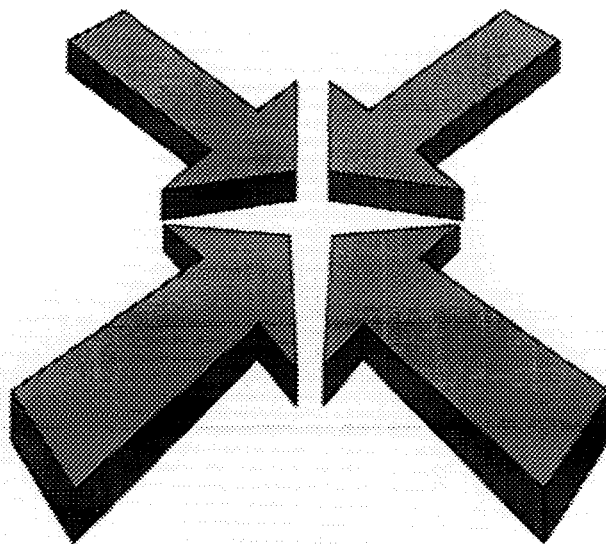


PNADC-904

**REPORTS PREPARED
BY
DR. THOMAS
BUTTERWORTH
FOOD ENGINEER
AUSTIN FOODTECH
SEPTEMBER 28 – OCTOBER 19, 2000**



**AGRICULTURAL LED EXPORT BUSINESSES
12 DOKKI STREET, 6th FLOOR
DOKKI, CAIRO
TEL 338-1445/348-0728
FAX 348-0729**

USAID PROJECT NO. 263-0264

THOMAS A. BUTTERWORTH

**Austin FoodTech
114 Pearl Avenue
Newport Beach, CA 92662
TEL (714) 666-8482 FAX (714) 666-1017**

EMPLOYMENT EXPERIENCE

- 1988-Present** **Managing General Partner Austin Food Tech, Inc.**
-Specialists in Food Product Development
- 1984-1998** **Instructor, "FDA Better Process Control School," Chapman University, Orange, CA**
- 1988-1989** **Lecturer, "Chemical Engineering Process Design," Department of Chemical Engineering California State University at Long Beach**
- 1973-1988** **Associate Director, Research and Development Beatrice/Hunt-Wesson, Inc., Fullerton, California**
- Management of product/process development with staff of 24

- Project budget of \$1.5 million

- Manpower assignments for product development, technical service, and non-routine regulatory interface for the following brands: Orville Redenbacher, Hunt's, Peter Pan, Fisher, J. Hungerford Smith, and Food Producers

- Experience with state-of-the-art aseptic systems, tomato products, toppings, sauces, dry mixes, drink bases, low-acid canned foods and fruits for both food service and retail product lines

- Staff commercialized 32 new products and line extensions and 30 product improvements in a five year period
- 1982** **Instructor, "Food Engineering" Dept. of Food Science and Technology Chapman University, Orange, California**

1980 -1981 Lecturer, "Chemical Engineering Process Design"
Dept. of Chemical, Nuclear and Thermal Engineering
University of California at Los Angeles

1968 -1973 Teaching and Research Assistantship
Dept. of Nutrition and Food Science
MIT, Cambridge, Massachusetts

1968 Chemical Engineer
Western Regional Research Laboratory, Albany, CA
- Work resulted in three publications

1964 - 1967 Chemical Engineer
B.F. Goodrich Chemical Company, Long Beach, CA

EDUCATION

Ph.D., Biochemical Engineering, 1973
Massachusetts Institute of Technology
- Chemical Engineering and Biology minors
- Thesis project concerned separation of protein
 solutions by ultrafiltration covered in two publications.
- Recipient of Nestle-IFT Fellowship

B.S., Chemical Engineering, 1967
University of California at Berkeley

PROFESSIONAL AFFILIATIONS

Institute of Food Technologists:
-Former Chairman, Food Engineering Division and
 Former Member, Annual Program Committee
Institute for Thermal Processing Specialists
American Assoc. for the Advancement of Science
Industry Advisory Council, Food Science and
 Technology Department, Univ. Calif. Davis
Food Engineering Advisory Council, Univ. Calif. Davis

AGRICULTURE-LED EXPORT BUSINESSES (ALEB)

Scope of Work

#12, Dokki Street, 6th Floor, Dokki, Cairo, Egypt

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

ARI ASSOCIATES, INC.

FOOD ENGINEER

Desired Professional Qualifications: The consultant shall have a practical understanding of the engineering aspects of food processing equipment and its technology. He or she must have worked in or with the private sector for at least ten (10) years. An understanding of how different commodities are processed and handled is a must. The consultant needs to understand basic Good Manufacturing Practices (GMP's) for the food processing industry, their effect on the products and the process and basic packaging systems. He or she must also have demonstrated an ability to organize materials and present them in a classroom environment.

Education: A minimum of a B.S. degree in food science or a related discipline is preferred. Proven practical experience may be substituted for educational requirements.

Language: There is no language requirement. A basic knowledge of Arabic would be useful, however.

Computer Literacy: Reporting requires a basic understanding of word processing and other programs. All reports are prepared in Microsoft Word 6.0 or higher.

Level of Effort and Duration of the Assignment: The assignment will consist of a minimum of two in-country phases, each lasting 3-4 weeks each. There will time allocated (7 days) prior to each trip to prepare training materials and after the return to the United States. The time after the trip (maximum of 3 days) will be used for preparation of final reports. Final reports are due three weeks after departure from Egypt.

Background of Work: The Agriculture-Led Export Businesses project has been developed to increase exports of processed foods from private sector Egyptian food processors. Over the three year life of the project, the goal is to increase exports by some \$10,000,000US. This will be accomplished through concerted efforts to enhance marketing, business and technical practices by exporters and potential exporters. The project also seeks to build alliances, links and associations to expand export businesses and improve the health and viability of the Egyptian food processing industry.

To compete in the international market place, especially in Europe, the United States or Japan, processors of frozen foods must be able to manufacture high quality products under the basic Good Manufacturing Practices described in Codex and other regulations, such as 21 CFR Part 110 in the United States. They must also be able to adequately document practices to assure safety, wholesomeness and quality. The majority of the processors in Egypt are deficient in these areas.

The consultant will work with processors in an effort to help them to better understand and upgrade their operations using an engineering approach.

Work Activities: The objective of this task is to enhance understanding of the food processing industry in general and improve in-plant practices. This shall be accomplished through working with the industry directly and in a classroom environment. There will be several visits as part of this project to work with processors and assess progress made by those visited on earlier trips.

The specific role of the consultant shall be;

1. Lecture in technical programs on specific topics in the areas of food processing and engineering by the consultant with the assistance of ALEB. Time will be provided to prepare these materials prior to departure. Any materials previously developed by the consultant and used in the program shall be clearly marked that these are the property of the consultant and that permission for their use in this project only is granted to USAID and ALEB by the author.
2. Visit private sector processors manufacturing processed fruits and vegetables in our target product areas, evaluate practices and offer suggestions as to improving processing operations.
3. Prepare trip reports for each site visit that includes recommendations for improvement and a process flow chart for each process. These will be shared with the client. Each trip report shall include a cover memorandum to the Task 2 leader that will not be included in the report to the client.
4. Recommend other "in country" activities once the consultant has gained an understanding of the situation.
5. Recommend to ALEB means to improve or modify programs.
6. Work with other Task Leaders while in country in the areas of marketing, business and association development as required.
7. Prepare a summary report at the end of the in-country portion of the project.

During the first visit, the consultant will focus on working with processors to upgrade in-plant operations. The second visit will continue with this activity, but will also serve to evaluate progress in operations visited the first trip.

Reporting: All reports shall be submitted in hard copy and electronically to Mr. Stier. Reports shall be prepared using MICROSOFT Word 6.0 or above in an arial font in an 11 pitch on size A4 paper. Trip reports shall be prepared while in-country and submitted prior to departure. The summary report shall be submitted within three weeks of the departure from Egypt.

REGISTRATION INFORMATION
FOOD ENGINEERING

Name _____

Title _____

Company _____

Address _____

TEL _____

FAX _____

Email _____

I will attend the program in

CAIRO

ALEXANDRIA

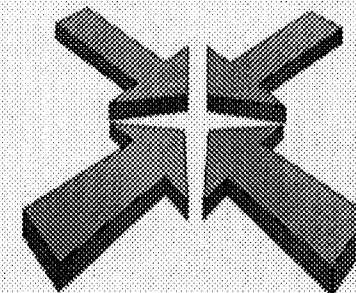
Attendees may register by calling in or faxing this registration to ALEB. They may also register on-site. Please let us know if you plan to attend so that we can plan appropriately.

There will be a 100LE registration for this program. Registrants will receive a course notebook, lunches and coffee breaks morning and afternoon on each day and a certificate of participation.

For further details, contact:

Agriculture Led Export Businesses (ALEB)
12 Dokki Street
Dokki, Cairo, EGYPT
TEL 202-338-1445 (8 Lines)
FAX 202-348-0729

**DESCRIPTIVE
FOOD
ENGINEERING**



**A SHORT COURSE IN A SERIES
SPONSORED**

**BY THE
AGRICULTURE LED EXPORT
BUSINESSES PROJECT (ALEB)
CAIRO, EGYPT**

&

**THE CENTER FOR ADVANCED FOOD
TECHNOLOGY
PISCATAWAY, NJ, USA**

USAID Contract No. 263-0264

October 16, 2000 at 9:30 at the Hotel
Mercure, Alexandria
October 17, 2000 at 9:00 at the ALEB
Training Center
12 Dokki Street, 5th Floor

ContactName	Position	Company Name	AddressEn	Headquarters	Headquarters
Dr. Hassan Gaafar	Quality Assurance	El Nasr Co. for Dehydrating	4 Maarouf St. from Soilman	5746377 -	5758755
Dr. Hala El Masry	Partner	Farm Fresh - MISRCO	68 El Naby Danial St., Alexandria	034862907 -	034846207
Dr. Adel Omara		HIPH - Higher Institute for Public	165 El Horreya Ave.	034215575	034218436
Dr. Aly Khamis Amin		HIPH - Higher Institute for Public	165 El Horreya Ave.	034215575	034218436
Dr. Hanaa Ismail		HIPH - Higher Institute for Public	165 El Horreya Ave.	034215575	034218436
Eng. Yousry El Sayed	Manager, Rasheed	Kaha Co. for Preserved Foods	43 Abd El Khalek Tharwat St.	3901480 -	3903487
Mr. Adel Abd El Maksoud	Tabia Plant Manager	Kaha Co. for Preserved Foods	43 Abd El Khalek Tharwat St.	3901480 -	3903487
Mr. Nazih Gamal	Manager, Tabia	Kaha Co. for Preserved Foods	43 Abd El Khalek Tharwat St.	3901480 -	3903487
Mr. Ahmed Khamis	Juice Plant Manager	Mansour Group - Siclam	Mostafa Kamel Street	035359099	035349870
Eng. Osama Tawfik	Quality Control	Mansour Group - Siclam	Mostafa Kamel Street	035359099	035349870
Mr. El Kotb Mostafa Bakr	Canning Manager	Naggar Foods	Industrial Area 1, Borg El Arab	035506788 -	034594429

Find: Descriptive Food Engineering

Training and TA Events

Every time a course is given or TA is offered, it is a TTA event

Course Name: Descriptive Food Engineering

Go to: Add

Start Date: 15-Oct-2000

Attendees:

Copy List of Attendees

Update List of Attendees

Number of Attendees

11

Dr. Hassan Gaafar	El Nasr Co. for Dehydrating Agricultural Products
Dr. Hala El Masry	Farm Fresh - MISRCO
Dr. Aly Khamis Amin	HIPH - Higher Institute for Public Health
Dr. Hanaa Ismail	HIPH - Higher Institute for Public Health
Dr. Adel Omara	HIPH - Higher Institute for Public Health
Mr. Nazih Gamal	Kaha Co. for Preserved Foods
Mr. Adel Abd El Maksoud	Kaha Co. for Preserved Foods
Eng. Yousry El Sayed Ahmed	Kaha Co. for Preserved Foods
Eng. Osama Tawfik	Mansour Group - Sidam
Mr. Ahmed Khamis	Mansour Group - Sidam
Mr. El Kottb Mostafa Bakr	Naggar Foods

SUMMARY REPORT

Thomas A. Butterworth, Ph.D., Consultant to ALEB
Managing General Partner
Austin Food Tech, Inc.
3818 E. La Palma Avenue
Anaheim, CA 92807
Ph: 714/888-8482; FAX: 714/888-8482
E-Mail: foodtech@compuserve.com

DATES IN EGYPT

September 28 until October 19, 2000.

PURPOSE

One major objective of the visit was to present a 1-day course in Descriptive Food Engineering. This course was presented twice, once in Alexandria and once in Cairo. This course was targeted to individuals working in the food processing industry in Egypt. Much of the feedback we later received from the participants was quite positive although some participants balked at some of the theoretical material presented in two of the sections. Side-by-side translations of each slide were given as handouts. ALEB's administrative staff helped make both events proceed quite smoothly.

The second objective of the trip was to visit as many food processing facilities as possible and provide whatever technical advice was appropriate after touring the facilities and meeting with key management personnel. In those factories I had already visited, I made follow-up inquiries and/or observations of any suggestions I had made previously.

FACILITIES VISITED

I visited thirteen different companies with one follow-up meeting. I had previously visited five of these facilities.

A summary of the visits is below.

Egyptian Canning Company (Americana)

Highlights: Process refinements I had suggested earlier had been implemented, resulting in increased vacuum and reduced bucking. Identified one mercury thermometer in four that did not comply with U.S. regulations. Suggested a means of upgrading it within the physical constraints of the existing retort.

Frostie

Highlights: Provided specific direction in their efforts to improve Ketchup and Mustard. Some failures in sanitation noted previously were improved, but facility pretty much like before. No improvement in Mayonnaise process.

Heinz Egypt

Highlights: Process refinements I had suggested earlier had resulted in substantial reduction in Ketchup "cracking," especially in the smaller sizes. Suggested further improvements to eliminate problem on all sizes. Other previous suggestions had resulted in the elimination of the gel-like and weepy texture of Ketchup. Provided direction in current problems they are experiencing in separation and processing of Tomato Juice, poor quality of Mayonnaise and separation and spoilage in Hot Sauce. Paste is still dark but they prefer it that way.

Kaha (Kaha)

Highlights: Identified several specific process improvements to improve the quality of frozen vegetables.

Interfoods Egypt

Highlights: Suggested some minor improvements to general sanitation and GMP's.

Al-Assaf Group

Highlights: None. Although they wanted to begin manufacturing processed foods in addition to fresh produce, a fire has left their continued existence in question.

Harvest Foods

Highlights: Suggested streamlining their incubation procedure and auditing their retorts against 21 CFR Part 113.

SFCO

Highlights: No change in facility since ALEB's last visit. Follow-up meeting with new Export Manager indicated that conditions at the facility would be improving per ALEB's recommendations.

Cairo Agro-Processing Co. (a.k.a. Nile Fruit Pulp)

Highlights: Explained the prerequisites of HACCP. At their request delivered two samples of Nile fruit pulp to Dr. Cheftel of France.

Dr. Olivee Co.

Highlights: Explained the details of registration and process filing with FDA and the concomitant importance of GMP's.

Agro Food Co.

Highlights: Provided specific recommendations for reducing problem with rodents as well as other sanitation issues.

Seclam

Highlights: Reviewed state-of-the-art milk and juice lines now under construction. First time ALEB representative has seen these lines.

Vitrac

Highlights: Suggested formula improvements to Apple Jam, a process improvement for Tomato Juice and an improved method for monitoring the cooling process.

IMPRESSIONS

Having Arabic translations of the handouts was extremely helpful. This practice should continue.

AL-ASSAF GROUP
DR. CHEMIST
Mansour Hassan Assaf
 GENERAL MANAGER



FROSTI

Manufacturing & Export
 Agricultural Products

Eng.
Adel Solaa
 Chairman

Head Office: 53 Ramsis St.
 Of Demashq - Roxy - Cairo
 Tel.: (02) 4507982 - 4507983 - 4507984
 Fax: (02) 4509675

DR. Ali J. Abd EL Rahman
 chairman

Ali Albrinkii
Abdul Rahman

Administration:
 Menahot El-Sadat
 Zagazig - Egypt
 Tel.: +2055333873
 Fax: +2055383873
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 Tel.: +2024194723
 Fax: +2022918271

DR. OLIVEE CO.
 For Food Industries & Agricultural Investment Ltd.

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 Tel.: 00202.7601028 - 3484252 Fax: 00202.3367831
 Mobile: 012.3249262 E-mail: agrofood@softcom.com.eg

Marco Semeria

Agro food Co.



INTERFOODS EGYPT

DR.
NABIL A. ABDEL SALAM
 PLANT MANAGER

*10th of Ramadan City Industrial Area B.2
 Tel.: (015) 365138 - 361438
 *1085 Comiche El-Nil - Garden City-Cairo
 Tel.: (02) 3559553/4 - 3559684
 Fax: (015) 367148
 E-mail: nass99@hotmail.com

Mr. M. M. ABD EL DAM
 المدير العام
 م. ابراهيم على ابراهيم

988/333873
 055/303873 Fax

DR. OLIVEE CO.
 For Food Industries & Agricultural Investment Ltd.

الإدارة : منطقة السادات
 الزقاق 10 / 1085
 فاكس (015) 365138
 مكتبة القاهرة : 17 من الأهرام
 مصر الجديدة / 1085
 فاكس 3559684
 مركز توزيع الإسكندرية :
 60 من أحمد المشيربي
 سياتر بشر عام 988-984

NILE Cairo Agro-Processing Co. Ltd.
 شركة القاهرة للتصنيع الزراعي ش.م.م

Eng. Abdel Nasser Morsy
 QC Manager

28 M. Seld Al Halwany st. - Helipolis 11361- Cairo, Egypt.
 Voice +202.266.4544 / 266.7779 Data +202.266.4222
 E-mail: anasser@nilefruit-pulp.com www.nilefruit-pulp.com

FROSTI فروستي
 FOR FOOD INDUSTRIES للصناعات الغذائية

مملوح صيام
MAMDOH SIYAM

القاهرة ت/ 21543799 - 2156982 - ف/ 2155253
 Cairo Tel.: 2156982-2143799 Fax: 2155253
 E-MAIL: MSIYAM@FROSTIE.FOOD.COM.

