

Relative weights of internal organs: After the breeding period, the live weight of 3 male birds were taken from each treatment, then slaughtered and cleaned by removing the head, legs, feathers, and lungs. The weight of gizzard, liver, heart, and spleen were recorded by using a sensitive electronic scale. The percentage of each internal organs were calculated according to the method mentioned by AO and Kim (4).

Physical characteristics of meat

Drip loss: Ten grams of breast meat samples were taken and packed in polypropylene bags and kept in the refrigerator at 4ºC. After 24 hours, the samples' surfaces were dried up with filter paper and then reweighed (22). The following formula was used to compute the percentage of drip loss%:

(final weight-primary weight)/(primary weight) x 100.

Cooking Loss: cooking 20 grams of breast meat samples for 10 minutes at 200 °C in an electric oven, the samples' surfaces were dried up using filter paper and then allowed to cool for 30 minutes at room temperature. The percentage of loss during cooking were calculated by difference in weight before and after cooking according to Dolatowski and Stasiak (9) as the following formula:

(cooking after sample weight-cooking before sample weight)/(cooking before sample weight) x 100

Sensory evaluation

Sensory evaluation of the thigh meat samples, each of flavor, acceptance, juiciness, texture, and tenderness have been obtained by cooking samples in an electric oven at 165 °C until the internal temperature of meat reached 70 ºC. Eight experienced judges from the professors of the department were evaluating the sensory evaluation by 8-degree scores.

Statistical analysis

The data were analyzed using the completely randomized design (CRD) to study the impact of different treatments. Statistical analysis of the data was performed using SAS (2012), and averages were compared with Duncan's test.

Results and Discussion

Results of drip loss in table 2 shown non-significant differences between treatments, although the lowest value was in T3 and T4 (3.45%, **3.59** %respectively). From the same table we noticed a significant differences (P≤0.05) in Cooking loss, the highest losses was in T1 (23.97%) comparing with experimental groups T2,T3, and T4 which were recorded 19.72%, 17.47%, and**19.92**% respectively. The lowest value among treatments was recorded by T3.

Researchers in other studies focused on cooking loss (the ability of meat to hold water) after heat treatment of chicken meat. The loss of cooking reflects the release of muscle ingredients. Losses occur after heat treatment due to water

evaporation, water distillation and fat (12).These results are inconsistent with (6). The control treatment was the lowest percentage of loss in cooking compared to adding treatments (grape pomace). Mnisi et al. (18) his access when using grape pomace to feed the quail. On the other hand, other study used 9% grape seed extract recorded a decrease in cooking loss (5).

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Table 2. The effect of adding different levels of raisins pomace powder with broiler diets on the drip and cooking loss of breast meat (mean ± standard error).

Treatment	Drip loss%	Cooking loss%
T1	3.8533 ±0.443	23.970 a ±0.690
T2	4.5278 ±0.505	19.726 b ±1.184
T3	3.4578 ±0.201	17.470 b ±0.554
T4	3.5989 ±0.270	19.924 b ±2.008
Level of significant	N.S	*

- T1: Control treatment (without additives). T2, T3 and T4 Adding raisins pomace powder by 10, 20 and 30 g/ kg of feed respectively.

-Different letters within a single column mean that there are significant differences($P \leq 0.05$) * between treatments.

-N.S: Non Significant differences.

Table 3. The effect of adding different levels of raisins pomace powder with broiler diet on the thigh meat sensory evaluation (mean ± standard error).

Treatment	Flavor	Acceptance	Texture	Juiciness	Tenderness
T1	6.400 c	6.200 c	2.133 b	6.266 c	6.733 c

	±0.213	±0.144	±1.333	±0.154	±0.153
T2	7.267 b ±0.206	7.266 b ±0.182	1.933 b ±0.181	6.866 b ±0.273	7.400 b ±0.190
T3	6.333 c ±0.303	6.400 c ±0.163	3.000 a ±0.195	6.333 c ±0.159	6.800 c ±0.144
T4	7.933 a ±0.066	7.933 a ±0.066	1.333 c ±0.210	7.866 a ±0.090	7.933 a ±0.066
Level of significant	*	*	*	*	*

- T1: Control treatment (without additives). T2, T3 and T4 Adding raisins pomace powder by 10, 20 and 30 g/ kg of feed respectively.

-Different letters within a single column mean that there are significant differences (P≤0.05)* between treatments.

-Tenderness can be determined after 5 chewers and feeling strong cutting and chewing.

-Juicy can be recognized after the first chewing, as well as the amount of moisture.

-Juicy in the mouth or dry mouth after chewing and differentiating between juice and saliva in the mouth.

In table 3,the two treatments T4 and T2 showed the highest value in flavor as they reached 7.93, and 7.26 respectively and were characterized by a strong flavor while the control treatment was medium flavor, where we note that the adding treatments are characterized by good flavor. Also in acceptance, the treatments T4, and T2 showed the highest value as they were reached 7.9, and 7.2 respectively, while the control treatment T1 record 6.2, which was less acceptable as we note the distinction of treatments as such. Additionally, treatment T4 and T2 also outperformed in the texture because they were very soft compared with T1, panelists reported that T4 shoed the best tenderness and juiciness significantly (P≤0.05) superior to the other treatments, as indicated by the same table.

Kasapidou et al. (15) noticed that all adding treatment showed improvement in all qualities comparing with control treatment. In the same direction, other study (21) show that the supplemented of red grape pomace by 6% improved meat texture and thigh meat oxidative stability.

Table 4. The effect of adding different levels of raisins pomace powder with broiler diet on the relative weight of the edible giblets and spleen (mean ± standard error).

Treatment	Heart%	Spleen%	Liver%	Gizzard%
T1	0.431 b 0.031±	0.099 0.013±	2.320 0.178±	0.828 ±0.176
T2	0.470 ab 0.020±	0.125 0.023±	1.962 0.248±	0.866 ±0.010
T3	0.405 b ±0.044	0.118 ±0.002	1.918 ±0.056	0.759 ±0.059
T4	0.548 a ±0.037	0.083 ±0.014	2.059 ±0.154	0.962 ±0.043
Level of significant	*	N.S	N.S	N.S

- T1: Control treatment (without additives). T2, T3 and T4 Adding raisins pomace powder by 10, 20 and 30 g/ kg of feed respectively.

* Different letters within a single column mean that there are significant differences (P≤0.05) between treatments.

-N.S: Non Significant differences.

Due to the low concentrations of raisins pomace powder utilized in the study, no adverse effects on growth performance were seen on the relative weight of the inner guts. Previous research has shown that broiler chicks fed diets containing various concentrations of grape seed extract showed a decline in growth performance and feed intake. This result seem to finding Aditya et al. (2) did not show any effect on carcass traits were add to diet three levels of grape pomace (5 g grape pomace/kg diet, 7.5 g grape pomace/kg diet, 10 g grape pomace/kg diet). However, giving grape pomace waste powder as a supplement did not have a detrimental effect on growth in the current study, There were no dietary effects on the relative weight of the liver, gizzard and Spleen of broiler. The higher level in T4 show increase in relative heart weight, Abu Hafsa and Ibrahim (1) reported that phenolic compounds of

raisins pomace powder have a growth enhancing effect on broiler.

Conclusion

The use of raisins pomace powder at levels ranging from 10 to 30 g/kg as feed additives succeeded in reducing loss by cooking making meat more available for manufacture and good quality of eating of meat produced and increased the characteristics of the juiciness. While we did not notice an increase in the weights of inner guts other than the heart. Maybe needs more studies using another dose.

Conflict of interest

The authors declare no conflict of interest.

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