POSTHARVEST INSTITUTE FOR PERISHABLES

POSTHARVEST HANDLING OF STRAWBERRIES FOR EXPORT IN COSTA RICA

BY

MIGUEL PEREZ RAMOS

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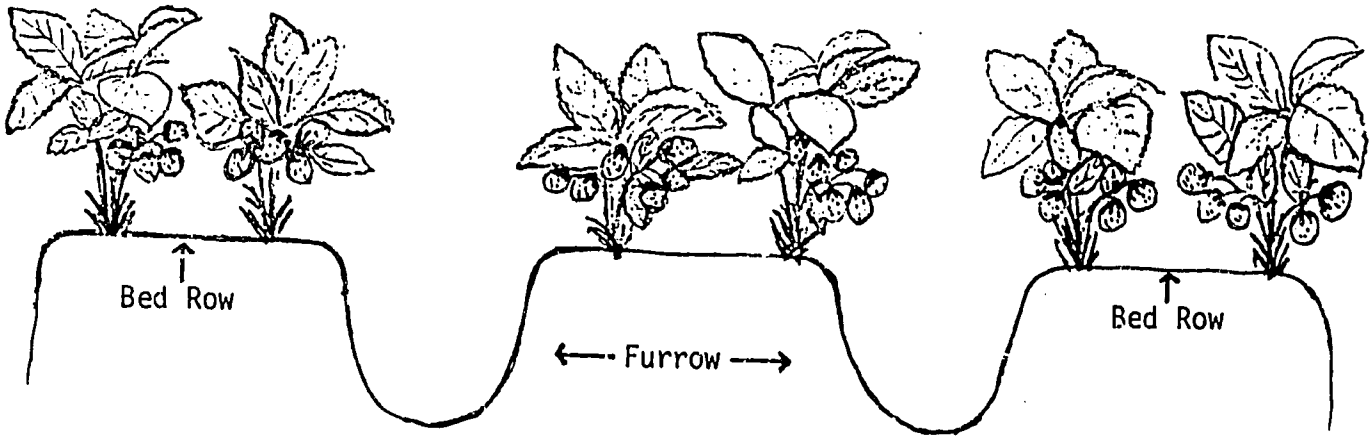
UNIVERSITY OF IDAHO

GTS Report No.
PIP/Costa Rica/February 1987, No. 84



University of Idaho

in cooperation with
United States Agency for
International Development

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INTRODUCTION

Strawberry export markets are usually very sophisticated and command top quality produce. Costa Rica needs to improve postharvest handling and its infrastructure to be able to compete in the international market. In order for it to do so, the Costa Rican Office of the U.S. Agency for International Development (USAID) funded this project. The Postharvest Institute for Perishables (PIP) contracted to provide the services of Mr. Miguel Perez Ramos, a strawberry grower from Watsonville, California, to travel to Costa Rica and work with the Costa Rican Strawberry Cooperative (Coopefresa, R.L.). His scope of work, as contracted by USAID/Costa Rica through PIP, appears as Appendix D to this report.

This consultancy consisted of two trips: December 3 to 19, 1986 and January 11 to 31, 1987. Most of the evaluations in this report are based on observations of Coopefresa R.L. and its members. The strawberry growing areas visited in Costa Rica are located in three different areas: Poasitos-Fraijanes, San Jose de la Montana, and Coronado. They are all within a 64 to 72 kilometer radius of San Jose, the capital. Most of the farms are quite small, averaging 1/2 hectare in size. The majority of the growers have backgrounds in dairy production, and have only recently (two years ago) begun strawberry production. Two of the growers are more sophisticated in their production and marketing practices and have been working with berries for a longer period of time.

Because strawberry production and marketing is a relatively new industry, Mr. Ramos' visit was extended so that he could give individual attention to the most members of the Coopefresa R.L. Work was performed establishing quality guidelines and evaluating present export quality of strawberries, cooling and storage facilities, and transportation within the country. A great deal of time was spent demonstrating better labor management practices on each farm visited. Videotape footage of their labor practices and pictures of defective fruit were taken to create a visual quality aid guide. The video footage and picture guide to diseases were left with CAAP/Coopefresa R.L. for their use. Work was also done to achieve better and more efficient use of pesticides. Sources for fabricating picking carts were found, and some carts were in use by the end of the second trip. Training for inspectors in the field and on the dock was given to Ing. Jose Luis Zamora R. Agronomic advice

and knowledge was shared with Ing. Jose Luis Zamora and Ing. Einer Matamores from ICAFE (Costa Rican Coffee Institute).

Strawberries are considered a non-traditional crop in Costa Rica and are relatively new in that area. A somewhat suitable climate, fertile soil, and potentially good export market have motivated Costa Rican growers to increase their production. However, because there is not a well defined infrastructure for exports, and knowledge of marketing and grading of strawberries is limited, the industry suffers from constraints to further growth and from potentially high risk. The alternatives to exporting strawberries are the domestic and processing fruit markets. However, the export market is easily saturated, and the domestic market is practically non-existent.

Strawberries are one of the most perishable crops known. Their short shelf life requires treatment with the utmost care during preharvest, harvest and postharvest. Fruit maturity, handling, and temperatures are directly related to the fruit's shelf life and dictate the distances it can travel, hence where it will be sold and the prices it will bring. The best prices are in the export market, and this sector is where the bulk of the Costa Rican strawberries should be sold. The U.S. and European markets are feasible from Costa Rica, but because of the distance and amount of handling required during transit, great attention has to be given to harvest and postharvest procedures to reduce losses of quality and to insure arrival in good condition.

It is the purpose of this report, based on the five week stay in Costa Rican strawberry growing areas, to analyze and make recommendations on the following points.

I. Harvest and postharvest: analyze and recommend improvements in harvesting methods, cleaning, grading and field packing of the product, as well as storage facilities, transportation and handling from farm to the wholesale warehouse. Note any foreseeable technological advances in postharvest handling. Assess the risk to the product's marketability due to present or recommended improvements.

II. Export infrastructure: analyze and recommend improvements in quality control methods, cold storage methods, packing, handling and transportation presently in use for the portion of production destined for export. Note any foreseeable technological advances which could affect the infrastructure.

III. Institutional support services: analyze and recommend improvements in the organizations in Costa Rica which support post-harvest technology, including but not limited to research, technology transfer, information exchange, cooperative marketing and credit. The analysis will also include the support services which are financed by the users of the services and an estimation of what further user fees might be justified.

IV. Technology transfer: outline a program for transferring or improving technologies to implement the changes recommended. Upon approval of the working groups and CAAP, supervise the initial implementation of this technology transfer.

I. HARVEST AND POSTHARVEST

A. Harvesting Methods -- Current Situation

Strawberry harvest in Cost Rica utilizes methods long abandoned in California because of the labor inefficiency and the high percentage of quality fruit loss. These harvesting methods are being practiced on 9 out of 10 farms visited, with small differences between farmers and with the same poor end result. This method consists of the farm worker continuously carrying a wooden tray holding dry pint baskets (8, 10, or 12) in which he/she deposits the picked fruit. (The male gender will be used hereafter for expediency to refer to either male or female workers.) This worker, in some cases, picks only one side of the row going in one direction and the other side on his way back. In other cases, the worker picks both sides of the row going in one direction and another row on his way back.

In most cases, the picking crew is divided into two groups. One group harvests only export quality fruit; oftentimes the workers in this group do not know what qualifies as export fruit and do not search the plant well, but pick only what is easily visible. The second group follows the first and picks what is left behind and divides it into two categories: domestic and processing fruit. Both groups take their harvested berries to a shaded packing shed where the berries are regraded and packed.

Other farmers have the same worker pick and divide the fruit into export, domestic or processing and transfer them into the packing shed where the fruit

is regraded and packed.

On one farm, pickers use a picking cart with one wheel (similar to a wheelbarrow) on which the box is set, and instead of carrying it they push it along with one hand. This frees a second hand for picking for a few moments at a time before having to move the cart again. But instead of using the extra hand to pick they use it to lean against the cart. They hold the cart with one hand or the other as though the cart were going to move by itself. The same pickers select for export, domestic or processing berries at the time they pick. Then they take the fruit to the packing shed where it is regraded and packed.

None of the farmers supervise the quality of the berries being harvested, the amount of ripe berries being left behind, or the pace of workers. From observations, by California standards, a fairly large amount of ripe berries is left behind even when the same row has been picked twice in a day.

Worker output is poor, and a considerable amount of ripe fruit is wasted. In three out of five farms measured, an average of 400 grams of ripe fruit per 30 meters of row was left behind. In one extreme case, one kilogram per 10 meters of row was lost. This one situation was due in part to a light rain and a high production period, but it can mostly be attributed to inadequate labor management.

