# *Sulsâme*

Final Report

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**Project Introduction**

As creative Food Science students, we have always had a passion for Product Development and experimenting in the kitchen. Our classwork has allowed us to expand our knowledge on topics such as sensory evaluation, quality assurance, nutrition and food packaging. As we neared the end of our journey at McGill, we longed to have the experience and support to foster a project which could encompass all of our Food Science knowledge. When we learned about the Student Experience Enhancement Fund we realized this could be our opportunity to develop out of classroom hands on learning. With our drive for the utilization of our scientific skills to serve a better cause we hoped to be able to utilize our innovative thinking to improve the development, safety and distribution of food in developing countries. Participating in IFT's (Institute of Food Technologists) DSDC Competition (Developing Solutions for Developing Countries) allowed us to explore the limitless opportunities to address global foo challenges.

This year, the Developing Solutions for Developing Countries (DSDC) competition focused on utilizing groundnut processing by-products. This food waste is rich in polyphenols and nutrients such as protein and fiber; as such, recycling this by-product by developing an innovative solution for a developing country would decrease food waste in the industry while providing essential nutrients to those in need. Our aim was to target a developing country which not only produced enough groundnut by-products for us to use as raw materials, but also a region with a dire need for safe, nutritious, affordable food. By researching the top peanut producing countries worldwide and looking up their Global Hunger Index, we narrowed it down to three possible options: Burkina Faso, Zambia, and Chad. All three were excellent possibilities, however Chad stood out amongst them for several reasons. In 2014, Chad was ranked 111th out of 113 on the Global Food Security Index and with an increase of refugees fleeing to the country undernutrition has worsened. With this nation being the 2nd highest on the worldwide hunger index, food insecurity has reached a critical level. Despite these conditions, there are many women run agricultural cooperatives in Chad and peanut production is on the rise making it a desirable country for our team to develop a solution. The main deficiencies among Chadians we hoped to tackle with our nutrient-dense product were vitamin A, iodine, iron and calcium.

Once Chad was chosen as our Developing Country, the next step was to research their cuisine and their typical usage of peanuts and peanut based products. We learned quite a bit about some of their traditional dishes such as Bouillie, which is typically eaten for breakfast. It is a millet or sorghum porridge which can include many toppings such as crushed peanuts or peanut butter. They also consume millet balls which are components of a very simple dish that is best dipped in sauces made up of tomatoes or peanuts. It became clear very quickly that especially in rural areas, Chadians did not have a varied diet. Due to the extreme poverty and

lack of proper post harvest technologies, they ate whatever was in season and available whenever they could. Near the capital of N'Djamena located near Lake Chad, a few inhabitants were lucky to have some fish to supplement their meals. Otherwise, the main edible crops were: sorghum, millet, peanuts, tomatoes and sweet potatoes. Another commonly found highly nutrient dense commodity found in Chad is moringa powder. Ground from the leaves of the *Moringa oleifera* tree the powder is high in iron and calcium, two of the principle micronutrient deficiencies for Chadians. Since the DSDC competition required the usage of a groundnut processing by-product we researched the nutritional properties of the skins, husks, shells, leaves and presscake (solids remaining after the peanut oil is extracted). It was concluded that the peanut presscake should be the main by-product since it is available in abundance along with the addition of a small portion of the skins and shells as these have a high polyphenol content.

**Our Trials**

Our original plan was to develop a dry porridge instant mix by incorporating sorghum, millet, moringa powder as well as the selected peanut by-products. With the addition of clean water we hoped this could be made into the traditional Bouillie breakfast that is so popular in Chad. After several trials in the kitchen we realized this would not be feasible. Although a dry food product is desirable for its high shelf life, low perishability and easy shipping, the production means available in Chad would not allow for the proper dehydration of the peanut presscake and the product would never reach its optimal low water content. Moreover, the addition of moringa powder to the product resulted in a horrendous green color that could not be masked. This was especially unfavorable in our product since it decreased product acceptability. Two photos of this trial can be observed below:

We went back to the drawing board to rethink our product. We researched for more traditional Chadian dishes and came across the peanut based vegetable soup known as Daraba. It was this dish that inspired our food product. After much deliberation we formulated our recipe to maximize our target nutrients of vitamin A, iodine, iron and calcium. We encountered many challenges when designing our recipe,  it was of the utmost importance that this product be affordable, but also tasty and true to the authentic dish Chadians were accustomed to. Ensuring that the production would be easy in a rural facility with simple techniques was required as well. A final decision was made to add crushed tilapia bones to the recipe. A small amount would exponentially increase the calcium content without affecting the taste.

