BIOCHEMICAL EVALUATION ON NEW METHODS TO PREPARE DIETS FOR BROILERS

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ABSTRACT

This study aimed to investigate the possibility of feeding broiler chicks on diets containing irradiated (0, 100 and 150 kGy) grape residue (GR) supplemented with or without enzyme mixture (Kemzyme) and studying their response on growth performance, some blood parameters and carcass characteristics. Two hundred and ten one-day old Arbor Acres chicks were distributed into 7 dietary treatments in 3 replicates of 10 birds each, after reared on starter diet for 2 weeks. Experimental diets were formulated using 15% of (GR) either irradiated or unirradiated with or without kemzyme in addition to the control. Chicks were fed the experimental diets from 2-7 week of age, body weight, weight gain, feed intake and feed conversion were determined. Blood parameters, electrophoretic profile muscle proteins and carcass characteristics were determined at the end of feeding period. The results showed that chicks fed on control diet had the highest body weight, weight gain and feed intake followed by chicks fed on diet containing irradiated (GR) at 100 kGy with kemzyme. The other applied level of dietary raw or irradiated (GR) had no significant effects on carcass traits and blood constituents.

Keywords: Grape residue, Irradiation, Enzyme Supplementation, Broilers, Growth Performance, Blood Constituents, Proteins, Electrophoretic Pattern, Carcass traits.

INTRODUCTION

Agro-industrial by-products can play an important role in animal nutrition in many countries. It can be used as supplement or even substitute for yellow corn or soybean meal in animal feeds. This by products are resulting from processing of fruits and vegetables. It consists mainly of skins, seeds, cakes, pulps and pomace.

Most of agro-industrial by-product are poor in nutrients such as protein and vitamins and they are rich in fiber with low digestibility Lima et al. (2000), therefore, there are many methods for improving the nutritive value of these by-products such as physical, chemical, physico-chemical and biological pre-treatments.

The average annual production of grape in Egypt, reached about 107,891.2 tons of grapes yield per year. The annual production of grape pomace was estimated to be 82877.9 tons. Egyptian Caning Company produces about 525 tons yearly Ministry of Agriculture (2002). Preston (2002) analyzed the stemless grape pomace and found that it contained 91% dry matter (DM); 12% crude protein (CP); 7.5% ether extract (EE), 32% crude fiber (CF) and 9.0% ash. These findings nearly the same with the results
obtained by Ibrahim (1994) and Abdel-Malak (1999). From the above, finding grape residue have potential to be a good protein source for animals, but may be limiting in energy owing to their fiber content. Gamma irradiation considered a physical process have been used to reduce the total fiber content as reported by Grlak et al. (1989); Al-Masl and Zarkawi (1994) and Villamide et al. (2004).

Enzyme supplementation to poultry diets received considerable attention over the past 10 years. These enzyme offer some creative possibilities for new feed formulations of non-conventional feed materials Makled (1993) and Clifford (1998).

Enzyme supplementation was found to decrease and improves the viscosity of intestinal contents, thus improves nutrient digestibility and absorption in broiler chicks fed diets containing roughages Patel et al. (1980) and Cheek et al. (1986). This work replace part of the broiler diet by grape residue either irradiated or unirradiated supplemented with or without enzyme mixture owing to produce unconventional diets for broilers with low cost and their effects on growth performance, blood constituents and carcass analysis of the chicks.

MATERIALS AND METHODS

1- Material preparation:

Grape residue (GR) was obtained from El-Ahram Henken for beverages (Ganakliise Company) at Ganakliise, El-Behera Governarate. The obtained material was in a wet condition with moisture content from 55-70%. The moisture content of GR was reduced by sun-drying to 9-10%. Then ground by hammer mill and kept for subsequent processing.

2- Irradiation treatment:

Dried (GR) was subjected to gamma radiation at 0, 100 and 150 kGy dose levels. The source of radiation was Co-60 gamma cell (at dose rate of 256.4 rad / Sec.) located at the National Center for Radiation Research and Technology at Nasr City.

