Improvement of Postharvest Grain Systems

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GRAIN HANDLING, CONDITIONING AND STORAGE IN THE UPPER HUALLAGA AREA

KSU
KANSAS STATE UNIVERSITY

FOOD & FEED GRAIN INSTITUTE
MANHATTAN, KANSAS 66506

REPORT SUMMARY

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Authors: Cornelius Hugo and Harold Stryker

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SUMMARY STATEMENT

The objective of this technical assistance task was to assess the need for grain drying and storage facilities within the Upper Huallaga development area in order to satisfy the conditions precedent of the project. Recommendations regarding those needs are contained within this report. Also, additional training and technical assistance associated with such needs have been elaborated.

More specifically, grain drying facilities are recommended for Tingo Maria, Nuevo Progreso, and Tocache. Type, size, and specifications for these drying units are contained in appendices to this report. Specific technical assistance to go hand in hand with these facilities has been determined.

At this time no further grain storage construction is needed, however, another assessment of the situation is called for within two to four years

Additional training above and beyond those immediate needs are essential in order to strengthen the project in the vital area of postharvest management. Additional training to achieve this has been included.

Other complementary recommendations were developed and either included in this report or reported orally to relevant USAID//Lima and GOP officials.

GRAIN HANDLING, CONDITIONING AND STORAGE IN THE UPPER HUALLAGA AREA

Prepared by

Cornelius Hugo
and
Harold Stryker

for the

AGENCY FOR INTERNATIONAL DEVELOPMENT
UNITED STATES DEPARTMENT OF STATE

AID/DSAN-CA-0256
Improvement of Postharvest Grain Systems

at the

FOOD AND FEED GRAIN INSTITUTE
Kansas State University
Manhattan, Kansas 66506

Charles W. Deyoe, Director

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ACRONYMS AND SYNONYMS

CECOAH	Central de Cooperativas del Huallaga
CIPA	Centro de Investigación y Promoción Agropecuaria
ECASA	Empresa Comercializadora del Arroz, S.A.
ENCI	Empresa Nacional de Comercialización e Insumos
FFGI	Food and Feed Grain Institute
INIPA	Instituto Nacional de Investigación y Promoción Agropecuaria (antes INIA)
MA	Ministry of Agriculture
MTC	Ministerio de Transporte y Comunicación
OSE	Oficina Sectorial de Estadística
PEAH	Proyecto Especial Alto Huallaga
UNAS	Universidad Nacional Agraria de la Selva
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

The terms of reference called for an analysis of grain drying and storage requirements within the Upper Huallaga Project development area. Also, additional technical assistance and training in grain handling, conditioning, and storage needed to be identified and suggested.

The conclusions and recommendations are contained herein:

1. The state agencies of ECASA and ENCI should cease to handle rice (ECASA) and corn and soybeans (ENCI) as separate entities. This current situation results in duplicate facilities, personnel, costs, and high inefficient use of existing grain drying and storage facilities. Peak harvest periods for corn and rice do not coincide, therefore the flexibility associated with the joint use of the facilities for all grains should lead to a lower unit cost of grain handled. The points of sale for farmers would also increase thus facilitating grain delivery and reducing such costs to them.
2. It is recommended that ECASA (or the new joint agency) cease milling rough rice and incentives be given to the private sector to take over this processing function. There is no need for a lengthy explanation as to why this should be; efficiency, quality, pricing are some of the reasons.
3. By law, ECASA is supposed to be buying 100 percent of the paddy sold by farmers. However, there is every indication that this is not the case. A sizable parallel market exists which should be given the freedom to develop. ECASA's role in the region should be redirected to that of a minimum price support agency only.
4. A review of previous studies and an update of data and field information leads to the conclusion that no further grain storage facilities are needed at the moment or the near future (two to four years). Nevertheless, it

is imperative that greatly improved production information be gathered in order to discern these production trends early enough. Additional storage needs can be compensated with a better evacuation program and future grain storage studies should take that factor into consideration.

5. It is imperative that grain drying equipment be purchased as soon as possible and be put into place before the next harvest season. Also, a fully-qualified, Spanish-speaking technician should be hired to spend the next harvest season teaching and supervising grain drying operations and equipment maintenance.

6. The grain purchase policy used by ECASA and ENCI is based on discounting by weight. Such policy must be changed to a price discount policy reflecting drying costs once these dryers are installed. However, rather than leaving it as a discount or penalty type of purchasing policy it should be changed to an incentive-disincentive purchasing policy to encourage farmers to market a higher quality grain. These requirements can be tightened gradually over a number of years as farmers adopt better technologies and are able to satisfy these higher requirements.

7. It is essential that the moisture meters and hygrometers be calibrated periodically. It is recommended that the necessary equipment be purchased and installed with sufficient training at UNAS. All moisture meters in the jungle region can then be calibrated periodically. A small fee should be charged for this service.

8. One of the weakest technical aspects of grain conditioning and storage has to do with the lack of qualified personnel. It is recommended that a number of participants be sent to the 1983 Grain Storage and Marketing Short Course at Kansas State University under the condition that these participants return to conduct yearly short courses in the Upper Huallaga

area. Preparation and delivery of these in-country short courses can be backstopped by FFGI personnel if needed.

9. Upper Huallaga Project personnel involved in agricultural marketing and agribusiness development should also participate in the marketing portion of the above mentioned short course. It will be critical for the project staff to know at least some basic agricultural marketing and project analysis concepts if they are to supervise and judge such activities.

10. If necessary, points 5 and 6 above should be repeated to assure continuity of trained personnel and in-country short courses.

11. Very little is known about the postharvest grain systems in the Upper Huallaga area. It will be critical to learn more about the reasons and conditions of its existence if the small subsistence farmer is to derive a long-lasting benefit. Such research can be tedious and time consuming, yet very rewarding and beneficial. It is therefore recommended that two staff members of UNAS be sent abroad for graduate training in the areas of grain storage entomology and grain conditioning and storage engineering. Also, there is the need to train agricultural economists in the area of agricultural marketing if light is to be shed in this area as well. As a consequence one or two staff members of UNAS should take graduate degrees in this area.

The above staff members should return and conduct training, research, and assist in extension activities within the area of postharvest grain systems with emphasis on the farm level and farm-to-market segment.

I. INTRODUCTION

A. Request and Team Composition

The Mission of the United States Agency for International Development, USAID/Lima, requested the assistance of two specialists in the area of grain handling, conditioning, and storage and related training and technical assistance needs for the Upper Huallaga Development Project (AID Loan No. 527-T-077).

Under the currently funded Cooperative Agreement (AID/DSAN-CA-0256) with USAID/Washington, the Food and Feed Grain Institute (FFGI) responded by providing USAID/Lima with two specialists, Dr. Cornelius Hugo, Agricultural Economist, FFGI, and Mr. Harold Stryker, Engineer.

B. Terms of Reference and Time Frame

The terms of reference for the team are contained in Appendix A. Assistance was required for the development of recommendations for adequate drying equipment, storage, training, and further technical assistance needs for the sub-component of grain storage facilities required in the project area.

The team arrived in Lima on January 29, 1983. After initial briefing with USAID/Lima officials, Upper Huallaga Project officials, as well as Empresa Nacional de Comercialización e Insumos (ENCI) and Empresa Comercialización del Arroz, S.A. (ECASA) representatives, the team traveled by air to the project area on February 3, 1983. Accompanied by project and other government officials, the team traveled throughout the area reviewing and consulting with respective project and government agencies, cooperatives, private merchants, and farmers. The team returned by car to Lima on February 17, 1983. While in Lima, the team consulted further with government officials, manufacturers, and representatives of drying equipment and feed manufacturers. After final briefing with USAID/Lima and Upper Huallaga Project officials, the team departed for the U.S. on February 27, 1983.

II. UPPER HUALLAGA AREA

A. General Description

The Upper Huallaga area obtained its name from a river which drains this upper jungle region of Central Peru. Starting just below the city of Huanuco, Department of Huanuco, this valley opens up gradually as it looses altitude before reaching the Amazone region north of the city of Tocache, Department of San Martin.

Characteristically, this region is tropical in climate, vegetation, and soils. On the average, the annual temperature is within a range of 17°C-30°C between the minimum night and the maximum daylight temperatures. The average temperature is between 23°C-24°C.[1] The average annual precipitation for the area is around 2,400 mm with heavier rainfalls occurring during the rainy season of November through April. Also, the rainfall patterns tend to decrease in a south to north direction. Generally, the relative humidity is high, ranging between 80-95 percent.

The vegetation and soils of the area, though considered "tropical", are less defined, especially the soils. Nevertheless, when not in agricultural use the surface is covered with the jungle characteristic of these regions.

B. Agriculture[2]

The agricultural production pattern within this area is determined by the characteristics of a subsistence agriculture. In his attempt to minimize risk and limited by manpower and lack of "proper" technology and inputs, the farmer produces a range of products. Cereals produced include corn, rice, and a limited

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[1]Detailed climatic tables can be obtained from the Servicio Nacional de Metereologia e Hidrología.

[2]More detailed information regarding agriculture is contained in the Upper Huallaga Development Project Paper.

amount of soybeans.[1] Other subsistence crops include plantain, yuca, cowpeas, beans, bananas, and citric and other tropical fruits. The principal sources of cash are such crops as coffee, tea, cocoa, and coca.

Generally, farm size is very small ranging from 10-40 ha with an average size of 25 ha. However, since the predominant input is manual labor it tends to limit the extensiveness (and intensiveness) of the cultivated area to well below the average farm size (and average potential). Except for handtools, farmers may use some fertilizer when available. Improved seed varieties, insecticides, pesticides, are used less and infrequently. Agricultural machinery is essentially non-existent. Therefore, production per ha is less than the average achievable potential for the area.

Production of rice, corn, and soybeans has either remained constant or decreased since 1975. Though incomplete and subject to question as to their accuracy, area, yield, and production for rice, corn, and soybeans for the Upper Huallaga area have been summarized in Tables 1, 2, and 3. The production trend for corn and rice has "apparently" remained very flat or even decreased. From conversations with farmers and government officials it is known that soybean production has been reduced to zero.

C. Postharvest Systems

The postharvest systems for handling the marketable surpluses of the area are even less well-defined than the production phase. What is known is that the surplus moves out of the area toward the Sierra and Lima. However, information on postharvest handling at the farm level, farm evacuation, marketing channels, participants, prices and margins, seasonalities, time-place-form-possession utilities, etc., is non-existent.

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[1]This is the remnant of a campaign started in the 1970s to introduce and produce soybeans.

TABLE 1

Area, Yield, and Production of Rough Rice in the Upper Huallaga Area

Year	Department[1]	Area (ha)	Yield (kg/ha)	Production (MT)
1975[2]	Huanuco	N.A.	1,454	N.A.
	San Martin	1,922		2,794
	TOTAL			
1976	Huanuco	N.A.		N.A.
	San Martin			
	TOTAL			
1977	Huanuco	1,200	2,000	2,400
	San Martin	1,136	2,000	2,272
	TOTAL	2,336		4,672
1978	Huanuco	753	2,000	1,506
	San Martin	1,442	2,000	2,884
	TOTAL	2,195		4,390
1979	Huanuco	796	2,000	1,592
	San Martin	1,730	2,000	3,460
	TOTAL	2,526		5,052
1980	Huanuco	1,057	2,000	2,114
	San Martin	2,134	2,000	4,268
	TOTAL	3,191		6,382
1981	Huanuco	1,314	2,000	2,628
	San Martin	N.A.	N.A.	N.A.
	TOTAL			
1982	Huanuco	N.A.	N.A.	N.A.
	San Martin			
	TOTAL			

[1]Huanuco Department includes the Province of Leoneis Prado with the District of Aucayacu, Rupa Rupa, D.A. Robles, H. Valgizan, P. Luyando, M.D. Beraun, and Monzon. San Martin Department includes the Province of MCL, Caceres with the District of Uchiza and Tocache.

[2]Upper Huallaga Development Project, Project Paper, p. 20.

N.A. = Not available.

Source: OSE, Tingo Maria.

TABLE 2

Area, Yield, and Production of Yellow Corn in the Upper Huallaga Area

Year	Department[1]	Area (ha)	Yield (kg/ha)	Production (MT)
1975[2]	Huanuco	N.A.	2,210	N.A.
	San Martin	3,704		8,186
	TOTAL			
1976	Huanuco	N.A.	N.A.	N.A.
	San Martin			
	TOTAL			
1977	Huanuco	6,250	2,000	12,500
	San Martin	2,130	2,000	4,260
	TOTAL	8,380		16,760
1978	Huanuco	5,992	2,000	11,984
	San Martin	2,398	2,000	4,796
	TOTAL	8,390		17,780
1979	Huanuco	5,160	2,000	10,320
	San Martin	2,392	2,000	5,784
	TOTAL	8,052		16,104
1980	Huanuco	2,469	2,000	4,938
	San Martin	2,180	2,000	4,360
	TOTAL	4,699		9,298
1981	Huanuco	1,393	2,000	2,786
	San Martin	N.A.		N.A.
	TOTAL			
1982	Huanuco	N.A.	N.A.	N.A.
	San Martin			
	TOTAL			

[1]Huanuco Department includes the Province of Leoneis Prado with the District of Aucayacu, Rupa Rupa, D.A. Robles, H. Valgizan, P. Luyando, M.D. Beraun, and Monzon. San Martin Department includes the Province of MCL, Cacerez with the District of Uchiza and Tocache.

[2]Upper Huallaga Development Project, Project Paper, p. 20.

N.A. = Not available.

Source: OSE, Tingo Maria.

TABLE 3

Area, Yield, and Production of Soybeans in the Upper Huallage Area

Year	Department[1]	Area (ha)	Yield (kg/ha)	Production (MT)
1975[2]	Huanuco	N.A.		N.A.
	San Martin		594	
	TOTAL	229		136
1976	Huanuco	N.A.	N.A.	N.A.
	San Martin			
	TOTAL			
1977	Huanuco	64	1,500	96
	San Martin	38	1,500	57
	TOTAL	105		153
1978	Huanuco	55	1,500	82.5
	San Martin	50	1,500	75
	TOTAL	105		147.5
1979	Huanuco	51	1,500	82.5
	San Martin	123	1,500	184.5
	TOTAL	174		261.0
1980	Huanuco	91		136.5
	San Martin	103	1,500	154.5
	TOTAL	194		291.0
1981	Huanuco	117	1,500	175.5
	San Martin	N.A.		N.A.
	TOTAL			
1982	Huanuco			
	San Martin			12*
	TOTAL			

[1]Huanuco Department includes the Province of Leoneis Prado with the District of Aucayacu, Rupa Rupa, D.A. Robles, H. Valgizan, P. Luyando, M.D. Beraun, and Monzon. San Martin Department includes the Province of MCL, Caceres with the District of Uchiza and Tocache.

[2]Upper Huallaga Development Project, Project Paper, p. 20.

N.A. = Not available.

*ENCI bought these 12 tons during 1982.

Source: OSE, Tingo Maria.

The participation of the GOP through two separate and independent agencies makes the postharvest grain systems even more complex. The postharvest system for paddy and rice is handled by ECASA who is supposed to buy 100 percent of the paddy directly from farmers, store it, and process it before wholesaling it to the public. Other grains such as corn and soybeans are handled ENCI. However, unlike paddy the farmer has the option of selling his corn and/or soybeans to ENCI or any other private merchant.[1]

After hand harvesting and shelling the grains farmers will use sun drying whenever feasible. The grain is stored mostly in plastic bags of an approximate weight of 45-50 kg. Days, even weeks, may go by before farmers are either able or willing to sell their harvested grains. Grain quality tends to deteriorate as a combination of inadequate postharvest practices, marketing inefficiencies, and infrastructure bottlenecks.

D. Infrastructure

The problems of infrastructure have been well addressed in the Upper Huallaga Project document and a previous FFGI report.[2]

The Marginal Highway, with a few exceptional stretches, is very rough and unreliable. Lack of proper maintenance such as adequate gravel, drainage, and consistent maintenance makes it a very rough road which considerably shortens the life of vehicles. Also, predictable and unpredictable landslides lead to excessive travel times. Sometimes the road can be blocked for several days before machinery from the Ministry of Transport and Communications (MTC) is able to clear a passage. Also, a few bridges do not have the weight-carrying

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[1]A more detailed description of ECASA and ENCI activities is contained in Section IV.

[2]An Analysis of Grain Drying, Storage, and Marketing on the Upper Huallaga Area, Food and Feed Grain Institute, May 1981.

capacities or the original ones have been weakened. This situation forces heavy trucks to ford these rivers. This can only be done when these rivers are not swollen with rainfall.

Feeder roads are few and receive hardly any maintenance. Such few roads hinder the development of agricultural areas and their lack of maintenance contribute to excessive transportation costs.

III. UPPER HUALLAGA DEVELOPMENT PROJECT

The Upper Huallaga Project is located in the central jungle region of Peru. The project area covers portions of the San Martin and Huanuco Departments. Along the Marginal Highway, connecting the cities of Tingo Maria (in the Department of Huanuco) and Tocache (in the Department of San Martin), the project will exert its influence within a corridor of 40 km of either side of the highway.

A. Goal and Purpose[1]

The goal of the project is to further the socio-economic development of the Peruvian small farmers so as to increase the production and income of the rural population of Peru.

The purpose of this project is to establish a set of viable economic alternatives to coca production in the Upper Huallaga region of Peru while a concurrent massive coca eradication and control program is carried out.

In order to achieve such goal and purpose, the project will initiate and carry out a series of activities during its initial projected lifespan of five years. The Upper Huallaga Special Project Executive Directorate, under the direct jurisdiction of the Office of the President of the Council of Ministers, commonly known as the Prime Minister's Office, will be responsible for the supervision of those government agencies directly involved and responsible for carrying out these activities.

B. Project Activities

The project activities address a broad range of interrelated development constraints that inhibit the growth of incomes, production, and employment in the region. The project will address these constraints as follows:

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[1]Taken directly and summarized from the Upper Huallaga Development Project Paper.

1. The project will transfer high profit, high yield agricultural technology to farmers throughout the project area.

2. Applied research in crop, livestock, and foresting technology will be strengthened in the region.

3. A coordinated seed production, storage, and distribution system will be set up to assure that adequate quantities of seed are available to farmers when they need them.

4. Agricultural credit will be expanded to finance the increases in cash costs that will be associated with the projected growth in agricultural production in the region.

5. The project will finance an expansion of grain storage capacity to handle the growth in grain production that is anticipated in the project area.

6. The project will promote agroindustrial development in the region.

7. The Regional Forestry Office in the Upper Huallaga will be strengthened.

8. The existing road network, including the Marginal Highway and its supporting access and farm-to-market road system will be improved, expanded, and maintained.

9. To facilitate progress in other project activities, the project will finance a number of essential support services.

10. The Special Project Central Office will be established in Aucayacu with zonal offices in three other cities.

11. Grant funds will be used to finance the contracting of technical assistance.

These different activities will be implemented by different government agencies and institutions as well as private sector participants.[1] Again, the role of the Executive Directorate is supervisory in nature to guarantee proper implementation of the above mentioned activities.

C. Project Time Frame and Costs

The project was authorized on September 8, 1981, with an execution date of September 15, 1981. The Project Anticipated Completion Date (PACD) is September 30, 1986. The total authorized loan amount is $15 million with an additional grant of $3 million for a total of $18 million. The counterpart contribution to this project is $8.5 million.

D. Projected Production and Marketing Levels for Grains and Soybeans

Under the Upper Huallaga Development Project, a ten-year projection of production and marketing levels for rice, corn, and soybeans has been made. The production projections are summarized in Tables 4 through 6. These ambitious projections foresee more than tripling rice production over the 1979 levels within the next 5 years from 5,052 MT to 17,961 MT. The tenth year shows a final goal of 21,953 MT.

Corn production is projected to have nearly doubled by the fifth year of the project from 16,000 MT in 1979 to 26,000 MT and to have reached 33,000 MT by the tenth year. Finally, soybean production is expected to increase from 261 MT in 1979 to 5,661 MT in the fifth year and 6,644 MT in the tenth year.

The main marketing channels envisioned for rice and corn are ECASA and ENCI, respectively. Their marketing levels are summarized in Tables 7 and 8. It should be noted that ECASA is scheduled to buy 100 percent of the paddy produced and sold off the farms while ENCI is supposed to buy 73-94 percent of the marketable corn.

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[1]See Project Paper for details.

TABLE 4

Annual Program for Total Rice Production by Zone

(MT/year)

Zone		Year 1	2	3	4	5	6	7	8	9	10
1	Aucayacu	260	985	1,976	3,341	4,725	5,466	5,789	5,958	6,000	6,000
2	Tingo Maria	280	690	1,143	1,644	2,145	2,384	2,484	2,541	2,550	2,550
3	Uchiza	280	730	1,513	2,798	4,321	5,109	5,454	5,655	5,700	5,700
4	La Morada	120	350	612	900	1,200	1,380	1,450	1,488	1,500	1,500
5	Tocache	450	1,013	1,570	2,058	2,559	2,828	2,926	2,985	3,000	3,000
Sub-Total Rice		1,390	3,768	6,814	10,741	14,959	17,167	18,103	18,627	18,750	18,750
Cult. Intercropped		696	1,108	1,312	1,439	1,375	1,108	996	1,002	1,080	1,062
TOTAL PROJECT		2,086	4,876	8,126	12,180	16,334	18,275	19,099	19,629	19,830	19,812
Outside the Project		4,456	4,090	3,379	2,550	1,627	1,462	1,608	1,679	1,947	2,141
TOTAL		6,542	8,966	11,505	14,730	17,961	19,737	20,707	21,308	21,777	21,953

Source: Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga.

TABLE 5

Annual Program for Total Corn Production by Zone

(MT/year)

Zone		Year 1	2	3	4	5	6	7	8	9	10
1	Aucayacu	450	1,186	1,996	2,872	3,768	4,214	4,374	4,460	4,480	4,480
2	Tingo Maria	300	774	1,046	1,440	1,724	1,842	1,894	1,916	1,920	1,920
3	Uchiza	413	1,045	1,880	2,982	4,193	4,757	4,977	5,095	5,120	5,120
4	La Morada	150	412	650	908	1,118	1,220	1,258	1,276	1,280	1,280
5	Tocache	413	1,008	1,527	1,899	2,202	2,329	2,375	2,396	2,400	2,400
Sub-Total Corn		1,726	4,425	7,099	10,101	13,005	14,362	14,878	15,143	15,200	15,200
Cult. Intercropped		381	1,127	1,956	2,796	3,539	3,461	2,983	3,093	3,233	3,254
TOTAL PROJECT		2,107	5,552	9,055	12,897	16,544	17,823	17,861	18,236	18,423	18,454
Outside the Project		8,640	8,735	9,078	9,198	9,371	10,094	11,102	12,212	13,434	14,777
TOTAL		10,747	14,287	18,133	22,095	25,915	27,917	28,963	30,448	31,857	33,231

Source: Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga.

TABLE 6

Annual Program for Total Soybean Production by Zone

(MT/year)

Zone		Year 1	2	3	4	5	6	7	8	9	10
1	Aucayacu	96	308	622	1,093	1,611	1,886	2,004	2,073	2,090	2,090
2	Tingo Maria	48	118	244	496	626	790	842	866	880	880
3	Uchiza	104	261	540	890	1,471	1,760	1,878	1,960	1,980	1,980
4	La Morada	48	134	230	336	446	508	532	546	550	550
5	Tocache	118	300	502	724	953	1,064	1,111	1,138	1,144	1,144
Sub-Total Soybeans		414	1,121	2,138	3,539	5,107	6,008	6,367	6,583	6,644	6,644
Cult. Intercropped		-	130	320	442	554	168	-	-	-	-
TOTAL PROJECT		414	1,251	2,458	3,981	5,661	6,464	6,535	6,583	6,644	6,644
Outside the Project		19	-	-	-	-	-	-	-	-	-
TOTAL		433	1,251	2,458	3,981	5,661	6,464	6,535	6,583	6,644	6,644

Source: Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga.

