PROGRESS REPORT

ON

SOCIO ECONOMIC ASPECTS

OF THE

STORAGE PROJECT

AT

GOMAO MPRUMEM

Submitted by

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A C K N O W L E D G E M E N T

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IMPORTANCE OF MAIZE STORAGE

The Oxford Advanced Learner's dictionary of current Englisg defines Storage as "keeping something for future use".
It involves the movement of the commodity from one point in time to another. This process is what is refered to as the creation of time utility. The usefulness of the process becomes obvious particularly in agriculture as production is seasonal ie. limited to the short harvest season. There is the need therefore to spread output over the whole year to even out the gaps between demand and supply and also to prevent violent price fluctuations.

Maize as an important staple in Ghana consumed throughout the country. particularly in the Northern and Costal Savana Zones. The balance sheet for the crop however indicates short fall in supply since 1976 and necessitates the importation of large quantities of maize with our scarce foreign exchange. The 1979 figure for rice and maize imports for instance was 185,000 metric tonnes worth about US $50m.

Ubfortunately what little maize is produced in the country suffers weevil infestation, fungi and rodent damage leading to quantitative, qualitative, nutritional and other types of losses.

To study the problem scientifically, with the altimate aim of lowering postharvest losses a multi-disciplinary team from the Food Research Institute selected a maize farming village, Gomoa Mprumem for a case study. This paper deals with the socio-economic aspects of the project.

THE OBJECTIVES FOR THE STUDY

The socio-economic aspects was designed (or rather intended) to be conducted in three phases. The first was a cross sectional survey, the second was a time series survey. These two were then supposed to supplement the third and major phase or aspect of the work which was the cost benefit assessment of introducting an improved maize storage crib for loss reduction.

The objectives for phase I were as follows:-

(1) To determine former storage needs, both for the short and long run

(2) To assess existing storage capacity of storage facilities

(3) To determine the types of cribs, farmer attitude to storage and storage practices. and

(4) To obtain baseline data for parallel or comparative studies on loss assessment on traditional and improved cribs.

These for the time series survey were

(1) Determine the usage of stored maize (basis for opportunity cost assessment)

(2) Storage pattern for the improved and local varieties

That for the final stage were

(1) Calculation of B/C ratio based on data collected from the first two phases

(2) Outline implications

HYPOTHESIS AND UNDERLINING ASSUMPTION

With the constraint of funds to carry out an exploratory survey to determine the felt needs of the target population, it was hypothesised that the

(1) existing storage system at village was sufficiently poor to need improvement (say loss / 30% over a period of 5 months using standard methodology for assessment).

(2) that best results would be obtained by the improvement of existing structures given the inavailability of insecticides and that proposed changes would lead to significant gains and that B/C ratio of improved crib would be greater than one(1) and also greater that B/C ratio for the traditional technology.

The above two hypothesis were based on the following assumption:

(i) Methods to be prescribed could be applied in the short run

(ii) recommendation would be practical

(iii) that proposed technology is appropriate for the target population.

SELECTION OF PROJECT SITE

Gomoa Mprumen was selected as project site. This area falls within the Cape Coast District and is a few kilometres from Winneba Junction on the Accra Takoradi Road. Its projected population based on the 1970 census at the time of survey would be between 442 and 482. It falls outside the main maize growing areas of Ghana, but it is an important maize growing area. Its special attraction is the system of block farming introduced by the Grains Development Board in 1978. The maize block farming project aims at placing developed land at the disposal of small scale farmers who would otherwise not be able to compete with large scale private farmers. It also aims at encouraging farmers to adopt improved cultural practices so as to increase production. Inputs like herbicides, seeds fertilizer and tractor services and technical supervision are offered at very nominal rates. Farmers pay for such services after harvesting the produce. The project began in 1978 with only 28 participating farmers each cultivating average of 1 acre. In 1982 participating farmers reached 112. Average yield too was indicated to have increased from 4.5 max bag/acre to 9 max bag/acre over the period.

Storage therefore became the necessary adjunct to the efforts of the G.D.B. as the traditional storage technology had not received any attention.

