EFFECT ORANGE ALBEDO AS A NEW SOURCE OF DIETARY FIBER ON CHARACTERISTICS OF BEEF BURGER

by
Mervat E. Eldemery

Home Economic Department, Faculty of Specific Education. Kafrelsheikh Unive.

THE 5TH ARAB AND 2ND INTERNATIONAL ANNUAL SCIENTIFIC CONFERENCE ON:

RECENT TRENDS OF DEVELOPING INSTITUTIONAL AND ACADEMIC PERFORMANCE IN HIGHER SPECIFIC EDUCATION INSTITUTIONS IN EGYPT AND ARAB WORLD

Faculty of Specific Education
Mansoura University - Egypt
April, 14-15, 2010

2010
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Mervat E. Eldemery*

Abstract

Consumers are increasingly aware of diet related health problems and therefore demanding natural ingredients which are expected to be safe and health promoting. By products of citrus processing industries represent a serious problem, but they are also promising sources of materials which may be used in food industry because of their valuable technological and nutritional properties. Three types of citrus by products, of orange albedo (raw albedo (RA), cooked albedo (CA )and (RA +CA) cooked albedo) and four concentrations of them (0% (control ), 5%, 10% and 15%) were added to beef burger mix with (20% fat) . The prepared burgers were evaluated for quality attributes including: Chemical composition, cooking characteristics (fat and moisture retention and cooked yield), physical tests (included shrinkage measuring, feeder number and cooking loss) and sensory analysis.

The addition of albedo to beef burgers represents on improvement in their nutritional properties. Results indicated that the highest protein content (16.61%) was observed with 5% of RA + CA, in this respect ash and fiber were also recorded high values. Energy value decreased with increasing albedo concentration and ranged between 233.56 to 273.21K.cal. The cooking properties were improved with some of added materials when compareing with control treatment. In this regard, adding 15% albedo of all types was decreased shrinkage by 35.53% than that of control, also the differences in fat retention noticed between all type albedo.

The sensory and textural taste properties and over all acceptability were improved by using 5% of all types. On the other hand, burgers with adding albedo (at any type and concentration) were less hard than that of the control treatment, while juiciness perception as decreased with adding raw albedo than other types and control.

Key words: Citrus by products; Beef burger; Quality characteristics; Orange albedo.

* Home Economic Department, Faculty of Specific Education. Kafrelsheikh Unive.

Faculty of Specific Education 2407 Mansoura University - Egypt April, 8-9, 2009
1. Introduction

Modern consumers are increasingly interested in their personal health, and expect the foods they eat to be-by-beyond tasty and attractive-also safe and healthy. As interest in the link between diet and health gathers place, many consumers seek ways to feel well and stay healthy by eating nutritionally designed foods. One of the food ingredients greatly used when developing nutritionally designed foods that promote health is the dietary fiber (Puupponen-pimi et al., 2002). Many efforts have been made to improve the quality and stability of burgers because consumer demand for fast food has been increasing rapidly in the recent years. Most of the products used in fast food are rich in fats and sugars, but deficient in complex carbohydrates (Papadina & Bloukas, 1999). Epidemiological research has demonstrated a relationship between this type of diet and the emergence of a chronic diseases, including colon cancer, obesity, cardiovascular diseases and several others disorders (Beecher, 1999; Best, 1991; Kaeferstein & Chugston, 1995). The presence of fiber in foods produces a diminution in their caloric content. For these reasons, it is interesting to increase the consumption of all foods that can supply fiber to daily food intake. Fiber incorporation in frequently consumed foods (meat, dairy and bakery products) could help to overcome the fiber deficit. It is one of the most communicational ingredients in food products and has been used is fat replacer, fat reducing agent during frying, volume enhancer, binder, bulking agent and stabilizer (Ang & Miller, 1991). Albedo is a white, spongy and cellulosic tissue which is the principal component of citrus peel. Moreover, Albedo has a better quality than other sources of dietary fibers due to the presence of associated bioactive compounds (Flavonoids and V.C) with antioxidant properties, which may exert higher health promoting effects than the dietary fiber itself (Marin et al., 2002; Schiber et al. 2001 and Temple, 2000).

