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CONTRACT FARMING AND ITS EFFECT ON SMALL FARMERS IN LESS DEVELOPED COUNTRIES

by

Nicholas William Minot

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Department of Agricultural Economics
Michigan State University
East Lansing, Michigan 48824-1039

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I. INTRODUCTION

It is generally recognized that small-farm agriculture plays a central role in economic development, both in supplying a significant portion of the domestic food crop supplies and in generating income for low-income families. In addition, there is growing acceptance of the idea that small-scale production of many high-value commercial crops can be competitive with large-scale production. For crops such as rubber, tea, coffee, and many fruits and vegetables, large amounts of labor are required for land preparation, planting, weeding, harvesting, and so on. Large farms must pay hired laborers a salary which is greater than that which families implicitly "charge" for their own labor. Furthermore, family labor is generally more motivated than salaried plantation labor. However, the potential for small farm production of these crops is not realized due to several limiting factors.

1.1 Constraints on small farm production

The most serious constraints on small farm production relate to problems of access to production resources (inputs, services, and information) and access to markets. First, small farmers often lack the production and marketing information necessary, particularly for new crops and varieties, and obtaining such information is difficult. Second, even with sufficient information regarding a profitable investment, small farmers may lack the financial reserves necessary, and the availability of external credit is limited by the lack of collateral. Third, small farmers operating near subsistence are probably more risk averse than larger farmers. They understandably tend to assure themselves a minimum supply of food before expanding commercial production for an uncertain market. And fourth, public intervention has been ineffective and even counterproductive in relieving these constraints. In the case of both credit and fertilizer, government efforts to subsidize inputs have led to unreliable supplies and rationing, generally favoring large farmers. Additionally, public extension efforts and policies to promote mechanized agriculture have had more impact on large farmers than small.

Thus, it is clear that, in the interest of both efficiency and equity, it would be useful to investigate the institutional mechanisms which 1) facilitate small farmer access to credit, technical assistance, and inputs and 2) reduce the uncertainty in marketing their output. To the degree that such mechanisms are developed and policy biases

reduced, small farmers will be able to raise their incomes by producing these high-value crops.

1.2 Potential of contract farming

One institutional form which deals with many of these constraints in an integrated manner is that of contract farming. Contract farming may be defined as agricultural production carried out according to an agreement between farmers and a buyer which places conditions on the production and marketing of the commodity. It is also called "core-satellite" or "outgrower" production. One variation occurs when the contracting firm also operates a large farm, or "nucleus estate," which is used to supplement the supply of raw materials from outgrowers.

In the United States, contract farming accounts for an estimated 17% of crop and livestock production, playing a particularly important role in vegetables for processing, sugarbeets, seed crops, poultry, and fluid-grade milk (Mighell and Hoofnagle, 1972). In the less developed countries, such figures are not available but contracting is used in the production of tobacco, bananas, tea, oil palm, sugar, rubber, poultry, milk, and many fruits and vegetables.

The buyer, frequently a processing and/or exporting firm, finds it profitable to contract growers to assure reliable supply of the commodity. In order to obtain sufficient supplies of the right quality and at the right time, the firm often provides technical assistance and inputs to the farmer as well.

In general, the buyer has an incentive to reduce the cost of production and raise the quality since the willingness of farmers to join and remain in the scheme is dependent on the farm-level profitabilty. The advantage to the farmer is that the market for the commodity is relatively assured, and, in many cases, the farmer is provided access to technical assistance, production inputs and services, and production credit. Thus, the farmer is able to produce higher-value commodities and improve productivity, thus raising farm income. Furthermore, these services are often provided wholly or largely by private firms, thus saving scarce public resources.

On the other hand, contracts cannot cover all contingencies and enforcement may be costly. There is a short-term incentive for opportunisitic behavior or outright

violation of the contract on both sides. After the farmer has planted the crop, the buyer may use various pretexts to force down the effective buying price. Alternatively, the farmer may use the inputs and technical assistance, but avoid repayment by marketing the commodity elsewhere. Even without opportunistic behavior, contracting involves some costs which must be justified by improvements in market coordination. As discussed later, it is appropriate only under certain conditions. For example, there appears to be little economic incentive to produce grains and other staple food crops under contract. Thus, contract farming should not be considered the key to raising world food production, but rather one strategy for income generation, useful in specific circumstances.

1.3 Scope of the paper

This paper will consider the potential and the problems of contract farming in the context of agricultural development. The term will be taken to include pre-production agreements, oral and written, between commercial buyers and farmers. Thus, the paper will not consider simple marketing agreements made after planting, nor futures markets which do not imply actual delivery. It will not discuss the operations of subsidized marketing parastatals and legal monopolies/monopsonies which do not operate on a commercial basis. These organizations have more complex objectives and face very different constraints than commercially-oriented entities. Thus, inclusion of this type of organization would greatly expand the scope of the study.

The paper begins with a review of the theory of contract production: the economic rationale for contracting and the conditions under which it is likely to arise. This discussion focuses on the problems of market coordination and the role of information. Second, a large body of literature on actual contract farming schemes is reviewed and patterns identified. This includes an overview of contract farming in the United States and a comparison of schemes in Latin America, Africa, and Asia. The final section summarizes the theoretical and empirical results and provides some conclusions regarding the impact of contract farming on small farmers. It also advances a number of hypotheses for further research.

II. CONCEPTUAL FRAMEWORK

2.1 Market imperfections

Neo-classical economic theory suggests that a "perfect" market is one characterized by free and complete information, homogeneous goods, the absence of externalities, and buyers and sellers small and numerous enough not to have control over prices. It is "perfect" in the rather limited sense that, given the existing distribution of income (an important qualification) and some plausible assumptions concerning the behavior of firms and consumers, it is impossible to improve the welfare of any person without reducing that of another.

Although perfect competition and monopoly/monopsony can be mathematically modeled and have well-known characteristics, real-life markets contain varying degrees of imperfections. Industrial organization theory attempts to analyze and evaluate markets by investigating the relationships between industry structure and performance. Structural variables include the product characteristics, number and size of firms, ease of entry and exit of firms, the pattern of demand, and so on, whereas performance consists of operational and allocative efficiency, progressiveness, and equity (see Bain, 1968 and Scherer, 1980).

Industrial organization research into agriculture has often taken as the unit of analysis the chain of industries involved in growing, processing, and marketing a commodity from the farmer to the ultimate consumer. The agribusiness commodity systems approach of the Harvard Business School (Davis and Goldberg, 1957) pioneered this kind of research using case studies to look at management strategy. The subsector approach (Shaffer, 1973) integrates this focus on the entire commodity chain with the variables of industrial organization. It emphasizes the importance of information flow within the vertical chain, adaptation to technological and other changes, and normative evaluation of market performance.

Given the lack of perfect information in real markets, it is increasingly clear that risk-aversion must be incorporated into models of behavior, particularly for small farmers. For the purpose of this paper, it is assumed that firms are risk-averse profit-maximizers. In other words, their decisions are based on the objectives of increasing profit and/or reducing risk, subject to the information, skills, and resources available.

Similarly, it is assumed that the farm unit is a risk-averse utility maximizer, where utility maximization is based on both market and subsistence production. Decisions by farmers are assumed to be rational, subject to information, skill, and resource limitations. Given the static efficiency gains from specialization, diversified subsistence production in the less developed countries is explained by 1) production and marketing risks associated with commerical production, partly resulting from information limitations, 2) insufficient financial resources (liquidity), 3) unavailability of quality inputs, and 4) high transportation costs.

2.2 Vertical coordination in markets

Both the agribusiness commodity approach and the subsector approach emphasize the importance of "vertical coordination," the process by which supply and demand are adjusted toward each other with regard to product quantity, quality, location, and time of delivery (Mighell and Jones, 1963). This coordination occurs along the "vertical" chain of functions: production, grading, packaging, transport, processing, storage, and distribution. It is through this process that farmers eventually adjust to changing consumer demand, that consumers are affected by crop failure, and that all adapt to new technology, policies, and institutions. The agricultural sector is particularly prone to problems of vertical coordination due to several distinguishing characteristics: sharp seasonal fluctuation of supply, delayed supply response, perishability of products, wide variation in quality, and the geographic dispersal of production.

The simplest institutional context for vertical coordination is the open spot markets in which transactions are arranged and completed relatively quickly and involve no continuing obligations on either side. Here, vertical coordination is accomplished principally through the price mechanism. Prices provide incentives to buyers and sellers to adjust in such a way to equalize supply and demand.

For reasons discussed later, it may be worth establishing more elaborate vertical coordination mechanisms such as contracts between buyers and sellers. Mighell and Jones (1963) distinguish between three types of agricultural contracts: 1) market-specification contracts, which establish some of the terms (quality, quantity, price, etc.) of a future transaction; 2) resource-providing contracts, which involve the provision of inputs or services to the grower as well as market-specification; and 3) production-management contracts, which involve technical assistance for the grower as well as

market-specification. Other forms of "intermediate" vertical coordination mechanisms in agriculture include "cooperatives, bargaining associations, market orders, information systems (including grades and standards), transportation services, credit services, government programs, trade practices, and trade associations" (Marion, 1976: 181).

And finally, under some circumstances, vertical coordination may be achieved by organizing two successive functions within the same firm, a pattern called vertical integration. In the extreme, a vertically integrated firm may be involved in all the functions (or stages) from production to distribution to the final consumer. In the vertically integrated firm, coordination becomes an issue of resource allocation within the firm.

What conditions favor the use of one coordination mechanism over another? Much of the variation in coordination mechanisms seems attributable to differences in product characteristics, the technology of production and marketing, demand characteristics, and the distribution of information. In the next section, the factors which influence coordination mechanisms are described, focussing on the three principal coordination mechanisms: spot markets, contractual relationships, and vertical integration.

2.3 Spot market exchange

Spot markets are considered highly efficient when the conditions approach those of perfect competition: a relatively homogeneous product, good information about market conditions, and many small buyers and sellers. Spot markets "process" a large amount of information concerning production and consumption patterns, equating the supply and demand for a given good, at a given time and place. In addition, markets retain an incentive for efficiency at each stage in the chain since each is an independent economic unit and must cover its costs. However, in the absence of some of these conditions, spot markets are less effective in coordinating supply and demand. The problems of spot markets can divided into those relating to imperfect marketing information, imperfect production information, and imperfect input and credit markets. Each will be considered in turn.

In the first category, spot markets do not facilitate the exchange of complex marketing information: the details of future supply and demand with respect to product form (crop, variety, quality, etc.), time, location, and acceptable price. For example,

many goods are not homogeneous but rather subject to variations in quality which the buyer cannot easily detect, thus introducing a problem of imperfect information. At best, buyers must depend on the reputation of the seller which tends to reduce competitiveness by raising barriers to entry for new firms. At worst, if there is no credible assurance of quality, the demand for the product is reduced. As Akerlof (1970) notes, low-quality producers can under-price others and damage the industry's reputation to the point that the market disappears. Alternatively, the buyer may have specific quality requirements which are difficult to communicate to the seller/producer through spot markets. Where credible grading systems are absent, these problems are prevalent in the marketing of fragile or perishable goods, particularly over long distances.

A related problem of marketing information concerns the the timing of supply and demand. An exporter of a perishable good may wish to trade during a "market window", a brief period of the season when supplies in the foreign market are short and prices high. Similarly, the processor of perishable commodities must schedule raw material deliveries to maintain a stable daily flow to the plant. Yet, working through the spot markets, buyers have no assurance that supplies will be properly timed, and producers are often either unaware or unconvinced that such timing is worthwhile. This is particularly disruptive when the needs of the buyer are large relative to the total supply. This apsect of mutual dependence is discussed below.

Yet another problem related to the transfer of marketing information focusses on prices. Although buyers are generally in a better position to estimate future market conditions, this information is difficult to relay to sellers (producers) through a simple spot market. This is a problem where supply response is slow and/or demand characteristics for the good are less well-known by producers. Thus, it affects many agricultural commodities, particularly those with long production cycles (tree crops and many livestock) and those that are new to the region (specialty crops, non-traditional exports, and commodities whose urban demand is growing rapidly). A related factor is that perishable goods at harvest have an inelastic supply while buyers with large fixed investments (processors) or a market window to reach (exporters) have inelastic demand. In competitive spot markets, this combination would generally imply great price variability.

A special case of price uncertainty occurs with a monopoly or, more common in agriculture, a monopsony. Just before harvest, an opportunistic buyer may offer a price

which barely covers the costs of harvesting, but which growers would be forced to accept. Klein, Crawford, and Alchian (1978) note that this is a problem whenever an investment (such as planting a crop) locks the investor into a transaction with another firm. Although such a strategy will only work for one production cycle, the possibility introduces price risk for growers. Thus, they may be reluctant to produce for a monopsonist, even one who is, in fact, not opportunistic. This problem is associated with bulky or perishable goods for which there are large economies of scale at some stage, such as processing, and no alternate markets.

In the second category of problems, spot markets may be inefficient since they do not facilitate the transfer of agricultural production information. Buyers may have more information concerning the technical aspects of production than growers, but this information cannot be transfered through spot markets. This is common in cases where the firm would like to buy a crop, variety, or level of quality different than that with which growers in the region are familiar. Even if the information were disseminated, growers would be reluctant to follow the new practices without some assurance of a market.

And third, spot markets may have disadvantages relative to other types of vertical coordination if there are imperfect markets for production inputs, services, and credit. Markets for inputs and agricultural services are often limited by the grower's difficulty in evaluating their quality, hence their profitability. Similarly, potential suppliers of inputs and services are caught between the farmers' need for credit and the problems of enforcing repayment. As will be argued later, other forms of vertical coordination are better able to deal with these imperfections. Thus, spot markets are inadequate in promoting the production of commodities requiring large amounts of specialized inputs and/or services with economies of scale, particularly in regions where access to these inputs and services from other sources is a problem.

In summary, spot markets function well for commodities that have little quality variation, are less perishable, have short production cycles, do not require precise timing of supply, and have stable and known markets. Furthermore, spot markets are adequate for commodities for which credit, input supply, and technical assistance are less critical because of minimal input requirements and well-known production techniques. And finally, spot markets are more likely to be adequate where production and market information is easily available and where credit and input markets are well developed.

2.4 Vertical integration

As mentioned above, vertical integration describes the system in which different stages of the vertical production-marketing chain are performed by the same firm. What are the advantages of having successive functions performed by the same firm compared to having these functions performed by various specialized firms? Although the literature varies widely, most explanations of vertical coordination emphasize 1) technological complementarity between functions, 2) the struggle to expand or maintain market power, and 3) the cost and risk of spot market transactions (see Marion, 1976). Each will be considered briefly.

Stigler (1951) offered a technological explanation of vertical integration by referring to the relationship between minimum efficient plant size and the total demand. As demand grows, he argued, firms become more specialized and tend to vertically dis-integrate, while declining industries exhibit vertical integration. While this may be a factor, it is clearly not the central cause since vertical integration is also found in many stable and growing industries.

A more convincing technological argument is that vertical integration results from economies of locating several functions in the same plant. If transporting an intermediate good from one stage to another involves high costs due to a high bulk/value ratio or loss of some important characteristic (heat, quality, etc.), it is often economical to locate both stages in one plant, thus facilitating joint management within the same firm (Bain, 1959). A common example from agriculture is integrated feed and livestock operations, economical because feed is a bulky, low-value commodity. Again, this is not a complete explanation since many vertically integrated firms have operations at various sites.

A third technological factor is scale complementarity: generally, the efficient scale of operations must be roughly similar between the two stages in an integrated firm. Otherwise, the firm would find itself having to buy or sell some of the intermediate good (Bain, 1959: 156). Alternatively, the large-scale stage would have to directly manage many small-scale ones. This is very costly and does not retain any direct incentive for efficiency in the numerous small-scale units. For example, the production of pelleted feed for poultry requires large-scale machinery, so that the output

of an efficiently sized plant is much greater than the requirements of an efficiently sized poultry farm. Unlike feed and livestock operations, feed and poultry production tend not to be vertically integrated. In general, vertical integration of farming and processing is severely limited because many crops are more efficiently produced on a small scale relative to subsequent stages in the marketing chain.

In contrast to the technological explanations, other writers argue that the motive for vertical integration is the enhancement of market control. In other words, integrated firms may discriminate against other firms in supplying inputs or marketing output. However, Bain (1959: 514) argues that that this market power derives from existing horizontal control at one stage. In any case, Mighell and Jones (1963: 37) argue that "backward" integration into farming is not likely to provide control over supply because of the ease with which other lands may be brought into production of the commodity. The implication is that vertical integration into farming is probably not motivated by market power but rather by other factors.

The third type of explanation for vertical integration focuses on the costs and risks of market transactions. Coase (1937) suggested that making a market exchange involves search and negotiation costs, and that these costs may explain why it is profitable to vertically integrate different operations. Williamson (1971) pursues this line of thought by identifying three motives for vertical integration: reduced costs of finding a buyer/seller and reaching agreement on the terms of the exchange, greater control through administrative rules and personnel policies, and greater flow of information between vertical operations. He notes that all three reduce the incidence of opportunisitic behavior, which benefits one function at the expense of another. The costs and risks of market transactions are closely related to the problems of spot markets considered earlier.

A fourth category may be added, that of transaction distortions. Coase (1937) noted that a sales tax on an intermediate good can be avoided through vertical integration, though he discounted its importance as a motive. Similarly, price controls on an intermediate good can create a situation of excess demand. This creates an incentive to integrate the two operations into one firm. The "seller" would then receive a higher internal "price" while the "buyer" is assured a reliable supply. Mighell and Jones (1963: 37) note that "abnormal supply conditions" during World War II, presumably due to price controls, caused vertical integration in various sectors.

In summary, there are several advantages of integrating farming with subsequent stages (grading, processing, packaging, exporting, etc.). From the transaction cost literature, information on product quality and demand conditions flows more easily, supply can be more accurately scheduled, and inputs and management applied without the problem of repayment of loans. The literature on technological complementarity implies that integration in the form of on-site packaging and processing may serve to reduce the transport and handling costs for bulky and/or fragile commodities. On the other hand, a critical limitation of vertical integration in farming is the lack of scale complementarity. Crops which are more efficiently produced on a small scale, such as those requiring intensive use of labor, are not easily integrated with large-scale processing or export firms. Thus, vertical integration is most appropriate for crops that have important quality variations, have long production cycles, require precise supply timing, have complex markets, and require substantial amounts of specialized inputs, yet, at the same time, do not require intensive use of labor or careful husbandry.

