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# ONION STORAGE AND MARKETING in CHAD'S OUADDAI REGION

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## INTRODUCTION

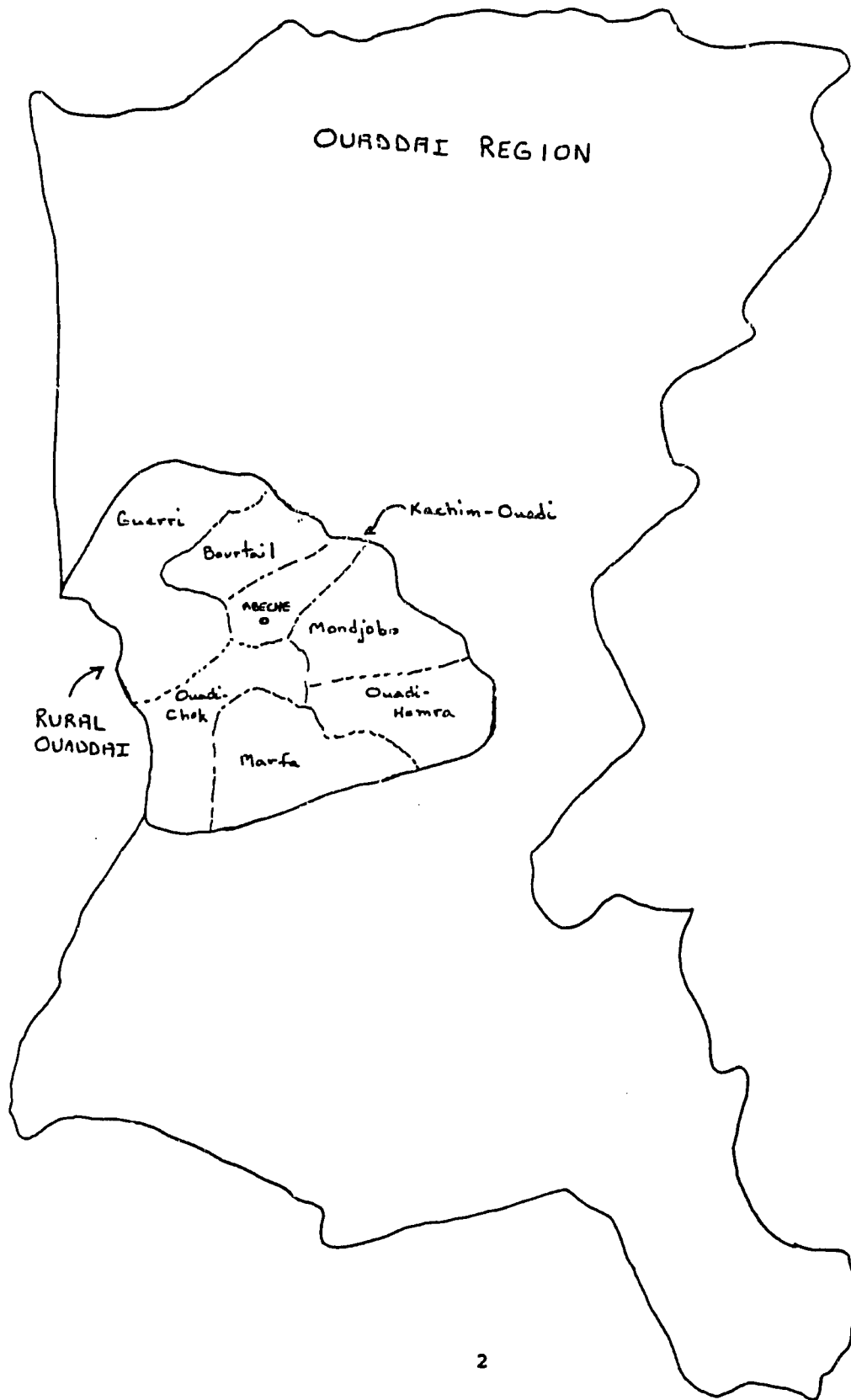
The primary goal of this study is to examine Ouaddai region farm level onion marketing. Objectives are to identify principal technological and profitability constraints with a special look at storage, and obtain alternative intervention solutions based on the needs of program recipients, the development philosophy of Africare, and available resources. This is the third of a series of five such studies. In order to avoid loss of important information that should be used in guiding the design of intervention tactics in the region, there will be some repetition of basic socio-economic facts documented in preceding Ouaddai studies researched by the same writer.

Onions are a critical component of daily Chadian cuisine, eaten year round, daily by most, they are a primary ingredient of traditional sauces along with tomatoes, okra, peppers and garlic. According to a Minister of Agriculture of Chad document, onions are the seventh most frequent purchase of Chadian homemakers in N'Djamena, following sugar, sandals, soap, coffee, tea, oil and salt.

Onions and garlic are competing crops grown in the same fields, by the same people, using the same cultivation techniques, and are ultimately destined for a similar market. However, unlike garlic, onions have two production periods per year serving to spread the work load, positively affect the market flow, and theoretically smooth seasonal price variations. For the purpose of this study, readers may consider the onion industry constraints and recommendations as essentially transferable to the second important Ouaddai bulb crop, garlic.

The Ouaddai Rural region in which Africare has concentrated development efforts consists of seven districts (see Rural Ouaddai map on page 2, hand drawn due to political situation). This region is known for the numerous seasonal rivers (ouadis) which web the countryside. They fill to overflow during the rain season, then recede to dry beds for the rest of the year. The moisture retaining clay subsoil and a shallow (6 to 12 feet) subterranean water table provide humidity for garden cultivation, both irrigated and non-irrigated. Thus, it is on the banks of these ouadis that wells are dug and the onion and garlic fields planted.

At harvest time, the historically small, hard Ouaddai onions are sacked for immediate sale or stored in speculation of



anticipated seasonal price increases. (see footnote <sup>1</sup>) Known for their storability, the Ouaddai onion has enjoyed a reputation of having a desirable pungency that comes not only from the advantages of variety, but from the hot dry climatic conditions of the region.

The problem of organizing efficient assembly, storage, processing, and distribution of crop surplus grown in the many Ouaddai farm gardens, is magnified by the highly individualistic decision-making behavior of farmers, the geographic isolation of the Ouaddai, and constant transportation challenges. Further complicating the situation, the rural people of Chad are extremely conservative and avoid risk. They fear change and protect lifestyle traditions. The arrival of organizations has begun to sensitize the population to a point where they are able to accept small deviations from tradition, but only if the change is culturally viable. In order to provide lasting aid, Africare seeks the economic and cultural information that will allow project designs to build upon the existing infrastructure of the Ouaddai people and their agriculture.

As with other Ouaddai vegetable crops, it is during average or high rainfall years that onion and garlic production potential is greater than the absorption power of the available market. Theoretically, improved commercialization will provide the farmers incentive to produce larger quantities more efficiently. This study puts forth the present situation and suggests intervention tactics that will potentially improve Ouaddai onion marketing at the producer and, subsequently, regional levels.

#### METHODOLOGY

In conducting this study a modified commodity systems approach was used where the targeted aspects of the onion industry were assessed extremely rapidly through interviews, site visits, and literature reviews. Attention was concentrated in the villages affected by the well construction efforts of Africare. There are aspects of the situation not examined because they are already being addressed in the projects of other organizations or outside the arena of Africare's development efforts.

The analysis and conclusions were derived from the following interactions: (1) interviews with private sector representatives, including farmers, people storing onions, onion wholesalers and

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<sup>1</sup>The current trend to irrigate with pumps from more sophisticated wells has resulted in production of larger, more watery onions and, thus, affects storability.