METHODOLOGY

Sample Size

A list of all the farmers, defined as anyone who owns a farm and spends more than half a day on the farm was compiled with the assistance of opinion leaders. This added up to 177. Using a confidence coefficient of .0.95 with precision or alleviable error of 8% the following formula was applied in obtaining the sample size.

$$n = \frac{N}{1 + N_e 2}$$

where n = Sample size
N = Population size
e = Allowable error such that
1% ⩽ e 10%

Substituting

$$n = \frac{177}{1 + 177\ (0.08)^2} \quad \underline{\text{L}} \qquad 87$$

The sample size obtained was therefore eighty seven.

Sampling

Having obtained the sample size, a random sample of 87 specific farmers were selected by use of a Table of Random sampling Numbers. The process was to number the individuals serially from .001 to 177. Blindly opening to a page in the Table the first 87 numbers were selected which were not greater than 177. The farmers whose names corresponded to the selected serial numbers were than interviewed. The aim of this procedure was to ensure that each farmer had the same probability of being interviewed.

Survey

Both the cross sectional and time series surveys were done by use of prepared questionnaieres. The data centered on the storage system. Questions were also asked on production, marketing and credit and the general background of farmers. Stores record schedule was used for the time series survey. The cross sectional survey lasted for two weeks. October 16 - 30, 1982, which was selected because farmers were just harvesting crops. This was immediately followed by the time series survey upto July 1982. Data was collected by personal interview and was proceeded by a familiarization campaign to establish the necessary rapport between the research team and the farmers.

SCOPE/LIMITATIONS

The study at Gomao Mprumen was an isolated one. The storage period under review was the 1981/82 major season. Due to the nature of loss which is location and season specific results would be applicable to the target area only. To ensure that information was realistic and true the following measures were adopted to minimize possible errors:

(i) call backs were made when inconsistencies and omissions were discovered
(ii) check questions were included in the questionnaire
(iii) two answered questionaires were discarded because certain issues could not be reconciled
(iv) local interpreters were used to assist two numbers of the survey team because of language problems
(v) for the not-at-hand-respondent, the name immediately below that respondent was selected for interview.

Due to the constraint of time and funds for the survey on allowable error of 8% was used instead of a smaller percentage. The pilot survey to proceed the work could not be done. This could have pretested questionaiere and given interviewers clear consistent interpretation to questions. Short discussions by the survey team delped, however, to eliminate difficulties. Another limitation was the waning enthusiasm of farmers as the season progressed and what they considered as their felt needs were not met.

SURVEY RESULTS

Background Information on Farmers

The farmers interviewed could be described as small scale farmers. The modal acreage was between 1 acre and 5 acres, with 67 farmers out of the 85 or 82.72% operating within this class. The ratio of female to male farmers is 1 : 1. Thus implies women contribute as much as merit the agricultural economy of the target population.

The age distribution of the farmers obtained confirms that general view that farmers are aging. About 50% were between the ageas of 41 and 60 years. Only 19% of farmers interviewed have received some amount of formal education. This group could be the possible early adopters of any innovation intended for the community. The low level of literacy was however counter balanced by regular visits from extension officers and the presence of the Grain Development Board. Farming aside, the next important economic activity was petty trading.

Crops and Storage

All the 85 farmers interviewed cultivated maize. Other crops cultivate include beans, yam, cassava and vegetables. Maize occupied the first position on all of the farmers' production programme. Eighty four per cent cultivated maize specifically for sale while 16% grew the crop for domestic consumption. Farmer emphasised the availability of land and fiance as the two important factors that could aid in the expansion of their farms. Indeed 54% of the respondents considered land as the most important while 11% felt finance should be given top priority. The other factors which would contribute to the expansion of farms are the availability of labour, fertilizer and the number of dependants.

The average quantity of maize stored per farmer was 6.25 max bags in the case of the local variety and 0.64 max bags in the case of the improved type. Only 33% indicated using insecticide during the season. Insecticide mentioned are aldex 40 and actellic.

The storage of cob with husk was typical. Farmers practised cob selection and in the words of one of the farmers avoiding those that show teeth' . Also arrangement on barns was observed. This could be to allow maximum amount of maize on the barn and possibly to suffocate weevil within the barn. Periodic smoking was practised, and farmers attempt at increasing life span of crib by using termite resistent plants as 'Ndumbra'. Factors identified as affecting storage were market price, need for cash and maize variety. The improved variety was stored for an average of 3-4 months while the local variety was stored for longer periods.

This could last as long as a 9 months or more with periodic smoking. Some problems identified in connection with cob storage are prestorage infestation, choice of cobs, and regular maintenance.