2.5 Contract exchange

The motives for contracting as opposed to spot market exchanges on the one hand and vertical integration on the other have been less fully analyzed. Trifon (1959) considers contracting to be a way of providing some of the advantages of vertical integration but on a temporary basis. Roy (1972) lists numerous advantages of the system to the farmer, some of which appear to overlap: reduced risk, the possibility of a relatively fixed income, reduced responsibility, access to inputs, technical assistance, reduced marketing problems, reduced need for operating capital, and being "employed" by agribusiness. However, these writers do not distinguish between the different kinds of contracts identified by Mighell and Jones (1963): market-specification contracts, resource-providing contracts, and production-management contracts. This discussion will focus on the incentives for each kind of contract, making reference to the technological factors and transaction cost problems mentioned earlier.

2.5.1 Market-specification contracts

Market-specification contracts facilitate the flow of market information, relieving many of the constraints on spot markets mentioned above. On the one hand, it provides demand information to the producer concerning the form (crop, variety, quality, etc.), timing, location, and acceptable price, as discussed above. On the other hand, the

process of finding and negotiating with growers provides information to the buyer concerning the supply conditions. Market-specification contracts have an advantage over vertical integration when the efficient scales differ between stages. Contracting allows one buyer to coordinate numerous growers without the management problems of vertical integration.

The effect of market-specification contracts on risk is quite complex. Although price information, in the abstract, reduces risk, the effect of a contract is less clear. It depends on the contract provisions regarding price, the definition of risk, and the specific market conditions. If risk is defined as the variability (variance) of income, a contract which fixes a price or establishes a price range does not necessarily reduce risk for either party compared to a competetive spot market for the same good. In fact, it may even increase risk for both parties. Hence, risk should not be viewed as a fixed amount to be distributed between buyers and sellers.

Applying Behrman's (1984) arguments on price stabilization schemes, if market prices and output tend to offset each other (supply shifts cause most of the price variation), then a fixed price would make producer revenue more variable. On the other hand, if price and output are unrelated or positively correlated (demand shifts are at least as important as supply shifts), then price stabilization tends to reduce variation in revenue. From the buyer's perspective, a contracted price stabilizes gross margin if market purchase prices and sale prices are unrelated (or negatively correlated, which is unlikely). This would occur if the raw material buyer was a minor supplier to an isolated market, as in the case of the exporter who does not affect world prices. On the other hand, agreeing to pay a fixed price increases the risk of the merchant who sells in the local market since the purchase price no longer "follows" his or her sale price. Given these arguments, it seems plausible that the conditions under which a fixed price reduces grower risk are more common than those under which it reduces buyer risk.

Assuming for the moment that both parties have similar expectations of the market price, a fixed price will be easily negotiated if it reduces income variability for both parties. If the variability is increased for one party and decreased for the other, then the contracted price will have to compensate the latter at the expense of the former, relative to the expected market price.

If it is true that a fixed-price is more likely to reduce grower risk than buyer risk, one would expect contracted prices to be more commonly found below the expected market price than above it. This kind of agreement is easier when the grower is quite risk-averse (i.e. willing to accept a large cut in price to reduce risk) and the buyer is less risk-averse (i.e. willing to accept only a small reduction in costs to bear risk). If fixing a contract price increases income variability for both, it is not likely that such an agreement can be reached.

Relaxing the assumption that price expectations are equal, it is clear that an agreement on a fixed-price contract is more likely in all the above cases if the buyer expects the market price to be higher than the seller does. If buyers have better market information, we would expect contracting to become more prevalent in periods of impending shortage. Conversely, if the seller's price expectations are higher, then a fixed-price agreement may not be attainable.

Risk can also be defined as the probability that income will fall below a certain minimum. Using this definition, similar results are obtained, although they are less determinate since they also depend on the actual price agreed on. For example, raising the contract price reduces this type of risk for the producer and increases it for the buyer. Similarly, a contract which only specifies a minimum price reduces this kind of risk for the producer and increases it for the buyer.

Only some contracts fix a price or a range; many, if not most, use a price formula based on production costs, market prices for the good, or market prices for a related good. One explanation of formula-price contracts is that it is a guarantee against the use of monopsony/monopoly power. As discussed earlier, investments, because of their location or their specialized nature, may "lock" a buyer to a seller or vice versa. Klein, Crawford, and Alchian (1978) note that after such an investment has been made, one party may change the terms of reference in its favor. Thus, investors are reluctant to make this kind of "durable transaction-specific investment" (Williamson, 1979) without a contract.

Similarly, Siamwalla (1978) relates the system of contract farming to "shifting cost," that is, the cost of shifting to an alternate buyer or seller. Suggesting that "shifting cost is the most important determinant of the structure of marketing" (p 41), he argues that high shifting costs for both farmers and buyers encourage the establishment

of contracts to reduce the risk involved. It is worth noting that, in addition to the possibility of a buyer becoming a monopsonist, organized growers may act as a monopolist. This kind of risk to buyer and seller can be reduced even if the contract does not specify a fixed price or price range, since the formula provides assurance that the terms are determined "independently," rather than by the exclusive trading partner.

An alternative explanation of formula-price contracts is that one or both sides doubt the enforceability of a fixed-price contract. The buyer may doubt that growers would comply with the contract if market prices rose above the contracted price; thus, the buyer has no incentive to guarentee against very low prices. Similarly, the growers may not trust the buyer to uphold the minimum, so they resist a maximum. A formula price is more credible, since it is closer to market prices.

Two caveats should be raised. The above discussion identifies some variables which affect the likelihood of a range of prices acceptable to both parties. However, within this range, the bargaining position of each helps determine the actual price reached. For example, if a contract reduces risk for both sides, a hard-bargaining buyer might obtain a price below the expected market price, even though he or she might accept a higher one. Second, the discussion refers to the impact of contract prices on risk, other things being equal. However, contracts often influence risk in other ways, increasing it with the use of purchased inputs, decreasing it with "forgiveable" loans, and so on.

Market-specification contracts also transfer marketing information to the grower in the form of the timing and quality preferences of the buyer. These can expressed in the contract in three ways. First, the buyer may use a varying price schedule to provide an incentive to the grower to deliver the desired quality and at the desired time. Second, the buyer may simply require delivery of a certain level of quality on certain dates. Third, the buyer may require the use of production inputs and cultural practices which will ensure that the crop will mature at the appropriate time and meet the quality standards. Assuming no administrative cost, no externalities, and perfect information, the first strategy would be the best. However, the second is administratively simpler, and the third is used in response to externalities and imperfect information, as explained in the two sub-sections below. Thus, a combination of these three strategies is usually used.

In summary, a fixed-price contract is easier to reach when 1) supply shifts are not an important cause of price variation so that a contracted price will reduce income variation for the seller, 2) the buyer's sale price is unrelated to the raw material price so that a contract price will reduce income variability for the seller, and 3) the buyer expects the market price to be higher than the seller does. In addition, a contract may be necessary to induce growers to produce a good with few marketing outlets. In this case, a formula-price contract is often sufficient. Quality and timing preferences may be expressed through price incentives, marketing standards, or stipulations regarding production practices.

2.5.2 Resource-providing contracts

A resource-providing contract may motivated by any of several factors, generally related to imperfections in input markets. First, productive inputs may not be available on the market. For example, producing a new crop or variety under contract generally requires providing planting materials. Second, even when the inputs are available on the market, the contracting firm can sometimes provide them at a lower cost. The buyer may enjoy certain economies of scale in pest control and mechanical operations, as well as having, in many cases, an existing distribution network. Third, the firm may wish to encourage the use of certain inputs by subsidizing the price and/or requiring their use. Naturally, any "subsidy" offered by the firm is covered implicitly in the commodity price.

The policy of subsidizing or requiring the use of an input can be explained in terms of deviation between the grower's and the buyer's perception of the return to the input. This may simply be due to a difference in information or due to externalities. In the first case, the buyer may believe that growers do not appreciate the effectiveness of the input, particularly if the crop is new to the region. In the second case, there may be externalities. Often inputs have an effect on quality or maturation which is desirable to the buyer but not reflected in the grower's return. They may contribute to a quality characteristic such as color which is not included in the grade-pricing systems. Grading systems cannot incorporate all the desired characteristics because of the costs and subjectivity of measurement. Another type of externality occurs because some inputs are require considerable labor, which constitutes a direct cost to the grower but only an indirect cost to the buyer. Still another externality is found in the use of pest control, which may be profitable to the group but not to the individual.

Growers would be expected to readily accept inputs which increase yield and which create product qualities which are reflected in the price. On the other hand, inputs that create quality characteristics not reflected in the grading-pricing system and those whose application is labor-intensive are often points of contention between growers and the buyer.

Frequently, inputs are supplied on credit, with their value being explicitly subtracted from the crop payment. Credit may be supplied because the interest and transaction costs to the firm of obtaining and distributing credit are less than the total costs that small farmers face in obtaining credit. Although subsidized credit programs are often available for small farmers, the transaction costs are generally quite large relative to the size of the loan (Adams and Graham, 1984). Frequently, it is argued that credit is used to tie the grower to a particular merchant, who subsequently offers a below-market price for the harvest. Siamwalla (1978) argues that it is generally too difficult to enforce such agreements if there are alternate market channels. He suggests the reverse: credit is only offered if there is some way of enforcing repayment, such as by subtracting from crop payment at harvest time. This, in turn, is only possible if the buyer can enforce the marketing agreement.

In some systems, credit programs may informally operate as a form of insurance. In other words, the debt may be forgiven in cases of genuine crop failure. Such a system is only possible when there is close contact between growers and the firm or some intermediary. It seems likely that resource-providing contracts with credit are more likely where there are substantial purchased input requirements and a long production cycle. This is particularly true when the required inputs are quite specialized or exhibit economies of scale in application.

2.5.3 Production-management contracts

Whereas a marketing-specification contract simply tells the grower what to produce, the production-management contract also provides some instruction as to how to produce it. Growers are ordinarily not willing to "purchase" production information without knowing its value (this is the quality problem discussed earlier), but a marketing contract guarentees its value. Similarly, the buyer is not willing to provide extension services unless it can perceive a benefit. With a contract, it can "capture" the returns to this technical assistance by implicitly deducting the cost of the extension service from

the crop price. In order to do this, the contract must be enforceable or the buyer must be the only outlet for that commodity. Otherwise, the grower may benefit from the information, yet sell to another buyer.

Like the resource-providing contract, it is justified because of imperfect information and/or externalities. In the first case, the buyer may have knowledge of production practices that can be transfered to growers. The more complex the quality standards and the newer the crop to growers, the less likely that growers have the information to reach these standards, thus making on-farm technical assistance necessary. In the second case, certain practices may be known by growers but not practiced because they do not yield sufficient return. A cultural practice may contribute to product characteristics which are desired by the buyer but not included in the grade-price system. For example, if it is costly to measure a certain quality characteristics at harvest, the buyer may supervise production to ensure the standard is met. Again, labor intensive practices often appear "worthwhile" to the buyer but are resisted by the growers.

Proponents of contract farming generally refer to production management as "technical assistance," while critics emphasize the "control over production." In fact, the only difference is whether the grower has the incentive to follow the practice without supervision. Any contract farming scheme is likely to have some elements of each. Furthermore, any "control" could, in theory, be converted to "assistance" merely by changing the pricing system to provide the grower with a more precise incentive structure.

2.6 Summary of factors affecting vertical coordination

In summary, spot markets exhibit deficiencies 1) in transfering production information, 2) in transfering marketing information, regarding quality, timing, and future demand, and 3) in overcoming problems resulting from imperfect input markets. These three categories of market failure are outlined in the first column of Table 1, along with the specific coordination problems which result.

These failures of spot market exchange systems are common in agriculture where supply response is slow, supply is seasonal, and efficient scales of production are often small. Within agriculture, they are more common for certain types of commodities and

certain types of markets. As described in the second column of Table 1, market failure is more likely when 1) the production technology is complex or new to growers, 2) the commodity has a specialized, new, or distant market implying that the buyer must provide market information (and sometimes guarantee against monopsony abuse), and 3) when large amounts of specialized inputs and credit are required to reduce cost or meet a specific demand.

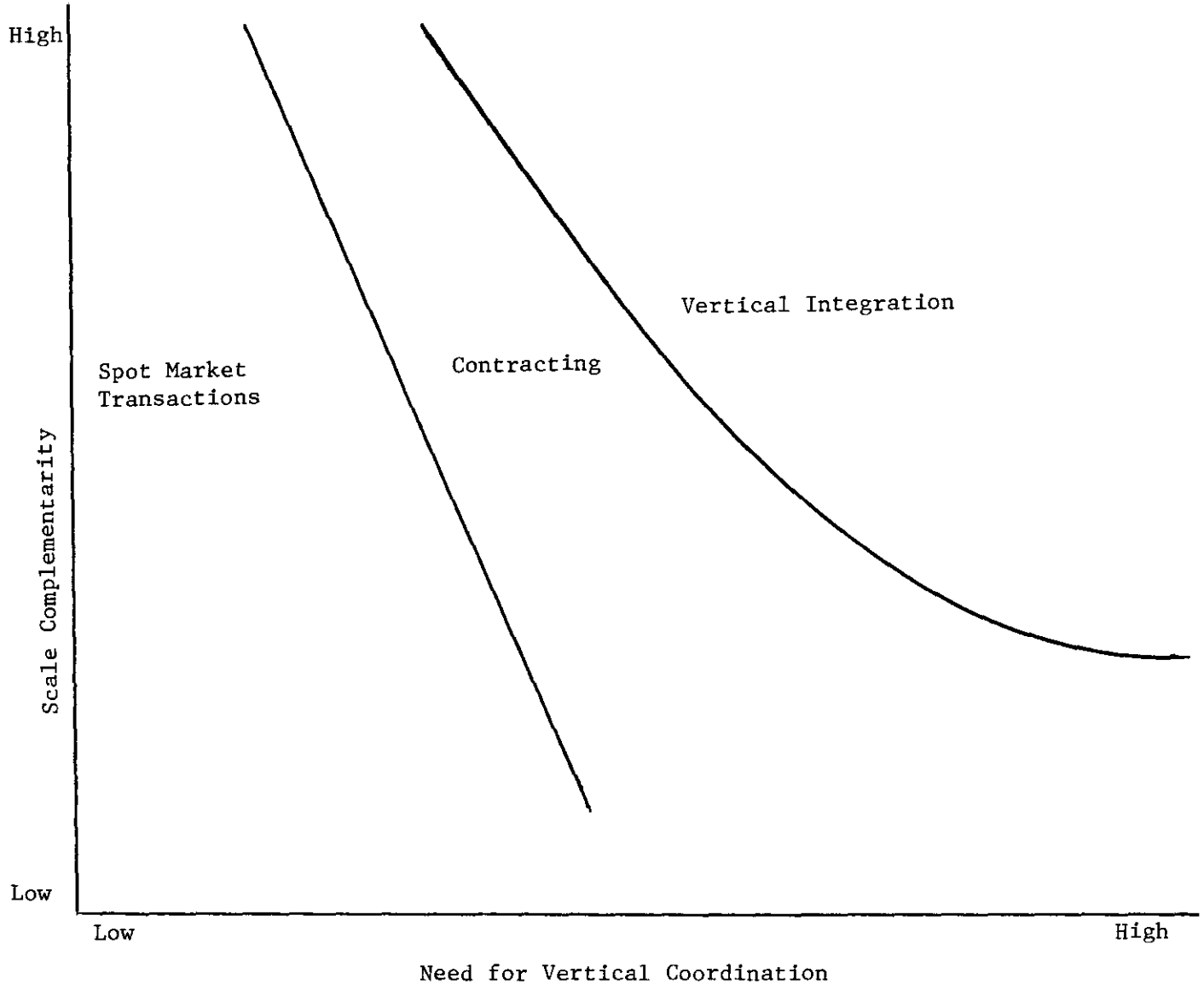
Vertical integration is an institutional solution to the problems of spot market failure. In agriculture, vertical integration facilitates information flow regarding production practices, information flow regarding specific demand characteristics (quality, timing, and future price), and the provision of financial and technical resources. Similarly, contracting production may serve to circumvent the failures of spot markets. Market-specification contracts can transfer information and reduce the risk of relying on a single marketing outlet. In the latter case, a formula-price may be sufficient to induce growers to produce for a monopsonist. Fixed-price or price-range contracts reduce income risk only under certain circumstances. Management-providing contracts allow the transfer of production information, and resource-providing contracts relieve credit and input constraints at the farm level. Thus, contracts take advantage of scale differences and information differences to provide the grower with needed services, encouraging the use of certain inputs and practices which are necessary to meet quality standards and delivery schedules. These patterns are outlined in the last two columns of Table 1.

In explaining the relative strengths of vertical integration and contracting, two variables seem most important. First, vertical integration seems to perform better when very complex coordination is required; contracting may be seen as an intermediate coordination mechanism. This is illustrated by the horizontal arrangement of the three types of coordination in Figure 1. The second variable is scale complementarity: the similarity of the efficient scales of farming and of processing/marketing. As illustrated by the downward-sloping line in Figure 1, a low degree of scale complentarity (when the efficient scale of farming is very small compared to that of processing/marketing) discourages contracting relative to spot market exchange since it raises the cost of contracting a given volume of raw material. In addition, as represented by the curve in Figure 1, a low degree of scale complementarity favors contracting over vertical integration, even as coordination requirements become relatively great. This is because contracting retains the efficiency of the small farming units.

TABLE 1: TYPES OF MARKET FAILURE AND MECHANISMS OF VERTICAL COORDINATION

TYPE OF MARKET FAILURE AND COORDINATION PROBLEMS WHICH RESULT	CIRCUMSTANCES UNDER WHICH FAILURE OCCURS	METHOD BY WHICH INSTITUTIONS IMPROVE COORDINATION: CONTRACTING	METHOD BY WHICH INSTITUTIONS IMPROVE COORDINATION: VERTICAL INTEGRATION
Production information assymetry: buyer knows significantly more than growers about the production technology.	Crop has complex technology or is new to grower.	Management-providing contract which specifies practices to achieve quality, timing, and least-cost production. Cost of extension covered in marketing good.	Transfer of production information within firm through training and supervision.
1) Quality increases are profitable but growers do not have technical knowledge how to improve.	Quality varies, affects demand, is controlable.		
2) Better timing of supply could raise profitability but growers cannot change timing.	Timing of supply affects demand, is controlable.		
3) Improved practices would be profitable but growers are not familiar with them.	Improved practices exist and are known by buyer.		
Marketing information assymetry: buyer knows significantly more about market than growers, e.g. future, seasonal patterns, quality needs	Crop has specialized or distant market, demand is relatively new.	Market-specification contract which allows greater exchange of information regarding demand: quality, timing, and price.	Market information transfered within the integrated firm down to the field level.
1) Quality increases are profitable, but growers are not aware of premium on quality.	Complex quality requirements, esp. exports		
2) Better timing could raise profitability but growers not aware of timing requirements.	Perishable good for processing or export.		
3) Although greater production is profitable, grower not sure of future price.	Volatile or new market, grower does not trust monopsonist.		
Imperfections in markets for credit, inputs, and agricultural services. High transaction costs, growers unsure of profitability of inputs and services, lenders unsure of reliability of borrowers, policy-induced distortions which reduce input and credit availability.	Use of large amounts of inputs, particularly specialized inputs, is profitable for the commodity.	Resource-providing contract supplying inputs and credit. Repayment assured by contract to market product.	Credit and inputs provided internally within the firm.
1) Quality is sub-optimal due to limited use of inputs and services.	Crop for which quality depends on inputs.		
2) Timing of supply is inappropriate or uncoordinated without inputs and services.	Crop for which timing depends on inputs.		
3) Sub-optimal output and excessive cost due to limited use of inputs and services.	Crop for which input use reduces production costs.		