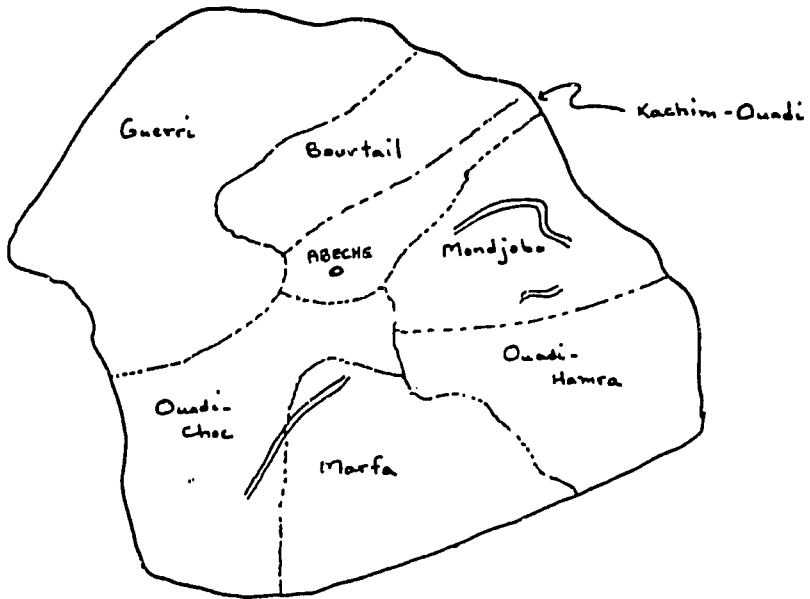
retailers, prospective marketing and storage entrepreneurs, and consumers; (2) interviews with government and Private Voluntary Organization (PVO) representatives and technicians involved in agriculture production and marketing development activities in Chad; and (3) site visits to production, storage, wholesaling, and retailing facilities in the Ouaddai and surrounding regions. A list of individuals contacted and question guide examples are provided in the appendix. As common constraints and needs outside the initial study area were identified they were pinpointed as potential territory for further study.


The Rural Ouaddai sub-region, one of seven districts surrounding the city of Abeche, contains the well construction sites of Africare. During 1989 and 1990 Africare has succeeded in digging 18 reinforced cement wells which serve to double the field size realized with traditional wells. Onions, garlic, potatoes, okra, irrigated tomatoes, corn, beets, cabbage and beans are the major crops found in these gardens. The author concentrated interview efforts in the fore mentioned areas, as shown in the page 5 Rural Ouaddai Districts map.


Need for a quick diagnostic study led to the use of an exploratory interview approach for which the economist spent approximately ten days in the target localities engaging in discussions with key community members and farmers. Interviews lasting from one to three hours were carried out in farmer's fields, or whatever otherwise was the territory of the respondent, in order to create a relaxed atmosphere where questions could be related to observed phenomenon. Structured questions designed in accordance with the interviewee's expertise framed the inquiries investigating what practices are followed, problems experienced, and variations possible given local economic and cultural constraints. Interviews with women were usually conducted through a female French/Arab speaking translator native to the area. After each day's work the information was evaluated, new hypotheses formed, and techniques improved in order to increase potential understanding during pursuing interviews.

There are all kinds of reservations that have to be made about "quick and dirty" study results. However, the interviews conducted appeared to provoke sincere, frank answers. Questions sometimes resulted in disparate reports between respondents. It is assumed that socio-economic conditions vary from village to village, that interviewees have access to varying quantities of information, and use common but inaccurate measurements of their product such as heaps, koros, and sacks of differing shapes and sizes. However, results provide indicative values of marketing practices in the Ouaddai. Importantly, the problems shared, and the solutions discussed are those of the Ouaddai people, thus, lead to recommendations that the citizens should be socially and physically prepared to launch.

## RURAL OUADDAI DISTRICTS



 Ouadi Bitcha : 11 P.M.B constructed by Africare

 Ouadi Mondjoko : 6 P.M.B.

≈ Other P.M.B site

The five southern districts produce substantial quantities of onion and garlic.

## SOCIO-ECONOMIC SETTING

The demographics of Chad are almost unknown and at this time it is impossible to seriously state population numbers. The official census dated 1964 did not count all geographic areas nor the nomads of the Ouaddai region. The ensuing census of 1968 did not include the Ouaddai for security reasons. Due to various political and social constraints, censuses taken by various organizations during more recent years are equally limited. Despite the constraints to census taking success, a vague population estimate of the Ouaddai is about 5 people per square kilometer, or about 400,000 people occupying the 76,240 square kilometers of the Ouaddai region.

The agropastoral population of the Ouaddai is profoundly affected by the seasons of the year. At least five principal seasons, each with specific characteristics, influence the way of life and work of the people. In short, the seasons may be defined as follows:

- \* The season of the start of the rains (June-July). Generally lasting several weeks starting the end of June or the first part of July. This period marks a period of great "stress" wherein people lose weight, food becomes more limited in variety and quantity, and sickness may be brought on by lack of proper nutrition.
- \* Rainy season (July-August) in which rain falls regularly and vegetation develops normally.
- \* The season marked by the end of the rain (September) in which rain stops, vegetation dries, and waters recede.
- \* Cold season (October-February) brings on the complete drying of vegetation and waterways, and groups of people install themselves near the dry season watering points. This marks a period of hard work when wells and holes for surface water collection are constructed or repaired.
- \* The hot and dry season (March-June) symbolizes all the pains and fatigue of a period in which sanitary and nutritional conditions become markedly worse.

It is within this seasonal framework that all principal economic objectives of the Ouaddai people are determined. An anthropologist defined the basic needs as: (1) obtaining social status, (2) survival, (3) obtaining a minimal revenue, (4) food security, and (5) risk reduction. Obtaining the latter four of these objectives requires that a system's inputs be converted into food through knowing and maximizing the available natural agricultural resources, labor, and capital (land and



animals). The health of a system is determined by the quality of rapport between the quantity of effectively used inputs and the product obtained in terms of alimentary subsistence. Here in the Ouaddai these variables are dependant upon the seasons, or climate, that have formed the economic mentality of farmers. This mentality formed from a fear of being without subsistence and an obsessional fright of famine based upon experience. The fundamental search for food determines farmer's technical choices of agriculture. Decisions are adapted to the following seasonality framework of crop production and harvest.

### Production and Harvest Schedule

Crop/Season	J	F	M	A	M	J	J	A	S	O	N	D	.
Cold Season	_____												
Hot Season				_____									
Rain Season							_____						
Tomato	+++++									*****			
Pimento/Okra	*****+									*****			
Millet/ Peanuts							*****+						
Onions	*****&&&&*****+									*****			
Garlic	*****+									*****			

++++ harvest  
 \*\*\*\* production  
 &&&& harvest and production activities at the same time

As can be viewed from the pattern produced by this table, there are three types of agriculture in the Ouaddai. The first type is rain-fed, during which millet, sorghum, beans, and peanuts are grown. The second, the cold season, is marked by the end of the rains, thus receding waters, and is typified by the production of berbere sorghum, sesame, tomatoes, and okra. The third season is hot and irrigated wherein the production of onions, garlic, some tomatoes, dates, potatoes, pimento and other vegetables takes place.

It is within this last type of agriculture, hot and irrigated, that onion and garlic take a major role. It is with these cash crops, upon which basic alimentary survival does not depend and through which a seasonal void may be filled, that

producers often attempt to fill monetary needs servicing non-producible essentials. As may be seen above there are two onion crops. The early onion crop is planted before the hot season begins and reportedly yields around 75 percent of the total yearly production for the region.

### Risk Reduction

Extremely instable and precarious global environment conditions serve as a basis of all decisions concerning production strategies and environment exploitation techniques designed to reduce risk. In addition, the precarious system of agriculture production is linked to the risk of drought with three specific dimensions which are: (1) the extreme variability of climate characteristics from one year to another, (2) the extreme and intensifying climatic fluctuations within any 10 year period, and (3) the change seen in the worsening conditions of climate over the past 40 years.

However, risk is also tied to the market of the principal products, cereals and animals, characterized by extreme price instability. This is the principal cause of farmer vulnerability the world over.

At last, risk is tied to the individual decisions such as which crops or enterprises will be undertaken, or uncontrollable factors such as accident, sickness, or death in the family.

Based upon these recognized uncertainties, farmers apply any one of several strategies. The first, and most important to organizations intending to develop agriculture, is diversification of activities. This extremely logical survival technique hampers development efforts to specialize farmers toward higher production efficiency. Another strategy currently used by the Ouaddai people is that of mutual support and cooperation, at least at the level of an enlarged family. This implies that the geographically scattered large number of small-scale producers who currently operate informally may be receptive to organization within their own socially acceptable, self selected groups.

### Division of Work

According to Anthropologist, Angelo Bonfiglioli, the customary division of work here in the Ouaddai is a function of sex. There are masculine work, feminine work, work done alternatively by men or women depending upon the stage of activities, and at last, work performed by either men or women.