Some dietary fiber ingredients could be desirable for their nutritional properties but also for their functional and technological properties (Thebaudin, et al., 1997).
Fiber is suitable for meat products and it has previously been used in cooked meat products to increase the cooking yield due to its water and fat-binding properties and to improve texture (Cofrades et al., 2000).

Some meat products, such as sausages, hamburgers and in general, those based on ground meat mixed with fat. In such products a decrease in fat content can have marked effects on caloric intake and cholesterol content (Hoelscher et al., 1987). Although the production and sales of low-fat foods have increased, there are many problems concerning the acceptance of those products (Sandrou and Arvanitoyannis, 2000), when the fat levels are lowered the products become firmer, more rubbery, less juicy, darker in colour and less acceptable (Kecton, 1994).

Manufacture have introduced several modifications in an attempt to offset the detrimental effects of reducing the fat level. These modifications include the selection of meat ingredients that can help convey desirable texture and enhance water holding capacity (Garcia et al., 2002).

Increased concerns about the potential health risk associated with the consumption of high-fat foods have led the food industry to develop new formulations or modify traditional products to make them healthier (Garcia et al., 2002).

Reduction of fat in meat products presents a number of difficulties have introduced several modifications in an attempt to offset the detrimental effects of reducing the fat level. These modifications include the selection of meat ingredients either to very the composition of the final product or to introduce certain functional characteristics and finally, the use of non-meat ingredients that can help convey desirable texture and, mainly, enhance water-holding ability. In this regard, carbohydrates and fiber have been successful in improving cooking yield, reducing formulation cost and enhancing texture (Akoh, 1998; Lyengar & Grows, 1991; Jimenez-Colmenero, 1996; Keeton, 1994; Mendoza et al., 1998a, 1998b).

The objective of this work to study the effect of the addition of orange albedo as source rich on dietary fiber on the chemical, physical and sensory characteristics of beef burgers.

2. Materials and preparation of beef burgers:

2.1. Orange albedo preparation :

Albedo was obtained directly from commercial oranges (Citrus sinensis) was obtained from fruit market at Kafr El-Sheikh city, Egypt. Three types of
albedo were used in this work: raw albedo (RA): obtained directly from orange; cooked albedo (CA): prepared by raw albedo immerse in water bath at 100°C for 5 min, then cooled to room temperature. Third type mix from RA + CA. The aim of the cooking step was to remove undesirable compounds associated with albedo (essentials oils) and decrease microbial load. Both materials were packed in vacuum pouches made of laminated polyethylene and immediately frozen at -30°C. When required, pouches were placed at 4°C during 24 h for thawing until used (according to methods of (Fernandez et al., 2004).

2.2. Burger preparation:

Three independent replicates of each batch were prepared in Home Economic Department, Faculty of Specific education Kafrelsheikh Univ. A Simple traditional formulation was used to obtain a base batter as follows (percentages of non-meat ingredients are related to meat): 80% minced beef meat, 20% minced beef back fat, 18% (w/w) water (ice), 1.5% (w/w) sodium chloride, 0.2 % white pepper.

All ingredients were mixed very well and then mixture was divided into three batches to which orange albedo (raw albedo, cooked albedo and raw + cooked albedo) was added at four levels (control %, 5%, 10%, 15%). Each treatment mixed separately for 5 min at medium speed, using a Moulinette machine (Model 320, cod 25, France) to obtain homogeneous mixture. This mixture was shaped using a commercial burger maker (9 cm internal diameter) to obtain patties of approximately 70 g and 1 cm thickness. Plastic packaging film was used to help maintaining the shape of the patties prior to freezing at -30°C in a commercial plate freezer and stored at -18°C for up to 4 months. Before using, samples were thawed over night at 4°C. Chemical analysis were made immediately after defrosting and the rest of tests were made on samples after cooking, which made at 220°C in electric oven. The method used for preparing beef burger was carried out according to (Alson et al., 2005).

