



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Vol XXV
No. 4

ISSN 0019-5014

OCTOBER-
DECEMBER
1970

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

The size of family (X_1) and the production of bajra (X_2) seem to be the most important variables accounting for 93 per cent of the variation in the marketed surplus of bajra. The regression coefficients of both these variables were statistically significant at 1 per cent level.

As for the individual size-groups, the regression coefficient of production (X_2) was positive, thus agreeing with the generally held belief that the marketed surplus increases with an increase in production.⁴ The present study also established that a part of this increase in the marketed surplus was likely to be siphoned off by an increase in the family size (adult units), as indicated by the negative sign of the regression coefficient of (X_1). Similar results were also reported by Vyas and Maharaja.⁵ Again as for the individual size-groups, the value of the intercept was found to be negative. Adopting the same procedure explained for the individual size-groups, the minimum level of production retained was 7.21 quintals.

The marginal propensity to sell with respect to production $\left(\frac{\partial Y}{\partial X_2}\right)$ was 0.58 in the sample farms. The elasticity of sale with respect to production $\left(\frac{\partial Y}{\partial X_2} \frac{Y}{X_2}\right)$ was found to be 1.74, indicating that one per cent increase in production augmented the marketed surplus by more than one per cent. But the influence of increase in the family size (consumption units, X_1) had negative elasticity—0.65 which restricted this augmentation to some extent.

The elasticities of sale with respect to (X_1) and (X_2) were alternatively compared with that of the individual size-groups. It was found that the elasticities with respect to both the factors were not significantly different, implying that the influence of the size of family and the production of bajra was the same as in the individual size-groups.

K. L. SHARMA
AND
M. P. GUPTA*

CONSUMER ACCEPTANCE OF CHAPATIS CONTAINING SOYBEAN FLOUR†

Soybeans contain about 40 per cent protein of good quality and are rightly described as the "Golden Legume of the 20th Century." The percentage of

4. See, e.g., Raj Krishna, "The Marketable Surplus Function for a Subsistence Crop," *The Economic Weekly*, Vol. XVII, Nos. 5, 6 and 7, Annual Number, February, 1965, pp. 309-20; P. V. G. K. Rao, "Marketed Surplus and Agricultural Production—A Case Study of a Village in U.P.," *Agricultural Situation in India*, Vol. XX, No. 7, October, 1965, pp. 567-75; G. Parthasarathy and B. V. Suba Rao, "Production and Marketed Surplus of Rice in the Deltas of the South," *Agricultural Situation in India*, Vol. XIX, No. 8, November, 1964, pp. 721-25.

5. V. S. Vyas and M. H. Maharaja, "Factors Affecting Marketable Surplus and Marketed Supplies—A Study in Two Regions of Gujarat and Rajasthan," *Artha Vikas*, Vol. 2, No. 1, January, 1966, pp. 52-78.

* Graduate Student and Joint Director, Agricultural Prices Commission, New Delhi, respectively. Senior author is presently a Senior Research Fellow of I.C.A.R. in Economics at the University of Rajasthan, Jaipur.

† This study was undertaken by JNKVV/USAID as a part of the All-India Co-ordinated Soybean Research Project. It was the first of a planned series of acceptance studies of full-fat soybean flour. The authors are deeply indebted to Agro-Processors Private Ltd. of Nagpur, who provided the soybean flour used in the study; to the panelists whose co-operation made the study possible; and to their colleagues, particularly Dr. M. B. Russell, Chief of Party, USAID/JNKVV and Dr. D. P. Motiramani, Director of Research Services, JNKVV, for helpful suggestions. The authors are also thankful to Kum. S. Kanthamani, Extension Specialist (Home Science), and Shri S. K. Sharma, Senior Research Assistant, for help in conducting the experiment.

protein in soybeans is about four times as large as that in wheat and maize, six times that in rice, and from one and one-half to two times that of other common legumes of India, such as groundnuts and pulses.¹ Although soybean protein, like the protein of groundnut, cottonseed meal, and most other legumes, provides proportionally less of the sulphur-containing essential amino acids (methionine plus cystine) than animal proteins, such as eggs, milk and beef,² soy protein is the highest quality protein available from commonly used plant sources.³ Moreover, soybeans are well supplied with lysine, the limiting amino acid in most cereal grains. Because most cereals are well supplied with sulphur-containing amino acids, the combination of soybeans with one or more common cereals provides food in which the quality of the protein is high.⁴ Soybeans thus potentially may contribute to correcting the "Calorie-Protein malnutrition" problem of the predominantly vegetarian diet of the Indian population. One way in which soybeans may be so used is in the Atta Fortification Project.⁵

A major question facing prospective Indian processors of soybeans for human food concerns consumer acceptance of the soybean food products that are produced. The study described in this paper was made to test one facet of consumer reactions, *i.e.*, their acceptance of chapatis made with soy reinforced wheat flour.

The full fat soybean flour used in the study was a commercial product of good quality. It was made by cooking whole soybeans in boiling water, drying them, and grinding them in a commercial stainless steel pin mill.