At the production level men generally help to do hard tasks like field clearing, cleaning and preparation for planting. Woman participants work in all production phases, particularly responsible for the harvest and post harvest product care. Women of work age often cultivate individual fields where they control the production. The role of the woman varies in function with what pastoral work is undertaken by each family unit, the degree of emigration of the men (seasonal), the population density, and cultural practices and techniques exploited.

The head of family defines the role of his wife(s) and children by distributing precise tasks. In a general manner:

\* Men occupy themselves with some gardening and watering of animals, looking for pasture, the construction or repair of water sources, and all that is relative to the sale of animals.

\* Women milk animals, do the large part of gardening, water some of the animals (in particular the donkeys), sell milk and garden products, process and prepare food, and care for the animals.

\* Children participate in caring for the animals, boys aid their fathers, and girls assist their mothers.

In the specific case of onion production the division of work may be summarized as follows: Men dig the wells, help break the ground, and in the case of larger scale production he helps water and sell the harvest. Woman break the ground, grow the nursery plants, water, harvest, and sell the crop.

#### WOMEN IN THE OUADDAI

Women play the critical role in every aspect of Ouaddai food production, marketing, processing, and consumption. The semi-nomadic Ouaddai family is given stability and security through the efforts of the woman (source - interviews). It is imperative that project activities focus upon the needs of women.

Data gathered by ONDR (the National Office of Rural Development) revealed some interesting quantitative facts concerning the role of woman as producers. A total of 1,390 farms in 31 Ouaddai villages were evaluated with respect to size and proprietorship. Of the total, 38 percent are operated by unmarried, divorced, or widowed women. Further, it was found that farm size was directly correlated to sex of the operator. In short, as can be seen in the table on the following page, the less men were involved, the larger the farm plot.

Assessment of Farm Size by Participant Type  
(in percent of total farms)

participant type	Farm Size (hectares)				average size
	0-1	1-2	2-3	more than 3	
Men alone	67	33	0	0	.8
Women alone	23	42	27	8	1.7
Man and Woman	55	33	10	3	1.0

Agriculture product traders in the market place are almost exclusively women. Men are found only in the stores where packaged food is sold along with all other goods. The role of women as intermediaries has been amply demonstrated.

Women are the processors of food products, whether for final consumption or in preparation for detail sales. As explained earlier, processing and preparation of food products is labor intensive and employs crude traditional techniques.

In summary, the members of society who are responsible for producing, marketing, processing and making family unit decisions are often women, despite what is traditionally thought. The flexibility and willingness of rural women to engage themselves in economic activities is considerable. It is then logical that the primary recipients of agriculture program efforts should be women. Importantly, in the Moslem society communications between men and women are, at minimum, strained. Necessarily, where ever practical teachers or extension agents should be female. In addition, it must be taken into account that most of the Ouaddai women do not speak French, and many are illiterate.

#### ONION SUPPLY

A loose estimate of the total number of Ouaddai onion and garlic producers is 12,000. Representing a sizable portion of the total, ONDR estimates 5,227 producers in the Bithea area alone (see map page 6). Usually the same producers are also growing a myriad of other crops and invested in diverse activities that, cumulatively, constitute their survival strategy "portfolios."

Abeche office of ONDR's 1988-89 cultivated area and volume of production estimates are broken down into onion and garlic production in hectares for each of the Rural Ouaddai's seven districts as follows:

District	Onions (ha)	Garlic (ha)
O. Choc	80	60
Marfa	150	150
O. Hamra	155	155
Guerri	-	-
Khachimel O.	53	35
Mondjobo	400	300
<u>Bourtail</u>	-	-
Totals	838	700

Verbal estimates from the same source reports hectares in onions for 1989-90 at 995 hectares with a production capability of 1,200. Estimates of current land in garlic production are given at 839 hectares with a capability of 1000 hectares. In both cases the maximum production capacity is justified with the statement, "if there is a market for the crop."

In addition ONDR estimates onion yield at 28 metric tons per hectare. This infers that total Ouaddai production for the 1989/90 season was 23,464 metric tons. Garlic yield is estimated at about 5 metric tons per hectare inferring a 1989/90 yield of 3,500 metric tons (based on chart estimates from above).

Information concerning yield from other reliable sources indicate similar production possibilities. A second representant of ONDR reports onion yield to be 20 metric tons per hectare and garlic yield at 7 metric tons. Africare has estimated a substantially more optimistic yield of 32 metric tons per hectare for onions, and 11 tons per hectare for garlic. Sahel biological facts literature offers an estimated yield range of 20 to 40 tons per hectare for onions, and 7 to 10 tons per hectare for garlic.

Average onion field (plot) size is estimated at 3.2 are per family (there are 100 ares per hectare). Using ONDR's yield estimate, this infers a production level of 896 kilos per family. Garlic fields are slightly larger, 3.8 ares, inferring a production level of 190 kilos per family.

Common volume measurements used in onion marketing are the koro and sack. In order to determine an average weight of these volume measurements, ONDR, BIEP (Inter-Ministerial Bureau for Programming of Rural Deelopment), and the writer each went into the market place and (BIEP and the author applying random sampling techniques) took a series of scale measurements. Averaged results are summarized as follows:

Source	Location	kilo/koro onions	kilo/sack	kilo/koro garlic	kilo/sack
ONDR	Abeche	2.5	94	2.0	71
BIEP*	N'Djamena	2.2	79	1.5	74
Writer	Abeche	2.56	82	1.8	74

\* According to studies preformed by Mr. Le Grontec of BIEP, all of the dry vegetables (tomato, okra, and pimento), all of the garlic, and 60 percent of all onions found in the N'Djamena central market are from Abeche. Another important document reports 75 percent of the total onions in the market were found to be from Abeche.

Based on ONDR's findings, one can assume that there are 37.6 koros in a sack of onions, and 35.5 koros in a sack of garlic. BIEP's information implies that there are 36 koros in a sack of onions and 49 koros in a sack of garlic. Findings of the writer result in an estimate of 32 koros in a sack of onions and 41 koros in a sack of garlic. Averaging all estimates, there are about 35 koros in a sack of onions, and about 41 koros per sack of garlic.

At last, a brief summary is offered concerning the observation of a production motivation phenomena that has an effect on onion supply, but which stems from food security and risk taking attitudes of the Ouaddai people. During interviews it was discovered that the decision to produce onions is directly linked to the success of the millet harvest. During the rainy season everyone works millet fields, the basic source of alimentary security. Usually this crop does not surpass the level of consumption. Good rains of correct timing and proportion that result in a good harvest serve to create a general state of well being. With minimum survival and food security assured, the Ouaddai culture permits people to relax and plant less of the labor intensive irrigated crops. This observed condition is substantiated by the observations made and reported by Sorenson in his document discussing marketing issues, in particular pricing. He reports that in the situation where the farm is foremost a source of subsistence, as in the case of millet production, the peasant family will work on the farm the hours needed to produce enough to feed the family at the socially determined level, and then stop. This is not the case in situations where the farm is viewed as a business, in which case peasants are expected to respond to prices by producing more when prices rise, and less when they fall. This is seen in the Ouaddai where the motivation to exploit available well water and dispensable hot season hours is a poor millet harvest. It is only now with the current campaign for alimentary self sufficiency that peasants attempt to surpass the minimal survival production levels. With small technological advancements such as

more productive wells and pumps, the people are beginning to see the working of land as a possibly profitable enterprise through which one can achieve a sort of economic equilibrium. It is this new mentality which agriculture development organizations are currently in place to cultivate.

Actual quantity of rainfall received oscillates dramatically from year to year and governs, above all, subsistence crop success. Over the past ten years the Ouaddai has received an average rainfall of 465 mm per year. Based on the Abeche airport data collected over the past six years the average has been substantially less.

Table 1 Abeche Airport Rainfall Records

1984 - 31.6 mm	1987 - 140.5	1990 - <sup>2</sup>
1985 - 428.3	1988 - 518.1	
1986 - 359.7	1989 - 422.0	

Onions are produced in both the cold and hot seasons, irrigation taking place two times more frequently in the latter case. Although the irrigated crops are less affected by the "little droughts" than grain crops, it is in the dryer years that peasant family well being depends upon their willingness to invest themselves in onion, garlic, or other such labor intensive production enterprises. Since Chad has seen six dry years in the last twenty, two of which were devastating, the importance of extending efforts toward the development of all production potentiality is evident.