2.3. Sensory evaluation:

Burgers were assessed for a number of sensory characteristics by ten members of the Department's staff, selected on the basis of interest and experience in sensory for evaluation and availability. Panelists were instructed to evaluate colour, texture, taste, flavour, odour, hardness, juiciness and overall acceptability using 10 point scale for grading the quality of samples (Crehan et al., 2000).
2.4. Chemical analysis:

Moisture, ash, protein, fat and fiber content were determined according to AOAC (1995). Moisture (g water/100 g sample) was determined by drying 3 g sample at 100°C to constant weight. Ashing was performed at 500°C for 5hrs (g ash/100 g sample). Protein (g protein/100 g sample) was analyzed using kjeldahl method, factor of 6.25 was used for conversion of nitrogen to crude protein. Fat (g fat/100 g sample) was calculated by weight loss after 6-cycle extractions with petroleum ether in sohxlet apparatus. Crude fiber was as (g crudefiber/100 g sample) was determined, carbohydrate contents were estimated by difference.

2.5. Caloric value determination:

Total coloric values (Kcal) were calculated using method of Watt and Mersil (1975), where 4.27 Kcal for gm protein and 9.02 Kcal for gm lipid and 4.10 Kcal for gm carbohydrate.

2.6. Cooking characteristics:

Brugers after cooking were cooled to 21°C for 1 h and blotted before weighing. Samples were weighted before and after cooking. To estimate the amount of fat and moisture retained in the samples, the following calculations were performed according to (Aleson et al., 2005).

\[
\text{% Fat retention} = \frac{100 \times [\text{cooked weight (g)} \times \% \text{fat in cooked samples}]}{\text{[raw weight (g) \times \% fat in raw samples]}}
\]

\[
\text{% Moisture retention} = \frac{100 \times [\text{cooked weight (g)} \times \% \text{moisture in cooked samples}]}{\text{[raw weight (g) \times \% moisture in raw samples]}}
\]

\[
\text{% Cooking yield} = \frac{100 \times [\text{cooked weight (g)}]}{\text{raw weight (g)}}
\]

2.7. Physical properties:

Shrinkage measuring:

Samples areas were measured before and after cooking (A_1, A_2) respectively, and shrinkage was calculated according to the method of El-Akary (1986) as follows:

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\[ \text{% Shrinkage} = \frac{A_1 - A_2}{A_1} \times 100 \]

2.8. Feeder number:

Feder number which is used for assessing one of the physical attributes in meat was determined in burger by the procedure described by Person (1976), using the following equation:

\[ \text{Feeder number} = \frac{\% \text{ water}}{\% \text{ organic non fat content}} \]

Where: \( \% \text{ organic non fat} = 100 - (\% \text{ fat} + \% \text{ ash} + \% \text{ moisture}) \)

2.9. Cooking loss:

Cooking loss values were determined by calculated the weight difference of three burgers before and after cooking using following equation (Crehan et al., 2000).

\[ \% \text{ Cooking loss} = \frac{\text{Weight before cooking} - \text{Weight after cooking}}{(\text{Weight before cooking})} \times 100 \]

2.10. Statistical analysis:

Data of sensory quality and chemical analysis were subjected to analysis of variance followed by Duncan's multiple range tests according to Stele and Torrie (1980).