3- Experimental diets:

Experimental diets were formulated to provide mixture containing 19-19.5% CP and 2900-3200 K cal /Kg metabolized energy (ME) as the broiler requirements NRC (1994). Six diets with 15% (GR) were prepared in addition to control diet as shown, 1) diet with raw (GR), 2) diet with raw (GR) and enzyme mixture, 3) diet with irradiated (GR) at 100 kGy, 4) diet with irradiated (GR) at 100 kGy and enzyme mixture, 5) diet with irradiated (GR) at 150 kGy, 6) diet with irradiated (GR) at 150 kGy and enzyme mixture. Enzyme mixture (Kemzyme) was added at the level recommended by producer company (1g/kg diet). Kemzyme was provided by KEMIN, EUROPA, N., M., Egyptian registration No. 4070.

4- Experimental birds:

Two hundred and ten one-day old Arbor Acres chicks obtained from Cairo Co. for poultry, 10th of Ramadan City, were kept in a battery brooders with screen floor placed in an electrically heated room. Chicks were fed on the starter diet for 2 weeks, then the chicks were weighed individually and
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**MATERIALS AND METHODS**

1- Material preparation:

Grape residue (GR) was obtained from El-Ahram Henken for beverages (Ganakilise Company) at Ganakilise, El-Behera Governorate. The obtained material was in a wet condition with moisture content from 65-70%. The moisture content of GR was reduced by sun-drying to 9-10%. Then ground by hammer mill and kept for subsequent processing.

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distributed (nearly similar weights) into seven dietary treatments in three replicates of 10 birds each. Chicks fed were on the experimental diets up to 7 weeks of age. Live body weight, weight gain and feed consumption were recorded weekly.

5- Blood biochemical parameters:
At the end of the experimental period, four birds / replicate were slaughtered and blood samples from each bird were collected then the clear serum was received and kept frozen at -20°C until analyzed. Serum were analyzed for total protein according to Doumas (1975), albumin according to Doumas and Biggs (1971), globulin was calculated by difference between total protein and albumin, total lipids according to Schmit (1964), cholesterol according to Allian et al. (1974), glucose according to Trinder (1969), glutamic oxaloacetic transaminase (GOT), glutamic pyruvic transaminase (GPT) according to Reitman and Frankel (1957), alkaline phosphatase according to Belfield and Goldberg (1971).

6- Slaughter test and meat analysis:
After blood samples were taken, the front part of breast and hind part (thigh) were deboned separately. The meat without skin of the breasts and thighs were dried at 60°C over night in an electric air oven. Representative samples were taken to determine moisture, crude protein (CP), ether extract (EE) and ash according to the methods of AOAC (1990).

7- Electrophoresis analysis:
Samples for electrophoretic quantification were taken from pectoralis major muscle of chicks breast (before drying) and minced, rapidly dried at 40°C in “SPT-200” high vacuum dried within 20 min., milled in “Maulinex” mill and defatted three times by cold acetone.

The defatted powder of the muscles were dissolved in the sample buffer. The method of Laemmli (1970) was used for the separation of protein bands, and estimation of their molecular weights using the following protein marker: carbonic anhydrase 29 kDa, egg albumin 45 kDa, bovin albumin 66 kDa, phosphorylase 97 kDa, B-galactosidase 116 kDa and myosin 205 kDa. The electrophoresis runs were accomplished using “Biomera” running chamber 11x12 cm under cooling condition. Scanning of the gels and densitometric analysis of the results were accomplished using “EPSON GT 8000” scanner using “Scan pack II” software of gel analysis.

8- Statistical analysis:
The statistical analysis was computed using analysis of variance procedure described by Steel and Torie (1960), the significant mean differences between treatment means were separated by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

1- Effect of experimental diets on growth performance:
Growth performance of broiler chicks as affected by (GR) either irradiated or unirradiated with or without enzyme supplementation are shown in Table (1). The highest body weight and body weight gain were found in chicks fed on the control diet as well as chicks fed on diet containing (GR)
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irradiated at 100 kGy and enzyme supplementation (T4) followed by those fed on diet containing (GR) irradiated at 150 kGy and enzyme supplementation (T6). The differences were non-significant (P ≤ 0.05). The same trend was observed for feed consumption. Significant differences (P ≤ 0.05) were detected among the groups in feed conversion ratio in irradiation treatment or enzyme supplementation. Our results are in agreement with the findings obtained by Mohamed (1999) who used (GR) at 7.5% of finisher diets, and the results of Friesen et al. (1992); Abou-El Wafa (1993) and Persia et al. (2003).