#### ONION STORAGE

Onion storage is historically a profitable marketing strategy in the Ouaddai. Regretfully, it is often not the producing peasant who undertakes this activity for which the Ouaddai onions are so well suited. In fact, the subsistence producer is often obligated to sell his product upon harvest in order to purchase food or repay debts. Compounding difficulties, intermediaries sometimes use the farmer's financial predicament to their advantage. Money is "lent" to producers who are consequently obligated to release their crop at harvest to the benefactor at greatly discounted prices. The net result is often discouraged peasants who say that they have the sense of working for nothing in order to make the rich richer. In fact, peasants

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<sup>2</sup>When the author left Abeche in September, 1990, it was another drought year.

caught in the money borrowing position report that a "rich merchant" can buy 200 sacks at such an extremely discounted price that he could loose 100 sacks and still realize a profit.

In 1988 the average price of onions in Abeche was 153 cfa per koro. The post rainy season price averaged 150 cfa per koro and the harvest period price averaged 100 cfa per koro. Exhibiting similar seasonal fluctuations, the 1989 average price was 211 cfa per koro with a post rainy season average of 400 cfa per koro and a post harvest average of 100 cfa per koro. These averages were calculated from the somewhat scattered data collected by ONDR, from which the writer eliminated inconsistent information. The average 135 percent increase in price between harvest and the post rainy season during the past two years aids in developing potential storage investment scenarios. Although possessing indicative value, caution must be exercised when using these information for decision making processes.

According to producers, intermediaries, and other onion buyers and sellers, there is no doubt that onion storage investments are historically and currently considered extremely profitable. The constraints are not lack of technological know how or desire, but solely a lack of financial opportunity.

There are two distinct qualities of Ouaddai onions. The small pungent onion from the districts Mondjobo, Khachimel-Ouaddi, and Ouadi Hamra store extremely well and are the most sought after by discerning consumers. The larger well irrigated onions from ouadi Bithea, located in Ouaddi Chock and Marfa districts, are more difficult to store due to high moisture content and command a slightly lower price. However, peasants consider both qualities a good storage investment. There has been no distinction made between the two qualities during data collection activities of either ONDR or Africare.

Onions are a highly perishable commodity, extremely sensitive to salt, humidity, and contamination from other spoiled bulbs. Even with good storage facilities a certain spoilage loss will occur. Storage techniques currently followed in the Ouaddai range between stacking sacks in a room of the house, to using well designed traditional sheds built from local materials. In all cases regular careful sorting is practiced every 4 days to two weeks wherein any spoiled bulbs are immediately removed before they can leak onto and contaminate neighboring onions. Another reported loss is due to the reuse of sacks contaminated with destructive chemical residues.

People are well aware of storage techniques that assure the minimum losses possible. However, Abeche intermediaries and merchants often store onions in the sack. In terms of quality preservation, this is perhaps the most crude commercial method found. The onions must be regularly (about every ten days)



emptied from the sacks onto the floor to be sorted for decay. This work intensive storage method realizes a spoilage rate of about 25 percent between the period of harvest and post rainy season marketing. Importantly, these investors are well positioned to select and store the small hard onions rather than the larger bulbs of the ouadi Bithea crop.

Storage research investigations at the household level found onions to be stored loose on the floor, usually in small quantities. A rule concerning this method is that the floor must be of well packed soil, not sand.

The most interesting storage facility seen was in ouadi Bithea where a rather dynamic producer stores his onions for post rainy season sales in a 17 foot diameter shed constructed from local materials. The shed, for which he paid 12,000 cfa, will last five years with maintenance. Densely shaded, 20 sacks of onions rest on an elevated platform where only about fifteen percent spoilage loss occurs between harvest and fall sales. Located in an area where onions tend to be larger and quicker to spoil, this producer tries to store small onions.

Thus, it may be concluded that storage losses range between 15 and 25 percent depending upon technology employed. With losses and expenses taken into consideration, peasants believe onion storage to be excellent marketing strategy. Please see the prices and margins section for further analysis. See appendix for appropriate technology storage shed example and Ouaddai region specific construction price estimates collected by the writer.

## INTERMEDIARIES

A powerful system of regional market intermediaries assemble products from farms or local markets of the Ouaddai. Their clients are community consumers, retailers, other intermediaries, and wholesalers or assemblers who hire transporters to convey products to some larger urban market or consumption point, the vast majority going to N'Djamena. Some rare intermediaries travel with the product to sell at the urban market. Elements of hard work, professional experience, skill, social contacts, and sheer luck are required for successful trading. This market channel role, dominated by women, requires a certain finesse to maintain relations with a complicated network of sellers, buyers, and colleagues. Essential to successful operations are a place of business, access to transport and storage, working capital, and business savoir-faire. Due to the extreme seasonal fluctuation in onion prices, intermediaries often take

speculative risks by storing as many onions as possible in anticipation that prices will rise at the end of the rainy season. Otherwise, the profitability of an individual's business depends upon volume trading or branching into complementary enterprises that use the same base resources. Their business problems center around organization of operations within the context of a complex social structure, and the reliability of product sources and clients. Intermediaries encounter some difficulties which should be recognized as constraints to their business effectiveness. The first mentioned is fatigue. Hours are long, 6:00 A.M. to 6:00 P.M., during which the person is always "on her feet." Secondly, there is a very high rate of vehicle breakdown during transport wherein products risk damage or spoilage, one of many obviously uncontrollable risks. There are times that an intermediary can't supply her customers due to lack of product, at this point she is obligated to go out into the villages to fulfill her supply promises. In addition, camel transport has recently become a greater risk due to their increasing attractiveness to armed robbers.

Family and political ties govern the "doors" of the market system, even assuring access to suppliers and purchasing clients. The strategic arrangement of these market channel elements require a certain "position" or dexterity within the Ouaddai cultural hierarchy.

As part of their complex role in the Ouaddai, intermediaries provide harvest time cash by purchasing (at admittedly low prices) from the subsistence farmer in need of an immediate market. Since there is no established credit source for the subsistence farmer, the financial environment gives birth to some highly exploitative arrangements benefiting intermediaries and merchants. Stressing this business vigor, farmers are often stopped by buyers on the road as they enter Abeche where, due to fatigue and reluctance to face further marketing stress, sellers give in to the "pressure" of buyers and end up "marketing" at an obvious disadvantage. Ideally, farmers will sell in an organized market place where many buyers and sellers are present. Seeing what various buyers will offer gives the seller a better chance to obtain full price for his product.

A second carefully nurtured farmer-trader relationship exists where the farmer has a specific intermediary who receives him upon arrival at the central market. This scenario often provides the farmer with shelter for the night, nourishment, and a sure buyer, providing him security and maximum time efficiency. Importantly, if one tries to pass the intermediaries for direct sales, small problems are "created" in order to discourage this habit, outweighing the possible gains. The two reported advantages of intermediary use are: (1) the seller does not lose time searching for a sure buyer, and (2) the merchant has a sure quantity and quality for his or her product service needs.

Intermediaries are sometimes a source of credit (however costly) for a few of the numerous small onion producers. Money is lent to producers when the incoming crop appears strong, usually to be recuperated in the form of discounted sacks of onions at harvest. This "service" is not often seen in tomato marketing. One can only assume that the drying process, a necessary step of the tomato harvest, may present a risk for the intermediary in terms of an assured ultimate payback.

Intermediaries are reluctant to divulge price and margin information. Profits are derived from using good business sense applied to speculative strategies or quick turnover of a large volume of product. Some intermediaries reported handling as many as 1,000 sacks of any major product each year. Precise quantity data is missing in all steps of the market chain. However, if this information is true it may indicate the presence of a semi-monopolistic intermediary situation.

During interviews intermediaries present an air of assertiveness, astute business sense, and financial well being. They seem to be well aware of the role of opportunity costs, and express motivation to diversify their activities according to carefully followed market signals. Views of intermediaries as provided by farmers and other village representatives are extremely diverse. Some interviewees report that the "women on the road" use coercion techniques in order to purchase products at advantageous prices. Others report that their attempts to sell directly to wholesalers or transporters resulted in a duress to pay the intermediaries their base fee (250 cfa per sack) despite the fact that they were uninvolved in the transaction. One respondent actually justified this fact with the idea that the intermediaries are friends and that "they must eat too." Often the intermediaries were described as very strong women who control all marketing transactions. They are said to over pack the sacks when they transfer from the sellers bag into their own. Importantly, it is a general belief that these powerful players are impossible to jump. The single interviewee idea on how to bypass the intermediaries involved bringing the transporting wholesaler directly to the villages where the amassed product could be loaded directly onto his truck and be taken away.