Results and Discussion

1. Proximate chemical composition of orange albedo:

Table (1) show the gross chemical compositions of two types of orange albedo. The results indicated that, raw albedo high content fiber and ash and low content in carbohydrate and energy than cooked albedo. There no significant differences between two types albedo in content of ash, fat and protein, while, moisture content in cooked albedo was higher than raw albedo. These results in agreement with results of Fernandez-Gines et al., (2004), who reported that the most important difference between cooked and raw albedo was the increase (P<0.05) in moisture content.
Table (1): Proximate chemical composition of orange albedo (g/100 g wet basis)

<table>
<thead>
<tr>
<th>Contents</th>
<th>Raw albedo</th>
<th>Cooked albedo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>63.30 b</td>
<td>67.60a</td>
</tr>
<tr>
<td>Total fiber</td>
<td>26.52a</td>
<td>22.83b</td>
</tr>
<tr>
<td>Ash</td>
<td>3.22a</td>
<td>3.00a</td>
</tr>
<tr>
<td>Fat</td>
<td>1.52a</td>
<td>1.90a</td>
</tr>
<tr>
<td>Protein</td>
<td>1.42a</td>
<td>1.25a</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>5.02</td>
<td>6.12</td>
</tr>
<tr>
<td>Energy kcal/100 g</td>
<td>39.44</td>
<td>40.28</td>
</tr>
</tbody>
</table>

All values are average of three determination.

2. Chemical composition of burgers formulas:

The chemical composition of burgers are presented in Table (2). The difference in the composition of the different treatments is attributed only to the amount and type of albedo added because the initial mixture for treatments was the same. Moisture content was affected (P<0.05) by all treatments. In case of samples which contained 15% albedo (RA, CA and RA+ CA), moisture content was increased, but the increase was higher at raw albedo than cooked albedo and control. The increase moisture content could be due to water released from the meat matrix during the cooking process being retained by albedo, which has a high water holding capacity, due to their soluble components, mainly pectin (Meseguer, 2002). The presence of albedo (For any type and concentration) decreased protein content (P<0.05) than control, however, all treatments with 5% albedo were high protein content than that of 10%, 15% albedo. On the other hand, the highest protein content (16.61%) was recorded for (5% RA + CA) followed by RA 5% (16.34%) with no significant differences between them. The highest protein content may be due to the decrease of moisture content. The presence of albedo cause to a decrease (P<0.05) in fat content, this decrease was higher in burgers with 15% (RA + CA) than control. Ash and fiber contents were increased (P<0.05) depending on the albedo concentration, but no differences (P>0.05) were found between burgers which contained 5% RA, 5% CA and 5% RA + CA. Also 10% and 15% of all albedo types highest ash and fiber contents were observed especially with 15% (RA + CA). However, ash content slightly increased by the addition of different types of albedo, this may be due to albedo which contains considerable ash percent.
Table (2): Chemical composition of burgers formulas prepared with three types and different concentrations of albedo (%).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Moisture</th>
<th>Protein</th>
<th>Fat</th>
<th>Ash</th>
<th>Fiber</th>
<th>Total carbohydrates</th>
<th>Energy Kcal/100g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>54.15g</td>
<td>17.22a</td>
<td>19.86a</td>
<td>1.09i</td>
<td>1.27j</td>
<td>6.42</td>
<td>273.21</td>
</tr>
<tr>
<td>RA 5%</td>
<td>54.85e</td>
<td>16.34d</td>
<td>19.11c</td>
<td>1.85g</td>
<td>2.83i</td>
<td>4.92</td>
<td>257.03</td>
</tr>
<tr>
<td>RA 10%</td>
<td>56.04b</td>
<td>15.22f</td>
<td>18.85d</td>
<td>2.65e</td>
<td>3.75f</td>
<td>3.72</td>
<td>243.29</td>
</tr>
<tr>
<td>RA 15%</td>
<td>56.86a</td>
<td>14.75b</td>
<td>18.12d</td>
<td>3.08c</td>
<td>4.32c</td>
<td>2.87</td>
<td>233.56</td>
</tr>
<tr>
<td>CA 5%</td>
<td>53.16 i</td>
<td>15.53c</td>
<td>19.08c</td>
<td>1.89h</td>
<td>3.05g</td>
<td>6.27</td>
<td>262.96</td>
</tr>
<tr>
<td>CA 10%</td>
<td>54.32f</td>
<td>15.89e</td>
<td>18.69e</td>
<td>2.85d</td>
<td>3.93d</td>
<td>4.31</td>
<td>249.01</td>
</tr>
<tr>
<td>CA 15%</td>
<td>55.13d</td>
<td>14.99g</td>
<td>18.11h</td>
<td>3.21b</td>
<td>4.85a</td>
<td>3.64</td>
<td>237.01</td>
</tr>
<tr>
<td>RA+CA 5%</td>
<td>53.69 h</td>
<td>16.61b</td>
<td>19.34b</td>
<td>2.05f</td>
<td>2.92h</td>
<td>5.36</td>
<td>262.07</td>
</tr>
<tr>
<td>RA+CA 10%</td>
<td>54.89 e</td>
<td>15.89e</td>
<td>18.70e</td>
<td>2.89d</td>
<td>3.83e</td>
<td>3.83</td>
<td>247.51</td>
</tr>
<tr>
<td>RA+CA 15%</td>
<td>55.45 c</td>
<td>15.24f</td>
<td>18.30f</td>
<td>3.42a</td>
<td>4.3ab</td>
<td>3.19</td>
<td>238.46</td>
</tr>
</tbody>
</table>

