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The above findings indicate that there is very little substitution between the two main cereals, wheat and rice. That implies that the composition of foodgrains buffer stocks is as important as their level. Because if the objective is to assure availability of both wheat and rice at reasonable prices (given the poor substitution between them), then in the event of a short crop, stocks of both wheat and rice are required to be distributed to guarantee price stability. Not surprisingly, with its insight of the problem, the Agricultural Prices Commission has been repeatedly emphasizing that a balanced buffer stock (not of wheat alone) is absolutely essential for achieving price stability of foodgrains (and also for reducing dependence on imports).

CONCLUSIONS

From the above findings it appears that rice is acceptable in all States whereas wheat is preferred only in the northern and western parts of the country. It seems that the distribution of imported wheat (through PL 480) at low prices competed more with the inferior grains and did not change the preferences of the consumers. Therefore, the availability of wheat did not significantly reduce the pressure on the demand for rice. There are indications that the demand for rice in the northern States (Punjab and Haryana) may increase rapidly.

No doubt, for the first time we provided estimates of price and income elasticities of demand for wheat and rice on a Statewise basis. But lots of improvements are possible as soon as better and desired data are available.

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CASTE INSTITUTION AND PRODUCTION EFFICIENCY OF FARMERS IN EASTERN UTTAR PRADESH

Although it is recognized that some of the social factors play an important role in the process of economic development, they are generally not included in economic analysis because of the difficulties in their quantification and of the belief that they would be taken care of by the included economic factors supposed to be correlated with them. This, however, does not reduce the importance of assessing their impact on economic development, particularly in developing countries where social institutions are relatively more important both from the point of view of helping or hampering the development efforts.

In spite of agriculture being a common occupation of most of the castes in rural India, it is believed that farmers belonging to certain castes are more efficient than others.[1] This is believed to be particularly so for eastern Uttar

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1. This can be seen from the following remarks made in a Census Report of Uttar Pradesh while discussing the issue of economic holding. "The skill and industry of cultivator also counts. A *Brahmin* would starve on a holding which may be more than sufficient for a *Koery*." Census of India, Uttar Pradesh, 1951, Vol. II, Part I-A Report, p. 226.

Pradesh where "the local custom does not permit the high caste people, *viz.*, Brahmins, Thakurs, and Kayasthas to handle the plough."[2] Further, women belonging to these castes generally do not take part in agricultural operations. In view of these considerations, it is believed in certain quarters that the attitude of higher caste farmers towards participation in agricultural operations has come in the way of agricultural development of the region. It would therefore be worth examining whether production efficiency of the farmers belonging to higher castes is really lower than those of lower castes in eastern Uttar Pradesh and whether this difference has anything to do with the differential economic conditions and the mode of agricultural production of the farmers belonging to the two caste groups.[3]

This paper is based on data of a sample of 150 farms, selected randomly from 15 villages of Deoria district, eastern Uttar Pradesh. The district was divided into two crop zones on the basis of its agro-climatic conditions and cropping pattern, and then the villages were selected from each of them. The data were collected at the instance of Ministry of Agriculture and Irrigation, Government of India, under the scheme of the Studies in the Economics of Farm Management and belong to the year 1967-68. We are cautious of the fact that the size of the sample is too small to represent the whole eastern Uttar Pradesh and to be adequate for generalisation on the issues. Thus the inferences drawn in this paper should be viewed with caution.

The demarcation line for categorising sample farmers into lower and higher castes has been drawn on the criterion whether or not the farmer of a caste traditionally handles the plough. On this basis, farmers belonging to the castes of Brahmins, Rajputs (Thakurs) and Kayasthas have been considered as higher caste farmers and the others as lower caste farmers. This categorisation, though arbitrary, represents roughly the broad socio-economic conditions and the mode of agricultural production of each group of farmers.

II

The distribution of sample farmers into lower and higher caste groups by size of farms is presented in Table I. Out of 150 sample farmers, 97 belong to the lower castes and 53 to the higher castes. The number of farmers belonging to the higher castes not only increases with the size of farms, but also the majority of them belong to the largest size-group. This in fact supports the well-known phenomenon that both social status and economic status go together. It is also worth mentioning that out of 53 farmers belonging to the higher castes, 41 come from crop zone II.