Evidence dictates that changes or refinements in the existing system must come at those points where there is the greatest likelihood of cultural acceptance as well as economic incentives. Socio-economic analysis provides reassuring signs that the disruptions to the important intermediary system by intervention efforts will be slow and minimal given the large numbers of small-scale producers supplying each agricultural product, the speed (lack of) at which change takes place in rural Ouaddai region, and importantly, there are a relatively small number of peasants prepared to immediately participate in innovative marketing programs.

## TRANSPORTATION

Inadequate transportation systems are often considered to be the cause of slow increases in marketing efficiency and continuing subsistence level food production. The state of Chadian roads, especially in the rainy season, have been described in documents of all major development institutions. They are considered to be among the world's most impassable. The purpose of this section is to familiarize readers with the Ouaddai dilemma, not to develop solutions to the troubled transportation system.

The principal road between Abeche and N'Djamena is "passable" during the eight month dry season. The GOC organization responsible for road maintenance is institutionally weak, lacking human and material resources to carry out a program. Multiplying the problem is the lack of suitable road construction materials or a suitable natural foundation on which to build. Natural soils are primarily clay or fine sand.

Recently very positive changes have been observed concerning at least two of the elements inhibiting the development of the transportation system. First, the monopolistic transporter's cooperative has been disbanded. Second, the barriers, renown for their substantial costs and delays of both official and non-official nature, have been officially removed. It is too early to tell whether or not this represents a veritable opening of the road system.

An issue that deserves mentioning in this section is where ouaddai dried vegetables, garlic, and onions are ultimately consumed, thus, where the greatest market potential exists, contrasted with the available road network. There are substantial commercialization possibilities toward the south. For example, it was discovered in the preceding tomato marketing study that Central Africa Republic, Congo, and even Zaire consistently demand Ouaddai powdered tomatoes. Ouaddai onions are reported to be in very high demand in the previously mentioned countries as well as Gabon and Cameroon. As an illustration, during the month of April 2,607 sacks of onions entered the N'Djamena market from Abeche, and 2,474 sacks (origin Abeche) left for other, mostly southern markets. For this reason one must consider an improvement of roads south from Abeche toward Sarh. This does not diminish the importance of continued improvement and maintenance of the principal road west between Abeche and N'Djamena. However, the need to exploit opportunities for increased, more effective, and more profitable commerce toward the south have become evident during the marketing research performed by this writer.

Ouaddai specific, the principle means of moving products is on the backs of donkeys or camels. Although not every farmer possesses a camel, most families own at least one donkey and rental animals are easily found. For example, the rental cost for a camel for transport between Moura and Abeche (45km) is 1,000 to 1,250 cfa. This camel can carry two sacks of onions, or four sacks of tomatoes. Thus, transportation for a sack of onions costs 500 to 650 cfa per sack, compared to 250 cfa per sack of tomatoes. Due to the weight of onions, animal transportation costs are double that of lighter weight products. Dependant upon distance, market trips can take anywhere from one to three days and sometimes require overnight accommodation in Abeche. In contrast, vehicular transport between Moura and Abeche, requiring no more than one hour of time, is 500 cfa per sack regardless of weight. The catch is that vehicles are rare. (Note that at the time of this study the onion price in Moura is 2,750 cfa, and the Abeche price is 3,500 cfa.)

Bithea is a renown and remote onion producing area where Africare has concentrated development efforts, and therefore, the area's special set of transportation problems will be mentioned in this section. Due to extraordinarily difficult road conditions, even by Ouaddai standards, the 35 km from Bithea to Abeche costs a reported 1,500 cfa per sack for vehicle transportation. Thus, when the price of tomatoes is 3,000 cfa per sack, the profit margin is 1,500 per sack, ignoring production costs. If the production level of a particular farmer is low he may take his harvest to market a little by little on the back of an animal. However, this is not a traditionally low level production area and is actually becoming extremely productive due to successful irrigation projects which have taken place in recent years. Consequently, based upon quantity produced, financial resources, and prevailing market conditions, Bithea producers consider themselves to have more business options available than the average subsistence farmer. The big producers, well organized and with financial means, might have the opportunity to take their product to N'Djamena. The average size producer may have the chance to take their product to the regional market by animal or vehicle, or to the closest market by donkey. The small producer falls into the category already discussed where marketing is a daily question of immediate financial needs and available transportation options.

Summarizing interregional transportation, in relative terms the widely used traditional local transport, the back of the family animal, appears to be the most cost effective method currently available. In the case where animal rental is requisite, there is an advantage only if the product is light weight. Otherwise, for the transport of heavy products such as onions, if there is a vehicle available its' use appears to be time and cost effective.

Considering the total Ouaddai interregional and national transportation situation, vehicular transport users must buy a service over which they have no control, nor potential to change. An old truck fleet of limited transport capacity operating on shockingly bad roads under draining economic and social conditions necessarily creates a discouraging situation where transportation costs can exceed product value. Dependant upon type of product and road (weather) conditions, the cost of transport per sack moved by truck the 800 plus kilometers between Abeche and N'Djamena ranges between 1,000 and 1,500 cfa. The cost for moving onions during dry season road conditions is predictably 1,250 cfa per sack. During the rainy season, the transport price increases to around 1,500, but is substantially more difficult to find and delivery is not guaranteed. This per unit price paid to transporters by merchants or producers includes the price of conveyance, any taxes paid during the trip, and the transporter's profit margin. The merchant or producer pays predictable expenses such as loading and unloading charges, watchmen wages, storage costs, commission fees, market taxes, and lodging.

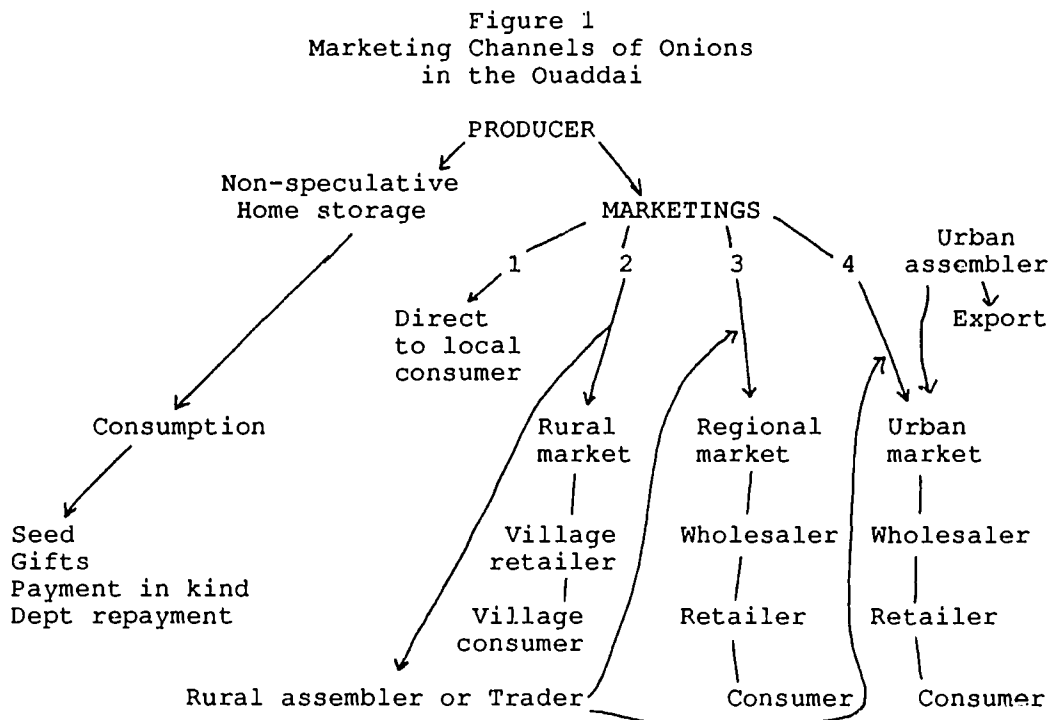
In summary, adding together transport costs to move products out of the region and the expense to bring them from the farm to regional market, then comparing with the value of a sack of Ouaddai produce at the farm gate, the comprehensive picture becomes scandalous. Examples of marketing margins may be found in the prices and margins section of this paper.