TABLE 7

Annual Rice Production to be Marketed by Zone

(MT/year)

Zone		Year 1	2	3	4	5	6	7	8	9	10
1	Aucayacu	1,224	2,344	3,336	4,582	5,673	6,284	6,622	6,815	6,969	7,025
2	Tingo Maria	1,318	1,642	1,930	2,255	2,586	2,741	2,841	2,907	2,962	2,986
3	Uchiza	1,318	1,737	2,555	3,837	5,188	5,874	6,239	6,469	6,620	6,674
4	La Morada	564	833	1,033	1,234	1,441	1,587	1,659	1,702	1,742	1,756
5	Tocache	2,118	2,410	2,651	2,822	3,073	3,251	3,346	3,415	3,484	3,512
TOTAL TO BE MARKETED		6,542	8,966	11,505	14,730	17,961	19,737	20,707	21,308	21,777	21,953

Source: Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga.

TABLE 8

Annual Corn Production to be Marketed by Zone

(MT/year)

Zone		Year 1	2	3	4	5	6	7	8	9	10
1	Aucayacu	3,708	4,605	5,692	6,492	7,079	7,252	6,865	7,425	7,971	8,505
2	Tingl Maria	2,473	3,005	2,983	3,255	3,239	3,170	2,973	3,190	3,416	3,645
3	Uchiza	3,403	4,057	5,361	6,741	7,877	8,186	7,812	8,481	9,110	9,721
4	La Morada	150	412	650	908	1,118	1,220	1,258	1,276	1,280	1,280
5	Tocache	413	1,008	1,527	1,899	2,202	2,329	2,375	2,396	2,400	2,400
TOTAL TO BE MARKETED		10,147	13,087	16,213	19,295	21,515	22,157	21,283	22,768	24,177	25,551

Source: Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga.

Finally, no marketing mechanisms and levels are identified for soybeans. It is therefore assumed that ENCI is scheduled to purchase the surplus of all marketable soybeans.

IV. GRAIN HANDLING AND STORAGE FACILITIES

A. Conditions Precedent

The required conditions for the grain storage activities, Section 5.7 of the Agreement between the GOP and the U.S.A., call for the inclusion of "engineering plans for the construction of the grain storage facilities; a procurement plan for the grain storage equipment needed to implement this component; and a plan which details the administrative organization of the storage facilities, including the number of personnel required and their duties and responsibilities."

B. Grain Handling and Storage Facilities

The existing facilities for handling, conditioning, processing, and storage of grains and legumes in the Upper Huallaga development area are located in four major urban centers along the Marginal Highway.

The static grain storage capacities by type and owner are given in Table 9. Of a total of 11,407 MT, only 1,000 MT are in bulk (this storage capacity is being installed at Tocache by ECASA). Also, ECASA and ENCI have a total of 8,000 MT, Central de Cooperativas Agrarias del Huallaga (CECOAH) a total of 1,455, and identified private a total of 252 MT.

The above storage capacity does not include (1) 70 MT currently used by ECASA at Tocache as a retail center, (2) approximately 400 MT being installed at a private rice mill in the Centro Poblado del Limon (8 km outside Tocache) by a private entrepreneur (Mr. Jose Salazar), and (3) other private storage facilities (bag) mentioned to the team but unable to substantiate with on-site inspections.

Except for the 1,000 MT being installed by ECASA at Tocache, all storage is flat warehouse space. These warehouses are generally adequate to protect stored grain from the elements but none are bird and rodent proof.

TABLE 9

Grain Storage Capacities in the Upper Huallaga Development Area

(MT)

	Locations					
Agency	Tingo Maria	Aucayacu	Uchiza and Progreso	La Morada	Tocache	Total
ENCI	2,000		1,500		1,550	5,000
ECASA	2,000				1,000*	3,000
MA		500	500	400	300	1,700
CECOAH		1,305			150	1,455
Other	252					252
TOTAL	4,252	1,805	2,000	400	2,950	11,407

Notes: Above figures compiled from previous FFGI report, MA figures, and own observations.

*All capacities are for flat warehouses except for the 1,000 MT being built by ECASA at Tocache which is for bulk storage

The grain drying facilities in the area are few and in different states of disrepair (see Section IV-D). The location, type, and capacity of these drying facilities are summarized in Table 10. At Tingo Maria, ECASA has an installed drying capacity of 9.2 MT with a total drying capacity of 2 percent moisture reduction in 2.5 hours and 10 percent moisture reduction in 12.5 hours.[1]

At Aucayacu, CECOAH has a dryer capacity of 5 MT for rice or 6.5 MT for corn with a 4 percent moisture reduction in 2.5 hours. Finally, at Tocache, ECASA is installing a dryer capacity of 2.5 MT with a 4 percent moisture reduction in 1.0 hour. In the same vicinity of Tocache, CECOAH has the same type and capacity of dryers as ECASA in Tingo Maria. Additionally, CECOAH has one German-made dryer at Tocache with the same specifications as those in Aucayacu (see Table 10).

The grain processing facilities are essentially limited to a few rice mills. Their location, ownership, capacity, and brand is summarized in Table 11. Total identified capacity amounts to 4,680 MT/hour rough rice basis of which 80 percent is in the hands of cooperatives or private entrepreneurs. Other minor mills (100 kg/hour or less) were indicated to be in the hands of other private people in the area. This information could not be substantiated with on-site inspections due to lack of time.

Other grain processing equipment identified includes (1) a corn sheller at Tingo Maria (CECOAH) of unknown capacity (minor), (2) a corn sheller of 3 ton/hour at Aucayacu (CECOAH), (3) a feed mill of 1 ton/hour at Aucayacu (CECOAH), (4) an oil extraction facility of unknown capacity (minor) at Aucayacu (CECOAH), and (5) a corn sheller and rice thresher of minor capacities at Tocache owned by a Swiss, Julio Brunner (he rents this equipment to farmers).

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[1]Were not operational at time of visit.

TABLE 10

Grain Drying Capacities in the Upper Huallaga Development Area

A. Tingo Maria

1.	ECASA:	Four (4) oil-burning SATAKE batch dryers, model MDR-230. Maximum dryer capacity 2,300 kg/dryer. Drying capacity per dryer: 2% moisture reduction in 2.5 hours 4% moisture reduction in 5.0 hours 6% moisture reduction in 7.5 hours 8% moisture reduction in 10.0 hours 10% moisture reduction in 12.5 hours
2.	ENCI:	None
3.	Cooperatives:	None
4.	Private:	None

B. Aucayacu

1.	ECASA:	None
2.	ENCI:	None
3.	CECOAH:	Four (4) oil-burning, German-made batch dryers. Maximum dryer capacity: 5,000 kg of paddy/dryer or 6,500 kg of corn/dryer. Drying capacity per dryer: 4% moisture reduction in 2.5 hours
4.	Private:	None

C. Nuevo Progreso

No dryers have been installed at this site by anyone.

D. Tocache

1.	ECASA:	Installing a new rice conditioning and storage facility. Drying capacity is 2.5 MT, 4% moisture reduction in 1.0 hour
2.	ENCI:	None
3.	CECOAH:	a. Four (4) oil-burning SATAKE batch dryers, model MDR-230. Maximum dryer capacity: 2,300 kg/dryer Drying capacity per dryer: 2% moisture reduction in 2.5 hours 4% moisture reduction in 5.0 hours 6% moisture reduction in 7.5 hours 8% moisture reduction in 10.0 hours 10% moisture reduction in 12.5 hours b. One (1) German-made, oil-burning batch dryer. Maximum dryer capacity: 5,000 kg of paddy or 6,500 kg of corn. Drying capacity: 4% moisture reduction in 2.5 hours

TABLE 11

Rice Milling Capacities in the Upper Huallaga Development Area

(MT/hr rough rice basis)

Location	Owner	Capacity	Brand
Tingo Maria	ECASA	1 T/hr	SATAKE
	Private	60 kg/hr	Figueira (Brazil)
	CECOAH	120 kg/hr	? (only dehuller)
Aucayacu	CECOAH	1 T/hr	SATAKE
Tocache	CECOAH	1 T/hr	SATAKE
	Private[1]	1.5 T/hr	Republic of China

[1]Owner Mr. Jose Salazar.

C. Grain Marketing Activities

Except for the activities of the government agencies, ECASA and ENCI, very little is known about the functions and performances of the different postharvest grain systems (as well as other postharvest systems) in the Upper Huallaga region. Their characteristics (descriptive) and performance (efficiency and effectiveness) need to be analyzed in depth as part of the agribusiness development component of this project due to the need for a private alternative to the present form of participation and intervention of the GOP through its state agencies.

This subsection will address, in accordance with the terms of reference, the postharvest grain activities of ECASA and ENCI which are similar in nature yet very different in certain key aspects. The observations are therefore recommendations that apply only to the Upper Huallaga region.

ECASA has been entrusted with the purchase of paddy, rice conditioning, storage, and subsequent milling and sale of milled rice to the public. According to the "reglamentos de Comercialización del Arroz"[1] ECASA must by law purchase all paddy sold by farmers. These farmers must be properly identified as such by the Regional Office of the Ministry of Agriculture (MA). The paddy is bought according to regulations and discounts (by weight) are applied to the published public price for moisture and foreign material contents. Such discounts range between 0.5 and 5 percent for foreign materials and between 14 and 22 percent for moisture. Paddy exceeding these limits will have to be cleaned and/or dried by the farmer at his own cost before delivery of such paddy is accepted. No other quality measures are taken.

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[1]See Appendix B.

The farmer is given a check which he can cash at the Banco de la Nación or the Banco Agrario. Such payments are subject to credit repayment deductions by the banks for any agricultural credit outstanding.

The paddy is sold predominantly in plastic bags weighing approximately 45-50 kg. The paddy is stored as received at different moisture and foreign material levels with pest management control "applied as needed". Drying takes place prior to the milling process in order to obtain a desirable moisture content of 14 percent. Once the paddy has been milled it is sold to the public in sacks of 45 kg.

In areas of Aucayacu and Tocache, where ECASA does not have its own milling operation, the paddy is milled by private mills for ECASA under a quota system. This procedure could not be observed by the team thus making quality comparisons of milled rice impossible.

Paddy and rice are bought and sold at fixed subsidized prices set by the GOP. Paddy is bought at S 291/kg before discounts for moisture and foreign materials are taken. Milled rice is sold under two quality classifications, "corriente" for S 298/kg and "superior" for S 482/kg. The "superior" rice is brought into the Upper Huallaga area by ECASA.

ECASA's purchasing activities within the area covered by the Upper Huallaga project are summarized in Table 12. During the last 3 years ECASA purchased a maximum of 2,700 MT in 1981. Since no other data were available before this time it was very difficult to analyze the trend. Nevertheless, in 1980 (the only year comparisons can be made with the data at hand), its purchases amounted to 34 percent of paddy production. Assuming a similar 1981 production level of rough rice, ECASA would have purchased 43 percent of it. These figures may indicate an active and sizable parallel private market not captured by ECASA.

TABLE 12

ECASA

Purchases of Rough Rice in the Upper Huallaga Area

(kg)

Year	Tingo Maria	Aucayacu	Tocache	Total
1980	886,204	104,704	1,171,614	2,162,522
1981	347,048	270,387	2,110,086	2,727,521
1982	.157,765	263,415	1,606,793	2,027,973

Source: Informe de Compras Mensuales de Arroz Cascara, Appendix F.

ENCI, on the other hand, functions more as a minimum price support agency in order to encourage higher production of corn and soybeans. Unlike paddy, corn marketing is not restricted to ENCI alone and farmers may sell in the open market. Nevertheless, ENCI is supposed to buy corn and soybeans only from properly identified farmers.

Discounts given for high moisture and foreign material contents are similar. Discounts by weight are applied for impurities when they are in the range of 3-5 percent. Similarly, moisture content is discounted between 14 and 18 percent. Corn or soybeans exceeding such limits are not accepted and will have to be dried and/or cleaned by the farmer at his own cost before delivery. Again, no other quality measures are taken.

When received, predominantly in plastic bags weighing 45-50 kg each, the grain is stacked without separating according to moisture and/or impurities. On each layer of sacks a copious amount of Malathion (4 percent) is applied in powder form. The grain is kept in storage until transportation by truck to Lima is arranged. Subsequently, such corn and soybeans are sold to feed manufacturers at a subsidized price and subject to the standard specification. Farmers are paid in the same manner previously mentioned.

Corn is bought at a subsidized price of S 175/kg before any discounts are considered. It is sold at the same subsidized price to feed manufacturers. Therefore, ENCI incurs all handling, storage, and transport costs.

ENCI's activities in corn and soybeans are summarized in Tables 13 and 14, respectively. Again, available data is not sufficient to draw any conclusive results. However, purchases of yellow corn peaked during the 1980-81 season. A comparison of the amounts purchased during the 1979-80 season shows ENCI's procurement to be 14 percent of the production of yellow corn. Like rice procurement by ECASA, corn procurements by ENCI seemed to be declining reflecting

TABLE 13

ENCI

Total Inflow and Deliveries of Yellow Corn

(kg)

Year	Site	Total Inflow[1]	Deliveries	Balance[2]
1979-80	Naranjillo	593,529	580,740	12,789
1980-81	Naranjillo	3,018,664	2,871,556	147,108
1981-82	Naranjillo	809,165	786,139	23,026
1979-80	Nuevo Progreso	-	-	-
1980-81	Nuevo Progreso	1,218,503	1,134,504	83,999
1981-82	Nuevo Progreso	1,295,070	1,234,224	60,846
1979-80	Tocache	841,939	794,757	47,182
1980-81	Tocache	1,664,401	1,572,751	91,650
1981-82	Tocache	1,448,019	1,406,761	41,258

[1]Total inflow refers to site purchases plus transfers. Only Naranjillo has had transfers.

[2]Balance is actual loss due to moisture and other shrinkage.

Note: See Appendix D for detailed monthly purchases, transfers, and deliveries.

TABLE 14

ENCI

Total Inflow and Deliveries of Soybeans

(kg)

Year	Site	Total Inflow[1]	Deliveries	Balance[2]
1979-80	Naranjillo	6,214	6,204	10
1980-81	Naranjillo	55,737	55,092	645
1981-82	Naranjillo	-	-	-
1979-80	Tocache	8,332	8,540	(208)
1980-81	Tocache	22,229	22,137	92
1981-82	Tocache	43,563	43,681	(118)
1982-83	Tocache	12,000[3]	?	?

[1]Total inflow refers to site purchases plus transfers. No site has had transfers.

[2]Balance is actual loss due to moisture and other shrinkage.

[3]These 12 MT were in store at Tocache.

Note: See Appendix E for detailed monthly purchases, transfers, and deliveries.

either a decline in actual purchases (assuming a more or less level percentage of purchases each year) or an overall decline in corn production (more likely).

Since ENCI's warehouses do not have a carryover stock from one season to the next an annual shrinkage is estimated from the information obtained (see Appendix D). This shrinkage has ranged from 2.15 percent of the volume handled to nearly 7 percent in yellow corn. A loss rate of 2 percent is acceptable but anything above 3 percent is subject to question. In soybeans the loss rate is sometimes positive (more delivered (sold) than purchased). These "positive" losses are due probably to a lack of drying facilities, inadequate sampling, weighing, and grading procedures, unadjusted inventories for standard shrinkage, and inadequate grain storage management.

A final indication of commercial movement of corn is given in Table 15 which summarizes the amounts of corn shipped out of the area through Tingo Maria. The steeply decreasing trend can only be explained by a rapidly increasing local consumption of corn, a rapidly decreasing production of corn, or a combination of both. Most likely this decreasing trend is due to rapid decline of corn production in that area. Nevertheless, this last statistic is highly questionable in terms of its accuracy and reliability.

D. Individual Site Inspection of Grain Facilities

This subsection summarizes observations gathered during on-site visits to grain handling and storage facilities within the project area.

1. Tingo Maria

A few km north of Tingo Maria, at Naranjillo, ENCI has a total of 2,000 MT of storage capacity composed for 4 warehouses of 500 MT each. Auxiliary buildings contain the offices and the house of the local warehouse manager. The road to the facility is satisfactory.

TABLE 15

Shipments of Yellow Corn from the Upper Huallaga Area

(kg)

Year	Quantity
1976	11,655,209
1977	11,911,534
1978	9,181,707
1979	5,356,212
1980	2,307,744
1981	1,890,000
1982	1,489,000

Source: Estadísticas Agropecuarias de la Region del Alto Huallaga, OSE, Nº 01-82.

The driveway and area for truck movement inside the fenced area has a rock base with good drainage. There is sufficient space for future expansion. Though the metal warehouses are suitable for grain storage they are not bird and rodent proof. A small generator is available for power needed at the office and house. There are no dryers at this facility.

All grain comes in small trucks or pickups and is bought according to regulations (see Appendix C). Over 90 percent of the grain is sacked in tightly-woven plastic bags. The grain is sampled on the truck in a non-representative manner. The sample is subdivided with a BORD divider. The divider is not level. Screen-type sieves are available to test for impurities but they are not used. Impurities are separated by hand and percentage established by looking at the separation. From an original sample of 1 kg a 100-gm sample is tested for moisture in a European-made moisture tester which has not been calibrated since it was purchased. Instead of using the available Triple Beam Balance Scale, a hand-held 100-gm scale is used to obtain the sample for the moisture tester. No other quality measures are taken. If the grain is accepted the bags are unloaded on a portable 500-kg scale in the warehouse, then stacked for storage. Each layer of sacks receives a copious amount of powdered Malathion (4 percent). It is applied with bare hands and without protective equipment. The grain is stored without segregation at various moisture and impurity levels. According to the warehouse manager the grain has not remained in these warehouses more than four to six months.

If the grain is not accepted because of moisture above 18 percent, the farmer has to sun dry it to 18 percent or less. This is done on the premises using a long, narrow concrete slab. Up to three days may be needed to dry the grain depending on initial moisture level and weather conditions. The farmer pays for labor at a rate of S 3,000/day plus 3 meals.

All the corn checked had the appearance of #2 U.S. grade (not considering moisture as a grade factor). Although the appearance was good there was some evidence of heating. Every inspected sample had a musty odor and slight growth of fungi on some kernels. There was evidence of insects and larvae, however, a ENCI official stated that the ultimate buyer had little concern for insects since corn sold was milled for animal feed.

An interview with one farmer disclosed he had brought 9 MT of corn to ENCI from a distance of approximately 90 km. He revealed some of the difficulties faced by farmers when merchandising their commodities. Believing his grain to have 18 percent moisture or less at his farm it tested 19.5 percent at ENCI. The grain was rejected and had to be sundried by the farmer at his own expense and time on the concrete walkways surrounding the warehouses. A sudden rain would have forced him to gather up his grain quickly to protect it from gaining moisture. He spent two days drying his grain in this manner. It is not uncommon for farmers to spend 2-5 days trying to lower the moisture content down to 18 percent or less in this manner.

The inventory control system is a simple in-out system on a daily basis. It is summarized weekly, monthly, and yearly. No adjustments for moisture content are undertaken and no standard shrinkage is applied. Losses of between 2.15 and 4.89 percent (see Appendix D) of volume handled were calculated from inventory records obtained.

Farmers are paid with a check they can cash at the local Banco de la Nación or Banco Agrario. It has happened that such checks cannot be cashed due to lack of ENCI's funds at the bank.

The facilities of ECASA are located within the city limits of Tingo Maria, boxed in within a residential area without possibility of expansion.

The access street to the plant is narrow. Within the confine of the walled area there is limited space for large truck movement. A semi-truck cannot enter the plant.

Paddy is bought only from farmers according to the regulations (see Appendix B). Again farmers are paid with a check which is subject to credit repayment deduction when it is cashed at the local bank.

At an initial meeting with the plant manager we were told that the rice mill operates 20 hours per day milling 1 ton per hour for 11 months out of the year. The preferred moisture content for milling was stated to be 14 percent for the rough rice. The head yield was given to be 66-68 percent depending on the variety, with 22 percent broken kernels. It was indicated that the drying capacity of the dryers did not supply enough dried paddy for the milling rate of the mill.

An inspection of the four dryers and rice mill was undertaken. It appeared none of the dryers had been used for some months evidenced by dust collection in the burners, fans, and pulleys. As a matter of fact, the dryers were being completely by-passed and the paddy was being milled at various moisture levels above 14 percent.

The rough rice we examined being fed into the mill was dark, there had been heat damage, some kernels were moldy, and there were kernels that had sprouted. All rough rice had a musty odor of mold. It was very poor quality.

As a consequence of high moisture, bad initial rough rice quality, and a rice mill with obvious maintenance deficiencies, the quality of the milled rice was extremely poor. There was more than 22 percent broken kernels, with uneven polishing on whole kernels. The milled rice also had the musty odor of mold. Such rice is questionable for human and perhaps animal consumption.

The rice mill was powered by a flat belt from a diesel motor. All of the mill machinery was driven by the same source by line shafts.

The cleaner, elevators, dryers, and mill showed a long history of lack of maintenance and control. This was evident from the lack of use of the dryers, missing pulleys, belts, holes in the ducts, and certain parts of the mill (such as a separator) which were no longer functioning. Also, there was no evidence of quality control of moisture samples of rough rice or milled rice sampling.

The warehouses themselves were sufficient to protect the paddy and the rice from the elements. However, neither warehouse was bird or rodent proof. A lot of trash, unused sacks, and other materials were stored within the warehouses. Also, milled rice was stored adjacent to rough rice.

In the second warehouse, a moderate-sized pile of milled rice was being fumigated with methyl-bromide. The plastic used to cover the pile was separated from the floor at several places due to a total lack of sand snakes. In the meantime workers were unloading a truck in the vicinity of this fumigated rice lot.

2. Aucayacu

The facilities at CECOAH were inspected. Started some seven years ago by Father Andres Godin (who now works at the Canadian Embassy), this service cooperative provided custom services for its members in (a) rice drying and milling, (b) corn shelling, (c) feed manufacturing, and (d) oil expelling. Since Father Godin's departure some years ago the machinery and services have deteriorated to the point where only the rice drying and milling services are being provided. The other machinery has either deteriorated and/or otherwise been disposed of so that extensive renovation will be required in order to operate such equipment.

This facility is milling rice for ECASA under a quota system. In 1983 they milled 1,500 MT of paddy at S 23/kg milled. In past years they have milled up to 2,000 MT of paddy. They hope to continue milling rice for ECASA.

It is obvious that these facilities have not been adequately maintained and this lack of maintenance has taken its toll. Except for the small storage bins, the storage facilities are not adequate for storing grains.

Since the whole facility had shut down for repairs and maintenance the team could not observe actual drying and milling activities.

3. Nuevo Progreso

At this site only ENCI and MA have grain storage facilities. ENCI's facilities are a duplication of those at Tingo Maria (1,500 MT). These facilities had been used during the last two years but "lack" of funds prevented ENCI from using it during the 1982-83 season. Therefore, these facilities were totally empty.

The MA has a warehouse in usable condition of approximately 24 m x 48 m. The floor is rough but the use of pallets can overcome this problem. This facility can be used to store grain and its access is adequate. It is located approximately 300 m from the Marginal Highway.

4. Tocache

Several facilities at Tocache were visited. ENCI has again duplicated a 1,500 MT grain storage facility without dryers. Access to this facility is nearly impossible due to the conditions of the access road. Water, mud, and deep, water-filled potholes prevented our vehicles from entering. The fenced-in area was inundated by water, preventing farmers from using it for grain drying.

The procedure for receiving grain is the same. However, this warehouse has only one manager who is not allowed to write a check to the farmer. Such check must be sent to Tingo Maria for approval, a procedure which adds another 15-20 days before the farmer can cash in his check.

Due to the bad situation outside the warehouses one of them was being used for drying grain. Also, the application of Malathion (4 percent) was observed. Excessive amounts of it were applied on each layer of sacks with bare hands and without any other protective measures being taken.

Some high moisture corn had been there for three months and its quality, without proper drying, will deteriorate. Normally, these facilities store grain for 6 months out of 12.