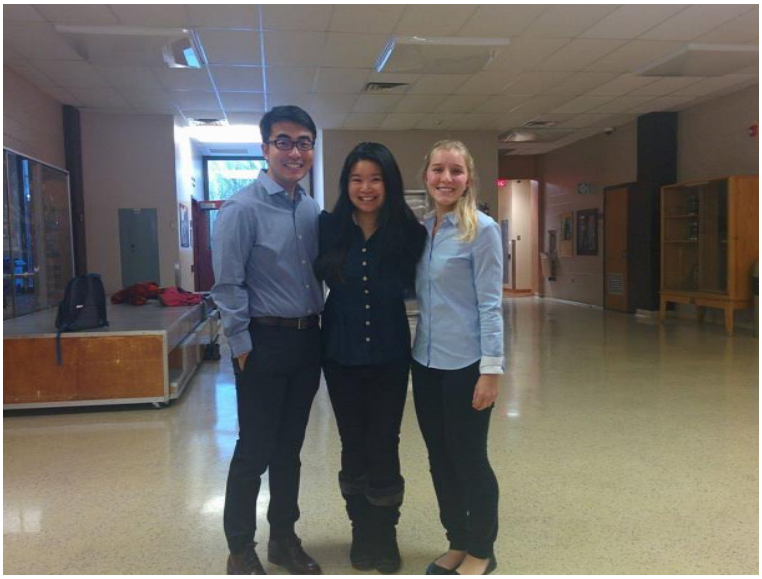
At last the ingredient list containing sweet potatoes, tomato paste, peanut press cake, ground millet flour, ground tilapia bones, spices and moringa powder was complete. After many, many more trials we perfected our food product titled Sulsâme. As shown below, our paste looked a lot more appetizing with its rich dark orange color as opposed to the previous strange green.

In Chad the two main languages spoken are Arabic and French. Sulsa in Arabic means sauce and âme in French is soul. In other words, our authentic Chadian dish was a nutritious, delicious sauce for the soul.

In June, our team will be attending the annual IFT17 Food Expo where we will have the chance to develop relationships other students and food science professionals that have a common interest in promoting global awareness of issues to food availability, nutrition and health. We look forward to attending in panels about food waste, global food security as well as going to the International Division events. Our objective is to better understand the challenges facing Food Scientists in other countries where their food production means have improved significantly compared to Chad. For instance there will be a lot of IFT attendees from India where there a lot of problems with accessibility to potable water and massive food waste due to inadequate post harvest technologies. Also that we look forward to meeting other students participating in the DSDC competition to better understand how they tackled this project and its theme of utilizing groundnut processing by-products. We know that attending IFT17 will open our eyes to other food waste challenges as well as other worldwide dilemmas regarding future Young Professionals such as us.

Without the help of the Student Experience Enhancement Fund these opportunities would not have been accessible and the development of Sulsâme would not have been possible. Not only did this funding expand our product development skills it gave us the chance to better understand the food supply chain in a very different part of the world. This project only grew our desire to learn about more regions such as Chad where food production is a challenge. When every sector of food production has seemingly insurmountable obstacles from agriculture (drought, pests), to the transport (pests, lack of infrastructure, paved roads), to the preservation (challenge of finding a canning facility) and finally to the distribution (again inefficient means of transportation, lack of communication, low literacy rates) this only inspires us to harness our creativity and Food Science knowledge to improve these circumstances.

**Photos of our happy team:**



Left to Right: Kyle Ye, Marina Nguyen, Myriam Vanier

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