#### MARKET CHANNELS

A fairly developed marketing system demonstrates numerous onion marketing channels available to Ouaddai participants. The system is deceiving in that there is a myriad of constraints controlling the thousands of low quantity independent Ouaddai producers. Individuals are seldom well positioned to market into the large number of markets and exchange points where assembly, storage, transportation, and breaking bulk take place. Financial and social restraint as pointed out in various sections of this document lock the vast majority of producers into the very basic levels of the marketing system.

Thus, during the analysis of the system of marketing channels shown on the next page it must be recognized that movement within is extremely constrained, controlled by the socio-economic situation of the Ouaddai.

Figure 1 illustrates the simplified system of marketing channels by which Ouaddai onions can reach the final consumer.



Before considering any of the four major onion marketing channels the basic non-speculative home storage, consumption, and non-monetary distribution avenue must be considered. Because of the sometimes desperate financial squeeze of many subsistence farmers during the onion harvest period, this particular route becomes somewhat more important than with other crops. Consumed in relatively small quantities in the home, thus, usually grown specifically as a cash crop during a financially difficult period of the year, there sometimes is an influence of an informal credit system wherein producers are sometimes obligated to release their crop as debt repayment, a highly unprofitable credit option for the borrower.

The direct to local consumer channel, although noted as number one, is not a large quantity channel in the onion market.

Substantially more developed, channel two feeds the rural market that assembles once or twice a week in every village or cluster of villages. It is here that the first of many marketing system transactions assembling onions destined for regional or

urban markets takes place. If producers cannot justify the transportation costs between their village and Abeche, it is here that petty dealers or intermediaries can make their first purchases.

Requiring some method of animal or vehicular transportation, channel three represents the movement of onions to the largest and most important assembly point for the Ouaddai region, which is the central market in Abeche. This market provides large traders access to high quantity onion sources. The crop is almost always sold through an intermediary who then stores or sells to local community consumers, other merchants, or to assemblers transporting onions out of the Ouaddai. Producers seldom have the opportunity to sell directly to the consumer or to the extremely important wholesalers assembled in Abeche.

Channel four, the most complex channel of all exportable Ouaddai goods, is dominated by intermediaries and the buying merchants who transport out of Abeche, almost exclusively to N'Djamena. Small volume traders are rare in this channel.

Ideally, there would be an extension to this fourth marketing channel. Perhaps already trickling south from Abeche, but with great untapped potential, the Abeche to Sarh regional export channel is a desirable option that will become more feasible with the improvement of Chad's road system.

#### PRICES AND MARGINS

The following price data is based on field interviews and secondary data collected by ONDR, BIEP, and Africare. Data varies seriously between sources indicating a lack of accuracy, but nonetheless conveys an informative overall price picture. Data from field interview responses is dependant upon respondent recollection and based on inaccurate and highly variable volume measurement units. However, the results indicate the general situation concerning cost of production, farm-gate price, wholesale and retail prices, transportation costs, processing margins, and provides a rough breakdown of marketing related costs. All prices are based upon Chad's commercial volume measurements, koros and sacks.

Listed below are onion prices collected by ONDR and Africare at the Abeche central market during the years 1988, 1989, and the first four months of 1990.



Price of Onions Abeche Central Market CFA/Koro

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988												
ONDR	300	125	100	100	250	150	150	150	150	150		150
AFRICARE				125			150	175	150		200	150
1989												
ONDR	175	175	150	100	100	150			400	400	250	
AFRICARE	250	200	135	90	100	100	225	200	325	225	350	400
1990												
ONDR	225	125	100	100								
AFRICARE	450	250	100	125								

As may be observed, both organizations were not collecting data for the entire two years and four months. Combining the existing ONDR and Africare onion price data given in koro units of measure permits the observation of Ouaddai onion price variation over time (see graph page 24).

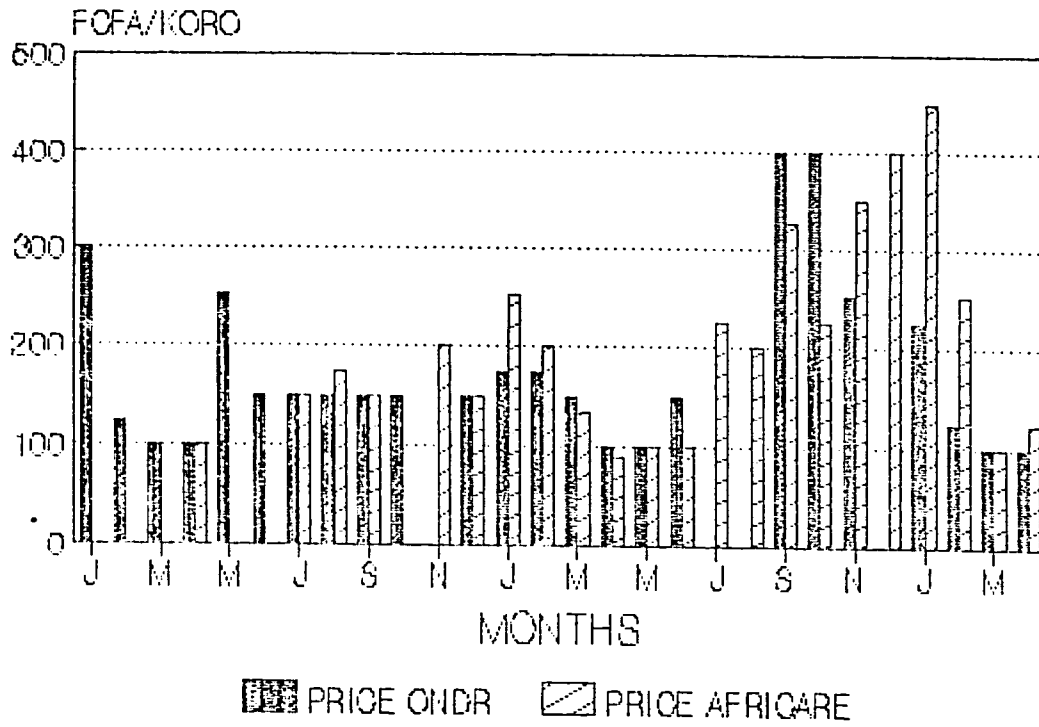
For the sake of price pattern comparison, a graph of garlic prices over time, as collected by Africare and ONDR, is provided in the annex.

Seasonal price variations of Ouaddai onions are reasonably predictable. As harvest begins and deepens, the market becomes saturated, and following classic textbook theory, the price is low. A little more specialized to the Ouaddai situation, onion buying decreases dramatically with the onset of the rainy season when impassable roads close off marketing channels. In September, when the rain ends and the roads begin to open, trade picks up and prices improve. Evolution into the pre-harvest months brings on the most important increase of prices, until the new harvest abruptly pulls the price back down. The extreme highs and lows are easily explained in an environment where onions can be stored for six months post harvest, then, despite people's daily consumption preferences, become scarce. The long harvest born of two production periods helps to smooth the curve, however, the rise in price near the time of the new year is radical.

Based on information collected during interviews conducted by the writer and some confirming information accumulated by Africare, ONDR, and BIEP, the table of margins found on page 25 was developed. One should not exaggerate the significance of these observations which are based upon a one month window in a price volatile industry. Although observations of this type are highly susceptible to error, it should be mentioned that during the same time period as the writer was collecting data in Abeche,

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another investigator, Mr. Le Grontec of BIEP, gathered data in N'Djamena, confirming that of the author. This is refreshing in a setting where striking discrepancies between data sets can be discouraging.