Where: Mean values with the same letter are not significantly different (P<0.05)
RA: raw albedo  CA: cooked albedo
All values are average of three determinations

The high level of fiber in tested burgers can be useful in decreasing cholesterol level in human (Lairon, 2001; Marlett, 2001), they demonstrated that the reduction in the levels of cholesterol and lipid by dietary fibers can be a consequence of alternations in dietary intake, reduced cholesterol biosynthesis and reduce absorption of lipid.

From the results in the same table, it could be noticed that, total carbohydrate content was higher in control and treatment which contained 5% cooked albedo than other treatments. The observed variations in the other contents are the results of the higher or lower degree of water loss during cooking (Garcia et al., 2002). As shown in table (2).

Caloric values of the treatments beef burgers varied widely, between control treatment and other treatments which contained 15% albedo. Energy value ranged between (233.56 to 273.21), the highest caloric values was mainly due to their high content of fat, protein and carbohydrates. Data also indicate that energy values of the tested beef burgers were decreased with increasing albedo concentration.

Energy reduction were 14.52%, 13.25% and 12.72% respectively according to types and concentration of albedo RA 15%, CA 15% and RA + CA 15%, the differences could be attributed to different types of added albedo (raw albedo, cooked albedo and the raw albedo + cooked albedo), in spit of Mansour and Khalil (1997) reported that 33% and 41% reduction in energy
value of cooked and uncooked beef burgers was occurred respectively with addition of wheat fiber.

3. Cooking qualities of beef burgers with adding different types of orange albedo:

Table (3) shows results which are representative of all amounts and concentration of albedo studied. Cooking yields of the burgers with any types of added albedo were higher than control treatment, the highest cooking yields were obtained from burgers with (15% CA and 15% CA + RA), followed by 15% RA, respectively. It is obvious that the yield values are rotated to fat and water retention, this results agreements with (Aleson, et al. 2004). On the other hand, Rocha-Garza and Zayas (1996) reported that, in meat products, quality attributes such as texture, structural binding and yield are determined by the ability of the protein matrix to retain water and bind fat in this regard, carbohydrates and fiber have been successful in improving cooking yield, reducing formulas cost and enhancing texture (Akoh, 1998; Lyenger & Grows, 1991). The differences in fat retention noticed between burgers with added RA, CA and RA + CA are responsible for the same differences showed in cooking yield, but the highest value recorded with treatment which contained 10% CA. There are no differences in water retention between the 3 types of treatments which added 15% orange albedo. Albedo has a good potential for fat and moisture retention, the improvement in cooking performance due to albedo addition appears to be related with their fat and water holding capacity (Aleson, et al. 2004). Some authors have reported that the increase in fat and/or water in meat products results in a lighter products (Perez-Alvarez & Fernandez-Lopez, 2000). Results also indicated that fat and water retentions were increased as fat content decreased. These results coincided with the results of Berry (1992) who reported that, fat retention decreased with increasing the amounts of fat in the product. Fat retention of beef burger increased as level of albedo increased with different types.