SCHEDULE FOR DR. THOMAS BUTTERWORTH

MONTH SEPTEMBER - OCTOBER 2000

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
24	25	26	27	28 TOM BUTTERWORTH ARRIVES	29	30 KAHA – KAHA 13:00
1 INTERFOODS EGYPT Mr. Nabil Abdel Salem TEL 012-280-0541	2 ASSAF FOODS Dr. Mansour Assaf TEL 02-243-5085 FAX 02-639-8010 Meet on Iamelle Desert Rd @ 10:30	3 HARVEST FOODS Ms. Suzanne Zekdy TEL 011-340-528 FAX 011-340-531	4 AMERICANA Mr. M. Dagher TEL 011-336- 015,16,17 FAX 011-336-013 HEINZ	5 6 th OF OCTOBER HOLIDAY WORK ON REPORTS NO PLANT VISITS	6	7 WORK ON REPORTS
8 COLUMBUS DAY SFCO Mr. Adel Solia (Chair) TEL 02-450-7862 FAX 02-450-8875	9 CAIRO AGRO FOOD PROCESSING Mr. Amr Rashad TEL 010-504-0540	10 FROSTI Mr. Mamdouh Siyam TEL 02-215-8982 FAX 02-215-5253	11 DR. OLIVEE Mr. Aly Ibrahim TEL 055-323-873 FAX 055-323-873	12 AGRO FOODS Mr. Salah Hegazy TEL 02-348-4252 FAX 02-336-7831	13 TRAVEL TO ALEX STAY AT MERCURE	14 WORK ON REPORTS
15 NAGGAR FOODS (Mr. Hassen Gewesh) Stay at Mercure	16 FOOD ENGINEERING (ALEX)	17 FOOD ENGINEERING (CAIRO)	18 VITRAC Mr. Mohamed Sami REPORT PREPARATION & DEBRIEFING	19 BUTTERWORTH DEPARTS	20	21
22	23	24	25	26	27	28
29	30	31 HALLOWEEN				



October 3, 2000

TEL/FAX 03-583-0187

Mr. Ahmed Auf
Auf Group
Auf Building
509 Horreya Street
Boulkdy, Alexandria

Dear Ahmed:

On behalf of Dr. Tom Butterworth and myself, I must again thank you for your hospitality when we visited on September 30. As always, you were a gracious host.

I hope that the meeting met your expectations. Both Dr. Butterworth and I felt that it was very enlightening in that it revealed that your upper level managers really do not fully understand the operations that they are managing. I have enclosed Dr. Butterworth's trip report. In this report, he summarizes the meeting and offers possible solutions to the problems that you saw on your visit to the Gulf country markets.

Dr. Butterworth mentions that possible causes of the carrot problem are failures in sorting, inspection and quality control. A part of the quality program should be equipment maintenance. The plant may simply not be properly maintaining the blades in the cutters. As you know, a dull or damaged blade does not cut properly.

We discussed several "next steps" for your plant people, which should help to not only to better define what is happening in the plants, but will also help develop the groundwork for troubleshooting any future problems.

1. Flow Charts – Your staff should "flow chart" each one of your products using the same procedure that we used in your office. These flow charts should be developed on the plant floor and describe what is actually happening, not what is "supposed to be happening." You saw how that exercise allowed us to find several points in the process where loss or lack of control could have compromised product quality. I would also suggest that your people expand this exercise to take an inventory of each piece of equipment being used. For example, if there is a blanching step being used at one plant, have them note by the blancher that it is a "steam blancher manufactured by FMC." If they take one more step and describe the condition of the equipment. Having a complete inventory of your equipment and its condition will help if and when you consolidate operations.

2. Palletizing – We talked about how a switch from shipping "loose" cases to unitized pallets could improve quality. Dr. Butterworth also mentions this in his

report. The more times a carton is handled, the greater the potential for damage, or in the case of frozen foods, thawing and subsequent clumping when it is refrozen. Palletizing *"in-plant"* and shipping pallets could reduce these two concerns. Mr. Morad also mentioned that any product that is trans-shipped through Saudi Arabia must be transferred to a Saudi truck at the border, which further increases the chances for thawing and damage. Transferring 20 pallets would be considerably easier and faster than transferring 2,000 cartons.

3. Documentation – Plant staff must be encouraged to better document what is going on. For example, maintaining records of blanch times or holding times will provide documentation on what is really happening in the plants and give your staff a means for determining problems. Without good records, there is no way to tell what really happened during a particular production run.

We are aware that you have been involved in a number of discussions with Doug Anderson and his consultants in the Business Development group. They have developed a company action plan or CAP for Kaha. You also have your own business plans. If the Technical Services group can help in any way, shape or form, please let us know. As you confirmed in your own visit to the Gulf States and Africa, Kaha has very strong brand recognition. By supporting you, we help move our own project forward.

Thank you again for your hospitality and cooperation. If you have any questions with regards to this report or anything that we have shared with you in the past, please let us know.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: Files, M. Ahmed



To: File
From: Thomas A. Butterworth
Subject: Trip Report, Kaha Company (Kaha)

On Saturday, September 30, 2000, we visited Kaha's facility in Kaha at the request of Mr. Ahmed Auf, General Manager of the Auf Group (e-mail: sauf@global.net.com.eg). For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Richard F. Stier (Director, Technical Service, ALEB)

Mr. Auf wanted us to concentrate on several quality issues, which he observed in Kaha's frozen vegetables at retail in the Gulf States. The problems centered around four areas:

1. Color: Varying in the same bag, some dark, some yellow, strawberries white on each end, artichokes with small specks of black, some yellow beans, very dark molokhia
2. Seals: Not always intact.
3. Product clumped with ice crystals inside the bag.
4. Varying sizes (as much as 30% in the same bag).
5. Some packages not flat.
6. Carrots not well cut.

We left aside the issue that many of these defects should be corrected, or at least documented, through an effective quality control system, since Mr. Auf seemed to be aware of this fact.

The issues on variable size and carrot cutting seemed to be clearly failures in sorting, inspection and quality control. Their solution is a review of all these procedures.

The discussion on seal failure revealed that there is no systematic testing, reporting and recording of seal failures. Lacking these there could also be no method of corrective action, something that could be quite simple for this manual sealing operation.

Packages not flat, clumped product and ice crystals indicate that some thawing is taking place. While it is easy to assume the thawing is taking place outside of Kaha's control (and some of it most likely is), an analysis of Kaha's flow chart indicated that it might also be taking place during delays in-process. One such delay is the loading of a truck, since this operation could require 2 to 3 hours. Switching to pallets could reduce this time to about 15 minutes.

The cause of the color changes is more subtle and we were able to point only to possibilities:

1. Underblanching: Blanching time at Kaha is determined by qualitative enzyme tests which are better suited to detect process failures rather than to develop blanching processes. They are "yes, maybe" tests; that is if you get enzyme activity with the tests, the enzyme is definitely present.

If the tests are negative it says only that the enzyme activity *may* have been reduced to a point where it does not affect product quality over the time of frozen storage.

2. In-process holding: Many of Kaha's processing lines are not straight through. Washed, trimmed and at times blanched product is held in-process at room temperature for as long as 8 hours.
3. Heavy metals: Ions of iron and copper can cause color changes in vegetables. While the water entering the facility may be low in these ions, the use of 0.1 to 1.0% citric acid in blanching and washing (respectively) could bring a high level of these ions into the process water if black iron and/or copper or its alloys are present on food-contact surfaces.

For the short term we suggested that Kaha should make an effort to freeze each rack of trays as the rack becomes available and not wait to fill an entire freezer.



Agriculture - Led Export Businesses

Supporting Egypt's Processed Foods Export Industry



October 3, 2000

TEL 015-365-138
FAX 015-367-148

Dr. Nabil Abdel Salam
Interfoods Egypt
Industrial Area B2
10th of Ramadan City

Dear Dr. Nabil:

Thank you for taking the time to visit with Dr. Tom Butterworth earlier this week. I have enclosed a copy of his report for your files. He was quite impressed with both your plant and your products. In fact, the only concern that he had was the fact that you had some unshielded lights.

It was also good to confirm that the lessons from the HACCP class of last November were taken to heart. We are pleased that you were able to utilize the information that we developed during the class as part of the food safety programs that you are developing for the powdered juice drinks.

Thank you again for your time, and should you have any questions or require any additional information please feel free to contact us.

Sincerely,

Richard F. Stier
Director, Technical Services

cc: Files, M. Ahmed

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Interfoods Egypt

On Sunday, October 1, 2000, I visited Interfoods Egypt, a small manufacturing company in 10th of Ramadan City that specializes in dry mixes for fruit drinks.

For Interfoods was:

Dr. Nabil Abdel Salam, Plant Manager (nabilnaas@hotmail.com)
Factory Ph: 015/365138-361438; FAX: 015/367148
10th of Ramadan City Industrial Area B2

Head Office: Ph: 02/3559553/4; FAX: 02/2954444
1085 Corniche El-Nil-Garden City-Cairo

COMPANY BACKGROUND

Interfoods began in 1983 with a license from General Foods to manufacture Tang. That license expired in 1994 and they developed their own instant orange drink powder under their own label, "Strike." They are currently selling another formulation of the orange product to Sainsbury's under the label "Tingo." Instant mango and apple drink powders were added to the line, to be followed soon with guava.

Most of the product is sold in Egypt with about 10% of the total exported to other Arab states.

All of the instant juice products are dry blended, not spray-dried. The mango product tastes quite good and has an excellent mouth feel, especially for a dry mix. The orange product, in my opinion, is demonstratively superior to Tang.

The lecithinated dry milk repackaging operation has moved to New Zealand, also in 10th of Ramadan City.

Dr. Salam described the operation as "seasonal," with a lot of production from February to September with small runs and maintenance the rest of the year. Dr. Salam seems uniquely qualified for his position, with an M.S. degree in beverage powders and Ph.D. in tropical fruits.

THE FACILITY

The grounds, warehouse and processing facilities were uniformly clean and well organized. There were three lines for 25 gm flat pouches and one line for glass jars. The batching area was standard for dry blenders: weighing, humidity and dust-controlled blending and gravity filling.

The only improvement I was able to suggest was covering some exposed fluorescent tubes in the processing area.

WHAT THEY HAVE LEARNED FROM ALEB

Dr. Salam attended a HACCP training session given by ALEB and modeled that flow chart for the manufacture of the drink powders after the example given in the class. He agreed to send you an acknowledgement of this contribution.

STATUS OF DOCUMENTATION

They have no ISO certifications and the HACCP plan is a work in-progress. They estimate the HACCP plan should be implemented by the end of March. They have written procedures for GMP as well as standard operating procedures. The company has no website.



Agriculture - Led Export Businesses

Supporting Egypt's Processed Foods Export Industry



October 3, 2000

TEL/FAX 02-243-5065

Dr. Mansour Hassan Assaf
Al-Assaf Group
Cairo

Dear Dr. Mansour:

Thank you for taking the time to visit with Dr. Tom Butterworth yesterday. I sincerely hope that he was able offer you some help and hope. I am enclosing a copy of his report on the visit for your files.

ALEB regrets the problems that the fire has caused and sincerely hope that we can provide some assistance. We have included a copy of the United States Agency for International Development's Commodity Improvement Program, but seeing as how you are looking at a season that is only a month off, there will be no way that you can take advantage of the program this year. If are interested in procuring baskets, equipment or chemicals locally for the pack season, please give the Technical Services Co-Director, Mr. Morad Ahmed a call (012-215-7061). He has an excellent understanding of local suppliers to the food industry, and may be able to help you source some of your needs.

Thank you again for your hospitality. Should you have any questions or require any additional information, please do hesitate to call.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Al-Assaf Group

On Monday, October 2, 2000, I visited the packing company of the Al-Assaf Group (hereinafter "Assaf") near Abu Hammad in the Eastern Delta. They pack most citrus, onions, garlic, rice and tropical fruits.

For Assaf was:

Dr. Mansour Hassan Assaf, General Manager
Ph/FAX: (002-055) 401652/405659

Cairo Office: Ph/FAX: (002-02) 2435065/6370197/6395010

Mobile: 012-3121151
010-5047756

COMPANY BACKGROUND

Assaf began as a packinghouse for fresh produce in 1997. Its major products and historical annual volumes are shown below:

Product	Capacity (Tons/year)
Oranges	2000
Onions	1000
Garlic	500
Mangos	300
Rice Grapefruit Lemon Guava	Various

Most of their products are for export to such countries as Vietnam, Hong Kong, Taiwan, the Gulf States, France, Poland and England.

THE CURRENT SITUATION

Assaf is in a desperate situation. They had an electrical fire in July, which destroyed most of their corrugated, their plastic totes for shipment of unprocessed fruit from the farms, and their chemicals. The equipment in the processing facility was mostly

untouched other than some of the rubber conveyor belts melted. They are currently repairing the electrical system and cleaning the considerable amount of debris in the processing area (although no one was working while I was there). Dr. Assaf said his losses amounted to about LE 2MM.

The insurance company has not yet settled. Although the season starts in about one month, they have no cash on hand to purchase the following items:

1. Plastic totes (5000)
2. Cartons (200,000)
3. Machine to staple cartons
4. Waterwax 22 (40 drums @ 200 kg)
5. Detergent (12 drums)
6. Fruitgard-P, SOPP 20% (20 drums)
7. TBZ, 98.5% (60 kg)
8. Imazalil (100 doses @ 0.5 kg)
9. Forklift

They currently purchase all the chemicals from Fomesa in Spain (international@fomesa.com) who can deliver within 15 working days after receipt of a letter of credit.

As for the totes I suggested that they do not have to be orange in color, they did not have to bear his logo and they did not even have to be new. This flexibility could only help in their procurement. I told him I did not think there was sufficient time to print the corrugated and suggested he could use blank stock and self-adhesive labels. He agreed to both these suggestions and then asked about the chemicals. I could think of no short cut for the chemicals. They must be procured from the supplier. I didn't know anything about procuring a forklift.

THE FACILITY

Because of the fire it is difficult to make much of an assessment of the line other than it is (or was) typical of, and in some ways better to the average produce packer, even in the U.S. Product was received in plastic totes, sorted, washed in detergent at about 35°C, rinsed with water and scrubbed, dried, waxed, dried again, and sorted twice more prior to sorting for size and packing.

CONCLUSION

I told Dr. Assaf that I would see if there were any resources available at ALEB to assist him now that we have some understanding of his situation. He said the best way to reach him is by FAX at his Cairo office.



Agriculture - Led Export Businesses

Supporting Egypt's Processed Foods Export Industry



October 9, 2000

TEL 011-340-528

FAX 011-340-531

Ms. Suzanne Zeidy
Harvest Foods
Zone 3, Lot 65
6th of October City

Dear Suzanne:

I would like to thank you and your staff at Harvest Foods for allowing us to visit with you last week. I must really apologize for the short notice, however. Please forgive us for that.

I am enclosing a copy of Dr. Tom Butterworth's report on the visit. He was really quite impressed with the operation. What he did not say in the report was how clean everything was. Congratulations on fat count. It is much easier to keep things clean on a regular basis than have to work as hard as you did to straighten up for the MFO audit.

Dr. Butterworth had only a few suggestions. These are;

1. Incubation Program – You may want to consider labeling and casing immediately, and checking for spoilage using a statistical sample. The dud detector could still be used on the labeling line. The target would be low vacuums rather than spoiled cans. Since you have yet to find any spoilage through the incubation program, this may be a cost savings option to pursue.
2. EDTA in Beans – Dr. Butterworth observed a discrepancy between a can of white beans and your website. The latter makes an all natural claim, but the can lists EDTA as an ingredient. EDTA is allowed in the United States as an additive to retain color (see attached).
3. Retort Systems – If you intend to export to the United States or a country like the UK, or intend to contract pack for Sainsbury's, retort systems and processes will need to be examined and validated. Dr. Butterworth noted that *"Each product has its own cook time but that there are no apparent changes in cook time for changes in initial temperature."* It is a standard practice to determine an initial temperature for the coldest can in each retort load to assure that the process is adequate. A potential customer such as Sainsbury's will not accept a process that was developed based on *"experience"*.

I am enclosing some information on a company called Temperature Indicators Limited. This UK-based company supplies time/temperature indicators that allow processors to be sure that foods are properly processed, and that cooked and

uncooked cans are not accidentally co-mingled. This is a product that I would recommend that you adopt.

Dr. Butterworth also mentioned that you have been considering added canned sweet corn to your product line. If you would like, we can help you research what equipment will be needed for this product.

Thank you again, Suzanne. Should you have any questions or require any additional information, please do hesitate to contact us.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files



To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Harvest Foods

On Tuesday, October 3, 2000, we visited Harvest Foods in 6th October City.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Terry L. Dunn Director (Market Information Systems)
Dr. Mark D. Jekanowski (Consultant to ALEB)

For Harvest was:

Ms. Suzanne Zeidy (General Manager and Co-Owner)
szeidy@yahoo.com

Factory Ph. (011) 340528-33; FAX: (011) 340531
3rd Industrial Zone, Lot 65
6th October City

Head office Ph. 393 4299; 392 1634; FAX: 393 4431
23 Talaat Harb St. Cairo
www.expolink.org/harvest

COMPANY BACKGROUND

Harvest Foods manufactures a wide range of canned bean products in 380 gm 2-piece steel cans. These include six types of Fava Beans, two types each of White Beans, Black-Eyed Peas, Green Peas, Chick Peas and Lentils. They also can Stuffed Vine (grape) Leaves and Wheat Breakfast Cereal. They have a small line of Fava, Lentils and Wheat Breakfast Cereal that they pack in 3-kilo cans for foodservice. Potential new products include Sweet Corn and Red Kidney Beans.

They manufacture their own cans, 2-piece deep-draw steel with easy-open lids.