The data presented in Table II provide some idea about the social and economic conditions of the two caste groups of farmers. The net sown area per farm (effective size of holding) and the average size of the family are

2. Government of India: Report of Joint Study Team, Uttar Pradesh (Eastern Districts) Planning Commission, New Delhi, 1964, p. 8.

3. Shri Jagjivan Ram (former Minister of Agriculture and Irrigation, Government of India) emphasized the need to study the importance of social factor on agricultural production in his Inaugural Address to the 36th Annual Conference of the Indian Society of Agricultural Economics, see *Indian Journal of Agricultural Economics*, Vol. XXXI, No. 4, October-December 1976, pp. 4-5.

TABLE I—DISTRIBUTION OF LOWER AND HIGHER CASTE FARMERS BY FARM SIZE

Size of farms (hectares)	Number of sample farms	Number of sample farmers belonging to					
		Lower castes			Higher castes		
		Crop zone I	Crop zone II	Total	Crop zone I	Crop zone II	Total
Less than 1·04	33	17	13	30	1	2	3
1·05-1·79	33	16	9	25	1	7	8
1·80-3·07	31	16	3	19	1	11	12
3·08 and above	53	19	4	23	9	21	30
Total	150	68	29	97	12	41	53

TABLE II—SALIENT CHARACTERISTICS OF LOWER AND HIGHER CASTE FARMS IN DEORIA DISTRICT: 1967-68

Particulars	Lower caste farms	Higher caste farms	All farms
Net sown area (NSA) per farm (hectare)	2·13	3·90	2·75
Average size of family (No.)	5·12	9·83	6·78
Number of family workers per farm	2·99	2·14	2·67
(*i*) Male worker	1·65	1·94	1·75
(*ii*) Female worker	0·95	0·11	0·65
(*iii*) Child worker	0·39	0·09	0·27
Number of farm servants per farm	0·13	1·17	0·50
Number of farmers hiring farm servants	10	43	53
Percentage of hired labour days to the total labour days used in crop production	24·0	64·0	45·0
Number of bullocks per farm	1·71	2·26	1·91
Average value of a pair of bullocks (Rs.)	727·00	818·00	756·00
Years of education per adult male member of the family	1·59	5·73	3·05
Percentage of farmers adopting high-yielding varieties (HYVs) of:			
(*a*) Rice	35·05	47·17	39·33
(*b*) Wheat	35·05	37·73	36·00
Percentage area under HYVs of:			
(*a*) Rice	24·92	30·67	27·40
(*b*) Wheat	22·37	29·78	26·27
Land revenue per hectare of NSA (Rs.)*	8·58	10·26	9·42
Rental value per hectare of NSA (Rs.)*	336·12	439·89	388·08
Percentage of NSA irrigated	33·71	42·41	38·06
Intensity of cropping (per cent)	149·50	109·24	129·34

* The rental value of land has been calculated at the rate of 6 per cent of the market value of land whereas the land revenue is equal to the land tax paid by the farmers to the Government.

considerably higher for the higher caste farmers, as compared to the lower caste farmers. As expected, females and children belonging to the higher caste farmers hardly work on their farms. Because of much larger participation of female and child labour, the number of family workers per farm is higher for the lower caste farmers. If no allowance is made for the differences in the efficiency of family workers and male, female and child workers are treated at par, the number of family workers per farm works out to be 2.14 and 2.99 respectively for the higher and lower caste farms. The number of workers per farm turns to be slightly favourable to the higher caste farmers when the number of permanent farm servants is also added to the family workers. The hiring of labour is more prevalent among the higher caste farmers. In fact, out of 53 farmers belonging to the higher caste, 43 hired one or more permanent farm servants for a varying duration of four months to a full year whereas only 10 out of 97 lower caste farmers hired permanent farm servants. The share of hired man-days to the total used in the crop production is about two-thirds for the higher caste farmers, but only about one-fourth for the lower caste farmers.