Table (1): Average live body weight, gain, feed consumption and feed conversion of chicks fed on the experimental diets.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average live body weight (g)</th>
<th>Body weight gain (g)</th>
<th>Feed consumption (g)</th>
<th>Feed conversion ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>1731 ± 143  a</td>
<td>1522 ± 78  b</td>
<td>3336 ± 141  b</td>
<td>2.19</td>
</tr>
<tr>
<td>T2</td>
<td>1789 ± 171  a</td>
<td>1592 ± 85  a</td>
<td>3379 ± 119  a</td>
<td>2.19</td>
</tr>
<tr>
<td>T3</td>
<td>1836 ± 122  a</td>
<td>1631 ± 73  a</td>
<td>3756 ± 153  a</td>
<td>2.29</td>
</tr>
<tr>
<td>T4</td>
<td>1927 ± 79  a</td>
<td>1724 ± 76  a</td>
<td>3772 ± 105  a</td>
<td>2.18</td>
</tr>
<tr>
<td>T5</td>
<td>1879 ± 117  a</td>
<td>1692 ± 90  a</td>
<td>3753 ± 113  a</td>
<td>2.25</td>
</tr>
<tr>
<td>T6</td>
<td>1918 ± 162  a</td>
<td>1707 ± 101  a</td>
<td>3746 ± 135  a</td>
<td>2.20</td>
</tr>
<tr>
<td>Control</td>
<td>1931 ± 155  a</td>
<td>1725 ± 96  a</td>
<td>3782 ± 163  a</td>
<td>2.14</td>
</tr>
</tbody>
</table>

L.S.D.(0.05) n.s. 245.000 n.s. 150.835 234.986

Each Column having the similar letter are not significantly different at (P ≤ 0.05); n.s.: nonsignificant values at P ≤ (0.05).

T1- raw GR; T2- row GR with enzyme mixture; T3- irradiated (100 kGy) GR; T4- irradiated (100 kGy) GR with enzyme mixture; T5- irradiated (150 kGy) GR and T6- irradiated (150 kGy) GR with enzyme mixture.

2- Effect of experimental diets on blood analysis:

Blood constituents have been used as an indicator for nutritional and physiological status of animals. Total protein, albumin, globulin, A/G ratio, total lipids, cholesterol, glucose, GOT, GPT and alkaline phosphatase are present in Table (2). Statistical analysis revealed no significant differences between chicks received experimental diets and group fed on control diet in total lipid, albumin, globulin and A/G ratio. All values were within normal range, (500-750) g/100ml for total lipids, (3.3-5.1) g/100ml for albumin and (1.85-3.69) g/100ml for globulin El-Ashry et al. (2001). There were significant differences (P ≤ 0.05) among the investigated groups in cholesterol and total protein. The values were within normal range (100-140) mg/100ml and (4.3-5.9) mg/100ml, respectively). Blood enzymes GOT, GPT and alkaline phosphatase considered as an indicator of liver function. Data presented in Table (2) showed the effect of (GR) irradiated or unirradiated and addition of enzyme or not on blood GOT, GPT and alkaline phosphatase at 7 weeks of age. Analysis of variance indicated that feeding chicks on experimental diets had no significant effect on those blood enzymes (GOT & GPT), showed (ALP) was significant differences (P ≤ 0.05) according to the diet.