Storage Facilities

Fifty three (53) out of the 85 farmers interviewed had cribs. Three of these had two each and one had three. These are rectangular structure on raised platforms. Four main types were identified depending on the material used for the container. Bamboo was the predominant material used in the area. Fourty eight (48) per cent of the crib had containers constructed of bamboo. Twenty four (24) per cent of sticks are the balance of 28% in main of cribs constructed with maize stalks and palm fronds. The usual roofing material is thatch with isolated cases of metal sheet roofing. The supports of the platform are sometimes 'Y' shaped branches or bamboo.

Table : Dimensions of Maize Crib

	$\bar{X}$ m	Largest
Platform Height	2.06	1.5
Container Height	1.94	2.0
Length	3.70	14.0
Breath	2.66	10.0
Volume	20 m^3	280 m^3

With reference to the above table, the second column indicate the average values for the hypothetical typical crib encountered in Gomoa Mprumen with a volume of $20m^3$. In contrast, the largest storage structure was about 14 times as large, built of bamboo and thatch with a framework of strong wood. This structure however, is an isolated case. On the average respondents recorded an excess capacity of 40-60%.

Farmers attitude to improvement in their structures and methods was luke warm. Less than 8% indicated the need for improvement in their storage methods. Proposed methods by the small group include the building of new barns, the change of chemical and the storage of cobs with husk for about 3 months, followed by shelling, bagging and fumigating with phostoxin, with occasional sun drying. No dissatisfaction was expressed about structures. In order words change in structures was not a felt need. This therefore calls for the determination of the efficiency of the traditional structures vis-a-vis any improved structures. The mean expected life span of cribs was 5 .8 years, with a standard deviation of 2.44. The usage of stored maize in order of importance are for sales, repayment of wages, use as seeds, food, gifts and feed.

Table : Cause of Loss

CAUSE	N	%
Weevil	36	58.62
Mould	8	13.80
Weevil/mould	6	10.33
Weevil/rodent	8	13.80
Weevil/rain	2	3.45
Total	58	100

The table above identify the weevil as the most important source of grain loss. Fifty-eight (58) per cent of the farm respondents attributed their losses to the weevil which was said to have infested the crop right from the field and mainly beacuse of the poor husk cover. In contrast to the local variety the husk do not extend well beyong the tip of the cob and husk cover is thin. The peak period of damage according to respondents was between September and December. The reasons are not clear and needs to be investigated. If confirmed it could then be a basis why less reduction resources should be concentrated within this period at least for the largest population.

Prices of the maize per 100kg bag exhibited the usual upward trend. The opening price in October was ₵ 1000 in March and then to ₵,1,600 in June. This trend is one of the factors that encourage storage. One most hasten to add that without that prices would be even higher because of scarcity.

Other important factors that influence time of disposal of stocks are financial commitments and avoidance of spoilage expecially in the absence of insecticides.

Sixty per cent of farmers had access to institutional credit, from the Agricultural Development Bank, the Co-operative Bank and from Pomadze where unlike the former two, farmers pay in kind. Irrespective of the ruling market price. About 30% of such loans extended to farmers go to labour expenses, 12% to tractor expenses, 13% other farming expenses and the balances to the farmers over the gestation period.

CONCLUSION

Farmer Storage Needs

The study revealed that the long run storage need for farmers is a variety that combines good qualities of local with that of the existing improved varieties. The local varieties (Mprumen local) have shealth extending well beyond the tip while the varieties C_4, CW posta etc are high yielding but 'show teeth' and hence store poorly. This calls for genetic engineering. In the short run farmers identify insecticides as the most important factor.

Storage Practices

Farmers give little importance to appropriate structures and to storage hygiene.

Loss reduction

The claim that peak period of damage occurs between September and December could be investigated as that would lead to efficient allocation of loss reduction resources.

Efficiency

The proposed 3 months cob storage plus in bag fumigation and crib storage could also be compared.

Further work

To be able to scientifically determine the B/C ratio of the traditional technology and that of the improved technology, there is the need for a time seris survey of consumption pattern together with parallel less assessment studies that would permit the calculation of B/C ratios of both technologies. This is very important as farmers are unlikely to invest money and effort in loss reduction activities unless they forsee good returns. This would be a basis of outlining the economic benefits for the adoption of improved storage structures.