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THE LOW-COST MODERN CRIB**

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Summary

The costs of constructing various types of low-cost modern cribs made from locally available and manufactured materials were determined for Greater Accra, Eastern and Central Regions. The profitability of storing in these cribs was also determined. Percentage profit varied from 10.14 percent in the crib with locally available materials to 9.43 percent in the crib with manufactured materials.

For the farmer who does not produce maize, he could do bulk purchasing at harvest period for purposes of storage. It has been deduced that this is a highly profitable enterprise and the magnitude of profit varies with the three types of cribs.

Introduction:

There is a constant need to invest more capital in farming because farmers are now very much aware of the importance of newly recommended farming practices. They now know that government extension agents usually bring new techniques that are beneficial to them especially as increase in profit is concerned.

Despite the fact that the low-cost modern crib can be constructed with some locally available materials on the farms, it is still necessary that the farmer incurs some capital expenditure. Such costs include the costs of wiremesh, nails, cement, corrugated iron sheets and the cost of transporting these materials to the site of construction.

Capital expenditure should be incurred only when the cost can be genuinely justified. The simplest criterion of justification has been a fairly simple one which is - Does the adoption of the new technique increase the farmer's profit? This kind of evaluation is very important because credit is a very big constraint in the activities of most farmers.

The very first attempt to cost this storage practice was in the work of Cornes and Riley (1962) when the average cost of constructing cribs made up of manufactured materials only was determined. The average cost of the crib using planks, nails, cement, wiremesh and corrugated iron sheets was found to be thirty-five pounds (£35) or seventy Naira (N70). In the same year Upton (1962) determined the profit margin per ton of maize stored in steel or concrete bins and also the return on capital invested. Storage costs include drying costs since the maize must be properly dried to the safe moisture level before storage in bins.

The modern crib - a structure used for the storage of wet maize on the cob has thus been designed and tested by the Food Research Institute using various materials ranging from cheap readily available or locally available materials to metal.

For the purpose of this study, the following three categories of cribs have been considered.

Types of cribs

The various types of cribs can be differentiated not by way of construction or functions, but by the different types of materials with which they are made and the sources of the materials.

Type I: This type is made entirely of materials locally available on the farm. The farmer may have to pay for the labour for constructing the crib.

Type II: This type is made from locally available materials which the farmer has to pay for because he does not grow or have the materials around him.

Type III: This is mainly different from the previous ones because in addition to the locally available materials, he uses some other manufactured items such as nails, wiremesh and corrugated iron sheets. These manufactured materials make the structure more firm and permanent. This could last much longer than the first two types. From the various surveys on storage structures carried out in Greater Accra, Eastern and Central Regions, it was discovered that the grass thatch roofing is not widely used in the Greater Accra and Eastern Regions which are the Savannah zones where they could be obtained. The reasons are that the cutting and weaving of the grass is hazardous and labour intensive and the people with the experience are already aged. In these two regions, it is preferable to use corrugated iron sheets. In fact, farmers have accepted the advantages of reducing incidences and improvement in the drying rates because the sheets allow radiation of heat. The wood and thatch type of roofing is still obtainable very readily and cheaply in the Central Region.

Assumptions

- 1 Method: The average costs obtainable for the materials and commodity stored in the three states are used.
- 2 Storage costs: include fixed and variable costs.
Fixed costs: This includes the cost of constructing the crib depreciated using the straight line method.
Variable costs: include costs of spraying insecticides as well as handling costs which are included in purchases and sales prices of the commodity stored.
- 3 Purchases and sales: The purchase price is only tenable with a farmer who embarks on the enterprise of bulk collection and buying from the farmers who cannot store at the time of harvest. For a farmer who can store, the purchase price is his cost of production. It is very important to carry out purchases and sales at the most appropriate period of the year. A good purchase price is at the time of harvest and the best sales are at off-

season period. For maize, the purchase period is September/October and the sales is in May/June. It is pertinent to note that this is the most important determinant of profit.

Results and Discussions

Table 1 shows that the Type III crib is the costliest. This is as expected because cost differences exist in the manufactured materials used for the third type. It is ₦270.00 (two hundred and seventy cedis) costlier than Type I which is made of local materials and costing ₦1,155.00 (one thousand, one hundred and fifty five cedis). The increase in cost may however be justified by its durability. The extra cost might have been higher but for the reduction in labour cost when corrugated iron sheets are used for the roof rather than thatched and wooden mats. Type II crib is cheaper than Type I by ₦525.00 (five hundred and twenty five cedis) which is mainly the cost of obtaining locally available materials. Storage costs consist of the costs of depreciation of the cribs and the cost of applying insecticides. Drying costs are excluded because wet maize can be stored effectively in the crib. This is one of the various advantages of using the modern crib for storage.

In obtaining the storage costs, a straight line method of depreciation is used assuming that Types I and II last for 2 (two) years and Type III lasts for 4 (four) years. The cost of spraying insecticide is obtained by assuming 3 (three) rounds of spraying Actellic 25EC at the recommended dosage in one year.

It can be observed that the cost of applying insecticide to one ton of maize in the three different types of cribs is constant. Depreciation costs however vary from Type to Type. The two factors contributing to variation in depreciation therefore, the varying costs of each crib and their durability. Contingencies allow for any increases that might occur in quantities of material used and their prices as well as transportation costs. Storage costs for the second and third type of crib differ by ₦243.30. However, storage cost for Type I Crib is reduced by ₦288.75 compared to Type II crib, and by ₦45.45 when compared to Type III.

To convince the farmer of the high profitability and the necessity of storage, there must be evidence in pure figures in terms of money accruing to him. This is shown in Table 3.

