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Review of assessment of soybean processing for sustainable food nutrition in north central Nigeria

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Abstract

The study assessed Soybean Processing for sustainable Food Nutrition among major crops produced in the North Central (Nasarawa State) the sample size was 92 respondents using well-structured questionnaires. The data of the survey was analyzed using descriptive, inferential and logit model. In the study, it was observed that soybean is meanly processing using traditional method 94.6%, the result indicated 26.6% of the respondents used both wet and dry method in soybean processing. Despite the problems associated with processing of soybean, the study showed that majority of respondents (45.7%) used soybean incorporated in other feed. The mean of processing methods was 0.50 out of 48 with standard deviation of 0.51, with standard deviation of 0.49 in Age and (Wald 0.000) income technique. It was recommended that processors should be assisted with credit facilities to enhance their productivity in soybean production and utilization.

Keywords: Soybean; Major crops produce; Dry method; Wet method; Processing; Utilization

1. Introduction

Soybean (Glycine Max) which is a member of Leguminosae family is one of the most important industrial plants in the world. 1/3 of edible oils and 2/3 of protein sources are obtained by soybean. It was discovered in North China five thousand years ago. Until 1950's China was the leader producer of soybean. However after this time, USA became the leader of soybean producing [1].

According to international institute Tropical Agriculture (IITA), [2] soybean was first domesticate in China in the 11th Century B.C and was cultivated alongside wheat, rice barley and millet. In Nigeria, soybean is reputable for its numerous uses and it considered as a crop for the poor and less privileged in the society due to the fact that it is cheap and affordable. It is also considered to be a miracle bean by many people and was known as one of the five sacred grains mention above. Soybean may be used in the production of many products such as bread, cookies, biscuits, pasta, cakes, baklava, dumpling, cornet, noodle, pasty, tarhana, nuts, baby food, confectioneries, chocolate, halva, milk, yogurt, cheese, ice cream, tomato paste, meat, coffee, special dietetic products, dry and cold ready food mixture, soap, paper, wax, gum

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substances, digital printing inks and lamp oil [3][4]. Soybean products which include high protein content, isoflavones, omega-3 fatty acids and dietary fibers are very important functional food components [5]. The standardization of traditional production method of soybean foods is very difficult because of the presence of different fermenting microbiota depending on geographical situation. Additionally fermentation conditions are very different that it is not very easy to get standard taste and flavor. However recent advances technology provides manufacturers to produce more uniform fermentation conditions [6].

Some historians attributed the survival of china as a nation to their consumption of soybeans as a major source of protein and calories in their diet. Today soybeans products are consumed in vast amount around the word [7]. In 1989, world production raised from above 56 million tons of 1974 to 107 million tones fifteen years later with Africa contributing a meager 0.5 million tons during the same yeas [8]. According to Wikimedia cited in Suleiman *et al*, Soy protein is generally regarded as the storage protein held in discrete particles called protein bodies which are estimate to contain a third type of storage protein called gluten or "polyamines" soybean also contains biologically active or embolic protein such as enzymes, lysine inhibitors, hemagglutinis and cysteine proteases [9]. The milk extracted from soybean is a source of protein used for both children and adult while the residue is used to produce feed for livestock. Furthermore, soybean has a crude protein content of about 44-48% which is the only plant protein source that can be compared, with animal protein, [9]. According to Central Bank of Nigeria, [10] soybean production and consumption estimates significantly upwards.

1.1 Processing

Is a way of changing the form of a product into a different and finished product. Many farmers in Nigeria today, find it difficult to process their produced and these accounts for a major loss experienced by farmers and agriculture in general. According to Olukosi, *et al*, [11] processing is the conversion of a commodity from its raw state to a form more acceptable to the buyer or the next stage in the distribution chain. The objectives of processing are quality enhancement, preservation and product differentiation. Processing adds to the product the utility of form or utility of transformations, [11]. According to existing published information, soybean digestibility is as high as the as that of other food products such as milk, meat, fish and eggs as long as it has been properly processed. On the average it is said to have a 90% digestibility value [12].