A considerable amount of time was spent talking to farmers who were delivering corn. The following is a summary of their complaints: (1) transportation costs are too high, eroding their profit margin to a considerable extent; (2) the minimum price support of S 175/kg is too low to make corn growing profitable; (3) they need a place to dry their grain in case it fails to meet ENCI's requirements; (4) checks should be approved at Tocache since they cannot wait 15 days or more for approval from Tingo Maria; (5) sacks must be made available to them (this is done at Tingo Maria); (6) access roads to the warehouse and patios must be improved; (7) they do not understand moisture content given as a percentage, for them grain is either wet or dry. This creates misunderstanding and mistrust in the grading process.

Finally, one Sectorista who participated in the 1975 campaign to introduce soybeans to the area stated that the failure of this campaign was due to the lack of market outlets for soybeans. Consequently, there is no production of soybeans in the area.

At the moment, ECASA's facilities for storing paddy and rice are limited. Within the city of Tocache, ECASA has rented a small warehouse which is used as a retail store for milled rice. Approximately 70 MT can be stored there. ECASA is selling rice "corriente" at S 298/kg and rice "superior" at S 482/kg. The quota imposed on ECASA at Tocache is 49 MT per month which apparently is creating an artificial scarcity of milled rice in the area. We were told that 1 kg of milled rice was selling for S 1,000/kg about 20 km from Tocache. The "superior" rice was not selling well at all and apparently had been brought in from Lima.

ECASA stores paddy in a MA warehouse outside Tocache. The warehouse is satisfactory but not rodent and bird proof. With very few alterations it could be utilized to unload trucks under a existing roof. The paddy was piled against walls approximately 4 m high. Approximately 80 MT was in storage, purchased since January 12, 1983. Inspection of the top layer of sacks showed that the rice had not been properly dried. Therefore, in conditions of high ambient temperature and high ambient relative humidity, rice or grain will begin to mold and heat damage will occur.

ECASA is building a new rice drying and storage facility outside Tocache (2 km). The construction site was inspected and the basic design, which had 4 foundations for 4 silos of 1,000 MT each, was reviewed. Though a dryer is going to be installed the team was unable to find any design or specifications for drying and aeration.

This situation was partially explained to the team upon returning to Lima. According to ECASA officials only one 1,029 MT silo will be built. Specifications call for a grain loader, thermocouples, and aeration. No further details could be obtained.

The dryer is a 2.5 MT/hour dryer with a 4 percent moisture reduction per hour. All equipment is made in Brazil by Vitoria.

The training of the personnel is estimated to last 10-15 days after construction is completed. No further training is planned.

The local CECOAH rice drying and milling facility was visited. Four dryers, Satake Model MDR-230, are functional. These dryers are the same used by ECASA at Tingo Maria. The mill was not in operation but a milled rice sample taken was of good quality and had no musty or moldy grain odor. Apparently this cooperative milled rice only for it members on a custom basis.

A privately-owned rice mill of 1.5 MT/hour was visited at the Centro Poblado del Limon, approximately 8 km from the new ECASA facilities. This is a new facility of practical design. It was clean and very well maintained. It is owned by Mr. Jose Salazar who apparently has several of these mills in the jungle region. Unfortunately, the team was unable to make contact with him.

This mill apparently operates under a quota system for ECASA. The exact arrangements could not be established. Apparently ECASA sends personnel to the site where paddy is purchased from farmers and turned over to the mill for processing. At the time of inspection no rice was being milled. However, apparently the same problem exists here as in Tingo Maria for milling damp rough rice of poor quality, since no drying facilities are available.

V. REQUIREMENTS AND RECOMMENDATIONS FOR GRAIN DRYING AND STORAGE FACILITIES

A. General Comments

Prior to starting our conclusions and recommendations it will be helpful to briefly review some comments pertinent to the postharvest grain system in the Upper Huallaga area.

1. Postharvest Grain Systems

The near total lack of information and knowledge about the postharvest systems in the Upper Huallaga area represents both a problem and an opportunity. As alluded to in other sections of this report, except for the activities of ENCI and ECASA, very little is known (statistics, description, utility, efficiency, effectivness, or otherwise) about grain handling, conditioning, storage, transport, and processing once it is harvested. The associated activities of financial needs and credit are also unknown.

This lack of knowledge about the postharvest grain systems stretches all the way from the farm level through the intermediate steps that carry these commodities to consumption or export.

The opportunity associated with the above problem rests with the ability of this project to shed more light (or some light) onto this situation. Again, this can be achieved through certain components of the project with proper instruction and guidance. The statistical analysis component through Oficina Sectorial de Estadística (OSE) and the Sectoristas can provide valuable farm level information. Project personnel themselves, especially those associated with agricultural marketing and agribusiness development, could also gather data regarding off-farm postharvest grain systems. In this manner a composite picture could be established describing the functions, behavior, and performance of the postharvest grain systems within the project area.

2. Bag versus Bulk

The postharvest grain systems in the area are exclusively handled with bags. Grain is both stored (with one exception) and transported in bags. While some paddy and rice does apparently move outside the region, corn is transported by ENCI to the Lima area.

Bulk transportation from ENCI plants to Lima would be impractical because it would require trucks with grain tight boxes with covers to keep the grain dry. Also, hopper bottom bulk carriers should not be considered because they would be limited to bulk with no opportunity for backhaul. A bulk load would be very difficult or impossible to divide if several buyers were to purchase a share of a 20 MT bulk truckload.

Bulk storage in the region would only make sense at a point within the postharvest system where some change in form of the product will take place, for example a rice mill. Also, there would have to be a minimum level of activity before a bulk handling facility can be justified.

3. Bag versus Bulk Drying

Bag drying should not be considered for rice, corn, and soybeans. The predominance of polyethylene sacks with such a tight weave would restrict the airflow through the grain. This predominance is partially due to the cost advantage of these sacks over jute. Therefore, it seems prudent to assume that farmers will continue to use them.

4. Alternatives for Grain Drying

Many alternatives for grain drying were examined before arriving at the recommendation contained in this report.

A system using conventional dryers was considered. Any dryer, batch or continuous flow, would require cup elevators or grain augers powered by electric motors. Bulk holding silos might be required depending on the type of dryer purchased.

It would be necessary to purchase an electric generator to provide electricity for the dryer and other electric motors. The generator must have the capacity for a peak load plus 20 percent growth. Therefore, there would be times when it would be necessary to operate the generator if the plant was to use one motor of one HP. Another problem with most vertical dryers is that there must be enough grain to fill the dryer, thus if only a small amount purchased it cannot be dried.

Automatic dryers require continued skilled operation and maintenance and a high technical knowledge and training to operate them.

The following is not to be interpreted as a negative criticism of the state institutions and private parties involved in grain storage and drying in Peru. However, in any country or region where travel, distance, and communications are difficult because of climate, terrain, or lack of infrastructure, the maintenance of machines will always be a problem. A mechanic cannot call a factory to request a new part or bearing be sent the same day. A grain drying system may be used 20 years before replacement. Often replacement parts for machines are not available after five years.

In view of the above, what is recommended is a drying system that can be maintained, repaired, fueled, and continually available in Peru.

B. Specific Recommendations for Grain Drying

1. Grain Drying Recommendations for ENCI

For the grain storage facilities of ENCI at Tingo Maria, Progreso, and Tocache the immediate purchase of a gasoline- or diesel-powered fan in one unit is recommended. This unit will divert all of the heat from the motor into the fan which blows this air below a perforated drying floor. Such floor would be contained within a metal silo wall (see page 50 and Appendices G, H, I, J).

Additional heat for the drying process can be obtained from three different sources. First, it can be obtained from a heat exchanger, which is nothing more than a fire box of 1 m x 1 m x 2 m of heavy metal covered by a metal-welded cover to contain the heat provided by wood, refuse, or any combustible material. Rice hulls can be used with forced draft. Second, since the grain dryer should be covered by a roof section of the same dimensions as the existing ENCI warehouses, such a roof could be used as a solar heat collector. The roof, of corrugated metal, should be painted black. Under the roof attached to the roof supports would be airtight panels of metal or plywood with the purpose of containing the heat generated by the sun. Hot air of 45°C (depending on cloud cover) could be drawn into the engine fan used to dry grain. Third, the diesel-powered drying fan can be purchased with a diesel fuel auxiliary heat exchange unit to increase the drying air temperature.

At the discharge of the silo drying floor would be a box-type movable wood hopper with double slide doors (45° bottom) so that sacks could be filled directly from the dryer. Workers, with practice, should be able to fill 240 bags of 45 kg each in 1 hour, or 11 MT per hour. Portable platform scales with a over-under weight attachment would assure equal weight of each bag. Bags will be closed by hand sewing.

As the dryer is being emptied workers could be filling the dryer by dumping the grain on emptied perforated floor space.

Since grain could be dried to 12 or 13 percent moisture and transported to Lima in less than 6 months, no need for bulk storage with aeration is visualized. Dried grain would be fumigated if necessary and stored in sacks in existing ENCI or MA warehouses.

Using the above system the drying process could begin if the perforated floor had only 1 cm of grain depth. If wet grain is put in the 11 m

diameter perforated silo floor to depth of .66 m, it would then be a batch dryer that could dry 40 MT per 24 hours. The procedure would be to empty and fill during the first working hours of a day. As soon as the floor is covered with grain the drying motor can be started which, if necessary, could operate 24 hours with only 1 person to check on the motor operation and moisture of the grain. Drying time will vary with ambient relative humidity and temperature of heated air.

2. Grain Drying Recommendations for ECASA

For the rice processing facility of ECASA at Tingo Maria the following corrective steps are recommended. First, immediately obtain technicians and mechanics to repair and place in operation all four dryers, and repair and completely overhaul the rice mill. A good source for this type of work is found in Peru at Pedro Martinto, S.A., Lima, a firm selling and maintaining this type of machinery. The technicians repairing the dryers and the rice mill should also spend some time instructing ECASA personnel in the fundamentals of grain drying and rice milling. Second, construct an approximate 20 MT bulk storage space with wood side walls so that as paddy is purchased it will be dried before being conveyed to bulk storage. This may require a small auger or conveyor which is available in Peru. Third, construct or re-arrange the system so that dried rough rice from bulk storage will be directed to the mill. Fourth, change the inventory management system so that milled rice will not be stored adjacent to insect-infested rough rice. Fifth, ECASA should develop a rice sanitation program by continual cleaning, fumigation, inspection, moisture checks of rough rice after drying, and hourly samples of milled rice as it is milled to monitor the quality of the milling process.

At Tocache, ECASA is building a new plant for drying and storing rough rice. It is recommended that ECASA review their plans for storing bulk

rice in 1,000 MT silos. It is known that the silos will be equipped with a grain spreader, heat detector cables, and aeration. In large silos the flow of aeration is more difficult. If adequate, timely aeration is not used, moisture migration within the silo will develop causing hot spots, rapid growth of fungus, and propagation of insects which will lead to losses.

C. Facility and Equipment Maintenance

It would be both beneficial and less costly over the long run if both ENCI and ECASA would implement a preventive maintenance program for their existing and future dryers and mill(s). Such a program will require a scheduled maintenance program with sufficient supplies of critical spare parts. Also, necessary tools must be on hand. Again, technicians repairing ECASA's dryers and mill could assist local personnel in setting up such a program.

D. Grain Purchasing Policy

Both ECASA and ENCI apply a discount weight system when purchasing rice, corn, and soybeans from farmers. This system as applied is more of a disincentive rather than incentive.

ECASA should proceed as they are and ENCI, as soon as the dryers are installed, should change to a price incentive-disincentive buying policy of grains. For example, if farmers, on the average, are only able to bring 18 percent moisture corn the minimum price support could be set at 18 percent with specified impurity tolerance. If a farmer brought in corn at less that 18 percent he would receive a premium and not a discount. This would encourage on the farm drying which would in turn result in a better product.

Corn could be purchased at <u>any</u> moisture level by adjusting the <u>weight</u> to a specified moisture level, say 13 percent. ENCI could then accept corn above 18 percent moisture, adjust it to the weight of 13 percent, and then charge the farmer a specific amount for removing each point of moisture. A similar procedure can be developed for other grains.

This procedure should lead to improved relations between farmers and state agencies since farmers would know that their grain will be purchased although they may have to pay for some drying costs. Furthermore, farmers would be motivated to deliver drier and cleaner grain if the system is set up within grasp of his technological capabilities. Finally, this system would offer an option to the farmer of either drying his grain to an acceptable moisture level or paying for such services.

E. Technical Specifications for Dryers (ENCI) (see Appendices G, H, I, J)

The grain drying locations for ENCI have no access to an electrical power grid. Also, dryers will be in a location where access to repairs is difficult.

The drying motors recommended are diesel and a brand name that has repair service at Tingo Maria and Tocache. All will use standard No. 2 diesel. Auxiliary air heaters will use the same fuel.

Heat from the drying fan motor will be utilized. The drying fan is also specified to utilize hot air from solar energy and, if desired, hot air from a heat exchanger that can be made in Peru with a fire box for wood, old tires, or any combustible waste material. Rice hulls could be blown into a fire box.

All motors specified are sold and can be serviced in Peru. Machine shops in Lima can make pulleys for the motors and obtain the proper length V belts.

It is recommended that all grain augers be imported in a separate crate so they can be routed to a machine shop in Lima where combustion motors, pulleys, and V belts can be adapted to the grain augers and checked for proper RPM and general operation.

All motors and grain drying floors and roofs made in Peru will be the same for Tingo Maria, Progreso, and Tocache.

All fuel, maintenance, and repairs will be the same.

At all locations the drying floor will be filled by emptying bags of grain over the low wall of the silo onto the perforated floor.

Following is a list of the equipment (see Appendix G for drawing):

1. Roof Made in Peru (Quantity: 3), "A" on drawing L . 1

Roof of same construction, height, pitch, and width as the existing warehouse roof. The extension to be approximately 18 m.

Below the main roof, panels of lightweight corrugated metal or plywood to be fastened to the top roof support (space approximately .40 m).

At the peak below the top roof a duct, .50 x .50, with a progressively larger opering from air discharge to furthest point to assure balanced hot air intake.

A vertical duct of .50 x .50 from top horizontal duct to intake of drying fan with adjustment or valve so hot air from roof can be stopped when cooling grain.

Top roof to be painted black with asphalt or black weather-proof paint.

The open space between the main top roof and the panels below the roof to be open at the lower part of the roof to permit intake of ambient air. Any open space is to be protected by screen to prevent birds or rodents from entering the space between the top roof and lower panels. End sections must be airtight so all air must be drawn into the solar heater from the lower roof opening.

2. Concrete Floor (Quantity: 3)

Concrete slab (floor) below the roof section with the same width as the existing concrete. The length should be such that platforms fit below the roof.

Load-bearing requirement not more than 1,000 kg per M^2.

Floor to be exactly level with smooth hard or glass finish to facilitate sweeping and cleaning.

3. Silo Drying Floor with Sidewall (Quantity: 3), "H" on drawing No. 1

Standard silo wall of approximately 1.3 m (4.25 ft) with top of wall rolled or altered to prevent a sharp edge. Bags of grain will be emptied over the wall by manual labor. No wall anchors are required.

Diameter 11.0 m (36 ft) approximate.

Flat surface drying floor (no corrugations) with supports for no more than 1 m (3.3 ft) approximate depth of corn or rice. Height of drying floor standard for silo wall. Opening for 1 transition duct 34,000 CFM at 1 inch SP - SWG. The transition duct to be made in Peru.

4. Unloading Auger System (Quantity: 3), "I" on drawing No. 1

Diameter .20 m (.66 ft) with center sump and 3 auxiliary sumps equipped with sliding gates to control grain flow. Outside discharge vertical auger 6 m (19 ft) approximate height.

Speed of horizontal auger to be lower than normal velocity to reduce vibration. Recommended no less than .40 m (1.5 ft) diameter of main V pulley.

Augers to be shipped in separate crates so they can be routed to a machine shop in Lima, Peru, to be equipped with a Lister diesel motor of approximate 12 HP at 1,500 RPM.

Maximum unloading capacity of the augers is not a factor.

Sweep augers with back shield, heavy duty, commercial grade. Sweep to remove grain from floor in one revolution. Heavy duty flighting to be 3/16 inch.

Back shield to have intermediate bearing on main shaft, with reinforced back shield and hand hold at outer end. Sweep auger to be an integral

part of the unloading unit driven from a gear box from the horizontal auger. Outer silo control rod to engage or disengage the sweep auger while the horizontal auger is in operation.

Unloading unit to be equal to Hutchinson vertical auger with sweep auger as one unloading unit. Made by Hutchinson, Clay Center, Kansas.

5. Diesel Motor (Quantity: 3), "J" on drawing No. 1

Air cooled, 12 HP at 1,500 RPM. Manual start. Equipped with hand clutch to start or stop unloading auger. Fuel--No. 2 diesel. Variable speed. Equivalent to Lister diesel model ST2, Type B.

Pulley for motor to be purchased or made in Peru to provide RPM recommended by the manufacturer of the auger unloading unit. Motor mount to be made in Peru to use the same bracing principal as the motor mount for the electric motors. V belts, if not furnished, can be purchased in Peru to obtain the correct length for the diesel motor mount.

6. Drying Motor with Fan (Quantity: 3), "D" on drawing No. 1

Diesel motor, air cooled. Manual start. Arranged as one unit so that all hot air from the motor will be drawn into the fan attached to the drive shaft of the diesel motor.

Air delivery of fan 34,000 CFM at 1 inch SP SWG at top motor RPM.

Heat rise of air from ambient approximate 1.6°C (3.0°F) at 34,000 CFM.

Motor equipped with alternator to provide electricity for the electric motor and control of an integral heater unit.

Diesel motor and fan unit as one unit to be equivalent to Lister HR4. The unit to be static, no wheels.

Heavy canvas air transition duct to transfer air from fan to the heating unit.

7. Additional Heater (Quantity: 3), "F" on drawing No. 1

Indirect heat exchanger to use same fuel as the diesel fan unit. If possible from the same fuel tank source. Open flame to be directed into a type of heat exchanger so that fuel fumes will not be blown into the grain.

Maximum heat per hour 1,000,000 BTU.

Equivalent to the Nu-Way Benson as a unit with the Lister motor drying fan.

8. Air Transition Duct (Quantity: 3), "G" on drawing No. 1

Lightweight metal or heavy canvas air transition duct from the heat exchanger unit to the under perforated floor plenum of the silo ring. Sufficient in size to permit free flow of 34,000,000 CFM air from heat exchanger unit to the space beneath the perforated drying floor. To be made in Peru.

9. Bagging Hopper (Quantity: 3), "K" on drawing No. 1

Made in Peru. Bagging hopper made of wood or metal as tall as possible and as much capacity as possible to receive grain from the height of the vertical grain auger.

The bottom to have a minimum of 40° slope to the bagging slide gates. The unit to be sufficiently braced to support 1.5 times the anticipated weight of the grain that will be in the filled hopper. Constructed so the unit can be moved if required and constructed so that it will not tip in any direction if not filled evenly from the spout of the vertical auger.

Two or more small, hand-operated slide gates with small hopper to direct grain into an empty bag. The height of the gates from floor level to be sufficient to permit a bag to rest on the portable platform scale and be completely filled. Approximately 1.30 m from the floor level. Size of bagging gates approximately .20 m x .30 m.

10. Portable Platform Scale (Quantity: 6), "L" on drawing No. 1

Portable platform scales of 450 kg capacity equipped with over-under head unit that fits on top of the scale beam to indicate when the desired amount of grain has been placed in a bag. (ENCI recommended the hanging-type automatic bagging scales so the correct weight can be placed in a bag.) This not only would decrease the capacity of the bagging hopper due to the increased height from the floor but the automatic bagging scales require continued delicate adjustment to make them accurate. The platform scale serves the same purpose. With the over-under unit, an arrow points to a predetermined spot on a dial when the correct weight is reached, this will provide the uniformity of bag weight. I would be concerned about the adjustment of the automatic bag scales (Stryker).

11. Grain Moisture Meter (Quantity: 6), 1 as spare tester

Portable type, battery powered, or powered from 220 volt, 60 Hz Grain to be tested is corn, sorghum, rough rice, and soybeans. Equal to Seedburo Dole model PB-70-22.

Spare thermometers with each moisture tester purchased.

12. Bagging Carts (Quantity: 15), 5 at each plant

Bags of grain must be moved from one location to another and at times one warehouse to another. Bags of dried grain must be moved into a storage warehouse. It will either be required to purchase several lift trucks with pallets or to move the bags of grain manually. To keep maintenance low we recommend the use of hand-pushed bagging carts. Bag-moving carts can also be made in Peru using two- or four-wheel type axles, wheels, and tires from wrecked cars. The axle is easily welded to a solid axle with one axle to swivel for turning as a push-type or pull-type wagon with a flat bed on which to pile bags of grain. If not made or purchased in Peru, the recommendations

are: heavy duty two-wheeled bag carts, ten-inch wheel diameter with hard ruber tires, wheel to have roller bearings at the hub. Steel construction, no hand braking system. (Brakes are only used when necessary to use carts on an incline.)

F. Grain Analysis and Quality Maintenance Equipment

Adequate and well-maintained equipment is essential for proper grain quality maintenance. Table 16 contains the minimum number and type of equipment each purchasing center should have on hand for proper grain sampling and analysis and grain quality control.

The most salient point to emphasize is the need for large sample size moisture meters. Increasing the current sample size from 100 g to 250 g should help obtain more reliable moisture readings.

Finally, proper equipment is of no use unless it is used and used right. Proper training in the use and maintenance of this equipment is therefore essential.

G. Calibration of Moisture Meters

The moisture meters being used in the Upper Huallaga project area have never been calibrated. It is obvious that their readings are subject to question. Not only is their periodic calibration essential but their proper use and maintenance is also important since different readings can be obtained from the same sample if the procedure is not carried out correctly.

In order to do periodic calibration of these meters it is recommended that a moisture tester using the oven method be purchased and installed at UNAS. Such procurement should be accompanied by proper training in the necessary calibration procedures and maintenance. The technical specifications are as follows: one moisture tester (for calibration of other moisture meters) equal

TABLE 16

Grain Sample Analysis Equipment (Per Plant)

#	Item	Rough Rice	Milled Rice	Corn	Sorghum
1	Bag probe 11 5/8" x 3/4" OD	OK	OK	OK	OK
1	Bag probe 12" x 1" OD	OK	OK	OK	OK
1	Bag probe 30" x 1/2" OD (9 openings)		OK		OK
400	Plastic bags for sample (one liter)	OK	OK	OK	OK
1	Sample divider. Small size SEEDBURO 100	OK	OK	OK	OK
1	Gram scale 3 beams 0.1 to 500 grams with scoop	OK	OK	OK	OK
1	Moisture tester DOLE	OK	OK	OK	OK
1	Dockage sieve and pan 12/64 round			OK	
1	Dockage sieve and pan 5/64 round				OK
1	Dockage sieve and pan 5 1/2/6/4 6/64 6 1/2 64	OK			

Grain Quality Control Equipment (Per Plant)

1	Dial-type hygrometer
3	Pocket thermometer
1	Deep probe thermometer with shield
	12 ft (4 of 3 ft sections)
	Thermometer calibrations metric
2	Large size polyethylene gauntlet-type gloves for fumigation
1	Gas mask with filters for bromide base fumigants
1	Airtight bag pile cover for fumigation, 10 m x 10 m
20	.50 m x .12 m sand-filled canvas bags made in Peru to hold down fumigation cover

to the Brabender Moisture Tester, Model SAS; oven hot-air type with weigh-in analytical scale and cabinet; set of 10 aluminum dishes; electrical power requirement 220 V, 60 Hz.

H. Additional Grain Storage Space

The deficient production estimates of the region and the lack of marketing flow and demand information makes it very difficult to ascertain the degree of need for any additional storage space.