The company is family-owned and began as a catering and foodservice company. The canning operation is separate and began small production runs in 1986. When they began no one in Egypt was producing canned Fava Beans.

Most of the raw materials are imported and they export only a small fraction of their production. They currently export small quantities to Italy, are negotiating to do contract packing for a Lebanese company and are having discussions with Sainsbury's for private label. They want to increase their exports and have viewed ALEB as a resource to help them accomplish this objective. Ms. Zeidy has attended "some" of ALEB's courses on HACCP and seemed quite interested in the upcoming course on Descriptive Food Engineering. Their HACCP program in process.

They are in operation 5 days/week, one shift/day, although the factory was not in operation when we were there. The capacity of the canning facility is 120 cans/min (2736 kg/hr or almost 22,000 kg/8-hr shift @100%). The can factory produces 180/min (@100%).

THE PROCESS

It appears that they purchased a turnkey system from IFM (Italy). Dry beans are received in bags and stored in one of three tanks. The dry beans then pass through a destoner and a grader which separates them into three sizes (They use similar size beans in the same production runs). The sized beans are transported manually in carts to an elevator which feeds one of six soak tanks. The beans soak for about 6 hours in city water at room temperature. After soaking they are dewatered and broken pieces and loose skins are removed by a rotating screen. The beans are blanched, cooled, dewatered and sorted for any remaining defects. They then pass under a magnet. Beans are filled into the can at this point with a rotary IFM filler. The cans are check-weighed and, if the formula requires, sent to a doser for some oil and returned. Topping is applied with a vacuum syrupe and steam flow is applied on closing. The filled and seamed cans are washed and loaded for retorting in a Busse-type system.

They have 4 retorts, each with a capacity of 5 baskets (or 1,120 cans). The retorts are stainless steel and are manufactured by O.P. Parini. It was difficult to tell exactly what type of sterilizing system they employed. It seemed to be a steam-air system since there was a 1 M dia. fan at the back of each retort attached to the outside with about a 5 horsepower motor. The pressure during retorting is 1.2 bar, which also points to a steam-air mixture since the processing temperature (121°C) would produce only one bar. Additionally, steam-air may be gentler on the easy open closures than steam alone.

Fava beans are cooked for 60 minutes. Each product has its own specific cook time but no apparent changes in cook time for changes in initial temperature.

The sterilized cans are cooled in the retort with overpressure to about 30°C, coded, cased by hand and held for an incubation time. The incubation time is 2 weeks in the summer and 3 weeks in winter at warehouse temperature. After incubation the cans are replaced on the line, sent through a dud detector, labeled and cased.

Double seams are checked at start-up and 2 to 3 times during the shift.

ANY SUGGESTIONS

Harvest has one of the two best bean operations I have seen, the other being in the U.S. The only suggestion I could make about the operation is that the incubation procedure could be streamlined. Rather than double casing the cans, they could send the cans all the way to labeling and final casing. The final cases could then be held for the incubation period and, instead of relying on the dud detector for spoiled cans, take a statistical sample of the lot. This procedure would be less costly and would involve handling the sterilized containers less frequently which, in itself, would reduce the frequency of defects. Thus far Harvest's incubation program has revealed no spoilage.

They have no current plans to export to the U.S. but if they ever do the retort, processing procedures and supporting documentation will have to be reviewed against 21 CFR Part 113.

Their website says that the products are 100% natural, yet my can of White Beans indicates that EDTA is added. While a website claim is not a label claim, Harvest should make sure that this claim does not appear on the label.

**Products****Contact Us**

Harvest Foods is the leading Egyptian company for processing and canning dehydrated beans in the Midd company was established in the year 1998.

The Harvest Foods Factory is located in the 6th of October City, 30Km west of Cairo.

The Company produces a wide variety of canned, ready to serve meals.

Harvest Foods uses 100% natural ingredients with no additives or preservatives. Freshness is contained in piece easy open cans.

Products are packed in 380gm cans except stuffed vine leaves which are packed in 360gm cans.

Harvest Foods have two main production lines:

- A Complete line for manufacturing of deep drawn tin plate cans making supplied from (Karges Hammer, capacity of 180 cans/min.
- A fully automatic line for processing and purchasing dehydrated beans supplied from IFM (SIMA) Italy w 120 cans/min.

The Company product portfolio mix a variety of beans (Fava (foul medames), navy beans, black eyed peas - all in brine and in various sauces) as well as Egyptian style stuffed vine leaves and the ever popular wheat called belila.

Aside from producing our brand "Harvest Foods" we are also interested in producing private label products produce all canned vegetables and fruits with the highest quality.

Contact Details:

Address: 3rd Industrial zone, block 65 infront of Alban El Maareyeen, 6th October
6th of October
Egypt

Tel: 2011-340528-29-30-32-33

Fax: 2011-340531

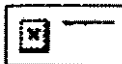
E-mail: gzaidy@yahoo.com

Key Contact:

Mr. Magdy Sabry, Marketing Manager

Ma. Suzan ZEIDY, General Manager

Proud to be a member of



The Egyptian Exporters Association

WASHINGTON ■ ■ ■

Nominations for FDA advisory committee members sought

The Food and Drug Administration is requesting nominations for members to serve on the Food Advisory Committee in FDA's Center for Food Safety and Applied Nutrition. Nominees must be knowledgeable in physical sciences, biological and life sciences, food science, risk assessment, and other relevant scientific and technical disciplines. The agency is particularly interested in candidates with a comprehensive background in food technology, molecular biology, genetics, biotechnology, and a variety of medical specialties. The term of office is up to 4 years. Details are in the *Federal Register* of July 28 (65 FR 46463-46464). For more information, contact C.M. DeBoever at FDA, 200 C St., S.W., Washington, DC 20204 (phone 202-205-4251).

Agencies help promote National Food Safety Education MonthSM

FDA and the U.S. Dept. of Agriculture have joined with the restaurant and foodservice industry in promoting September 2000 as National Food Safety Education Month (NFSEM). It is sponsored by the International Food Safety Council, which was founded by the National Restaurant Association Educational Foundation in 1993. Now in its sixth year, NFSEM has become a major food safety education focus for government and consumer organizations, as well as industry. President Clinton's National Food Safety Initiative recognizes and encourages observance of NFSEM, whose theme this year is "Be Smart. Keep Foods Apart—Don't Cross-Contaminate." Materials for educators are available at www.foodsafety.gov or <http://www.usda.gov>.

Early data show that HACCP-based inspection improves food safety

On July 17, the U.S. Dept. of Agriculture's Food Safety and Inspection Service announced that its HACCP-based inspection project is beginning to produce results showing dramatic improvements in food safety and other consumer protection concerns, according to preliminary data now available for young chickens. According to FSIS, this system of inspection has reduced food safety defects in young chickens by at least 92% in plants that are participating in the project. However, a three-judge panel of the U.S. Court of Appeals for the District of Columbia reversed a lower court ruling in favor of the project and sent it back for further proceedings. Meanwhile, the agency is continuing all other HACCP-based inspection projects.

Comments on approach to safety of foods during distribution requested

FDA is requesting comments on the materials presented at its June 9 public meeting on in-distribution control. The meeting was held to discuss the agency's strategy for addressing the safety of retail and poultry products during distribution. In addition, the Agency has assigned the greater majority of its resources to inspection activities in meat and poultry slaughter and processing plants. FSIS now is looking at strategies for bolstering the safety of retail and poultry products after they leave an inspected plant. One of these strategies is through the in-distribution project, which requires the presence of inspection personnel outside the plant. Deadline for comments is Sept. 15. For more information, contact M. Currell at USDA/FSIS, Washington, DC 20250 (phone 202-720-3219).

Comments to Food Chemicals Codex proposed

FDA is requesting comments on revisions and corrections to current specification monographs for various substances used as food ingredients, new and revised general test procedures, and revised test methods. The changes will appear in the third supplement to the fourth edition of Food Chemicals Codex, scheduled for public release next summer. Comments for consideration in Sept. 02. Details are in the *Federal Register* of August 8 (65 FR 46321-46329). For more information, contact B. Marks in the Institute of Medicine, 2101 Constitution Ave., N.W., Washington, DC 20418 (phone 202-334-2500) or <http://www.nationalacademies.org>.

EDTA allowed in canned legumes to retain color

FDA is allowing use of up to 365 ppm of calcium disodium ethylenediaminetetraacetate (EDTA) or up to 165 ppm of sodium EDTA to promote color retention for all edible types of cooked, canned legumes, in response to a petition filed by the National Food Processors Association. Details are in the *Federal Register* of August 8 (65 FR 46377-46379). For more information, contact M.E. LaVecchia at FDA, 200 C St., S.W., Washington, DC 20204 (phone 202-418-3042).

Dairy proposal withdrawn

The American Dairy Products Institute has withdrawn its Feb. 3, 1995, petition proposing that FDA affirm that the use of whey protein isolate and dairy product solids is generally recognized as safe (GRAS) as direct human food ingredients. These food ingredients were redefined from the original submission containing specifications for reduced lactose whey, reduced mineral whey, and whey protein concentrate. Details are in the *Federal Register* of August 9 (65 FR 48716). For more information, contact A.M. Belolan at FDA, 200 C St., S.W., Washington, DC 20204 (phone 202-418-3082). ●

02 OCT 2000

Registered Office
Yewbarrow Studio
Grange-Over-Sands
Cumbria, England
LA11 6ED.

Telephone: 015395 35488

Fax: 015395 35489



SUPPLIERS OF TEMPERATURE
ACHIEVEMENT INDICATORS

2nd October 2000

Agriculture - Led Export Businesses (ALEB Project)
12 Dokki Street
6th Floor
Giza 12311
Egypt

For the attention of Mr Richard F. Stier

Dear Richard,

We have today received from you a request for information regarding retort indicators, and subsequent to our telephone conversation I am pleased to confirm that samples will be forwarded to you today to Egypt.

I will forward separately, in a few days time, the video which has been produced to help introduce retort operators to the principles of canned food operations.

Till our literature arrives please note

our website is : www.temperature-indicators.co.uk

e-mail : sales@temperature-indicators.co.uk

With best regards,


David J Arrowsmith



TEMPERATURE
INDICATORS
LIMITED

product information

Retort Checks

Retort Canning Process Indicator

For steam pressure cooking of
low-moist foods

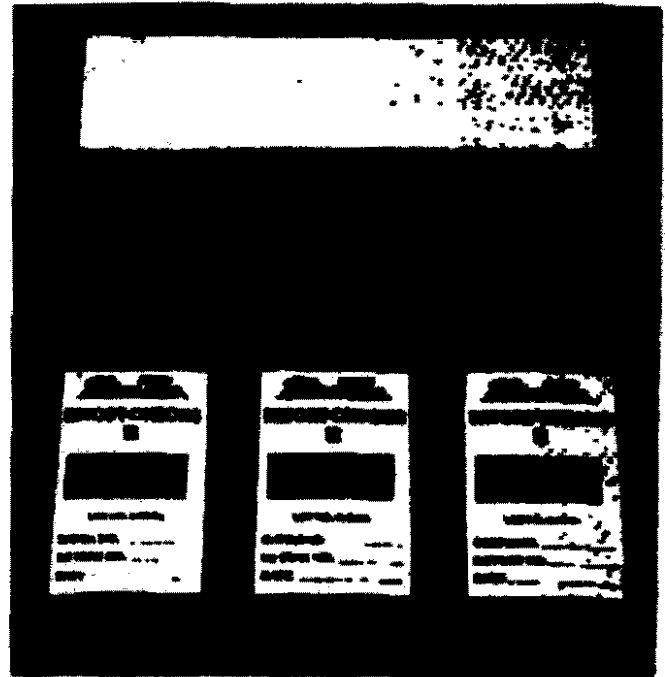
- Assure compliance with prescribed cooking cycle
Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart.
- Signals errors in processing time/temperature or a malfunction of equipment
Chemical indicator will not complete its colour change to green if an error in the cook has occurred.
- Meets guidelines for the safe production of "Heat Preserved Foods" Department of Health Section 16.3.4.

The basic principles are:

- A heat sensitive indicator marked with the basket number and sufficient information to fully identify that basket of product.
- A large, easily visible marker to identify at a glance the process status and product scheduled process time.

A typical system uses a heat sensitive card or tape which is marked by the basket loader with the sequential basket no., date, product/line code plus any other critical information such as time of starting to fill basket.

- Provides a permanent record of processing
- Range of time/temperature indicators
Available for various cooking processes (see selection chart).



Widmore Street, Grange over Sands
Cumbria LA11 6EP United Kingdom

t. +44 (0) 15395 35400
f. +44 (0) 15395 35409

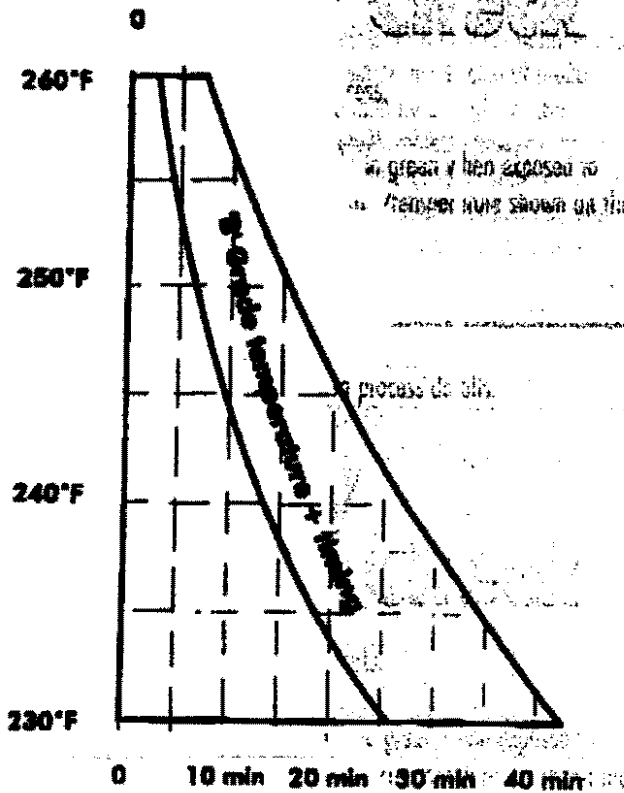
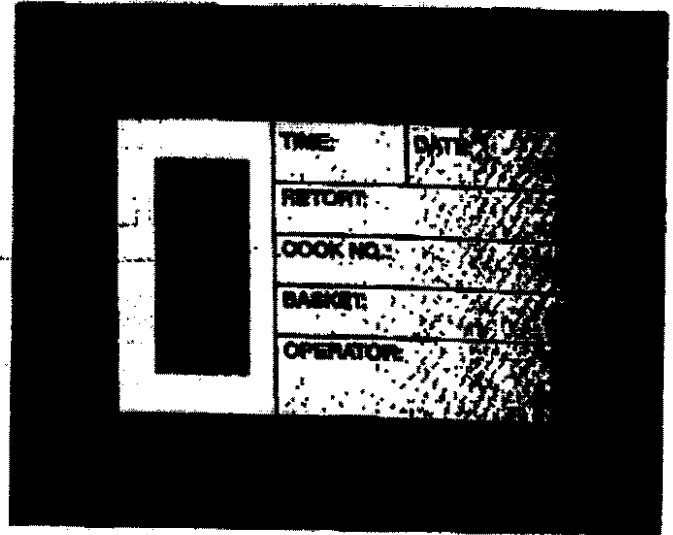


TEMPERATURE
INDICATORS
LIMITED

product information

B grade Economy Cannery Check

- Provides a permanent record of process.
- Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart for return-check 3.
- Evidence of process only.
- Six available segments for recording process details.
- Samples forwarded on request.



Yarrow Stalls Group over Seeds
 Conals LATT 6ED United Kingdom
 Temperature Indicators is a member of the Compton and
 Charlewood Food Research Association, Gloucestershire, UK.

t: +44 (0) 15395 35488
 f: +44 (0) 15395 35489
 w: www.temperature-indicators.co.uk
 e: sales@temperature-indicators.co.uk

Autoclave Tape

ISO9000 approved

Properties

- **Carrier:** Craped paper
- **Adhesive:** Rubber
- **Thickness:** 0.185mm
- **Tensile:** 93N/25mm
- **Adhesion to steel:** 11N/25mm
- **Elongation:** 7%
- **Temperature range:** 125°C - 135°C
- **Shelf life:** 100sec to 240sec
- **Storage:** 1 year (original packaging)
Cool, dry conditions

Description

- A tape based on a smooth craped paper and rubber adhesive.
- The product is designed as an indicator for steam autoclaving. (Steam sterilisation).
- During service black lines will appear to indicate when steam sterilisation has been attained.

Supplied

- 19mm wide - 64 rolls per case
- 25mm wide - 48 rolls per case



Temperature Indicators Limited
Gorge over Searc
Cardle LA11 6EP United Kingdom
Temperature Indicators is a member of the Compton and
Chadwood Food Research Association, Gloucestershire, UK.