Onion Marketing Prices and Margins:  
Abeche - N'Djamena, March/April 1990

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	CFA per sack
Production Cost Estimate	1,250
Village price Moura, 45 km from Abeche	2,250
Farmers Margin in the village*	1,000
Transportation Moura - Abeche**	575
Market tax if paid, per sack average	50
Abeche regional market price	3,000
Farmers Margin, self sold, Regional Market	1,125
Average price departing Abeche	3,250
Intermediary Immediate Turnover Margin	250
Transport Abeche-N'Djamena	1,250
Entry into N'Djamena	5,000
Merchant Margin, Abeche - N'Djamena	500
Departing N'Djamena	5,625
Merchant Margin, turned over out of NDJ ***	625
<u>Farmer Stored Marketing Margin Scenario:</u>	
March - April harvest value, Abeche	3,000
Storage Cost (from storage section)	120
Estimated Sept - Oct price, Abeche****	7,050
Storage loss - 20 percent	1,410
Storage Margin - above harvest time sale remaining in Abeche market	2,520

\* The sack value should be considered an element of this margin. Sacks cost 250 CFA new. Sometimes the farmer's sack is emptied into the sack of the intermediary. Sacks are reused many times, thus the value usually ranges below 250 CFA. Production cost estimates vary greatly, however, the most common estimates range around 1,250 cfa for seed, labor, food, etc.

\*\* Most producers own at least one donkey and transport their own product to market. However, at times the producer must rent an animal for transport purposes. If transportation is rented, 500 to 650 cfa per sack must be deducted from the margin.

\*\*\* The figure seen here assumes an immediate turnover, therefore at most may contain some minor overhead, market taxes, and handling fees. It should be noted that of the 2,607 sacks of Abeche onions that entered N'Djamena during the March - April period, 2,474 were exported out of the area, most toward the south (Le Grontec).

\*\*\*\* Estimation derived from the averaged percentage rise in price between periods March/April and September/October for the past two years. Then, using this historical percentage price increase (135 percent), calculations were made accordingly using the March/April price of this year.

Based upon this information, there appear to be some unexploited marketing opportunities. It cannot be suggested that these March/April figures would apply to other periods of time.

#### CONCLUSIONS, CONSTRAINTS, AND RECOMMENDATIONS

In the light of this study, one must turn to finding answers to the all-important questions: What are the principal technological and profitability constraints affecting farmer level onion marketing in the Ouaddai, and what are the potential alternative solutions based on the needs of recipients and the program philosophy of Africare.

The generally bleak picture of marketing in Chad indicates a need for attention at all levels from communication and transport to credit and policy. However, it is within a defined area of the total situation that Africare's efforts are philosophically and financially able to be placed. Therefore this section will concentrate on the identification of Ouaddai farmer level constraints, and especially those that provide an opportunity for Africare to work within and support the existing cultural and traditional framework of Ouaddai agriculture.

The major factors impeding the commercialization of Ouaddai region agriculture products that will be discussed in this text are not particular to this document concerned with onions. The familiar constraints, as researched and addressed in other studies by the same writer, are followed by recommendations that should be harmonized with the interventions suggested for other Ouaddai region agriculture products. In fact, the socio-economic setting, the constraints, and to a degree, solutions, are largely the same. For these reasons, the two studies in progress addressing peanut production and agriculture credit will be treated as attachments, and an integral extension of this document.

1. The most severe constraint to profitable onion marketing at the farm level stems from the subsistence positioning of highly independent producers, particularly critical in the typical circumstances surrounding onion production enterprises. Except in exceptional cases (less and less exceptional with the advent of cooperative organization, credit sources, and a new "investor" attitude) most of the 10,000 plus onion and garlic producers cultivate cost and work intensive irrigated crops because they are in a poor position with respect to millet reserves, and often have little or no money going into the irrigated crop production season. This unenviable financial state forces borrowing at exorbitant cost, or at best, necessitates immediate sale upon harvest. Either option rendering the entire venture unprofitable and dispiriting. There are evident strategies, meriting serious pursuit, that encompass the organization, storage, and marketing efforts of Ouaddai producers who appear cognizant of advantageous opportunities and are ready for the challenge. For these reasons especially, a global solution that eliminates several interrelated constraints with one project is recommended.

\* It is recommended that Africare organize self-formed cooperatives amongst small scale farmers to provide credit opportunities, and technical and business training, with the overall goal of facilitating the speculative storage of onions. specific objectives should be as follows:

- (a) promote the organizational and cooperative skills of farmers toward the end of developing beneficial business activities,
- (b) generate income and rural capital formation and investment opportunities based on more efficient production and marketing,
- (c) develop improved storage technology, and
- (d) better organize the fragmented marketing channel between Abeche and N'Djamena through linking the farmer coops directly to wholesale buyers.

2. The remote Ouaddai region is greatly handicapped by a lack of adequate farm-to-market roads. The geographical variability in the price of onions is substantial and multiplies the already depressing effects of temporal price variations, a constraint especially critical for the subsistence farmer. Importantly, a large part of Ouaddai production flows toward the south with important quantities finding channels into countries below Chad. In no case was an Ouaddai producer or trader found to profit from this important channel. Ouaddai products are reported to almost exclusively pass through Sarh, the second largest city of Chad, located approximately 1,000 kilometers south of Abeche. Currently, products cannot flow directly to Sarh, but must travel the 880 kilometers west to N'Djamena, then be resold and shipped the 600 kilometers south to Sarh. In the case of onion marketing, this is not a constraint that Africare is equipped to directly confront at this period in time. However, based upon the findings of both the tomato study and this examination of the onion situation, the opening of the southern roads could eventually help the Ouaddai economy gain some margin currently lost due to geographical disadvantage.

\* It is recommended that Africare consider some level of road improvement interventions in long term future program planning. Some basic objectives are as follows:

- (a) open the channel between Abeche and the Sarh market south in order to vault the entire N'Djamena market leg, thus permitting the Ouaddai region to capture some potentially substantial profits,
- (b) to improve the link to potential markets south within the region (as well as open export channels out of the region) without diminishing the importance of, or lessening the efforts to maintain and ameliorate, the most critical Ouaddai communication link, the road from Abeche to N'Djamena.

3. Successful vegetable exports out of the isolated Ouaddai region are somewhat dependant upon the traditional drying of bulky perishable crops into non-perishable, concentrated products. The suitability of the area for this type of processing is evidenced by wide spread drying of tomatoes, okra and pimentos. It is recommended that Africare study appropriate technology onion drying practices used in similar African climates that may be transferable to the Ouaddai region.

\* Although the information is not available at the Abeche field post, it is believed that simple slicing and drying technology would render the bulky onion crop into a highly marketable dry product substantially less costly to transport and easily stored for strategic marketing.

4. In a previous document concerned with the tomato marketing situation, problems of an absence of market information, lack of a solid research data base, and consequent regional and farmer level constraints and solutions were discussed in some detail. The problem and the recommendations remain the same for any crop that might be studied in this, the Ouaddai region. Since the onion situation study uncovered the same system information weaknesses, the recommendation will be repeated in short form as follows.

\* Africare should develop a marketing research and education program designed to produce diagnostic evaluations of market system problems and devise actions to stimulate market coordination improvement with specific objectives as follows:

- (a) remove the relative disadvantage of the small producer or trader in marketing negotiations consequent to lack of market intelligence system access,
- (b) provide base information required for the analysis of potential rational and effective intervention programs, and
- (c) provide the information and training essential for making competent managerial and marketing decisions within the framework of Ouaddai agriculture.

