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## EXPERIMENTS WITH SOY BEAN MEAL AS A SUBSTITUTE IN THE ARMY RATION.

CAPT. ARTHUR W. DOX.

The use of soy beans for human food has of late been the subject of a number of scientific investigations. The literature is not available to the writer at the present time, hence will not be discussed in this brief paper. The nutritive value of soy beans has, however, been established, and a future for this commodity as an article of human food is almost certain. The Chinese and Japanese have used soy beans for many years and prepared them in quite a variety of ways. In our own country little is known of soy beans except as a forage crop for cattle and swine.

While conducting a food survey of the National Army, National Guard and Aviation Camps in the Southern Department, the writer has had opportunity to make a few tests of the suitability of soy bean meal as a substitute in the army ration. In view of the present movement toward the conservation of our wheat supplies, suitable substitutes are being sought. On "wheatless" days, corn meal is commonly used. It is known, however, that corn protein is inferior to that of wheat because of its deficiency in certain amino acids. Soy bean protein, on the other hand, is a more complete protein.

The army ration prescribes eighteen ounces wheat flour, which may be in part substituted by other cereals. Since the army represents only one per cent of our total population, the saving of wheat effected by observance of wheatless days in army camps is comparatively small. However, many of the organizations in these camps are observing wheatless days. Other substitutes in addition to corn are therefore desirable for the sake of variety.

The company messes in an army camp afford a splendid opportunity for such experiments. At each mess one hundred to two hundred men are fed, all of them normal individuals with good, healthy appetites. They have little opportunity for obtaining food outside of the messes, except an occasional parcel from their friends at home, a meal now and then in the neighboring town, and the candy and cookies purchased at the regimental post exchanges. The men therefore eat what is served to them

at their company messes, notwithstanding all manner of gratuitous comments on their food.

The few tests described here were made at Camp Travis, San Antonio, Texas. The 360th Infantry Regiment was selected because it was under direct supervision of a very efficient School for Bakers and Cooks. Similar tests were made also at the Officers Mess of the 165th Depot Brigade. Thus we were able to get the opinions of both officers and enlisted men.

Our experiments thus far have been confined to a soy meal and a soy bean flour, both of the following chemical composition:

	PER CENT
Moisture .....	6.5
Protein .....	44.1
Fat .....	3.3
Fiber .....	5.9
Carbohydrates .....	35.5

The meal and flour were by-products from the oil industry. The pressed cake from the oil presses had been subjected to a process of regrinding and sifting, and the product had somewhat the appearance of graham flour.

The meal was used for making soup, in the proportion of one and one-half ounces to a pint of boiling water. It was boiled five minutes, and then various articles of seasoning were added. With the addition of beef stock, onions, tomatoes, celery and salt a very palatable dish was prepared. In the companies of this regiment where the soup was served, the mess sergeants report that it was well liked. At the officers' mess, all of the officers ate the soup and many of them were well pleased with it. Without proper seasoning the soup would not be very palatable, but with the judicious use of beef stock, onions and tomatoes the dish proved popular.

A soy bean flour of practically the same chemical composition was used for experimental bread making. The officer in charge of the Post Bakery at Fort Sam Houston cooperated in this experiment. One hundred pounds of bread were baked, using a mixture of 80 per cent wheat flour and 20 per cent soy bean flour. The dough was prepared and baked according to the standard army practice. However, instead of baking it in sheets of six loaves each as is customary, individual loaves were baked. The product was darker in color than wheat bread and the height of the loaves considerably less. The flavor, however, was excellent. The bread was distributed to several company messes

and officers messes. Practically all of the comments the writer heard were favorable. More than 20 per cent soy bean flour would not be advisable, since the loaves would tend to become soggy. It is believed that 10 per cent would yield the best results.

The use of soy bean meal does not decrease the nutritive value of bread, since it is not a mere filler like bran. It has a high protein content, 90 per cent of which is digestible as shown by actual experiments conducted elsewhere.

Although these tests were carried out on rather a small scale, it is safe to predict that soy bean flour will some day become recognized as a useful article of food and appear on the market as such.

FOOD DIVISION,  
SANITARY CORPS, NATIONAL ARMY.