The present harvesting methods have some advantages: the fruit is not shaken too much because it is always suspended in mid-air, hanging from the arm of the worker. As a worker is not required to completely fill his crate, he frequently carries the picked berries to the packing shed and the shade. These two practices protect berries from some possible bruising and from over heating. The disadvantage is high labor cost, even under Costa Rican conditions, in terms of time spent per unit of fruit picked.

B. Harvesting Methods - Recommendations

The recommendations given below may not be entirely applicable due to climatic conditions, experience, size of farm, marketing strategy, or other factors. More in-depth studies might be needed to evaluate their applicability and efficiency in Costa Rica. In any situation, they should only be applied if they are fully understood and appreciated.

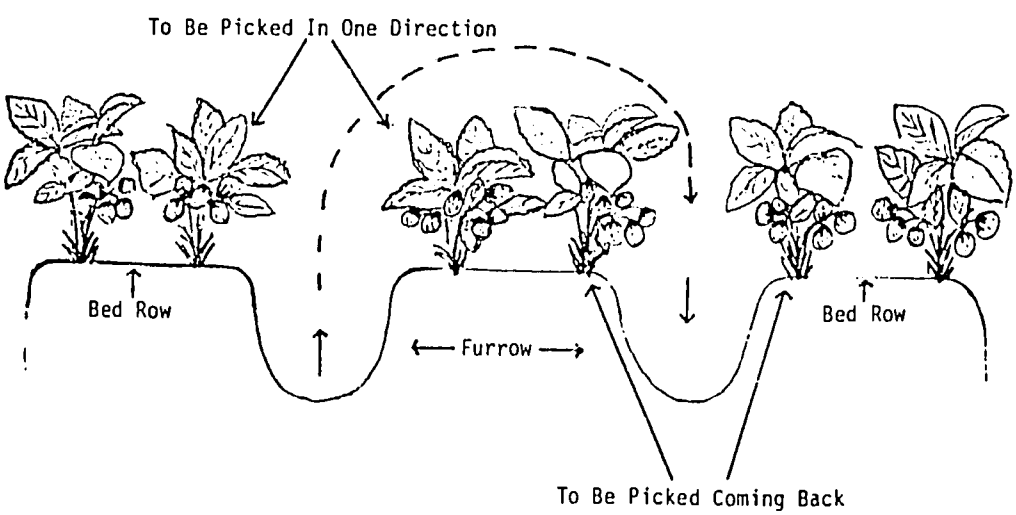
Harvesting methods, regardless of how simple or sophisticated, will not be effective if the owner and/or the supervisor do not understand or cannot control them. Knowledge of harvesting costs, training and practice, adequate supervision programs, worker incentive programs, and an efficient working

force are but some of the requirements for a sound labor management program. When harvesting season starts, or when a new worker arrives, it is of the utmost importance to train workers well in all areas described below, and to maintain a sound, consistent supervision program.

In general, grading and packaging can all be done by the worker while he is picking. The use of a one wheel cart is strongly recommended in addition to the harvesting of two rows while going in one direction and two more in the reverse direction. (See diagram Figure 1.)

Workers should be trained in the different grades of berries that are in demand, what each grade consists of, and when to change from one grade to the other. They should be taught how to pick the fruit properly without bruising it or removing the calix (see Appendix A), how to pick the berries immediately to their right and left without leaving ripe fruit behind, how to get into the habit of checking the row for fruit left behind, and how to pick with both hands. If a cart is used, one should demonstrate and enforce the proven methods for pushing it systematically while controlling its direction. Workers should be taught how to fill crates before taking them to the sheds, what to do when one container is full and the other empty, and how to insert the baskets faster into the cardboard crate. When weather permits, workers should be shown how to pick export fruit and place it directly into the export crate. They should be shown how to place pack (facing the top of the crate neatly) out in the field, in case this is desired. Workers should be taught as much as possible about picking cycles so that they are flexible and can perform necessary tasks in more than one way. Supervisors should encourage workers to be honest and open and should interact with them when they have suggestions or problems.

Figure 1 - Picking Method for Strawberries



The foreman/supervisor must know how to do all of the necessary tasks in handling strawberries in the field and must continuously enforce them so that the handling process is efficient and continuous. Since no two workers are alike, the supervisor needs to be flexible, but he must also set and enforce tolerance limits to enhance quality control and cost effectiveness.

Several work payment systems are used in California. Each producer employs the one best suited for his operation. Three of these systems are described below:

1. Piece rate. Workers are paid a fixed amount per unit. Amounts paid may be less at the beginning and more at the end of the season. In this method, the unit is a 12 dry pint crate that may or may not be place packed, but in any case the box must be of an even grade and completely full. Each worker is given a punching card on which a punch is made every time he delivers a full crate. The card is in duplicate, and one may be given on a daily basis or one may be used for an entire week. In the latter case, the card is returned to the employer before the worker leaves the farm each day. At the end of the day or the week the duplicate copy goes to the employer for computing the payroll. The worker keeps the original. Very strict and intensive supervision is required with this system. Cost example: If a worker averages 4 crates per hour and is paid $1.35/crate, he will earn $5.40/hour. The costs of harvesting is fixed initially at $1.35/crate and may be changed by the employer.

2. Hourly rate plus bonus (incentive). The unit (12 dry pint crate) is picked in the same way as the previous example, but the worker is paid, for example, $3.50/hour. This will guarantee a minimum wage to the worker. In addition to the hourly wage, the worker might receive an extra $0.50 per crate picked as a bonus. This provides an incentive to increase picking amounts. If the average worker picks 4 crates an hour at $0.50 per crate, plus the minimum wage of $3.50 per hour, the total wage is $5.50 per hour. Some workers will make more and others will make less under this arrangement. The cost in the

above example is $0.10 per hour more than in example number one above, but if the grower has a good crop throughout the season his fixed costs per harvested tray will be less. Costs will be high during low production and lower during high production.

3. Set hourly rate. Some large, well-established farms in California pay by this method. The wages are considered good, and there are some fringe benefits. These farms are highly labor efficient and are operated much like successful, large farming corporations. They set minimum standards for their workers, and most of them gear every aspect of their operation to minimize their labor force. They usually pay equal to or above union wages.

   Some small or marginal farms also pay by the above system. Because of their financial problems, these producers pay the lowest prevailing wages and demand the most from their workers. This also happens when there is an over-supply of cheap labor. One major problem for these producers is the high turnover, which requires the continuous training of new workers. Poor quality is prevalent, and costs are higher per unit of production, even though their preharvest costs are similar to those of other producers, and production prices are lower than average.

C. Grading and Field Packaging -- Current Situation

As explained in Harvesting Methods, the grading and packaging can both be accomplished by the same worker during the picking process. In Costa Rica, generally, a different worker is assigned to each one of the three tasks.

Once the berries are in the packing shed, the grading continues. This is done by one or two workers for export berries and several other workers for those in the domestic market. On most farms, packers empty each basket onto a table where they further grade the berries and select the bigger ones for export crates. These berries are set aside until they are needed. The smallest berries are put at the bottom of the baskets. The packers physically manipulate every berry once or twice before it is packed. By the time the packer finishes place packing one crate, two to three berries per basket

have been bruised. The crate looks beautiful on the surface: the berries appear the same size, are red and even, and should be easily sold.

This work is extremely time consuming and repetitious since the field picker supposedly has already done the grading. The practice of packing is counterproductive not only because it is expensive, but also because the amount of handling injures many more berries which will have to be sold at a lower price or which will reduce the overall quality of the export product. The place packing apparently is highly desired by the middle man. However, the producer and consumer pay the extra cost.

D. Grading and Field Packaging -- Recommendations

It is to the growers' advantage to have pickers do the grading from the moment berries are picked and separated into a particular grade. However supervision should be provided, whether the farm is large or small, to assure good quality and to avoid duplication of effort. Containers, somewhat different in shape and/or color, should be provided to pickers to make it easier to separate one grade from another. Perhaps a round bucket for processing fruit, half a crate for domestic fruit and a complete crate for export fruit would be advisable. This will help the pickers associate one container shape with a particular grade. All of the containers can be carried on the same picking cart simultaneously. Pickers should be asked to frequently check export crates for poor quality berries.

Weather permitting, workers should pick and deposit directly into the export crate to avoid extra handling of the fruit. This is how it is done in other strawberry exporting areas, and could be implemented in Costa Rica. Rain or wet mornings might hinder this improved process; however, a waterproof crate could be used.

In California "facing" of the crate is done in the field, by pickers, while picking. This practice gives rise to various facing styles and slight bruising of the top berries, but in general it produces a very acceptable quality. For the interim, facing of the export crate in the field may not be possible in Costa Rica because of inexperienced workers. They can, however, fill the crate to a point where the packer will only have to do the final facing. When picking and depositing berries in a waterproof crate, pickers should only fill the basket to the rim. Once the export boxes are full, they should be placed in the cool shade.