Objectives of the Study

General : To determine consumer acceptance of chapatis made with 10 and 20 per cent soy flour in comparison with chapatis made with pure wheat flour.

Specific : (a) To determine consumers' reactions to taste, smell, colour and texture of chapatis made with 0, 10 and 20 per cent soy flour.

(b) To determine consumers' overall preference for chapatis made with 0, 10 and 20 per cent soy flour.

Hypotheses

General : Chapatis made with 10 and 20 per cent of soy flour are equally acceptable for eating as chapatis made in the usual manner with wheat flour.

1. Ahmad Kamaluddin, "Protein Needs and Its Deficiency in Asia," Proceedings of International Conference on Soybean Protein Foods held at Peoria, Illinois, October 17-19, 1966, Agricultural Research Service, U.S. Department of Agriculture, ARS-71-35, p. 57.

2. Ahmad Kamaluddin, *ibid.*, p. 47. Ruth M. Leverton, "Soybean Protein in Mixed Foods," Proceedings of International Conference on Soybean Protein Foods, *ibid.*, pp. 78-79.

3. Cleveland P. Eley: Food Uses of Soy Protein, Marketing and Transportation Situation, Economic Research Service, U.S. Department of Agriculture, August, 1968, p. 27. Ahmad Kamaluddin, *ibid.*, pp. 47-60.

4. Ahmad Kamaluddin, *op. cit.*, pp. 47, 57-59.

5. Fortification Atta Project has been sponsored by the Government of India in co-operation with the Maharashtra Government.

"Similar Projects are planned for other large urban centres." Shri. I.C. Puri of Food Corporation of India states "Soybean has no problems of aflatoxin. It should therefore be possible to use soybean extensively in all future fortification programmes." *Vide* I. C. Puri, "First Step in Food Fortification," Special issue on Fortified Atta Project, The Food Corporation of India in the *Indian Express*, February 25, 1970.

Specific : (a) Consumers' reactions to taste, smell, colour and texture of chapatis made with 10 and 20 per cent soy flour will not be different from those for chapatis made with pure wheat flour.

(b) There will be no significant difference in consumers' overall preference for chapatis made with 0, 10 and 20 per cent soy flour.

Methodology

The experiment involved selection of consumer panels covering the socio-economic range of families in Jawaharlal Nehru Krishi Vishwa Vidyalaya staff quarters, Jabalpur (M.P.). For the purpose of selecting the consumer panels, stratified sampling with income-groups as strata and families as sampling units was followed. The selection of persons within each income-group was purposive depending upon qualities of consumer panel needed and their willingness to co-operate in the experiment. In total 86 persons participated (Table I).

TABLE I—NUMBER OF PARTICIPANTS BY INCOME LEVEL AND SEX

| Monthly income (Rs.) | Standard of living | | | | Persons constituting panel | | | |
|----------------------|--------------------|--------|----|----|----------------------------|----|----|----|
| | Male | Female | | | Total | | | |
| Below 150 | .. | .. | .. | .. | Very poor | 13 | 11 | 24 |
| 150 to 300 | .. | .. | .. | .. | Poor | 10 | 9 | 19 |
| 300 to 700 | .. | .. | .. | .. | Moderate | 11 | 11 | 22 |
| 700 or more | .. | .. | .. | .. | High | 11 | 10 | 21 |
| All income-groups | .. | .. | .. | .. | | 45 | 41 | 86 |

Incomewise and sexwise classification of panel members was adopted to cover the socio-economic range of the population. The number of samples in each income-group being small, results were generalised on observations for all income-groups and for men and women combined.⁶

Chapatis of uniform quality made of wheat flour and with 10 and 20 per cent soy flour, respectively, were served to each participant, unidentified except for coding. Trials with the four income-groups were held on four different days. Each participant was asked to rate the taste, smell, colour and texture of each type of chapatis on a five-point scale, viz., Not acceptable, Poor but tolerable, As good as regular product, Very good and Excellent. Participants also were asked to rank the three types of chapatis in order of overall preference. Each participant was served with salty biscuits and water between different types of chapatis to avoid carry over of taste from one type to another. Code lettering of the three types of chapatis was changed from day to day to rule out the possibility of a panel's being influenced by the reactions of an earlier panel.

Each of the characteristics, taste, smell, colour and texture, was considered of equal importance. In summarising evaluations of those characteristics, weights of 5, 4, 3, 2 and 1 were assigned to the ratings excellent, very good, as good as regular product, poor but tolerable, and not acceptable, respectively. In case

6. Results by income-groups may be obtained from the authors.

no overall preference was indicated between 2 chapatis, values of 1.5 or 2.5 were assigned to each depending on whether the third type of chapati was considered inferior or superior to the two that were ranked equally.

Results and Discussion

The most common ranking of each type of chapati in terms of the four characteristics that were evaluated was "as good as regular product" (Table II). There was no consistent pattern of deviations around this intermediate rating. All types of chapatis were a little more commonly rated below that standard than above it in taste and smell, while there was a similar difference in the opposite direction in ratings of colour.