Tel: +44 (0) 15375 35400
Fax: +44 (0) 15375 35407
www.temperature-indicators.co.uk
e: sales@temperature-indicators.co.uk

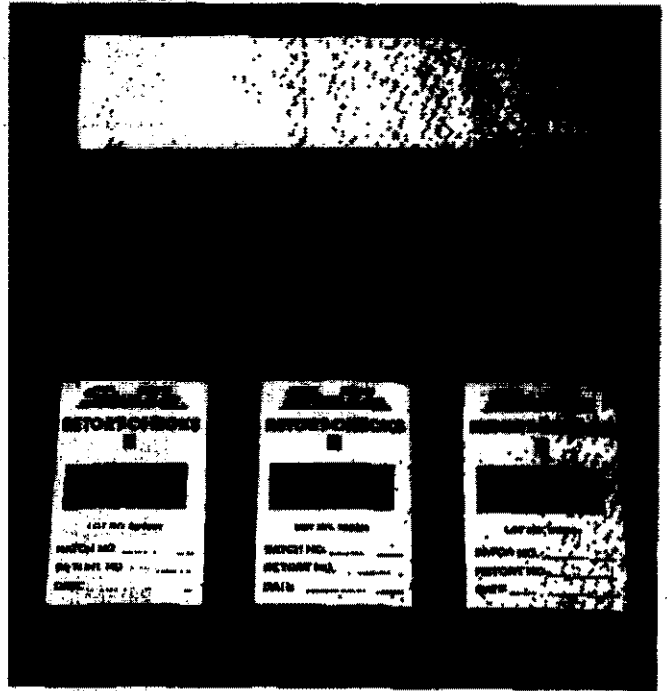


Retort Checks

Retort Canning Process Indicator

For steam pressure cooking of low-acid foods

- **Assure compliance with prescribed cooking cycle**
Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart.
- **Signals errors in processing time/temperature or a malfunction of equipment**
Chemical indicator will not complete its colour change to green if an error in the cook has occurred.
- **Meets Federal Regulation Title 21, Code of Federal Regulations...Section 113.87**
(b) All retort baskets, trucks, cans or crates containing unretorted food products, or some of the containers on the top of the baskets, shall be plainly and conspicuously marked with a heat sensitive indicator or by other effective means, which will usually indicate to thermal processing personnel whether or not each such unit has been retorted.
- **Provides a permanent record of processing**
- **Range of time/temperature indicators**
Available for various cooking processes (see selection chart).



US MARKET

For samples or ordering

in the USA

Call the Steritec Facility Direct

303-660-4201



October 9, 2000

Mr. Mohammed Aboul Ezz
Heinz Egypt
Industrial Zone No. 2
6th of October City

Dear Mohammed:

Many thanks to you and your colleagues for taking the time to visit with Dr. Tom Butterworth last week. He was quite pleased to see that his past visits have been helpful. I am enclosing a copy of his report for your files. The report provides updates of observations and discussions from his previous visits, plus several new recommendations. Dr. Butterworth will be in Egypt through October 18 should you wish to discuss any of these issues at greater length. The recommendations from this report are summarized in part below;

1. Tomato Juice – You mentioned that there have been some problems with separation of the juice. Dr. Butterworth makes two suggestions to address this concern; casing upside-down or adding a continuous neck label to hide the problem. Another option could be to add a notice to the label advising the consumer to "SHAKE WELL BEFORE USING." There is also a suggestion that you may want to increase the process on the juice to assure the destruction of the flat-sour bacteria, *Bacillus coagulans*. This organism has been known to spoil tomato products with pH values greater than 4.1 and solids concentrations of less than 18%. The recommendation is to heat the product in a heat exchanger to 118°C and fill at 90°C or above. An article on thermophilic organisms involved in food spoilage is attached.

2. Mayonnaise – Dr. Butterworth observed that the mayonnaise had some problems. He will send you a starter formula and suggests that you work with Golden State Foods to assure that there are no pro-oxidant materials (iron, copper or brass) in their processing lines. He also suggests that you use an outside lab to analyze (if you have not already done so) the competition to provide better guidance in the formulation.

3. Hot Sauce – There were two issues with the hot sauce product; separation and sporadic spoilage. Dr. Butterworth suggests that you either modify the way that the xanthan gum is being rehydrated or consider reformulating with the instantized xanthan gum manufactured by Zumbro. A change in present thermal process might help to eliminate the spoilage problem.

Thanks again for your time. Should you have any questions, or require any additional information, please feel free to contact us.

Sincerely yours,

Richard F. Slier
Director, Technical Services
cc: M. Ahmed, File

To: R.F. Stier
From: Thomas A. Butterworth
Subject: Trip Report, Heinz Egypt

On Wednesday, October 4, 2000, we visited the Heinz Egypt facility in 6th October City.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Grayson Daniels (Sparks Corporation)
Terry L. Dunn Director (Market Information Systems)
Dr. Mark D. Jekanowski (Sparks Corporation)

For Heinz were:

Mohammad About Ezz (Head, Quality Assurance)
E-mail: maboulezz@heinz.com.eg
Ahmed Soliman Mohsen (Quality Assurance, Technical Department)
E-mail: asoliman@heinz.com.eg
Also present were the Quality Control Manager and the Mahead of R&D

Factory:

6 October City
No. 36 Industrial Zone #2
Ph. 011 330474; FAX: 011 330467

Office:

9, Hussein Ahmed Rashad St.
El-Dokki
Ph. (202) 3384355; FAX: (202) 3609280

BACKGROUND & UPDATES

The primary objective of the visit was to follow up on the status of technical recommendations from my visit of March 23, 2000. The following is the status of these questions and recommendations (original issues in italics). I have listed only those issues, which were not resolved during our last visit.

1. *The cold broken paste is at times too thick, causing processing problems.*

This is still an issue since even local (non-Heinz varieties) are very thick.

2. *The capacity of the vacuum pan is lower than expected. The fresh tomato capacity is supposed to be 8 tons/hour (to 37° Brix) but they only get about 5.*

They have not done the testing to show if the evaporator can even run water at 8 tons/hour, which I suggested in March. This issue is apparently not a priority right now.

3. *They have no way of relating the color of incoming tomatoes to finished product color.*

I suggested in March that they abandon this issue as having very little chance of success. They apparently have done so.

4. *They occasionally get split seeds.*

Split seeds were not a major issue and apparently occurred in paste on only one occasion. As such no action was taken on this.

5. *"Cracks" in ketchup*

A "crack" may be thought of as a displacement of the headspace gas (under vacuum) to some other area of the bottle. If this headspace "gas" shows up at the side of the bottle it appears as a "crack" in the product.

I recommended in March two approaches that were adopted by Heinz:

- a. Measure final temperature into the case (case-in temperature) as an average (or stirred) temperature of the entire bottle, not the center temperature.
- b. Increase the case-in temperature to 40 to 45°C, stirred.

The incidence of cracking has been reduced substantially since March, especially in the smaller sizes. However there is still some cracking to some degree in the larger sizes. These bottles have narrow necks compared to the contents of the bottles.

One possible solution occurred to after we left. When I visited Heinz in March, I remember that the cooling water was quite cold, perhaps even refrigerated. This relatively cold water could possibly be forming a "plug" of cooled ketchup in the narrow neck, preventing headspace gas from rising even though the average temperature of the ketchup would otherwise be high enough to prevent cracking. The smaller bottles are cooled for only 30 minutes and the larger sizes for 45. This additional cooling time required for the larger sizes could be sufficient to form such a plug, which is not observed in the smaller sizes. Every other ketchup operation I have ever seen used cooling water temperature of about 25 to 30°C. In no other ketchup operation have I observed cracking. My suggestion (if feasible) is to cool the bottles to an average temperature of 40 to 45°C with water as warm as possible without reducing output. This information has been transmitted to Mr. Ahmed Soliman Mohsen by e-mail.

6. *They installed a new APV homogenizer and it is producing a gel-like, weepy product with an unusual texture.*

I suggested in March that the product looked over-homogenized. They have reduced the homogenization pressure and texture is much improved.

7. *Consumer paste is dark and has a burned flavor*

Heinz believes that their paste is what Egyptian consumers want.

NEW ISSUES

1. **Tomato Juice:** This is one of several new products. It is packed in a 180 mL ketchup bottle, is made from concentrate and is hot filled in a manner similar to ketchup.

They are having some problem with separation, common to juice made from paste. I suggested either casing the product up side down so the "clock" on the separation does not begin until the retailer places the bottle on the shelf. Another possible solution is a continuous neck label, depending on the extent on the separation.

I also suggested that the pH of tomato juice in the U.S. is high enough to support the growth of flat-sour bacteria. A typical heat process for juice in the U.S. is to heat the juice to 118°C for 30 seconds and cool to 90°C for filling.

2. **Mayonnaise:** This product is co-packed by Golden State Foods until the market will justify a facility for in-house production. The target product is Gober.

The current formulation/process has some problems. The product separates on transit, is somewhat rancid and tastes too strongly of egg yolks. The product is 80% sunflower oil (quite high), contains 0.05% xanthan gum (unusual for mayonnaise) and was not inerted with nitrogen, either in the headspace or in-process. Additionally, Golden State packs it into drums and ships it to Heinz where it is more-or-less dumped into a tank and packed into jars. The formula seemed like it had some problems. I agreed to send a "starter formula" for a mayonnaise similar to Best Foods in the U.S.

If EDTA is allowed as an antioxidant in Egypt they should be using it.

Meanwhile, I encouraged them to audit Golden State Foods and their own operation for any black iron, brass or bronze fittings on food contact surfaces as they will catalyze the lipid oxidation process. Additionally they should take steps to assure that the oil (either in its pure form or in mayonnaise) is not

exposed to an oxygen level over 2% (target 1%). I discouraged the idea of trying to create vacuum in the jars with steam flow.

If they continue to receive mayonnaise in drums they should pump it out, perhaps with a Graco style pump, thus minimizing oxygen transfer into the product.

I also suggested that they send some of the target product, Gobar, to an analytical laboratory for proximate analysis (moisture, fat, protein, ash and carbohydrate by difference), total acid, salt, sugar profile and cholesterol. This information will provide some hard data to guide the formulation process.

3. **Hot Sauce:** This is not a new product for Heinz. They have introduced a larger size, 180 gm in a ketchup bottle with a shaker filament. The product is manufactured from fresh chiles. The crushed, washed and sorted chiles are pasteurized at 90°C.

They have been experiencing some separation and I suggested they change the way they handle the xanthan gum to achieve maximum functionality. Currently they blend the gum with salt and then add it to water and vinegar. Xanthan gum does not hydrate well in salt solutions. It hydrates best in either plain water or with some non-ionic solute such as sugar. I suggested they add a small amount of sugar to the formula (the same level as xanthan gum), blend the two, add to the water and allow the gum to hydrate for 5 to 10 minutes before adding any other ingredient. The sugar should have a finer granulation than regular Egyptian sugar. If they do not want to use the sugar approach, Zumbro, in the U.S., (<http://www.zumbro.com>) manufactures an instantized xanthan gum that can be dispersed directly into water.

The second issue is more elusive. They are experiencing a low level of sporadic spoilage only in the older, smaller, narrow-neck glass jar. This jar uses manual filling, a plastic cap, no torque control and no cap liner. These are the only differences I could tell between the newer larger bottle and the smaller one that is experiencing spoilage. Yet none of these differences could explain how mold can grow in a product with $2.8 < \text{pH} < 2.9$, Brix 10 to 10.5 and total acidity of 3.0 to 3.5%. This spoilage should not be occurring. I could suggest only a mild hot fill process (80 to 70°C) or acidification of the chile pasteurization process (to pH 4) to better utilize the heat at 90°C.

As a side issue, I was served a new 180 gm bottle of Heinz Hot Sauce at a hotel in Luxor. After I opened the bottle the sauce was not coming out fast enough to suit me so I shook more vigorously. The shaker filament came out and my pizza was drowned in hot sauce. I suggest that some thought be given to increasing the diameter of the hole in the shaker filament to match the neck of the smaller, narrow bottle.

One possible solution occurred to after we left. When I visited Heinz in March, I remember that the cooling water was quite cold, perhaps even refrigerated. This relatively cold water could possibly be forming a "plug" of cooled ketchup in the narrow neck, preventing headspace gas from rising even though the average temperature of the ketchup would otherwise be high enough to prevent cracking. The smaller bottles are cooled for only 30 minutes and the larger sizes for 45. This additional cooling time required for the larger sizes could be sufficient to form such a plug, which is not observed in the smaller sizes. Every other ketchup operation I have ever seen used cooling water temperature of about 25 to 30°C. In no other ketchup operation have I observed cracking. My suggestion (if feasible) is to cool the bottles to an average temperature of 40 to 45°C with water as warm as possible without reducing output. This information has been transmitted to Mr. Ahmed Soliman Mohsen by e-mail.

Thermophilic Organisms Involved in Food Spoilage: Introduction

CLEVE B. DENNY

National Food Processors Association, 1133 Twentieth Street, N.W., Washington, D.C. 20036

(Received for publication May 28, 1980)

The thermophilic spoilage organisms will be discussed in this series of papers. As you know, thermophilic means heat-loving. Some of these organisms in the vegetative form can grow at 70 C or 158 F. In fact, Gordon and Smith (10) showed that 45 of 87 cultures of *Bacillus stearothermophilus* could grow at 70 C. These thermophilic organisms are all spore-formers, can grow anaerobically, and have some heat resistance, so we would expect them to be of some consequence in the spoilage of canned

Inadvertent under-processing and post-process contamination of canned foods are the leading causes of canned food spoilage today. However, before 1930, the leading cause of spoilage in canned foods was probably thermophilic spoilage.

In 1913, Barlow (1) submitted to the University of Illinois his Master of Science thesis, based upon experimental studies on spoilage of canned corn. Almost unnoticed at the time and for some years afterward, this piece of research was eventually recognized as a landmark in the bacteriology of canning. Earlier literature has indicated that the role of thermophilic bacteria in spoilage was suspected, but supporting data were lacking. Barlow's contribution, and an outstanding one, was in demonstrating the fact of spoilage through the activity of thermophilic bacteria.

In more recent years, Barlow's work has been cited by various writers, with fitting tribute to its soundness and originality. The text, however, has not been generally available to workers in the science of food preservation, since it was never published. To make this historic contribution more generally accessible, the National Canners Association reproduced Bronson Barlow's thesis, "A Spoilage of Corn Due to Thermophilic Bacteria."

During the 1926 canning season, bacteriologists from the Research Laboratories of the National Canners Association conducted the first of a long series of bacteriological investigations in canning factories. This work was reported by Cameron (2). It was ascertained very early in the investigations that refined sugar, a canning ingredient for a number of products, might contain spores of thermophilic spoilage organisms. This was reported in *The Canner* in

1930 (3). The fact that use of sugar containing excessive numbers of these organisms could lead to spoilage difficulties was demonstrated in a practical way by the use of a test pack (5). It was quite evident from the data that even extensive heat processing failed to eliminate the spoilage type contributed by the high-count sugar. As a result of the early studies, the National Canners Association, in 1931, set up advisory bacterial standards for sugar (11). Reports on microbiological methods for detecting and estimating thermophilic bacteria in sugar were published in the *Journal of the Association of Official Agricultural Chemists* in 1936 (4), 1938 (5), 1940 (6) and 1950 (7). These standards are applied to sugar or liquid sugar intended for use in the canning of low-acid foods (pH 4.6 or above). The method is listed as "Thermophilic Bacterial Spores In Sugars - Official First Action (46.062)" in the 12th edition of *Official Methods of Analysis of the Association of Official Analytical Chemists* (8).

Similar procedures have been applied to other ingredients such as starch, flour and spices to test for thermophilic spores. Equipment and product material on the canning line, particularly if held hot, can become sources of contamination. These organisms reproduce and form spores much faster than mesophilic organisms, so sanitation plays an important role in keeping their numbers low.

The thermophilic spoilage spores are much more heat resistant than the mesophilic anaerobic spore-formers, such as the putrefactive anaerobes. The thermophilic spoilage organisms produce no toxins and exert no health consequences; some may remain ungerminated in low-acid canned foods. The definition of commercial sterility in the Food and Drug Administration regulations on processing of low-acid canned foods, 21 CFR § 113, allows the presence of some of these spores. Therefore, canned foods are not completely sterile, but may contain dormant spores of thermophilic bacteria. The spores will never germinate if the canned food is cooled properly and held at room temperature. Also, the thermophilic spores will autosterilize eventually when held at temperatures at which they cannot germinate or outgrow. Studies by Pearce and Wheaton (12) and by

Schmidt and Nank (13) have shown this fact. This information also allows the industry to produce canned food of much better quality than if the thermophilic spores would have to be inactivated.

In addition to the thermophilic spores that affect low-acid canned foods, *Bacillus coagulans*, the acid-uric flat sour organism was found in the 1940s, to cause spoilage of tomato juice without swelling the container. Heat resistance of spores of the bacterium does not exceed 0.7 min at 250 F in pH 4.3 tomato juice, and it has been eliminated in commercial practice by presterilization.

The thermophilic anaerobes swell the container. Flat sour organisms do not swell the container but sour the product. There may be other spoilage signs, such as cloudy brine. The sulfide spoilage organisms darken the product and produce the odor of hydrogen sulfide.

Thermophilic spoilage may be eliminated by preventing steam leaks which keep equipment hot; by good sanitation of canning lines, with frequent cleaning; by holding hot product before canning at 165 F or above; by cooling cans to 110 F or lower if possible; by storing cans at temperatures below 86 F and by providing for air circulation among stacked cans.

Thermophilic spoilage is really not a big problem today, but there is still concern about it and interest in the responsible bacteria. The papers in this series will describe these extremely heat resistant spore-formers that reproduce at a rapid rate at very warm

temperatures.

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October 10, 2000

Mr. Ahmed Soliman Mohsen
Heinz Egypt
Industrial Zone No. 2
6th of October City

Dear Mr. Ahmed:

Dr. Butterworth has provided you with some preliminary information on pectins. Earlier today, we reviewed several specification sheets provided by TIC Gums from the USA. The feeling is that the *TIC Pretested Pectin HM Rapid* product might meet your needs (see attached). If you would like additional information on the TIC products, you can contact the company directly (contact information on the specification sheets). You could also contact a friend of mine who is a salesperson for the company. Her name is Mrs. Pamela Vaillancourt and she can be reached by email at pvallancourt@ticgums.com. As I said, Mrs. Vaillancourt is a good friend, and will be more than willing to assist you. Feel free to use my name in any correspondence with her.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

PRODUCT DATA

TIC PRETESTED[®] Pectin HM Rapid

DESCRIPTION

TIC PRETESTED Pectin HM Rapid is a standardized natural purified polysaccharide extracted from the rind of citrus fruits. It usually occurs as an odorless, yellowish to tan free-flowing powder having a mucilaginous taste. It dissolves in water forming an opalescent colloid solution. It is practically insoluble in alcohol. The major part of the pectin is composed of a (1-4) linked D-galacturonic acid units. Some of the carboxyl groups are esterified with methyl alcohol while the remaining carboxylic units exist in the free acid form or ammonium salt.