E. On-Farm Storage Facilities and Recommendations

There was only one farm observed that had an on-farm cold storage facility it is a very productive little unit. The remainder of the farms have one or two packing sheds of wooden frame construction with black plastic or galvanized metal sheets on the walls and roof. These sheds are only adequate to the point of maintaining a shaded area and protecting the fruit from rain or fog. They are not sufficiently cool. On a sunny day, the temperature in these sheds is higher than in the shade. Adding some vents to the structures would increase ventilation on warm days.

It is not economically feasible for producers to maintain a cold storage room on all farms, even if they had higher volumes of fruit. The next best thing for producers to owning a cold storage room is to frequently transport the fruit to the receiving dock, where cold storage is available. This transporting of berries should be done at least twice a day -- no later than noon and before the end of the day. If it is a very warm day, the fruit should be taken to the dock immediately after harvest.

F. Transportation to Cold Storage and Recommendations

Most strawberry farms in Costa Rica are scattered around three main areas: Poasito and Fraijanes near Volcan Poas, San Jose de la Montaña near Volcan Barba, and Coronado on the northwest side of the Volcan Irazu. These farms range from 1,400 to 2,000 meters above sea level. The Coopefresa facilities are located in Barrial de Heredia at approximately 1,300 meters above sea level where the terrain is mountainous and the roads very curvy. Some roads are steep and are not in good condition. Most farms are within 30 - 40 minutes of Coopefresa, but some of the entrance roads to the farms are in very poor condition.

Poor public roads, coupled with privately owned roads of even worse condition, create yet another quality control problem. In most cases, the berries suffer some degree of damage by the time they arrive at Coopefresa. The berries that have the most immediate damage are those sitting directly on top of the basket rim and those resting on the edges of the crate. Other damage may take place, but it is not visible at that point.

Some farmers depend on a delivery truck that goes from farm to farm to pick up berries. By the time the truck gets to Coopefresa, it has traveled some 60 - 80 kilometers. This long distance in one trip is not recommended.

On the other hand, a grower that produces only 20 - 30 export trays cannot justify the expense of driving 50 to 80 kilometers one way for such a small delivery. Perhaps, as volume increases, a receiving station, be it a refrigerated truck or cold storage building, could be placed in a central location for each major production area. For the interim, the delivery truck should avoid going to farms with rough roads or leaving a paved road once it is loaded with fruit. Farmers interested in continuing this system should transport their own fruit to the nearest point on a paved road and have it picked up by the delivery truck from there. If, for any reason, a farmer cannot make it on time to the receiving dock, he should call the dock to advise them of his late arrival instead of driving at high speeds on the poor roads.

G. Marketability

Demand for strawberries in the U.S. and Europe is far greater than the supply available from the winter strawberry producing countries. This demand is at its greatest during November, December and January, tapering off in early February. Because of low volume but good quality, Costa Rican produced strawberries are only sufficient to partially supply two buyers. These two buyers are Makkitel S.A., who ships to Miami, Florida, and MEIA Inc., who ships to Puerto Rico. Oftentimes, there are conflicts in deciding who should get the berries since they are insufficient to meet demand. Demand during these months is so great that there is room for more than one grade. The growers and their sales force need to recognize this so that they can plan a marketing strategy and sell most of their medium to large fruit at a higher than average price.

It is a misconception that a crate with elaborate place pack on top is of a higher quality than any other pack; unfortunately, many shippers believe this. It is up to growers and their salesmen to educate the shipper and/or the buyer on what makes a good berry. Quality guidelines and available grades should be provided to the middleman so that they may know what to expect and how to sell it. These guidelines are presently being developed for Costa Rica, and marketing trials are being conducted with the buyers in Miami to better assess their marketability.

The first marketing trial took place during the week of February 9 to 15, 1987. It consisted of shipments to Miami, Florida where the crate will

have no place pack facing and the berries will be mixed in size, but not less than 17 berries per basket or more than 25. The crate should be filled to the top. This trial is being done with the buyers' agreement, and they will report their experiences back to the Coopefresa. This non-facing of the crates is already well accepted by many buyers in the U.S. who found that they get fewer bruised berries and a longer shelf life.

II. EXPORT INFRASTRUCTURE

A. Quality Control Methods -- Current Situation

Some guidelines on quality have been passed on to growers, but these guidelines do not provide instructions on the defects and requirements to make a particular grade. The guidelines are unclear, causing the grower to strive for the very best grade, i.e., all large strawberries. However, the result is frequently a mixed size grade. Fruit size varies between farms visited; some have large strawberries, most have medium to large, and a few have medium to small sized fruit. These different sizes are noticeable when a proper inspection is done, but are often difficult to see with only a visual on-farm inspection. Some growers have the tendency to pack in a way that is somewhat dishonest: putting the smaller fruit at the bottom and facing only with larger fruit. This practice is called "deceptive packaging," and it can be punishable by law in the U.S. Perhaps the high demand for strawberries has diminished the effect of the undesirable packaging, so it has not been addressed. If this is the case, however, then there must be a market for other smaller fruit grades.

All berries are sold under one grade and receive the same price. Consequently, all growers get paid at the same rate regardless of the quality and size of their fruit. This will sooner of later create problems amongst the co-op and the better growers.

B. Quality Control Methods -- Recommendations

A set of quality guidelines was given during a visit to the working group. Additionally, pictures of damaged fruit were taken. A color visual guide will be printed to help establish the desired grades and train everybody involved in the Costa Rican strawberry industry.

Grades suggested for fresh export strawberries are: Stem Berries (STEMS), a large berry with a stem; Extra Fancy (XF), comparable to a "jumbo" grade; Fancy (F), comparable to a "large" grade; and, if demand is high, a Regular (R) grade, comparable to a "medium" grade. The differences between grades are as follows:

Grade	Number berries/basket	Ripeness
STEMS	No more than 12	90 to 100% ripe, firm and not overripe
XF	No more than 16-17	75% ripe
F	17 - 26	75% ripe
R	27 - 35	75% ripe

The only difference in these grades is the size of the fruit, except in the case of the STEMS, where more color is required and the berry must accompany its stem, which should be no shorter than 2 1/2 inches and preferably longer. No tolerance is allowed for major defects, such as rot, insects in the fruit, or any other highly visible defect. A tolerance of one or two defective berries per basket may be allowed, depending on market demand, with any combination of minor defects such as: albinism, water damage, scarring, staining and bruising; or fruit which is small and overripe, dirty, slightly deformed, and lacking green or calix. If three or four berries per basket with any combination of minor defects are found during inspection, the fruit can be lowered one grade from the grade given by the count per basket. Demand will dictate how critical the inspection should be. If the inspection shows too many defects per basket, the fruit should not be exported.

The two examples in Figure 2 are from grower/shipper companies "A" and "B" in California. They are presented here for comparison with other qualities and grades. The same high quality of berries is basic to these companies. The only differences are count per basket and degree of ripeness. Company "A" grows its own berries and ships them along with the berries from other commercial growers representing about 1200 acres. Company "B" grows its own berries and ships only its own fruit.

Figure 2 - Comparison of Quality and Grades of Strawberries

Company A: some degree of place packing required.

Grade	Count Per Basket	Ripeness	Major Market
STEMS	No more than 14	100%	Central and Eastern U.S.
XF	No more than 19-20	75%	Central and Eastern U.S.
F	20 - 22	75%	Central and Eastern U.S.
R	22 - 27	75%	Central and Eastern U.S.
Standard	28+	75 - 100%	San Francisco, Los Angeles
Japan	30 - 38	Salmon Color	Special picking for Japan

Company B: no place packing required

Grade	Count Per Basket	Ripeness	Major Market
STEMS	No more than 12	100%	Central California Coast New York
XF	No more than 16-18	90-100%	Central California Coast New York
F	19 - 27	90-100%	Central California Coast New York
R	28 - 38	90-100%	Central California Coast only at the end of the season

It is recommended that two inspectors be hired in Costa Rica, one for the field and one for the receiving dock. The field inspector must make daily visits to all growers, if possible, to update them on any changes and/or decisions that affect the market prices. The inspector will have to enforce quality guidelines by conducting physical inspection of random samples on each farm visited. If he suspects a bad load, he can call the receiving inspector to warn him that the load should be more closely inspected. The field inspector should evaluate the fields to get an estimate of the next day's production.

The receiving inspector will inspect samples of the fruit upon arrival at the dock, and assign a grade to each load received. The number of samples should be related to the size of the load. A sample should consist of one full basket, randomly selected. The findings should be registered on a log sheet together with the name and/or number of the grower (See Appendix B). If a load is down-graded or rejected for whatever reason, the grower must be informed as soon as possible. Hopefully, the grower can wait in the dock until his fruit is given a grade. This will avoid some problems.