**ANNEX**



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### Government of Chad, Ministries and Parastatal Institutions

- Bureau Inter-Ministeriel d'Etudes et de Programmation du Developpement Rural (BIEP) (Inter-Ministerial Bureau for Programming of Rural Development)

Philippe Le Grontec, FAO Agriculture Economist

- Ministere de L'Agriculture: Office National du Developpement Rural (ONDR)  
(Ministry of Agriculture, Office of Rural Development)

Ousman Abderaman Haggat, Deputy Director of zone Sahelienne  
Joel Thomas, Biltine - Ouaddai District Director  
Tahitangarti N'Garmadji, Ouaddai Regional Director  
Beassoum Tanassengar, Personnel Director  
Ommar Dassering, Chef du Sous Secteur  
Benaky Djimianan, Coordinator of Agriculture Work

- Cooperation Technique Tchado - Allemande (GTZ)

Bichara Cheriff, Coordinator

### Non-Governmental Organizations (NGOs)

- Africare

Adoum Djibrine, Agriculturalist

- VITA

Haroun Sow, Agriculturalist

- Private Anthropologist

Bonfiglioli, Angelo

### Producers, Processors and Merchants

- Abeche Market Merchants

Makia Ahnat, Intermediary  
Hadje Zenaba Djimey, Intermediary  
Saadia Moussa, Intermediary  
Madania Ahmat, Intermediary  
Mariam Mahamat, Intermediary

- Woman's Cooperative, Moura village, Mondjobo district

Bournous Abderaman, President  
Fatouma Thamis, Vice President  
Dahabaye Sakine, Member  
Hawaye Djibrine, Member

- Habjilidje Arle village interview

Abderaman Ajibrine, Mondjobo district chief  
Abdoulaye Ahmat, Producer  
Daoud Issagha, Hadjilidje Cooperative Member Producer  
Ousman Bahratine, Producer

- The Women of Abgoudam

Madjada Zakaria, Wife of the chief, detail market sales  
Fatime Abdelkerim, Producer, Processor and Merchant  
Manira Abdadine, Producer, Processor and Merchant  
Amina Abboulaye, Producer, Processor and Merchant

- Ouaddi-Chock District Interview

El Hadj Oumar Haroun, District Chef, Producer  
Hassan Yaghoub, Zone chief, ONDR  
Bachir Ousman, Producteur  
Aboud Haroun, President of Committee, Matar Dam  
Adoom Aboel Madbid, Producer  
Zara Halou, Matar Dam Committee Member, Producer  
Adam Brahim, producer  
Moussa Doutoum, producer

- Mondjobo District Interviews

Hassaballah Saleh, Producer, Village Ouere  
Issagha Bourma, Producer, Village Ouere  
El Hadj Hassan, Producer  
Ahmat Sciol, Producer, Village Moura  
Tidjani Aboleraman, Producer, Village Moura

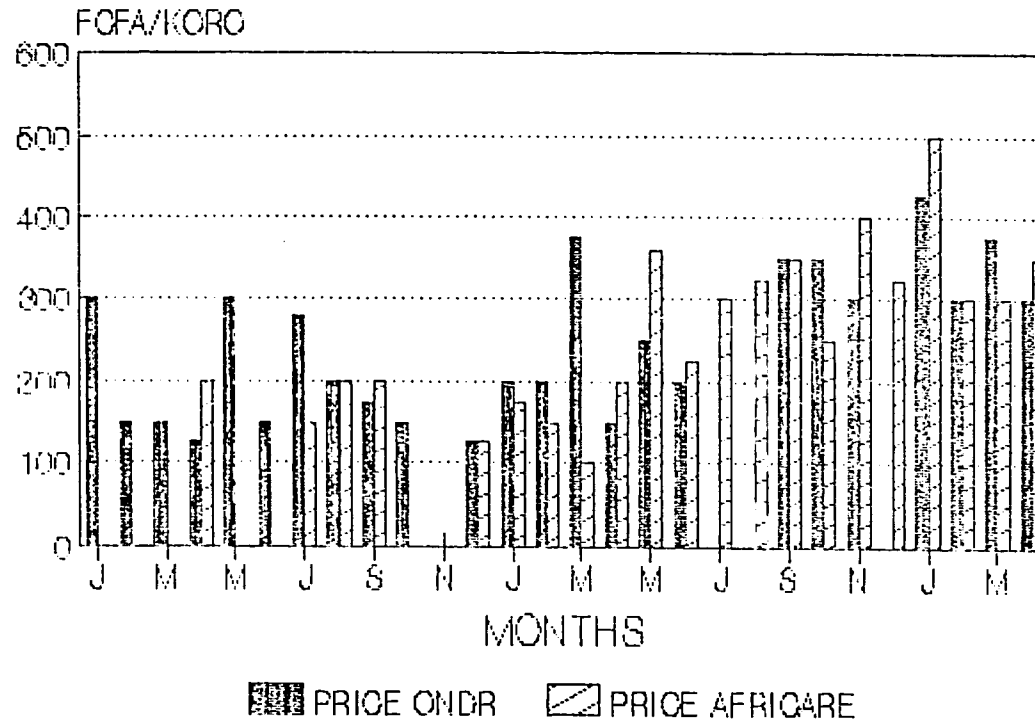
- Tarbaka Dam Site Interviews, Village Nakhal

Mahamat Taha, Tarbaka Dam Committee Chief, Producer  
Doutoun Mahamat, Nakhal Village Chief, Producer, Dam Committee  
Cherif Bahar, Producer  
Ahmat Mahamat, Madourmo Village Chief, Producer  
Ahmat Abdelaziz, Tarbaka Dam Committee Member, Producer  
Hassan Abakar, Tarbaka Dam Committee Member, Producer  
Hamid Abdoulaye, Producer  
Mahamat Saboun, Tarbaka Dam Committee Member, Producer  
Ibed Boukhari, Producer

Other Important Contact: Pere Zuka, Abeche

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## ONION STORAGE SHED - LOCAL PRICE ESTIMATE

Mr. Sow of VITA provided an example of an appropriate technology storage shed for onions. With the following diagram in hand a custom builder price estimate was solicited in Abeche.

Roof: 80 wall supports	13,000 cfa
center support	600
millet stalks	<u>4,000</u>
	17,600 cfa
Walls: 28 forked sticks	3,500
Doors: two	10,000
Rope: twenty of sisal or bark	1,000
Labor: five people	<u>5,000</u>
<b>TOTAL</b>	<b>38,100 cfa</b>

Several important points must be made concerning this storage shed. First, if the construction is done during the millet harvest, the price is reasonable due to simplified material access. Second, the intervention efforts necessarily assume cooperative efforts on the part of peasants. If the group of peasants has "self-selected," then one can assume that they are capable of working together to divide the work and responsibilities of storage shed construction. In summary, this appropriate technology shed can be built for a minimum of cash outlay. For planning purposes an estimate of 10,000 cfa may be assumed.

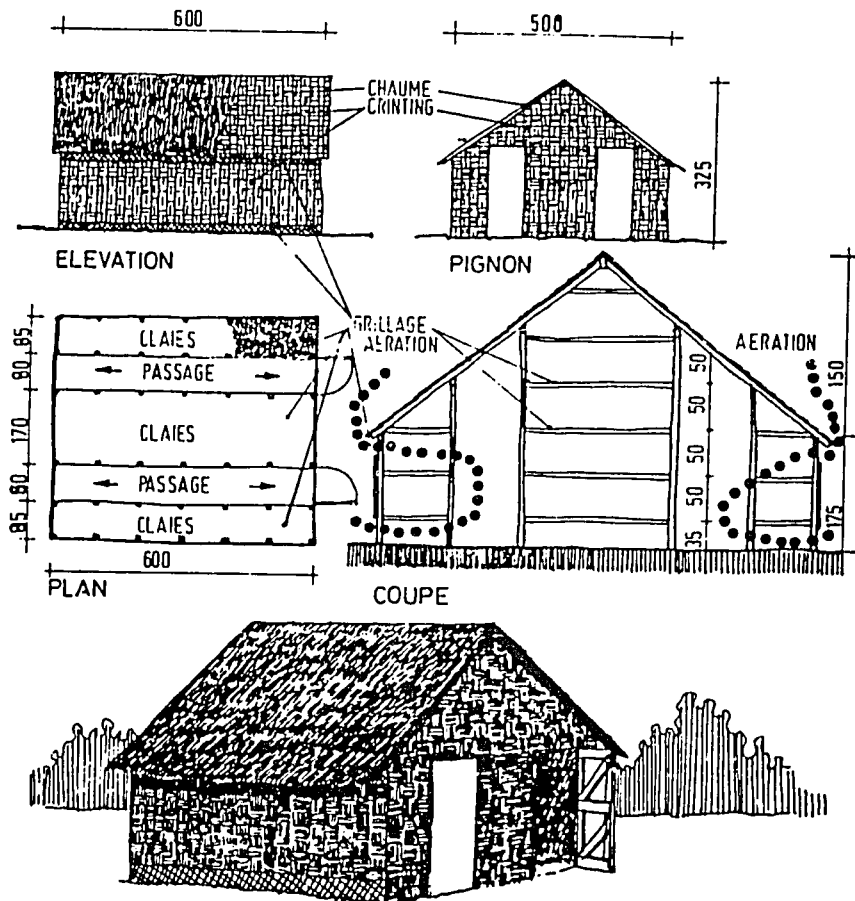


Fig. 199. Hangar-séchoir simple pour la conservation d'oignons et de pomme de terre.

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