FIGURE 1: VERTICAL ORGANIZATION AS A FUNCTION OF SCALE COMPLEMENTARITY AND NEED FOR COORDINATION



Thus, contracting is most likely when coordination requirements are high but scale complementarity is low. This would be the case for commodities which are perishable, processed, and/or exported, which have large input requirements, which are labor-intensive and/or involve careful husbandry (making small farming units efficient), and which have economies of scale in processing/marketing.

III. PATTERNS OF CONTRACT FARMING

The case study literature on contract farming is diverse, coming from a variety of disciplinary backrounds and political perspectives. It includes project evaluations, agribusiness case studies, applied marketing research, and dependency school critiques of agribusiness operations in developing countries. There are two principal problems with a review of such diverse literature. First, the case studies are often difficult to compare as they analyze different aspects of the problem. Some focus on the management problems faced by contracting firms, others on the socio-cultural impact at the farm-level, and still others on the implications for public policy. Second, since only a portion of the existing examples of contract farming appear in the literature, there is the danger of bias in the sample. One would expect over-representation of successful, large-scale contract farming schemes and under-representation of smaller schemes and those which are less successful.

The review of the theoretical literature in the previous section suggests that technical characteristics of the commodity and its demand are important factors. Hence, there is likely to be more similarity between, say, vegetable contracting in Honduras and Thailand than between poultry and tobacco contracting in Jamaica. Thus, with the exception of an introductory section on contract farming in the United States, the case studies will be organized by commodity.

3.1 Contract farming in the United States

A USDA study estimated the importance of contract production and vertical integration in the United States based on "the best judgement of a number of production and marketing specialists in the Department" for each commodity group (Mighell and Hoofnagle, 1972). A weighted average of these estimates indicates that contract farming accounts for around 17% of crop production and 31% of livestock production. However, there was substantial variation among commodities, as shown in Table 2. Over 80% of sugarbeets, fluid-grade milk, poultry, vegetables for processing, and seed crops were produced under contract, but less than 5% of grains, forage, oil-seeds, dry beans and peas, tobacco, and hogs were. Furthermore, it is interesting to note that similar crops with different final uses display different degrees of contract production. Examples are the different patterns for processed and fresh vegetables and the difference between seed and commercial grain crops.

TABLE 2: RELATIVE IMPORTANCE OF CONTRACT FARMING AND VERTICAL INTEGRATION IN U.S. AGRICULTURE, 1970 (percent)

	Contract production	Vertical integration	Other
Sugarbeets	98	2	0
Vegetable for processing	85	10	5
Seed crops	80	0.5	19.5
Citrus fruits	55	30	15
Potatoes	45	25	30
Sugarcane	40	60	0
Vegetables for fresh market	21	20	59
Cotton	11	1	88
Tobacco	2	2	96
Food grains	2	0.5	97.5
Dry beans and peas	1	1	98
Oil bearing crops	1	0.5	98.5
Hay and forage	0.3	0	99.7
Feed grains	0.1	0.4	99.5
Weighted average	9.5	4.8	85.7
Fluid-grade milk	95	3	2
Poultry	90	7	3
Turkey	42	12	36
Manufacturing-grade milk	25	1	74
Eggs	20	20	60
Fed cattle	18	4	78
Sheep and lamb	7	3	90
Hogs	1	1	98
Weighted average	31.4	4.8	63.8
Weighted average for total farm output	17.2	4.8	78

SOURCE: Mighell and Hoofnagle (1972).

Furthermore, the proportions of farm output produced under contract in the United States appear relatively stable. Mighell and Hoofnagle (1972) compare their results with figures estimated ten years before (Mighell and Jones, 1963) and note a slight overall rise in contracting and vertical integration, although the pattern varies among commodities.

An analysis of 420 production contracts sheds some light on the nature of these arangements circa 1960 (Harris and Massey, 1968). In 80% of the contracts, the buyer provided the "subject-matter input," that is, the planting material, chicks, or other live inputs. Over 90% involved some restrictions and/or monitoring of production practices, while in 56% of them the buyer specified "more than two important production practices" (p. 78). Risk was handled in numerous ways, but often the buying firm agreed to compensate the grower for damages resulting from its managerial decision. All the contracts allowed buyers to refuse deliveries which did not reach quality standards, some allowed refusal for late delivery, and a few allowed refusal if it was simply not profitable to process the commodity. Prices in the contract sample were almost always set according to a formula based on market prices, costs of production, and other factors, often calculated at the time of sale.

The patterns of contract farming vary among commodities, often involving complex relationships between growers, cooperatives, processors, and government programs. It is worth briefly describing the patterns of contract farming for selected commodities to illustrate this variety. These descriptions are based primarily on work by Mighell and Jones (1963), Mighell and Hoofnagle (1972), Roy (1972), and Marion (1986).

Sugar crops are almost exclusively produced under contract or by vertically integrated firms. This is due to the efficiency of large-scale processing plants and the possibility of spreading the harvest over a relatively long period. By coordinating planting, the required design capacity of the plant is minimized relative to its actual operating capacity. Sugarcane is processed by plantations (particularly in Hawaii), by cooperative mills, and by mills with informal agreements with independent growers. Sugarbeets are grown almost exclusively under contract arrangements involving extension, seed provision, and a formula price tied to beet quality and the processor's sale price.

Vegetables for processing require contracting because of the perishability and quality requirements of the crop. The contracts are often complex, involving provisions

covering varieties, planting dates, chemical use, and production practices, as well as defining complex price-quality schedules. There is variation among vegetables with the crops requiring more attention and more precise scheduling (green peas, sweet corn, etc.) relying almost exclusively on contracts.

Seed crops are generally produced under contract because of the need to precisely specify and monitor production practices to maintain physical and varietal purity and ensure seed health. As a rule, early generations (breeder and basic seed), requiring the most exacting husbandry, are grown directly by seed companies, while later generations (commercial seed), which involve greater volumes and somewhat lower standards, are produced under contract.

The marketing of fruit crops varies widely, with citrus production involving the greatest use of contracting. Packers and processors, both cooperative and private, contract growers, though price is generally not determined until after the produce has been marketed. Deciduous fruits are more loosely coordinated, while the Hawaiian pineapple industry consists of vertically integrated plantation-processors.

Potato contracting is associated with the processed potato industry which obtains 90% of its supply through contracts. The potato chip industry contracts virtually all its supply because of the need for daily production of a perishable final product. Freezers use contracts and, to a lesser degree, spot market purchases. Potatoes for the fresh market are only occasionally contracted.

Other crops are contracted only for special varieties, when supplies are tight, and when destined for a special market. For example, cotton contracting rose in 1970 due to tight supplies, presumably because buyers had better knowledge of impending shortages. The only contracted tobacco is the special wrapper tobacco produced in a few small zones in the country. Among oil-bearing crops, only the minor crops with narrow market outlets (sunflower, safflower, and castor beans) are contracted. And grains are only contracted when a special, high-quality type must be produced, such as wheat for breakfast cereal and barley for malting. Dry beans and peas were commonly contracted in the early 1960s when the crops were introduced to new regions, but the use of contracting has declined since that time.

Among animal products, milk and poultry are most commonly contracted. In dairy production, producer cooperatives act as bargaining agents by contracting members and having them deliver supplies to a processor with which a supply contract has been made. These are indefinite quantity contracts employing a formula price. Fluid-grade milk is used for fluid milk and other dairy products, while manufacturing-grade milk is exclusively for butter, cheese, and powdered milk. Contracting reduces the transaction cost of frequent sales of a perishable product, particularly for fluid-grade milk since fluid milk is more perishable than other dairy products and must be produced daily. Marketing orders set minimum prices and regulate the market, while purchases by the Commodity Credit Corporation maintain support prices for milk products.

Broiler (chicken) production is dominated by vertically integrated firms that operate hatching facilities, feed mills, and poultry processing plants. Contract producers receive chicks, feed, medication, and other inputs and are paid a fixed price per pound produced. The firm retains ownership, thus absorbing production risk, and the producer is virtually an employee. The financial and technical requirements of broiler production favor contract arrangements. Turkey production is similar, though vertical integration and spot marketing are more common than in broiler production.

In summary, the patterns of contract farming in the United States appear to support the principles established in the previous section. Specifically, they confirm that the technical characteristics of the commodity and the type of market structure influence the suitability of contract production. The commodities for which contracting is significant tend to be those which have higher value/bulk ratios, are more perishable, serve as raw materials for processing industries, and require relatively careful control of quality. Furthermore, the nature of the contractual relationship varies by crop and market destination.

3.2 Contract production of bananas

Banana production in Latin America provides one of the most familiar examples vertically integrated transnational firms. In the last 30 years, however, both political and economic forces have resulted in the growth of contract production of bananas and the relative decline of direct plantation production. While a comprehensive review of the history of banana production is beyond the scope of this paper, it is useful to briefly review the patterns of contracting found in this industry.

Banana exports from Central America and the Caribbean became important in the latter half of the 19th century. Bananas were produced by independent growers, frequently foreigners, and marketed by a large number of shipping companies. Simple market-specification contracts were highly prized by growers, but available to only a few. The use of spot markets with poor communications systems to market a highly perishable export commodity resulted in severe coordination problems.

> Growers faced unpredictable prices, grading, and delivery dates; companies had to deal with inadequate docking and storage facilities, tremendous rates of spoilage and fruit of varying quality. A ship might stop in at a Central American port to 'top up' its load before heading home, only to met by dozens of growers desperate to sell their fruit. Another time, boats from several companies would arrive at once and be forced to take whatever fruit was available. (Glover, 1983: 256)

In order to deal with these problems, firms began to integrate vertically, incorporating plantations, access roads, railroads, port facilities, shipping, and U.S. distribution facilities. The system of independent producers was reduced and eventually squeezed out in 1936 by the costs of controlling the outbreak of the disease Sigatoka. Although this process promoted investment in infrastructure and improved coordination, it also introduced economies of scale which led to a series of mergers. United Fruit was formed by a merger of the two largest firms in 1899, while Standard Fruit was formed by a series of mergers of the surviving remainder in 1930. Until the emergence of independent Ecuadorian exporters in the 1950s and Del Monte's entrance in the 1960s, United Fruit (now United Brands) and Standard Fruit (bought by Castle and Cook) maintained a virtual duopoly (Glover, 1983).

In the 1950s in Honduras, United Fruit introduced the system of "associate producers," providing a total of around 2400 hectares to 120 former employees and 5-10 year contracts to supply the company. The producers would pay for the land over several years by deductions from crop payments. The company provided aerial spraying against Sigatoka, irrigation, management assistance, and transportation of the produce to the dock, the cost of which is also deducted from produce payments. In addition, ten supervisors received around 110 hectares each, and a 1000 hectare corporate farm became a contract producer. The larger farms assume more responsibilities, such as packing and transportation to the docks. Although the associate producers as a whole have grown to provide 30% of United Brands' exports from Honduras, it is not clear whether the small farmers continue to participate (compare Glover, 1983: 268 and McCommons et al, 1985: 29).

Standard Fruit began contracting producers in Honduras in the 1960s and now contracts with three medium-sized cooperatives totalling 1160 hectares and one large cooperative with 2000 hectares. This constitutes around 38% of Standards exports from Honduras. The Guanchias cooperative, one of the three medium-sized cooperatives, is a frequently cited success story of the operation of transnational corporations in developing countries (Truitt et al, 1981; McCommons et al, 1985). This cooperative was formed by laid-off plantation workers who, through a difficult political struggle, obtained land from the land reform institute. In 1968, they obtained a contract to grow bananas for Standard Fruit. The company provides technical and administrative assistance and a line of credit to the cooperative, guaranteeing to purchase all bananas that reach minimum standards. Over time, the cooperative has taken on more functions such as disease control, irrigation management, packing, and transportation to the docks. In addition, the cooperative has prospered to the point that it now hires labor for a majority of the work. The contract price is based on the costs of production and can be renegotiated whenever these costs rise by a specified increment. The large cooperative, Isletas, has been plagued with problems since its formation in the mid-1970s. A state marketing corporation is supposed to provide credit and technical assistance and act as a marketing intermediary. In fact, over-staffing and political appointments have meant dissatisfaction with the services and high costs.

In Guatemala, Del Monte produces bananas on a plantation (79%) and through relatively small contracted producers (21%). This operation was bought by Del Monte from United Brands in 1972 as part of an anti-trust settlement. In Panama, United Brands produces similar proportions on plantations and through associate producers. In Costa Rica, associate producers constitutes over 43% of the total, though they tend to be politically influential businessmen operating large farms (Glover, 1983). For example, Del Monte contracts 13 producers with an average of 250 hectares for two thirds of its supply (Burbach and Flynn, 1980: 218). Recently, United Fruit sold its land in Costa Rica to the government and is now relying entirely on contract producers (Omang, 1985).

Ecuador is the largest banana exporter, though it tends to be a supplier of last resort because of its distance from U.S. markets and the lower quality of its product. Unlike the Central American banana trade, Ecuadorian exports are handled by numerous firms, most of which are local. Although there is a mix of grower-exporters, contracted growers, and uncontracted growers, it appears that slightly over half the volume is sold on spot markets, generally by small farmers (Glover, 1983).

Little information is available on banana production in other regions. It is known that Philippine production, principally for export to Japan, grew rapidly in the 1970s. It is based on plantation production as well as contracted production. According to Burbach and Flynn (1980: 203), the contracts are with large-scale growers. The banana industries in the Caribbean and Africa, primarily for export to Europe, have been characterized as "high cost smallholder production" (Glover, 1983: 251).

Why did exporters re-establish the system of contract production in Central America? Part of the reason was political: the banana plantations have long been the focus of resentment against U.S. political and economic influence in the region. The associate producer programs generate a group of local producers whose interests parallel those of the company, as well as creating better public relations in general.

However, there are various economic advantages to contracting production. McCommons et al (1985) note that it allows greater geographic dispersal of production zones, particularly important given the frequency of storm-related damage in the Central American plantations. Burbach and Flynn (1980), in their critique of transnational agribusiness, claim that the company forces the independent producers to bear the brunt of market fluctuations by adjusting the quality standards: when demand is low, they raise the standards to limit the volumes they must purchase and when demand is high, they lower standards. In fact, Glover (1983) reports that the variation in annual export volumes is no greater for independent producers than for company plantations. Furthermore, he notes that the cooperative members are generally satisfied with the consistency of quality standards and stability of sales. He also states that contracting producers does not allow the companies to escape all costs of supply instability since 1) storms can still cause shortfalls in supplies and 2) any risk born by contract growers would presumably have to be "paid for" with risk premiums included in the purchase price.

In addition to risk reduction, banana companies may contract production simply because it is less costly. Thus, Burbach and Flynn (1980: 218) argue that contracting was a response to the threat of expropriation, "a necessary adaptation which they have turned to their own advantage... allowing them to lower their profiles without cutting into their profits." Contradictorally, they also argue that "profit margins are significantly higher on their own plantations, which are able to produce quality fruit more cheaply and efficiently than are the associates" (p. 219). Discussion of comparative costs usually revolve around differences in labor costs. Workers on the large plantations have long

been organized and are frequently an important force in national politics. They earn more than workers for smaller plantations since the latter are less likely to be unionized. In Honduras, cooperative employees are prohibited from unionizing. It is significant that the Standard Fruit contracts exclude higher labor costs as a basis for renegotiation of the purchase price, thus maintaining downward pressure on wages among contract producers. However, lower labor costs on the contracted farms are offset by the lower yields and lower labor productivity. Although the calculation of costs is complicated by the valuation of services provided to associate producers, estimates by Ellis (1976, cited in Glover, 1983: 316) indicate that the costs of contracting producers is somewhat lower than that of directly producing bananas on company plantations.

Glover (1983) raises the possibility that independent producers may have better access to credit and reconstruction assistance from development banks and donor agencies. However, this should not be considered an abuse of this assistance, since the purpose of these programs is precisely to promote small-farm agriculture in the interest of equity.

In any case, these advantages for the companies do not necessarily correspond to disadvantages for contract producers. Even the relatively small farmers in the Guanchias cooperative have considerably higher standards of living, both compared to their previous situation and compared to the level of the surrounding region. With financing from the government and Standard Fruit, the cooperative has built a school, a health clinic, and a 123-unit housing complex with electricty and indoor plumbing. There is a long waiting list for cooperative membership (McCommon et al, 1985). On the other hand, the overall impact on employment may not be as favorable since the associate producers tend to pay lower wages and use fewer workers per unit of output than the company plantations.

In summary, banana production would seem to have some economies to scale, particularly in packing and disease control. This favors the use of large-scale plantations. The fragility and perishability of the commodity imply that good marketing coordination is essential and that vertical integration or contracting is useful, particularly for high quality production.

Small-scale production is feasible if some functions with economies of scale, such as packing, technical assistance, and financing, are provided by a larger entity. It is

costly for exporters to provide these services, but the example of Guanchias demonstrates that these functions can be gradually transfered to an intermediary such as a cooperative. This more widely distributes the returns to banana production and marketing. However, given the mixed results from attempts to replicate the Guanchias example, it is clear that the necessary administrative and management capacity of this intermediate institution should not be underestimated. The case of the Isletas cooperative in Honduras suggests that state marketing corporations may not be efficient enough to undertake this intermediary role.

3.3 Contract production of tobacco

Tobacco production differs from banana production in several important ways that influence the nature of vertical coordination mechanisms used. The most important difference is that tobacco production requires much more intensive use of labor, including careful husbandry. In addition, there are fewer functions with large economies of scale. As a result, there are few plantations and most tobacco companies contract farmers to produce it on quite small plots (generally less than 2 hectares). A British transnational, British American Tobacco, has followed this strategy in various African countries, as have other companies producing tobacco in Africa, Asia, and Latin America.