The average weight loss of ten per cent is arrived at from the previous studies conducted on losses in storage of maize in cribs in Nigeria. Riley and Matheson (1960) and Adesuyi (1977) in their studies found that a maximum of 20 per cent insect damage occurred in maize stored in cribs and sprayed with insecticides. Caswell (1960) showed that weight loss is about 10 per cent of the percentage insect damage. Cornes and Riley (1961) estimated average moisture content loss to be 8 per cent. Total weight loss is therefore $10\% = (20\% - 8\%) = 10\%$.

It can be observed from Table 3 that the farmer makes a profit of ₦360.00 (three hundred and sixty) and ₦660.00 (six hundred and sixty cedis). The percentage profit varies between five and ten per cent. This is a lot of revenue in terms of many tons which the farmer produces.

For an entrepreneur who does not produce maize but wants to embark on the collection and storage for sales in urban areas, his profit margin can be obtained using urban market prices, as shown in Table 4. The net returns vary from ₦690.00 to ₦975.00 per ton.

TABLE I
MATERIALS AND COSTS FOR CONSTRUCTING THE VARIOUS TYPES OF
ONE-TON MODERN CRIBS

TYPE I		TYPE II		TYPE III	
	Cost in Cedis		Cost in Cedis		Cost in Cedis
Bamboo	--	Bamboo: Used as building frame and slated for the sides instead of wire-mesh 40 at €4.50	€180.00	Bamboo or tree stems: Used as building frame only	€135.00
Grass or Wood	--	Wood: Used for roofing 90 mats at €2.25 20 poles at €150.00	€202.50	Iron sheets: Used for roofing 12 sheets at €30	€360.00
Ropes	--	Ropes: for tying wooden mats and building frames	€75.00	Nails: for building frames and washers for roofing	€82.50
Cement	--	Cement: 1/2 bag	€10.50	Cement: 1/2 bag	€10.50
Labour: 2 men at €5.00 a day for 3 days	€30.00	Labour: 2 men at €5.00 a day for 3 days	€30.00	Labour: 2 men at €5.00 a day for 2 days	€20.00
Wiremesh	--	Wiremesh	--	Wiremesh: for the sides. 13 yds. at €30 per yd.	€390.00
TOTAL COST	€30.00		€528.00		€998.5

Average prices in the three states were used.

TABLE 2

STORAGE COSTS USING VARIOUS TYPES OF LOW COST CRIB

	TYPE 1	TYPE 2	TYPE 3
	Cost in Cedis	Cost in Cedis	Cost in Cedis
Depreciation of crib	¢315.00	¢577.50	¢356.25
Insecticide	¢118.80	¢118.80	¢118.80
	¢118.80	¢696.30	¢475.05
10% Contingencies	43.35	¢69.60	¢47.55
TOTAL	477.15	¢765.90	¢522.60

TABLE 3

REVENUE ACCRUING TO THE FARMER USING VARIOUS TYPES
OF CRIBS AND RURAL FARM GATE PRICES.*

	TYPE 1	TYPE 2	TYPE 3
	Cost in Cedis	Cost in Cedis	Cost in Cedis
108 baskets at c60.00 a basket at off-season	c6,480.00	c6,480.00	c6,480.00
108 baskets at c45.00 a basket at off-season	-c4,860.00	-c4,860.00	-c4,860.00
Returns due to storage	c1,620.00	c1,620.00	c1,620.00
Costs of storage	-c4,777.15	-c765.90	-c522.60
10% Weight loss (Using harvest season price)	-c486.00	-c486.00	-c486.00
Profit	c656.85	c368.10	c611.40
Percentage Profit	c152.10	c85.20	c141.45

*The prices used overlap in the three states and were observed to have negligible variations.

Conclusions and Recommendations.

The storage of maize in cribs has been found to be a highly profitable venture which is of great benefit to the farmer as well as the nation in terms of prevention of food losses.

One other factor that can increase the farmer/traders profit margin here is that sale is made by volume and not by weight. As such the 10% weight loss deficit may not be reflected in sale price..

The ability to store wet maize at the harvest period in these cribs, enables the farmer to harvest at high moisture content. This timely harvest reduces losses arising from late harvest and field pests. In addition, the farmer can start land preparations on time for a second cropping (late maize) in the year.

From the magnitude of revenue from the various types of cribs, it is advisable for the farmer to make use of suitable materials which he has grown on or around his farm. If however, he has to purchase materials, he should construct a crib made with manufactured materials making it a more permanent structure.

TABLE 4
REVENUE ACCRUING FROM STORAGE USING VARIOUS TYPES OF CRIBS AND URBAN
MARKET PRICES.*

	TYPE 1	TYPE 2	TYPE 3
	Cost in Cedis	Cost in Cedis	Cost in Cedis
Average market price of one ton of maize in May/June (off-season)	c9180.20	c9180.20	c9180.20
Average market price of one ton of maize in Sept/Oct	-c7020.00	-c7020.00	-c7020.00
Returns due to storage	c2160.00	c2160.00	c2160.00
Costs of storage	-c477.15	-c765.00	-c522.60
	c1680.00	c1680.00	c1680.00
10% Weight loss	-c702.00	-c702.00	-c702.00
Net Returns	c980.85	c692.10	c935.40

*Average market prices at the time of scarcity (May/June) and plenty (September/October) have been used.

To obtain profit, handling charges and transportation costs are to be deducted from the returns.

For an entrepreneur who does not produce maize, the time of purchase and sale are very critical. A few weeks delay may mean a loss rather than profit. Trends of market prices must also be observed very carefully.

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