Although many parts of Nigeria in the southern and some areas in the northern parts of the country have been growing soybean in high quantity, its utilization is still very low. Soybean as an important crop grown for its rich protein and oil content is not being fully utilized for maximum satisfaction due to the inability of the potential uses to understand that soybean has to be totally processed [13]. Olufaya cited in Suleiman *et al*, reported that, [9] despite production has grown all over the world due to the benefits associated with it, there is still a wide gap between the demand and supply for soybean as a result of the inefficiency in its processing which ultimately affects its usage. Soybean is highly nutritive and has for several years been recommended for feeding of infants and adults in place of the usual cow milk. However, one would have expected that people should demand more of this product but the reverse is the case as very few people actually consume this soy product. Iwe [14] stated that increasing problem of malnutrition among infants, children, lactating and pregnant mothers have posed greater demand on cheaper protein sources such as soybean and its processed product. Since animal protein is expensive, the use of soybeans is redressing the nutritional problems associated with inadequate protein intake and calories and other essential nutrients in becoming increasing attractive. Inefficiency use of processing techniques and lack of knowledge of soybean utilization, which have been a major constrain to increased soybean product availability in rural communities, has kept the use of the crop below its potentials compare with other pulse. To overcome the constraints associated with processing, food security and mal-nutrition in general, and to improve soybean processing, particularly in the study areas the research investigated various methods and problems of soybean processing [9].

The result of the study would serve as a feedback to research institutes and extension agencies with respect to decision making process of rural community and general populace associated with the improved soybean processing and utilization techniques and the aim and objective of this study is therefore to assess the processing of soybean in the study are (Karu and Keffi Local Government Area of Nassarawa State, North Central Nigeria) soybean processing is insignificant to the production ratio in the area.

2. Material and methods

2.1 Sampling Techniques

Karu and Keffi local Government areas were purposefully selected as the highest Soybean producing areas in Nasarawa State, North Central Nigeria, was sample through preliminary surveys. Using simple random sampling (a procedure by which each member of population most have an-equal chance of being part of the sample), a total of 92 questionnaires were administered among soybean processors randomly from the two Local Government Areas.

2.2 Data Collection

Primary data was used for this study. Well-structured questionnaire was used to collect the information on the Assessment of soybeans processing for sustainable food nutrition form the respondents.

2.3 Analytical Techniques

Data gathered from the study was analyzed using descriptive and inferential statistics such as, frequency and percentages and logit model was used to analyze the factors influencing the social-economic characteristic of respondents. .

2.4 Logit Model

Logit regression was used to determine the degree to which the respondents' socio-economic characteristics influence their processing techniques.

The logit regression model is a binary choice technique, which allows for prediction of effects of independent variables on the dependent variable. It was used in this study to predict the effect of socio-economic characteristics of the respondents on the usage of processing techniques. The logit model was chosen as the best approach used for handing multinomial or polytomous dependent variable [16](Aldrich and Nelson, 1987) the logistic probabilities are given by

$$Y = B0 + B1*X1 + B2*X2 + B3*X3 + \ldots .B10^{x}X10 + Ɛ$$

Where; Y= Soybean processing,
B = bate (Coefficient)
Ɛ = Error term
X = Variables (X1 - Xn);
X1 = Sex (Is the gender of the respondents of been a female or male);
X2 = Marital Status (The state of being married or not married);
X3 = Age (Age is the length of existence of respondents in years)
X4 = Education (Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits of the respondents and classified as post-Secondary education or other form of education)
X5 = Experience (Is the number of years the soybean processing)
X6 = Income (The amount earn in soybean processing)

2.5 Soybean processing

For a dichotomous response variable, a similar linear model was set up to predict individuals' category memberships if numerical values are used to represent the two categories. Arbitrary values of 1 and 0 are chosen for mathematical convenience. Using the first example, we assigned Y = 1 if soybean processing is affected by socio-economics characteristic and Y = 0 if soybean processing is not affected socio-economics characterises or we assigned X = 1 if respondent is male and X = 0 if respondent is female.

The decision reached earlier in this study to explain access to extension using socio-economic factors suggested prima facies the inclusion of certain variables: age, education, family size farm size and income. The expected sign of their coefficients were predicted a priori, based on past studies, economic theory and logical reasons. Most of the independent variables were expected to be highly significant in the model at $p<0.05$.

2.6 Measurement of Variables

Age. This measured by the last birthday of respondent at the time of study (Year).

Income Amount of money realized from the sales of soybean product per day (Naira)

Experience: number of years a respondent has been in the processing business and Sex is measured as dummy female = 1, male = 0

3. Results and discussion

3.1 Distribution of Respondents According to Methods and forms of Processing

The result in Table 1 shows that 94% of the respondents used traditional method of processing while only 5.4% of them use the modern method of processing method. The result also indicated that 26.6% of the respondents used soybean in dry processing method and also 26% of respondents used in wet form. 47.8% of the respondent uses soybean in both wet and dry processing methods.