Serum glucose was not affected by supplementation of irradiated or unirradiated (GR) or enzyme mixture on broiler diets. The glucose values ranged from 218.78 to 225.35 mg/100 ml serum.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Protein profile</th>
<th>Lipid pattern</th>
<th>Liver functions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total protein (g/100 ml)</td>
<td>Albumin (g/100 ml)</td>
<td>Globulin (g/100 ml)</td>
</tr>
<tr>
<td>T1</td>
<td>5.53 ± 0.12</td>
<td>2.65 ± 0.12</td>
<td>2.88 ± 0.21</td>
</tr>
<tr>
<td>T2</td>
<td>5.68 ± 0.16</td>
<td>2.66 ± 0.11</td>
<td>2.94 ± 0.12</td>
</tr>
<tr>
<td>T3</td>
<td>5.29 ± 0.17</td>
<td>2.57 ± 0.11</td>
<td>2.72 ± 0.13</td>
</tr>
<tr>
<td>T4</td>
<td>5.50 ± 0.23</td>
<td>2.62 ± 0.10</td>
<td>2.88 ± 0.29</td>
</tr>
<tr>
<td>T5</td>
<td>5.30 ± 0.24</td>
<td>2.53 ± 0.13</td>
<td>2.77 ± 0.19</td>
</tr>
<tr>
<td>T6</td>
<td>5.47 ± 0.18</td>
<td>2.59 ± 0.10</td>
<td>2.88 ± 0.25</td>
</tr>
<tr>
<td>Control</td>
<td>5.67 ± 0.11</td>
<td>2.68 ± 0.13</td>
<td>3.19 ± 0.25</td>
</tr>
<tr>
<td>L.S.D.(0.05)</td>
<td>0.313</td>
<td>n.s. 0.217</td>
<td>n.s. 0.375</td>
</tr>
</tbody>
</table>

Each Column having the similar letter are not significantly different at (P ≤ 0.05); n.s.: non-significant values at P ≤ (0.05). T1, raw GR; T2, raw GR with enzyme mixture; T3, Irradiated (100 kGy) GR; T4, irradiated (100 kGy) GR with enzyme mixture; T5, irradiated (150 kGy) GR and T6, irradiated (150 kGy) GR with enzyme mixture.
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The results are in agreement with the result of Ibrahim (1995) who reported that normal range of serum glucose in poultry is from 200.8 to 267.82 mg/100 ml serum. Ali (1999) and El-Deek et al. (1999) found no significant differences in blood contents of total protein, albumin and globulin as affected by addition of enzyme mixture to broiler diets. El-Sebai and Osman (1999) found that, the addition of enzyme mixture at different levels to diets containing 10% rice milling by-product had no significant differences on total lipids and cholesterol of broiler. Mekkawy et al. (1998) reported that broiler diets which containing grape marc or tea marc irradiated at 150 Kgy had no significant effect on serum constituents.

3- Effect of experimental diets on the chemical composition of the chicks meat:

Chemical composition of the meat of chicks received the experimental diets are present in Table (3). The analysis of variance of chemical composition of both breasts and thigh indicated significant differences (P ≤ 0.05) could be attributable to the experimental diets compared to the control diet in moisture content, protein, ash and fat contents. The data showed that breasts contained higher protein than the thigh, on the other hand fat content of thigh was higher than that of the breasts.

Results are agree with the results of Selim et al. (1974); Stino et al. (1981) and Vander Pol et al. (2005) who reported that, there were no significant different in chemical composition of debond carcass for chicks raised on diets containing different levels of industrial by-products.

4- Effect of experimental diets on the protein electrophoretic pattern of chicks major muscle:

The electrophoretic pattern of proteins of pectoralis major muscle of chicks fed on the control diet is shown in Table (4) and illustrated in Fig. (1). The identification of different proteins was based on previous studies of Porzio and Pearson (1977); Penny (1980) and Salem et al. (1983). The data revealed that the control chicks muscle contained 20 protein bands, with molecular weight (MW) range of 18 – 208 kDa. They have close percentages ratio (1 - 4.9%), except that of actin protein band (8.1%, 28 kDa) and the band number 20 (13.8%, 18 kDa). About 17 protein bands were identified as a specific protein names according to the previously mentioned reviews. Also, 3 proteins were characterized by their MW, and mentioned as un-identified (U. I.) as reported in Table (4).

