Food Supplies and the Cotton Crop

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FEW people realize the important place which the products of the cottonseed have taken in augmenting our food supply during the past quarter century. Every bale of cotton ginned sends to the oil mills 690 to 700 pounds of cottonseed. With a 15,000,000 bale crop such as we had last year, the mills received 5,000,000 tons of seed. This may seem small from a tonnage standpoint when compared with the great cereal crops of the country, but when the concentration of protein and that of oil in the different crops are considered, we can readily see that the cottonseed stands pre-eminent.

TABLE I

	Protein	Oil
Cottonseed	17.2	20. %
Wheat	13.2	1.6
Oats	12	6
Corn	10.6	6.5
Potatoes	2	.6

The cottonseed is poor in carbohydrates. It is a highly concentrated fat and protein food source, and when we compare it with the leading food crops as in Table 2, we see the effect of this concentration.

TABLE II

	Greater than Cottonseed crop	Protein	Oil
Corn	16 times	8-9 times	5 times
Wheat	5 "	3 "	38%
Oats	4 "	2½ "	1¼
Potato	2 "	20%	2%

Referring again to Table I, it is evident that the cottonseed is the only product which contains the fat and protein sufficiently concentrated for the ready manufacture of food products rich in these essential food elements. The large quantity of oil in the corn crop is concentrated in the germs which are separated before the manufacture of starch and the corn sugars. The production of corn oil amounts to about 10% as much as that from the cottonseed, which at the present time is one of the three chief sources of edible fats in this country viz: butter, cottonseed oil, hog lard. At the present time, with a fifteen million bale cotton crop, the annual production of crude cottonseed oil is about one billion one hundred and fifty seven million pounds, losing about 8% in its conversion into refined oil suitable for edible purposes.

If we had to depend on lard for shortening and cooking fat, there would be about half enough to meet our needs. In other words, the cottonseed oil, perfected by modern methods of refining and hydrogenation, furnishes half of our shortening and 75% or more of our salad oils. As a manufacturing process, crude oil refining is fairly satisfactory as 96.5% of the available refined oil is obtained.

The same cannot be said of the methods by which crude oil is produced from the seed. Mechanically they are highly developed, but when we consider that with the present method of pressing, only 85% of the oil is recovered, it is quite evident that the mechanical methods of pressing fall far behind, in efficiency, the chemical methods of refining.

The average milling results per ton of seed at present are as follows:

Oil	309 lbs.
Cake and meal	888.9 "
Oil left in cake and meal	55 "

In other words, 15.5% of the total oil is left behind in the cake which is ground into meal and used for cattle food. The recovery of only 84.5% is a strong indictment against modern manufacturing methods. Alas, this is only a small part of the story. Let us look again to Table I, which shows that cottonseed contains practically as much protein as it does oil. Average figures would be somewhere around 17 to 17% protein to 18 to 20% oil, according to locality. Protein, as everybody knows, is the most important, as well as the most expensive food element of our diet. Its cost depends on the form in which we buy it. The following table gives an idea of what we are paying for it in our common foods:

TABLE IV - A

As Purchased	Protein per cent	Price per lb.	Protein Cost
Roast beef	15	35	$ 2.32
Sirloin steak	16	50	3.12
Lamb chops	15	50	3.33
Ham (smoked)	16	35	2.50

Chicken	14.8	40	2.70
Turkey	16	50	3.12
Cod fish steak	18.5	25	1.35
Mackerel (fresh)	10	20	2.00
Salmon	12	30	2.50
Oysters	7.4	25	3.38
Lobster	4.6	50	13.
Milk	3.3	10	3.00
Cheese (American)	29	35	1.20
Peanuts	17.3	15	.87
Beans	22.3	10	.45

It will be noticed the animal proteins are the most expensive, while that of beans, the standby for vegetable protein, is the lowest priced. There is a reason. Bean protein is less digestible than that from animal sources. It also has lower biologic value. It does not promote growth nor repair tissues as does the animal protein. The protein of the cottonseed has been found to have high biologic value and for this reason, is worth from a dietary standpoint, more than that of the bean. Supposing for a minute that the protein of the cottonseed could be eaten as a human food and could be purchased at the same price as that of beans. The 360 pounds of protein in a ton of cottonseed would be worth at 45c per pound, $162.

As already shown, the meal from a ton of cottonseed is 889 pounds. This contains all the protein and sells today at $37.50 per ton. Therefore the protein in a ton of cottonseed brings $16.62 per ton of meal. The 309 lbs. of oil from a ton of cottonseed at 8c for crude would be worth $24.72 or $40.34 for the oil and protein in a ton of seed, as against $162 for the protein alone if it were properly utilized as a human food instead of being sold in a cattle food for less than 5c per pound. Let us suppose that chemical instead of mechanical methods were used for extracting the oil from the seed. A ton of seed would then yield as follows:

Oil 360 lbs. @ 8c	$28.80
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Edible (residue) 700 lbs. containing 360 lbs. protein at	162.00
Making value of oil and meal per ton of seed	$190.80

This looks like almost a 400% proposition. It would be a pipe dream or an air castle were it not for certain well demonstrated facts:

First—Cottonseed meal as now made containing 6% or more of oxidizable oil gums, resins and gossypol, can never be a successful human food, on account of its flavor and poor keeping quality.

Second—Removing the above mentioned by-product, we have a sweet almost tasteless flour-like body which will keep as well as wheat flour. This carries 50 to 60% protein, or 2½ to 3 times as much as is found in meat, and is available for human food.

Third—The extra oil removed by solvent extraction amounts to 50 to 55 lbs. per ton of seed. It costs no more to get it out than press-room work, and the result produced by refining is *better.*

Fourth—The protein residue, when properly prepared is palatable and nutritious. It not only can be eaten but has been eaten by many people.

Fifth—Words without works are worth little. The samples I have prepared give ocular evidence, obtained on a semi-commercial scale, showing what has been accomplished.

There was a time not so many years ago, when cottonseed oil was considered fit mostly for the soap kettle and as an adulterant for other oils and lard. It has been sold as low as 3c per pound and now in the refined form brings 10c per pound and better, and there is little left for the soap kettle. Today it is a necessity in the American dietary.

The protein product after extracting the oil, is a far better one than the cotton oil of yesterday. It has been named Wessona. When mixed with vegetable shortening and water to simulate meat, a meat substitute costing about 5c per pound can be produced. It can be used in hash, croquettes, meat loaf, sausages, sandwich fillings, etc. Such a product would be a boon to the poor and furnish cheaply the needed protein to combat pellagra in the South.

The cotton crop contains enough protein to meet the needs of over 50 million people. The utilization of the protein of the cottonseed as a human food, would add immeasurably to the value of the cotton crop. This would be a real farm relief measure free from politics and Congressional oratory. The farmer did not ask for Congressional relief when applied chemistry by rational refining methods brought the value of his cottonseed from $8.00 a ton to the present price of $37.00. During the War it went to $85.00 a ton. If Congress, instead of trying to find out why cottonseed oil mills will not pay more for the cottonseed than they can get for its products after the expense of milling, would devote its energies and investigational activities and appropriations to chemical research to the end that the cottonseed would find its proper place in our food markets, they would be giving aid not only to the farmer but to the whole people.

This paper is presented in the hope of furnishing food for thought, and bringing a new food product to your attention.