These two inspectors should meet daily with the sales personnel to communicate to each other their findings and to agree on a working plan for the next day.

C. Cold Storage Methods and Recommendations

The present cooling system at Coopefresa was already used when purchased. It had been used to cool cantaloupes and other fruits that do not require the same temperature as strawberries. This system, which is called a Phylocell forced air system, is, in its present condition, unable to lower the temperature below 40^{o} F. There are supposed to be two compressors (Model NO. 6R44-2000TSK), each with its individual air tunnel. However, since only one is operating -- the other compressor is currently being repaired -- it was not possible to evaluate the cold storage facility as it would function with both compressors operating. The size of the room is 17,588 cubic feet (67 X 33 X 8), of sufficient size to hold over 5,000 strawberry crates at a time. It will not cool berries quickly, but rather lowers their temperature slowly.

The cooling machinery appears to be inadequate for the cooling demand of the strawberry fruit. This fruit requires an optimum cooling temperature between 32^{o}F and 36^{o}F. To obtain these temperatures, a newer and better forced air system should be installed, or possibly the old compressors coupled with a coil system could give the same result. Presently, the strawberries are not being cooled to their optimum temperature. They leave the dock at approximately 40^{o}F to 44^{o}F and arrive in Miami at 50^{o}F to 55^{o}F. The "master container," which acts as a thermos, is a very usable and practical method. This container is a waxed cardboard box with walls insulated by a one inch styrofoam layer, having a capacity for 10 five kilogram crates. It is, in most cases, precooled and packed and sealed inside the cooler. If it weren't for this container and this practice, the berries would not arrive at Miami in a marketable condition.

The fruit is put into the cold room as soon as it arrives at the dock. Unfortunately, some of it arrives late and is not allowed to be cooled sufficiently. This is caused by two factors: the late arrival of the fruit and the pressure exerted by the buyer/shipper who wants to take as much fruit as he can possibly sell during that day regardless of whether it is cooled properly. If this practice continues, the buyer/shipper should sign a waiver releasing the coop from any problems that may arise because of poorly cooled fruit.

A relative humidity of 90% is very important to keep the fruit from losing weight and to keep its fresh appearance. A humidity higher than 90% may promote the growth of fungal organisms.

The present cold storage room, if repaired properly, should have the capacity to handle the coop's fruit for the next two to three years, or until the coop increases its acreage to about 150 to 200 acres. In case of a break-down, there are other nearby cooling facilities that could be used temporarily. (See Appendix C for specific locations.)

D. Transportation for Export -- Current Situation

Fresh export strawberries must be transported by air. There is no other practical way if they are going to the U.S. or Europe. Presently, they leave from Aeropuerto Juan Santa Maria, 17 kilometers away from San Jose and 15 minutes away from Coopefresa's cold storage facilities.

There are some current problems with insufficient flights. Two cargo airline flights go directly northeast, bound for the eastern U.S. and Puerto Rico, but there are no direct flights northwest bound to the western U.S. The two airlines are: 1) LACSA Airlines, which is more often than not late but never seems to miss a flight. LACSA has a one cargo flight on Monday, Wednesday, Friday and Saturday. 2) Challenge Airlines, which has six cargo flights per week, one daily except for Sunday. Challenge flights are irregular and sometimes do not take off.

Some cargo space is available on passenger flights, but still there are no direct flights to Los Angeles or San Francisco. These flights are not reliable during the Christmas holiday season because they have very little or no extra cargo space available during that time. The holiday season is when the demand for strawberries is at its peak all over the U.S, yet it is presently difficult to access new clients because of the lack of flights. Sales to Europe would be equally difficult for the same reason.

E. Transportation for Export -- Recommendations

Juan Santa Maria airport has a rather small public cooler, so it might be better for the strawberry industry to assume that it is not there. Producers take the risk of damage to their perishable products when the airline is late, doesn't show up, or does not have sufficient space available. There are only two immediate solutions to the air shipment problem: make the delivery to the airport on a refrigerated truck that could remain at the airport until the

the aircraft arrives, or request permission from airport personnel to install, on a convenient location, a refrigerated trailer where berries could be kept cool until the arrival of the airliner. This will be more expensive, but less risky. Also, the buyer should be charged the same fee for cooling that is regularly charged by U.S. shippers. This fee, which in the U.S. is usually $0.60 per crate cooled, will help with the cooling expenses.

Some export brokers are considering using Panama City and/or Managua, Nicaruaga for transhipment points -- Panama City because of its different and more diverse air flight schedule and Managua because of the availability of cargo space on different flights. If the Costa Rican government does not provide for better export transportation infrastructure, these are two possible alternatives.

III. INSTITUTIONAL SUPPORT SERVICES

The Costa Rican Coffee Institute (ICAFE) presently has one researcher, Ing. Einer Matamoros, devoting 50% of his time to strawberry research and extension work. Mr. Matomoros' research is more oriented toward agronomic and varietal adaptability problems than postharvest or marketing research.

Some secondary promotional work is being done by the Coalicion Costarricense de Iniciativas de Desarrollo (CINDE). This agency will soon be publishing a pamphlet promoting Costa Rican non-traditional crops that are available for export. To this effect, pictures to be included in this publication were taken portraying a strawberry field in full production and methods of fruit packing.

No other institution or agency is known to be conducting research on strawberries, although some Costa Rican growers and some shipper/brokers are actively conducting marketing trials to the U.S. and Europe. Efforts should be taken to better unify the strawberry industry to initiate its own research program. Perhaps the California Strawberry Advisory Board can serve as a model to follow.

The California Strawberry Advisory Board (CSAB) was founded in 1955 under the authority of the Department of Food and Agriculture of the State of California. The objective of the Board is to provide for orderly marketing of the California strawberry crop in both fresh and processed forms, which it accomplishes through agriculture research and marketing support. The forum provided by the CSAB, comprised of growers, shippers and processors,

is in itself a resource that ensures thoughtful analysis of industry needs and allocation of resources. A copy of the CSAB Annual Report is attached. (See Appendix E.)

IV. TRANSFER OF TECHNOLOGY

Most of the problems in the strawberry industry that could be solved by the people involved can be categorized in four main areas: labor management, quality control, marketing, and agronomic practices. None of these require machinery that is not already available and in use to some degree in Costa Rica. Therefore, the technology transferred by this consultant was mainly in the form of verbal explanations/descriptions and practical demonstrations of existing California methodologies carried out in the field, on a daily basis, with as many growers as possible during the two visits.

One spraying boom was introduced to demonstrate a faster and more efficient way of spraying. The objective was to achieve broader coverage for better insect and disease control during the preharvest and harvest season. Growers who had the appropriate equipment to use the spraying boom appeared so pleased with the demonstration that they immediately wanted to buy one. Some orders have been initiated to have them fabricated and shipped to the grower. Most of the parts for the new spraying boom are available in Costa Rica, but some are of a lower quality. Dimensions and designs were taken by Ing. José Luis Zamora. He can locate someone to produce them if they become popular.

A picking cart was fabricated in Costa Rica based on a California design. It was difficult to find an appropriate wheel, but after some searching one was found. A welder fabricator was contacted to build some carts to be used on a trial basis. After this trial, the farmers who saw their increased efficiency ordered carts for their workers.

A substantial purchase that may be needed is the conversion kit for the present compressors, or perhaps a new cooling system altogether. This will have to be ordered either through a local distributor or directly from the manufacturer.

Some of the agronomic and labor management problems could best be solved by an internship program whereby growers and/or technicians would be sent to California for first hand experience and training in the strawberry industry.

A P P E N D I C E S

University of California • Agricultural Extension Service

How to Pick Strawberries

Strawberries are very tender and easily damaged. Your care in picking will determine whether the berry is good or is a cull.

Fruit to be used for fresh market is picked differently from fruit that is to be frozen.

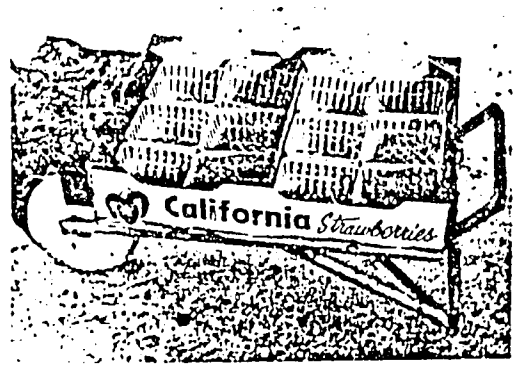
General Instructions

1. Use the picking stand or cart.

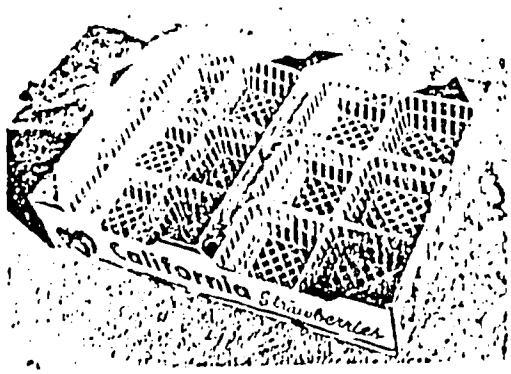
2. Do not allow crate to sit on the ground or get into the mud.

