QUALITY CHARACTERISTICS OF SOME FOOD PRODUCTS CONTAINING DIFFERENT FAT-REPLACERS

By

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B.Sc. Agric. Sc. (Food Technology), Ain Shams University, 2006

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ABSTRACT

Eman El-Sayed Ibrahim Yousef : Quality Characteristics of Some Products Containing Different Fat Replacers.Unpublished M.Sc. Thesis, Department Food Science , Faculty of Agriculture, Ain Shams University, 2010.

In this study , xanthan , flaxseed mucilage , carrageenan and defatted soybean flour were selected as fat replacers for developing reduced- fat products (i.e. mayonnaise and beef burger). In the first stage of experiment , the functional properties of the aqueous solutions of fat replacers were measured under different conditions. Xanthan showed the highest water and oil absorption capacity (WAC and OAC) among different selected fat replacers. A significant ($P \leq 0.05$) synergistic improvement in WAC appeared when two fat replacers were mixed . Addition of 0.2% divalent $CaCl_2$ resulted in increase of gel strength of carrageenan and enhanced the ability of flaxseed mucilage to form gel . On the other hand, adding xanthan, defatted soybean flour (fail to form gel) and flaxseed mucilage (formed weak gel) to carrageenan can not decrease the syneresis of gel in the presence of 0.2% $CaCl_2$. Among the four selected fat replacers xanthan showed the most emulsion capacity (EC) and stability (ES) . A considerable enhancement in EC and ES was observed when two fat replacers was mixed.The flow curves of the selected fat replacers showed non-Newtonian behavior of pseudo- plastic type with yield stress and thixotropy. Values of consistency coefficient of xanthan solutions were higher than those of flaxseed mucilage , carrageenan and defatted soybean flour.

In the second stage of the study, the influence of partial substitution of fat in mayonnaise and beef burger formulations with(0.5 , 0.7 and 1%) fat replacers on physicochemical and sensorial properties of the reduced –

fat (Rf) food products were investigated . Reduced – fat mayonnaise formulated with carrageenan and defatted soybean flour were rejected by all panelists, since they fail to form oil-in-water emulsion.The result indicated that all Rf mayonnaises formulated with different levels of xanthan or flaxseed mucilage and their mixture had significantly ($P \leq 0.05$) lower fat and caloric values but higher water content and emulsion stability than their full- fat (Ff) mayonnaise samples .The caloric value was reduced by 48 , 34 and 61% in Rf mayonnaise with 0.7% xanthan , 1% flaxseed mucilage and 0.5% of both of them compared with the Ff (control).Full fat mayonnaise samples showed higher yield stress values than those of reduced fat mayonnaise samples supplemented with flaxseed mucilage , carrageenan and defatted soybean flour . However, incorporation of xanthan or its mixture with flaxseed mucilage in reduced fat mayonnaise samples produced a final product with rheological properties close to those of full- fat mayonnaise .From the obtained results it can be observed that use of xanthan or its mixture with flaxseed mucilage led to improvement of mayonnaise viscosity.Sensory evaluation demonstrated that Rf- mayonnaises formulated with 0.7%xanthan, 1% flaxseed mucilage and 0.5% of both of them were judged to be acceptable.

The moisture content of reduced – fat beef burger (Rf) formuled with 0.5 , 0.7 and 1% of selected fat replacers was inversely proportional to the fat content. The caloric value was reduced by 35.37% in Rf-beef burgers because of a lower level of added fat (≈ 6%) , when compared to the normal fat (control) beef burger . Cooking yield , fat and water retention , shrinkage and diameter reduction were also improved in Rf-beef burger that had fat replacers incorporated when compared to control product. Fat had a highly significant effect on the hardness values of both raw and cooked beef burger . When fat level was reduced from about 20% to 6% in Rf- beef burger, hardness decreased in both raw and cooked burgers.Rf-beef burgers formulated with 1% xanthan , carrageenan ,

flaxseed mucilage or defatted soybean flour showed higher water holding capacity (WHC) than normal- fat beef burger sample(Nf)

Panel members gave reduced – fat beef burgers formulated with 0.5% carrageenan and flaxseed mucilage or 0.7% of xanthan and defatted soybean flour similar or higher ratings than the normal-fat sample for most attributes

In conclusion, partial substitution of fat with 0.7%xanthan , 1% flaxseed mucilage and 0.5% of both of them will produce reduced fat mayonnaise with a good consistency , high acceptability and storage stability but lower fat and caloric values than their full-fat counterpart . On the other hand , substitution of 70% of fat in beef burger formulation with 0.7% of selected fat replacers improved cooking characteristics , water holding capacity , hardness and sensory attributes of reduced –fat beef burger, within these 0.7% defatted soybean flour was better.

Key words:

Fat replacers – Xanthan – Flaxseed mucilage – Carrageenan – Defatted soybean flour – Functional properties –Mayonnaise- Emulsion stability - Low –fat beef burger.

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