The extent of adoption of high-yielding varieties (HYVs) of rice and wheat seems to be higher on the higher caste farms. Apart from other factors, higher level of education among the male members of the higher castes appears to be important in influencing the adoption of new technology.[4]

On the basis of per hectare land revenue and rental value of land and the extent of net sown area irrigated on the two groups of farms, it may be said that higher caste farmers possess relatively better quality land than their lower caste counterparts. Although the superiority of land on the higher caste farms may be partly due to the higher proportion of land irrigated, it may also be partly due to higher natural fertility of land that they cultivate. The latter is possibly reflected from the fact that the land revenue, which was fixed a few decades back, is also higher for them. It is a bit surprising that in spite of higher proportion of irrigated area, the intensity of cropping has been lower on farms belonging to the higher castes.

It is thus clear from the above that considerable social and economic disparities exist between the higher and lower caste farmers and the quality of inputs used in production differs considerably between the two groups of farms. Hence, while examining the impact of caste on agricultural production, both social and economic factors should be included and the qualitative difference between the inputs of the two caste groups should be taken into account.

With a view to examining the impact of caste on agricultural production, Cobb-Douglas production function has been fitted with a dummy variable for caste along with dummy variables for farm size and crop zone and real variables for important factors of production. Holdingwise data on aggregate of crops have been used for estimating the function. As far as possible, the

4. Education was found to have a significant impact on the output of HYVs of wheat in eastern Uttar Pradesh. See J. P. Singh, "Resource Allocation on the Farms of Eastern Uttar Pradesh", *Indian Economic Review*, Vol. XIII (New Series), No. 1, April 1978, pp. 44-58.

quality differences in inputs have been taken into account by measuring them in standard units.

The function has been specified as follows:

$$\log Y = \log A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + d_1 Ds_1 + d_2 Ds_2 + d_3 Ds_3 + d_4 Dz + d_5 Dc + U$$

where

Y = value of output (main plus by-product) of all the crops grown on a farm,

X_1 = land input measured in terms of hectares of net sown area standardised on the basis of rental value of land,

X_2 = human labour measured in terms of man-days of eight hours,

X_3 = bullock team measured in terms of eight hours' day worked by a pair of bullocks and a person,

X_4 = value of manures and fertilizers (in rupees),

X_5 = services of fixed capital, which include depreciation and interest on farm buildings, implements and machinery (in rupees).

Ds_1, Ds_2, Ds_3 stand for dummy variables for the first three size-groups of farms.

A value of one has been used for each of the first three size-groups and zero for the last size-group of farms.

Dz is the dummy variable for crop zone. A value of one has been used for zone I and zero for zone II.[5]

Dc is the dummy variable for caste. A value of one has been used for the lower caste farmers and zero for the higher caste farmers.

A is the constant term.

U is the error term.

Regression results are presented in Table III. The equation has a good fit as about 90 per cent of the variations in the inter-farm output have been explained by the chosen specification.

Among the real variables, the elasticity coefficients are significant for land, labour, bullock team, and manures and fertilizers. Among the dummy variables, only the dummy coefficients for the farm size are significant but not for zone and caste. This probably indicates that caste as such does not seem to influence the production efficiency of the farmers if other relevant factors of production are taken into account and inputs are measured in standard units. Similarly, if the relevant factors of production are taken into account and the effect of farm size is accounted for, crop zones representing differences in crop combination and agro-climatic condition also do not seem to influence the production efficiency of the farmers.

All the coefficients of farm size dummy are significant, but have negative sign and their magnitude declines as the size of farm increases. Therefore, they indicate that probably the technical efficiency of the farmers increases with

5. It was considered necessary to introduce a dummy variable for crop zone, firstly because agro-climatic conditions and crop patterns differ between the two zones, and secondly because 41 out of 53 farmers belonging to higher castes fall in zone II. In spite of the larger concentration of higher caste farmers in zone II, the simple correlation coefficient between caste dummy and zone dummy was only 0·45.