Generally, addition of different types of albedo at 5%, 10% and 15% led to increment in fat and water retentions when compared with control. In this relation, Lario et al., (2004) reported that, albedo has a good potential for fat and moisture retention.
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Table (3): Cooking characteristics and physical properties of beef burgers with different types of orange albedo.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Cooking yield (%)</th>
<th>Fat-retention (%)</th>
<th>Water-retention (%)</th>
<th>Shrinkage (%)</th>
<th>Feder number</th>
<th>Cooking loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>48.30</td>
<td>47.94</td>
<td>41.15</td>
<td>27.33</td>
<td>2.17</td>
<td>16.41</td>
</tr>
<tr>
<td>RA 5%</td>
<td>52.00</td>
<td>49.69</td>
<td>44.50</td>
<td>22.22</td>
<td>2.28</td>
<td>18.00</td>
</tr>
<tr>
<td>RA 10%</td>
<td>54.29</td>
<td>51.16</td>
<td>46.12</td>
<td>19.67</td>
<td>2.49</td>
<td>15.71</td>
</tr>
<tr>
<td>RA 15%</td>
<td>57.70</td>
<td>52.56</td>
<td>49.30</td>
<td>16.44</td>
<td>2.65</td>
<td>12.30</td>
</tr>
<tr>
<td>CA 5%</td>
<td>56.82</td>
<td>45.69</td>
<td>47.35</td>
<td>25.00</td>
<td>2.66</td>
<td>13.17</td>
</tr>
<tr>
<td>CA 10%</td>
<td>58.40</td>
<td>54.57</td>
<td>48.93</td>
<td>23.56</td>
<td>2.24</td>
<td>11.60</td>
</tr>
<tr>
<td>CA 15%</td>
<td>59.60</td>
<td>53.97</td>
<td>49.73</td>
<td>18.98</td>
<td>2.35</td>
<td>10.40</td>
</tr>
<tr>
<td>RA+CA 5%</td>
<td>53.39</td>
<td>51.65</td>
<td>44.85</td>
<td>23.36</td>
<td>2.16</td>
<td>16.61</td>
</tr>
<tr>
<td>RA+CA 10%</td>
<td>58.00</td>
<td>54.17</td>
<td>84.46</td>
<td>21.60</td>
<td>2.34</td>
<td>12.00</td>
</tr>
<tr>
<td>RA+CA 15%</td>
<td>59.20</td>
<td>54.27</td>
<td>49.18</td>
<td>17.44</td>
<td>2.14</td>
<td>10.80</td>
</tr>
</tbody>
</table>

All values are average of three determination.

As for shrinkage percentage, data presented in the same table (3) also show that adding 15% orange albedo for all treatments reduced shrinkage than those of 5%, 10% and control, respectively. The results is in agreement with those of Bessar (2008), who reported that, the reduction was increased with increasing the rate of addition of orange and apple peels and are in line with those reported by Ali (1995) and Metwalli (2005), they found that shrinkage was decreased with adding soy bean hull fibers.

On the other hand, the results in the same table, indicated that the feeder number which used for assessing one of the physical meat products was recorded high values with treatments which contained 15% and 10% raw albedo followed by 15% cooked albedo, it was lower for control treatments. These it decreases attributed to the lower water and fat retention content. Feeder value for all treatments were less than 4.0, this results certainly all treatments are good quality according to Pearson (1991), who reported that, good quality meat products showed have feeder values less than 4.0.

Cooking loss of beef burgers which prepared with 10% and 15% orange albedo of all types were lower than that of control treatment. This may be due to the addition of orange albedo which is able to bind water and fat, consequently improved the cooking loss (Nauss and Nagyvary, 1983 and Rinaudo, 2006). Also, cooking loss in beef burgers the amount of water bonded with these albedo. Similar results were obtained by Ahmed et al.,
who reported that reducing the fat content of the frank further caused a significant increase in cooking loss.