Pectins vary in their jellification properties and therefore are normally standardized with sugars to yield a consistent gel.

Application: TIC PRETESTED Pectin HM Rapid is used for jams that are kept in small jars (<1KG). TIC PRETESTED Pectin HM Rapid helps to avoid fruit flotation.

Requirements: pH 3.3-3.5 and 63-67 sugar solids.

FDA CLASSIFICATION

Pectins are affirmed "generally recognized as safe" for use in human foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Off-White	Combined Yeast/Mold	100 cfu/g maximum
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Bland	Total Coliforms	30 cfu/g maximum
Texture	Free flowing powder	Aerobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
pH	3.4 to 4.0	Moisture	12% maximum
Grade	145 - 155 USA SAG	Degree Of Esterification	71 to 75 %

Mesh Analysis	
98% minimum through USS #60	

Packaging

Each container is identified with the product name and lot number.

PECT HM RAPID-2 - 12/9/97 PD109713

PRODUCT DATA

TIC PRETESTED[®] Pectin 17240 LMS Powder

DESCRIPTION

TIC PRETESTED Pectin 17240 LMS Powder is a natural purified polysaccharide extracted from the rind of citrus fruit. Low Methoxyl (LM) Pectins are produced by acid treatment of high ester (HM) pectins. Low Methoxylated Pectins have a degree of esterification below 50%.

The gelling mechanism of the LM pectins differs from that of the HM pectins. To obtain a gel formation in a system containing LM pectin the presence of calcium ions is essential. The important characteristics of LM pectin are that it will form a gel at lower solids than HM pectin and under a larger variation of pH. Calcium is to be added at not more than 30-50 mg/g of pectin.

Application: In products where the total soluble solids (TSS) are low (less than 30%) and the pH may vary (2.5-3.5). Example is in a low TSS jelly. Requirements: Calcium must be added or contained in the fruit.

Pectin 17240 LMS was developed for a specific customer's application and is standardized for uniform viscosity development.

FDA CLASSIFICATION

Pectins are affirmed "generally recognized as safe" for use in human foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Off White	E. coli	Negative per g
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Slightly sweet	Staph. aureus	Negative per g
Texture	Free flowing powder	Aerobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
Viscosity ¹	110 to 170 cP	Moisture ¹	14% maximum
pH ²	3.5 to 5.5	Mesh	35% maximum on USS #80

Packaging

Each container is identified with the product name and lot number.

PECT 17240 LMS - 010/10/00

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TIC GUMS, INC.

4609 Richlyn Drive
Belcamp, Maryland 21017 USA
Phone: 410-273-7300 / 800-221-3953

Cable: TRAGACAN
Telec: 221049 TIC L
Fax: 410-273-6469

PRODUCT DATA

- ¹ Measured at 4% concentration in a 1% sodium phosphate solution, Brookfield RV, spindle #2 @ 20 rpms
- ² Measured on a Cenco Moisture Balance after 10 minutes
- ³ Measured immediately in a solution of 1% concentration in distilled water.

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PRODUCT DATA

TIC PRETESTED[®] Pectin 1694 Powder

DESCRIPTION

TIC PRETESTED Pectin 1694 Powder is a standardized natural polysaccharide extracted and purified from the rind of citrus fruits. It occurs as odorless, yellowish to tan, free flowing powder having a mucilaginous taste that gives mouthfeel to natural fruit juices if present in sufficient quantity. It dissolves in water forming an opalescent colloidal solution.

Where pectin is insufficient such as in artificially flavored juices or even in natural fruit juices that are short in mouthfeel, TIC PRETESTED Pectin 1694 Powder has proved to be a very good viscosifier and mouthfeel enhancer. TIC PRETESTED Pectin 1694 Powder is standardized to a narrow range of viscosity for consistency. Its recommended usage level is between 0.1% to 0.2% in fruit juices.

For easy dispersion characteristics (no lumping, virtually dust-free) try our Pre-Hydrated[®] grade of Pectin 1694 Powder.

FDA CLASSIFICATION

Pectins are affirmed generally recognized as safe for use in foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Off white	E. coli	Negative per g
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Slightly sweet	Staph. aureus	Negative per g
Texture	Free flowing powder	Acrobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
Viscosity	400 - 700 cP (4% soln.)	Moisture	10% maximum
pH	2.8 - 3.8 (1% soln.)		

Mesh Analysis	
75% minimum through	US# #80

Packaging

Each container is identified with the product name and lot number.

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PRODUCT DATA

PECT 1694 - 07/09/97

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PRODUCT DATA

TIC PRETESTED[®] Pectin LM 32 Powder

DESCRIPTION

TIC PRETESTED Pectin LM 32 Powder is a natural purified polysaccharide extracted from the rind of citrus fruits. Low Methoxyl (LM) Pectins are produced by acid treatment of high ester (HM) pectins. Low Methoxylated Pectins are pectins with a degree of esterification below 50%.

TIC PRETESTED Pectin LM 32 Powder contains 27-35% methoxyl groups. The gelling mechanism of the LM pectins differs from that of the HM pectins. To obtain a gel formation in a system containing LM pectin the presence of calcium ion is essential. The important characteristic of LM is that it will form a gel at lower solids than HM pectins and a larger variation of pH. Calcium is to be added not more than 30-50 mg/g of pectin.

Application: Where the total soluble solids (TSS) are low 30% and the pH may vary 2.5-3.5. Example is in a low TSS jelly. Requirements: Calcium must be added or contained in fruit.

FDA CLASSIFICATION

Pectins are affirmed "generally recognized as safe" for use in human foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Cream	E. coli	Negative per g
Odor	Odorless	Salmonella	Negative per 25 g
Flavor	Bland	Staph. aureus	Negative per g
Texture	Free flowing powder	Aerobic Plate Count	500 cfu/g max.

Physical & Chemical			
pH ¹	2.8 - 4.0	Moisture	12% maximum
Grade ²	90 - 130 USA SAG		

Mesh Analysis	
1% maximum on USS #60	

Packaging

Each container is identified with the product name and lot number.

PECT LM 32 - 3/27/98 PD039818

- 1 1% in distilled water
- 2 gel power

PRODUCT DATA

TIC PRETESTED[®] Pectin LM 35 Powder

DESCRIPTION

TIC PRETESTED Pectin LM 35 Powder is a natural purified polysaccharide extracted from the rind of citrus fruits. LM (low methoxy) amidated pectins are produced by demethylation with ammonia of high methoxy pectins standardized by addition of dextrose/sucrose.

TIC PRETESTED Pectin LM 35 Powder contains 27-33% methoxyl and 20-25% amidated groups. The gelling mechanism of the LM pectins differs from that of the HM pectins. To obtain a gel formation in a system containing LM pectin, the presence of calcium is essential. The important characteristic of LM is that it will form a gel at lower solids and a wider pH range than HM pectins. Calcium is to be added at not more than 10-30mg/g of pectin.

Application: Where the total soluble solids range 10-45% and the pH may vary 3.0-3.3. Example is in low Total Soluble Solids jelly. Requirements: Calcium must be added or contained in fruit.

FDA CLASSIFICATION

Pectins are affirmed "generally recognized as safe" for use in human foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Cream	E. coli	Negative per g
Odor	Odorless	Salmonella	Negative per 25 g
Flavor	Bland	Staph. aureus	Negative per g
Texture	Free Flowing Powder	Aerobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
Grade	115 - 135% USA SAG	Moisture	12% maximum
pH	4.0 to 4.8		

Mesh Analysis	
3.5% maximum on USS #60	

Packaging

Each container is identified with the product name and lot number.

PECT LM 35 - 07/18/00 - PD070004

PRODUCT DATA

TIC PRETESTED[®] Pectin Pre-Hydrated[®] 1694 Powder

DESCRIPTION

TIC PRETESTED Pre-Hydrated Pectin 1694 Powder is a standardized natural polysaccharide extracted and purified from the rind of citrus fruits which has been standardized for viscosity and processed into the Pre-Hydrated form. It is an odorless, yellowish to tan, free flowing powder having a pleasant taste that gives mouthfeel to natural fruit juices. It can also be used for tomato-based sauces, yielding a pleasant "shine" as well as building body.

Unlike powdered pectins, Pre-Hydrated Pectin 1694 Powder disperses easily in water, and, if suitable care is taken, needs no special handling or mixing to form an opalescent colloidal solution.

Beverages made with fruit juice naturally contain "native" pectin which produces the pleasing mouthfeel that we all enjoy. However, when the native pectin is insufficient, mouthfeel may suffer and additional pectin required. TIC PRETESTED Pectin 1694 Powder has proved to be a good viscosifier and mouthfeel enhancer.

Its recommended usage level is between 0.1% to 0.2% in fruit juices or sauces.

FDA CLASSIFICATION

Pectins are affirmed generally recognized as safe for use in foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Off white	E. coli	Negative per g
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Slightly sweet	Staph. aureus	Negative per g
Texture	Free flowing powder	Aerobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
Viscosity	400 - 700 cP (4% solution)	pH	2.8 - 3.8 (1% solution)

Mesh Analysis	
50% minimum on USS #80	

Packaging

Each container is identified with the product name and lot number.

PECT PH-1694 - 07/10/97

PRODUCT DATA

TIC PRETESTED[®] PRE-HYDRATED[®] Pectin HM Rapid

DESCRIPTION

TIC PRETESTED PRE-HYDRATED Pectin HM Rapid is a purified natural polysaccharide extracted from the rind of citrus fruits. PRE-HYDRATED pectin is easier to disperse and does not form lumps when dissolved in water. The regular powdered HM Pectin was subjected to a process that increases its hydration rate. Rapid set is used for jams and jellies that are processed in small jars. pH Requirement: 3.3 to 3.5. Sugar Solids: 63-67%.

FDA CLASSIFICATION

Pectin is affirmed as "generally recognized as safe" or GRAS for use in human foods under 21 CFR 184.1558.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Hazel nut	E. coli	Negative per g
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Slightly sweet	Staph. aureus	Negative per g
Texture	Free flowing powder	Acrobic Plate Count	1000 cfu/g maximum

Physical & Chemical	
Viscosity	600-1200 cP

Mesh Analysis	
50% minimum on USS #80	

Packaging

Each container is identified with the product name and lot number.

PECT PH HM RAPID - 02/07/00 - PD020005

PRODUCT DATA

TIC PRETESTED[®] Pectin 17240 HMB Powder

DESCRIPTION

TIC PRETESTED Pectin 17240 HMB Powder is a high methoxy pectin that has been standardized with dextrose and buffered with sodium citrate. Pectin 17240-HMB is recommended for use in beverages for mouthfeel, especially in acidic fruit juices. Pectin 17240-HMB will also boost the body of sauces, and provide sheen. For this reason Pectin 17240-HMB is a natural for barbecue sauces and salsas. Typical usage level will vary upon specific recipes, but a good starting point is between 0.25% and 0.40%.

Although Pectin 17240-HMB goes into solution with minimal lumping, it is also available as a Pre-Hydrated[®] product. Pectin 17240-HMB is soluble in cold water, but will work best in heated systems where the Pectin is more fully activated.

FDA CLASSIFICATION

The ingredients in TIC PRETESTED Pectin 17240-HMB are Generally Recognized As Safe (GRAS) according to FDA classification and, hence, may be safely used in foods.

ANALYTICAL STANDARDS

Organoleptic		Bacteriological	
Color	Off white	E. coli	Negative per g
Odor	Nearly odorless	Salmonella	Negative per 25 g
Flavor	Slightly sweet	Staph. aureus	Negative per g
Texture	Free flowing powder	Aerobic Plate Count	1,000 cfu/g maximum

Physical & Chemical			
Viscosity ¹	35 to 55 cP	Moisture ²	14% maximum
pH ³	4.0 to 6.0	Mesh	40% maximum on USS #80

Packaging

Each container is identified with the product name and lot number.

PECT 17240 HMB - 010/10/00

¹ Measured at 4% concentration in a 1% sodium phosphate solution, Brookfield RV, spindle #2 @ 20 rpm.

² Measured on a Cenco Moisture Balance after 10 minutes.

³ Measured immediately in a solution of 1% concentration in distilled water.



Agriculture - Led Export Businesses

Supporting Egypt's Processed Foods Export Industry



October 9, 2000

TEL011-336-15/016

FAX 011-336-013

Mr. Desoky Shehata
Americana/Egyptian Canning Company
3rd Industrial Zone, Lot 38
6th of October City

Dear Mr. Desoky:

Thank you again for your hospitality in taking time to visit with Dr. Butterworth, Terry Dunn, Grayson Daniels, and Mark Jekanowski. I hope that the visit was profitable both on the technical and marketing side. Judging from Dr. Butterworth's comments, I can safely say that the technical discussions went quite well. I have enclosed Dr. Butterworth's trip report for your files. He is extremely complimentary about the progress that you have made and the level of effort that it took to move forward. Based on the report and discussions that Dr. Butterworth and I have had, we have the following recommendations.

1. **Mercury-in-Glass Thermometer** – There is still one retort that needs a thermometer with a larger scale. As Dr. Butterworth mentioned, models with a bend can be purchased.
2. **Purchasing** – We heartily agree with your thoughts that the Americana Group of Companies work together in purchasing. By working together, you can reduce costs, improve quality and upgrade your supplier network. This is an excellent idea and should be pursued.
3. **Retort Upgrades** – We are pleased that we have been able to help in upgrading your retorts. Some literature from an English company called *Temperature Indicators Limited* is enclosed. As part of your program to upgrade retort operations, please look at this company's products. The indicators allow you to determine whether a basket of cans has been cooked.

Dr. Butterworth's report contains a section called "New Product Updates". Should you have any questions with regards to product development issues, please let us know. There have been a number of consultants, including Dr. Butterworth that we have brought into Egypt who have extensive product development experience. We may be able to help you over any "bumps in the road."

Also, please allow us to congratulate you on obtaining your FCE number from the United States Food and Drug Administration. I know that Mr. Dennis Dignan, the Food and Drug liaison who was one of the instructors at the Better Process

Control School, will be happy to learn that the school has already paid some dividends. The next step will be to get your processes properly filed.

On the subject of process filing, I spoke with Mr. Massimo Pelizza of Levati FoodTech this past weekend. You should already have received correspondence from him on the subject of retorts. If you would like to meet with him one-on-one, he mentioned that he plans to be in Egypt next month for an installation. You should be able to visit at that time.

Thank you again for your time. Should you have any questions or require any additional information, please do not hesitate to call.

Finally, I must personally say that it is a great pleasure and an honor to work with you and your colleagues. It is great to see an operation improve and it is a nice feeling to know that we have been able to help.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files



To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Egyptian Canning Company (Americana)

On Wednesday, October 4, 2000, we visited the Egyptian Canning Company (Americana) in 6th October City.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Grayson Daniels (Sparks Corporation)
Terry L. Dunn Director (Market Information Systems)
Dr. Mark D. Jekanowski (Sparks Corporation)

For Americana on the Technical/Operational side were:

Desoky Shehata, Operation Manager (e-mail: ecc@ie-eg.com)
Mohamed M. Dagher (Production Manager)

Factory Ph. (002011) 336015-16-17; FAX: (002011) 336013
3rd Industrial Zone, Lot 38
6th October City
www.americana-group.com

Head Office Ph. (00202) 3480822-3; FAX: (00202) 3615788
38 Syria St. Mohandessen, Cairo

BACKGROUND & UPDATES

The primary objective of my visit was to follow up on the status of technical recommendations made by myself and other ALEB representatives as well as to discuss any new questions. The following is the status of questions and recommendations (original questions in italics) made after my visit of April 10, 2000. I have listed only those issues that were not resolved during our last visit.

1. *Steam was condensing on the cans, causing rust on the exterior.*

The can corrosion was apparently caused not only by lack of ventilation in the warehouse but also lack of proper boiler additives. They remedied both situations and can corrosion is under control.

2. *Is it O.K. to store pallets of empty cans outside if they are sealed in stretch wrap?*

They no longer have a need to store empty cans out-of-doors.

3. *At times they have trouble achieving minimum vacuum of 8 cm Hg (3.1 in Hg).*

We recommended in April, among other things, that they should fill the topping as hot as possible. They have made some piping changes and are now filling the topping at 90 to 92°C and vacuum has significantly increased.

Additionally, we recommended that if they were able to reduce variations in headspace, the vacuum control would improve. They made some modifications to their still-unsanitary "shower filler" (see my report of April 10) and reduced headspace variations, thereby reducing vacuum variations.

In April they had plans to purchase a piston filler to replace the "shower filler," an idea I did my best then to discourage. Current plans are to purchase a PVS filler to deposit the topping with vacuum, as we suggested in April. This item is part of a long-range plan.

In the interim they plan to reconfigure the "shower filler" in a more sanitary manner, with the cans passing under the shower flange-to-flange, eliminating the need for recycle, as outlined in my April report. They expect to implement this flange-to-flange configuration by January of 2001.

4. *When is pressure cooling necessary after retorting?*

We recommended in April that they use overriding air pressure during cooling, especially for the larger size cans only to the extent necessary to replace, not exceed, the steam pressure during the initial 1/3 or so of the cooling cycle. They are now using a consistent and controlled overriding air pressure during cooling and as a result the incidence of paneling and buckling is nearly nonexistent.

RETORT UPGRADES

They are going through the retort check list prepared by Rick Stier and have been trying to get some heat distribution data from the manufacturer, Levati. Mr. Shehata called Levati when I was there and it was clear that this issue is not a priority for Levati. Americana can handle most of the retort issues by themselves but will clearly need help in finding a process authority to perform the required testing.

Three of the four retorts are equipped with new mercury-in-glass thermometers, which appear to be in compliance with U.S. regulations (21 CFR Part 113), although I did not measure them. One retort was still equipped with the smaller scale thermometer. They said that a pipe would obstruct the view of any larger thermometer on this retort. I suggested they investigate the purchase of a thermometer with a 90° bend that is still designed to place its bulb directly in the steam.

They felt that they should have the retort system and procedures in compliance with Rick's report within 2 to 3 months.

About 6 weeks ago they have registered their establishment with FDA as a manufacturer of low-acid canned foods but have not yet received their FCE number.