TABLE III—COEFFICIENTS OF REAL AND DUMMY VARIABLES FOR THE SAMPLE FARMS OF DEORIA DISTRICT: 1967-68

Variable	Coefficient	Standard error
Constant (in log)	2·6631	(0·1680)
Real variables		
Land	0·2580**	(0·0574)
Human labour	0·2425**	(0·0760)
Bullock team	0·1354*	(0·0676)
Manures and fertilizers	0·0716*	(0·0329)
Fixed capital	0·0392	(0·0408)
Dummy variables		
Farm size-group I	—0·2923**	(0·0643)
Farm size-group II	—0·1895**	(0·0454)
Farm size-group III	—0·0785*	(0·0369)
Zone	—0·0089	(0·0300)
Caste	0·0005	(0·0307)
R^2	0·90	

** Significant at one per cent level.
* Significant at 5 per cent level.

the increase in their size of farms.[6] This seems to be in line with the fact that the area cultivated by most of the farms belonging to the first three size-groups is much lower than what could be considered as economic holding to make efficient use of the factors, such as fixed capital, labour and bullocks. The size of farm thus seems to be an important factor which has a significant influence on agricultural production at the farm level.

III

The foregoing analysis indicates that the farmers belonging to the higher castes in eastern Uttar Pradesh not only possess larger size holdings but also

6. In an earlier paper when we merged first three size-groups to form small size farms and termed the last size-groups as the large size farms, and fitted Cobb-Douglas production function to them with only real variables, the test of equality of equations with the real variables indicated that the regressions of the two size-groups of farms belonged to the same model and hence overall production efficiency of the two sizes did not differ significantly. The production efficiency differences among the size-groups found in this paper could have been ironed out in the earlier paper because of the merging of first three size-groups into a single category of small farms. See J. P. Singh, "Resource Use, Farm Size and Returns to Scale in a Backward Agriculture", *Indian Journal of Agricultural Economics*, Vol. XXX, No. 2, April-June 1975, pp. 32-46.

the land cultivated by them is of superior quality and has better irrigation facilities than that of the lower caste farmers. In view of these favourable conditions and higher level of education, the extent of adoption of HYVs of rice and wheat has been higher on the higher caste farms than those belonging to the lower castes. When the response of output to real variables (including adjusted land) and to dummy variables (including caste and farm sizes) is estimated through production function analysis, it is observed that caste, as such, does not seem to influence agricultural production to a significant extent. Thus, the mode of cultivation associated with the castes has nothing to do with the poor performance of agriculture in the eastern Uttar Pradesh. On the other hand, the technical efficiency of the farmers in the production of crops appears to increase with the size of farms in eastern Uttar Pradesh. Thus, the main constraint on the production efficiency of farmers is their smaller size holdings, most of which are uneconomic in their size.

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THE ROLE OF CREDIT AND TECHNOLOGY IN INCREASING INCOME AND EMPLOYMENT ON SMALL AND LARGE FARMS IN WESTERN REGION OF HYDERABAD DISTRICT, ANDHRA PRADESH

Recent farm economic studies in India have made abundantly clear that capital plays a crucial role in increasing productivity. This crucial input is scarce with Indian farmers. The Government initiated several measures, such as nationalisation of commercial banks in July 1969, in order that the banks are adequately motivated to cater to the capital needs of farmers. Besides, agricultural technology in India has made rapid strides in recent years. The small farmers constitute the bulk of the farming community in India. Consequent to the identification of small and marginal farmers by the SFDA and MFAL the rate of adoption of new technology by these farmers has displayed an upward trend recently. In view of the change in the attitude of commercial banks in favour of the agricultural sector and changes in agricultural technology there is a need to explore the possibilities of increasing income and employment potential under irrigated and unirrigated conditions at existing and improved technology levels. The present study is an attempt in that direction with the following objectives: (*i*) to analyse the existing pattern of income and employment on irrigated and unirrigated small and large farms, (*ii*) to assess the role of credit and technology for increasing income under current practice and improved technology situations with presently available capital and adequate credit facility, and (*iii*) to find out the additional employment potential on small and large farms through adequate capital use under the two technology situations.

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