4. Sensory evaluation of cooked beef burgers with different types of orange albedo:

Results from sensory evaluation are presented in Table (4) colour and odor were affected (P<0.05) by albedo addition (type or concentration). The highest score recorded with treatment which contained 15% cooked albedo, in spite of all treatments were higher than control. Colour and odor were increased with increasing orange albedo.

Table (4): Sensory evaluation of burger samples formulated with different types and concentration of orange albedo.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Colour</th>
<th>Odour</th>
<th>Texture</th>
<th>Juiciness</th>
<th>Taste</th>
<th>Hardness</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>5.66 e</td>
<td>5.33b</td>
<td>5.66b</td>
<td>6.83ab</td>
<td>6.33 b</td>
<td>7.90d</td>
<td>6.50ab</td>
</tr>
<tr>
<td>RA 5%</td>
<td>7.16bc</td>
<td>7.36a</td>
<td>6.33ab</td>
<td>6.00ab</td>
<td>8.00a</td>
<td>6.79ab</td>
<td>7.30ab</td>
</tr>
<tr>
<td>RA 10%</td>
<td>7.66ab</td>
<td>7.66a</td>
<td>6.16ab</td>
<td>5.00bc</td>
<td>7.00ab</td>
<td>7.15a</td>
<td>6.83ab</td>
</tr>
<tr>
<td>RA 15%</td>
<td>7.16bc</td>
<td>8.83a</td>
<td>5.50b</td>
<td>4.83bc</td>
<td>6.66 b</td>
<td>7.32a</td>
<td>6.00b</td>
</tr>
<tr>
<td>CA 5%</td>
<td>6.56b</td>
<td>6.83ab</td>
<td>7.33a</td>
<td>6.33ab</td>
<td>8.66a</td>
<td>6.33ab</td>
<td>7.66a</td>
</tr>
<tr>
<td>CA 10%</td>
<td>7.83ab</td>
<td>7.33a</td>
<td>6.50ab</td>
<td>6.50ab</td>
<td>7.50ab</td>
<td>7.60ab</td>
<td>7.00ab</td>
</tr>
<tr>
<td>CA 15%</td>
<td>8.16 a</td>
<td>8.33a</td>
<td>5.66b</td>
<td>5.00bc</td>
<td>6.00b</td>
<td>7.00a</td>
<td>5.50b</td>
</tr>
<tr>
<td>RA+CA 5%</td>
<td>6.66b</td>
<td>6.50b</td>
<td>6.56ab</td>
<td>6.16ab</td>
<td>7.83ab</td>
<td>6.33b</td>
<td>6.33ab</td>
</tr>
<tr>
<td>RA+CA 10%</td>
<td>7.33b</td>
<td>6.83ab</td>
<td>6.16ab</td>
<td>5.83cd</td>
<td>6.50b</td>
<td>6.65ab</td>
<td>6.00b</td>
</tr>
<tr>
<td>RA+CA 15%</td>
<td>7.66ab</td>
<td>7.50a</td>
<td>5.50b</td>
<td>4.60d</td>
<td>5.50c</td>
<td>7.11a</td>
<td>5.50b</td>
</tr>
</tbody>
</table>

Where: Mean values with the same letter are not significantly different (P<0.05)
RA: raw albedo  CA: cooked albedo
All values are average of three determinations

The results in the same table show that the sensory and textural taste properties and overall acceptability were improved with using 5% for all types. In contrary, albedo increment of all types up to 10% led to deterioration by reducing product sensory properties like hard texture and taste not accepted. This result was agreements with Caceres et al., (2004) they reported that the sensory and textural properties and the overall acceptability were very good when the fiber assayed was used in sufficient amounts between 2 and 12% of the final products.
The highest overall acceptability (7.66) was recorded with 5% CA followed by (7.30) for 5% RA with insignificant differences (P>0.05) between them. In this regard, Fernandez-Gines et al., (2004) found that, product acceptability scores depend on the type and concentration of albedo, when raw albedo was used, the higher product quality was obtained for sausages up to 5% albedo added, while in the case of cooked albedo the samples with 2.5%, 5% and 7.5% albedo obtained the highest scores, similar to control samples.