NEW PRODUCT UPDATES

Last April, Americana had several new products under development. Below is a summary of their current status:

1. Olive Oil: Started to receive raw materials for test runs.
2. Fava Beans with Extra Chili: Small run made for Libya but no further demand.
3. Chickpeas for Lebanon: Ongoing product
4. Green and Black Olives: Factory scheduled to be ready for production next year
5. Green Peas: Factory scheduled to ready next year.
6. Fava Beans with Extra Tomato, Red and White Kidney Beans, Baked Beans, and Peeled Broad Beans: Still under development.

MISCELLANEOUS

1. Last April they were working on exporting product to Australia. This work has come to fruition and they are now also exporting to the U.K.
2. They feel their HACCP system is in place, along with written GMP and manufacturing/sanitation procedures.
3. They have no ISO certifications
4. There is no purchasing in common with Americana's sister companies but Mr. Shehata said they were trying to start.
5. Mr. Shehata agreed to draft a letter acknowledging ALEB's role in the improvement of vacuum, rusty cans, headspace control, buckling and paneling, and retort equipment and procedures.
6. Mr. Shehata is very interested in a packaging cost reduction. He had in mind several plastic containers used primarily for frozen and refrigerated foods. Unfortunately, I could suggest no better package for their bean products other than steel cans, what they are already using. The only things I could suggest was experimenting with lower base weight steel for both body and lid stock and to consider eliminating the lithography from the ends.

CONCLUSION

Americana has made a lot of progress in the last 6 months, partly by keeping an open mind to ALEB's suggestions, but mostly from their own efforts and their own desire to improve quality and reduce cost while increasing production.

02 OCT 2000

Registered Office
Yewbarrow Studio
Grange-Over-Sand
Cambria, England
LA11 6ED.

Telephone: 015395 35488

Fax: 015395 35489



TEMPERATURE
INDICATORS
LIMITED

SUPPLIERS OF TEMPERATURE
ACHIEVEMENT INDICATORS

2nd October 2000

TELEPHONE LTD

015395 35488

Agriculture - Led Export Businesses (ALEB Project)

12 Dokki Street

6th Floor

Giza 12311

Egypt

For the attention of Mr Richard F. Stier

Dear Richard,

We have today received from you a request for information regarding retort indicators, and subsequent to our telephone conversation I am pleased to confirm that samples will be forwarded to you today to Egypt.

I will forward separately, in a few days time, the video which has been produced to help introduce retort operators to the principles of canned food operations.

Till our literature arrives please note

our website is : www.temperature-indicators.co.uk

e-mail : sales@temperature-indicators.co.uk

With best regards,

David J Arrowsmith



TEMPERATURE
INDICATORS
LIMITED

product information

Retort Checks

Retort Canning Process Indicator

For steam pressure cooking of
low-acid foods

- **Assure compliance with prescribed cooking cycle**
Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart.
- **Signals errors in processing time/temperature or a malfunction of equipment**
Chemical indicator will not complete its colour change to green if an error in the cook has occurred.

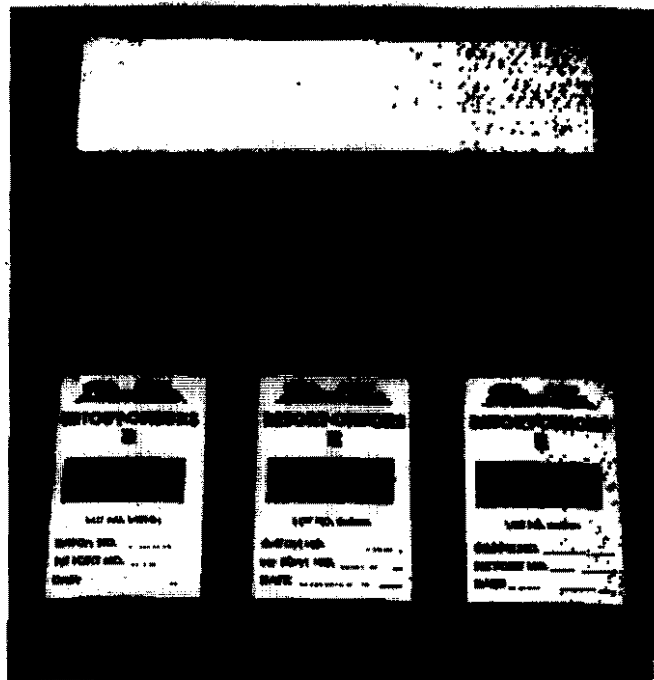
- **Meets guidelines for the safe production of "Heat Preserved Foods" Department of Health Section 16.3.4.**

The basic principles are:

- A heat sensitive indicator marked with the basket number and sufficient information to fully identify that basket of product.
- A large, easily visible marker to identify at a glance the process status and product scheduled process group.

A typical system uses a heat sensitive card or tape which is marked by the basket loader with the sequential basket no., date, product/line code plus any other critical information such as time of starting to fill basket.

- **Provides a permanent record of processing**
- **Range of time/temperature indicators**
Available for various cooking processes (see selection chart).



Yokerow Studio George over Sands
Cumbria LA11 6ED United Kingdom

t: +44 (0) 15395 35488
f: +44 (0) 15395 35489

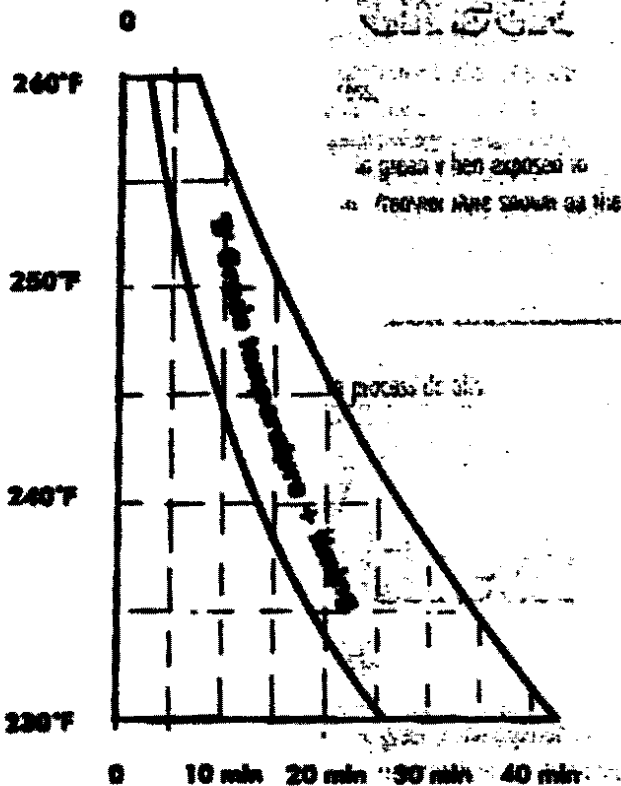
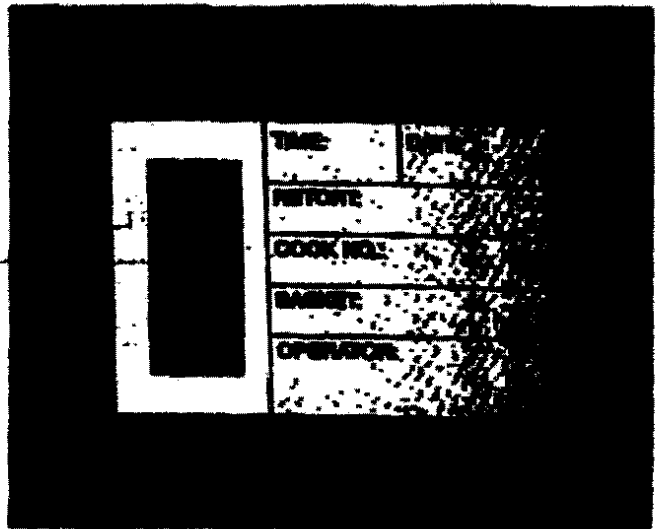


TEMPERATURE
INDICATORS
LIMITED

product information 63

B grade Economy Cannery Check

- Provides a permanent record of process.
- Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart for retort-check 3.
- Evidence of process only.
- Six available segments for recording process details:
- Samples forwarded on request.



Yorkshire Steels Group and Sons
 Canbrite LATT 62B United Kingdom
 Temperature Indicators is a member of the Group and
 Oakwood Food Research Association, Chislehurst, UK.

E +44 (0) 15095 35400
 E +44 (0) 15095 35409
 W www.temperature-indicators.co.uk
 E sales@temperature-indicators.co.uk

Autoclave Tape

ISO9000 approved

Properties

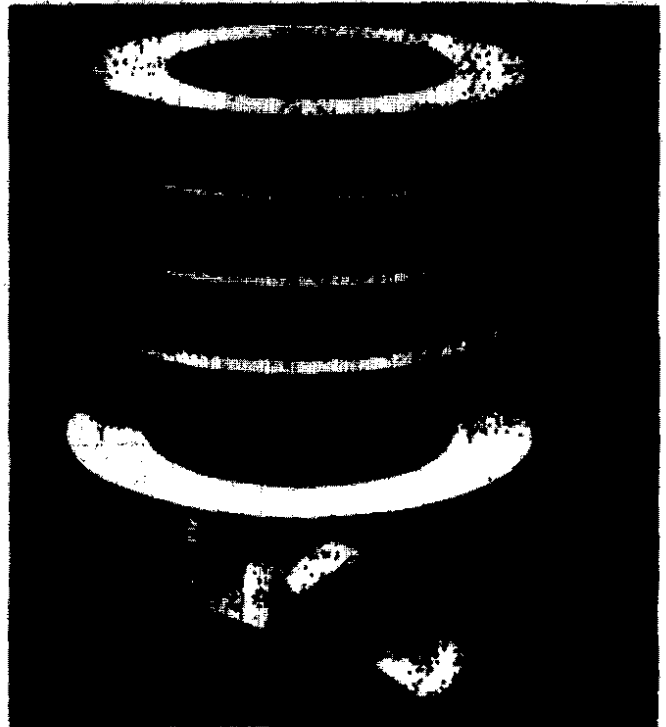
- Carrier: Creped paper
- Adhesive: Rubber
- Thickness: 0.185mm
- Tensile: 93N/25mm
- Adhesion to steel: 11N/25mm
- Elongation: 7%
- Temperature range: 125°C - 135°C
- Shelf life: 180sec to 240sec
- Storage: 1 year (original packaging)
- Shelf life: 1 year (original packaging)
- Storage: Cool, dry conditions

Description

- A tape based on a smooth crepe paper and rubber adhesive.
- The product is designed as an indicator for steam autoclaving. (Steam sterilisation).
- During service black lines will appear to indicate when steam sterilisation has been attained.

Supplied

- 19mm wide - 64 rolls per case
- 25mm wide - 48 rolls per case



Yemenway Studio Grange over Sands
 Camble LA11 6ED United Kingdom
 Temperature Indicators is a member of the Compend and
 Charleywood Food Research Association, Gloucestershire, UK.

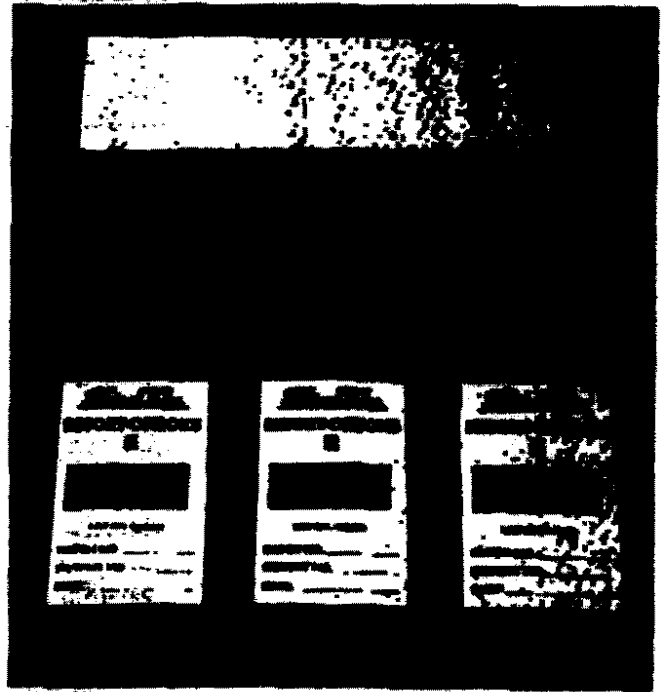
t: +44 (0) 15395 35488
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 w: www.temperature-indicators.co.uk
 e: sales@temperature-indicators.co.uk

Retort Checks

Retort Canning Process Indicator

For steam pressure cooking of low-acid foods

- Assure compliance with prescribed cooking cycle
Chemical indicator turns from purple to green when exposed to saturated steam for the prescribed time/temperature shown on the selection chart.
- Signals errors in processing time/temperature or a malfunction of equipment
Chemical indicator will not complete its colour change to green if an error in the cook has occurred.
- Meets Federal Regulation Title 21, Code of Federal Regulations...Section 112.87
(b) All metal baskets, trucks, cans or crates containing unopened food products, or some of the containers on the top of the baskets, shall be plainly and conspicuously marked with a heat sensitive indicator or by other effective means, which will usually indicate to thermal processing personnel whether or not each such unit has been retorted.
- Provides a permanent record of processing
- Range of time/temperature indicators
Available for various cooking processes (see selection chart).



US MARKET

For samples or ordering
in the USA

Call the Steritek Facility Direct
303-660-4201

Yorkshire Studio Group over Seals
Canada LATT 6ED United Kingdom
Temperature Indicators is a member of the Creaplan and
Chartered Food Research Association, Gloucestershire, UK.

E: +44 (0)15395 35400
F: +44 (0) 15395 35409
W: www.temperature-indicators.co.uk
E: sales@temperature-indicators.co.uk



October 11, 2000

Mr. Adel Sofia
SFCO
53 Ramsis Street
Of Demashq-Roxy-Cairo

Dear Mr. Adel:

I would like to thank SFCO for taking the time to visit with Dr. Tom Butterworth on October 8. I am attaching a copy of his report for your files.

Dr. Butterworth's visit was not nearly as valuable to you as it could have been thanks to the language barrier. He was able to see the plant, however. Before the visit, he reviewed Mr. Ed Hayashi's visit report from May 30 of this year. He observed that *"the factory remains much the same as it was during Ed's visit."*

Dr. Butterworth will be here in Egypt through October 18. He has a busy schedule, but most evenings are free. If you would be interested in visiting with him before he leaves for the United States, please let us know.

We are enclosing two booklets, Good Manufacturing Practices for Employees and the US Food & Drug Administration's Current Good Manufacturing Practices (GMP's). The documents are in English and Arabic, so they should be useful. These should be used as the basis for upgrading your sanitation and GMP programs.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, SFCO

On Monday, October 9, 2000, I visited the factory of SFCO in a village outside the town of Kafr az-Zayyet, address given as Al Negealh, Kom Hamada-Al Behera.

For SFCO were the following:

Mustafa Solia (Chief Financial Officer)
Nora Sabet (Chemist/Secretary who also served as translator)
Factory Ph: 045/682200; 674086

Head office is in Cairo:

53 Ramsis St.
Of Demashq-Roxy-Cairo
Ph: (02) 4507962,3,4; FAX (02) 4509675
e-mail: sfco@link.com.eg

COMPANY BACKGROUND

SFCO began several years ago as a packer of fresh potatoes. About three years ago they converted the facility into more value added products: frozen French Fries, Potato Flakes and Potato Granules. The potato products contain no sulfur dioxide.

Flakes and granules are offered in 125 gm chipboard boxes (for retail) and ½, 1, 25 & 50-kilo poly-lined bags for foodservice and industrial. The combined capacity for flakes and granules is 250 MT/hr.

Frozen French Fries are packed into form/fill/seal bags of ½, 1 & 2.5 kilo. The capacity for French Fries is 600 MT/hr.

Two potato varieties predominate, Lady Rosetta and Diamond although they run many others as well.

The factory was not operating when I was there and the people there could not answer many of my questions. The Chairman, Eng. Adel Solia was unable to attend the meeting.

They did not seem to have any written procedures and no one could recall if ALEB had been any help to them in the past. They run 3 8-hour shifts/day, six days/week so business appears to be good.

SUMMARY

In short, I found very little to add to Ed Hayashi's report of May 30, 2000. The factory remains much the same as it was during Ed's visit. They encouraged me to make an appointment with Mr. Adel Sofia in Heliopolis so that any questions that still remained could be answered.



October 10, 2000

Dr. Ashraf E.S. Hassan
Cairo Agro Processing Company
Nile Fruit & Pulp
28 Mohamed Said El Halwani Street
Heliopolis, Cairo

Dear Mr. Ashraf:

I would like to thank you for allowing Dr. Tom Butterworth to visit your plant on October 9. We had hoped that you would have allowed him to tour the processing operation itself, especially since he has had many years of experience working with tomatoes and tomato products using equipment very similar to what you purchased from FPR in Italy.

As you can see by the attached report, Dr. Butterworth was quite impressed with your laboratory. Having a good laboratory to support your business is extremely important, especially when one is interested in the export market. Based on the observations that were made at the plant, we would suggest the following:

1. Receiving Area – An effort should be made to establish a designated trash area outside that is away from high traffic doors. The receiving area should not serve as the garbage area. Trash should be stored in closed containers, which are cleaned on a regular schedule. The area should be paved or covered with crushed stone.
2. HACCP – Dr. Butterworth was correct when he said that ALEB will not write a HACCP plan for you. We offer workshops in HACCP in the hope that we can give processors enough information that they can create their own plans. We will review HACCP plans as works in progress and offer suggestions as to how they can be improved, but the development of the plan is your responsibility. Also, before implementing a HACCP plan, it is essential that basic pre-requisite programs be put into place. These programs include sanitation, Good Manufacturing Practices (GMP's), product identification, product tracking and recalls, preventive maintenance and worker education. As part of your sanitation and GMP programs, you need to develop programs for cleaning and sanitizing, pest control and general housekeeping. We will be offering programs in all these areas should you be interested.