The electrophoretic patterns of different dietary treatment were presented in Fig. (2 to 8) and tabulated in Table (4).
Table (3): The chemical composition of dried boneless meat from breast and leg parts at 7 weeks of age.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Moisture %</th>
<th>Dry matter %</th>
<th>Crude protein %</th>
<th>Ether extract %</th>
<th>Ash %</th>
<th>Moisture %</th>
<th>Dry matter %</th>
<th>Crude protein %</th>
<th>Ether extract %</th>
<th>Ash %</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>70.71 ± 0.76 a</td>
<td>29.29 ± 1.35 c</td>
<td>81.41 ± 0.10 c</td>
<td>11.70 ± 1.69 a</td>
<td>5.3 ± 0.09 a</td>
<td>72.64 ± 0.49 a</td>
<td>27.36 ± 0.70 a</td>
<td>0.69 ± 0.28 a</td>
<td>70.80 ± 1.60 b</td>
<td>19.30 ± 0.62 a</td>
</tr>
<tr>
<td>T2</td>
<td>70.95 ± 1.30 c</td>
<td>29.05 ± 1.30 c</td>
<td>81.77 ± 0.20 b</td>
<td>9.62 ± 1.80 a</td>
<td>5.2 ± 0.06 a</td>
<td>72.30 ± 0.90 b</td>
<td>27.70 ± 0.72 b</td>
<td>0.69 ± 0.16 a</td>
<td>71.02 ± 0.90 b</td>
<td>20.21 ± 0.70 a</td>
</tr>
<tr>
<td>T3</td>
<td>68.35 ± 1.40 b</td>
<td>31.65 ± 1.50 ab</td>
<td>82.07 ± 0.34 b</td>
<td>9.25 ± 0.77 b</td>
<td>5.5 ± 0.12 b</td>
<td>69.92 ± 0.55 b</td>
<td>30.08 ± 0.81 ab</td>
<td>0.52 b 0.32 b</td>
<td>70.98 ± 0.67 a</td>
<td>19.66 ± 0.72 a</td>
</tr>
<tr>
<td>T4</td>
<td>67.66 ± 1.60 ab</td>
<td>32.34 ± 1.20 bc</td>
<td>81.96 ± 0.10 b</td>
<td>8.96 ± 0.40 b</td>
<td>4.9 ± 0.22 a</td>
<td>70.91 ± 0.36 b</td>
<td>29.09 ± 1.20 ab</td>
<td>0.20 b 0.80 a</td>
<td>72.46 ± 1.70 ab</td>
<td>17.18 ± 0.80 a</td>
</tr>
<tr>
<td>T5</td>
<td>69.90 ± 2.00 ab</td>
<td>30.10 ± 0.32 a</td>
<td>81.99 ± 0.92 bc</td>
<td>7.99 ± 0.49 a</td>
<td>4.9 ± 0.04 a</td>
<td>72.38 ± 0.98 a</td>
<td>27.62 ± 2.00 ab</td>
<td>0.22 a 1.30 a</td>
<td>71.93 ± 2.00 ab</td>
<td>20.55 ± 1.30 a</td>
</tr>
<tr>
<td>T6</td>
<td>71.79 ± 1.23 b</td>
<td>28.21 ± 0.80 c</td>
<td>82.18 ± 0.27 b</td>
<td>7.21 ± 0.70 a</td>
<td>4.7 ± 0.09 a</td>
<td>72.59 ± 0.60 a</td>
<td>27.41 ± 2.00 ab</td>
<td>0.34 ac 1.70 ab</td>
<td>72.04 ± 2.40 a</td>
<td>17.81 ± 4.80 a</td>
</tr>
<tr>
<td>Control</td>
<td>67.47 ± 0.84 b</td>
<td>32.53 ± 0.75 b</td>
<td>83.38 ± 0.10 a</td>
<td>8.54 ± 0.30 bc</td>
<td>3.9 ± 0.42 b</td>
<td>69.51 ± 1.33 b</td>
<td>30.49 ± 2.20 a</td>
<td>0.16 a 0.70 a</td>
<td>73.39 ± 1.41 b</td>
<td>18.85 ± 4.5 a</td>
</tr>
</tbody>
</table>

L.S.D.(0.05) 2.205 2.211 1.904 1.80 1.403 1.864 0.441 2.121 2.242

Each Column having the similar letter are not significantly different at (P ≤ 0.05); n.s.: non-significant values at P ≥ 0.05.