Two recent studies addressing this question were reviewed (FFGI study of May 1981 and ENCI study of January 1982) and due to the different assumptions taken by the respective authors no congruent answer can be drawn. By assuming different monthly purchases and deliveries of grain, different storage capacity needs can be derived. Also, the assumption of an initial inventory at the beginning of the buying season (which is not a correct assumption for corn) inflates the storage need. It follows that by changing any of the three variables above, different storage space levels can be derived. For example, by increasing the rate of grain deliveries (which in the opinion of these authors is quite feasible) the storage space needs can be more conservative in nature.

Two more points call for caution. Again, though data is inconclusive it seems that the production levels for corn and rice have remained even or declined in recent years. These trends were indicated by the scant data available as well as by interviews with "knowledgable" persons. Second, the projection and marketing estimates for grains included in the Upper Huallaga project are very optimistic estimates. However, there are some indications that neither ENCI or ECASA are purchasing the levels of grains they think they are. The project paper calls for purchasing levels of 100 percent of projected production levels of paddy for ECASA and between 73 and 98 percent of projected production levels of corn and soybeans for ENCI. If the past is any indication then these purchasing levels seem somewhat optimistic.

Finally, there is no knowledge of the exact storage capacity in private hands. Such capacity seems to be increasing, especially in the Tocache area where private rice mills are being put into operation.

In conclusion this team recommends the following course of action regarding grain storage. First, no additional grain storage should be built at this moment by ENCI and ECASA beyond the facility being built by ECASA at Tocache. This will allow for sufficient static capacity in the near future (two to four years), especially if transport and evacuation logistics can be improved. Second, and most important, it is imperative that far better production and marketing data be gathered for the region. This can be achieved by the statistical component of OSE and the Sectoristas under the project. Such information will allow for more accurate trend projections of the project impact on grain production levels and market surpluses. From this more reliable data adequate estimates of storage capacity needs (among many other things) can be determined with more confidence. Under these conditions a more thorough and reliable estimate of storage capacity needs can be made three or four years from now.

I. Personnel Requirements at Each Grain Drying and Storage Location

ENCI

Administration (or person who lives at site): 1 person
Capable of starting and stopping the drying fans. Must know enough about mechanics to know that drying motor and other equipment is operating properly. Must to be able to supervise maintenance of equipment, check the oil level in motors, and change the motor oil. In addition, this person must know when the grain is dried to the proper moisture level so that the drying motor can be stopped. This person also supervises the buying and administration duties.

Assistant to the Administrator: 1 person
Must be mechanically inclined to start, stop, and maintain motors and grain auger unloading equipment. Must know how to operate the moisture meters to determine when grain is dry. This person should supervise the bagging operation and the filling of the drying floor to begin the drying operation.

Grain Quality Control: 1 person
Person to take samples of grain when purchased, make an analysis of grain samples, test for moisture, and monitor when grain is drying (should stop drying process if on duty). This person also to be in charge of checking quality of grain that is being stored and have the knowledge to supervise and assist in the fumigation process.

Security Personnel: 1 person
To live at the site. This person could also be trained to check the drying process to determine when the grain is dry. He could then shut off the heating unit to cool the grain and also shut off the drying motor when the drying and cooling process is complete.

Bagging Grain: 6 workers
The first job each morning would be to start bagging the dry grain. It is calculated that they should be able to bag 10 tons per hour. The bags of dried grain will be closed or sewn by hand labor. It would be necessary to close the bags as fast as they are filled. Often open bags are placed in an upright position then sewn after the filling process to utilize the labor for a longer period.

Filling the Drying Unit: 4 workers
As soon as there is empty floor space workers can begin to dump bags of grain over the silo side wall. At the very beginning of the bagging process these workers could assist in bagging, but just as soon as there is space available they should be shifted to starting filling the drying unit. The number of four need not be exact. The workers could be shifted from bagging to filling or from filling to bagging depending on the priority.

ECASA

It appears ECASA has sufficient personnel. What is needed are job descriptions and training.

VI. TRAINING REQUIREMENTS AND RECOMMENDATIONS

A. General Comments

Another weak area within the postharvest grain systems of the Upper Huallaga region deals with the preparation and experience of the persons who handle, condition, store, and process grains.

The observations made during the field visit indicate that training in general has been scant or none. This lack of knowledge (and to a degree lack of experience) has contributed to a deterioration of grain quality, losses, and to an inferior finished product in the case of rice. This situation has also been exacerbated by the lack of proper facilities (dryers) and the lack of proper maintenance and repair of machinery (dryers and rice mills).

Future training and technical assistance recommendations given in this report to overcome these deficiencies are aimed to be given over a period of time. Within this time frame (five years or life of project) it is hoped that several levels of training will be accomplished in order to retain a continuous training capacity within the Upper Huallaga area after the project has run its course. This local training capacity should then be able to continue training persons (with the necessary backstopping from the FFGI, if needed) in the important aspects of handling, conditioning, storing, and processing grains.

B. Training Recommendations for Grain Drying

Within the project area, the principles of grain drying (corn, rice, soybeans), rice milling, and general grain quality management will be the same as in any other tropical climate. However, to obtain the greatest capacity and efficiency from the specified system will require special training.

To go hand-in-hand with the installation of ENCI's dryers at Tingo Maria, Tocache, and Progreso, it is recommended that a hands-on technician be present.

This technician, fully familiar with the grain drying process, with Spanish capabilities, innovative, and mechanically oriented should be assigned to the project area for the first harvest season after the grain dryers are installed.

Among the duties he (or she) should find the need to conduct training seminars, supervise the drying of the grain under different climatic and operational conditions, and establish a proper preventive maintenance program for the drying equipment.

This technician should also train, supervise, and teach maintenance to ECASA personnel as well as to private operators of CECOAH and other private grain handling firms.

In order to accomplish the above, the technician will have to be provided with enough funds, a vehicle, and sufficient training materials in Spanish.

C. Rice Milling

Should ECASA continue to mill rice at Tingo Maria it is imperative that the milling personnel be adequately trained in rice milling and equipment maintenance. A potential source for this training may be found in Peru at the firm of Pedro Martinto S.A. in Lima.

D. Training Recommendations for ECASA and ENCI

The training for the technical personnel of ECASA and ENCI should be made contingent upon both having set in motion points VI B and C above as well as a full commitment by these agencies to implement a proper delivery methodology to field personnel.

Under the above conditions it is recommended that one person each from ECASA and ENCI be sent to the 1983 Grain Storage and Marketing Short Course to be given at KSU, June 13 - July 29, 1983 (see Appendix O). Two individuals should be responsible, one within each agency, for the technical aspects of grain drying, quality maintenance, grain grading, inventory control, etc. In short, he should be responsible for the technical aspects of grain management.

These two persons, if sent to this short course, should return not only with the knowledge of grain management, but they should immediately implement training programs for their field personnel within (and perhaps outside) the project area. These periodic training sessions should be done in conjunction with each other and, if need be, backstopped by FFGI personnel as well as the on-site technician previously mentioned (for as long as he is present).

These training sessions should be given prior to each harvest season at Universidad Nacional Agraria de la Selva (UNAS), Tingo Maria, which is well equipped with classroom space and laboratories. The hands-on demonstrations can be performed at the facilities of ENCI and ECASA.

Since both ECASA and ENCI perform marketing of grains which requires planning, logistics, and marketing management, thought should be given to the possibility of sending one person each from ECASA and ENCI to the 1983 Grain Storage and Marketing Short Course, marketing portion (see Appendix O for details). Such training is valuable for personnel engaged in market management, market facilitating operations, analysis of storage cost and alternatives, project analysis, transportation planning, etc.

However, this second aspect of training in grain marketing does not seem to be as pressing as the technical aspects and, therefore, these two persons could be sent to KSU for the 1984 short course.

E. Training Recommendations for Project Personnel

The Upper Huallaga project personnel carries out supervisory duties over state agencies entrusted to carry out the activities specified within the project. One of the components of the project deals with agricultural marketing and agribusiness development. Such sub-project development will require marketing, project, transportation, financial analysis, etc. Whether project personnel will be involved in such analyses or not, it is critical that they be

familiar with basic marketing principles, as well as project, transportation, economic, and financial analysis concepts in order to understand and judge analyses made by others.

In view of the above it is recommended that the person in charge of marketing and agribusiness development be sent to the 1983 Grain Storage and Marketing Short Course in order to participate in the marketing portion of such. Though oriented toward grains, most if not all such concepts listed under the "Content" in Appendix O are applicable to other agricultural commodities.

Such fundamental knowledge will strengthen the capability of this person to understand, assist, and judge market analysis and development as well as potential agribusiness development projects.

F. Academic Training

The best potential for "institutionalizing" grain storage (at all levels) and marketing training remains with UNAS. This university is located in the "ideal" tropical environment to carry out research and teaching (academic and non-academic) specifically oriented to the unique tropical conditions and problems of grain handling, conditioning, and storage.

The university, in conjunction with the Experiment Station at Tulumayo, could start to do descriptive research and later applied research in the post-harvest handling of grains at the farm level. An open and inviting area of research is at hand which could lead to an improvement of grain quality and loss reduction (both qualitative and quantitative) at the farm level. Such applied research disseminated through an effective extension service would undoubtedly contribute towards an improvement of the welfare of the subsistence farmer typical of that tropical jungle region.

It is recommended that two scholarships be made available under the project for either two Master's degrees or one Master's and one Ph.D. degree. These degrees should be one each in the area of grain storage entomology and grain handling, conditioning, and storage.

G. Training Sequence

A tentative training and in-country short course sequence has been summarized in Table 17. It should only be taken as a guide and modified to the needs of the project. The in-country short courses have been entitled in a very broad sense in order to encompass important areas of grain handling, conditioning, storage, and management. Specific topics can be developed later.

TABLE 17

Training and In-Country Short Course Schedule

Year	Training
1983	One (1) ENCI official to the 1983 KSU short course, technical area.
	One (1) ECASA official to the 1983 KSU short course, technical area.
	First in-country short course. Topic: grain handling and storage. Place: Tingo Maria.
	UNAS staff members start English courses in the U.S. if needed.
1984	One (1) ENCI official to the 1984 KSU short course, marketing area.
	One (1) ECASA official to the 1984 KSU short course, marketing area.
	Both Master's and Ph.D. candidates start academic courses.
	Second in-country short course. Topic: grain quality and preservation and review of first short course. Place: Tingo Maria.
1985	If needed, due to attrition further ENCI and ECASA personnel are sent to the 1985 KSU short course.
	Master's candidate returns. Starts teaching, research, and extension activities.
	Third in-country short course. Review of first two short courses. Topic: warehouse management and inventory control.
1986	Ph.D. candidate returns. Starts teaching, research, and extension activities.
	Fourth in-country short course.

APPENDIX A

PAGE 01 LIMA 00687 2823082 3985 002254 AID2988
ACTION AID-00

ACTION OFFICE STAG-02
INFO LASA-03 LADP-03 LADR-01 CMGT-02 CTR-02 STMD-01 CAST-01
STFA-01 RELO-01 [redacted] MAST-01 STHR-01 /022 A1 428

INFO OCT-00 ARA-00 AMAD-01 /052 W
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O 2822002 JAN 83
FM AMEMBASSY LIMA
TO SECSTATE WASHDC IMMEDIATE 6728

UNCLAS LIMA 0687

AIDAC

FOR: R. MORRIS, S&T/AGR
J. FOSHIA, LAC/DR/RD

EO 12356: NA
SUBJ: PIO/T NO. 527-0244-3-20075 (KANSAS STATE UNIVERSITY)

REF: JESSEE/SUGRUE TELCON, JANUARY 28

1. SUBJECT PIO/T POUCHED JANUARY 13 ATTENTION JANE MOHAN, LAC/DR.
2. AS REQUESTED BY JESSE VIA REFTELCON RELEVANT DATA FROM SUBJECT PIO/T FOLLOWS BY PAGE AND BLOCK NUMBER:
PAGE 1
1. PERU
2. PIO/T NO. 527-0244-3-20075
3. ORIGINAL
4. 527-0244 -UPPER HUALLAGA AREA DEVELOPMENT
5. 72-1121021
6. LDAA-82-25527AG13
8. 9/30/86
9. AID/W
10. PRO AG NO. 527-0244 DATED
10/15/81 - AMENDMENT 3/3/82
14. (A) THE CONTRACTING OFFICER IS AUTHORIZED TO OBTAIN THE SERVICES OF TWO GRAIN STORAGE/HANDLING SPECIALISTS UNDER THE FOOD GRAIN HANDLING POST HARVEST LOSES PROJECT WITH KANSAS STATE UNIVERSITY (KSU) FOR A PERIOD OF 4 WEEKS STARTING O/A JANUARY 15, 1983. THE SPECIALISTS WILL ASSIST THE UPPER HUALLAGA AREA DEVELOPMENT PROJECT (AID LOAN 527-T-077) WHICH IS LOCATED IN THE CENTRAL HIGH JUNGLE REGION OF PERU (TINGO MARIA) IN CARRYING OUT THE TASKS DESCRIBED IN ANNEX I. TRAVEL AND PER DIEM COSTS ARE FUNDED UNDER THIS PIO/T. (B) OFFICE OF THE CONTROLLER, USAID/PERU, C/O AMERICAN EMBASSY, LIMA, PERU.
PAGE 2
19. (A) ONE SPECIALIST TO HAVE SPANISH PROFICIENCY S-3-R3. (C) LIMA, PERU 1/2 M. TINGO MARIA 1/2 M.
20. (A) PROJECT PAPER AND PROJECT AGREEMENT. (B) BACKGROUND INFORMATION AND STUDIES AVAILABLE IN THE OFFICE OF AGRICULTURE AND RURAL DEVELOPMENT, USAID/PERU.
PAGE 4
ATTACHMENT I. STATEMENT OF WORK
A. OBJECTIVE
THE OBJECTIVE OF THE TECHNICAL ASSISTANCE BEING REQUESTED IS TO ASSIST THE GOP IN DEVELOPING PROCUREMENT, OPERATIONAL AND ENGINEERING PLANS FOR GRAIN STORAGE FACILITIES IN THE PROJECT AREA IN FULFILLMENT OF THE CONDITIONS PRECEDENT SPECIFIED IN SECTION 5.7 OF THE PROJECT AGREEMENT, AND IN DETERMINING ADDITIONAL SHORT-TERM TECHNICAL ASSISTANCE THAT MIGHT BE NEEDED IN CARRYING OUT THE PLANS.
B. DESCRIPTION OF DUTIES:
THE SPECIALISTS WILL ASSIST THE UPPER HUALLAGA AREA DEVELOPMENT PROJECT (AID LOAN 527-T-077) WHICH IS LOCATED IN THE CENTRAL HIGH JUNGLE REGION OF PERU (TINGO MARIA), IN THE FOLLOWING TASKS:

LIMA 00687 2823082 3985 002254 AID2988
(1) ORGANIZING SHORT COURSES, SUCHAS THOSE PROVIDED BY THE FOOD AND FEE GRAIN INSTITUTE, AT KSU, TO TRAIN LOCAL PERSONNEL IN GRAIN STORAGEMANAGEMENT AND OPERATIONS E.G. RECORD KEEPING, LOGISTICS, QUALITY CONTROL, ETC.
(2) DETERMINING THE TYPE, QUANTITY, AND CAPACITY OF GRAIN DRYING EQUIPMENT NEEDED AT TWO PRINCIPAL STORAGE CENTERS IN THE PROJECT AREA, AND IN DEVELOPING THE SPECIFICATIONS.
(3) DETERMINING THE TYPE AND CAPACITY OF ADDITIONAL GRAIN STORAGE FACILITIES FOR THE TWO PRINCIPAL CENTERS.
(4) DETERMINING WHAT EQUIPMENT IS NEEDED AT THE EXISTING GRAIN COLLECTION CENTERS, AND DEVELOPING THE TECHNICAL SPECIFICATIONS.
(5) DETERMINING THE AMOUNT AND TYPE OF ADDITIONAL SHORT-TERM T.A. THAT MIGHT BE NEEDED AND DEVELOPING SCOPES-OF-WORK.
(6) MAKING OTHER OBSERVATIONS AND RECOMMENDATIONS, IF REQUIRED CONCERNING GRAIN HANDLING STORAGE, TRANSPORTATION, ETC.
PAGE 5
ATTACHMENT II. ILLUSTRATIVE BUDGET

1. TRANSPORTATION COSTS:		$3,288
A. INTERNATIONAL AIR FARES		
2 R.T. AT $1,500	$3,000	
B. IN COUNTRY AIR FARES		
4 R.T. AT $5)	200	
2. PER DIEM COSTS:		$2,996
A. LIMA - 14 DAYS X 2 PERSONS AT $75/DAY		2,100
B. TINGO MARIA - 14 DAYS 2 PERSONS AT $32/DAY		896
3. TOTAL		$6,196
ROUND TC		$6,200

ORTIZ

STAG

ADVANCE
ACTION COPY

APPENDIX B

EMPRESA COMERCIALIZADORA
DEL ARROZ S. A.

ECA S.A.

REGLAMENTO DE COMERCIALIZACION DEL ARROZ

R.M. No 00498-81-AG/DGAIC. del 15.05.1981
R.M. No 00327-82-AG/DGAIC. del 18.05.1982

ECASA. S.A. Empresa Comercializadora del Arroz
Los Laureles 214 - San Isidro
Lima 27 Perú
Cent. Teléf. 717212 TELEX 25383 PEECASA

RESOLUCION MINISTERIAL Nº 00498-81-AG/DGAIC.

Lima, 15 de Mayo de 1981

Considerando:

Que el Decreto Ley Nº 21975 y su modificato-
ria Decreto Ley Nº 22956 dictan las normas para la comercia
lización del arroz y su financiamiento:

Que el artículo 3º del citado Decreto Ley Nº
21975 establece que el Ministerio de Agricultura y Alimenta
ción, elaborará las normas que regirán la comercialización de
arroz y sus sub productos, los mismos que serán aprobados po
Resolución Ministerial,

Que es necesario aprobar el Reglamento de Co
mercialización del Arroz:

De conformidad con el Artículo 23º del Decre
to Supremo Nº 0010-77-AL de fecha 25 de Octubre de 1977

SE RESUELVE:

Artículo 1º.— Aprobar el adjunto "Reglament
de Comercialización del Arroz" que consta de 28 artículos qu
rubricados al margen en cada una de sus páginas por el Dire
tor General de Agroindustria y Comercialización, forma part
integrante de esta Resolución.

Artículo 2º.— Dejar sin efecto las Resolucion
Ministeriales Nº 01373-78-A...-DGC- de fecha 09 de Agosto d
1978, y Nº 01037-79-AA-DGC del 27 del Agosto de 1979, a
como las demás disposiciones legales o administrativas que
le opongan.

Regístrese y Comuníquese, Nils Ericsson Correa, Ministro
Agricultura.

1

RESOLUCION MINISTERIAL Nº 00327-82-AG/DGAIC

Lima, 18 de Mayo de 1982.

Considerando:

Que por Resolución Ministerial Nº 00498-81-AG/DGAIC, de fecha 15 de Mayo de 1981, se aprobó el Reglamento de Comercialización del Arroz;

Que con la finalidad de perfeccionar el Sistema de Comercialización del Arroz se hace necesario modificar y complementar determinados artículos del Reglamento antes mencionado;

Estando a lo informado por la Dirección General de Agroindustria y Comercialización y a lo prescrito por el artículo 6º del Decreto Legislativo Nº 21;

SE RESUELVE:

Artículo 1º.— Sustituír los Artículos 6º, 10º, 11º, 15º y 19º del Reglamento de Comercialización del Arroz aprobado por Resolución Ministerial Nº 00498-81-AG/DGAIC, del 15 de Mayo de 1981, por los siguientes:

Regístrese y Comuníquese, Nils Ericsson Correa, Ministro de Agricultura.

3

REGLAMENTO DE COMERCIALIZACION DEL ARROZ

Artículo 1o.– El presente Reglamento tiene por finalidad establecer normas y procedimientos para la comercialización del arroz a nivel nacional, de conformidad con los dispositivos legales vigentes.

Artículo 2o.– Con el objeto de identificar cada ámbito de producción de arroz en los cuales opera ECA S.A. dicha Empresa elaborará una relación codificada que comprenda los distintos ámbitos productores.

Artículo 3o.– El arroz en cáscara que ECA S.A. adquiera ingresará a los molinos, amparado con su correspondiente "Orden de Ingreso".
El productor, para poder obtener la "Orden de Ingreso" en la Dependencia de ECA S.A. presentará el documento que lo acredite como tal, pudiendo ser: Certificado la dependencia más cercana del Ministerio de Agricultura, Copia del Documento de Crédito otorgado por el Banco Agrario o presentación del Plan de Cultivo y Riego.
De constatarse ingreso de lotes de arroz en cáscara, sin la correspondiente "Orden de Ingreso" ECA S.A. dispondrá la inmovilización de dichos lotes, dando cuenta de esta infracción a la dependencia de la Dirección Regional de Agricultura de su jurisdicción, para los efectos del Decreto Ley 21411 o decisión sobre el particular.

Artículo 4o.– ECA S.A. podrá contratar los servicios de ilado de arroz con los molinos que cuenten con la respectiva esolución Directoral de Funcionamiento, infraestructura adeuada para un buen pilado de arroz (pre limpiadoras, limpiadoas, secadoras mecánicas, silos estabilizadores, molinos y almaenes acondicionados para la zona y con la capacidad requerida) que además estén libres de responsabilidad. En los casos de nolinos que no están libres de responsabilidad, sólo procederá a contratación de sus servicios cuando ECA S.A. adopte las nedidas de control necesarios sin perjuicio de las acciones legaes correspondientes.

Artículo 5o.– ECA S.A. podrá contratar por excepción, con los molinos que no cuenten con la infraestructura adecuada para un buen pilado de arroz, siempre y cuando, previo a os estudios técnicos que presenten los molinos de acuerdo a as pautas que señale ECA S.A. en su manual de procedimientos, éstos se comprometan con las garantías del caso a implementarse y ECA S.A. lo considere conveniente y realizable en el tiempo límite que se acuerde para tal efecto.

Artículo 6o.– Las cuotas tentativas de arroz en cáscara para cada Molino las asignará ECA S.A. en coordinación con los Comités Zonales y/o Regionales de Molineros de Arroz y de productores de Arroz, informando posteriormente a la Dirección General de Agroindustria y Comercialización.

ECA S.A. proporcionará a los Molinos, los envases necesarios para el arroz pilado, los cuales serán utilizados exclusivamente para tal fin, bajo responsabilidad de los Molinos.

Artículo 7o.– Los molinos que contraten con ECA S.A. deberán constituír garantías a favor de ésta, por el equivalente al 10°/o del valor total del arroz en cáscara por ingresar, en calidad de depósito para su procesamiento, de acuerdo a las cuotas tentativas asignadas, con el fin de cubrir la responsabilidad que pudiera producirse. Estas garantías, deberán ser reales (Hipotecas) y/o liquidables mediante cartas fianzas bancarias y/o de entidades financieras autorizadas por la Superintendencia de Banca y Seguros. En éstos casos las fianzas serán dinámicas, es decir, su renovación y/o prórroga cubrirán hasta el 10°/o del valor de los saldos de arroz existentes en los molinos a la fecha de su extinción.

Los equipos de molinería podrán constituír Garantía Prendaria, quedando bajo depósito y responsabilidad del Administrador del molino, especificándose en el Contrato con ECA S.A. las condiciones de dicha garantía.

El valor de los inmuebles propios, o de terceros, o equipos de molinería en garantía hipotecaria, a satisfacción de ECA S.A., deberá estar amparado con copia Notarial del último Autovalúo conforme a Ley o por tasación efectuada por el Cuerpo Técnico de Tasaciones del Perú o por el Colegio de Ingenieros del Perú o sus filiales.

En aquellos casos en que los molinos no puedan cumplir con presentar garantías. ECA S.A. adoptará las medidas pertinentes, a solicitud notarial de los interesados, para evitar los riesgos que cubre la garantía a que se refiere el presente artículo.