Table 1 Distribution of Respondents According to Method of Soybean Processing (n = 92)

Processing Method Forms	Frequency	Percentage (%}
Traditional Method	87	94.6
Modern Method	5	5.4
Total	92	100
Wet Method	24	26.6
Dry Method	24	26.6
Both Methods	44	47.8
Total	92	100

Source: Field Survey 2009

3.2 Distribution of Respondents According to Scale of Processing Soybean

The survey shows that 52.9% of the respondents maintain a small scale processing operations, and 29.4% of the respondents maintained medium scale processing. While 17.7% engage in large scale processing. This implies that soybean processing in the study area is yet to assume commercial dimension.

3.3 Distribution of Respondents According to Quantity of Processing Soybean per Day (Bags)

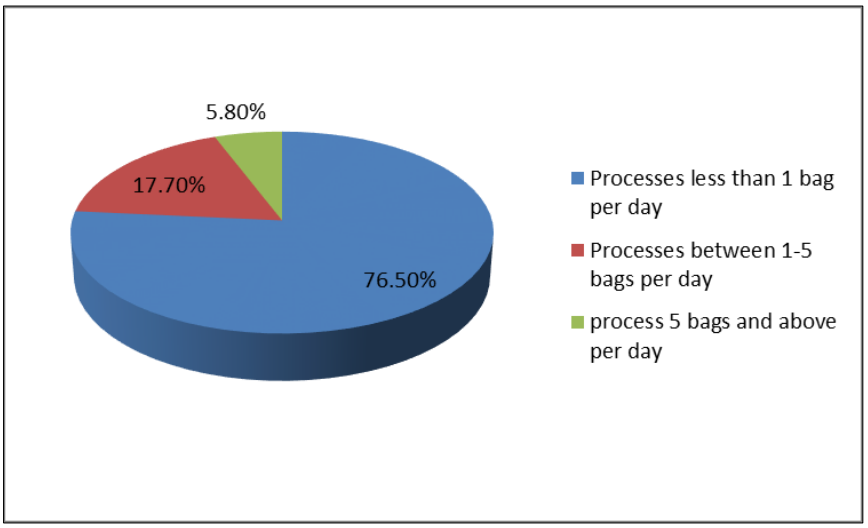

Figure 1 Quantity of Processed per Day (Bags)

The result of study shows that 76.5% of the respondents process less than 1 bag per day. 17.7% of the respondents processed between 1-5 bags per day whereas only 5.8% of respondents process 5 bags and above per day. The result ditched that majorities of the respondents in study area are small scale soybean processors and this may be as a result to some certain factors that need to further investigation.

3.4 Respondents According to types Labour Employed in Soybean Process

The result of the study indicated that majority of respondents (92.4%) the survey area employed family labour only for soybean processing. And 3.3% of the respondents utilized hired labour for processing soybeans while 4.3% of respondents employ both hired and family labour in soybean processing and utilization the area of study. This implies that respondents in study area meanly employed family for production which means soybean processing is on the small scale of production.

Table 2 Respondents According to types Labour Employed for Soybean Processing (n = 92)

Variables	Frequency	Percentage
Family Labour only	85	92.4
Hired labour	3	3.3
Hired and family labour	4	4.3
Total		100

3.5 Problems encountered in Soybean Processing

The result in table 2 shows that, problems encountered by the respondents in soybean processing and utilization, unskilled manpower topped the array of problems (32.4%), this was closely followed by 29.4% attributed to high cost of machine for processing, and 17.7% of the respondents viewed lack of technical knowledge as their greatest challenge. Unstable price of the soybean has 5.9%, the respondents attributed to instable price of the bean as a major challenge problem. And problem of accessibility of the products counted for 29% of the respondents while 11.8% of respondents saw other problems not specified as their main challenges. Soybean utilization also has it peculiar problems were the respondent faulted the taste of soybean milk with 33.7%, followed by the longtime of cooking soybean milk and other soy products with 25%. The odour associated with soybean takes 22.8%, while foaming characteristic with soybean and other problems not specified was 6.5% respectively and finally unavailability of the product to the consumers was 5.4%.

Table 3 Distribution of Respondents According to Problems encountered in Soybean Processing

Problems encountered	Frequency	Percentage (%}
Unskilled Manpower	11	32.4
High Cost of Machine	6	17.7
Availability of Seeds	1	2.9
Unstable Price of Seeds	2	5.9
Other Problems not specified	4	11.8
Total	34	100

Source: Field Survey 2009

3.6 Distribution of Respondents According Contact with Extension Workers

The majority of the correspondents (77.8%) have not had any contact with extension personal while only 22.2% of the respondents have had contact with extension personal this may be responsible for the low scale of processing by the respondents

3.7 Distribution of Respondents According Sources of Fund in Soybean Processing

The result of the survey as showed that majority (44.1%) of the respondents raised money through multiple means, contributions from friends, relatives, and personal savings. 17.7% sourced funds through personal savings, combination of funds from friends, relatives and cooperatives Banks, 11.8% raised fund through cooperatives while 8.8% raised fund through personal savings and cooperatives and 20.6% from turn over interest.