T1, raw GR; T2, raw GR with enzyme mixture; T3, irradiated (100 kGy) GR; T4, irradiated (100 kGy) GR with enzyme mixture; T5, irradiated (150 kGy) GR and T6, irradiated (150 kGy) GR with enzyme mixture.
Table (4): Effect of dietary grape residue either irradiated or unirradiated with or without enzyme supplementation on pectoralis muscle constituents.

<table>
<thead>
<tr>
<th>Band No.</th>
<th>Protein subunit</th>
<th>Control</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Myosin heavy chain</td>
<td>208</td>
<td>3.0</td>
<td>242</td>
<td>2.4</td>
<td>220</td>
<td>4.7</td>
<td>207</td>
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<tr>
<td>2</td>
<td>C-protein</td>
<td>150</td>
<td>3.5</td>
<td>177</td>
<td>2.3</td>
<td>155</td>
<td>4.3</td>
<td>173</td>
</tr>
<tr>
<td>3</td>
<td>Mt. band</td>
<td>92</td>
<td>2.4</td>
<td>128</td>
<td>2.3</td>
<td>98</td>
<td>2.9</td>
<td>112</td>
</tr>
<tr>
<td>4</td>
<td>Iα band</td>
<td>74</td>
<td>2.3</td>
<td>98</td>
<td>1.8</td>
<td>82</td>
<td>2.3</td>
<td>85</td>
</tr>
<tr>
<td>5</td>
<td>Iβ band</td>
<td>70</td>
<td>2.2</td>
<td>84.76</td>
<td>1.7-1.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Serum Albumin</td>
<td>63</td>
<td>2.6</td>
<td>60</td>
<td>1.2</td>
<td>68</td>
<td>1.1</td>
<td>68</td>
</tr>
<tr>
<td>7</td>
<td>α-Actin</td>
<td>53</td>
<td>1.6</td>
<td>60</td>
<td>2.6</td>
<td>58</td>
<td>2.0</td>
<td>57</td>
</tr>
<tr>
<td>8</td>
<td>U.I.</td>
<td>49</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
<td>53</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Tropomyosin-1</td>
<td>43</td>
<td>2.2</td>
<td>48</td>
<td>3.3</td>
<td>46</td>
<td>2.7</td>
<td>46</td>
</tr>
<tr>
<td>10</td>
<td>Tropomyosin-2</td>
<td>40</td>
<td>2.3</td>
<td>40</td>
<td>7.07</td>
<td>39</td>
<td>4.8</td>
<td>-</td>
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<td>Tropomyosin-3</td>
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<td>3.3</td>
<td>-</td>
<td>-</td>
<td>38</td>
</tr>
<tr>
<td>12</td>
<td>U.I.</td>
<td>33</td>
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<td>-</td>
<td>35</td>
<td>1.6</td>
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<tr>
<td>14</td>
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<td>25</td>
<td>1.9</td>
<td>20</td>
<td>1.3</td>
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<tr>
<td>15</td>
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<td>1.9</td>
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<td>19</td>
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<td>15</td>
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U.I.: Un-identified; MW: Molecular weight.
T1, raw GR; T2, row GR with enzyme mixture; T3, irradiated (100 kGy) GR; T4, irradiated (100 kGy) GR with enzyme mixture; T5, irradiated (150 kGy) GR and T6, irradiated (150 kGy) GR with enzyme mixture.
Fig. (1): Polyacrylamide gel electrophoresis of chicken muscle proteins of different treatment.

- $T_0$: raw GR;
- $T_2$: raw GR with enzyme mixture;
- $T_3$: irradiated (100 kGy) GR;
- $T_4$: irradiated (100 kGy) with GR enzyme mixture;
- $T_5$: irradiated (150 kGy) GR and
- $T_6$: irradiated with (150 kGy) and enzyme mixture.