Los contratos que suscriben los Molinos de pilar arroz con ECA S.A. se regirán por las normas establecidas en el Código de Comercio, Código Civil y demás disposiciones legales que le sean aplicables, en concordancia con las normas contenidas en el presente Reglamento y las condiciones que se pacten en los contratos de pila.

Artículo 8o.— Al ingresar un lote de arroz en cáscara al molino, éste será recepcionado por el conductor del mismo ó su representante y en presencia del representante de ECA S.A., quienes constatarán fisicamente el peso y calidad del arroz que ingrese. El conductor del molino y respectivo procederá inmediatamente en presencia del productor o de su representante autorizado, a efectuar el análisis determinatorio de los porcentajes de impurezas y humedad del arroz que ingresa. En caso de suscitarse discrepancias intervendrá como dirimente el representante de ECA S.A. cuyo común acuerdo de producirse éste, será reflejado por la firma conjunta del Certificado de Compra.

De subsistir desacuerdo, se procederá a la toma de dos (2) muestras representativas, una para su análisis por la dependencia de ECA S.A. en segunda instancia, y la otra para dirimencia y dictamen definitivo por la Dirección Regional del Ministerio de Agricultura, sí es que las discrepancias no hubieran sido superadas en segunda instancia. En este último caso los gastos correrán por cuenta del responsable.

8

En la determinación del porcentaje de impurezas a materias extrañas, entendiéndose por éstas: trozos de tallo, cáscaras, granos vanos, granos mal conformados, semillas de otras especies, piedras, terrones y toda materia diferente al arroz, se aplicarán los siguientes descuentos:

Porcentaje de Materias Extrañas	Descuento en Peso por cada 100 Kgs.
0.5	0.5
0.6	0.6
0.7	0.7
0.8	0.8
0.9	0.9
1.0	1.0
1.1	1.1
1.2	1.2
1.3	1.3
1.4	1.4
1.5	1.5
1.6	1.6
1.7	1.7
1.8	1.8
1.9	1.9
2.0	2.0
2.1	2.1
2.2	2.2
2.3	2.3
2.4	2.4
2.5	2.5

2.6	2.6
2.7	2.7
2.8	2.8
2.9	2.9
3.0	3.0
3.1	3.1
3.2	3.2
3.3	3.3
3.4	3.4
3.5	3.5
3.6	3.6
3.7	3.7
3.8	3.8
3.9	3.9
4.0	4.0
4.1	4.1
4.2	4.2
4.3	4.3
4.4	4.4
4.5	4.5
4.6	4.6
4.7	4.7
4.8	4.8
4.9	4.9
5.0	5.0

Los lotes que exceden de 5.0°/o de materia, extrañas, no serán recepcionados por ECA S.A. mientras no sean sometidos a un proceso de limpieza.

Artículo 9o.— El arroz que ingrese a los molinos, cuyo nivel de humedad llegue hasta el 14°/o, no sufrirá descuento por tal concepto.

Si la humedad sobrepasa dicho límite, hasta el 22°/o estará sujeta a descuentos en el peso, aplicados sobre el peso del arroz limpio (una vez deducidas las impurezas y de acuerdo a las siguientes escalas:

Porcentaje de Humedad	Descuento en Peso por cada 100 Kls. de arroz en cáscara (Kgs).
14	0.0
15	1.0
16	2.0
17	3.5
18	4.5
19	6.0
20	7.0
21	8.0
22	9.0

Los lotes de arroz que exceden el 22°/o de humedad no serán recepcionados por ECA S.A , mientras no sean sometidos a un proceso de secado.

El conductor del molino deberá proceder al secado de los lotes de arroz cáscara que sobrepasan el límite del 14°/o de humedad, antes de someterlo a su almacenamiento, pudiendo ECA S.A. tomar las acciones necesarias en caso de incumplimiento.

Las tarifas que deberá pagar el productor por la operación de secado mecánico y no mecánico serán fijados por ECA S.A. en coordinación con la Dirección General de Agroindustria y Comercialización del Ministerio de Agricultura.

Artículo 10o.– Los Molinos beneficiarán el arroz en cáscara para obtener arroz clase corriente con las siguientes características de calidad:

A. Límites de tolerancia	Costa Jaén - Bagua	Selva
	%	%
a. Granos quebrados	35.00	35.00
b Materias extrañas incluyendo paddy	0.35	0.50
c. Granos rojos	2.00	2.50
d. Granos tizosos francos	8.00	8.50
e Granos dañados	2.00	2.50
f. Humedad	14.00	14.00

B Sin olores extraños

C Buenas condiciones de sanidad

D. Lustre normal de la variedad.

E. Ausencia de ñelén.

Artículo 11o.– La Empresa Comercializadora del Arroz ECA S.A., cuando lo considere conveniente podrá elabora arroz clase superior y extra, los mismos que deberán reunir la siguientes características de calidad:

A. Arroz clase superior: Límites máximos de tolerancia	%
a. Granos quebrados	20.0
b. Materias extrañas incluyendo paddy	0.2
c. Granos rojos	1.0
d. Granos tizosos francos	6.0
e. Granos dañados	1.0
f. Humedad	14.0
– Ausencia de ñelén	
– Libre de olores extraños y tufos	
– Lustre normal.	

B. Arroz clase extra: Límites máximos de tolerancia:	
a. Granos quebrados	5.
b. Materias extrañas incluyendo paddy	0.
c. Granos rojos	0.
d. Granos tizosos francos	2.
e. Granos dañados	0
f. Humedad	14
– Ausencia de ñelén	
– Lustre brillante	
– Libre de olores extraños y tufos.	

Artículo 12o.– El polvillo y ñelén que producen los molinos, deberán estar exentos de infestaciones, no presentarán enranciamiento y mostrarán color, olor y sabor normales. Además, no podrán exceder los siguientes límites máximos de tolerancia:

a. Polvillo	o/o
Humedad	11.8
Materia extraña	1.0
Cenizas	11.0
Fibra	0.8

b. Ñelén	o/o
Humedad	14.0
Materia extraña	1.0
Pajilla y Polvillo	3.0

Artículo 13o.– Los molinos están obligados a entregar a ECA S.A. el arroz pilado con el máximo de 14o/o de humedad. En los casos que por condiciones ambientales la humedad del arroz pilado sea superior, deberán completar con arroz el porcentaje excedente de humedad.

Artículo 14o.– Todo despacho de arroz deberá ser analizado previamente a su salida del molino. En el documento de análisis se indicará detalladamente las características de calidad, contenido de humedad y el peso neto.

Artículo 15o.– ECA S.A. en los contratos de servicio de procesamiento que celebra con los Molinos para la elaboración de arroz, fijará los siguientes rendimientos mínimos de pilado.

A. Arroz corriente	Costa Jaén-Bagua o/o	Selva o/o
Arroz pilado	69.00	67.00
Polvillo	4.00	5.00
Ñelén	0.50	0.70
B. Arroz Superior		
Arroz pilado	65.00	
Polvillo	4.00	
Arrocillo	4.00	
Ñelén	0.50	
C. Arroz Extra		
Arroz pilado	58.00	
Polvillo	7.00	
Arrocillo	8.00	
Ñelén	0.50	

Los Molinos están obligados a entregar a ECA S.A. el íntegro de arroz pilado y los sub-productos que se obtengan, consignando estos datos en los certificados de pila correspondientes, que serán obligatoriamente confeccionados quincenalmente, para que ECA S.A. proceda a cancelarlos dentro de los quince (15) días siguientes a la entrega del arroz.

Artículo 16o.– ECA S.A. fijará las tarifas básicas ponderadas del servicio de pilado de arroz en las regiones de la costa, Jaén-Bagua y Selva para los rendimientos mínimos ponderados establecidos, a partir de los cuales se reconocerán tarifas especiales por mayor eficiencia y productividad de este servicio.

Los pagos que efectúe ECA S.A. por concepto de pilado, se estipularán sobre el total de arroz cáscara procesado y señalado en cada Certificado de Pila, que será presentado dentro de los siguientes 15 días de su confección, para su liquidación.

Artículo 17o.– En caso de deficiencia, impedimento o paralización de los molinos que se encuentren en proceso de pilado y/o se prevea que no pueden cumplir con el contrato, ECA S.A dispondrá de las medidas necesarias para beneficiar oportunamente el arroz en las mejores condiciones.

En caso de traslado de arroz cáscara por lo expuesto en el acápite anterior, los molinos están obligados a devolver con igual peso y calidad, el arroz que recibieran, y a pagar de inmediato la diferencia en peso neto que existiese. Los fletes y demás gastos que ocasione la aplicación de esta medida, serán abonadas por el molino de origen.

Artículo 18o.– ECA S.A. realizará frecuente y obligatoriamente el control de las existencias de arroz en los molinos mediante cubicaciones y arqueos, previa determinación de la masa correspondiente a la unidad volumétrica, para cada control.

Asimismo, efectuará las liquidaciones finales. Dichas operaciones se harán con la participación del representate autorizado del molino.

En los resultados de las cubicaciones y arqueos, se admitir que tengan una aproximación del 3% entre el volumen cub cado y el saldo de existencias de arroz registrado a la fecha se gún libros.

En caso de haber diferencias mayores a dichos porcentaje que no fueran aceptados por el molino, se efectuará el pesaj de las existencias a fin de determinar el monto real de las re ponsabilidades que hubiere, el pesaje no se efectuará en el cas de que el molino acepte la responsabilidad establecida.

Determinada la responsabilidad del molino, se levantará Acta correspondiente con intervención de un notario Públic en la que conste, el monto de la responsabilidad. ECA S.A. r querirá su pago inmediato mediante Carta Notarial. Tratándo se de liquidaciones finales se procederá de igual forma.

Los gastos que generen estas operaciones correrán por cue ta del molino.

Artículo 19o.– Los precios y condiciones de venta para l sub-productos de molinería serán fijados por ECA S.A. toma do en cuenta las características especiales de su comercializ ción, en coordinación con la Dirección General de Agroindu tria y Comercialización.

El polvillo y ñelén obtenidos por cada Molino Arroce como resultado de sus labores de pilado de arroz en cáscar

serán vendidos íntegramente por ECA S.A. a los usuarios. Esta Empresa cuando estime conveniente podrá encargar la venta directa de los sub-productos a los Molinos y descontarles los importes en los certificados de pila correspondientes.

Artículo 20o.-- En las liquidaciones económicas correspondientes a responsabilidad por faltantes, éstas serán en todos los casos valorizadas a los precios de costo vigentes para ECA S A., a la fecha de establecida la responsabilidad. En lo correspondiente al arroz éste será referido al arroz pilado. Asimismo ECA S.A. cargará al molino responsable el interés anual vigente establecido, para créditos comerciales desde la fecha en que el molino comenzó a recepcionar el producto hasta la fecha de cancelación total, sobre los saldos deudores de la responsabilidad

Estos cargos se harán extensivos sobre el valor de los envases en caso de determinarse responsabilidad por faltante de éstos

En el caso de responsabilidad de sub-productos, los cargos serán computados a partir de la fecha de la expedición del Certificado de Pila correspondiente.

ECA S.A. procederá dentro del término de 72 horas, útiles computados desde la fecha de levantamiento del Acta de Responsabilidad por faltante, a elevar copia de la misma a la dependencia de la Dirección Regional de Agricultura de la jurisdicción correspondiente, para la aplicación del Decreto Ley 21411 o decisión sobre el particular.

Artículo 21o.- ECA S.A. podrá disponer un nuevo proceso de pilado, en determinados lotes de arroz que acusen pilado imperfecto o defectuoso, suspendiéndose el pago correspondiente al pilado del producto hasta su rectificación. De no acatarse tal mandato se ordenará el traslado de este arroz a otro molino o almacén para su mejoramiento, corriendo el infractor con los gastos, mermas y pérdidas que ocasione dicha operación.

Artículo 22o.- Cuando algún lote de arroz depositado en un molino sufriera manchadura u otro daño y su calidad resultara inaparente para su comercialización, ECA SA. podrá proceder a su mejoramiento o a vender dicho lote para usos industriales o alimentación animal, en caso de ser declarado no apto para el consumo humano por la dependencia del Ministerio de Agricultura o el Area de Salud de la Zona.

En caso de mejoramiento se adoptará el procedimiento señalado en el Artículo anterior.

Cuando la venta se efectúe para usos industriales y/o alimentación animal, el molino pagará a ECA S.A. la diferencia entre el monto obtenido de la venta del arroz pilado deteriorado y su equivalente en arroz al precio de costo real y vigente para ECA S.A., adicionándose los costos financieros que señala el artículo 17 más el valor de los envases en forma inmediata.

Artículo 23o.- Para el transporte de arroz pilado, que se encuentre en los almacenes o molinos, ECA S.A. expedirá el Certificado de Traslado correspondiente.

Las Autoridades Policiales, al controlar el tránsito de arroz pilado, exigirán a los transportistas la presentación de dicho documento.

En los casos en que ECA S.A. venda arroz pilado a terceras personas, con la finalidad de abastecer a localidades donde la Empresa no cuente con oficinas, el tránsito del arroz estará amparado por una Factura Guía en la cual deberá constar expresamente el lugar final del destino.

Artículo 24o.– Toda persona natural o jurídica que contravenga las disposiciones contenidas en el presente Reglamento, quedará incursa dentro de los alcances del Decreto Ley 21411.

Artículo 25o.– ECA S.A. formulará el Manual que contendrá los procedimientos y Normas Complementarias del Reglamento de Comercialización del Arroz, que permita la correcta aplicación del presente Reglamento, poniéndose en conocimiento de los interesados en un plazo máximo de noventa días computados a partir de la fecha de Publicación del presente Reglamento.

Artículo 26o.– En los lugares de Selva y Ceja de Selva en los que ECA S.A. no cuenta con la infraestructura molinera y de almacenamiento, deberá promocionarlos dentro de la actividad privada y de no lograrlo deberá efectuarlos por su cuenta.

Artículo 27o.– En los casos especiales, que constituyeran razón de excepción en la aplicación del presente Reglamento

motivados por circunstancias de fuerza mayor y/o fenómenos ecológicos imponderables o fitobiológicos la Dirección General de Agroindustria y Comercialización del Ministerio de Agricultura dictará las medidas convenientes que el caso requiera.

Artículo 28o.– ECA S.A. queda facultada para resolver todos aquellos asuntos que no hayan sido expresamente contemplados en el presente Reglamento o en el Manual de Procedimientos y Normas Complementarias del Reglamento de Comercialización del Arroz.

APPENDIX C

LUIS ERNESTO LOPEZ PALACIOS
Reg. [illegible] Nro. 21191

DICTAN NORMAS COMPLEMENTARIAS PARA LA COMERCIALIZACION DE MAIZ

: RESOLUCION DIRECTORAL N°0031-77-DGC-AL

Lima, 15 de Agosto de 1977

CONSIDERANDO:

Que, por Resolución Ministerial N°0661-77-AL, de fecha 17 de Junio de 1977, se han establecido los precios de compra y venta del maíz amarillo y sorgo granífero importados y de producción nacional disponiendo en el numeral 5°que la Dirección General de Comercialización del Ministerio de Alimentación dictara las normas complementarias a las que se sujetará la comercialización de dichos granos:

Que, con esta finalidad las Direcciones de Márgenes y Precios, de Alimentos Agrícolas y de Inspección y Control de la Dirección General de Comercialización han efectuado los estudios correspondientes y elaborado las indicadas normas;

De conformidad con el Artículo 22°del Decreto Ley 21033 y el Art. 116°del Reglamento de Organización y Funciones del Ministerio de Alimentación.

SE RESUELVE:

TITULO I - DE LOS PRECIOS

1°- Los precios del maíz amarillo duro y sorgo granífero de producción nacional destinado como insumo para la producción de alimentos balanceados y otras industrias, así como el destinado al consumo directo de la ganadería, se venderán a los precios y condiciones indicadas en el Art. 1°de la Resolución Ministerial N° 0661-77-AL.

2°- La comercialización del maíz y sorgo importados estará a cargo de EPSA la que venderá únicamente a las Plantas de Alimentos Balanceados y para el consumo directo de la ganadería, a los precios y condiciones establecidos en el Art. 3°de la Resolución Ministerial N° 0661-77-AL.

Las Plantas de Alimentos Balanceados utilizarán el maíz y sorgo importados para la fabricación de alimentos balanceados y en ningún caso la destinarán para otros usos.

3°- Los productores de maíz y sorgo podrán vender su producción directamente a las Plantas de Alimentos Balanceados al precio oficial establecido, o pueden canalizar sus excedentes por intermedio de EPSA y/o agentes de las Plantas de Alimentos Balanceados.

4°.- Las empresas productoras de alimentos balanceados están obligadas a comprar, hasta el límite de su capacidad de almacenamiento, toda la producción de maíz y sorgo que les oferten los productores, a los precios fijados por el Art. 1°de la Resolución Ministerial N°0661-77-AL.

5°.- La Dirección de Alimentos Agrícolas en coordinación con la Dirección General de Producción analizarán la problemática del producto priorizarán las necesidades y lo darán a conocer a la Dirección Superior del ministerio de Alimentación, a fin de que decida sobre la distribución del remanente que se genera por la diferencial de precios de compra del sorgo con relación al del maíz importado frente al igual precio de venta de estos productos.

6°.- Para la comercialización del maíz amarillo duro y sorgo granífero producidos en la región de la selva, EPSA hará uso del remanente que se genera por el menor precio de compra puesto en centro de acopio, con relación al precio de venta de dichos granos, pra cubrir parte del subsidio asignado a los gastos de transporte de maíz y/o sorgo desde los centros de acopio hasta las Plantas de Alimentos Balanceados.

TITULO II - DE LA COMPRA - VENTA

7°.- Las condiciones de compra-venta, del maíz y sorgo de producción nacional se refieren al grano sano, limpio, con un máximo de 14.5 % de humedad, 3% de impurezas, sin envase y pago al contado.

8° A los lotes de maíz y sorgo con contenidos de humedad e impurezas mayores a los e señalados en el numeral 7°de la presente Resolución, se les aplicará la escal- de descuentos siguiente:

Procentaje de humedad	Descuento en Kg. x c/100 Kg.	Porcentaje en impurezas	Descuento en Kgs.
14.5	0.0	3.0	0.0
15.0	0.5	4.0	1.0
16.0	1.6	5.0	2.0
17.0	2.7	6.0	3.0
18.0	3.9	7.0	4.0

Los granos que exceden estos máximos porcentajes de humedad e impurezas, deberán ser secados y/o limpiados previamente por el productor.

9°.- EPSA, adquirirá el maíz y sorgo producidos en la región de la selva, en los lugares indicados como centros de acopio ubicados en las zonas de producción que a continuación se detallan.

Zona Alimentación - Provincia - Distrito.

II	Jaen-Jaén
II	Bagua-Pagua
VII	Crl. Portillo -Pucallpa
VIII	Requena-Requena
VIII	Ucayali-Contamana
IX	Alta Amazonas-Yurimaguas
IX	Leoncio Prado-Tingo María
IX	Mariscal Cáceres-Rio Uchiza
IX	Leoncio Prado - Aucayauu
IX	Mariscal Cáceres - Tocache
IX	San Martín-Tarapoto
X	Tarma-San Ramón
X	Satipo-Satipo
XI	Paucartambo-Kcosñipata
XI	La Convención-Quillbamba
XII	San Juan de Oro - Sandia
XIII	La Mar - Pichari

10°- Los productores del maíz y sorgo que deseen concertar su colocación por intermedio de EPSA informarán a la Agencia de la Zona de Alimentación más cercana el volumen estimado a cosechar con una anticipación de 45 días al inicio de la cosecha, quienes informarán a la Dirección General de Comercialización.

11°- La Dirección de Alimentos Agrícolas, en base a los informes sobre los volúmenes disponibles del maíz y sorgo, coordinará con EPSA para que se responsabilice en la adquisición de dichos productos.

12°- Los productores solicitarán a la Oficina Zonal de EPSA o a la Agencia de Alimentación mas cercana, la entrega de los sacos vacíos necesarios para el envasado de su producción, de acuerdo al volúmen a cosechar, los cuales serán utilizados única y exclusivamente con esta finalidad, bajo responsabilidad del productor.

13°- EPSA, remitirá antes del inicio de las compras las cantidades necesarias de sacos vacíos a sus Oficinas Zonales para su distribución a los productores que lo soliciten. En caso de que EPSA no cuente con Oficinas en las localidades, donde va a realizar las compras, los sacos vacíos serán remitidos por esta a las Agencias de las Zonas de Alimentación para su distribución a los productores.

TITULO III - DEL CONTROL

14°- Las plantas industriales y conductores de almacenes que tengan almacenados maíz y sorgo, presentarán dentro de los primeros diez (10) días de cada mes, declaraciones juradas de sus operaciones de compra-venta, consumo y saldo de estos granos del mes anterior a la Agencia de Alimentación más próxima.

15°.- El control de calidad en la comercialización de maíz y sorgo será efectuado por los interesados.

16°.- En caso de discrepancias sobre la calidad del maíz amarillo duro y/o sorgo granífero, intervendrá como dirimente la Dirección Zonal de Alimentación, de persistir la discrepancia, la Dirección General de Comercialización resolverá en última instancia a solicitud de los interesados.

17°.- Las Direcciones Zonales de Alimentación velarán por el cumplimiento de la presente norma.

18°.- Los infractores a lo dispuesto en la presente Resolución serán sancionados de conformidad a lo establecido en el Decreto Ley 21411 y su Reglamento.

19°.- Derógese, modifíquese o déjese en suspenso las disposiciones que se opongan a lo dispuesto en la presente Resolución asimismo, derógase la Resolución Directoral N° 0003-77-AL-DGC, de fecha 18 de Febrero de 1977.

REGISTRESE Y COMUNIQUESE

CORONEL EP. JULIO OCAMPO QUZONICH, Director General.

APPENDIX D

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Naranjillo

1979-1980

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Jan 1980	66,793		66,793		66,793
Feb 1980	26,588		26,588		93,381
Mar 1980	64,854		64,584	51,391	106,844
Apr 1980	45,632		45,632		152,476
May 1980		57,376	57,376	62,394	147,458
Jun 1980		332,286	332,286	461,077	18,667
Jul 1980				5,878	12,789
Total	203,867	389,662	593,529	580,740	12,789

Note: Shrinkage (loss) of 12,789 kg is 2.15 percent of volume purchased and transferred.

Source: Resumen del Movimiento de Existencia, Naranjillo.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Naranjillo

1980-1981

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Oct 1980	3,210		3,210		3,210
Nov 1980	3,276		3,276		6,486
Dec 1980	27,091		27,091	8,692	24,885
Jan 1981	312,596		312,596	144,389	193,092
Feb 1981	1,397,329		1,397,329	625,322	965,099
Mar 1981	808,473	49,995	858,468	326,211	149,356
Apr 1981	342,299	2,443	344,742	172,196	1,669,902
May 1981	68,687		68,687	398,525	1,340,064
Jun 1981	3,265		3,265	960,265	383,064
Jul 1981				235,956	147,108
Total	2,966,266	52,438	3,018,664	2,871,556	147,108

Note: Shrinkage (loss) of 147,108 kg is 4.87 percent of volume purchased and transferred.

Source: Resumen del Movimiento de Existencia, Naranjillo.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Naranjillo

1981-1982

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Dec 1981	7,857		7,857		7,857
Jan 1982	114,111		114,111	44,532	77,436
Feb 1982	184,244		184,244	196,117	65,563
Mar 1982	390,769		390,769	371,245	85,087
Apr 1982	103,950		103,950	94,841	94,196
May 1982	8,234		8,234	69,799	32,631
Jun 1982				9,605	23,026
Total	809,165		809,165	786,139	23,026

Note: Shrinkage (loss) of 23,026 kg is 2.84 percent of volume purchased and transferred.