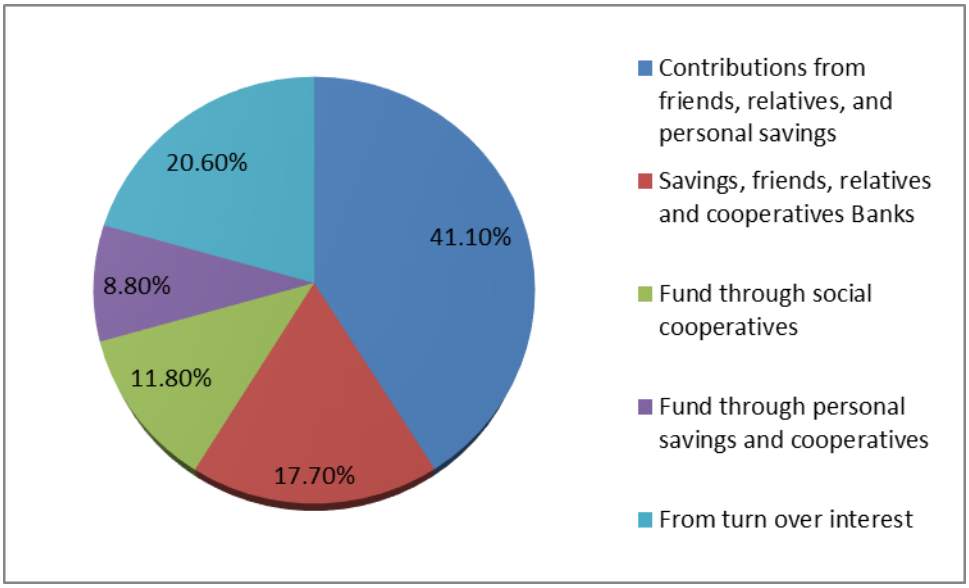

Figure 2 Sources of Fund of the Respondent

3.8 Distribution of Respondents According Daily Earnings from soybean Processing

94% of the respondents earn between one thousand (₦1000) to five thousand Naira (₦5000) per day from the processing of soybean earnings while respondents that earns five thousand (5,000) to ten thousand Naira (10,000) per day and the respondents that earned above 10,000 per day were paltry 3% respectively.

3.9 Hypothesis Testing

There is no significant relationship between the socio-economic characteristics of respondents and the processing method.

3.10 Summary

The survey was basically conducted with the broad objective of assessing soybean processing and utilization. The Primary data used for the investigation, descriptive statistics inferential statistics and logit model were used for the analysis of the result obtained the socio-economic characteristic observed to be related to processing and utilization of soybean. The common methods of soybean processing in the study area were wet and dry methods and mainly carried out on a small scale and for household consumption. Soybean is utilization in various from such as flour. Paste and incorporated in to other feeds. It was identified to be most serious factors affecting soybean processing and utilization in the study area: poverty of rural people, lack of processing technologies, difficulty associated with cooking of the beans.

4. Conclusion

The survey indicated that about 7.5% processor process less than 100kg per day, this result as shown lack of awareness among the processors on improved soybean processing and utilization methods. However, the finding also indicated that there is a higher prospect for soybean processing and utilization in the study area. If the numerous problems identified were well tackled soybean processing and utilization will be wall embraced by the farmers in the survey area.

Recommendation

The following recommendation is made to help increase soybean processing and utilization.

- The Federal government through its programmes, i.e National poverty eradication programme and milieus development goal (MDGs) programme should provide modern equipments and appropriate processing machines that will remove drudgery from processing on soybean to the rural and urban community inform of credit facilities.
- Agro-Allied industries that utilize more soybean as their primary raw materials should be encouraged in order to widen the processing range to large scale from present small scale processing
- Information on improved soybean processing and utilization should be translated into local language of the area. This will enable farmers to comprehend information about improved soybean processing.
- Result demonstration should be organized by state Agriculture development project (ADPs) this can be achieved by using Women –In-Agriculture (WIA) to train the farmer son improved soybean processing and utilization.
- Credit faculties should be made available to prospective business men and women who intend to venture into soybean processing such load could be given by government through commercial banks, micro financial banks and Agricultural bank as soft loan with minimum interest rate of single digit.

Finally, the state government should provide adequate and consistent extension services to the processors, and importance of soybean to the human diet and economic growth of the nation.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest in anyway among the Authors in the research project.

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