Fig. (2): Denstogram of protein subunits of pectoralis major muscle of chicks fed on control diet.
5- Chicks fed on diet of 15% raw GR ($T_1$):

Comparing the denstograms of this treatment (Fig. 3) with that of the control diet (Fig. 2), we obviously observed the following difference in different muscle proteins: myosin heavy chain (mHc, 208 kDa and 3.0%) have enlarged in its molecular weight (242 kDa) and reduced in percentage (2.4%). C-protein, $M_1$ band, $M_2$ band, $M_3$ band, serum albumin and $\alpha$-Actin followed the same behavior (condensation of the molecular weight and decreased of percentage). The degradation product (band No.8, Fig. 2) have completely disappeared (Fig. 3). Tropomyosin-1, Tropomyosin-2, Actin, myosin light chain-1 and Troponin-1 have increased in their percentages with slight differentiation in molecular weights. Band No.12 (unidentified) have completely disappeared and band No.20 (degradation product) have apparently decreased in percentage (from 13.8 to 10.3%).

6- Chicks fed on diet of 15% raw GR supplemented with kemzynme ($T_2$):

Fig (4) present the denstogram of chicken muscle feed on that diet, comparing it with Fig. (2) of the control diet, it seems that mHc, C-protein, $M_1$ band, $\alpha$-Actin, degradation product (U.I. band No.8, Fig. 2), Tropomyosin-1, Tropomyosin-2, mLc-1 and Troponin-c have increased in their percentages with slight change in molecular weight. $M_2$ band (74 kDa) have only increased in its molecular weight (82 kDa) but still the same in percentage (2.3%). Serum albumin, band No.12 (U.I.), actin, Troponin-T$_1$, Troponin-T$_2$, Troponin-1, mLc-2 and band No.20 (degradation product) have decreased in their percentages with slight alteration in molecular weight. $M_3$ band (band No.5) and Tropomyosin-3 have completely disappeared.

![Denstogram of protein subunits of pectoralis major muscle of 15% (GR).](image)

![Denstogram of protein subunits of pectoralis major muscle of 15% (GR) supplemented with](image)

7- Chicks fed on diet of 15% irradiated GR at 100 kGy ($T_3$):

Fig (5) presents the denstogram of chick's muscle fed on that diet. Comparing it with Fig. (2) of the control diet, it could be seen that myosin heavy chain, $M_3$ band $\alpha$-Actin, Tropomyosin-1, Tropomyosin-3, Troponin-T$_1$, Troponin-T$_2$ (with its two isoforms 1.2% + 2.4%) and Troponin-1 have increased in their percentages with slight alteration in molecular weights.
whereas serum albumin, actin, mLc-1, mLc-2 and band No.20 (degradation product) have decreased in their percentages with slight alteration in molecular weights, M₃ band, No.8 (U.I.). Tropomyosin-2 and Troponin-c were completely disappeared. C-protein and band No. 12 (U.I.) were still unchanged.

![Figure 5: Denstogram of protein subunits of pectoralis major muscle of 15% irradiated](image)

![Figure 6: Denstogram of protein subunits of pectoralis major muscle of 15% irradiated (GR) at 100kGy](image)

8- Chicks fed on diet of 15% irradiated GR at 100 kGy and kemzyme addition (T₄):

Fig. (6) presents the denstogram of chick's muscle fed on that diet. Comparing this denstogram with that of the control diet, we clearly find that mHc, M3 band, band No.8 (U.I.), Tropomyosin-1, Tropomyosin-3, band No. 12 (U.I.), Actin, Tropomin-T₂ and Troponin-1 were increased in their molecular weights with slight change in their molecular weights, whereas C-protein, M₁ band, M₂ band, Troponin-T₁, Troponin-c, Myosin light chain-2 and band No. 20 (U.I.) have decreased in their percentages with little alteration in their molecular weights. Serum albumin, Tropomyosin-2 and mLc-1 were completely disappeared.