From the same table, results indicated that, albedo addition (raw, cooked and raw + cooked) caused an increase in hardness (P>0.05). The increase in hardness perception was higher in beef burger with raw albedo than cooked albedo and raw + cooked albedo. Burgers with added albedo (with any type and concentration) were less hard (P<0.05) than the control. This hardness reduction could be related to the dilution effect of albedo in meat protein systems. Some authors have reported that the dilution effect of non meat ingredients in meat protein systems primarily accounted for soft texture (Comer & Dempster, 1981; Tsai et al., 1998). On the other hand Garcia et al., (2002) mentioned that addition of fruit fibers seems to decrease the hardness of sausages. Hardness was not different (P>0.05) among treatments with added RA, CA and RA+ at any concentration.

Albedo addition (raw, cooked and raw + cooked) caused to decrease (P<0.05) in juiciness perception, regardless of the added does. This decrease was higher in burgers with added raw albedo than cooked and raw + cooked albedo, the decrease in juiciness could be related to the proportional reduction of fat content, Fernandez-Gines et al., (2004).
References


Effect orange albedo as a new source of dietary fiber on Characteristics of beef burger


تأثير قشور البرتقال (طبيعة الأبيض)

كمصدر جديد للألياف الغذائية على خواص البرجر البكرى

مرفت إبراهيم الدميري

المصطلح العربي

يتم المستهلكون بالوجبات المتعلقة بالمشروبات الصحية. فلذا، يوجد حالياً إضافات طبيعية
والتي تتوقع أن تحتوي أو تحسن الصحة مثل الألياف الغذائية. وحيث أن الخصائص النادرة لمستر
المصنوع أو المرتبة من الحمضيات تشتمل مشكلة حقيقية وخطيرة. ولكن هذه الخصائص تعتبر خاصة
تستخدم في بعض الصناعات الغذائية لكونها تتميز بصفات ذات قيمة كيميائية وغذائية صحية.

استخدم في هذا البحث ثلاث أنواع من مخللات قشور البرتقال (أقلورن الضر، القشور الطبيعية
الي جانب القشور الخام مخالطة بالقشور الطبيعية)، وأضيف من هذه الأنواع اربع ترخيصات لتحسين
برجر لحم البقري (صفراء) 5% و 15% والمخلوطة ب-20 دهن.

وتم تقسيم صفات الجودة للبرجر المحضر متضمنة الترتيب الكمي (الرطوبة، البروتين الدهن،
الألياف الغذائية، الكربوهيدرات) ثم حساب حسب القيمة الطاقة وصفات الطبخ (الاحتياط بالدهن والماء الناتج
بعد الطبخ) والاحتكارات الفيزيائية وتشمل النقاط من عملية الطبخ: الرقم الغذائي، الانكساخ بعد الطبخ.

هذا الى جانب الاختبارات العضوية الحسبية.

وقد أظهرت النتائج أن إضافة قشور البرتقال قد حسنت الخواص الغذائية للبرجر الدعميه به حيث
بينت التحليل أن أكبر نسبة للبروتين 18.01% قد لوحظت مع إضافاة 5% من خليط الأبيض والخام
المطبخ. كما سجل الرماد والألوفيد أعلى مستوي مع نسبة 10% من القشور الطبيعية.

وقد أظهرت النتائج انخفاض الطاقة الناتجة عند إضافة قشور الأبيض للبرجر وقد تراوحت من
372.84 إلى 127.63 ك مثالي/100 جرام ببرجر.

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**Faculty of Specific Education, Mansoura University, Egypt, April 8-9, 2009**