In Kenya, British American Tobacco (BAT) contracts some 8,000 small holders who produce 80% of national production. In order to produce for the BAT, a farmer must be willing to grow 0.5 hectares of tobacco, the maximum that the BAT feels a family can care for adequately. Farmers must also have at least four additional hectares for subsistence production and to supply wood needed for curing. The BAT exercises considerable supervision and control over production through a team of field agents. They ensure that land preparation, planting, weeding, spraying, harvesting, and curing are done according to company specifications. Harvesting and curing, in particular, must be done correctly to assure a quality product. The company provides credit to growers, subject to an evaluation of husbandry techniques by the field staff. After the six-month production period, the BAT collects the cured tobacco and pays the grower in cash based on the volume and quality produced (Buch-Hansen and Kieler, 1983).

One study of the impact of contract farming in Kenya concluded that contract tobacco producers had cash incomes almost 150% greater than similar farmers in the same area. More surprisingly, the study found that:

> farmers in the contract production schemes have a higher degree of self-sufficiency in food compared to those outside. The contract farming systems, which result in increased purchasing power, have enabled the producers not only to develop the productivity of cash crop production but agrochemcials, ploughs, hybrid seed, hiring of tractors, and so forth are increasingly used in subsistence production. (Buch-Hansen and Kieler, 1983: 30)

The authors, starting from a political economy perspective, argue that continued capitalist penetration into Kenyan agriculture may eventually lead to social differentiation and proletarianization. However, they conclude that, for many years to come, a more common cause of rural poverty will be exclusion from capitalist development and isolation from markets. They suggest that contract farming is an effective mechanism for transfering technology to small farmers.

Although British American Tobacco was also involved in Tanzania, the industry was nationalized in two stages in 1967 and 1974. Now the Tobacco Authority of Tanzania is responsible for organizing production, extension, purchasing, storage, processing, and sales. Although tobacco is predominantly produced by small farmers, generally with less than two hectares, there is some variation in the organization of schemes. Boeson and Mohele (1979: 131) conclude that often the schemes were over-regulated and over-supervised. Less rigidly controlled schemes tended to perform better, particularly since production recommendations were frequently not economic. The authors note a number of other problems including rising marketing costs, revenue extraction, politically determined targets, late delivery of inputs, and disruptive settlement policies (p. 139-150). They state that:

> a large peasant sector is the productive basis for important segments of the country's small non-agricultural sectors. By exercising a politico-bureaucratic monopoly over the whole intertwined circulation (and processing) sphere, they secrure for themselves a major, and increasing, part of total revenue deriving from that crop. (p. 150)

As a result, the situation as of 1978 was not encouraging: the producer price had fallen as a proportion of the export price, producer indebtedness was growing, and production had stagnated. This case illustrates some of the problems of parastatal operation of contract farming schemes.

The Nigerian Tobacco Company (NTC) was started by British American Tobacco in 1933. Initially, the company contracted growers to produce green leaf (uncured) tobacco,

providing seedlings, technical assistance, and credit. The company bought the leaf at a fixed price depending on the quality, then cured, graded, and marketed it. In 1954, the company decided to transfer the curing and grading functions to selected groups of growers. At first, the company organized cooperatives of relatively large growers which would construct a "barnsite" where the tobacco could be cured (dried on racks using artificial heat) and graded. Each cooperative would subcontract smaller farmers to produce green leaf tobacco.

As the size of the cooperatives grew, the cooperatives came to subcontract hundreds of green leaf growers and quality declined. Furthermore, internal disputes over the distribution of cooperative returns became more frequent and time-consuming for company extension staff. The contract system entered another stage as the company began to experiment with farm-level curing and grading in 1969. The company established Farm Family Units (FFUs), three heads-of-household who were blood relatives producing at least 2.4 hectares of tobacco among them. The FFU must construct a barnsite to the specifications of the NTC, requiring about 180 person-days of labor and costing about US$ 500. Although construction credit is available from Barclay's Bank (guaranteed by the NTC), it is at commercial rates of interest. In spite of these costs, farmer interest in joining the program has been strong and within five years over 700 FFUs were formed and barnsites constructed (Morss et al, 1976).

As of the mid-1970s, there were about 7000 green leaf growers in the Iseyin Division of the Western State (it is not known how many contract growers there are in other regions), 3000 of which are part owners of a barnsite. The average farm in the program had 0.4 hectares of tobacco and 0.8 hectares of other crops. On average, farmers in the region cultivated 0.9 hectares and had a net income of US$ 179. On the same area, green leaf tobacco production yielded a net income of US$ 331, while tobacco production and curing provided US$ 667. Furthermore, the fertilizer applied to the tobacco increased the yield of the maize with which it was grown in rotation.

Much of the success of the program is attributed to the quality of the extension services, which have taught complex production and curing procedures to largely illiterate small farmers (the literacy rate is about 10%). This is accomplished through an intense, tightly organized extension service. There is one "leaf instructor" for every 200 farm units, and they are provided better salaries and benefits than public sector equivalents. Most are college graduates, but

> an important part of the training (and screening) takes place in a remote village without water or electricity. According to NTC officers, living under the same conditions as farm families for an extended period increases the understanding of the leaf instructors of farmer constraints. (p. 216)

Furthermore, field agents are provided with transportation, housing, and overtime payments if appropriate. There is tight chain of supervision: the leaf instructors prepare reports on the activities of the FFUs, the divisional office tracks the quality of each FFU, and senior leaf instructors meet with the head of the FFUs monthly.

Other factors contributing to success include 1) the continual technical and institutional experimentation of the company in search of more effective procurement systems, 2) the commercial orientation of the Yoruba people where the project is active, and 3) the use of other institutions such the FFUs and Barclay's Bank to share the functions for which the company does not have an economic advantage.

In Jamaica, tobacco production follows a similar system. Dark tobacco for cigar manufacture is contracted by the Tobacco Industry Control Authority (a public agency) and the Jamaica Tobacco Company. Tobacco for export cigars is grown by around 50-60 contract growers. More important to the Jamaican economy, Virginia-type tobacco for cigarettes was initiated in the 1950s to substitute for imports. Production has grown to cover 80% of domestic consumption. Over 1000 contract growers produce cigarette tobacco for the Cigarette Company of Jamaica, Ltd., associated with Carreras Rothman, a well-known British firm.

Jamaican growers, like those in Africa, produce cigarette tobacco on small plots, averaging 0.8 hectares, either their own land or land leased from the company. The company provides "machinery for land preparation and tillage, facilities for curing the leaf, and irrigation facilities and services ... in a pool for joint use by groups of farmers" (Lewis, 1983: 186). It also supplies technical assistance and credit for all input purchases and the hiring of labor. The company promotes the formation of grower committees to facilitate training, administration, and technical assistance. The elected officials of the committee also serve as a communication channel between the company and its contract growers, particularly in the negotiation of the crop price (it is not clear if this is determined before or after planting). After coming to agreement on the cash costs of production, a reference yield figure, and the required amount of labor, the negotiation revolves around the remuneration per hour of labor applied. The result is that growers "clear" US$ 1410 per hectare for the four-month crop. Thus, it is not surprising that

"contracting with a tobacco company is very popular with farmers" (Lewis, 1983: 186). On the other hand, it should be noted that the impact is concentrated in that less that one percent of Jamaican farmers are involved.

Another country for which information on contract tobacco production is available is Thailand. Due to differences in quality and variety, tobacco is both imported and exported. Exports grew almost four-fold over the 1970s while imports declined from 50% to 30% of domestic consumption. All cured leaf for domestic consumption is purchased by the Thai Tobacco Monopoly (TTM) a parastatal. Growers must obtain permits to produce tobacco and they are required to obtain a marketing contract with the nearest curing plant (the curing is not performed by growers). In order to assure quality, the curing plants select the seed, prepare the seedlings, provide credit and detailed technical information on production and disease problems, and purchase the product at a price which varies with the grade (Thosanguan, 1983).

Siamwalla argues that, although curers have introduced improved agricultural technology and raised farm income,

> the overwhleming control exerted by the curers has allowed them to exploit (and I use the term advisedly) the growers on the matter of price ... (B)ecause of the quality variations, the price stated in these contracts would be a price range. The grading is done by the curers when the leaves are delivered. Here, the curers have complete freedom, and ... the farmers have no choice in the matter, as they cannot move from one curing-house to another. (Siamwalla, 1978: 46)

A curing plant presumably must pay farmers enough to keep them from switching to other crops, since turnover implies greater training and supervision costs. On the other hand, legal restrictions prevent farmers from switching to other curing plants for the next year, thus reducing competition among plants and lowering the price they must pay. Thosanguan (1983: 9) makes the convincing argument that:

> The thrust of government policy (regarding contract farming) should therefore be toward broadening the farmers' field of choice. For tobacco, beset by the greatest number of problems, the Tobacco Act should be amended to let farmers contract with curing factories outside their home districts. TTM ought to: reinstitute its program of encouraging farmers to cure their own tobacco, expand farmers' quotas, and permit farmers who cure their own tobacco to buy fresh leaf from other farmers.

Also recommended are the establishment of spot markets, particularly through auctions, which could serve as a reference price for contract negotiation.

The case of Thai tobacco production by Adams International is described by Karen (1985d). A U.S. firm, W.A. Adams Company, has been involved in Thai tobacco exporting

since the 1950s. In 1969, it formed a joint venture with a Chinese-Thai firm, becoming Adams International, though exports were still only 100 MT annually. Since 1974, when a marketing agreement was reached with Philip Morris Inc., the export volume has risen to around 5000 MT annually. This expansion required major investments in leaf handling and cleaning equipment, storage facilities, and training.

The production of "Turkish" tobacco by Thai producers is even more labor-intensive than that of Virginia tobacco so the area contracted per farm is quite small, less than 0.2 hectares. Thus, the company must contract as many as 40,000 growers. Thus, a large extension staff had to be trained and supervised. There are 500-600 Village Inspectors, implying a ratio of 70-80 growers per Inspector. They report to Head Inspectors who, in turn, report to Stations Managers. The latter manage the buying stations where the tobacco is graded, purchased, cleaned, and stored. Each regional manager administers a network of buying stations and reports to one of two Field Managers in the country. This chain implies an average span of control (ratio of subordinates to supervisors) of 4.2. Thus, the extension effort is quite intense; by comparison, the recommendations for the World Bank's Training and Visit Extension System include a span of control of 6-8 and a ratio of 500-1200 growers per agent (Benor, Harrison, and Baxter, 1984: 34-35).

Originally, the company recruited students from the agricultural colleges to be village inspectors. However, serious problems of attrition (50% the first year), lack of dedication to the work, and inability to earn the respect of the farmers forced the company to revise its strategy. Now, village inspectors are tobacco farmers recruited from the villages. In addition to initial training in tobacco production and extension techniques, there is a continuing system of in-service training which includes a "road show complete with slides, cut-outs and tests, as well as ongoing seminars" (p. 9). Village inspectors are supplied with teaching tools such as wall calendars for distribution to farmers with illustrations of correct practices and the dates they are to be performed. They conduct field demonstrations on farmers' fields. The success of these village inspectors has lead to their promotion into head inspector and station manager positions.

The input delivery system is also quite complex with as many as twelve items available to the grower, from agricultural chemicals to spray pumps, water cans, plastic sheeting, and burlap. All are provided at a price to be deducted from the commodity payment at harvest (an interest charge is implicitly included). In order to keep track of input supply and production for 40,000 growers, the company has computerized the

record-keeping. The company is also diversifying into production of sunflower, sesame, and groundnut. This is intended to generate a sustainable crop rotation systems with tobacco and to increase farm income.

As of 1983, the average farm income from tobacco was US$ 157, or around US$ 825 per hectare. This is about four times the return to rice or cassava production (though it is not clear if this is gross or net revenue). The 40,000 growers contracted by Adams International produce only 8% of the volume of tobacco produced in Thailand, though the Virginia-type tobacco probably requires fewer growers per unit of output. Although the policy changes in the EEC recently reduced the European market for Thai tobacco, the profitability of the enterprise seems to assure continuity (Karen, 1985d).

In summary, tobacco production is quite well suited to small-scale production under contract due to 1) the labor-intensivity which makes plots under one hectare economical, 2) the high-value of the output, 3) the importance of technical assistance and quality control, and 4) the large amount of purchased inputs necesary for its production. Successful programs depend on intensive extension input, experimentation in institutional design, and a long-term perspective by the contracting firm. The farm-level returns to production of tobacco are often twice that of competing crops, so that contracting creates a significant impact, though narrow in focus.

3.4 Contract production of rubber

The natual rubber trade essentially began in the early twentieth century with the expansion of the automobile industry, and continues to grow in spite of the development of synthetic rubber capacity. Around 90% of world natural rubber production comes from Asia, primarily Malaysia (43%), Indonesia (24%), and Thailand (12%). Sri Lanka, India, Liberia, and Nigeria share most of the remainder of the market. Rubber trees take six or seven years to reach production and can be tapped until age 30-35. Rubber production for maximum yield is relatively labor-intensive and requires careful tapping, but occasional tapping of unattended trees is practiced by many small farmers (Courtenay, 1980).

According to the World Bank (1982: 21), "rubber is particularly well suited among tree crops to smallholder cultivation." In fact, figures compiled by Courtenay (1980: 212) indicate that only 25% of world rubber area is found on estates, defined as farms with

more than 40 hectares (their contribution to output is greater than this due to the higher yields of estate production). Small holders account for over 80% of the area in Thailand, Indonesia, and Nigeria. Furthermore, the relative importance of smallholder production has probably increased somewhat over the last twenty five years with the parcelization of large estates and the intensification of smallholder production.

Smallholders generally have lower yields due to the use of older varieties, greater density of planting (including intercropping), and less productive husbandry and tapping practices. Another problem is that financial constraints often prevent smallholders from replacing and rehabilitating older trees. A major marketing problem is the difficulty of ensuring high-quality raw material from small holders. A 1966 report listed this as the most serious problem in Nigerian smallholder production, noting that adulteration of the "lump" with stones, bark, and pieces of metal to increase its weight was very common (Arthur D. Little, Inc., 1966). Similar problems of adulteration were reported in Indonesia. Even in Thailand, where small holders transform the latex into "unsmoked rubber sheets," this is a problem:

> The quality of the unsmoked sheets depends very much on the grower, i.e. how much care he has put into removing dirt and impurities as well as the quality of the acid used by him. Clearly in this case, the grower usually has a much better idea of the quality than the buyer. (Siamwalla, 1978: 44)

A variety of marketing mechanisms are used to deal with these production and marketing constraints, including some forms of contracting.

Traditionally, smallholder rubber has been marketed through a chain of intermediaries who develop stable relationships based on mutual trust with growers and among themselves. Since buyers are reluctant to purchase from unknown sellers, the latter can obtain a better price from known buyers than from others. The frequency of sales also encourages the development of a stable quasi-contractual relationships. Thus, in Thailand "buying and selling rubber become a matter of personal trust" (Siamwalla, 1978: 44). In Malaysia, the ethnic Chinese have traditionally dominated the rubber trade because of the trust among them. They tend to "personalize or particularize exchange relationships as a way of coping with contract uncertainty" (Landa, 1981: 350).

Several public programs have attempted to organize farmers to market the raw material directly to the factory. The unit can obtain better prices from the factory if it is successful in developing and maintaining a reputation for high quality, using internal sanctions to control quality. In the early 1970s, over 350 such groups with 25-75

members were organized in Nigeria as part of a Clean Rubber Campaign, doubling or tripling the price received by growers (Armstrong, 1972). Group marketing organizations in Thailand serve a similar role, though they tend to be concentrated in the more populated areas. And the Rubber Industry Smallholders' Development Authority in Malaysia organizes small-scale "group processing centers" in which growers convert latex into crumb rubber that can be marketed according to standard grades.

A third marketing arrangement is the creation of nucleus estates by private, public, or mixed entities. These estates process their own rubber as well as that of outgrowers in the region and provide technical assistance, credit, and inputs to outgrowers. Often these are established as settlement schemes in which settlers are provided with cleared land paid for with a mortgage. This strategy is most developed in Malaysia where the Federal Land Management Authority and other public entities have organized fully 20% or 398,000 hectares of current rubber production (Courtenay, 1980; Bunge, 1984). The World Bank has funded similar projects in Indonesia, Ivory Coast, and Cameroon, among other countries (World Bank, 1982). These projects attempt to increase the replanting of rubber stands with new higher-yielding varieties, to improve husbandry and tapping procedures, and to increase quality of the raw material. Often the price is set as a percentage of the FOB price or the Singapore world price.

Courtenay (1980: 228) argues that there is "a strong trend toward increasing sophistication of the rubber smallholding sector, not only in replanting with high yielding varieties but also in the quality and range of products (smoked sheet, latex, crumb rubber) that are marketed. Malaysia leads this trend." It appears that there are several initial processing functions that can be economically performed by growers because the efficient scale is relatively small. However, this is only possible if small holders are organized and provided with information regarding processing techniques and the types of products in demand.

In summary, although the raw material for rubber is not highly perishable, vertical coordination is needed to transfer information regarding the quality of the product. This explains the development of regular relationships among rubber growers and traders. Newer coordination mechanisms such as farmer marketing groups and nucleus estates can also provide technical assistance and financing to small holders for rehabilitation and replanting.

3.5 Contract production of oil palm

The oil palm industry has grown rapidly since the 1950s, though it has long been cultivated in West Africa. The agro-climatic requirments of oil palm are similar to those of rubber, although it needs more level terrain and higher-quality soil. The life cycle of the oil palm tree is also similar to that of rubber, though oil palm comes into production two years sooner and requires less labor (Courtenay, 1980: 106). Malaysia, Indonesia, Nigeria, Ivory Coast, and Zaire are the principal producers of palm oil. Asian production has grown rapidly to surpass West African production as a result of improved varieties, a more suitable climate, and more efficient extraction equipment. Since the fruit bunches are bulkier and more perishable than latex, it is important to produce oil palm near the processing plant and to schedule its daily arrival.

> Generally the need is for a large scale unit operating at a high rate of throughput day in, day out. Intermittent supplies (of oil palm fruit) mean idle shifts and high overheads... Fruit must be brought in as quickly as possible and in organized rotation with the least possible bruising. Concentration of planting is therefore highly desirable. (Phillips, 1965: 103)

Thus, vertical integration (plantations) and other forms of coordination are more important for oil palm than for rubber. This is particularly true for export production which requires higher quality standards and larger processing equipment.

Small holders often function as outgrowers to plantations with processing plants. These plantations may be private, but a large number of them are public settlement projects using the nucleus estate/small holder model, often financed by the World Bank or the Commonwealth Development Corporation. Courtenay (1980: 116) argues that:

> If oil palm is to be developed on any scale as an efficient smallholder crop it can only be on government sponsored plantation-type schemes or as a subsidiary source of supply to an existing or specially established (nucleus) estate.