9- Chicks fed on diet of 15% irradiated GR at 150 kGy (T₃):

Fig. (7) presents the denstogram of chick's muscle raised on that diet. Comparison between this denstogram and that of the control diet have resulted in the increase of mHc, C-protein, M₁ band, M₂ band, α- Actin, band No. 8 (U.I.), Tropomyosin-3, Troponin-T₂ (the two isoforms 1.1% + 1.0%), mLc-1 and mLc-2 in their percentages with little alteration in their molecular weights. Adverse effects have taken places with respect to serum albumin, Tropomyosin-1, band No. 12 (U.I.). Actin (with its two isoforms (6.4 and 0.9%), Troponin-T₂ (with two isoforms 1.0 and 1.5) and band No.20 (U.I.) on decrease in their percentages with little alteration in molecular weights. Troponin-1 still the same as in control diet, whereas M₃ band, Tropomusin-2 and Troponin-c have completely disappeared.
10- Chicks fed on diet of 15% irradiated GR at 150 kGy and kemzyme addition (T9):

Fig. (8) presents the denstogram of muscle proteins of chicks raised on that diet. By comparing this denstogram with that of the control diet, it seems that mHc, C-protein, band No.8 (U.I.), Tropomyosin-1, Tropomyosin-3, Troponin-T, (with its two isoforms 1.9% + 0.8%) and Troponin-1 have increased in their percentages with little alteration in their molecular weights, whereas M, band, M2 band, serum albumin, band No.12 (U.I.), Actin, Troponin-T2, mLc-1, Troponin-c, mLc-2 and band No.20 (U.I.) have decreased in their percentages with minor differentiation in molecular weights. α- Actin did not differ in its percentage (1.61%) but slightly increased in molecular weight (58 kDa instead of 53 kDa). M, band and Tropomyosin-2 have completely disappeared upon feeding the chicks on this diet.

It could be concluded that, inclusion of grape residue in raw state or irradiated at 100, 150 kGy in broiler diets with or without enzyme supplementation (kenzyme) have no pronounce alteration or adverse effects on the biochemical parameters, slaughter test, meat analysis and muscle protein pattern of pectoralis major muscle of chicks. Grap residue can be used as supplement material in the diet of chickens with no adverse effect but it is an economic source for the diet.

Fig. (7): Denstogram of protein subunits of pectoralis major muscle of 15% irradiated (GR) at 150kGy

Fig. (8): Denstogram of protein subunits of pectoralis major muscle of 15% irradiated (GR) at 150kGy

REFERENCES


Ebtesam, A. Mahmoud et al.


دراسات كيميائية حيوية على طرق جيدة في إعداد علاقي كتانة كتانات التسمين

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3- قسم الإنتاج الحيويي (تقنية دواجن) – زراعة القاهرة.

يهدف هذا البحث إلى إمكانية تغذية كتانات التسمين علي علاقي تحتوي علي 15% من مخلوط من خليطات عنب (GR) مع عناصر التغذية المختارة (صغر ضخمة، درجة جيدة، وبدين). إنها مكونات الدم وخصائص الزيادة. استخدم في التجربة 20 كتانة عمر بحثي ضمت إلى 7 مجموعات حسب تركيب علاقي قبل البدء. تم ذلك باستخدام العلاقيات من 10 طيور. تم معالجة 각 كتانة على العلاقيات البائية لمدة أسبوعين. استخدم في إعداد العلاقيات المختارة 10% من الزيادة في قدرة الأذينات. استخدم في الدراسة 27 أسابيع. في نهاية فترة التجربة تم تقدير كل من وزن الجسم وحجم الزيادة في وزن الجسم - معدل استهلاك الأذينات - معدل التحليل الغذائي - محصول الدم - نمو الأذينات. كل هذه الخصائص الزيادة - مكونات الدم وخبرات الظروف المعدلة. أن أظهرت النتائج ارتفاع كل من وزن الجسم وحجم الدم المكتسب. وعدد تشمل الأذينات 100 كيلوغرام. وعندما أختمية قبائل الإذينات التفاحية. كذلك، نظرت بابل النتائج أن الأذينات تستخدم معينة في بابل المعاملات مقارنة بالككندول لخصائص الزيادة - مكونات الدم وخبرات البروتينات.