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Egypt: Risks of using sweet potatoes in production of bread

Dr. Abdel-Tawab Barakat

Egypt is the most world country that suffers from the unprecedented rise in global wheat prices, amid its scarcity in the international grain trade market following eruption of the Russian war on Ukraine on 24 February 2022. This has imposed great pressure on Egypt's general budget and foreign exchange resources, being the world's largest importer of wheat, 13 million tons in 2021, with 90% of wheat imports coming from the two warring countries, Russia and Ukraine.

To overcome the wheat import crisis, the Egyptian Minister of Supply and Internal Trade, Ali El-Moselhi, announced that the ministry was heading to use sweet potatoes in a mixture with wheat flour to produce the subsidized popular bread, as part of the government's plans to reduce the import of wheat, which was affected by the repercussions of the Russian war on Ukraine.

This has recently aroused much debate on social networking sites about the idea first introduced by Dr. Abdel Moneim El-Gendi, a researcher and scientist known for efficiency and excellence at the Agricultural Research Center. But the debate only focused on the extent to which the Egyptian citizen may accept the taste of bread containing sweet potatoes rather than the extent to which the idea of adding sweet potatoes to wheat flour can be applicable, from a manufacturing point of view and economic feasibility in solving the wheat crisis in Egypt.

In fact, we must be cautious about adding any food item to the subsidized bread, so as not to affect its nutritional value, taste, or appearance.

It is known that the subsidized bread, made from 82% extracted wheat flour, has been the most important and cheapest source of carbohydrates and protein for Egyptians over the past several decades. In a study on subsidized "baladi" (local, popular) bread in Egypt, issued in 2014 by the Central Agency for Public Mobilization and Statistics (CAPMAS) in 106 pages, the results confirmed that it provided Egyptians with 52% of the nutritional needs of calories and 70% of protein, before reducing the weight of the loaf from 130 to only 90 grams. (Study of Subsidized 'Baladi' Bread in Egypt, Central Agency for Public Mobilization and Statistics, March 2014).

Although the taste and appearance of bread made from sweet potatoes and wheat flour may be acceptable, the debate must revolve around two points:

First, the reduced nutritional value of bread resulting from mixing sweet potatoes with wheat flour;

Second, the difficulty of preparing sweet potatoes to be added to wheat flour.

Sweet potato nutritional value

A review of food analysis tables clearly shows that the nutritional value of sweet potatoes is much less than that of wheat, because the average protein content does not exceed 2% in sweet potatoes, compared to 12% in wheat flour, which proves the inadequacy of sweet potatoes in the production of 'baladi' bread. It is also clear from the food analysis tables, that the average percentage of carbohydrates in sweet potatoes is 25%, compared to 72% in wheat flour, which means that adding sweet potatoes to bread will reduce calories in a loaf of bread, which is an important nutritional value for the Egyptian citizen who has got no alternative for bread in providing energy and vegetable protein, which is a deficient substitute for animal protein usually absent from the Egyptians' tables, which is another evidence of the inadequacy of sweet potatoes in the production of bread in Egypt.

Adding boiled sweet potatoes to wheat flour by one to one will reduce the proportion of protein in bread by 50%, and calories by 30%, which makes the use of boiled sweet potatoes in the making of bread closer to diet foods to reduce the weight of obese people than bread that millions depend on to obtain their basic protein and energy needs. Also, the average moisture content of sweet potatoes is 70% compared to 10% in wheat flour, which means that adding sweet potatoes to wheat flour is a kind of more water than any other food ingredient.

In brief, mixing sweet potatoes with wheat flour to produce subsidized 'baladi' bread reduces the nutritional value of bread, which 90% of Egyptians rely on to satisfy hunger and provide energy and protein needs; and it is harmful to public health, especially in growing children.

Technological challenges

"Applicability and economic feasibility" is one of the most important aspects of evaluating peer-reviewed academic research at the Agricultural Research Center. In fact, the sweet potato tubers, technologically speaking, need to be subject to a boiling process to achieve what is known as

'gelatinization of starch', so that they can be mixed with wheat flour for making bread. This may be acceptable when applied on a small scale in a bakery, but when the idea is applied on a large scale, the process of boiling and processing sweet potatoes will be economically costly and closer to waste of time and energy, given that the process requires labor in each bakery to sort the tubers and exclude the damaged ones, while the manufacturing process needs to consume large amounts of water in the tubers washing process to get rid of the remnants of agricultural soil that may be left on them. The bakery also needs a source of energy, gas or diesel, to use in the boiling process, which doubles the cost of making bread mixed with sweet potatoes, enough to reject the whole idea.

Dr. Abdel Moneim El-Gendy also suggested another way to trade sweet potatoes by freezing them after boiling, packing them in packages weighing 20 kilograms and its multiples, and distributing them frozen to bakeries. But this requires the establishment of large factories to prepare and boil the tubers, then package, freeze and store them in freezing rooms, in preparation for distribution in refrigerators mounted on equipped vehicles to bakeries spread throughout the country, estimated at 33,000 bakeries, and then providing another way to melt the frozen sweet potato cubes before adding them to the flour, which is a more expensive method than the method of boiling sweet potatoes inside bakeries.

On his part, the Minister of Supply suggested a third method for preparing sweet potato tubers, that is to dry the tubers and then grind them. Nevertheless, realizing its difficulty, the minister added that "It is a big problem", as it will need huge dryers that run on gas or electricity, which are not available in Egypt; and then mills appropriate for grinding dry potato tubers, different from wheat mills, which are also not found in Egypt! After obtaining potato flour, devices must be provided to mix it with wheat flour in a homogeneous manner. Due to the difficulty of drying, grinding and mixing the two components homogeneously, it is expected that this method and others will fail in processing the sweet potatoes, in case there are sufficient sweet potatoes currently or next year in Egypt, to be used in the production of subsidized bread.