An early description of nucleus estate/smallholder schemes in Malaysia noted that a plant needs 2000 to 4000 hectares of oil palm supplying it, perhaps half of which would cultivated by small holders with four hectare plots. Land is also allocated for gardens and food crops. The estate provides extension services (one agent per 100 families), planting material, credit until the groves begin producing, and some services more easily handled on a large scale (Phillips, 1965). By 1973, government organized or assisted schemes accounted for 37% of Malaysian oil palm area (Courtenay, 1980: 113).

Similar public schemes, financed by the World Bank, have been developed in Nigeria, Cameroon, and Ivory Coast. These involve nucleus estates which contribute 50-

75% of the oil palm area while outgrowers contribute the remainder. Those in the Ivory Coast have been described as follows:

> The basic structure is a central plantation ... serviced by a mill. Then in a 20-kilometer radius from the mill, outgrowers in the various villages have been furnished with seedlings, fertilizer, pesticides, and technical help.... The mill sets up a weekly collection schedule for which the small holder is paid on a weight basis. (Lyman, 1972: 6)

The average mill is supplied by a nucleus estate of 4200 ha and outgrower production totalling 2800 ha.

It is worth noting that the nucleus estate/small holder strategy often requires substantial administrative and technical resources, particularly where population density is low and resettlement is involved. The necessity of providing roads, housing, social services, land clearing, and technical assistance makes these sizable investments. One reason that such investments are rarely undertaken by the private sector in West Africa is that marketing boards often impose price controls on the commodity, partly to generate revenue from export trade. In addition to discouraging private investment, this probably also diverts oil palm products to the small-scale processing industry and to domestic consumption, where price controls are unenforceable.

Thus, oil palm requires "tighter" vertical integration than does rubber because of the bulkiness and perishability of the fruit. Although production for local sale may involve spot sales and small processing units, large processors for export generally require a nucleus estate and contracted small holders. Support from government settlement programs and the World Bank has been important in promoting this form of production.

3.6 Contract production of sugarcane

The growth of sugarcane production in Brazil in the 16th century marked the beginning of the colonial plantation system. The persistence of the use of plantations for sugarcane production is due to the combination of three factors: the large minimum economic scale of sugar refining plants, the low value/bulk ratio of harvested cane, and the fact that it must be delivered to the plant within 48 hours of harvesting. Thus, sugarcane, even more so than oil palm, must be grown near the plant and planting should be staggered to distribute the raw material deliveries over as long a season as possible (O'Conner, 1965).

On the other hand, the labor requirements for sugarcane harvesting are "probably the heaviest made by any tropical crop grown commercially... (a typical Cuban mill in 1962) needed to employ a minimum of 1200 cutters to keep it fully operating" (Courtenay, 1980: 134). This gives rise to the long history of turbulent labor relations associated with sugarcane plantations, and explains the current use of mechanized harvesters in higher-wage regions. A wide range of institutional forms have been used to alleviate this problem, including the use of outgrowers.

The Commonwealth Development Corporation (CDC) has financed several outgrower sugarcane production schemes, of which the most well known are the Vuvulane Irrigated Farms in Swaziland and the Mumias Sugar Company project in Kenya. In the 1950s, the CDC created the Swazi Irrigation Scheme (SIS) and the Mhlume Sugar Company with its nucleus estate and sugar mill. In the early 1960s, Vuvuland Irrigated Farms (VIF) was created as a smallholder settlement scheme on SIS land to supply cane to the mill. Starting in 1963, thirty to forty plots per year were cleared and provided to Swazi farmers until 263 such farms had been formed. These farms, mostly four-hectares lots, are provided on long-term leases which regulate crop production, agricultural methods, construction, grazing, and so on. Sugarcane production occupies about 70% of the land, though other food and cash crops are grown.

The CDC organizes the distribution of irrigation water, the operation of a tractor and equipment pools, the distribution of seed cane, fertilizer, and other inputs, and the cutting and transport of cane. The cost of all of these services are at least partly recovered from farmers through user fees. The government provides four field advisors, each responsible for around 65 growers (Williams, 1985b).

In Swaziland, sugarcane can only be produced by farmers who have been issued a "sucrose quota" which

> both entitles and obliges him to deliver a specific quantity of sucrose in the shape of sugarcane to one or other of the two sugar mills during the course of each season for which he receives payment at a rate decided for each season by the Sugar Association" (Tuckett, 1977: 90).

The delivery to the mill of smallholder cane is scheduled by the CDC. The mills also receive cane from their respective nucleus estates as well as from other estates. In

essence, the legal quota system simulates the use of production contracts by fixing volumes and prices.

The CDC has attempted to transfer some functions to the organization of settlers with mixed success. The organization became a bargaining and lobbying agent for the settlers rather than accepting significant administrative responsibility. Disputed issues include land ownership and inheritance rights, the management of cutting and transport services, and the fees and rent paid by the settlers. In 1983, arrangements were made to transfer VIF to a public corporation, although the CDC will continue to manage the scheme (Williams, 1985b).

There is no doubt that the VIF scheme has been profitable for participating small holders: they reported substantially higher incomes than farmers outside the project and receive free housing, services, health care, and education. In the early 1970s, there were 1000 applications for the 30 openings per year for new settlers. In addition to the settlers, several thousand are employed in the mill, as cane cutters, and elsewhere on the scheme. On the other hand, Williams (1985b: 20) reports that malnutrition is "more widespread among children than might be expected in such a bounteous place" and that social cohesion among settlers was less than had been hoped. With regard to the payoff to CDC, the scheme has yielded returns each year but the CDC is not likely to recover the original development costs. With the transfer of the scheme to the public sector, the sutainability of the scheme will depends on the ability of the public sector to maintain high-quality management allowing the project to cover operating expenses.

The Mumias Sugar Company in Kenya is a similar project, larger and probably more sustainable but not without problems. It was formed in the early 1970s as a joint venture among the Kenyan government (70%), the Commonwealth Devlopment Corporation (12%), and several minority shareholders including Booker McConnel which would construct the mill and manage the project. The mill is supplied by a nucleus estate of 3400 hectares and 13,000 outgrowers with 22,000 hectares of sugarcane (Allen, 1981: 9). The MSC performs a wide range of functions for the grower including plot selection, mechanized land preparation, seed cane and fertilizer supply, techical assistance, and cane harvesting and transport. It also provides free medical attention and has built a school.

The impact has been positive from several sides. The MSC is profitable and provides tax revenue and dividends to the government. It is producing around 150,000 metric tons annually for the domestic market, substituting for imports. The cash income of outgrowers, formerly subsistence farmers, is over three times the median income for the region. The economic success of this project owes a great deal to the previous experience of Booker McConnel in outgrower schemes in Guyana, to the long period of negotiation, field trials, and feasibility studies, and to the flexibility of the Kenyan government and avoidance of political interference in questions of hiring and management. This success has lead to two other nucleus estate/outgrower sugar schemes in Kenya, one in Nzoia (Western Province) and the other in Sony (Nyanza Province) (Allen, 1981).

On the other hand, the Mumias scheme has been criticized for reducing food production among outgrowers. Since the MSC has a policy not to contract all a growers land, there is sufficient land, but growers apparently prefer to earn the cash income and purchase food. More seriously, the rapid rise in income has reportedly led to high levels of alcohol consumption and extended trips to the city by the men. Family relations have been strained by the fact that women and children tend to do the work, yet men control (and hide) the payments (Williams, 1985a). Nonetheless, it is suggested that such social problems are more limited and more easily dealt with than the problems faced by the region's subsistence farmers before the project began.

A third example of outgrower sugar production is found in Uganda in the 1960s. O'Conner (1965) reports that about 5% of the sugar was produced by small outgrowers located in the immediate vicinity of two sugar mills. Smith (1970) describes one of the two mills which was supplied by a nucleus estate of 8500 hectares and by 733 outgrowers with a total of 1700 hectares of cane (2.4 hectares per farm). Over three quarters of the small holders also cultivate coffee and food crops. In spite of the small size of the farms, over 87% of them needed to hire labor for the harvest. They also relied on hired transport to bring the cane to the mill. The nature of the contractual relationship is not described, but the fact that less than 20% of the cane was supplied by the outgrowers makes them vulnerable. Economic problems related to declining export prices led to the temporary suspension of cane purchases in late 1969, and it is not known whether the scheme still exists.

In Thailand, a tighter and more organized system has evolved, relying on the extensive use of pre-planting contracts. Reportedly, plantation production of sugarcane has been tried in the past but has been abandonned for economic reasons. Currently, the sugar mills purchase all sugarcane under contract which specify volume, price, and delivery schedule. Those growers with contracts, called "quota men," tend to be large farmers who fill their quotas with their own cane and that of subcontracted small farmers. This system is simpler and more flexible than directly contracting all growers. If small holders were contracted directly, then it would be difficult to ensure that the cane matured at the time specified in the contract. However, the quota men have contracts for various dates and several mills, thus facilitating the coordination of cane deliveries. The fee for this service is only 3-5% of the cane price (Siamwalla, 1978).

The mills extend credit to the quota men who in turn provide credit to small holders for fertilizer and hired labor. Interest is charged (15% annually) and the amount is deducted from crop payments. No technology transfer is involved in Thai sugarcane contracts. Before planting a price is negotiated between the mills and two growers associations. Although the small holders are not represented on the associations, their interests coincide with those larger farmers in the matter of cane price.

In this case, the existence of large cane growers appears to improve the situation of small growers by facilitating the scheduling of cane deliveries and favoring the formation of an effective producer association which represents the growers as a whole, particularly in the determination of price (Thosanguan, 1983 and Siamwalla, 1978).

In Fiji, over 90% of the sugarcane is produced by Indian tenant farmers with long-term leases. They produce under contracts with the mills, owned by a private company until 1973. The company provided inputs on credit, ran an extension service, and organized cooperative harvest of the cane. In addition, it carried out research and introduced improved cane varieties. In 1973, the company was acquired by the government which continues to operate it. A number of variations of this kind involving cane production by tenants blur the distinction between contract production and plantation agriculture (Courtenay, 1980: 141).

In summary, sugarcane production and marketing is greatly influenced by 1) the large seasonal labor input required, 2) the perishability and low value/bulk ratio which concentrate production around the mills, and 3) the large economies of scale in

processing which imply a need for careful scheduling of supplies to maintain constant operation of the mill. Sugarcane tends to be produced on large farms (particularly where high labor costs make mechanized harvest economical), but can be produced by small holders under appropriate institutional arrangements. The use of contracts and "quota men" appears to be one institutional arrangement which facilitates scheduling and credit for smallholder production of sugarcane.

3.7 Contract production of tea

The tea plant is a perrenial which thrives in relatively cool, misty climates and with deep, acidic soils. It can be harvested beginning in the fourth year of the plant. Depending on the climate and the number of leaves plucked, it can be harvested as frequently as every one or two weeks. Considerable experience is required to determine the optimal harvest frequency and to prune the bushes to maximize vegetative growth and minimize the effort required for harvesting. The actual harvest also requires skill and detexterity, particularly to select the bud and the first two leaves of the stem which produce the highest quality tea. The harvested leaves must be brought to the factory for processing the same day. Processing tea for export involves relatively small economies of scale such that small plants may be supplied by only 200 to 400 hectares of tea (Courtenay, 1980: 253).

Tea production is more ideally suited to the plantation system than are the other commodities discussed thus far. First, the tea must be produced relatively near the processing plant. Compared to sugarcane, the value/bulk ratio of tea is relatively high so that transportation costs are not as serious a problem and the economies of scale of tea processing are much lower. However, the perishability of tea requires geographically concentrated production and coordinated delivery. Second, as mentioned above, tea production is technically difficult, more so than sugarcane production. And third, the labor requirements of tea production are spread over the season, thus fitting the needs of plantation agriculture more than, for example, sugarcane. On the other hand, the careful, labor-intensive husbandry required, particularly for high-quality tea production, favor production by skilled small holders.

The major producers are India, Sri Lanka, and China, with the first two being the dominant exporters. For the reasons described above, plantation production is almost universal in these countries. African tea production represents a small but growing

proportion of world exports, rising from 5.7% in the early 1960s to around 10% of world exports. Although African tea production was initiated in the 1920s by the British on East African plantations much of the recent growth is attributed to smallholder schemes, principally that of the Kenya Tea Development Authority.

The Kenya Tea Development Authority (KTDA) was formed in 1964 when a colonial multi-crop development authority was transformed into a more specialized entity. It promoted the contract production of tea by small holders, providing planting materials, fertilizer, credit, and technical assistance. The scheme has grown to include 140,000 growers, an estimated 9% of all Kenyan small holders. On plots of tea averaging 0.4 hectares, these small holders have come to produce 40% of Kenyan tea exports, itself the country's second largest commodity export (Buch-Hansen and Kieler, 1983).

From the beginning, the KTDA has been run on a commercial basis, neither extracting resources from farmers like many African marketing boards nor relying on support from the public sector. The KTDA has been financed by the Commonwealth Development Corporation, the World Bank, and, recently, other sources. Operating expenses of the KTDA are covered by a fixed cess applied to growers on a per-kilogram basis. Thus, the organization has enjoyed a degree of financial independence unusual among parastatals.

The KTDA has been able to maintain high quality through an elaborate system of control over key points of the production and marketing system. Initially the KTDA regulated the tea quality and farmer participation through control of planting materials. More recently, increasing numbers of growers have been trained in vegetative propagation techniques and are able to maintain their own nurseries. As a result, the KTDA has shifted to greater attention to and control over the tea factories, taking over some and building new ones.

Technical assistance is provided by extension agents who are seconded by the Ministry of Agriculture but receive special training and additional benefits for their work with the KTDA. The extension effort is both intensive, with a farmer-agent ratio of 170:1, and tightly organized, with an average span of control of 4.8. Agents keep "diaries" of contacts with growers and status of the crop which are signed by growers for confirmation. These have been adjusted over the years to provide sufficient information and accountability, without imposing excessive paperwork on agents. In addition, contact

between growers and extension supervisors provides some verification of reports. A parallel hierarchy of grower committees serve to facilitate communication and identify problems at various stages. Each tea factory serves around 3500 growers (1400 hectares) and, although most factories are owned by the KTDA, each has separate accounting systems and is responsible for its own profitability. The inspection system and careful record-keeping allow quality problems to be traced back to the responsible grower(s) (Lamb and Muller, 1982).

Payment consists of a fixed price per kilogram of greenleaf harvested each month (from which the cess is subtracted), plus an annual bonus whose value is tied to the international price of tea. In fact, since the tea of each factory is auctioned separately, the bonus is tied to the value of the tea produced by factory with which the grower is associated.

It is generally agreed that the scheme has improved the standards of living of the growers (see Lele, 1975; Lamb and Muller, 1982; and Buch-Hansen and Kieler, 1982). For example, on the basis of farm-level surveys in the mid-1970s, Buch-Hansen and Marcussen (1982: 28) conclude that "contract (tea) farmers are far better off than the average smallholder in this area." Net farm income (after subtracting the cost of inputs) was 50 to 100% greater among tea growers than the average among all small holders (including tea growers) in the region. They argue that, contrary to the claims of dependency theory, capitalist penetration has not increased "marginalization and proletarianization" (worsening poverty and wage labor). In fact, these are found more frequently in non-project areas. On the other hand, it has been noted that the tea growers are "middle peasants" who have been involved in cash crop production for many years, rather than the poorest farmers.

From the perspective of the KTDA and the government, the project has been highly successful. Recently, financial strains have been caused by soft world demand and several drought years, so effort has been focussed on consolidating the gains rather than expansion. But the project has demonstrated the economic viability, under favorable circumstances, of smallholder production of a classic plantation crop. Contributing to this success are a favorable policy environment, an excellent road network, and the selection of a high-value crop for which Kenya has a comparative advantage. In addition, the structure and management of the KTDA itself has been critical, involving financial autonomy, commercial orientation, strong technical capacity, and institutional innovation to ensure accountability and cost-control at all levels.

Several efforts to replicate the success of the KTDA have not been as successful. Malawi, the second largest African tea exporter after Kenya, introduced a smallholder scheme in 1967. By 1972, around 1300 growers were producing tea on 830 hectares (Pachai, 1973). In Uganda, the use of outgrowers was reported growing in the 1960s, though it still composed less than 5% of the tea area (O'Conner, 1965). Lamb and Muller argue that the "generally poor record" of smallholder tea schemes in South Asia and Africa is due to various institutional constraints imposed on the crop authority.

> The Tanzania Tea Authority, for example, had to take direct responsibility for managing former private tea estates when it was already struggling to meet smallholder planting targets and to overcome resource and management problems. In Uganda, the Tea Growers' Corporation had a much more diverse clientele than KTDA (including very large growers), and less direct control over field operations because of the intermediary cooperative structure. In Mauritius, the Tea Development Authority has become essentially a (heavily subsidized) public employment program, with the people who were intended to be independent growers becoming paid employees (exerting) strong political resistance to any change in their status. (Lamb and Muller, 1982: 25)

On the other hand, Courtenay (1980: 263) predicts that smallholder production of tea in Africa will increase its share of the world market relative to Asia. This forecast is based on the relative youth of African tea bushes, the efficiency of newer processing equipment, and the fact that African outgrowers are "more likely to survive lower profit margins in what seems to be an era of excess tea growing capacity."

In summary, although tea has traditionally been a plantation crop, the KTDA is an important example of the possibilities of smallholder contract production. Given the experience with such schemes elsewhere, there is some question of the replicability of the KTDA's success. But the labor- intensivity of harvesting and the importance of quality control indicate that there is a potential for smallholder contract farming schemes, particularly in Africa. The crucial obstacle is finding the appropriate institutional structure to maintain accountability, financial responsbility, and quality control.

3.8 Contract production of milk

The organization of milk production in less developing countries appears to be less frequently researched than that of many other agricultural commodities. Nonetheless, given the technical characteristics of the commodity, it would not be surprising to find contracting, formal or informal, in milk production. It is a highly perishable commodity

for which processing is more efficiently done on a relatively large scale. Furthermore, the high frequency of transaction would seem to favor the establishment of some regular relationship between buyer and seller. As noted above, these factors contribute to almost universal use of contract milk production in the United States. Several scattered descriptions of contract milk production are available, but the cases mentioned here should not be considered comprehensive, nor necessarily representative.

In Mexico, the government invited Nestle to participate in a rural development program in a settlement zone. Nestles was to provide technical assistance, training, and management in milk production to six newly formed "ejidos" (collectively owned and operated farms). Then, it would purchase the milk, subtracting the value of the inputs supplied. The project began around 1970, but was beset with problems.