Source: Resumen del Movimiento de Existencia, Naranjillo.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Nuevo Progreso

1980-1981

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Feb 1981	213,301		213,301		213,301
Mar 1981	617,815		617,815		831,116
Apr 1981	334,604		334,604		1,165,720
May 1981	52,783		52,783		1,218,503
Jun 1981				488,181	730,322
Jul 1981				639,313	91,009
Aug 1981					91,009
Sep 1981					91,009
Oct 1981				7,010	83,999
Total	1,218,503		1,218,503	1,134,504	83,999

Note: Shrinkage (loss) of 83,999 kg is 6.89 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Nuevo Progreso.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Nuevo Progreso

1981-1982

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Nov 1981	6,147		6,147		6,147
Dec 1981	54,574		54,574		60,721
Jan 1982	75,341		75,341		136,062
Feb 1982	329,022		329,022	329,969	135,115
Mar 1982	489,107		489,107	436,446	187,776
Apr 1982	324,357		324,357	435,068	77,065
May 1982	16,522		16,522	32,741	60,846
Total	1,295,070		1,295,070	1,234,224	60,846

Note: Shrinkage (loss) of 60,846 kg is 4.69 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Nuevo Progreso.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Tocache

1979-1980

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Dec 1979	67,040		67,040		67,040
Jan 1980	187,520		187,520		254,560
Feb 1980	165,192		165,192		419,752
Mar 1980	270,272		270,272		690,024
Apr 1980	134,306		134,306	26,952	797,378
May 1980	17,609		17,609	123,414	691,573
Jun 1980				644,391	47,182
Total	841,939		841,939	794,757	47,182

Note: Shrinkage (loss) of 47,182 kg is 5.6 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Tocache.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Tocache

1980-1981

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Oct 1980	35,281		35,281		35,281
Nov 1980	19,306		19,306		54,587
Dec 1980	71,322		71,322	43,773	82,136
Jan 1981	375,466		375,466		457,602
Feb 1981	644,813		644,813	80,382	1,022,033
Mar 1981	393,744		393,744	38,883	1,376,894
Apr 1981	122,399		122,399	2,443	1,496,850
May 1981	2,070		2,070	21,114	1,477,806
Jun 1981				338,226	1,139,580
Jul 1981				927,015	212,565
Aug 1981				120,915	91,650
Total	1,664,401		1,664,401	1,572,751	91,650

Note: Shrinkage (loss) of 91,650 kg is 5.5 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Tocache.

ENCI

Purchases, Tranfers, and Deliveries of Yellow Corn at Tocache

1981-1982

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Dec 1981	20,935		20,935		20,935
Jan 1982	252,622		252,622		273,557
Feb 1982	531,972		531,972	104,195	701,334
Mar 1982	497,952		497,952	304,374	894,912
Apr 1982	119,455		119,455	973,532	40,835
May 1982	18,298		18,298	11,315	47,818
Jun 1982	6,785		6,785		54,603
Jul 1982				13,345	41,258
Total	1,448,079		1,448,019	1,406,761	41,258

Note: Shrinkage (loss) of 41,258 kg is 2.85 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Tocache.

APPENDIX E

ENCI

Purchases, Tranfers, and Deliveries of Soybeans at Naranjillo

1979-1980

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Nov 1979	1,347		1,347		1,347
Dec 1979	3,897		3,897		5,244
Jan 1980	769		769		6,013
Feb 1980	85		85		6,098
Mar 1980	116		116	6,099	115
Apr 1980					115
May 1980					115
Jun 1980				105	10
Total	6,214		6,214	6,204	10

Note: Shrinkage (loss) of 10 kg is .10 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Naranjillo.

ENCI

Purchases, Tranfers, and Deliveries of Soybeans at Naranjillo

1980-1981

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Oct 1980	21,431		21,431		21,431
Nov 1980	14,211		14,211		35,642
Dec 1980	10,835		10,835	45,850	627
Jan 1981	6,699		6,699	6,787	539
Feb 1981	1,989		1,989		2,528
Mar 1981					2,528
Apr 1981					2,528
May 1981	572		572	2,455	645
Total	55,737		55,737	55,092	645

Note: Shrinkage (loss) of 645 kg is 1.16 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Naranjillo.

ENCI

Purchases, Tranfers, and Deliveries of Soybeans at Tocache

1979-1980

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Nov 1979	4,810		4,810		4,810
Dec 1979	2,141		2,141		6,851
Jan 1980	634		634		7,585
Feb 1980	747		747		8,332
Mar 1980					8,332
Apr 1980					8,332
May 1980					8,332
Jun 1980				8,540	(208)
Total	8,332		8,332	8,540	(208)

Note: According to records a total of 208 kg were shipped in excess of purchases.

Source: Resumen del Movimiento de Existencia, Tocache.

ENCI

Purchases, Tranfers, and Deliveries of Soybeans at Tocache

1980-1981

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Oct 1980	6,372		6,372		6,372
Nov 1980	7,339		7,339		13,711
Dec 1980	3,857		3,857	14,692	2,876
Jan 1981	2,000		2,000		4,876
Feb 1981	1,853		1,853		6,729
Mar 1981	348		348		7,077
Apr 1981	460		460		7,537
May 1981					7,537
Jun 1981					7,537
Jul 1981					7,537
Aug 1981				7,445	92
Total	22,229		22,229	22,137	92

Note: Shrinkage (loss) of 92 kg is .40 percent of volume purchased.

Source: Resumen del Movimiento de Existencia, Tocache.

ENCI

Purchases,* Tranfers, and Deliveries of Soybeans at Tocache

1981-1982

(kg)

Month	Purchases	Transfers	Total Inflow	Deliveries	Inventory Balance
Aug 1981	1,043		1,043		1,043
Sep 1981	2,998		2,998		4,041
Oct 1981	2,035		2,035		6,076
Nov 1981	19,799		19,799		25,875
Dec 1981	16,141		16,141		42,016
Jan 1982	109		109	42,137	(12)
Feb 1982	461		461		449
Mar 1982	977		977		1,426
Apr 1982					
May 1982					
Jun 1982					
Jul 1982				1,544	(118)
Total	43,563		43,563	43,681	(118)

Note: According to records a total of 118 kg were shipped in excess of purchases.

Source: Resumen del Movimiento de Existencia, Tocache.

APPENDIX F

Campaña: 1981

Informe de Compras Mensuales de Arroz Cascara
de Enero a Diciembre de 1981

Mes	Tingo Maria Kilos Netos	Aucayacu Kilos Netos	Tocache Kilos Netos
Enero	1,780	2,732	24,759
Febrero	1,276	20,469	102,135
Febrero	6,163	3,724	35,031
Marzo	57,201	45,388	210,569
Abril	24,114	17,231	150,589
Abril	30,215	13,269	52,347
Mayo	25,918	17,873	147,354
Mayo	18,869	14,012	61,718
Junio	63,772	66,707	396,544
Julio	64,011	27,848	515,472
Agosto	26,116	11,434	174,800 137,238
Setiembre	23,402	23,377	77,964
Octubre	4,211	4,808	14,444
Noviembre	-	-	7,509
Diciembre	-	1,515	1,613
Totales	347,048	270,387	2,110,086

Oficina de Tingo Maria, 05 de Mayo de 1982.

Compras Arroz Cascara Campaña 1980

Meses	Molino Tingo Maria Kilos	Molino Aucayacu Kilos	Molino Tocache Kilos
Marzo	88,588	-	-
Abril	118,672	-	-
Mayo	150,395	-	-
Junio	90,131 30,297	7,942 -	148,527 83,135
Julio	111,236	37,765	253,180
Agosto	194,762	29,895	422,720
Setiembre	61,796	20,119	203,229
Octubre	34,657	8,983	44,392
Noviembre	4,738	-	6,043
Diciembre	932	-	10,388
Totales	886,204	104,704	1,171,614

Tingo Maria, 05 de Mayo de 1982.

Informe de Compras Mensualizadas de Arroz Cascara
de Enero a Diciembre de 1982

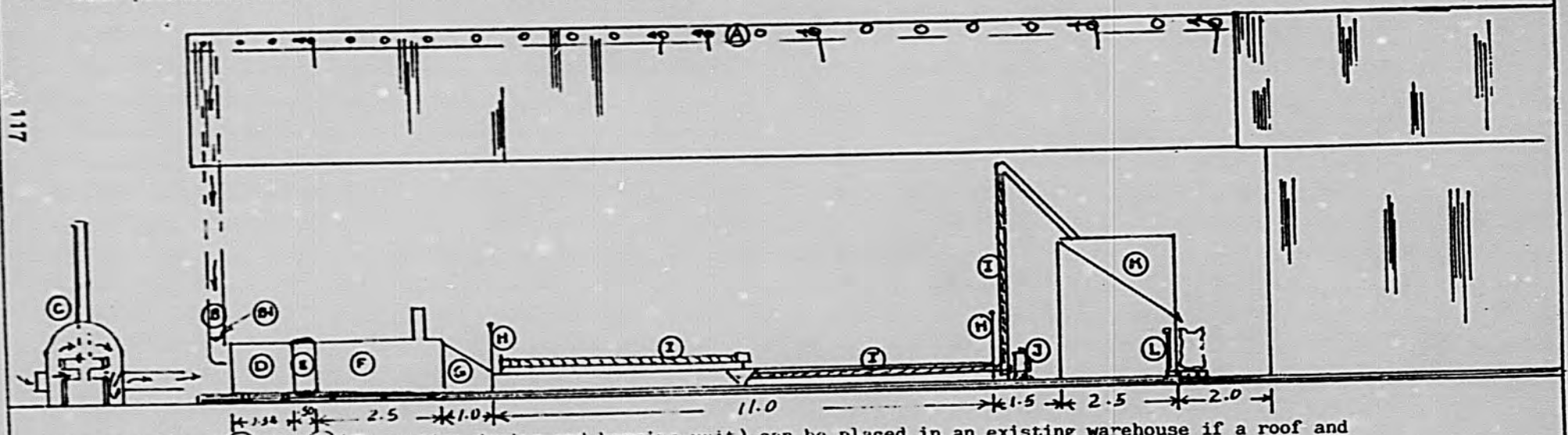
Mes	Tingo Maria Kilos Netos	Aucayacu Kilos Netos	Tocache Kilos Netos
Enero	-	5,285	8,185
Febrero	12,493	44,149	89,104
Marzo	21,689	47,122	165,228
Abril	27,973	34,484	146,906
Mayo	20,038	43,281	178,463
Junio	16,182	36,225	201,820
Junio	7,413	524	140,494
Julio	29,446	28,905	472,011
Agosto	10,276	11,275	144,998
Setiembre	4,452	2,802	49,190
Octubre	4,516	-	10,394
Noviembre	2,099	2,895	-
Diciembre	1,208	6,468	-
Totales	157,785	263,415	1,606,793

Oficina de Tingo Maria, 06 de Enero de 1983.

APPENDIX G

DRAWING No. 1

	ENCI	PERU
(A) (OPTION) HOT AIR DUCT under double roof.	Made at site	
(B) (OPTION) HOT AIR DUCT from roof duct to dryer fan with shut off air valve B-1.	Made at site	
(C) (OPTION) WOOD or WASTE MATERIAL HEAT EXCHANGER		Made in Peru
(D) LISTER HR4 30,000 CFM 1" SP SWG.		Purchased in Peru
(E) LISTER HEAVY DUTY CANVAS CONNECTOR.		Purchased in Peru
(F) LISTER NU-WAY BENSON 1,000,000 BTU HEATER		PURCHASED in Peru
(G) LIGHT METAL AIR TRANSITION from drying unit to silo plenium.	Made at site Or in Peru	
(H) 1.30 M. SIDE WALL 11.0 M. diameter silo with flat perforated floor.	Purchased outside Peru	
(I) SILO UNLOADING SYSTEM. Heavy duty Power sweep with back shield & verticle auger, 8" dia. 18" dia. 2V pulley. auger, slide gate at center sump, Recommend equal to Hutchinson R., Box 33, Clay Center, Kansas		
(J) LISTER DIESEL MOTOR ST2 with variable speed, hand clutch, Pulley & V Belts to match pulley of I unloading system.		
(K) BAGGING BOX with two slide gates.		Made of wood or metal at site
(L) PLATFORM SCALE 150 KG capacity with addition of over-under indicator head on scale beams. Two scales for each site.		Purchased in Peru Or Outside country



The assembly of (D) thru (L) (The entire drying and bagging unit) can be placed in an existing warehouse if a roof and concrete slab cannot be constructed.

If roof and slab is constructed later it would not be difficult to partially disassemble only the silo portion and move the entire unit to the new location.

One of the above drying units for: Tengo Maria
Progresso
Tocache

NOT TO SCALE

STRYMER MARCH 8 1983

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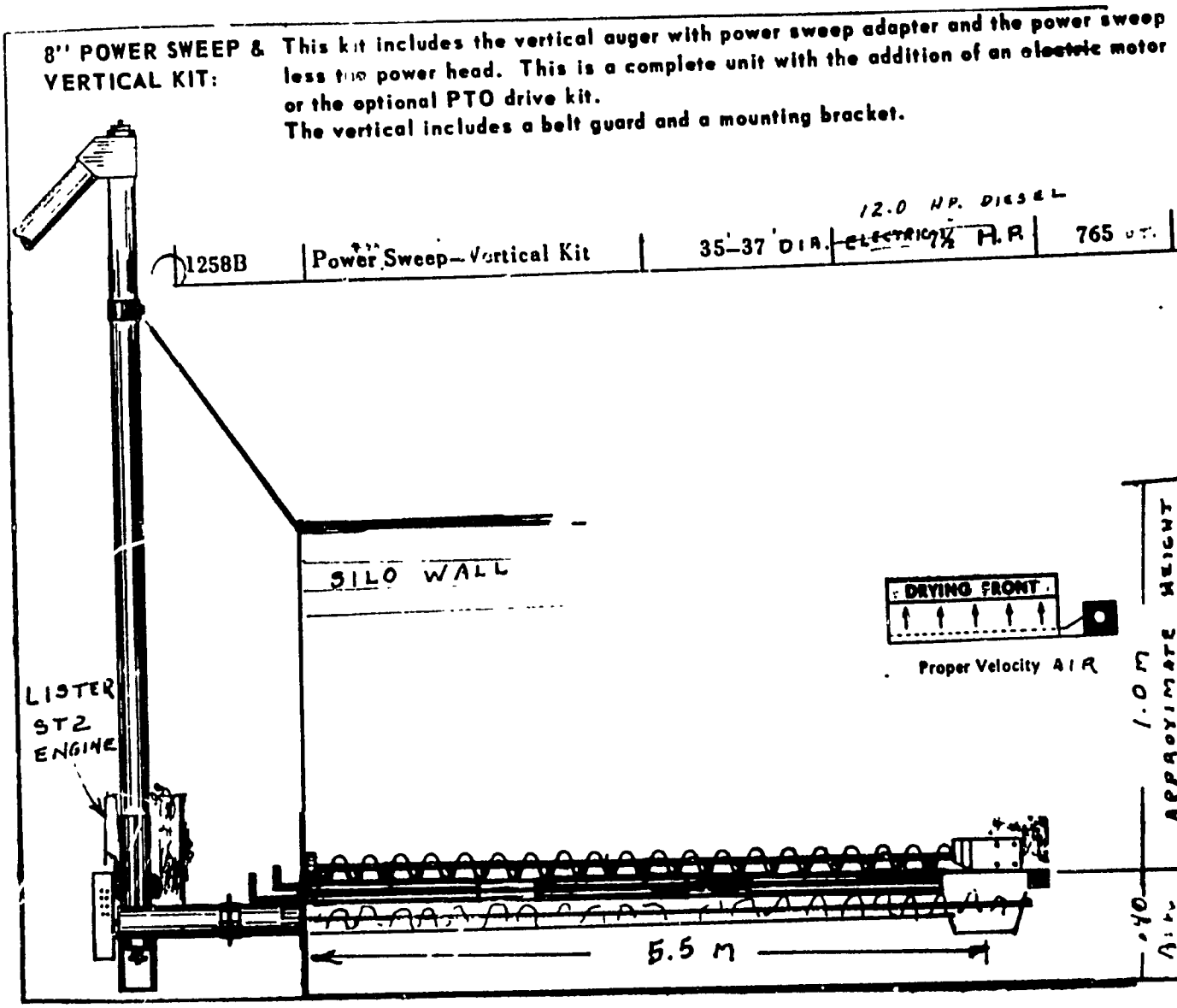
DRAWING No 2

POWER SWEEP AND VERTICAL BIN UNLOADING AUGER KIT

BY USING THE POWER SWEEP AND VERTICAL UNLOADER TOGETHER YOU CAN USE ONE MOTOR TO UNLOAD DIRECTLY INTO THE TRUCK. ALL OF THE POWER IS OUTSIDE OF THE BIN. THIS COMBINATION MAKES A VERY EFFECIENT HANDLING SYSTEM FOR A HIGH TURNOVER MOVEMENT IN A BIN. IT IS AN EXCELLENT UNIT FOR BATCH DRYING BINS.

8" POWER SWEEP & VERTICAL KIT: This kit includes the vertical auger with power sweep adapter and the power sweep less the power head. This is a complete unit with the addition of an ~~electric~~ motor or the optional PTO drive kit.
The vertical includes a belt guard and a mounting bracket.



The above illustration shows a 6" Vertical Bin Unloader Kit coupled to a Power Sweep. The ~~Optional~~ Intermediate Bin Walls ~~are shown~~.

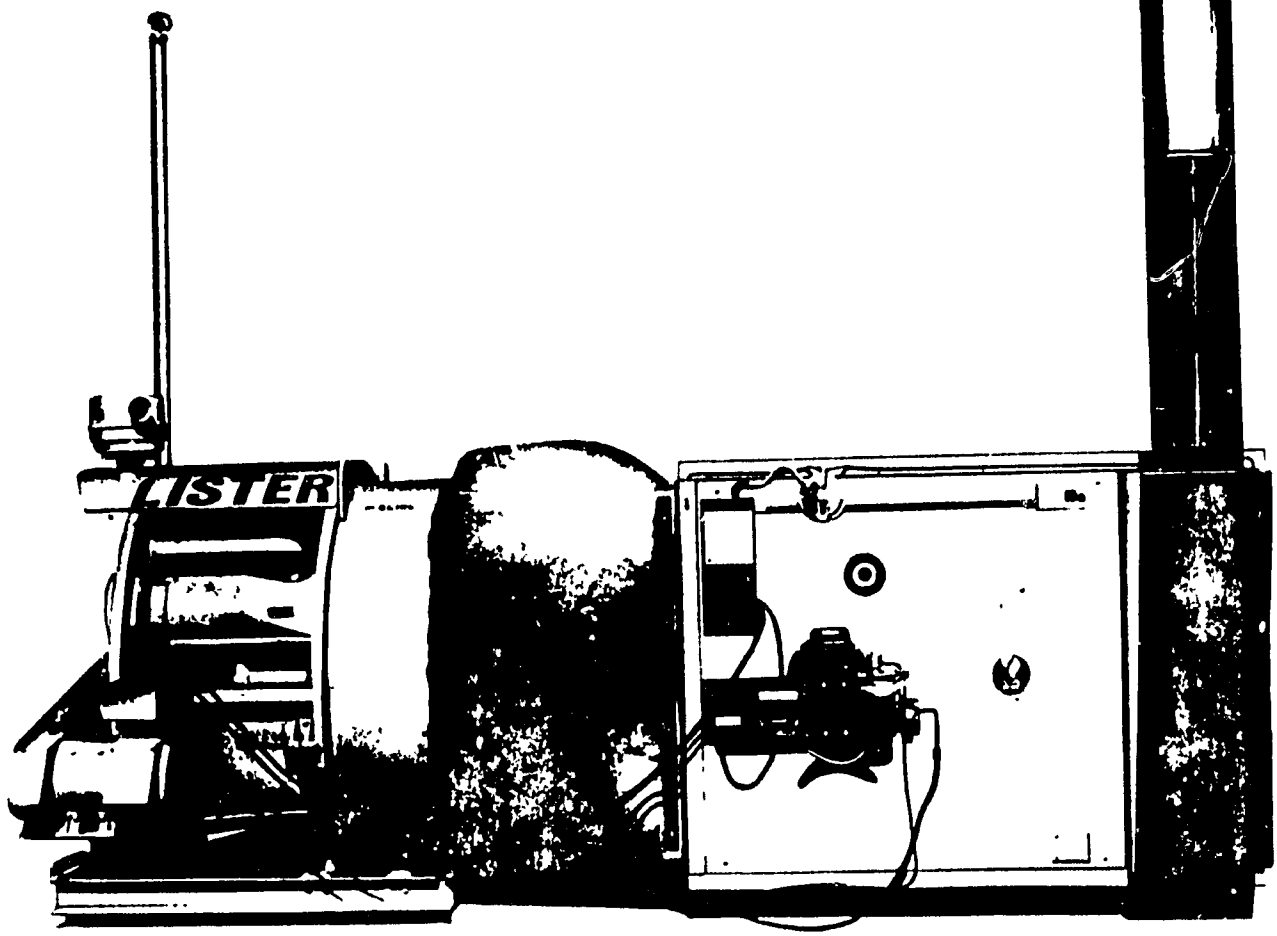
This kit includes the complete power sweep as described on the power sweep page. It is complete except for the power head section which is not used when the unit is coupled to the vertical. The vertical unloader is also the standard unit as described earlier in this section. It is furnished less the horizontal flight but with a short horizontal flight adapter that adapts to the power sweep horizontal flight. This flight adapter has a square to square section which allows the vertical to be removed without removing the entire horizontal power sweep flight.

~~There is also an optional PTO drive available as an accessory.~~

DRAWING No. 3

LISTER — NU-WAY BENSON

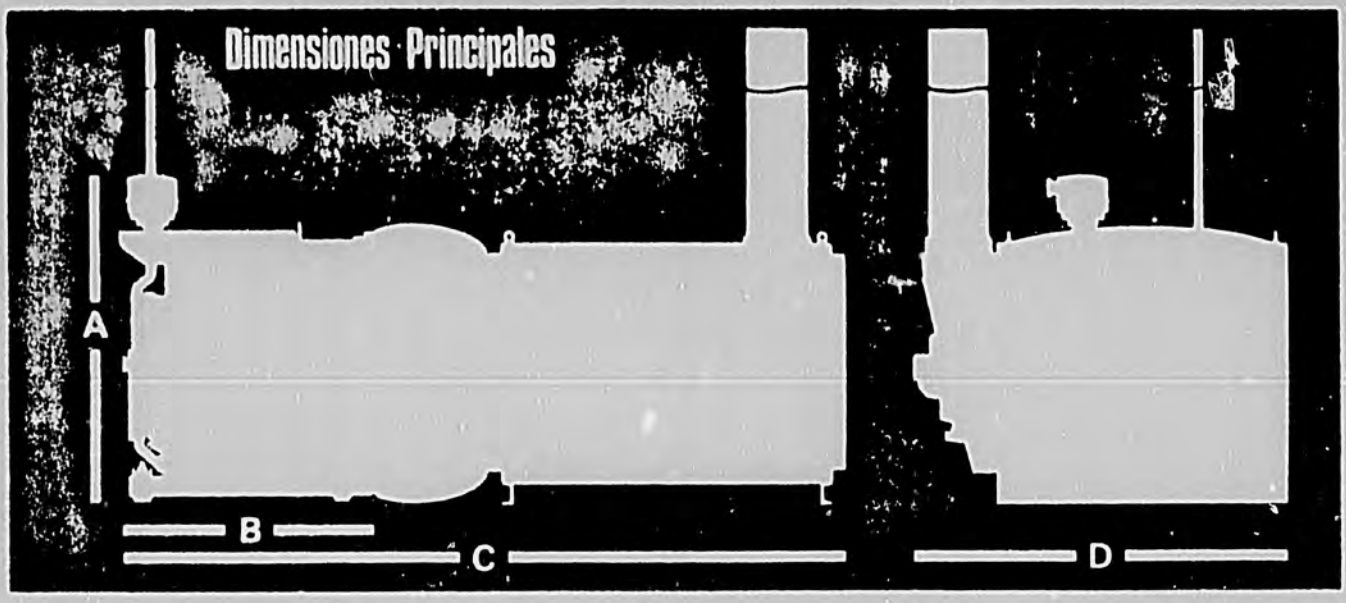
Secadora de Cultivos



Máquina de gran capacidad para secar rápidamente por tandas cualquier grano, hierba, café, cacao, yuca, copra, marañón, maní, tabaco y semillas.