3. Handle the full crate very gently.

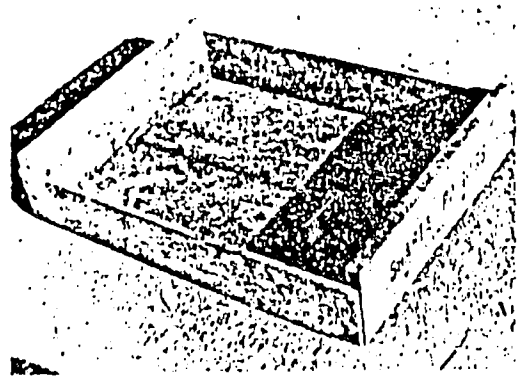
4. Be careful with the feet and knees that you do not injure any green fruit hanging in the furrow.



Picking cart with crate in place ready for picking.

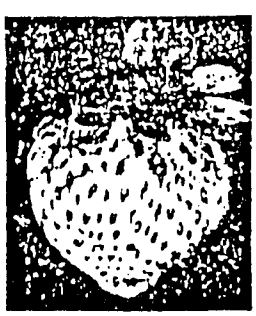


Crate used in fresh picking. When full, the baskets do not show.



Tray used in freezer picking.

Picking for Fresh Market



1. Color: Usually the fruit is picked before it is full red. Learn from your foreman the color he wants.

2. **Picking:** Berries are picked with the caps on. Take hold of the fruit between the thumb and first two fingers. With an upward or forward twist of the wrist, the stem should snap off.

Hold fruit loosely in the hand without squeezing. Remember that anytime you squeeze the fruit it is bruised and discolors, so HANDLE IT GENTLY.

PLACE the fruit in the crate – **DO NOT** throw it!

3. **What to Throw Away:** Throw away any berries showing rot, sunburn, insect injury, severe misshape and berries which are soft and overripe. Throw away berries where the cap has been removed accidentally. Remove these berries from the plant and throw them in the bottom of the furrow.

4. **Fill the crates full.** Do not fill so full that berries will be crushed when crates are stacked. Some shippers require that the berries on the top of the crate be placed in an orderly arrangement. Your foreman will tell you exactly what he wants you to do.

Picking for Freezer

1. **Color:** Berries should be full red.

2. Picking: Berries are picked without the cap. Take hold of the stem between the thumb and first finger just behind the cap. Squeeze slightly against the cap. At the same time, apply slight pressure with the second finger against the berry. It should pull loose leaving the cap on the stem.

DO NOT dig thumb into fruit to remove cap.

DO NOT leave any green stem in the fruit.

DO NOT squeeze berries in the middle.

3. PLACE the fruit in the tray; DO NOT throw it!

4. Throw away all berries showing rot, sunburn, severe misshape, insect injury and overripeness. Remove these berries from the plants and place in bottom of the furrow.

5. Fill the crate full. Do not fill so full that berries would be crushed when crates are stacked.

Prepared by F. Gordon Mitchell, Extension Pomologist, Marketing, and Arthur S. Greathead, Farm Advisor, Monterey County.

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating.
Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914.
5/59--5000 George B. Alcorn, Director, California Agricultural Extension Service.

APPRENDIX B
QUALITY LOG SHEET
Coopefrasa R.L.

DATE: _____

Inspector Signature: _____

GROWER Name/No	Sample No.	Basket Count	Rot	Deformed	Insect Damage	Green	Over Ripe	Bruised	No Calix	Albinism	Small	Other	No. of Defects	Grade	Comments
Ex No 1 # 5	1	16	-	-	-	1	-	1	-	-	-	White stain	2	XF	small white stains come off easily, not noticeable
Ex No 2 # 8	1	20	-	-	1	1	-	1	-	-	-	-	3	F	one slightly green, mostly well colored
Ex No 3 # 4	1	20	2	-	-	-	1	-	-	-	2	-	5	R	Rot not too severe, but some was noticeable
Ex No 3 # 4	2*	18	-	-	-	-	-	1	-	-	-	-	1	F	Good Quality
Ex no 3 # 4	3*	18	-	-	1	-	-	-	-	-	1	-	2	F	Warning given out

* Because the first sample comes out bad, it does not mean that the entire load is bad. When in doubt, a 2nd or 3rd sample should be drawn. If they are okay, then a warning should be given to the grower advising him to increase his supervision.

This log sheet will clearly indicate who are the good and the bad quality growers. It should help the inspectors to decide with whom they should be strict.

APPENDIX C

SERVICIO DE CARGA AEREA S.A.

FACILIDADES DE REFRIGERACION

CENADA:

De lunas a Viernes tienen servicio de 7:30 A.M. - 16:00 P.M. y los Sabados de 7:30 A.M. a 10:00 A.M.

Horas fuera de jornada hay que llamar al Sr. José Ramirez al telefono No. 37-20-67 y mu tiempo segun la hora es a convenir tarifa.

Congelado ¢30.00 por metro cuadrado por dia. Mantenido ¢25.00 por metro cuadrado por dia.

Los dias son calendarios. Si mete una carga a las 23 horas y la saca a las 2. A.M. cuenta como dos dias.

ENCOOPER:

Esta en CENADA. Tienen solamente camaras para mantener. Si en el futuro dan servicio de congelacion nos avisaran.

CODIPROAL S.A.:

El senor Alfonso Sibaja es el Adminstrador. Telefono 41-15-21.

Nos da servicio las 24 horas diarias. Estan exactamente a 3 Km. del Aeropuerto en Rio Segundo.

Mantencion, no alquila una camara de 48 pies cubicos con temperatura a solicitar. Costo ¢1,000.00 diarios las 24 horas, metamos una caja o 60 cajas.

Congelacion a 0.06 centavos diarios por kilogramo. Se toma peso de aeroguia.

Precios de Mayo de 1985

APPENDIX D
Scope of Work

ARTICLE I - STATEMENT OF WORK - The Contractor will provide 36 person workdays, 3 days in the United States and 33 days in Costa Rica to accomplish the following tasks:

1. a. Harvest and Postharvest. Analyze and recommend improvements in the harvesting methods, cleaning, grading and field packing of product, as well as storage facilities, transportation, and handling from farmgate to the wholesale warehouse. Note any foreseeable technological advances in postharvest handling. Assess the risk to marketability of product due to present or recommended improvements.

   b. Export Infrastructure. Analyze and recommend improvements in the quality control methods, cold storage methods, packing, handling, and transportation presently in use for that portion of production destined for export. Note any foreseeable technological advances which could affect this infrastructure.

   c. Institutional Support Services. Analyze and recommend improvements in the organizations in Costa Rica which support post-harvest technology, including but not limited to research, technology transfer, information exchange, cooperative marketing and credit. The analysis will also include the amount of these support services which is financed by the users of the services and an estimation of what further user fees might be justified.

   d. Outline a program for the transfer of improved technologies to implement the changes recommended. Upon approval of the Working Group and CAAP, supervise the initial implementation of this technology transfer.

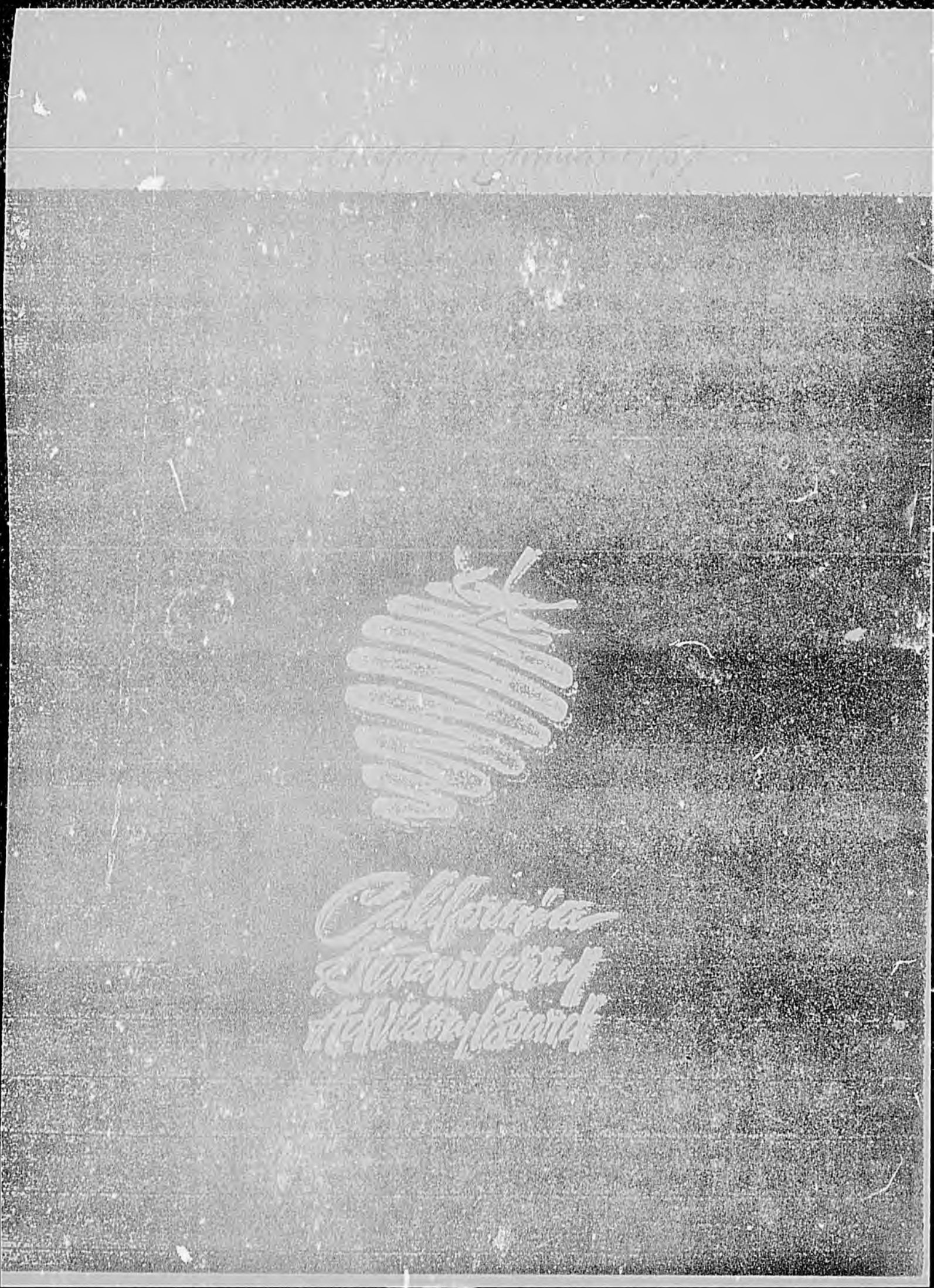
ARTICLE II - TECHNICAL DIRECTIONS AND REPORTS - The consultant will work under the general policy guidance of the USAID/Costa Rica Mission Director and AID Liaison Official from the Rural Development Division.

The Contractor will verbally present preliminary findings to CAAP and the Producer's Working Group prior to departure from Costa Rica. A written final report, in English, will be presented to the Working Group through CAAP NTE thirty calendar days after the preliminary presentation. Translation of the report into Spanish will be at the discretion and expense of the Working Group.

ARTICLE III - KEY PERSONNEL - The key person to perform this contract shall be Mr. Miguel Perez of Postharvest Institute for Perishables.

ARTICLE IV - LEVEL OF EFFORT - The level of effort for the performance of this contract shall be 288 total work hours of direct labor.

0633r


California
Secondary
Principals'
Association

President's Report

It's hard to believe that this is my tenth annual report to the strawberry industry. I joined the staff in 1977. In the ten intervening strawberry seasons we have seen tremendous changes in the industry and the Strawberry Advisory Board.

The dominant variety in California then was the Tioga with the Tufts and Aiko beginning to show their influence. The crop value in 1977 was around $169 million. The Board was using the Table Grape Commission merchandising staff during peak season and the Board approved its first funding in foodservice marketing ($10,000).

Today strawberry crop value exceeds $350 million. We are three generations past the Tioga variety. We have our own merchandising staff and one of the best foodservice programs in the produce industry.

As we look ahead, we have an excellent foundation upon which to build. While many aspects of the Advisory Board's programs have changed substantially, the essential direction and purpose of the Board has been consistent. I have always seen my main responsibility as developing resources to meet industry needs. The extent and the application of those resources rest with the Board of Directors and ultimately to the industry. In this report, I would like to review the resources that we are developing.

Organization

When the Strawberry Board was founded in 1955, its purpose was to provide a forum to discuss industry problems, represent the industry, promote strawberries and fund the agricultural research program. While the extent of these activities has changed, they still summarize what the Board does. The forum provided by the Strawberry Board comprised of growers, shippers and processors is in itself a resource which insures thoughtful analysis of industry needs and the allocation of resources.

People

From the marketing staff to the clerical support, the individuals who make up the Advisory Board staff are characterized by their professionalism and commitment to the industry. Having a full time merchandising staff has been a most significant advance in recent years. The merchandising staff is an invaluable conduit of information. They bring knowledge about strawberry marketing, status of the strawberry crop, research and training capabilities to the trade for the Advisory Board they are a source of information in the planning and development of our marketing programs.

Knowledge and Information

Using marketing research, information resources and analysis, the Board has developed a substantial body of information. We periodically update our information about consumer attitudes, purchasing habits and usage trends. The Board subscribes to a retail advertising survey that gives us detailed information about chain, market, regional and national food page advertising. This information is beneficial to the trade and the strawberry industry in guiding our planning and monitoring results.

The Board staff spends a lot of time in supermarkets measuring strawberry displays, monitoring pricing, packaging trends and watching out of stock conditions on both fresh and frozen strawberries. Certainly not the least of our informational resources comes from the day to day visits of the field staff to produce merchandisers and buyers across the country. Our staff is truly curious about the role that strawberries play in produce merchandising and how various marketing strategies actually work. This dialogue provides important perspective for the entire program.

David R. Riggs, President.

Agricultural Research

The agricultural research program conducted by the University of California and funded through the Strawberry Board has been a mainstay of Board activities. No other single factor has contributed to the significant growth and success of the strawberry industry more than our research program. Yet in the last three or four years the Board has taken steps to make this resource even more productive.

We have done this primarily by taking more responsibility for the direction of the program. Our committees have evaluated industry needs in plant pathology, entomology, pomology and other areas. In so doing, we have identified important needs requiring research solutions. We have sought scientists throughout the University system to bring their capabilities to bear on these problems.

In addition the Advisory Board has taken responsibility for pesticide registration. Keeping abreast of the ever-changing process of registering agricultural chemicals has become a substantial part of the Advisory Board.

As the strawberry industry continues to grow the Advisory Board continues to develop resources to meet industry needs. Developing the best resources to meet the changing needs of the industry will always be our goal. The Board itself, the capability of our people, a foundation in research and information and a top agricultural research program stand ready to serve the industry.

Research

In last year's Annual Report, research activities focused on the steps taken by the Board to assume responsibility for planning research programs, development of continuity in plant breeding, improve the availability of clean plants and assume responsibility for pesticide registration.

In 1986, the Board built on this foundation. Substantial progress has been made in planning, continuity, clean plants and registration activities.

Planning

It is clear that industry input is our most important resource to maximize research expenditures. The Research Committee and special subcommittees meets regularly and as needed to evaluate proposed research priorities. This structure has allowed the Board to be more knowledgable and active in directing the program.

Improving the communication system so the industry at large receives the full benefit of the research program has become a high priority. This year, for the first time, the Board published an Annual Research Report. This report is a compendium of all research funded by the Board. While it is technical in nature, it provides much useful information for growers, farm advisors and other researchers.

The Board will resume publication of the pink sheet research bulletins on a timely schedule when the data is most useful to growers. The Board will also be working with farm advisors in production districts to schedule more frequent research meetings.

Continuity

In March, Dr. Douglas Shaw joined the Pomology Department at UC Davis to begin studying under Dr. Royce Bringhurst and Victor Voth. This will provide a substantial overlap and an opportunity for Dr. Shaw to fully learn the needs of the industry. Additional steps will be taken to ensure the continuity of integrated cultural research for both the Southern and Northern districts.

Clean Plants

As of July, the Foundation Seed and Plant Material Service (FSPMS) at Davis had completed work on its meristem laboratory. Working with plant breeders, industry and strawberry nurserymen, the FSPMS has begun work to increase the availability of virus free plantlets for propagation. In addition, the meristem program will allow more extensive testing of clean stock of advanced selections. It is hoped that when new varieties are made available for grower testing or actual releases in the future, they will have been tested free of virus and clean stock will be available in quantity upon commercial release.

Registration Activities

Between data call-ins on existing chemicals, the need to register new substances and dealing with varying pesticide tolerances between the United States and Canada, pesticide registration activities reached a fevered pitch in 1986. Despite a lot of work and intense effort, nothing happens quickly in the bureaucracy of pesticide registration. This calls even more attention to the importance of planning and foresight.

Continuing Research Activities

Several new strawberry varieties are close to commercial release from the breeding program of Dr. Bringhust and Victor Voth. While the industry is currently adjusting to the proper handling and balancing of the acreage of Chandler and Selva varieties, yet another generation of new cultivars is in the wings. All the while, important grower testing and integrated cultural research on existing and advanced selections continues.

Among the other important projects underway are research in developing a rapid virus detection system to improve plant indexing, entomological research to facilitate pesticide registration and improve pest and disease control research on such problems as leaf spot.

Experimental strawberry varieties.

Advertising & Publicity

Strawberries enjoy a very large user base which is currently estimated to be 83% of all households. The marketing task is therefore to carry on this favorable image of strawberries and convert the image into sales and consumption.

The marketing strategy, based on the advertising theme of "Great Straight", has been in effect since 1982. The campaign remains viable today. Results from a consumer study conducted by the University of Santa Clara, indicate that consumers are indeed eating strawberries more often straight, or in simple preparations.

The peak season consumer advertising campaign for 1986 featured television and an expanded posting of outdoor billboards. Both the early and late season crops were supported by radio campaigns. An aggressive and successful public relations campaign began the first day of spring and continued throughout the season.

The balance of this report will highlight the various programs and people that have contributed to the success of the Strawberry Board's marketing efforts during 1986.

The Consumer

The consumer population is ever changing and evolving as lifestyles, tastes and trends affect the way we live. This constant consumer evolution creates a need for a means to track the shifting population and keep abreast of the changing marketplace. In 1986, the Board commissioned a major consumer research study. By learning of patterns and attitudes about strawberries, the Board can utilize the information to more effectively target both media and message to communicate to the vast American public.

With television serving as the primary vehicle, the Board aired a series of 10-second commercials commencing in mid-April and continuing for six weeks. Outdoor boards were posted during the same time period and in most markets actually were extended through mid-June.

The Board continually tries to tailor the consumer advertising program to respond to the needs of the industry and keep pace with the consuming public.

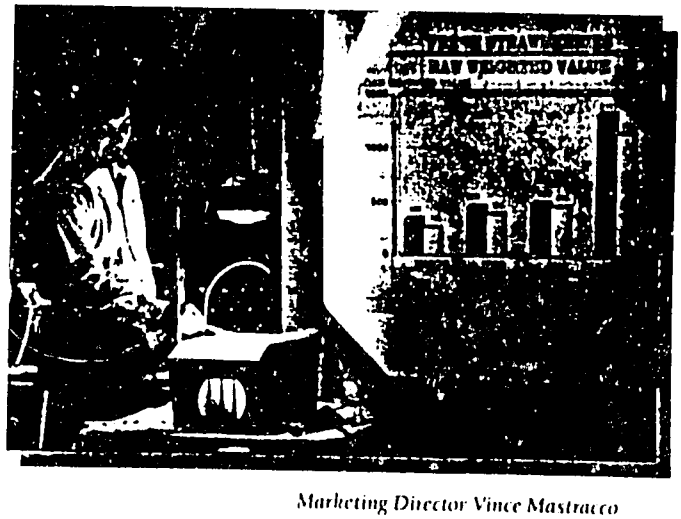
Consumer Publicity

California strawberries, delivered to weather forecasters across the country, have come to signify the first day of spring. Now in its fifth year, the promotion has been expanded to 22 markets and even includes several key Canadian cities.

During the strawberry season, newspaper food pages and consumer magazines frequently use strawberry recipe features. To capitalize on the inherent desirability of strawberries the Board provides news, recipe releases and responds to editor requests to help them feature strawberries.

A highlight of this year's program was a harvest tour for selected magazine editors and writers. The Board hosted major consumer magazine food editors and writers on a three-day tour of the state's strawberry growing areas. The tour was attended by representatives from *Ladies Home Journal, Women's Day, Good Food Magazine* and *Southern Living*. These editors and selected syndicated writers were given a firsthand look at the strawberry industry.

The Strawberry Board makes every effort to build on the popularity and desirability of strawberries by integrating advertising and publicity programs to gain consumer awareness and increase sales.



Marketing Director Vince Mastracco presents consumer information to the Board.

A shopper surveys a strawberry display.

Merchandising

To meet the needs of retailers for information related to market trends and crop conditions, the Board's full-time merchandising staff crisscrosses the country, calling on produce buyers, merchandisers and corporate officers. The staff provides information, service, training, promotional materials, and market data. In 1986, the Board's merchandising staff visited every major retail chain as well as regional chains, independents and terminal market distributors.

The staff now consists of four full-time regional merchandisers. The group is anchored by Theresa Nolan in the Northeast and Jim Grabowski in the Midwest. Both Jim and Theresa have been with the Board for several years. David Howald joined the team in February and is the Western Regional Merchandiser. Dave brought to the Board an extensive background in retail grocery management and recent wholesale produce experience.

The key Southwestern Regional Merchandising position has recently been filled by Cindy Eggenberger. Cindy's background includes produce merchandising and advertising agency experience. The merchandisers represent the California strawberry industry and are constantly striving to gain increased retail ad features and display space.

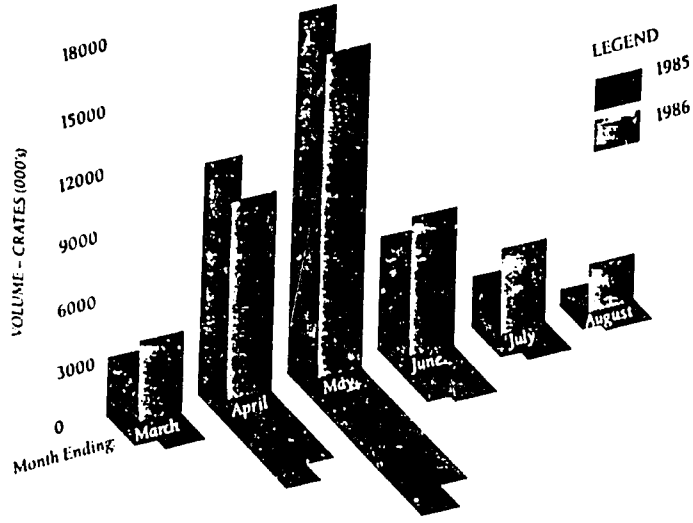
Again this year, the Board provided retailers with ad feature information available from Majers Mastertrack Advertising Service. Analysis of the data provides the Board with an accurate measure of frequency and quality. This information aids the staff in targeting retail accounts and helps retailers keep abreast of trends.

The Board provides retail training programs in video tape or slide formats. The merchandising staff has also responded by presenting in-person seminars on a number of occasions. The Board's training program, "Profits In A Bright Red Package", was once again utilized by over 100 retail operations. Backroom training posters and retail bulletins are also available.

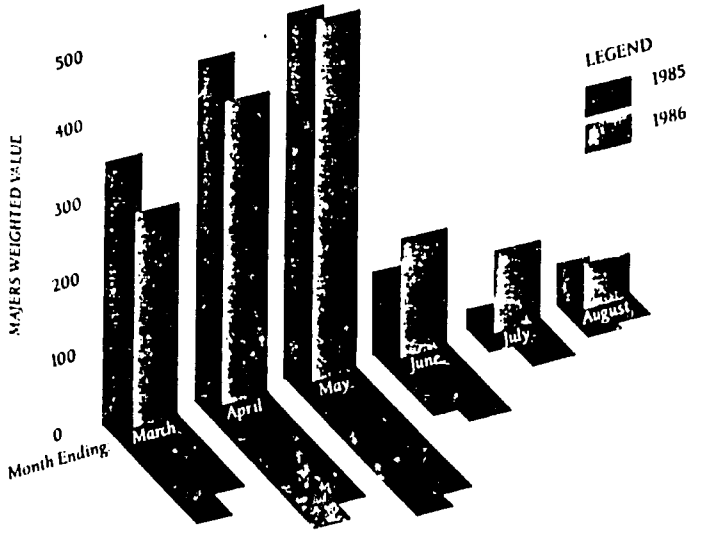
The competition for ad features is seconded only by the competition for retail display space. Data from the 1986 Consumer Research Study show that strawberries are a tremendous impulse item. Approximately 58% of shoppers indicate that they decide to purchase strawberries when they see them in the store. This fact underscores the importance of maintaining high quality in-store displays and further supports the use of point-of-purchase materials.

As competition for retail display and promotion intensifies, the Strawberry Board continues to rise to the challenge by developing programs and data which meet the needs of retailers and stimulate aggressive merchandising activities.

Fresh Strawberries
Trends In Crate Volume
March–August 1985 & 1986



Fresh Strawberries
Trends in Feature Activity
March–August 1985 & 1986



Total Ads 1986 = 2841 (- 2%)
1985 = 2903

"The longer a distributor carries strawberries, the higher percentage strawberries represent of total produce sales." This conclusion was reached through a survey of 80 broadline and specialty fresh strawberry distributors in telephone interviews conducted for the Strawberry Advisory Board by Technomic Consultants. Other findings from the survey included produce as a percentage of gross sales, average yearly and monthly strawberry volume, and the segment mix of a distributor's business.

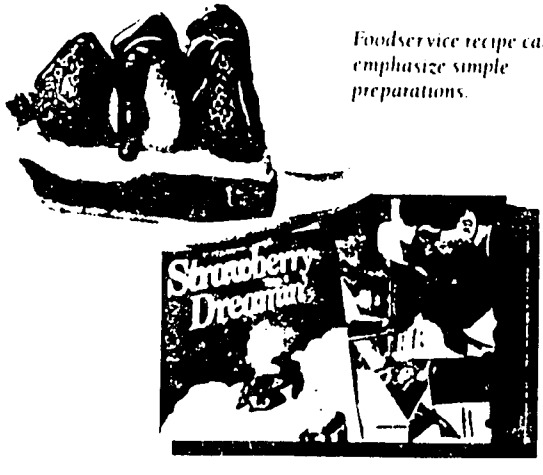
Using information from the survey we will be able to work with foodservice distributors who are new to produce to establish a benchmark for their future strawberry sales volume.

Distributor Training Programs

The basis of our foodservice distributor program is to develop training and merchandising support materials for the distributor sales force. Training materials include a nine minute video focusing on handling, storage and preparation at the operator level. Merchandising support includes an operator kit with recipe cards, beverage guide, handling tips, table tents and posters.

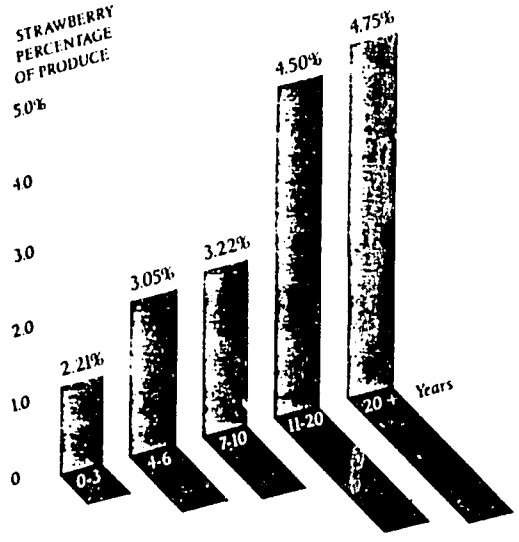
Other operator programs consist of promotional support for development of customized point-of-sale materials and new menu ideas. To recognize outstanding operator promotions using both fresh and frozen strawberries, the Strawberry Board sponsored the eighth annual "Ripe Success and Juicy Profits" promotion contest. Winners included Emporium-Capwell department stores, Chicago Hyatt Regency, Grace Restaurants (CoCo's), Brann's Steak & Seafood, Motorola, Princeton Hospital and Stouffer's Top of the Hub restaurant in a special beverage category.

The use of frozen strawberries in foodservice continues to be supported by a beverage recipe guide as well as trade advertising and promotions. Concern with declining liquor sales has led many chains to seek alternative menu ideas for their beverage operations. Strawberries fit easily into the trend toward low-alcohol drinks.



Foodservice recipe cards emphasize simple preparations.

Foodservice editors served as judges for the CSAB Operator Promotion Contest.



Strawberries As A Percentage Of Yearly Produce Sales By Length Of Time For All Distributors
Base: 53

A new item developed for the 1986 season was a set of six fresh recipe cards. These were the first new strawberry recipes developed by the Board for foodservice operators in over five years. However, the advertising focus for fresh strawberries continued to emphasize serving whole strawberries in a bowl or salad bar. This application saves the operator labor costs by keeping preparation simple–just rinse and serve. Waste is also reduced by not slicing the cap off the berry.

New Opportunities for Fresh

Large volume chains, Wendy's and Sizzler in particular, have had success offering whole fresh strawberries on their salad bars. The 1986 season was the first time Wendy's featured strawberries on their salad bars on a corporate-wide basis. This usage represents significant new volume for the strawberry industry. It also presents opportunities for the Strawberry Advisory Board to target additional foodservice market segments. Salad, breakfast and fruit bars are featured in almost every segment of the foodservice industry. Fast food chains, hospital cafeterias, schools and employee feeding operations have all focused on "fresh" self-serve bars in the last few years.

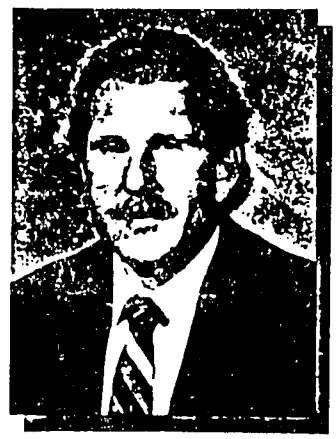
Encouraging new usage, increasing operator promotions and supporting distributors with training materials form the core of our foodservice program. Providing programs which increase usage and awareness of California strawberries within all segments of the foodservice industry is our primary goal.

Processed Strawberry Report

Although California's strawberry crop for the 1986 season didn't produce the record yields of the past, the total production of 775,845,000 pounds will go down as another all time high, with the processing strawberry volume amounting to almost 27% of the total. The wet spring weather during 1986 tempered strawberry production throughout the state, and, after a relatively slow start, the 1986 processed strawberry pack came in with 167,856,000 pounds (Grade No. 1), which was 2% higher than the 1985 Grade No. 1 pack.

Due to a reduction in frozen strawberry imports from Mexico of 4 million pounds coupled with the smaller than expected crop from the Northwest, the total frozen strawberry input was somewhat less than originally anticipated. These factors, along with increased development of new products, have helped increase the demand for processed strawberries. Frozen inventory holdings of 188.6 million pounds as of October 31, 1986 were over 23 million pounds less than compared to the same period last season. Cold storage holdings as of December 31, 1986 are estimated to be 152 million pounds, compared to the 167.1 million pounds carried over on December 31, 1985, assuming that consumption patterns will be similar to the previous three years.

With the Crop Reporting Service showing strawberry growers intentions to harvest 15,700 acres in 1987, the coming season could prove to be another record setting year for strawberry production in California.



Hank Drabin
Processing Strawberry
Advisory Board

Processed Strawberry Report
Production Yield and Value
1984–1986 Strawberry Crop

	1986	1985	1984
California Acreage	15,100	14,600	14,100***
(% of US)	(32.9%)	(32.4%)	(31.7%)
Production (lbs)	775,845,000	762,717,000	726,367,000
(% of US)	(77.1%)	(75.9%)	(75.6%)
Yield Per Acre (Tons)	25.7	26.1	25.8
US Yield Per Acre Excluding California (Tons)	3.8	3.9	4.3
Value-Total*	$382,843,423	$326,292,000	$306,821,618
Fresh	338,067,847	290,428,000	276,371,337
Freezer	44,775,576	35,864,000	30,450,281
California Production			
Fresh-lbs	568,523,000	570,320,000	563,086,000
Crates	49,436,782	49,593,043	49,016,173
(% of Total)	(73.3%)	(74.8%)	(77.6%)
Freezer-lbs	207,322,000	192,397,000	162,681,000
=Crates**	14,808,714	13,742,642	11,620,071
(% of Total)	(26.7%)	(25.2%)	(22.4%)
Total-lbs	775,845,000	762,717,000	726,367,000
=Crates	64,245,496	63,335,685	60,636,244

* Fresh value based on weighted index of FOB prices quoted by Federal State Market News (not actual prices after adjustments, consignments, and other factors affecting actual prices)

** Freezer crates based on assessment unit of 14 lbs. per crate

*** Revised Acreage per Crop Reporting Service (10/85)

Frozen Strawberries
*Pack, Import, Consumption**

	1986**	1985	1984
Beginning Inventory January 1	167.1	166.0	176.6
Input (US)			
California***	186.0	181.1	160.2
Northwest	7.3	6.8.7	8.4.7
Others	5.7	5.0	6.2
Sub-Total	266.0	254.8	251.1
Total Input	315.0	307.5	312.9
Total Available	482.1	473.5	489.5
Ending Inventory December 31	152.0	167.1	166.0
Disappearance	330.0	306.4	323.5

* Million pounds

** Estimated

*** Juice strawberries not included