> the newly formed communities had little social cohesion and were fraught with dissent and nepotism, and few of the farmers were experienced in milk production. The government was slow in draining the pastures, leading to excessive use of feed concentrates. (Truitt et al, 1981: 21).

Later, the number of farms was reduced to three, production technology simplified, and management streamlined by both Nestle and the ejido administration. By 1978, the remaining three were profitable from the perspective of the ejido. The benefits to Nestle were minimal, however, since the volumes of production were very small, particularly given milk price controls and consequent diversion of raw milk to cheese production. Clearly, the project was not a commercial success for Nestle, though it may have contributed to good public and governmental relations (Green and Hymowitz, 1983).

In India, Hindustani Lever Ltd., a majority-owned subsidiary of Unilever, built a milk processing facility in Uttar Pradesh. At first, the capacity utilization of the plant was only 30% and supplies of quality raw milk were difficult to organize. In the mid-1970s, the company initiated an ambitious rural development program involving cattle breeding, veterinary services, seed production, crop extension, and social services. The motive appears to have been a combination of social responsibility and tax benefits, since legal provisions allow rural development costs to be deducted as business expense.

Starting in six villages, dairy cooperatives were formed, artificial insemination services provided, and technical assistance offered to producers. The milk is assembled daily and delivered to a collection center run by the company. The market is guaranteed and the price scale (dependent on the fat content) is fixed, an arrangment which facilitates credit from commercial sources. In addition, this system reportedly provides

a producer price 25% greater than that previously offered by intermediaries. As of 1983, the program had been expanded to cover 50 villages. The result has been an apparent increase in producer incomes in the project areas (though figures are not available) and greater supplies of raw milk to the plant, now running at 66% of capacity (Karen, 1985a).

Pinar is a member firm of the Turkish conglomerate, Yasar Holding. In 1975, it entered milk production, a field dominated by public corporations. Starting with 9000 farmers, it provided veterinary services, forage seed, and technical assistance. Unlike the public corporations, it paid a fixed price and collected milk seven days a week. "Collecters" assemble all the milk for an assigned region and deliver it to refrigerated collection centers. Collectors are independent contractors, working on a commision, who are hired and supervised by "field representatives." The latter are employees of the firm who receive salary and commission. They are carefully recruited, trained for three months, and provided with technical and administrative manuals. "Inspectors" provide quality control in supervising and advising the field representatives.

As of 1983, Pinar worked with 21,000 farmers. Small farmers (less than ten hectares) provided 68% of the volume, 38 cooperatives provided another 18%, and 155 large farmers contributed 14%. Although data are not available, anecdotal information seems to confirm that the contractual relationship has benefited farmers in the form of greater milk yield and a more stable and profitable marketing arrangement. The company produces around 70 million liters of milk annually, close to 100% of plant capacity, compared to 30% utilization at 36 government plants. Nonetheless, government policy favors the public plants through subsidized credit, monopolization of sales to public institutions, and control over the importation of frozen semen (Karen, 1985a).

However, it should be kept in mind that these cases are larger and more ambitious than most milk contracting schemes. More common are modest systems such as those found in Cali (Colombia) and Recife (Brazil) in which a processing plant (for powdered milk manufacture or for pasturization) will obtain raw milk supplies from a regular network of producers. Each day, the raw milk is collected, and payment is made on the basis of a set price. This contractual relationship may or may not involve input supply, technical assistance, and financing. Even smaller and more informal is the system used for raw milk marketing. It is collected by independent specialized truckers who regularly purchase from the same group of producers and deliver to the same customers, either

homes or small retail stores. This borders on a simple marketing agreement since input supply and technical assistance are not provided (Harrison et al, 1974: 71).

The most frequent problems in milk marketing appear to be the low quality of milk and government control of milk prices. The latter may contribute to the diversion of raw milk to non-milk dairy products such as cheese, the distribution of raw milk (for which costs can be covered) rather than pasterized milk, adulteration, and shortages of milk (see Ariza-Nino, 1985). These controls prevent the establishment of contract systems which can improve the quality and quantity of milk available. This is because the costs of the necessary technical assistance and quality control cannot be covered at the controlled price.

3.9 Contract production of poultry

The poultry (broiler) industry is undergoing rapid transformation in many developing countries. Once dominated by small- and medium-scale farms using traditional breeds and simple feeds, the industry is seeing the emergence of large-scale, technically sophisticated poultry production systems. These units use improved genetic stock (often imported chicks), nutritionally balanced feed, and veterinary technology to control disease. Indeed, because of the suceptibility of chickens to contagious disease, thousands of birds at a time are produced in batches, being raised and slaughtered together. This system of production is very frequently carried out within the context of a contract. The firm supplies high-yielding chicks, specialized feed (accounting for a large portion of the costs of production), and veterinary services. At the end of the production cycle (approximately 50-70 days), the company purchases the birds on the basis of weight and deducts the costs of inputs. The company may be vertically integrated into the slaughtering and dressing functions, or even through to the retail level.

The Peruvian poultry industry is an example of this transformation. In the 1970s, there was a series of boom and bust cycles which left only a few large surviving firms. Feed companies integrated forward into poultry marketing, contracting farms to produce the birds. In addition, poultry farms merged and integrated backward into feed production. These too began to contract out some of the actual production. One large firm established a chain of retail outlets. Since just eight integrated firms now dominate the production of chicken for the urban centers, one might expect some price collusion. In fact, a poultry producer association does meet regularly to set "reference prices."

Nonetheless, the real price of poultry has declined by 50% over the last ten years, making it now cheaper than red meat. Consumption per capita, in turn, has more than doubled over the same period (Gil et al, 1985).

A very similar system outside a Bolivian city is described by Adams (1980). Started in 1968, the firm has come to produce several thousand broilers per month using contract producers who receive feed and technical assistance. A formula price based on a percentage of the current retail price is used.

Likewise, a Jamaican firm started importing broilers in 1958, but soon organized a contract production system.

> Under this system, each farmer was responsible for building the broiler house to company specifications, purchasing the equipment and caring for the chickens during the eight to nine weeks required to bring them to marketable size. The company, on the other hand, would supply day-old chicks, feed, medication and technical services at no (explicit) cost to the farmers. (Freivalds, 1981: 64)

Following the general growth in broiler production (15% per year since 1965), the company has even increased its market share from 23 to 56%. It now contracts 260 growers each with an average of 14,000 birds at any one time. It mixes its own feed (provided to both contractors and others) and hatches its own chicks from imported fertilized eggs. It also has an unusual employee/contractor ownership plan.

In Kenya, the British American Tobacco Company (BAT) has organized a major poultry contracting scheme.

> The company's hatcheries produce over 50,000 chicks a week: of these 15,000 stay on its own farms and the rest go either to the contract growers or are sold to individual farmers. While profitable, the contract scheme is not designed to provide a living for large number (sic) of farmers. After three years of operation there were a mere 20 contract farmers, between them taking 10,000 one-day-old chicks a week. At 7-8 weeks, when the birds weighed 2 kg each, the company brings them to its own slaughter house, where they are processed, packed, frozen, and labelled "Kenchic." (Dinham and Hines, 1984: 109)

Such industries are said to be developing in many African countries (Dinham and Hines, 1984), in Thailand (Siamwalla, 1978; Thosanguan, 1983; Tang, 1985), and in other parts of Asia (Pray, 1985). As is clear from the examples provided, small farmers are not generally contracted for poultry production. In fact, it is possible that rapid expansion of such large-scale schemes may displace small-scale poultry producers. Given the fact that poultry is a high-income consumption good, these schemes may have a negative impact on income distribution, although more detailed data would be required.

3.10 Contract production of fruits and vegetables

It is in this commodity group that one finds the largest number of examples of contract farming. Fruits and vegetables, particularly for processing or for export, have many of the characteristics favoring the use of production contracts.

Much of the literature on fruit and vegetable contracting emphasizes the cases of multinational corporations which export their produce. The examples of this kind of scheme are concentrated near the major markets of the developing countries. Thus, Mexico and Central America have numerous cases of contract production of fruits and vegetables for export to the United States, particularly in the winter months. Similarly, North Africa, Kenya, and some West African countries produce fruits and vegetables under contract for export to Europe. Less well-researched is the phenomenon of contract production of fruits and vegetables for local (generally urban) consumption. In the middle-income developing countries, this may take the form of contract production for both fresh and processed markets. Even the low-income African nations appear to have a relatively strong urban demand for fresh fruits and vegetables, often produced under contract near the larger cities. The patterns of fruit and vegetable contracting in Latin America, Africa, and Asia will be discussed in turn.

3.10.1 Latin America

The examples of contract production of fruits vegetables in Latin America are concentrated in Mexico and Central America. Morrissy (1974) compliled information from various countries indicating that, as of the late 1960s, there were 41 fruit and vegetable "processing establishments" in Mexico, 19 in Costa Rica, and two or three each in Nicaragua, Honduras, El Salvador, and Guatemala (the definition of "establishment" is not clear, though apparently a minimum size was set). In a survey of these firms yielding twenty-four responses, eighteen (75%) used production contracts with independent farmers and six bought their raw materials in spot markets. With regard to types of inputs (seed, fertilizer, herbicides, and pesticides), the average firm supplied 2.2 of the four. A majority (61%) provided inputs on credit, and, on average, the inputs supplied had a value of 17% of the crop value. Almost all the firms (85%) specified both harvesting and delivery dates, reflecting the importance of timing in fruit and vegetable contracting. The contract growers averaged 10 hectares, though at least one firm worked with "thousands" of one-hectare growers.

In general, contractual relationships were most extensive among international firms producing frozen goods and least so among local canners. This was manifested in the frequency of use of contracts, the variety of inputs supplied, the amount of credit provided, and the level of specification of production practices and timing. International firms and freezers also tended to employ larger numbers in the plants, work with larger growers, and be more specialized in their product mix. The author notes that the survey probably over-represented the larger processing firms so that contracting may not be employed by a full 75% of the non-respondents. On the other hand, Mexican and Central American production of fruits and vegetables for the U.S. market has grown rapidly since 1970 so the absolute number of contractors is undoubtedly much greater today.

Four U.S. firms are involved in fruit and vegetable processing in Mexico: Del Monte (R.J. Reynolds), Green Giant (Pillsbury), Campbell Soup, and Bird's Eye Foods (General Foods). Williams (1985c: 142) reports that:

> They all use contract farming as primary sources, with an emphasis on larger, commercial units. They all carry a staff of agronomists, provide technical assistance, and are highly regarded in the rural community.

The largest, Del Monte, produces canned asparagus, peas, sweet corn, and other vegetables, principally for the local market. Around 80% of their raw material needs are met by 140 contract farmers averaging 25 hectares. Direct payroll at the cannery in Irapuato (Guanajuato) and elsewhere is around US$ 1.4 million. Campbell contracts growers to produce vegetables for locally consumed canned soup and exported tomato paste. Although the scheme began with large commercial farmers, problems led to a shift toward the contracting of smaller growers. The tomato paste factory contracts all its raw materials from several ejidos. Green Giant contracts around 30 growers averaging 13 hectares of vegetables each (Williams, 1985e).

Burbach and Flynn (1980: 184), in their critique of multinational corporations in Latin America, condemn the low wages paid to temporary cannery workers, the impact of contracting on the distribution of land and income, and the fact that canned goods are only consumed by the higher-income urban consumers. Williams (1985c) argues that the Mexican experience indicates that "the larger, more commercial farmers turn out to be troublesome, unreliable sources of supply in very few years," but that the firms find it more convenient to deal with small numbers of growers. He also notes that the schemes are hampered by retail price ceilings, government control over input supply, and import restrictions. Williams recommends government support to encourage these firms to contract smaller farmers.

In the production of fresh fruits and vegetables for export to the United States, a highly organized system has developed to provide the necessary coordination between growers and U.S. distributors. Goldberg (1974: 83) reports that around 50 distributors in Nogales (Arizona) handle almost all Mexican fresh vegetable exports to the United States. Some growers have their own distributors and some distributors have direct investments with growers.

> Where the distributor has no ownership interest, he utilizes oral and written contracts with growers in order to ensure supplies. Distributors also maintain close day-to-day communications with growers. Over the years, this system appears to have developed an attitude of mutual trust... (Goldberg, 1974: 83)

The growth of this $30 million trade has been supported by financing from U.S. sources, Mexican public investment in highways and irrigation, and the development of strong grower associations to regulate quality, provide inputs, and control trade. Although the growers tend to be large farmers, Goldberg (1974: 86) argues that "contractual arrangements with small farmers may be preferable for the longer run," due to greater political support for small-scale agricultural ventures.

Central American fruit and vegetable production for export is much less developed. Problems include the cost and infrequency of ocean transport, lack of established relationships with U.S. distributors, quality control, and market information. One example is the efforts of two Guatemalan cooperatives to export cucumbers to the United States. One was contracted by a packer-shipper and the other had a contract with a commission broker in Florida. In spite of the provision of technical assistance, production problems included mineral deficiencies in the soil and lack of experience in harvesting practices. The grading was insufficient leading to large rejections in Florida and consequent excess transport cost. Furthermore, the broker apparently violated the contract, leading to further losses (Goldberg, 1974: 172).

A more successful scheme is the contracting of cauliflower and broccoli by ALCOSA, a Guatemalan subsidiary of Hanover Brands, to be frozen and exported to the United States. Since 1976 the scheme has expanded to incorporate 2300 small farmers. The firm supplies seed, chemicals, credit, and technical assistance, offering a fixed-price contract (varying only with quality). The project has significantly raised incomes and the impact is visible in the affected towns. Greater social stratification occured in one village, but in two others it was the smaller farmers who participated and benefited. Even so, there was a crisis in 1980 when a combination of good weather and unauthorized contracting by field personnel caused a severe surplus. The company was forced to

temporarily discontinue purchases in two towns causing hardships. Among the production zones, the most successful was the town in which ALCOSA contracted with a strong grower cooperative rather than with individual farmers. The cooperative assisted in providing technical assistance, quality control, and administering the accounts (Kusterer et al, 1981 and Truitt, 1983).

Another successful case is the contract production of hot peppers in Honduras for McIlhenny, maker of Tobasco brand sauce. Following several years of unsuccessful efforts to contract individual farmers, the company began to obtain its raw material through an intermediary, "La Fragua," a religious training center. The center had been involved in several agricultural projects as part of donor-funded hurricane relief efforts. The center selected growers, helped distribute inputs and credit, and organized extension services. It also operated small company-built processing plants to inspect, clean, mash, and salt the peppers before loading them in wooden barrels for export. Currently, some 300 growers are contracted, almost all with less than one hectare of peppers. Now that appropriate sites have been identified and farmers trained, another firm has entered the market to purchase peppers (Truitt and Edmunds, 1981). In the last few years, La Fragua has phased out its intermediation role, but the scheme continues (Williams, 1985d).

In the Dominican Republic, the Azua Valley has a number of firms engaged in horticultural exports through contract production. One such firm is the Caribbean Basin Investment Corporation, a small Miami-based firm which contracts around 100 growers to produce melons for export. The growers are primarily beneficiaries of a land reform program distributing plots of 4-6 hectares to landless agricultural workers. The price is negotiated before planting and the contract is quite detailed. At least partly as a result of the growth of the export industry, the residents in the Valley enjoy per capita incomes three times the national average. The investment has also been successful for the firm, which plans to expand into other vegetables (Karen, 1985c).

Another Caribbean example is Southland Frozen Foods which owns a freezing plant in the Dominican Republic and contracts the production of okra, which is frozen and exported to the United States. Around 2500 growers are contracted, averaging slightly over one hectare per grower. Although the scheme was unprofitable for a number of year due to insufficient raw material supply, the plant reached capacity in 1982 and now appears profitable. The company has benfitted from various concessions such as a 20-

year tax holiday, duty-free imports, and exemption from a requirement to sell foreign exchange earnings to the central bank at the official rate (Williams, 1985d).

Other examples of contract production of fruits and vegetables in are briefly described in an evaluation of the operations of the Latin American Agribusiness Development Corporation (LAAD) in Central America (Checchi, 1977). In Guatemala, Conservas de Centroamerica (a foreign-owned firm) organized tomato and peach production with 30 contracts with individual growers and cooperatives. In Nicaragua, IFRUGALASA was contracting fourteen individuals and a 20-member cooperative to produce tomatoes for a tomato paste plant. Both of these rely on small farmers for around 40% of the total raw material supply.

Still further examples are provided by Glover (1983). He describes three cases in Honduras involving melons, tomatoes, and cucmbers. PATSA, a subsidiary of United Brands, produces melons for export using some 90 contract growers, each with less than 10 hectares. It offers technical assistance and a fixed price contract. Although the quality standards are quite strict, the author reports that the growers were satisfied because of the fair enforcement of the standards and the good price offered. On the other hand, the scheme was marginally profitable for PATSA because of under-utilization of the packing house. The author speculates that PATSA may be maintained partly to preserve good relations with the government and the U.S. Agency for International Development (p. 208).

Mejores Alimentos produces a range of tomato products for export to other Central American countries using its own land (60%), contract growers (30%), and spot purchases (10%). Ten contract growers averaging 15 hectares receive credit, inputs, and technical assistance, though there are numerous complaints about the firm. The price is low relative to market prices, the technical assistance is said to be poor, and the reject rate was unaccountably high. Glover (1983: 222) suggests that only medium and large growers tolerate the terms because their deliveries on any one day would depress prices in the small local market. On the other hand, former contract growers have gone on to produce high-quality tomatoes for the local market using their new skills.

The third Honduran example is the Fruta del Sol project, partly financed by AID, producing cucumbers for export. The government hires Stardard Fruit to provide technical assistance and supervise the packing operation, while Fruta del Sol contracts

four cooperatives averaging two hectares of cultivable land per family. This system is credited with revitalizing the cooperatives and increasing the demand for labor in the region, as well as for tranfering technology (p. 239).

3.10.2 Africa

There are fewer published cases of contract production of fruits and vegetables in Africa. In part, this may be attributed to the lesser importance of fruits and vegetable production in the lower-income countries of Africa, although it appears that the region is also less well researched than Latin America in this respect. A number of recently established contract farming schemes are reported by field researchers but have not appeared in published accounts. Clearly, more research is called for in this area.

As in Latin America, there are a number of schemes producing vegetables for export, particularly in those regions relatively close to the high-income consuming countries. Fresh fruit and vegetable exports from the North African countries to Europe are important, but little information is available concerning the organization of production. Kenya, favored by a good road network, excellent air connections to Europe, and a relatively good investment climate, has attracted fruit and vegetable export schemes as well. Kenyan exports of fresh fruits and vegetables grew from 13,000 tons in 1975 to 21,000 tons in 1979, 30% of which were produced by small-scale farmers.