DRAWING No. 3.1

Dimensiones Principales



Secadora	A	B	C	D
ST3 EM150	101 cm	123 cm	229 cm	140 cm
HR4 EM300	160 cm	134 cm	383 cm	200 cm

Especificaciones de Embarque Aproximadas

Secadora	PESO NETO	PESO BRUTO	VOLUMEN
HR4 EM300 DOS CAJAS			
Motor y Ventilador	1016 kg	1200 kg	4.4 m³
Permutador Térmico	760 kg	950 kg	7.2 m³
ST3 EM150 DOS CAJAS			
Motor y Ventilador	640 kg	770 kg	2.85 m³
Permutador Térmico	390 kg	290 kg	2.33 m³

SECADORA LISTER HR4 NU-WAY BENSON CON PERMUTADOR TERMICO EM300

Volumen de Aire		Presión por Columna de Agua		Alza de Temperatura por encima de la ambiente	
Pies³/Min.	M³/Seg.	PULGS.	MM.	°F	°C.
31000	14.63	0	0	32	17.78
28000	13.21	1.7	43.18	36	20.00
26000	12.27	2.65	67.31	40	22.22
24000	11.33	3.55	90.17	45	35.00
22000	10.38	4.3	109.22	50	27.78
20000	9.44	5.0	127.00	56	31.11
18000	8.49	5.6	142.24	62	34.44

SECADORA LISTER ST3 NU-WAY BENSON CON PERMUTADOR TERMICO EM150

Volumen de Aire		Presión por Columna de Agua		Alza de Temperatura por encima de la ambiente	
Pies³/Min.	M³/Seg.	PULGS.	MM.	°F	°C.
16528	7.8	0.12	3	33.48	18.6
14833	7.0	1.46	37	42.12	23.4
12714	6.0	2.83	72	53.64	29.8
10595	5.0	3.98	101	65.16	36.2
8476	4.0	4.88	124	76.5	42.5
6357	3.0	5.59	142	88.2	49.0

Las cifras dadas en este folleto son apenas promedios, basados en condiciones ambientes medias.

HAWKER SIDDELEY
R. A. LISTER FARM EQUIPMENT LIMITED
Dursley, Gloucestershire GL11 S, Inglaterra
Teléfono: Dursley (0453) 4141
Telex: 43261

NU-WAY BENSON LIMITED
Temeside Works, Ludlow, Salop SY8 1JL,
Inglaterra

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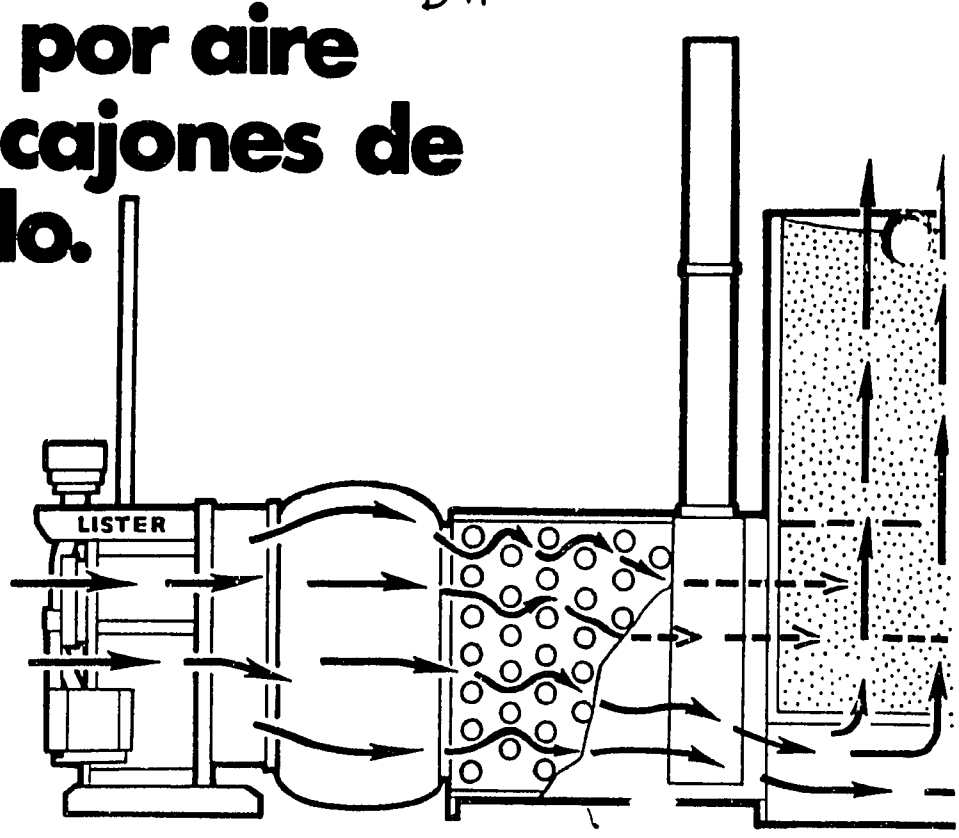
DRAWING No. 3.2

Secamiento por aire forzado en cajones de piso ventilado.



La secadora autónoma Lister/Nu-Way Benson comprende un ventilador impulsado por motor diesel acoplado a un permutador térmico, (intercambiador de calor), y satisface la necesidad de secar rápidamente, por tandas, cualquier cultivo. Utiliza grandes volúmenes de aire a temperaturas medianas.

Es independiente de toda fuente de energía eléctrica externa, puesto que el motor diesel que impulsa el ventilador mueve también un generador que proprorciona corriente para el quemador de aciete del permutador térmico, para otros menesteres de poco consumo y para alumbrado.

Las hay de dos tamaños: la HR4 EM300 y la ST3 EM150.

HR4 EM300

MOTOR	ALTERNADOR	VENTILADOR	CONECTOR	PERMUTADOR TERMICO	CALOR TOTAL
Diesel Lister HR4 de 4 cilindros, refrigerado por aire, 2000 RPM, 200,000 UTB de calor (60 kW).	2,75 kVA, de 240V, 50 Hz, Monofásico, o de 110V, 60 Hz. Tablero de control de potencia con enchufes.	Propulsor de flujo axial de 1,22 metros (4 pies) de diámetro, montado directamente en el eje del motor. Estator nervurado.	Del ventilador al permutador térmico, de lona adecuada para servicio pesado.	Nu-Way Benson, de 1 millón de UTB (300 kW). Rendimiento: 80%.	1,2 millones de UTB (360 kW). Consumo total de combustible 40,5 litros (9 galones imperiales) por hora.

ST3 EM150

Diesel Lister ST3 de 3 cilindros, refrigerado por aire, 24 HP, 2250 RPM, 120,000 UTB de calor (35 kW).	2,75 kVA, de 240V, 50 Hz, Monofásico, o de 110V, 60 Hz. Tablero de control de potencia con enchufes.	Propulsor de flujo axial de 0,915 metros (3 pies) de diámetro, montado directamente en el eje del motor. Estator nervurado.	Del ventilador al permutador térmico, de lona adecuada para servicio pesado.	Nu-Way Benson, de 500,000 UTB (150 kW). Rendimiento: 80%.	620,000 UTB (180 kW). Consumo total de combustible 20,25 litros (4,5 galones imperiales) por hora.

El motor, el ventilador y el alternador están montados integralmente sobre un chasís rígido con montajes elásticos, o con ruedas y barra de tiro. El permutador térmico es de dos etapas, alta y baja, con dispositivo de seguridad de célula fotoeléctrica contra falla de la llama. La cámara de combustión es de acero inoxidable calorífugo, de alta calidad. El motor y el permutador térmico emplean un mismo aceite combustible (diesel). Ningún producto de la combustión puede contaminar el grano, puesto que los gases del quemador y del escape se conducen a la atmósfera. Por el grano o cualquier otro cultivo pasa únicamente aire caliente limpio.

Debido a que el motor impulsor del ventilador proporciona también la energía eléctrica para el alternador, al detenerse el ventilador deja de funcionar el quemador—garantía de seguridad inherente!

Rendimiento

tres factores varían según el tamaño de los cajones, como también dependen del tipo y la profundidad del cutlivo en vía de secamiento. El rendimiento de las máquinas varía igualmente, claro está, según la humedad inicial del cultivo, la humedad final deseada y la propensión del cultivo a ceder su humedad al aire secador.

Los cereales, tales como el maíz, el arroz, el trigo, la cebada, el sorgo y la soya pueden secarse en grandes cantidades y en cajones de tamano amplio.

Los cultivos tropicales, como por ejemplo el café, el cacao, la yuca y la copra, cuya humedad inicial es elevada, exigen tratamiento especial: es necesario secarlos en tongadas de poca profundidad y en cajones de corriente de aire reversible.

Tratándose de cereales, reduciendo la humedad del maíz, por ejemplo, del 22% al 12%, o la del arroz del 22% al 14%, la máquina HR4 EM300 secaría 100 toneladas en 40 horas, aproximadamente o

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DRAWING No. 4

ESPECIFICACION

El motor diesel Lister ST2, refrigerado por aire, se construye de 18 modelos básicos, con una variedad de accesorios fáciles de instalar y adecuados para casi toda aplicación. Su potencia continua máxima es de 21 HP (15,7 kW) a 3000 RPM.

Refrigeración: Por ventilador adosado al volante, a cualquier temperatura ambiente hasta 52°C

Lubricación: A presión constante, mediante bomba de émbolo buzo, a toda superficie de apoyo importante. Cada motor trae su filtro de aceite de paso completo, con elemento filtrante renovable.

Regulación: Clase A2 o Clase B, según el modelo y la aplicación.

Cárter: Robusto, de hierro colado.

Arranque: Manual, mediante manivela desmontable por el árbol de levas o por engranaje multiplicador al extremo del volante. Arranque eléctrico a disposición del interesado.

Toma de Fuerza: Toda la fuerza desarrollada por el motor puede tomarse del extremo del volante, o de la prolongación del árbol de levas a la mitad de la velocidad del motor, previa aprobación de la aplicación propuesta.

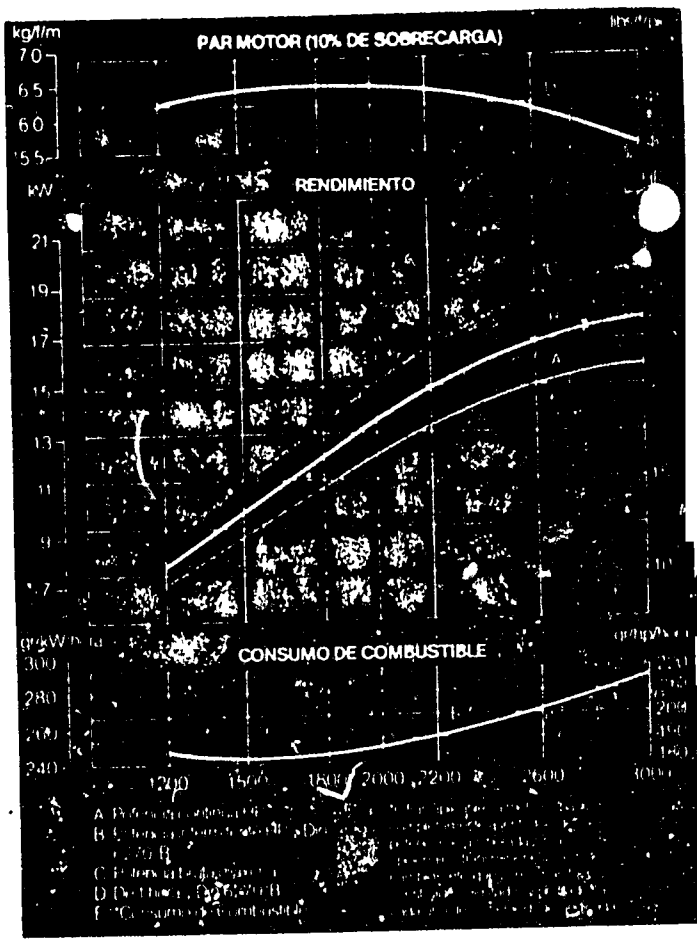
Giro: Destrorso o sinistrorso, conforme se pida.

DATOS TECNICOS

Rendimiento

RPM	Continuo HP (kW) (NB 649:1958)	PS o CV (kW) (Din 6270 'B')
3000	21,0 (15,7)	23,4 (17,2)
2600	20,0 (14,9)	22,3 (16,4)
2000	16,2 (12,1)	18,1 (13,3)
1800	14,6 (10,9)	16,3 (12,0)
1500	12,0 (8,9)	13,4 (10,8)
1200	9,4 (7,0)	10,5 (7,7)

PMEF a 1800 RPM: 5,73 barras (83,1 lbs/f/pulg²)
Alesaje: 95,25 mm (3,75")
Carrera: 88,9 mm (3,5")
Cilindrada: 1,266 litros (77,4 pulg³)
Consumo de aceite lubricante: Menos de 0,75% del consumo de combustible a plena carga.



CLASIFICACION: NORMA BRITANICA 649 de 1958 (y Norma Din 6270)

Esta representa la fuerza expresada en HP que el mot debe ser capaz de rendir continuamente, a determinada velocidad del eje cigüeñal, de acuerdo a lo prescrito en la NB 649 de 1958 (Norma Din 'A'). Además, debe poder rendir satisfactoriamente 10% más, a la misma velocidad, por 1 hora en cualquier jornada de 12 horas consecutivas (Norma Din 'B'), excepto al impulsar bombas de agua centrífugas, ventiladoras o equipos similares, en cuyo caso la sobrecarga no está permitida.

Nota: el 10% de sobrecarga y las clasificaciones de la Norma Din 'B' son aplicables únicamente a motores completamente asentados, estado que se logra, por lo general, al cabo de unas 50 horas de trabajo, pero previa negociación especial podemos entregarlos de fábrica en tal estado.

MERMAS DE POTENCIA. NB 649 de 1958

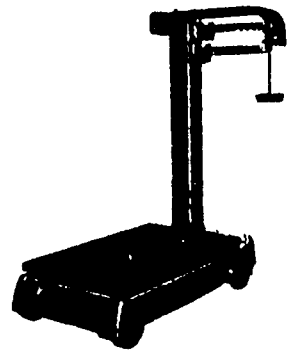
Por Altitud: 3½% por cada 300 metros sobre el nivel del mar, pasados los primeros 150 m.

Por la Temperatura del Aire Entrante: 2% por cada 5,5°C por encima de 30°C.

Por humedad: Hasta 6%, máximo.

DRAWING No 5

FAIRBANKS—MORSE
platform scales



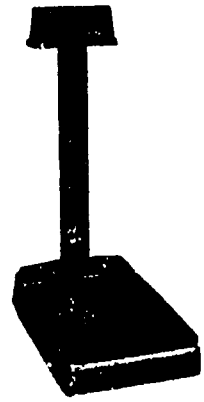
This metal scale is used for weighing materials in every form. Enclosed wheels eliminate hazardous projections. The offset pillar allows narrower, over-all width without reducing the platform size, permitting movement through smaller aisles.

Recessed counterpoises guard against interference. Self-aligning hardened tool steel "V" bearings throughout, with hardened tool steel pivots.

	Platform Size	Capacity	Graduated Pounds	Price
Model 41-3132 Single Beam	18" x 27"	1000#	100 x ½	$340.70
Model 41-3132A21 Double Beam	18" x 29"	1000#	100 x ½	488.60

Shipping weight: 200 lbs.

TOLEDO
electronic digital scale



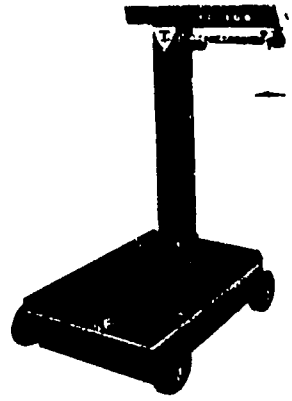
Toledo's digital scales combine the reliability of a proven lever system with the speed and accuracy of a digital display. The weight indication is positive because there is no parallax, and operator interpolation is not required. The standard pushbutton tare allows fast and accurate net weight determination. Switching from pounds to kilograms occurs instantaneously with a push of a button. Scale electronics, including load cell, are housed within a dust-tight and water-tight enclosure, providing reliable operation in damp or dirty environments.

To facilitate moving, the full height scales can be provided with wheels and the bench height with wheeled stands. Capacities up to 2500 lbs. Platform: 24" x 30"

Avoirdupois 150 lb x .1 lb / 400 lb x .2 lb / 1250 lb x .5 lb / 2500 lb x 1 lb
Metric 75 kg x .05 kg / 200 kg x .1 kg / 500 kg x .2 kg / 1250 kg x .5 kg
Model 2186 ..... $2665.00

Standard Capacity and Graduations (Bench or Full Height Full Height Available with wheels at extra cost)

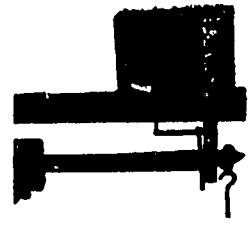
TOLEDO
portable beam scale



Dependability, ruggedness, and accuracy are provided by the functional design on Model 4181. Platform area 19¼" x 28⅛". Easy reading triangular beam. Offset steel column head. Triangular weights.

Beam	CAPACITIES Loose Weights	Total Cap.	Price
Avoirdupois **Model 4181A** 100 lb. x 8 oz.	2 of 100 lb. 1 of 200 lb. 1 of 500 lb	1000 lb.	$368.00
Metric **Model 4181M** 50 kg. x 250 g.	2 of 50 Kg. 1 of 100 kg. 1 of 200 kg.	450 kg.	444.00

Model 4181C—Combination Avoirdupois (front) and Metric (back). Beams & Weights as above.

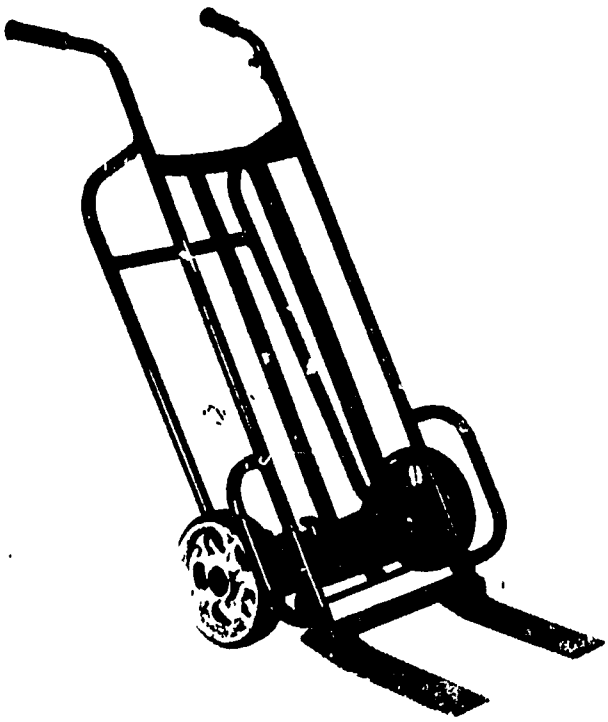


over-under indicating head

Converts any beam scale to a faster, more accurate weighing device. A large dashpot piston diameter increases damping and efficiency. Lucite window.

No. 123 .....

DRAWING No. 6



Seedburo

EZY-TILT
pallet truck

The time savings potential of this pallet truck has caught the imagination of lumber yards, feed stores, elevators, fertilizer plants, trucking companies and many others whose operations allow the palletizing of heavy or bulky materials

Asbestos shingles, cement, bricks, grain sacks, fertilizer bags and large boxes or crates are just a few of the items that can be handled with this rugged truck.

Although standard pallets are 12" x 24", larger pallets can be used For wide materials such as shingles, rock-lath, etc , two standard pallets can be placed side-by-side allowing a 48" wide load to be handled.

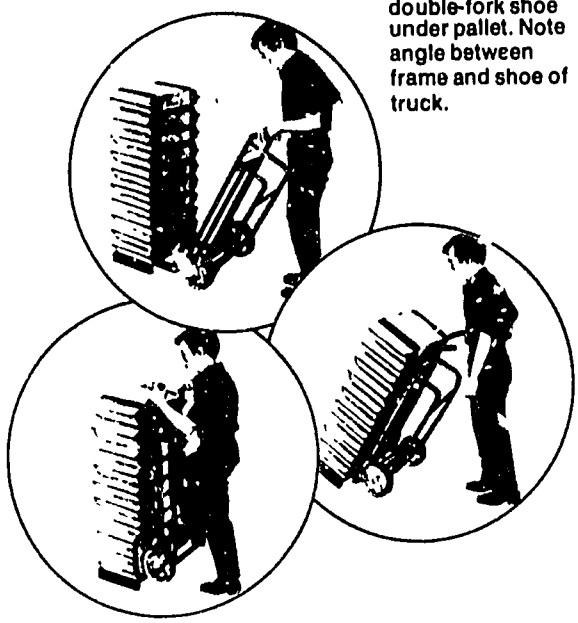
Offered in both steel and aluminum construction the Ezy-Tilt Pallet Truck is available with two wheel safety brakes which eliminate accidents when moving down steep inclines A ramp can be used for safely moving heavy loads from delivery truck body to ground by a single operator

Wheels have 10" x 2½" replaceable solid rubber tires for use on smooth floors. Heavy duty pneumatic tired wheels 12" x 4" for outside use available.

No. 800AA	Alum., 12" Air Tires without Brakes	**$259.00**
No. 800SA	Steel, 12" Air Tires without Brakes	**224.00**
No. 800AS	Alum., 10" Solid Tires without Brakes	**241.00**
No. 800SS	Steel 10" Solid Tires without Brakes	**[illegible]**
No. 825AA	Alum., 12" Air Tires with Safety Brakes	**309.00**
No. 825SA	Steel, 12" Air Tires with Safety Brakes	**274.00**
No. 825AS	Alum., 10" Solid Tires with Safety Brakes	**291.00**
No. 825SS	Steel, 10" Solid Tires with Safety Brakes	**256.00**

OTHER MODELS AVAILABLE
CALL OR WRITE FOR PRICES..

1 Operator moves double-fork shoe under pallet. Note angle between frame and shoe of truck.



2 As handles are pushed forward shoe locks at right angle to frame moving wheels off floor. Load is now tipped back with shoe acting as fulcrum rather than the wheels.