Should you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Cairo Agro-Processing Co.

On Monday, October 9, 2000, I visited the **Cairo Agro-Processing Co.** (a.k.a. Nile Fruit Pulp), a nearly new facility in El About City, address unknown

For Cairo Agro-Processing Co. (hereinafter "Cairo") was:

Eng. Abdel Nasser Morsy (Q.C. Manager)
Factory Ph. 010 504 0540
E-mail: anasser@nilefruit-pulp.com

The head office is in Cairo:

28 M. Said Al Halawany St.
Heliopolis 11361
+202.266.4544/266.7779
www.nilefruit-pulp.com

COMPANY BACKGROUND

Cairo has been in existence for a little over one year. They manufacture only aseptic, single-strength fruit pulp with no additives. Their product line and current output is below:

Fruit Pulp	Production (MT/Year)
Mango	10,000
Peach	2,500
Guava	12,000
Fig	1,500
Pear	1,500
Strawberry	8,000
Apricot	2,500

Included in their sales materials are the above products as well as Peach and Tomato (I discouraged the marketing of aseptic tomato pulp and it sounds as if it is a low priority with Cairo).

Almost all production is 200 L bag-in-box but they have the capability for both 1000 L totes and 1 L sample bags.

Cairo sells mostly to companies that manufacture juice but have no capacity to handle fresh fruit. These companies are in Egypt and elsewhere in the Middle East. They are hoping to expand exports into Europe and the U.S.

As part of a long-range plan they would like to manufacture the products that other people manufacture from their pulp. I thought of juice but Mr. Abdel Nasser Morsy mentioned concentrates.

THE FACILITY

I did not see much of the facility. I saw the receiving/shipping area, trimming operation (on the way upstairs), Quality Control laboratory and the factory (from the window of the laboratory). Being almost new, the factory looks clean and well organized. It was purchased as a turnkey system from FPR in Italy. They were running guava when I was there. The stated capacity is 2000 L/hr.

The laboratory was modern and well equipped.

The receiving area is the same area where both finished product is shipped and trash is stored waiting to be hauled. The trash makes a bad impression on visitors and was clearly attracting flies.

WHAT THEY WANT

Mr. Abdel Nasser Morsy asked if someone at ALEB could write a HACCP plan for his facility. I explained that while ALEB could help him develop such a plan, any plan written by someone from outside would not be implemented. Moreover, they do not seem to have the prerequisites of HACCP, written and verified procedures for sanitation and operation. He said some people from Cairo have attended the HACCP course but he had not.

They have no ISO certifications.



Agriculture - Led Export Businesses

Supporting Egypt's Processed Foods Export Industry



October 11, 2000

TEL 02-215-6982

FAX 02-215-5253

Mr. Mamdouh Siyam
Frostie for Food Industries
10 El Salam Street, Aga Khan
El Sahel, Kalioubia

Dear Mr. Mamdouh:

Thank you for taking the time to visit with Dr. Tom Butterworth yesterday. Judging by his trip report (attached), it was a very useful visit. The discussions obviously focused on product improvement and new product development. If you have any questions with regards to what was discussed yesterday, please let us know. Dr. Butterworth will be here through October 18, and he is accessible by email in the United States.

One of the issues that is not in the report, but that I discussed with Dr. Butterworth was sanitation and compliance with Good Manufacturing Practices (GMP's). He mentioned that he has seen some improvement in the plant, but that you still have a lot of work to do. As you build your business, there will be a greater probability that you will be audited by buyers, so appearances are very important. For example, an inspector does not like to see birds in a food processing area.

As I said, should you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Stier
From: Thomas A. Butterworth
Subject: Trip Report, Frostie

On Tuesday, October 10, 2000 we visited the Frostie facility in Cairo. This was my second visit and the facility appeared much the same as it had on March 21 of this year.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Dr. Mark D. Jekanowski (Sparks Corporation)
John Schnittker (Information Specialist; Market Information)

For Frostie were:

Mr. Mamdoh Siyam (Marketing Manager)
E-mail: msiyam@frostiefood.com
Eng. Samy Abdel el Hameed (Director of Production)
Factory Ph. 2156982; FAX: 2155253
www.frostiefood.com

NEW TECHNICAL ISSUES

They wanted to discuss two main issues on the technical side: improved ketchup and improved mustard. They demonstrated a sample of current ketchup against an experimental sample that had been homogenized. Both were made from the same formula (tomato paste plus other normal ketchup ingredients; 26°Brix; sodium benzoate added). The homogenized sample was much better, exhibiting no syneresis and a smooth texture. Both seemed to be the same thickness but it was a little hard to tell just by pouring them onto a plate. The flavor of the homogenized sample was more subdued and less "peaky" than the control, typical of homogenized ketchup. This particular sample was homogenized twice, usually not a good practice. I drew for Mr. Samy a schematic of a basic ketchup process: finished batch heated to 75°C, homogenized at 2800 psig (190 bars), heated to fill temperature and filled. I emphasized that every homogenizer was somewhat different and they should feel free to experiment with the pressure so that there was no need to homogenize the product twice.

I was not so sure what type of improvement they had in mind for Mustard. They seem to want to get away from the cooked character of their present product and move more toward a product that is not cooked like French's in the U.S. The approximate formula for Frostie mustard is given below.

INGREDIENT	KILO/BATCH	%	% ACID	CONT.	% MOIST.	CONT.
VINEGAR (5%)	80	46.78	5	2.34	95	44.44
MUSTARD FLOUR & WHEAT FLOUR	40	23.39	0	0.00	12	2.81
WATER	30	17.54	0	0.00	100	17.54
SUGAR	14	8.19	0	0.00	6	0.49
SALT	6	3.51	0	0.00	0	0.00
TURMERIC	1	0.58	0	0.00	5	0.03
TOTALS	171	100.00		2.34		65.32

$$\text{ACID/WATER X 100} = 3.58\%$$

Note: Wheat flour must be added to the mustard seed prior to grinding in order to produce a powder.

There is sufficient acid in the water phase that the product will be microbiologically stable without heating. As such it may be manufactured on the mayonnaise line. The powdered mustard should be soaked in the formula water for about 5 minutes to allow it to hydrate somewhat before the vinegar is added. Otherwise a bitter off-flavor might result. Mr. Samy had a reservation that such a cold process might result in a thinner product. To some extent he is right since much of the functionality of the starch contained in the mustard flour (and wheat flour) will not express itself in a cold process. However, typical French's mustard has a moisture content of about 80% vs. 65% for Frostie. If viscosity becomes an issue there exists some ratio of mustard flour to wheat flour or some level of mustard flour that will achieve the desired texture.

It should be noted that uncooked (French's) mustard has a completely different and thinner texture than the cooked Frostie product. If Frostie wants to change their Mustard they should pick a target product and try to match it.



October 16, 2000

Mr. Essam Abdallah
Dr. Olivee
Manshiet El-Sadat
Zadazig

Dear Mr. Essam:

I would like to thank you and your staff for taking the time to visit with Dr. Tom Butterworth, Dr. Mark Jekanowski and Mr. John Schnittker when they visited the plant in Zagazig city on October 11. It was Dr. Butterworth's first trip to the facility and the second by a member of ALEB's technical services staff. I am enclosing a copy of Dr. Butterworth's report for your files.

We were quite pleased to learn from you and through our contacts at Levati FoodTech that Dr. Olivee is investing in a new retort. This is something that Dr. Lopez-Garcia and I spoke with you at length during our previous visits. What are known as California black olives are low-acid foods (pH greater than 4.6) so they must be processed under pressure and at elevated temperatures to assure that they are safe. Please be sure and work with Levati during the installation to be sure that;

1. Heat distribution studies are performed on the system after installation
2. Thermal processes for the various products are issued by an acknowledged expert, also known as a thermal process authority.

Sanitation is also an area that needs to be addressed. The report generated following the visit by Dr. Lopez-Garcia and myself is enclosed for reference. It is essential that Dr. Olivee make an effort to improve the areas mentioned in this report.

Another topic of discussion was the loss of color in black olives. We regret that the ideas that were proposed last March failed to "fix" the problem, but we did emphasize that neither Dr. Lopez-Garcia nor myself were olive experts. ALEB's Technical Services group has plans to bring in such an expert in 2001. Dr. Olivee will be one of the companies on his list to visit.

Thank you again for your hospitality. Should you have any questions or require any additional information, please do hesitate to contact us.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Ster
From: Thomas A. Butterworth
Subject: Trip Report, Dr. Olivee Co.

On Wednesday, October 11, 2000, we visited the Dr. Olivee facility in Zagazig for the (technical) purposes of acquainting them with U.S. regulations on low-acid canned foods, following up on Dr. Lopez-Garcia's report of February 24, 2000 and acquainting myself with their facility.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
Dr. Mark D. Jekanowski (Sparks Corporation)
John Schnittker (Information Specialist; Market Information)

For Dr. Olivee were:

Essam Abdallah (Chemist/Q.C. Manager)
Ibrahim Ali Ibrahim (General Manager)
Manshiet El-Sadat, Zagazig
Factory Ph. +2055333873; FAX +2055303873
E-mail: dr.olivee@egyptonline.com

We also met briefly with the Chairman:

Dr. Ali Ibrahim Abdul Rahman

OVERVIEW

This was my first visit to Dr. Olivee, a manufacturer of naturally fermented olives, green & black, whole, sliced, mashed and stuffed. They are packed in glass jars and 9 to 12 kilo tins. The process is simple: fermented olives are pitted or not, stuffed or not, soaked briefly in brine, sorted, sliced or not, and filled into jars or tins. The jars are filled with a Solburn-type filler while the tins are filled by hand. The containers are topped with brine at 80°C and closed with steam flow. The target equilibrium values for pH and salt are 3.5 to 4.0 and 3 to 4%, respectively.

It seemed that the fermentation vats were adjusted with brine or water as necessary prior to filling.

The facility has not changed much from the time of Dr. Lopez-Garcia's visit.

CANNING OF LOW-ACID FOODS FOR EXPORT TO THE U.S.

Olivee is scheduled to receive a retort system from Levati by the end of November, presumably to manufacture California-style black olives ($\text{pH} > 4.6$). I reviewed some principles of thermal processing, including the significance of pH, the need for high temperature processing when the $\text{pH} > 4.6$, as well as the procedures for heat distribution and heat penetration studies. I also reviewed with them the requirements of 21 CFR Part 113 and the need for registering the factory with FDA (U.S. Food & Drug Administration). I told them that ALEB could help in the registration process as well as recommending a process authority in the event that they could not get the data from Levati. They are not equipped to perform heat distribution or heat penetration studies by themselves.

I also described the concept of filing a low-acid process with FDA and what sort of information would be required. I also emphasized that within a year or two from the filing date they could expect an unannounced inspection by FDA. The inspectors would primarily focus on the retort system and the data showing the process is adequate. However, they would also focus on GMP (or sanitation) failures. Dr. Olivee has many such failures, many of which are easily fixed: loose jewelry, standing water, trash in the wrong places and open shoes. I encouraged them to work on these areas.

I left Mr. Essam Abdallah a disk containing a Word file of 21 CFR Parts 113 and 114.

VISIT REPORT

To: Richard F. Stier
From: Rebeca López-García, Ph.D.
Subject: Dr. Olivee

Contact information:

Company Dr. Olivee

Address Manshiet El-Sadat- Zagazig, Egypt
Tel: +2055333873
Fax: +2055323873
Cairo Office:
Tel: +2024194723
Fax: +2022915271

Date February 24, 2000

Present:

ALEB Rick Stier
John Coburn
Rebeca López-García
Yousef Hamdi

CONTACT: Ashraf A. Ibrahim, General Manager

Background information

This company processes Olives as well as pickled vegetables packed in glass. They also pack bulk olives and pickles in metal containers.

Comments:

This facility has basic sanitation problems and lacks Good Manufacturing Practices.

Production had stopped for the day. However, we noticed several major issues that included but are not limited to:

1. Birds were flying all over the plant. There was no evidence of pest control
2. Doors and windows were wide open and there were no screens to prevent pests from coming in
3. Olives sat in open vats and contamination from birds and other pests was extremely possible

4. The production line was rather discontinuous. No operation was connected; therefore, product had to be manually moved from operation to operation in containers that were evidently not cleaned and sanitized properly. Additionally, this led to a lot of human handling of the product.
5. Water accumulated on several parts of the plant, good drainage was not evident
6. Even when production was just shut down, there was no evidence of cleaning and sanitizing
7. The road leading to the plant was not paved and the grounds looked rather un-kept. A dead cat was sitting right outside the door

Some of the problems noticed with their processing were:

8. No connection between unit operations
9. Filling temperatures seemed too low. Although, there was no evidence of any temperature control device and every person seemed to have a different idea of what the temperature should be
10. Jars are not flipped after "hot fill"
11. Although they had an ink jet printer for lot codification, it was out of ink (they said they bought the equipment, but cannot find ink in Egypt and cannot get support from the equipment supplier).

One of the major issues noticed is that questions on the process asked to different employees, evoked very different answers. This may have been a communication problem. However, my main concern is that this is actually true and that there is no control over the process.

Request for additional information:

They requested technical support on many issues. More information will be needed to adequately help this company. Several follow up visits will be needed. The following is a summary of problems presented to us as well as initial recommendations:

1. White precipitate in products such as vine leaves
 - Usually this problem appears when the brine is not at a high enough temperature for hot fill. In other products, when brine is just warm (50-60° C), some of the starches and other gums are extracted from the product and when the product cools, they precipitate as a white slime. To avoid this problem, fill temperatures should be higher (85-90°C) and the products should be adequately cooled. The 85-90°C temperatures are usually enough to gelatinize the starch that is usually extracted from these products. There is evident lack of control in filling and cooling temperatures, so this is a probable source of the problem.
 - Also, the jars are not flipped after filling so the lids are not being properly sterilized. This could lead to microbial proliferation (especially molds) on the lids.

2. Discoloration of black olives

- This is a complex problem that may involve several factors including type and maturity of the olives, storage procedures, and type of process used.
- When visiting the plant the basic process for black olives described, was the following:
Sorting-sizing-placement in plastic containers with a saline solution- soaking in a 2% NaOH solution with aeration for 10 hours- washing (3 times) – 1% NaOH solution – washing – neutralization with acetic acid brine (1% acetic acid + 7% salt) – addition of ferrous gluconate
- However, upon later conversations the description of the process changed considerably. Therefore, we do not have an exact account of what really goes on in the plant.
- The season for black olives is over. It would be useful to visit the company next season and observe the process to determine potential sources of the problem.
- When we looked at one of the jars with discolored olives, it was evident that the pigment had leached out to the brine (bright red). Addition of a NaOH solution changed the brine color and made it clear. This showed that at least the anthocyanin system was extracted.
- This process should consider a color-fixing step before exposure to the acid brine. This could be accomplished with a heat and/or chemical treatment.
- More information is needed to determine the nature of the problem as well as possible solutions.

3. Water treatment

- They expressed interest in water treatment processes. One of their concerns is the presence of metals such Fe, Mg and Mn in their well water (110 m depth). However, they do not have good qualitative or quantitative information on their water quality.
- It is impossible to recommend any treatment if there is no analytical information.
- The first recommendation for them is to get reliable analytical data on the water quality. With that, we can follow up with treatment recommendations.

Rebeca López-García



October 16, 2000

Mr. Marco Semeria
Agro Food Company
3 El-Shiekh Mohamed El-Ghazaly Street
Dokki, Cairo

Dear Mr. Marco:

I would like to thank you for taking the time to visit with Dr. Tom Butterworth on October 12. We also appreciated the fact that you were able to pick him up at the office and bring him to and from the operation. I have enclosed a copy of Dr. Butterworth's report for your files.

As he observes on the first page of the report, Agro Foods is currently packing only "raw agricultural produce". You have informed us that you intend to move into the production of value-added products in the near future. These are the target products of the ALEB project, so we hope that we can help you get started properly.

As an organic processor, you have several distinct advantages over other operations. These include an understanding of the importance of documentation and how vital it is to monitor operations back to the farm, including all aspects of growing. When you move into the production of value-added products, having a company mentality that understands the importance of documentation and monitoring will be invaluable.

We also commend you for your commitment to Good Manufacturing and employee hygiene, but there are areas where improvements can be made. These include;

1. Housekeeping on the Grounds - The grounds should be policed on a regular schedule. Trash and waste should be removed as it will attract all manner of pests. We also suggest that any unused equipment either be sold as scrap or properly stored so that it does not serve as harborage for pests. You mentioned that you had a rat problem, so removing waste (food sources), improving drainage to eliminate standing water (source of water) and old equipment (harborage) will be a first step towards addressing the problem.
2. Chemical Storage - Storing chemicals in a separate facility as you do is a good practice. Be sure that the facility is locked, that there are signs stating that there are chemicals in the facility and that access is restricted

to authorized personnel only. Also, be sure that incompatible chemicals are not stored in close proximity.

3. **Handwashing Facilities** - The handwashing facilities were in good condition, but an effort should be made to assure an adequate supply of hot water.
4. **Pest Control** - Dr. Butterworth's notes indicate that you have a pest control program, but that you also have a rodent problem. If this is the case, than perhaps your program needs to be upgraded. ALEB will be teaching a pest control workshop on November 20 in Alexandria and again in Cairo on November 21. We would hope that you will consider joining us for one of these programs. I have enclosed some background information on pest control for your files.
5. **Cleaning & Sanitizing** - When you move into the packaging of value-added products, one of the areas where Agro Foods will need to look at is cleaning and sanitizing. All equipment, floors, walls, and drains should be cleaned and sanitized each day following production. I would suggest that you begin talking to companies who can supply with the chemicals and equipment to properly do this. I have listed three companies who can help in this area

DIVERSEY LEVER

39 Beirut Street
Heliopolis, Cairo
TEL: 02- 417-0967 FAX: 02-417-4759
02- 417-0968
02-291-7491
CONTACT: Mr. Osama Farid
Managing Director

KLEENCARE HYGIENE

12 El Sawra Street
Heliopolis, Cairo
TEL: 02-290-9665 FAX: 02-418-5727
EMAIL:
CONTACT: Mr. Ray Docherty
Eng. Manal Shoukry

EGYPTIAN TRADING & INDUSTRIAL OFFICE (Henkel)

8 Abd El Hakim El-Garhy Street, Ard El Golf
Heliopolis, Cairo
TEL: 02-291-8678 FAX: 02-290-9913
02-291-9046
CONTACT: Mr. Nasr El Din A. Nasr

There was one other area that Dr. Butterworth mentioned in which you might assistance; the purchasing of a hydro-cooler. Give me a little time to do some research, and I will get you a few names of manufacturers. If you purchase from a United States supplier, you can qualify for the United States Agency for International Development's Commodity Import Program (CIP). Information on the CIP program is enclosed.