One large trading company, the Corner Shop, deals in fresh produce both for the local market and for export. Although much of the purchasing is apparently done on the open market, it has been trying to organize horticultural production. In 1975, an attempt to contract 10,000 tons of potatoes for export failed because of poor seed and low quality produce. Later, an effort to produce French beans failed because of labor shortages. And in 1979, a new attempt to contract bean production appears to be more successful. Around 3000 growers are organized into groups of 100-200 which, in turn, are grouped into cooperative societies to facilitate input distribution and management.

> Each farmer produces about 200 square meters with beans every two weeks throughout the growing season, using a standard package of 2 kilograms of seeds and 4 kilograms of fertilizer. (FAO, 1982: 47)

The produce is assembled by the cooperative society and delivered to a canning plant. The canning company pays an amount which is divided among the farmer (70%), the society (7%), and the Corner Shop (22%). Government cooperation, particularly in contributing extension agent time, has been critical. Although there are problems with

low yields and loan recovery, the Corner Shop plans to expand the scheme to include 6000 growers (FAO, 1982).

Kenya also exports significant quantities of dehydrated vegetables to Europe. The Pan African Vegetable Products, formed by a West German firm with equity interest by various banks, exports 36,000 tons of dehydrated vegetables (although it is not clear from the source, this figure seems to refer to the weight before dehydration). Included are carrots, turnips, beans, leeks, potatoes, dill, cabbage, and celery. The firm produces half the volume on 320 hectares of its own irrigated land and contracts 5000 growers for the other half.

> These growers depend totally on the company: it approves and provides seeds, pesticides, and herbicides to listed growers on a credit basis, against the crops being grown for the factory. Over 90 per cent of the factory's production is exported and it runs all year round, working six days a week, 24 hours a day, employing between 450 and 650 people, depending on the season. (Dinham and Hines, 1983: 31)

The authors do not indicate what the farm-level impact of the scheme has been, nor the details of the contractual relationship.

There are also several West African examples of contract production of vegetables for export. Exports of fresh produce from Senegal rose from 100 tons in 1965 to 10,000 tons in 1977, then fell to around 5000 tons as a result of the collapse of Bud Senegal, a large-scale "vegetable plantation" scheme. More durable has been the production of vegetables, principally green beans, by groups of small farmers under contract to export trading companies. Around 15 such companies, each exporting between 100 and 1000 tons annually, provide credit, seed, fertilizer, and other inputs to contracted growers. Since the growers are mostly illiterate, the contracts are verbal and not legally enforceable. On the other hand, enforcement is facilitated by the organization of growers into groups, with a "sector chief" responsible for distributing inputs, supervising production, and monitoring contract compliance. Since the group's contract is at risk, social pressure among growers presumably plays a role.

Soex Horticultural Export Enterprise is one of these Senegalese trading firms. It contracts with 22 groups representing 600-700 growers producing an exportable volume of 600 tons per year. The gross revenue averages US$ 570 per producer family per year. An FAO report emphasizes the importance of good management, careful grading, and the absence of government control over the fresh produce market (FAO, 1982).

These Senegalese export firms are said to face severe competition from Kenya, Morocco, Burkina Faso, Niger, Cameroon, and Mali. Although published information on the organization of these schemes is scant, researchers with experience in the region report the rapid growth of contract production of vegetables in Burkina Faso and Mali. In these countries, vegetables for local consumption and for export are grown under contract along the river near the capital city. It seems likely that exports from the other countries also involve contracts between growers and export trading companies.

There are several examples of contract production of vegetables for processing in Africa. One of the more widely cited, though not particularly successful, examples is the scheme of Cadbury to contract tomato production in Nigeria. Tomato paste for a popular locally-consumed sauce had been imported, but in 1969 the government placed a 100% import tariff on the paste. Cadbury built a processing plant and, with the participation of an FAO advisor and the government, established a system to obtain tomatoes locally. Eventually, 960 growers were contracted to produce 128 hectares of tomatoes. The village headmen acted as intermediaries in the scheme.

Numerous problems resulted. First, the government support in the areas of fertilizer distribution and extension was so unreliable that the company had to assume these functions. Second, the prices offered were generally lower than prices in the local market, contributing to substantial "leakage." And third, favoritism and corruption on the part of the headmen reduced the interest of the growers. A survey of 240 growers found that trust and respect of the leader was negatively correlated with leakage. The most successful villages were those in which the organizer was chosen by, or at least trusted by, the participating growers. As a result of these problems, the plant was operating at less than 30% capacity, and, as of 1976, the future of the project was in doubt (Morss et al, 1975; Agbonifo and Cohen, 1976). On the positive side, the project increased incomes of participants significantly (50% by one estimate), diffused tomato production technology, and stimulated an active fresh tomato market in the region. Truitt (1981: 37) reports that the project was replicated elsewhere in Nigeria by another firm.

The Mazenod cannery in Lesotho was funded by the United Nations and other donor agencies to can asparagus for export to South Africa and Europe. The scheme contracted 240 growers, providing them with extension services and inputs. The cannery, operated by the government, has been unprofitable in spite of considerable donor assistance in

management and other areas. A U.N. evaluation team made various recommendations including expansion of the plant. The U.N. Capital Development Fund has since provided a grant of US$ 1.0 million for this purpose.

Contract farming is said to be used by several agro-industrial firms in Zimbabwe, both for the large urban market in the country and for export. Campbell, for one, contracts growers to produce vegetables for processing. A United Nations study (cited in Dinham and Hines, 1984: 31) identifies fruit and vegetable processing investments by 33 leading food processng firms in Angola, Benin, Ghana, Ivory Coast, Kenya, Liberia, Nigeria, Senegal, Tanzania, Uganda, Zambia, and Zimbabwe. Presumably, other processing activities have been initiated by other firms or mixed enterprises. What is not known is how many of these use contract production for their raw material supplies.

Although the prospects for fruit and vegetable processing in the developing world are said to be good, a recent FAO report cautions that:

> a very considerable number of the fruit and vegetable processing plants set up in African countries have failed. This was due to: 1) Overestimation of prospective demand 2) Optimistic assumptions regarding raw material supply, lack of suitable varieties for processing; insufficient incentives to farmer suppliers; lack of supporting services such as extension and credit. 3) Problems of management, in particular marketing management. (FAO, 1984: 119)

These problems result from unrealistic feasibility analyses, lack of experience, and politically determined location decisions, among other factors. The report argues that:

> Governments are pressed to promote processing as an outlet for surpluses to fresh market requirements. However, the best raw material location for a processing plant is one where growers have no easy alternative outlet, are free of credit ties to other traders and will accept direct production/marketing contracts which permit an effective control of variety, quality and time of delivery. (FAO, 1984: 128)

Thus, contract farming may facilitate raw material procurement for fruit and vegetable exporters and processors, but it cannot compensate for inadequate feasibility studies or uneconomic decision-making.

3.10.3 Asia

Contract production of fruits and vegetables is probably more prevalent in Asia than in Africa because of the demand for high-quality produce and processed foods in the large, relatively high-income urban areas. At the same time, published information on these cases is sporadic. For example, the surveyed literature contained numerous case studies for Thailand and yet only one for all of India (FAO, 1982).

One of the countries which most relies on contract production of fruits and vegetables is Taiwan (Menegay, personal communication). Although the literature on contracting in Taiwan is scant, it appears to be concentrated in the export sector. The use of contract farming in Taiwan is described as follows:

> Due mainly to unstable market supply, Taiwan's major export farm products, such as mushrooms, asparagus, bamboo shoots, etc., are subject to excessive price fluctuation which often cause financial loss to the producer and the processing firms alike. To ameliorate this situation, systems of contract farming and profit sharing for export crops have been instituted. These systems provide for planned production to ensure adequate supplies of raw materials for the processing plants and the establishment of stabilization funds to safeguard the farmers' economic interest. (Fu-shan, 1983: 29)

In Thailand, contracting is used in the large canned pineapple export industry. Since the construction of the first cannery in 1967, Thailand has grown to become the largest exporter in the world. Although pineapple is generally a plantation crop because of the importance of uniform marturation and precise scheduling of harvest, there is apparently some contracting of pineapples in Thailand. Siamwalla (1978: 46) notes that:

> Some of the firms in the pineapple industry did try at first to mimic the methods of the sugar industry but had disastrous results. They tried to bind the growers by contract, by giving them loans and even by teaching them new methods of production. The rate of default was, however, astoundingly high, and this particular mode of procurement has been given up.

He attributes this problem to leakage into the parallel fresh market with which the cannery must compete. At the same time, Thosanguan (1983) reports the continued use of contract pineapple production in Thailand. He states that growers receive inputs and technical assistance and that a formula price based on the fresh market is used. The factory arranges "less congested lines when (growers) bring in their fruit" (p. 9).

Menegay (1985) provides an insightful comparison of five Thai firms involved in contracting vegetables for processing. The first is a large joint venture between an Israeli investment group and Thai interests established in 1972. It was to produce 29,000 tons of tomato products, 1000 tons of dehydrated vegetables, and 20,000 tons of other processed fruit and vegetable products. The procurement unit would provide the almost 100,000 tons of raw material required yearly through contracts with growers. Extension agents were hired to recruit growers, provide technical assistance, and organize the assembly of raw materials. Each agent of the 80 agents had an oral contract with the firm and written contracts with an average of 50 individual farmers (4000 in all).

It almost immediately suffered a series of problems. First, the agents were young college graduates with only theoretical knowledge of horticultural production practices. They were not able to earn the confidence of the growers and came to spend very little time in the villages. Second, the written contracts were alien to the growers and involved considerable paperwork, yet were no more enforceable than oral ones. Third, the program was oversold relative to the amount of production assistance the firm could realistically provide. The result was delayed planting, low yields, leakage to fresh markets, inferior quality, and uneven supplies to the factory. Facing severe economic problems, the firm switched to a smaller, locally-recruited staff of "promoters" who would take responsibility for credit and raw material assembly. Unfortunately, bad weather caused the firm into bankruptcy before the new system could be tested (Laramee, 1975; Menegay, 1985: 243).

A similar, though more successful, evolution of procurment systems was followed by one of the older and more established canneries in northern Thailand. It was established in the early 1970s and produces jellies, juices, sweetened fruits, canned goods, and sauces from a variety of commodities. Originally, the factory provided credit, inputs, and technical assistance directly to the growers through salaried agents. Following several years of losses due to high outreach costs and low product quality, the firm instituted the "promoter system," involving the selection and training of local intermediaries to provide the raw materials of a certain quality and quantity, on a defined schedule, and at a fixed price. The promoters, working on a commission basis, are responsible for organizing production and delivery in their region. They provide seed, fertilizer, plowing services, credit, advice, and transport services, as necessary depending on local conditions. The idea is to make use of the promoters' knowledge of the local people, language, traditions, and production problems.

> In other words, the promoter had a natural perception of and linkage to the social-cultural situation and production conditions unique to individual villages. Concerning reliability, as a local resident the promoter had to live and work near the farmers and thus was known to and generally trusted by them. (Menegay, 1985: 230)

Furthermore, because the promoters were well acquainted with the contract growers, they could forgive input loans to growers with unavoidable crop failure, thus providing an informal kind of partial crop insurance.

Two successful tomato processors in northeast Thailand grew out of fresh tomato contract buying operations in which they provided seed on credit to growers and shipped

the produce to Bankok. As the local supply grew, they invested in tomato paste factories. They continue to rely on oral contracts with growers, with prices determined by the market, subject to a minimum price. When fresh tomato prices are high, they act as traders, shipping fresh tomatoes to Bankok markets. During the peak season glut, prices fall to the minimum price (at which the plants are profitable) and the tomatoes are used to make paste. Around 1000 growers are contracted under these two operations (Menegay, 1985: 260).

A third tomato processor adapted to the competition from the fresh market in a different way. This firm found it could not compete with the fresh market in procuring raw materials from an area long involved in vegetable production. It decided to contract more isolated growers who did not have this option and were more content with the prices offered. Unfortunately, the "guaranteed" minimum price was often not respected during the peak season. The declining reputation of the firm was making procurement increasingly difficult, and "knowledgable sources" predicted the failure of the firm if it did not change its approach. On the other hand, Menegay (1985: 275) notes that because of the plant's isolation from consuming markets, it was only marginally profitable and had few realistic alternatives to this kind of behavior.

The final contract farming example described by Menegay (1985) focusses on the operations of a large and successful promoter for a medium-size cannery. The promoter, a dynamic woman who is assisted by family members, has a written contract with the plant and oral contracts with local representatives. The latter, in turn, have oral contracts with individual growers. The author emphasizes the importance of developing and maintaining the trust of the growers. At one point, the management of the plant wanted to pay a price less than that contracted.

> When the lady manager refused to agree to this practice, the factory refused to accept the raw material. Yet, she had to pay the farmers the agreed price and accept the loss of a few hundred thousand baht (at least $25,000) in order to keep her reputation... Later, her strenuous activities to rectify the irregularities of that particular set of managers was said to have led to their dismissal and the reinstatement of her working relationship with the original management staff.

Here again, intimate knowledge of the production situation and a strong financial position allowed her to forgive debts in the event of crop failure, thus improving her ability to recruit growers.

There is no obvious reason to think that Thailand has more intense activity in fruit and vegetable contracting than other Asian nations with similar levels of income. It

seems more likely that the larger number of case studies from this country is due to the fact that a number of studies happen to have focused on this topic in Thailand. Thus, it seems clear that there are many cases unstudied and that the list provided here should not be considered exhaustive or even representative.

In summary, fruits and vegetables are often contracted, particularly for processing and for export. This is because they tend to 1) be perishable, 2) require carefully scheduled deliveries, either to allow maximum use of a processing plant or to ship during an export "window," 3) have important quality differences, 4) have high income-elasticities, so that demand increases must be communicated to growers, and 4) require intensive input of labor and careful husbandry. However, not all fruits and vegetables fit this description. Pineapple, for example, is generally produced on plantations and contract production schemes have not been very successful.

The cases described demonstrate that the success of fruit and vegetable contract farming schemes depends on several factors. First, the firm must create an incentive structure to ensure quality control. This entails a combination of field-level supervision and post-harvest grading. Second, outreach costs must be minimized. In several successful schemes, this was accomplished by using locally-recruited intermediaries who organized production and assembly on a commission basis rather than as a salaried agent. Thus, these "promotors" have an incentive to be innovative and reduce costs to the degree possible. Third, fruit and vegetable contracting often must compete with local fresh markets. One solution is to combine fresh produce marketing operations (when the price is high) and processing (when the price is low). Furthermore, the use of group contracts and local people to act as intermediaries reduces the likelihood of leakage.

3.11 Contract production of other commodities

The above review covers the commodities most frequently found in the literature on contract farming in less developed countries. There are, however, other crops for which less detailed information is available. The lack of reported cases may reflect the fact that they are only occasionally contracted, while other commodities may simply be under-researched. In any case, it is worth briefly mentioning several other commodities involved in contract farming schemes.

The Compagnie Francaise pour le Developpement des Fibres et Textiles (CFDT) and its various subsidiaries are involved in contracting small farmers in francophone West Africa to produce cotton. Seed, chemicals, and technical assistance are provided to the contracted growers and a fixed price is set. The organization of the schemes and degree of government involvement appears to vary among the countries (Lele, 1975).

In several countries, particularly Colombia and Kenya, the cut flower industry has expanded rapidly. Researchers familiar with these systems report that the flowers are produced by export firms and by contracted farmers to be air frieghted to high-income consuming regions such as the United States and Europe. The extreme perishability of cut flowers means that coordination is essential, hence the rationale for contracting.

In some cases, oilseed production is contracted by an oil extraction plant to ensure a reliable and even supply of high-quality raw material. This is particularly common when a plant requires an unusual oilseed or one not traditionally grown in the area. Thus, for example, East Africa Industries contracts around 1700 small farmers in Kenya to produce sunflower seed for cooking oil (Knudson, 1984; Williams, 1985d).

Most less developed countries with active seed industries rely on contract production for most crops. Private seed companies in Brazil, Colombia, Kenya, Zimbabwe, India, Thailand, and the Philippines contract specially trained growers, providing them with the "foundation seed" and inputs. Seed production is generally supervised by the contracting entity to ensure that the final product is healthy and varietally pure. Government seed programs often attempt to produce seed on research stations or large state farms. While this is necessary for the early generations of seed, producing commercial seed on state farms has often resulted in insufficient quantity, low quality, and high costs. Following a disastrous experience with a large seed farm in Indonesia, the World Bank now designs all its seed projects to rely on a system of contract producers (see Minot, 1985). Given the importance of quality control and the fact that seed must be processed (dried, cleaned, and treated), it is not surprising that contracting is a favored method of production.

It is worth noting that, with the exception of three small rice contracting schemes in Central America (Checchi, 1977), there are virtually no reported cases of contract production of food grains. This follows the pattern found in the United States where only 2% of food grains are contracted.

IV. SUMMARY, CONCLUSIONS, AND HYPOTHESES

As mentioned above, the available theoretical and empirical literature on contract farming in less developed countries is somewhat limited, of varying perspectives, and probably unrepresentative. Drawing conclusions from this literature is risky, but some patterns are consistent enough to justify generalization. The first subsection presents a summary of the descriptive findings of this study. The second reviews some tentative conclusions concerning the evaluation of contract farming from various perspectives. And the third subsection offers some hypotheses for further research.

4.1 Summary

Contract farming is best seen as a form of vertical coordination since it contributes to the harmonization between adjacent stages in the commodity marketing channel with respect to the quantity, quality, timing, and location of supply and demand. As such, a contractual relationship between grower and buyer may be seen as an alternative to 1) an open market relationship and 2) the organization of production and marketing functions within the same firm, such as plantation-processing plant complexes.

Spot markets are efficient when the good is homogeneous, there are many small buyers and sellers, and there is perfect information. However, agricultural markets sometimes suffer from wide variation in product quality, monopsony, and various information problems. In such cases, "tighter" forms of coordination such as contracting and vertical integration may be favored.

Vertically integrated plantations are favored when special quality requirements must be met, when local growers are unfamiliar with the production technology, when supplies must be carefully scheduled, and when other kinds of marketing information are more available to the processor than local growers. On the other hand, if the economies of scale are large for one marketing function, say processing, but small for agricultural production, then integrated production is not very efficient. In this case, contractual relations may provide some of the coordination mechanisms but allow production to be carried out at a more efficient scale.

Contract farming accounts for around 22% of the value of agricultural production in the United States and a smaller but growing proportion of the agricultural product in

less developed countries. This expansion is based largely on the growth in domestic urban demand for processed and high-quality goods and the growth in exports.

The extent of contract farming varies greatly among agricultural commodities, being the greatest with high-value perishable commodities which are processed such as vegetables, fruits, milk, poultry, tobacco, and many traditional tropical exports. Conversely, it is least common for basic food grains which are not processed.

The extent of contract farming also varies among countries. The published cases of contract farming tend to be concentrated in Mexico, Central America, Kenya, and Thailand, though there are examples in a wide range of less developed countries.

Many contracts involve the provision by the buyer of agricultural inputs to the farmer. Seed and fertilizer are the most common, but other chemicals, pest control services, machinery hire, and harvesting services may also be supplied.

The cost of these are subtracted from the crop payment at harvest, either implicitly through a lower crop price or explicitly. Although production contracts are often associated with the pre-planting determination of crop prices, in fact, formula prices and negotiated prices are probably common.

Contract farming often involves technical assistance as well. The extension and supervision effort is generally quite intensive with farmer-agent ratios of less than 200:1. Many of the more successful schemes incorporate locally-hired paraprofessionals at the field level to take advantage of their knowledge of local farming patterns, constraints, and cultural factors. These may work as salaried employees or on a commission basis.

However, there is great variation in the contract provisions, the size of farmers contracted, the type of technical assistance and services provided to growers, and the bargaining relationship between the buyer and the growers. For any one scheme, these variables depend primarily on the commodity produced and its final market, and to a lesser degree on the existing land tenure system, the technology of processing, the policy environment, and other factors. Thus, it is useful to examine the patterns of contract farming by commodity.

Although bananas are often produced by integrated plantation/export companies, the use of independent contracted growers has expanded since the 1950s, partly under political pressure and partly to reduce labor costs. Generally, the contract growers are large farmers due to economies of scale in production, but there are examples of successful cooperatives of small farmers which produce under contract with substantial support from the company.

Tobacco, being very labor-intensive and requiring careful husbandry, is, in many cases, produced by thousands of small growers under contract. Firms like the British American Tobacco Company insist on plots smaller than one hectare to maintain quality. Technical assistance is intensive, and focusses on both production practices and some processing, such as curing and baling.

Rubber and oil palm are produced on plantations, by small holders (contracted or not), and in nucleus estate/smallholder schemes. Many of the latter are public settlement projects involving several thousand outgrowers per scheme. Due to the perishability and bulkiness of oil palm fruit, production must be clustered around the processing plant and deliveries carefully scheduled. Rubber is less perishable but vertical coordination serves to ensure high quality and transfer technology regarding local-level processing. There is a trend toward greater farm-level processing, assisted by the contracting entities.

For sugarcane, there are economies of scale in production and even more so in milling. Each mill may be supplied by one or several plantations and sometimes small outgrowers or contracted tenants. Again, perishability and bulkiness of the cane requires geographically concentated production and careful scheduling.

Although tea is viewed as the ideal plantation crop, there are examples of smallholder contract production, particularly in Africa. The most well known scheme is the Kenya Tea Development Authority with its 140,000 growers. Other such schemes have been attempted though none have succeeded on the same scale. Intensive technical assistance, careful grading, and rapid assembly are keys to successful tea contracting.

Poultry (broiler) production is increasingly carried out under contract. A firm contracts growers, providing them with chicks, feed, veterinary services, and credit. This system can lead to concentration of ownership and displacement of small producers,

though it can reduce poultry prices significantly. The growers tend to be large, with tens of thousands of birds.

Milk production is often contracted because of the need to assure regular supplies of the perishable commodity. There are some examples of firms providing technical assistance and inputs as part of the contract though it is not clear how common this is. Milk pricing controls often constrain the development of improved marketing systems with small holders.

Fruit and vegetable production is frequently contracted, particularly when the commodity is for processing or for export. This is because of the labor-intensivity of production and the importance of quality control. In addition, fruits and vegetables for processing must be carefully scheduled to assure stable supply to the plant, while exports must reach the market during a seasonal period of shortage. There are numerous examples in Mexico, Central America, northern Africa, Thailand, and Taiwan, among others. They involve contract production of tomatoes, peppers, melons, green beans, and cucumbers. Leakage to fresh markets may be a problem for the buyer, depending on the product, and contract violation occurs on the part of the buyer as well. However, successful schemes are generally based on institutional innovation and mutual trust between contracting parties.

4.2 Conclusions

Contract farming is generally successful in supplying credit, inputs, technical information, and market information to growers. In doing so, it transfers production technology to the growers as well as providing, in many cases, a more secure market outlet.

In almost all cases for which the data are available, the implementation of contract farming schemes has resulted in significantly higher incomes for participating growers. Furthermore, there is often a long waiting list of growers interested in participating.

The literature supporting contract farming tends to overlook several limitations. Perhaps the most important one is that the impact of contract farming, though intense, tends to be relatively narrow. Even in Kenya, with a wide range of such schemes, only 12% of the small holders are contract growers (Buch-Hansen and Kieler, 1983: 21). While

there is probably scope for expansion of contract farming as an institution, it is probably not appropriate for the production of basic food grains. Thus, this system should not be considered the basis for an entire rural development strategy, but rather an important component in improving agricultural production and marketing.

Another limitation is that greater incomes are not always translated into improvements in standards of living broadly defined to include nutrition, education, and health. Although the impact of higher incomes is generally positive, some schemes involve a shift from subsistence food production to commercial production. Although not harmful in itself, this is sometimes combined with poor choices regarding food purchases and/or inequitable distribution within the household. Men are assumed to be the growers and heads of household by the company and receive the crop payment. In cultures where men and women have separate budgets and spending responsibilities, such as in much of Africa, women are generally responsible for care and feeding of the family. Thus, payment to the men may bias household purchases away from food and health related items. In several cases, income from the schemes has made possible excessive consumption of alchohol. However, it should be noted that this problem can occur with any income-generating project and is not a problem unique to contract farming.

The literature critical of agribusiness argues that contract farming is simply a method of obtaining cheap labor and of "transferring" risk to growers. This is an oversimplification and unnecessarily pessimistic for several reasons.

First, lower implicit wages are only one reason for contracting as opposed to plantation production: improved labor productivity, dispersion of production zones, and reduced investment risk are also factors. To the extent that the lower cost of labor is an incentive, this tendency has a positive equity impact since the firm is (indirectly) employing precisely those workers who have the poorest alternate employment opportunities.

Second, with regard to "transferring" risk, it is important to note that the distribution of risk is not a zero-sum game. A contract may reduce (or increase) risk for either or both parties, depending on the details of the case and the alternative to which it is compared. For example, fixed price contracts reduce gross revenue variability for the grower (compared to spot sales) when market price variation is due to shifts in demand rather than in supply. On the other hand, they reduce buyer risk (compared to

spot purchases) when market raw material prices are unrelated to final product prices. These are not mutually exclusive. In any case, one would expect any increase in risk bearing by growers to be compensated by greater average returns; otherwise, the grower would be reluctant to contract.

Contracting firms are also depicted as abusing their monopsony position and violating contract provision in order to maintain their large profit margins. It is true that the literature provides numerous examples of conflicts between buyer and growers, often related to the quality control and grading practices. However, this argument ignores the fact that such behavior is generally not sustainable for annual crops grown by owner-operators: growers will withdraw from the scheme within a year or two if they find the returns insufficient. In fact, when parallel markets for the commodity exist, leakage is generally a serious problem unless the company pays a price superior to the market price. Long-lasting contract farming schemes almost always involve a deliberate attempt by the company to develop mutual trust between itself and its growers. Finally, it should be noted that high profits are not a forgone conclusion: the literature provides abundant examples of marginally profitable schemes and outright failures.

Another debated issue is the size holding preferred by contracting firms. Critics of agribusiness argue that firms tend to contract only large farmers, whereas proponents emphasize the cases where small holders are contracted. In fact, the tendency depends greatly on the commodity. Sugarcane, bananas, and poultry appear to have significant economies of scale, but tobacco, tea, and many vegetables are generally contracted out to quite small farmers. For each commodity, however, there is a range, as indicated by sucessful smallholder schemes producing sugarcane and bananas. Contracted small farmers require expensive outreach efforts, for credit, training, and inputs. But their advantage over larger farmers is greater motivation, lower implicit labor costs, and less risk that they will come to market their own produce.

The geographic patterns of contract farming also vary depending on the commodity. Bulky crops such as sugarcane and oil palm tend to be produced quite close to the processing plant, whereas higher-value commodities such as tobacco, tea, and vegetables tend to be more dispersed. It is not clear whether central or remote locations are preferred. Central locations offer better access and lower outreach costs, but land and labor are more expensive and leakage is more likely to be a problem.

4.3 Hypotheses

Contract farming for the domestic market is more likely where there are large, relatively high-income urban areas.

Contract farming for the export market is favored by proximity to these markets and good transportation networks.

Contract farming is favored where price controls and market regulation are minimal. For export commodities, contract farming is favored when the currency is not overvalued relative to foreign currencies.

The existence or possibility of government market regulation and government investment in productive or commercial enterprises acts as an inhibitor to the establishment of private contract farming schemes.

Contract farming is more likely to be accepted by growers if they have alternate market outlets for the commodity and if there is no nucleus estate also supplying the raw material since this will improve their bargaining position and reduce the risk of monopsony abuse.

Contract farming is more likely to be accepted by buyers if growers do not have alternate market outlets for the commodity and if there is a nucleus estate to supplement contracted production. However, fruit and vegetable canneries, particularly publicly-financed ones, are often based on unrealistically low estimates of alternate market prices. Successful adaptation requires effective enforcement of contracts and/or accomodation to market prices.

Fixed-price contracts are more acceptable to growers when yields are relatively stable, such as in areas with dependable rainfall or irrigation, but the market is unstable or unpredictable. Fixed-price contracts are more desirable by buyers when the buyer exports, buys from a remote market, or sells to a remote market. In other words, buyers are reluctant to offer fixed price contracts where raw material and final good prices are closely related.

The problems of arbitrary or variable rejection rates is most likely to occur in the first few years of a scheme. After several years, growers will have better knowledge of expected net return, after learning about standards and company procedures in applying them. Furthermore, after the first few years, buyers will either refine grading practices or, if net returns to growers are insufficient, be forced out of business.

With inexperienced growers, detailed instruction and supervision may be necessary and growers should be informed of their labor and financial obligations. With experienced growers, it is often better to provide economic incentives for performance and let growers decide best way to achieve it. Again, after first few seasons, growers will have better knowledge of obligations and company practices, and thus of the net return relative to alternate crops.

Contract growers will be more concentrated around a processing or transportation center if the commodity has a low value/bulk ratio, the commodity is frajile, timing is very important, or there are large economies of scale in processing. Thus, small economies of scale in processing and high value/bulk ratios (tea) allow dispersed production, while large economies of scale and low value/bulk ratios (sugarcane) require concentrated production.

The returns of land are increased to the extent that contract farming raises the income-producing potential of the land. This may occur through the introduction of a new crop or yield-increasing technology. In addition, this can be the result of the construction of a processing plant in the region, particularly if it is costly to transport the raw material and supplies must be obtained close to the plant. In this case, land owners or those with traditional usufruct rights benefit, but not necessarily renters, sharecroppers, or hired laborers.

The returns to labor are increased to the extent that contract farming improves labor-productivity through the introduction of new technology or production practices or through the creation of specialized farm-level capital. If the new skills are limited to the contracted growers, it is likely that the return to their labor will increase. If labor productivity is improved for anyone working on the farm, it may result in greater use of hired labor. This effect is more likely to benefit hired laborers (through employment generation) and other landless farmers.

There is widespread use of informal contractual relations between growers and buyers which is not reported in the literature because it does not involve large firms. This contracting is probably most common with perishable and specialty crops. These contracts are likely to employ formula prices rather than fixed prices.

Contract farming has the greatest development impact when the crop is labor-intensive, when it does not completely displace home food production, and when intra-household distribution is equitable.

There is scope for expansion of the extent of contract farming, mainly within the commodity groups identified here, through policy reform.

ANNEX 1: INVENTORY OF CONTRACT FARMING SCHEMES: AFRICA *

COUNTRY/CROP	CONTRACTOR(S)	NUMBER OF GROWERS	COMMENTS	SOURCE(S)
Cameroon				
oil palm	SOCAPALM	250	State nucleus estate	World Bank
oil palm	SOCAPALM	250	State nucleus estate	World Bank
rubber/palm	CAMDEV	250	State nucleus estate	World Bank
Ivory Coast				
oil palm	12 schemes	7000	State and private nucleus estate	World Bank, Lyman
rubber	SAPH	700	State nucleus estate	World Bank
vegetables	various	-	-	Buch-Hansen and Marcussen
pineapples	various	-	-	Buch-Hansen and Marcussen
Kenya				
sugarcane	Mumias Sugar	23000	Mixed, small holders, local demand	Allen; Williams and Karen
sugarcane	2 schemes	7000	-	Allen
tea	K Tea Dev Auth	140000	State, small holders, for export	Lamb and Muller, Buch-Hansen
tobacco	Brit Am Tob	6400	Private, small holders	Buch-Hansen
poultry	Brit Am Tob	20	Private, large growers, local demand	Dinham and Hines
sunflower	E. Africa Ind	1700	Private, for oil, local demand	William and Karen; Knudsen
spices	Kalamazoo Spice	-	Private, small holders, for export	Lane Holdcroft
vegetables	Corner Shop	3000	Private, small holders	FAO (1982)
vegetables	Panafrican Veg	5000	Private, dehydrated for export	Dinham and Hines
Lesotho				
asparagus	GOL/UNDP	2500	State, for export, problems	Truitt; Green and Hymowitz
Malawi				
tea	S Tea Auth	1300	State, small holders, like KTDA	Pachai
Mali				
vegetables	Fruitema	-	Private, for export fresh	Staatz
Nigeria				
tomato	Cadbury	960	Private, sauce for local demand	Agbonifo and Cohen; Morss et al
tobacco	Nig Tob Co	7000	Private, small holders	Morss et al
oil palm	GON	-	State nucleus estate	World Bank
rubber	GON	-	State nucleus estate	World Bank
Senegal				
vegetables	Soex	650	Private, fresh export, small holders	FAO (1982)
vegetables	14 firms	-	Private, fresh export, small holders	FAO (1982)
Sudan				
tobacco	Haager	2300	Private, local demand, small holders	Williams and Karen
coffee	Haager	100	Private, local demand, small holders	Williams and Karen
Swaziland				
sugarcane	Vuvulane	263	State, smallholder settlement	Williams and Karen; Tuckett
Tanzania				
tobacco	Tan Tob Auth	15,000	State, small holder schemes	Boeson and Mohele
Uganda				
sugarcane	Mehta	733	Was private in 1970, mainly estates	O'Connor; Smith
tea	various	-	Was private in 1970, mainly estates	O' Connor
Zimbabwe				
vegetables	Campbell	-	Private, for processing	Eicher

* The sources are listed in the bibiliography. GO refers to "government of."
CDC refers to the Commonwealth Development Corporation.

ANNEX 2: INVENTORY OF CONTRACT FARMING SCHEMES: ASIA

COUNTRY/CROP	CONTRACTOR(S)	NUMBER OF GROWERS	COMMENTS	SOURCE(S)
India				
milk	Unilever	-	Private rural development program	Williams and Karen
strawberrry	Reki	-	Private, local urban demand	FAO (1982)
Malaysia				
oil palm	FELDA, etc.	+60,000	State nucleus estate settlement	Bunge; Phillips; Courtenay
rubber	FELDA, etc.	-	State nucleus estate settlement	Bunge; Courtenay
Indonesia				
oil palm	CDC, GOI	-	State nucleus estates	Courtenay; World Bank
rubber	CDC, GOI	-	State nucleus estates	Courtenay; World Bank
Papua New Guinea				
oil palm	CDC, Higaturu	1400	Mixed nucleus estate	Williams and Karen
Philippines				
banana	various	-	Private, large growers, for export	Glover
Taiwan				
vegetables	various	-	Agricultural exports contracted	Fu-shan
Thailand				
poultry	various	-	Private, large growers, local demand	Siamwalla; Thosanguan
sugarcane	various	-	Private, some small growers, export	Siamwalla; Thosanguan
tobacco	Adams etc.	40,000	Private, small holders	Williams and Karen; Siamwalla
vegetables	various	-	Private, small holders, processing	Laramee; Menegay
pineapple	various	-	Private, principally for export	Siamwalla; Thosanguan
Turkey				
milk	Pinar	21,000	Private, small holders	Williams and Karen

ANNEX 3: INVENTORY OF CONTRACT FARMING SCHEMES: LATIN AMERICA AND THE CARIBBEAN

COUNTRY/CROP	CONTRACTOR(S)	NUMBER OF GROWERS	COMMENTS	SOURCE(S)
Bolivia				
barley	CBN	-	Private brewery, small holders	
poultry	various	-	Private, large growers, local demand	Adams
Costa Rica				
rice	Alimentos C.R.	68	Private, small and large growers	Checchi
banana	U Fruit, Standard	-	Private, mainly large growers, export	Glover
Dominican Rep.				
melon, veg.	CBI Corp.	100	Private, fresh export to U.S.	Williams and Karen
Ecuador				
bananas	various	+10,000	Private, small and large growers	Glover
El Salvador				
honey	Lassally	115	Private, medium and large growers	Checchi
coffee	I.A. Ideal	1900	Private, some small growers, export	Checchi
Guatemala				
frozen veg	ALCOSA/Hanover	2300	Private exporter, small growers	Checchi; Kusterer; Truitt
cucumbers	ELCO	-	Private, unsuccessful fresh export	Goldberg
rice	A.L. Corrales	245	Private, small and large growers	Checchi
tom., peaches	Conservas C.A.	+50	Private, small and large growers	Checchi
bananas	Del Monte	-	Private, plantation and small growers	Glover
Honduras				
peppers	McIlhenny	300	Private, small growers, sauce export	Truitt
banana	Castle & Cook	130	Private, plantation and large growers	Glover
banana	United Brand	+300	Private, plantation and cooperatives	Glover
milk	LEYDE	150	Private, small and large growers	Truitt; Checchi
rice	MA Chorotega	+300	Private, mainly small growers	Checchi
Jamaica				
poultry	J. Broilers	260	Private, large growers, local demand	Frievalds
tobacco	J. Cigarette	+1000	Private, small growers, export	Lewis
Mexico				
vegetables	Del Monte	140	Private, large growers, for canning	Williams and Karen; Burbach
vegetables	various	-	Private, for canning and fresh export	Williams and Karen; Burbach
milk	Nestle	-	Private rural development program	Truitt
strawberries	various	-	Private, mainly large growers	Buchbach
Nicaragua				
tomato, fruit	IFRUGALASA	34	Private, mainly small growers	Checchi
Panama				
bananas	United Brands	-	Private, plantation and outgrowers	Glover
Peru				
poultry	various	+150	Private, large growers, local demand	Gil et al

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