3 Tipping effort is greatly reduced and truck now reaches a balance point and is ready for movement.

plastic and wood pallets

Transport and store feeds, seeds, fertilizer, etc. on Seedburo's low cost plastic or wood pallets The double fork shoe of our Ezy-Tilt truck will accommodate the lighter weight pallets with reinforced center support

Plastic Pallets 12" x 24"		
1 to 99	each	$1.95
100 and over	each	1.70
Wood Pallets 12" x 24"		
1 to 89	each	1.35
90 to 269	each	1.30
270 and over	each	1.25

APPENDIX H

Cost Estimate for Grain Drying System

ENCI, Peru

Origin		Cost for One Site (estimates)
Peru	Roof (drawing No. 1) Double roof with top roof painted black. No sidewalls. Ground surface to be covered 280 m^2.	Obtain cost estimates in Peru. Stryker estimate of Peru construction for roof to floor $90 per m^2. 280 x $90 = $25,000 per site.
Peru	Concrete Slab (drawing No. 1) Exactly level. Smooth steel troweled. .15 to .18 m thick. Area 280 m^2.	
Peru	Hot Air Duct (drawing No. 1, A, B, B1) Made at sight from light metal or plywood.	
Peru	Heat Exchanger Unit (drawing No. 1, C) Welded metal designed to burn wood or other waste material.	
Peru (CIF Lima)	Diesel Drying Fan (drawing No. 1, D, E) Canvas transition HR4 Lister	$ 14,900
Peru (CIF Lima)	Diesel Fuel Heater (drawing No. 1, F, and drawing No. 3) Lister Nu-Way Benson. 1,000,000 BTU.	$ 6,600
Peru	Hot Air Transition (drawing No. 1, G) Made in Peru of canvas or metal.	$ 200
USA	Drying Silo Wall and Perforated Floor (drawing No. 1, H) 11.0 m diameter.	$ 6,248
USA	Vertical Auger Unloading Unit (drawing No. 1, I, drawing No. 2)	$ 3,072
Peru	Cost of Motor Mount	$ 100
Peru (CIF Lima)	Diesel Motor (drawing No. 1, J, drawing No. 4) Lister ST2 complete with pulley.	$ 4,000
Peru	Bagging Hopper Made of metal or wood	$ 1,500
USA or Peru (CIF Lima)	Platform Scale 450 kg. Over-under indicator (<u>important</u>). 2 scales at $600 each.	$ 1,200

(CIF Lima)	Grain Laboratory Equipment for Each Site	
	Moisture meters, 2 at $400 each	$ 800
	Bag probe, 12' x 3/4'	20
	Bag probe, 12" x 1"	20
	Bag probe, 30" x 1/2"	50
	Plastic samples bags (possible purchase in Peru)	10
	Sample divider	200
	Gram scale	100
	Dockage sieves with one pan	100
	Hygrometer dial, non-recording	70
	Pocket thermometer, 3 at $7 each	21
	One deep probe thermometer	100
	Gloves for chemicals, 2 pair at $10 pair	20
	2 gas masks for fumigating	300
	2 plastic covers, 2 at $150 each	300
	20 sand-filled bags made in Peru, 20 at $2 each	40
USA (CIF Lima)	Moisture Meter Calibration Unit Equal to Brabender Seedburo Model SAS. Located at University.	$ 4,000

APPENDIX I

Each Site

ENCI, Peru

		Tingo Maria Progreso Tocache
Double roof and concrete floor Harold Stryker estimate of Peru construction 280 m^2 at \$90 m^2		\$ 25,000
Option--Wood burning heat exchanger Made in Peru \$3,000		
Lister HR4 and heat unit (purchased in Peru)		21,700
Silo drying floor with augers		9,420
Lister motor ST2 to power augers (purchased in Peru)		4,000
Bagging hopper (made in Peru)		1,500
Platform scales with over-under head		1,200
Grain moisture tester and grain analysis equipment		2,151
		\$ 64,971
	Rounded	\$ 65,000
3 sites x \$65,000		\$195,000
10% contingency		19,500
Estimated cost		\$214,500
Moisture meter calibration oven for university at Tingo Maria		\$ 4,000

ECASA--None

APPENDIX J

Drying Silo Floor Manufacturers

1. Behlen--Columbus, Nebraska

2. York--York, Nebraska

3. Storemore--Fremont, Nebraska

4. Butler--Kansas City, Missouri

5. READ--Atlanta, Georgia

APPENDIX K

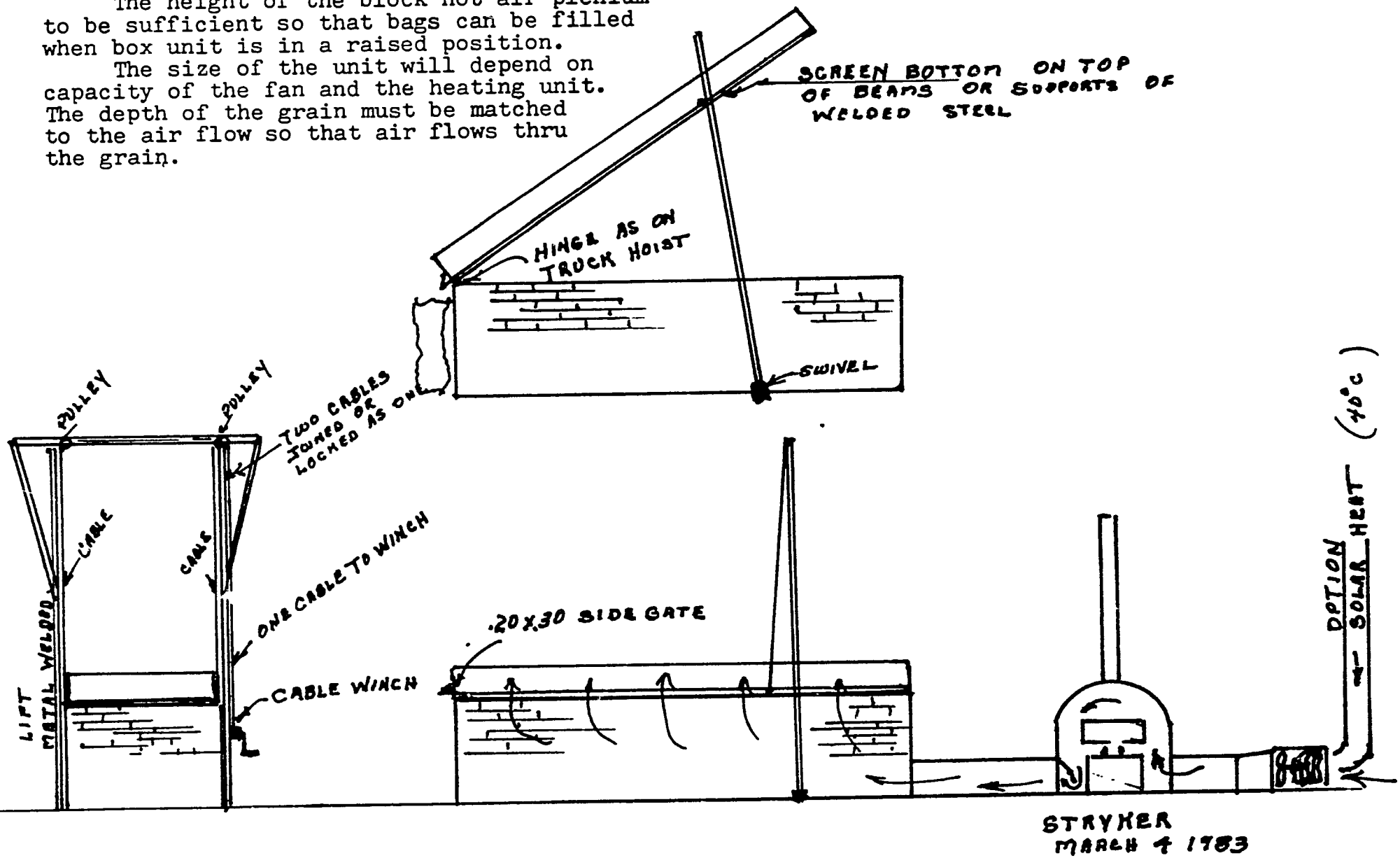
PERU S. A. EXPERIMENT STATION at TULUMAYO

The Fan Unit can be a gasoline motor with a fan from a large truck or tractor attached to the pulley shaft of the motor. It must be well balanced. It can be a commercial unit or an electric driven fan. If a gas motor, the exhaust fumes can be drawn into the fan to utilize the exhaust heat.

The length and width of the unit will very to match the CFM of the fan unit. The heat exchanger size will depend on the size of the entire unit.

The height of the block hot air plenium to be sufficient so that bags can be filled when box unit is in a raised position.

The size of the unit will depend on capacity of the fan and the heating unit. The depth of the grain must be matched to the air flow so that air flows thru the grain.

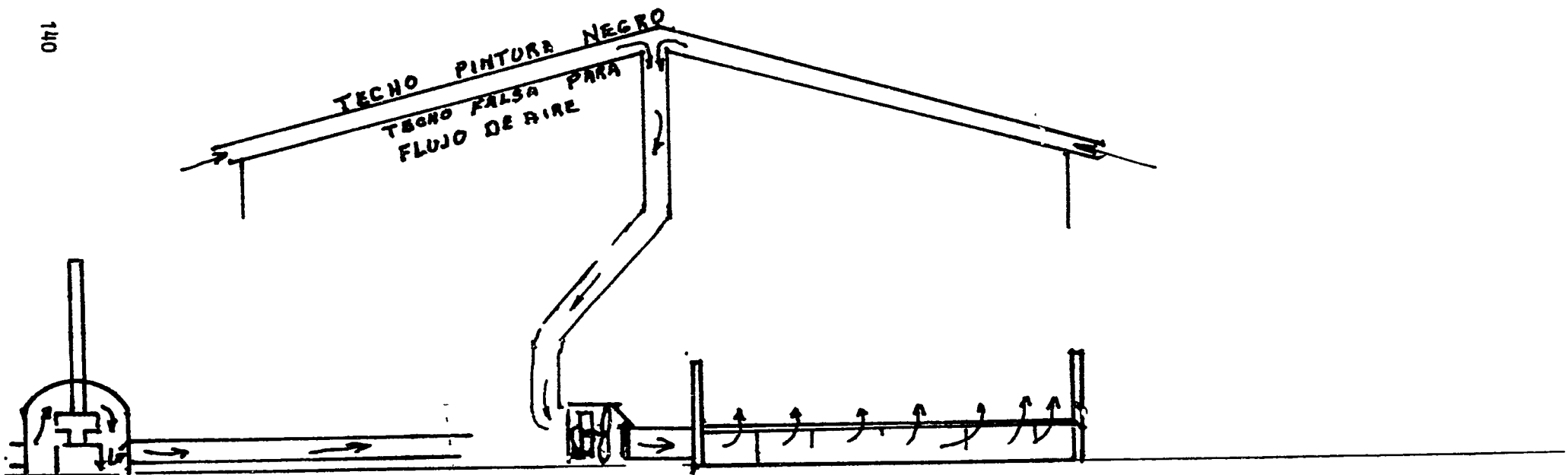


EXPERIMENT STATION at TULUMAYO

This plan would be for a very small capacity drying unit, with wood or block walls. The floor would be perforated metal or screen placed on top of supports.

The grain would be removed by hand shovels or type of drag unit on a long handle. Either or both the solar or wood burning heat exchanger could be used for heat in addition to the heat from the motor, but caution must be used if the wood exchanger is used for the heat may be excessive for the fan motor.

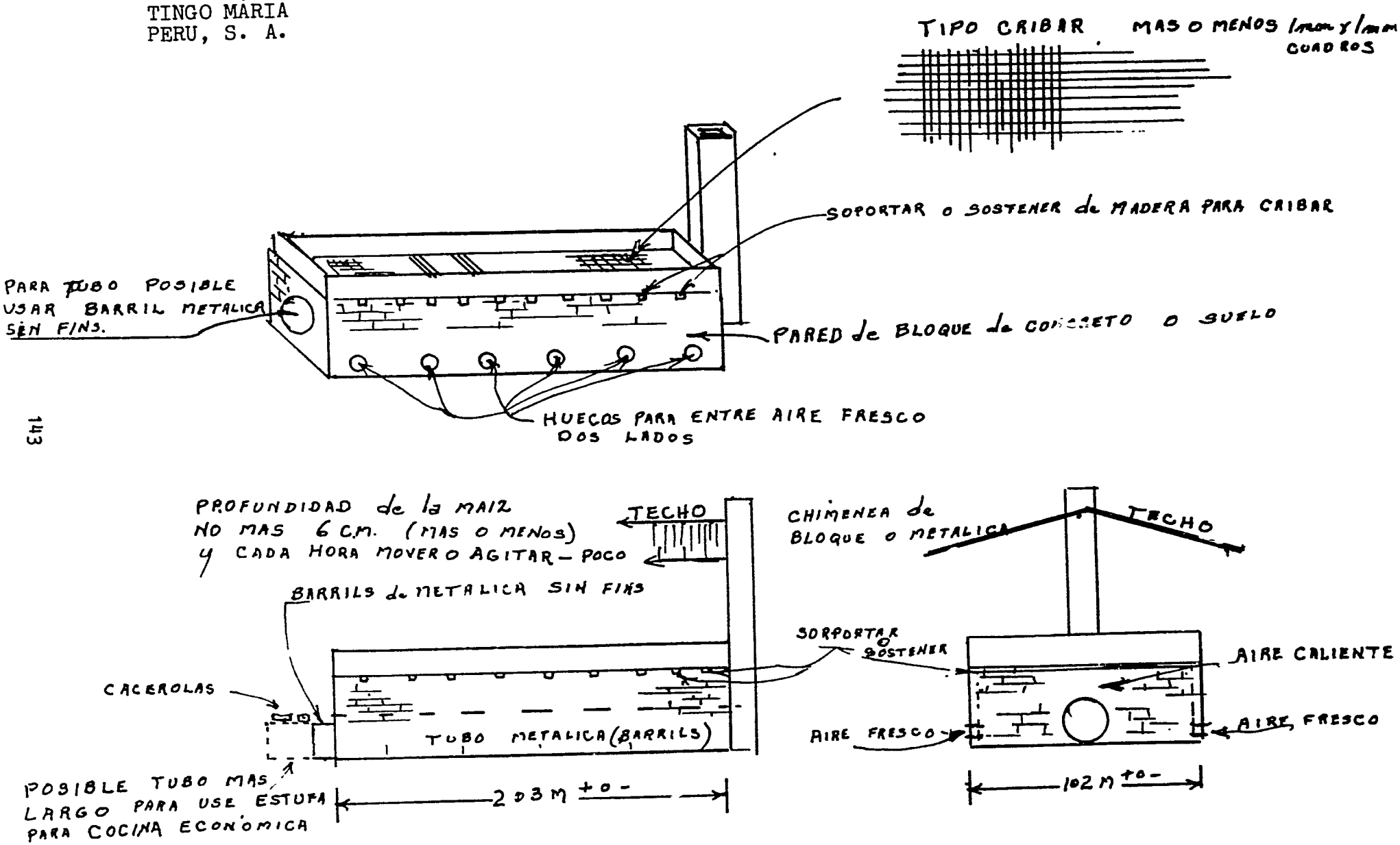
The perforated floor spance and depth of grain to be dried will depend on capacity required and the CFM of the air flow with matched heat source.



STRYKER
MARCH 4 1983

APPENDIX L

PARA: RICARDO CORDOVA JIMEMEZ
LO MORODO
ZONA E (A84 LOTE)
TINGO MARIA
PERU, S. A.



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STRYKER
4 MARZO 1983

APPENDIX M

Lister Dealers in Lima

Electric Diesel Service S.A.
EDISSA
Av. Colonial 501-515
Lima — Tel. 32-88-60

Blackstone Onan
Av. Mexico 454
La Victoria
Lima 13 — Tel. 72-44-23

Lister
Esperanza 392-394
Miraflores
Lima — Tel. 47-00-59
46-54-98

Possibly more

APPENDIX N

Jack D. Rosholt
Project Manager, Upper Huallaga Project
Regional Development Division
USAID/Lima
APO Miami 34031
Tel 286000 - 286200 Ext. 407, 408

Adolfo Jurado, Ph.D.
Agriculture Division
USAID/Lima

Ing. Ramón Cornejo Saavedra
Executive Director
Upper Huallaga Special Project

Ing. Manuel Arrus Raschio
Jefe, Oficina de Planeamiento y Desarrollo Empresarial
Empresa Nacional de Comercialización e Insumos (ENCI)

Ing. Luis López Palacios
Gerencia de Almacenes
ENCI
Tel. 293800

Ing. Ramón Ferreira Riveiro
Sub-Gerente de Estudios y Proyectos
Empresa Comercializadora de Arroz (ECASA)
Los Laurelres 214 - San Isidro
Tel. 410345

Gunther López Vela
Warehouse Manager, ENCI
Tingo Maria

Ing. Simeón Romero
Director, Zona de Promoción Agropecuaria
CIPA, Tingo Maria

Dr. Durial Pérez
Director, Zona de Investigación (in Exp. Station of Tulumayo)
CIPA, Tingo Maria

Ing. Manuel Feijoo A.
Coordinador Técnico
PEAH, Aucayacu

Ing. Pablo Arredondo
Director Zonal
PEAH, Aucayacu

Ing. Felix Bardales
Manager, ECASA
Tingo Maria

Ing. Enrique Cribillero
Director Zonal, Rio Uchiza, PEAH
Nuevo Progreso

Ing. Franz Estrada
Director Zonal, Tocache, PEAH
Tocache

Ing. Raul Palacios
Director Técnico, PEAH
Aucayacu

Ing. Carlos Alfonso Laos
Asistente Técnico II
OSE, Tingo Maria

Ing. Luis Lossio P.
Sub-Director de Comercialización y Agroindustria
PEAH
Apartado 185 - Tingo Maria

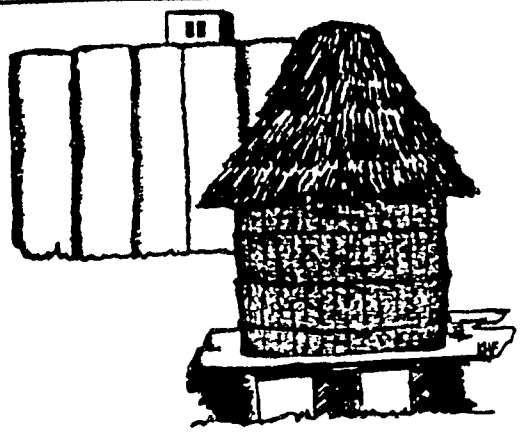
Mr. Darwin Hilario E.
Apartado 108
Tingo Maria

Eco. Felix R. Paz Flores
Gerente de Almacenes
ENCI
Av. Argentina 2424
Callao, Lima

Ing. German Echecopar del Solar
Gerente Servicios Técnicos
ECASA
Los Laureles Nº 214 5º Piso
San Isidro
Lima

APPENDIX O

Curso Intensivo de Almacenamiento y Mercadeo de Granos de KSU/AID



Entrenamiento en Almacenamiento y Mercadeo de Granos

13 de junio al 29 de julio 1983

Un curso de siete semanas sobre el almacenamiento y el mercadeo de granos se ofrecerá de nuevo este verano a Kansas State University bajo el Acuerdo Cooperativo AID/DSAN-CA 0256 con la U.S. Agency for International Development. El propósito de este curso, presentado por el Food and Feed Grain Institute, es de mejorar la eficiencia de los organismos de almacenamiento y mercadeo de granos en los países en desarrollo a través del entrenamiento de su personal

Objetivos

Los objetivos de este curso son de ampliar los conocimientos y capacidades en las áreas siguientes.

- Fundamentos de almacenamiento de granos
- Causas y prevención de perdidas en los granos
- Inspección de granos y evaluación de perdidas
- Transporte y almacenamiento de granos de la producción hasta el consumo
- Administración y operación de las empresas de granos
- Relaciones entre los precios de granos y los costos de mercadeo
- Administración de mercadeo
- Funciones adicionales de mercadeo
- Técnicas analíticas de mercadeo de granos

Contenido

El curso proveera entrenamiento en todas las áreas básicas, incluvendo la estructura de granos, la humedad y su determinacion, los métodos y procedimientos de almacenamiento, los principios de aireacion v secado, la introducción al control de plagas, los principios de administracion v operaciones, la politica agricola, el ambiente de mercadeo, el diseño de las empresas, la administracion de los almacenes v el control del inventario y los sistemas de mercadeo de granos y su desarrollo Además, cada participante decidirá por especializarse en el mercadeo o en el almacenamiento

Los que se especializan en el mercadeo recibiran entrenamiento adicional en la administración de mercadeo las operaciones para facilitar el mercadeo la planificacion de transporte, los costos y alternativas de almacenamiento el análisis de precios, los pronosticos el analisis economico el análisis financiero y el análisis de transporte v localizacion

Los que se especializan en el almacenamiento recibirán entrenamiento adicional en la inspeccion v tipificacion de granos, la evaluacion de perdidas, la determinacion de humedad, los insectos de granos almacenados, los mohos de almacenaje, v las plagas vertebradas la aireacion v el secado de granos, el equipo de manejo de granos v su mantenimiento, el manejo v almacenamiento de semillas v el control integrado de las plagas incluvendo la inspección v limpieza de los almacenes los metodos fisicos y mecanicos, los metodos quimicos v la seguridad en el control de las plagas

Ademas de conferencias, discusiones y sesiones de laboratorio, habrá varias giras educativas, incluvendo una gira de ocho días Habra visitas presentaciones v discusiones en las fincas, instalaciones de manejo de granos fabricantes de equipo de manejo, almacenes agencias reguladoras, instalaciones de investigación, instalaciones de exportacion, molinos de arroz comerciantes de arroz bolsas de comercio, comerciantes y especuladores de granos v cooperativas

Idioma

Las conferencias v sesiones de laboratorio serán presentadas en ingles con la traduccion simultánea al español v al frances Se proveeran los manuales y todo el material escrito en estos tres idiomas

Participantes

Este curso está organizado para las personas que trabejan en el almacenamiento y mercadeo de cereales y legumnosas en los paises en desarrollo, tales como los agentes de calidad, los gerentes de instalaciones de manejo de granos, los especialistas y gerentes de mercadeo, y las personas responsables de diseñar los sistemas de mercadeo de granos Todos los participantes deben tener un diploma de bachillerato o equivalente Las personas matriculadas en universidades en los E U pueden obtener cinco horas semestrales de crédito por este curso

Profesorado

El curso está presentado por el personal del Food and Feed Grain Institute de Kansas State University. Todos los profesores tienen títulos universitarios de alto nivel y tiene experiencia a trabajar en los paises en desarrollo El personal incluye ingenieros agrónomos, economistas agricolas entomólogos de productos almacenados, micólogos, v especialistas de almacenamiento de granos

Solicitud de inscripción

Las misiones de AID que quieren matricular participantes en este curso deben consultar el USDA Catalog of Courses 1983 Los otros pueden matricularse o recibir información adicional al ponerse en contacto con el Coordinador Food and Feed Grain Institute, Shellenberger Hall Kansas State University, Manhattan, Kansas 66506, USA (teléfono (913) 532-6161) Se puede matricularse hasta el 30 de mayo 1983

Los métodos para dividir al azar una muestra de grano son una parte de las tecnicas que aprenden los participantes.

Para información sobre los costos, vease el inverso.

Becas

El Food and Feed Grain Institute no puede brindar becas para este curso. Los participantes pueden hacer contacto con USAID, el Banco Mundial, FAO y otras agencias para obtener ayuda.

Costos

Participantes patrocinados por AID

Los que quieren asistir a este curso bajo el patrocinio de AID deben consultar el USDA Catalog of Courses and Research Opportunities in Agriculture 1983. El Curso Intensivo de Almacenamiento y Mercadeo de Granos se indica como TC 150-2.

Otros participantes

El costo del curso es de U.S. $1750, pagadero a su llegada. Esto incluye hospedaje al dormitorio (dos personas por cuarto), las comidas en la universidad (escepto el domingo en la noche), el seguro médico, y los servicios de recreación, además de todos los manuales y material de entrenamiento. Los cuartos para una persona son disponibles a un precio un poco más alto.

El costo de U.S. $1750 no incluye hospedaje y comidas durante la gira de ocho días, el almuerzo durante dos giras de un día, y los gastos personales. Los participantes deben tener dinero para cubrir estos gastos. Por lo tanto, se recomienda una suma adicional de U.S. $1175 (U.S. $25 por día por 47 días).

Los participantes aprenden a identificar moho encontrados en los granos almacenados.

KSU KANSAS STATE UNIVERSITY

Food and Feed Grain Institute
Shellenberger Hall
Manhattan, Kansas 66506
USA

LIST OF REFERENCES

Plan de Ejecución del Proyecto de Desarrollo Rural Integral del Alto Huallaga, Resumen, Vol. I - V.

Upper Huallaga Development Project, Project Paper.

Grain Drying, Storage and Marketing in the Upper Huallaga Area, Food and Feed Grain Institute, Kansas State University, May 1981.

Project Agreement between the Republic of Peru and the United States of America for Upper Huallaga Area Development Project, September 1981.