TABLE II—RATINGS OF CHARACTERISTICS OF CHAPATIS MADE WITH 0, 10 AND 20 PER CENT SOYBEAN FLOUR, ALL INCOME-GROUPS COMBINED

| Rating | Per cent soybean flour | | | Per cent soybean flour | | |
|-------------------------------|------------------------|----|----|------------------------|----|----|
| | 0 | 10 | 20 | 0 | 10 | 20 |
| | Per cent of ratings | | | | | |
| | Taste | | | Smell | | |
| Excellent | 0 | 1 | 1 | 1 | 2 | 0 |
| Very good | 17 | 14 | 14 | 13 | 13 | 19 |
| As good as regular product .. | 58 | 44 | 47 | 62 | 53 | 56 |
| Poor but tolerable | 23 | 37 | 35 | 23 | 30 | 23 |
| Not acceptable | 2 | 4 | 3 | 1 | 2 | 2 |
| | Colour | | | Texture | | |
| Excellent | 3 | 1 | 1 | 5 | 1 | 2 |
| Very good | 29 | 18 | 18 | 22 | 14 | 22 |
| As good as regular product .. | 55 | 59 | 72 | 53 | 56 | 67 |
| Poor but tolerable | 11 | 20 | 8 | 20 | 27 | 8 |
| Not acceptable | 2 | 2 | 1 | 0 | 2 | 1 |

Mean ratings for each characteristic of each type of chapati were close to 3, the mid-point of the scale (Table III). The mean ratings of chapatis made with 10 per cent soybean flour were significantly below those of chapatis made with regular wheat flour in colour and texture. The reason for this difference, which showed up in two of the four income-groups, was not evident. There was no significant difference in ratings of any of the characteristics between chapatis made with regular wheat flour and those made with 20 per cent soybean flour.

Rankings of the three type of chapatis in terms of overall preferences also were similar (Table IV). The rankings assigned to the chapatis made with 10 per cent soy flour were very slightly below the rankings of the others, but the differences were not significant.

TABLE III—MEAN RATINGS AND SIGNIFICANCE OF DIFFERENCES IN RATINGS OF CHARACTERISTICS OF CHAPATIS MADE WITH 0, 10 AND 20 PER CENT SOYBEAN FLOUR, ALL INCOME-GROUPS COMBINED†

| Characteristics | Per cent soybean flour | | | Differences between groups | | |
|-----------------|------------------------|------|------|----------------------------|---------|----------|
| | 0 | 10 | 20 | 0 vs 10 | 0 vs 20 | 10 vs 20 |
| | Mean ratings | | | t values | | |
| Taste | 2.88 | 2.72 | 2.74 | 1.44 | 1.24 | 0.20 |
| Smell | 2.90 | 2.82 | 2.91 | 0.64 | 0.16 | 0.96 |
| Colour | 3.21 | 2.95 | 3.09 | 2.27* | 1.12 | 1.40 |
| Texture | 3.12 | 2.85 | 3.16 | 2.34* | 0.43 | 3.11** |

† Although sampling was purposive, it was restrictive only in the sense that the sample included persons willing to co-operate in the experiment. The authors believe that they had a dependable sample of the population within each stratum—a sample whose reactions would be expected to be distributed normally. Consequently, the “t” test is applicable in testing the significance of differences in their responses.

* Significant at 5 per cent probability level.

** Significant at 1 per cent probability level.

TABLE IV—RANKINGS OF CHAPATIS MADE WITH 0, 10 AND 20 PER CENT SOYBEAN FLOUR IN ORDER OF OVERALL PREFERENCE, ALL INCOME-GROUPS COMBINED

| Ranking | Per cent soybean flour | | |
|-------------------|------------------------|------|------|
| | 0 | 10 | 20 |
| | Per cent of rankings | | |
| 1 | 35 | 22 | 29 |
| 1.5* | 9 | 11 | 6 |
| 2 | 24 | 30 | 37 |
| 2.5** | 5 | 7 | 5 |
| 3 | 27 | 30 | 23 |
| Mean rank | 2.10 | 1.94 | 2.06 |

* Tie with another type; superior to third type.

** Tie with another type; inferior to third type.

Summary and Conclusions

Chapatis made with 0 and 20 per cent soybean flour were equally acceptable in terms of taste, smell, colour, texture, and overall preference. Chapatis made with 10 per cent soybean flour were rated slightly inferior to the others in colour and texture, but not significantly different in taste, smell and overall acceptability.

There was no obvious reason for the slightly lower preference for the chapatis made with 10 per cent soybean flour. On the basis of this ‘one-time’ experiment, it appears that up to 20 per cent of good quality soybean flour can be used in chapatis without appreciable adverse reaction by consumers.

K. L. RATHOD
AND
S. W. WILLIAMS*

* Marketing Economist, All-India Co-ordinated Soybean Research Project and University of Illinois/USAID Adviser in Agricultural Marketing, respectively, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh.