Is extrusion cooking of blended foods really advantageous?

Published Paper

Blended foods prepared by mixing a cereal flour, usually maize flour, with soy flour to get a high protein food with a good balance of amino acids are widely used in food aid programmes. These foods are included in emergency general rations for populations entirely dependent on food aid and also used in selective feeding programmes for malnourished individuals. Blended foods are usually pre-cooked by extrusion so that less cooking time is required and to improve shelf-life.

A study\(^1\) funded by Nutriset and ANVAR (Agence Nationale de la Valorisation de la Recherche) compared the starch digestibility of a blended food prepared with and without extrusion cooking. Resistant starch along with soluble and insoluble dietary fibres were measured in vitro before and after extrusion. Starch digestibility was assessed in 8 volunteers who ate a test meal with either 100 gms of extruded blended flour (EF) or nonextruded (NEF) blended flour cooked for 15 minutes at 80 degrees Centigrade in 500 ml of water.

Starch digestibility was measured by C\(^{13}\) (radioactive isotope of carbon) enrichment of breath samples for 8 hours. Concentrations of hydrogen in the breath were measured during 12 hours to assess bacterial fermentation in the colon.

Results

In vitro (outside the body of a person or animal in conditions created artificially by scientific experiment), resistant starch and soluble and insoluble dietary fibres were higher in NEF. However, in vivo (inside the body of a person) C\(^{13}\) excretion was no different for EF and NEF while hydrogen excretion was significantly higher for EF. Furthermore, feelings of satiety were marginally higher with EF. The authors of the study raised the following points:

1. i) The study was made on only one sample of blended food prepared from whole maize and soy grains with and without extrusion cooking. It is not known whether these results would be obtained with other types of blended flour especially with a lower fibre content.
2. Cooking for 15 minutes as is commonly practised in food aid programmes was probably enough to gelatinise starches present in the NEF to be well digested in healthy adult subjects. However, the similar starch digestibility of EF and NEF found in the study may not be extrapolated to malnourished children.
who often have an impaired starch digestion.

3. In malnourished children, excessive fermentation may lead to flatus, bloating or abdominal pain.

4. The increased satiety following an EF meal was unexpected. But as the statistical significance of the difference was border-line, the result needs to be confirmed by other studies. Nevertheless, a reduction of appetite due to a change in fibre structure and increased colonic fermentation or a mechanical effect seems plausible.

In conclusion the authors state that "extrusion cooking of blended flours for porridge preparation does not seem to present a major advantage in terms of digestibility in healthy subjects. It also suggests that extrusion cooking of high fibre blended flour may increase bacterial fermentation in the colon which may also depress appetite. Further studies in malnourished children are needed to determine whether extrusion is warranted when taking into account its advantages and also its increased costs and potential disadvantages".

**Editorial comment**

1. These findings do not alter the fact that extruded blended foods have a longer shelf-life than non extruded blended flour (NEF) and:

2. The lower resistant starch and fibres found in vitro in extruded blended flour (EF) may indicate that these flours require less than 15 minutes cooking time to achieve comparable digestibility with NEF after 15 minutes cooking of the latter. This may have implications for fuel saving.

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Taken from Field Exchange 10

www.ennonline.net/fex/10/extrusion

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