Economic feasibility

The researcher then compared the average production of a feddan (acre) of potato tubers and wheat grains, stating that he was able to produce 20 tons from the former, while an acre of wheat at its best produced 20 ardebs, equivalent to 2 tons of flour. Thus, the production of one feddan of potatoes

is equivalent to the production of 10 feddans of wheat, according to his interview with the government-owned Al-Ahram newspaper on 24 March this year.

In fact, this comparison is incorrect; as when the production of an acre of potatoes is compared with that of wheat, the moisture content of the two crops must be calculated.

The average moisture content of potato tubers is 70%, and the average dry matter content, carbohydrates, protein, fats, minerals and vitamins, is only 30%. Therefore, it is more correct to say that an acre that produces 20 tons of sweet potato tubers produces 6 tons of flour. However, the researcher stated in Youm7 newspaper on 27 June that an acre of sweet potatoes can give only 4 tons of flour after the sweet potatoes are dried and ground.

On the other hand, the average moisture content of Egyptian wheat does not exceed 9%, and the percentage of the dry material, which represents the nutritional components of the grain, amounts to 91%.

Accordingly, wheat has been the main bread-making material in Egypt and the whole world since the dawn of history, with no complete alternative to it until now.

Although the average production of an acre of wheat may reach 3 tons compared to 4 tons of sweet potato flour, it does not justify mixing sweet potatoes with wheat flour for making bread. However, the productivity of wheat in Egypt has recently fallen compared to many countries that produce about 4 tons of wheat per an acre, despite the fact that there are wheat varieties in Egypt that can produce 4.5 tons per an acre, but they are not provided to farmers for non-national goals.

In a statement to Al-Dostur newspaper on June 27, the researcher said that one ton of boiled sweet potatoes is equivalent to a ton of flour, and that an acre produces 20 tons of sweet potatoes, equivalent to 10 acres of wheat production. However, this is a big mistake, because the researcher calculates the percentage of water in boiled potatoes as if it were flour.

The debate about mixing sweet potatoes with wheat flour to produce a loaf of subsidized 'baladi' bread reminds us of the failed experiment of adding corn flour to wheat flour at a rate of 20% to produce subsidized bread, a decision made in 1997 by Dr. Ahmed Goweili, the former Minister of

Supply; and his argument was that the price of corn was less than that of wheat, and that the addition of corn would reduce the import of wheat and save the hard currency that the state uses for imports.

However, the government put the decision into force ignoring the opposition of specialists in the milling industry from the very beginning of suggesting the idea. The argument of critics of the decision relied on the fact that corn flour lacks the gluten needed to form the dough consistency, which is specific to wheat alone, in addition to being needed to separate the two layers of a loaf of bread during baking. Moreover, then existing mills were not equipped to grind corn grains, and the size of corn starch granules are bigger than those of wheat flour, with the possibility of getting a heterogeneous flour mixture.

After implementing the decision, the percentage of spoiled bread during the baking process increased, and it was found that bread containing cornmeal loses its freshness after a short time no more than two hours, where it then becomes unsuitable for eating. Accordingly, the percentage of bread loss increased, whether in garbage bins in cities, or bird pens, and livestock and fish farms in the countryside. The ministry estimated the loss of bread at more than 30%, where adding corn to the wheat flour became a waste of public money. Nevertheless, the implementation of the decision continued until the outbreak of the January revolution in 2011. When Dr. Bassem Odeh was appointed Minister of Supply during the era of the late President Dr. Mohamed Morsi, he suspended addition of corn flour to bread, which led to improvement of the quality of bread, according to testimony of the entire Egyptian society.

Conclusion

There is no substitute for wheat in the bread industry, as the world has not yet succeeded in finding a full substitute that can replace wheat in the production of bread. The regime's insistence on adding substitutes, such as corn, sweet potatoes, or others, to wheat in making subsidized bread, is a deliberate harm to the health of Egyptians, and a waste of public money and efforts exerted by researchers in non-applied research. The government should provide support to agricultural research aimed at increasing wheat productivity by developing high-yielding varieties that are resistant to plant diseases, and improving the quality of subsidized local bread, which will be more feasible than searching for alternatives to wheat.

I suggest that raising the percentage of flour extraction used in the production of bread from 82% to 87.5% or 93.3% could be more successful in solving part of the current wheat crisis. Thus, the amount of flour resulting from grinding 100 kilograms of wheat will increase to 87.5 or 93.3 kilograms, instead of only 82 kilograms. This method will save half a million or one million tons of the total 10 million tons used in the production of subsidized bread, while maintaining the quality of bread at the same time.

However, this will also not be a full solution to the wheat crisis in Egypt. Therefore, there is need to focus on efforts to achieve self-sufficiency in wheat, according to the plan set by the late President Dr. Mohamed Morsi in 2012, which resulted in an increase in wheat production by 30% in the first year, through offering remunerative prices to farmers and encouraging them to increase the cultivated area of the strategic yield. The application of the crop rotation system and generalization of dissemination of high-yield seeds can lead to a vertical doubling of wheat production, before increasing the area planted with wheat horizontally[1].

[1] The views expressed in this article are entirely those of the author's and do not necessarily reflect the views of the Egyptian Institute for Studies