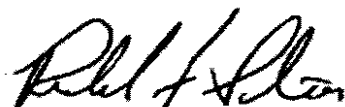


Lastly, I have enclosed two documents that you may find useful. They are in both Arabic and English. The titles are;

1. Post-Harvest Handling of Fruits & Vegetable: The First Step Towards Quality Processed Foods
2. Guide to Minimize Microbial Food Safety Hazards for Fresh fruits and Vegetables

ALEB thanks you again for your hospitality. Should you have any questions or require any additional information, please do not hesitate to contact us.

Sincerely yours,



Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files



To: R.F. Stier
From: Thomas A. Butterworth
Subject: Trip Report, Agro Food Co.

On Thursday, October 12, 2000, we visited the Agro Food Co. a packer of fresh organic produce located about 70 km south of Alexandria, off the Cairo/Alexandria desert highway. Future plans for Agro Foods include manufacturing processed organic produce, either liquid or dry.

For Agro Food Co. was:

Marco Semeria (General Manager & Partner)
Mobile: 012 3249262

The head office is in Cairo:

Salah Hegazi (Partner)
3, El-Shiekh Mohamed El-Ghazaly St.
Dokki, Cairo
Ph: 00202.7601028 – 3484252; FAX: 00202 3367831
www.agrofood@soficom.co..eg

COMPANY BACKGROUND

Agro Food Co. has been in existence for a little over seven years. Presently it is a "prepacker" (no washing involved) of mostly organic produce. Most of their products are exported:

Product	MT/Year	Exported To:
Potatoes	2700	U.K. (Sainsbury's)
Chinese Garlic	100	U.K.
Chinese Garlic	150	Continental Europe
Onions	500	Continental Europe
Melons	120	All of Europe
Sweet Potatoes	50	U.K.

They tried to enter local markets last year but there was little consumer acceptance for organic produce.

Agro Foods grows 65% of the organic produce on its own fields and contracts the rest. The factory receives the produce in plastic totes, tests it for quality, sorts it, grades it for size (N = 3) and packs either into conventional or "jumbo" (1100 L) bags. There is presently no wet processing and all produce must first be processed further before

presenting to a consumer. Therefore, what Agro Foods is presently manufacturing what could be considered a "raw agricultural commodity" under 21 CFR Part 110.

Next season (which begins in about 2 weeks) Agro Foods will start processing organic green beans, strawberries, sweet peppers, and cherry tomatoes in a new facility about 15 km away. The new facility will also have no wet processing for now. The incoming produce will be air cooled to 7 to 8°C, sorted, packed and cooled for shipment. Green beans, melons and sweet peppers will need no further processing than this cooling and sorting before being presented to consumers.

Besides the cooling room the new facility has 8 rooms for cold storage, each about 100 M². Next year the plan is to install a hydro cooler at the new facility.

They employ field workers on a full time basis but only about 15% of what is needed during peak times. The company employs a total of 180 to 190 people, of which 35 are at the original packinghouse. A total of 1,100 acres are under cultivation, about 2/3 of which is owned by Agro Foods. These fields are all within about 50 km of the facility.

The only part of the business that is computerized is accounting. They have no e-mail at the factory and the company has no website. However they have two computers scheduled for delivery within two weeks. Mr. Semeria's phone bill is about LE 100,000/year.

MAINTAINING ORGANIC CERTIFICATION

Agro Food's organic certification is with the Institute of Market Ecology (IMO), which is a Swiss organization. The E.U. organic "community" does not allow Egyptian companies to certify themselves so IMO has started a relationship with the Egyptian Center of Organic Agriculture that in turn certifies other Egyptian organic processors.

Agro Foods receives a Certificate of Guarantee from all the contract growers that no forbidden substances were used during cultivation or harvesting. Additionally, Agro Foods periodically "drops in" unannounced on these growers to see that all is well. The proof, however, is in the testing. Every "lot" is tested for 68 different residues by the Laboratory of Residue Analysis of Pesticides and Heavy Metals in Food of the Ministry of Agriculture and Land Reclamation (7 Nadi El Said St. Giza; Ph: +202 3611 282). Agro Foods pays about LE 38,000/year for the testing of 180 lots of produce. They have had only one problem with a residue in seven years. This residue was traced to a neighboring field.

THE FACILITIES

I had intended to audit the facility against 21 CFR Part 110, but the factory was not operating. Therefore, I filled in whatever information I could by asking questions and making whatever observations I could.

110.10 Personnel

a) Disease control. Any employee who comes to work ill or with an open cut or sore that could contaminate food is sent to a company doctor and is usually sent home after that. This doctor visit also provides some documentation of the practice.

b) Cleanliness:

(1) Protective outer garments are required for employees, management and guests whenever the factory is operating.

(3) Hand washing is required

(4) Unsecured jewelry is not allowed with the exception of some earrings that are "welded" on. In this case, a restraint similar to a hair net is utilized.

(6) Hairnets and beard covers are required.

(7) Employees (male & female) have their own rooms to store their personal effects.

(8) Eating, chewing gum, drinking or using tobacco are forbidden in areas where food is present.

d) Supervision. The responsibility for sanitation is assigned to Mr. Adel Shaakr who has been with Agro Foods since its inception.

110.20 Plant and Grounds

a) (1) There is a moderate problem with trash and unwanted equipment discarded rather casually in places, especially along one side of the building. Proper disposal of these materials could be especially important since they are having a problem with rats.

a) (3) There was some standing water on the uneven pavement just outside the rear of the building. This water will never drain.

a) (4) Solid waste is buried within 500 M of the facility; liquid waste is piped to the village and treated there; anything suitable for compost is used as such.

b) (5) All lights are equipped with protective covers during season.

110.35 Sanitary operation

a)(b) (2) Cleaning and sanitizing substances and other toxic substances are stored in a separate building from any food processing operation.

a)(c) Agro Foods has a problem with rats, partly because the facility is in the middle of the desert. Exacerbating the problem is an occasionally cavalier attitude about trash (mentioned above), storage of pallets and other materials directly against inside and outside walls and the presence of planters against the outside of the processing facility. They do have a pest control program.

110.37 Sanitary facilities and controls

- a) The facility has an adequate (city) water supply.
- b) The plumbing system is adequate
- d) The toilet facilities are adequate and accessible.
- e) The hand washing facilities are adequate other than a lack of hot water.
- f) I got the feeling that processing waste was not hauled away as often as it should.

110.40 Equipment and utensils

- e) All cold storage facilities have temperature indicators.

I gave Mr. Semeria a copy of ALEB's transcription of 21 CFR Part 110 as well as ALEB's "Good Manufacturing Practice for Employees."

PRINCIPLES OF FOOD PROCESSING SANITATION

edited by

Allen M. Katsuyama
Director, Sanitation/Microanalysis
Western Research Laboratory
National Food Processors Association

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CHAPTER 9

Food Plant Pests

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Figure 12. A rodent-proof storage area.

SUPPLEMENTARY CONTROL MEASURES

After a plant has been rodent-proofed, the resident population of rodents must be eliminated. Some continued control may be necessary to eliminate the occasional rodent that finds a way into the plant. Supplementary control measures, such as poisoning, fumigating, and trapping, are only partially successful. Their effects are only temporary unless the basic principles of permanent controls are also applied.

Poisons

With but one possible exception discussed later, all rodent poisons (rodenticides) are dangerous to humans and domestic animals and should not be used in a food plant without consideration of all inherent dangers. Secondary poisoning, contracted when domestic or protected wild animals eat a poisoned rodent, is a danger which should also be considered. If there is no person acquainted with these poisons, it is better to rely on traps. Poisons and their accompanying equipment should be conspicuously labeled and stored separately in locked rooms or cabinets.

BAIT SELECTION

Selection of bait is most important in a rodent poisoning campaign. Rodents' food preference varies with time, locality, and species. To compensate for dietary deficiencies, a bait should contrast periodically with available food. At other times, it should be food familiar to

the rodents. When there is less other food available, the chances are better that poisoned baits will be taken. Some bait favorites are nuts, bacon, raw meat, raisin bread, grain and grain products, doughnuts, fruits, melon, fish, and vegetables. Cheese is not usually effective. Cereal grain, such as oats or corn, is cheap but hulled and rolled or crushed oats and corn meal are generally more effective. Since rodents may carry solid baits a short distance and drop them where foods can become contaminated, extreme care must be exercised in bait placement to prevent the contamination of foodstuffs.

Rats are cautious feeders and the only sure way to determine what food is most preferred by a particular population is to conduct a bait-preference test with a variety of unpoisoned foods. Several kinds of baits should be placed at locations frequented by rodents and checked for several days to determine the preferred food. Baits and poisons should be changed from time to time because rodents may become "wise" and refuse them. They may also develop a tolerance for certain poisons.

Prebaiting is the placement of unpoisoned preferred baits in the same locations, amounts, and manner that will later be used for a poison. This helps to overcome any suspicion the rodents may have of the bait (bait "shyness"). Moist or fresh baits that may spoil should be picked up and replaced daily. Dry baits, such as cereals, should be left undisturbed. Prebaiting should be continued for 3 to 10 days or until bait shyness has been overcome.

Bait enhancers or attractants are sometimes used but there are no universally irresistible attractants. About five percent sugar or equivalent sweeteners from corn syrup or molasses can be added to grain and water baits. Three to ten percent table-grade vegetable oil may increase acceptance of cereal baits. However, no amount of sugar or oil improves a basically unacceptable bait.

The sanitarian should be certain that bait loss is not due to other animals, ants, or birds. Care must be taken to avoid poisoning pets or birds. Emetics, such as tartar, are sometimes used to make baits safer where children or pets can gain access to poisons. This does not affect the rodenticide's efficacy because rodents are unable to vomit. However, the emetic may reduce bait acceptance.

Distinctive coloring of baits helps prevent accidental misuse and human poisoning. Colors can also be used to identify the toxicant. Although rodents are color-blind, the dye or pigment may affect the flavor of the bait. Therefore, it should be tested for rodent acceptance and only the necessary amount to obtain the desired color should be used.

Water is used sometimes as a carrier for toxic compounds, such as 1080, arsenic, and soluble salts of anticoagulant rodenticides. In such cases, other sources of water should be eliminated to increase the chance of rodents drinking the poisoned water.

POISON SELECTION

An ideal poison should be odorless, tasteless, finely divided, readily mixed with any bait, lethal in small doses, and specific to rodents. Unfortunately, none of the known rodenticides have all these characteristics.

Food Plant Pests

Acute (single-dose) rodenticides are highly toxic and require only a single feeding to cause death. Multiple-dose rodenticides, such as most anticoagulants, are generally safer but require multiple, consecutive feedings. When food commodities are being contaminated or disease hazard is high, the quick acting poisons may be needed. Multiple-dose anticoagulant poisons may not be suitable where other foods are so readily available that bait acceptance over several days is unlikely. However, single-dose anticoagulants have been developed and are approved for use in many states.

ACUTE RODENTICIDES

Acute rodenticides are useful for achieving quick reduction of a large rodent population. The same acute toxicant should not be used more than three times a year and preferably only once or twice. When an acute poison is used repeatedly in the same locality, a bait- or poison-shy population of rodents may develop. The following chemicals are used as acute rodenticides.^{1,2} Typical concentrations in solid baits are listed in Table 6; their comparative toxicities in Table 7.

Table 6. ACUTE (SINGLE-DOSE) RODENTICIDES AND THEIR CONCENTRATIONS IN RODENT BAITS.^{1,2}

Common Name	Percent Active Ingredient in Solid Baits	
	Rats	Mice
Zinc or zinc phosphide	1.0 - 2.0	1.0 - 2.0
Red squill	10.1	0.2 in tracking powder only
1080	0.11	0.11
1081	1.0 - 2.0	Not registered
ANTU	0.75 - 3.0	Not effective
Phosphorus	Seldom used	Seldom used
Arsenic	Rarely used	Rarely used

Table 7. COMPARATIVE TOXICITIES OF RODENT POISONS*

Poison	Milligrams of poison per kilogram of body weight required to kill 50 percent of the rats (figures are approximate)	
	Source A	Source B
1080	0.22	4-5
ANTU	6.9 (Norway rat) 250+ (Roof rat)	
Zinc phosphide	40.5	
Arsenic trioxide	138	25-100 (depending on degree of pulverization)
Fortified red squill:		
For females	133	300-400
For males	276	500-600

* Figures from two sources are quoted because the types of animals, the methods of administration, the methods of recording data, etc., are so varied that no one set of figures could be considered authoritative: (A) Diecke, S., and C.P. Richter, Johns Hopkins Hospital, Baltimore, Md. Data apply mainly to the Norway rat. (B) U.S. Fish and Wildlife Service.

Zinc phosphide, the most widely used acute rodenticide, is very effective and presents no major problems of secondary poisoning. It is a dark-gray powder with a garlic-like odor, insoluble in water, and reasonably stable. It is moderately toxic but effective against Norway rats, roof rats, and house mice. It is generally used at a strength of 1 to 2 percent (1 to 2 parts poison to 100 parts bait by weight). Its strong odor appears to attract rodents but tends to repel people and domestic animals to some degree. Oils and fats, such as vegetable oil and peanut butter, make good binders and increase absorption of the poison by the rodents.

Sodium fluoroacetate or sodium monofluoroacetate, also known as 1080, is one of the most effective rodenticides. It is rigidly regulated. 1080 is practically tasteless, odorless, and quite stable - poisoned baits remain toxic for a long time. It is highly soluble in water, hence, rapidly absorbed from the gastrointestinal tract. 1080 is used in water and less frequently in dry baits. Cats, dogs, and other carnivores are very susceptible to primary and secondary poisoning and there is no effective antidote. Although it may be permitted, 1080 should not be used in food plants except under unusual circumstances and with careful supervision by qualified professionals. Fluoroacetamide (1081) belongs to the same group of chemical compounds and has many of the same characteristics, hazards, and restrictions.

Red squill, a chemical mixture consisting primarily of scilliroside glycoside, is extracted from a plant belonging to the lily family. An acute rodenticide, it is relatively safe to humans and other animals because it acts as an emetic. It is recommended for control of Norway rats, but not roof rats; it has questionable effectiveness against mice. Fortified red squill with a guaranteed toxicity of 500 to 600 milligrams per kilogram of rat body weight should be specified. It is available in powder, paste, and liquid (concentrated or ready-to-use) forms. It may be dusted on baits, made into a paste, or mixed with oil, such as banana, coconut, anise, or butter, and spread on baits at 10 percent concentration (1 part red squill plus 9 parts bait). It should be used infrequently on any rat population since rats quickly develop bait shyness. The pure scilliroside glycoside is used in tracking powders at 0.2 percent concentration.

ANTU (alpha naphthylthiourea) is only effective with Norway rats. It is insoluble in water and normally used at about 1 to 3 parts ANTU to 100 parts bait. Twenty percent ANTU talc has been used as a dusting powder in runways. Since rats develop bait shyness and immunity rather quickly to it, it should be applied only once per year.

Arsenic (as arsenic trioxide, As_2O_3 , and others) was a common rodenticide at one time but is seldom used today. It is sold only as a liquid at 1.5 percent active ingredient and used at about 1 part poison to 20 parts bait by volume, or in water solution of about 3 ounces to 1 gallon (88.7 ml to 3.8 l). It is considered less effective on mice than on rats. It is highly toxic to people, domestic mammals, and birds and has been largely replaced by more effective, less hazardous materials.

Phosphorus, or yellow phosphorus, is seldom used today, although it too was once popular. It has poor acceptance by rodents and is reported to be less effective on mice than on rats. A few commercial preparations are available in paste form as a 3 percent concentrate to be spread on baits. Phosphorus baits have caused fires from spontaneous ignition. It has been supplanted by more effective, less hazardous materials.

Formerly used but no longer registered acute rodenticides include strychnine (except for ground squirrels and pocket gophers), barium carbonate, and thallium or thallium sulfate. An acute rodenticide marketed under the trade names Norbromide, Shoxin, and Raticide has also been canceled (February 1974). It is illegal to use these in the United States. Vacor[®], also marketed as RH-787 and DLP-787, is also being canceled.

ANTICOAGULANTS

Anticoagulants, also called chronic or multiple-dose rodenticides, have cumulative effects and must be consumed over a number of days to cause death. Death results from internal bleeding. Anticoagulants are relatively safe for people and other non-target animals because the chance of repeated consumption is low. Since the toxic effect is relatively slow, there is time to administer blood transfusions or vitamin K₁. The latter is an effective antidote for all anticoagulant rodenticides, including the newer single-dose anticoagulants.

Anticoagulants are readily accepted by rats and mice. Shyness to the poison rarely develops if the baits are attractive. Mice are less susceptible to anticoagulants than Norway or roof rats and must feed for longer periods for the baits to be lethal.

These rodenticides can be used in dry baits. Their sodium or other soluble salts are useful with water baits. For best results, treated baits should be offered daily; intervals between feedings should never exceed two days. Many fresh, attractive baits are important. Sources of other food must be eliminated. One pound (0.45 kg) is usually sufficient for an individual home and 2 to 3 pounds (0.91 to 1.36 kg) for an ordinary business establishment. A sizable food processing plant will require significantly more.

Coarsely-ground yellow cornmeal as bait is acceptable to Norway rats. It is usually successful with house mice if mixed with an equal amount of rolled oats plus 3 to 5 percent sugar. Some rodent populations may prefer other baits and cereal mixes. The addition of 5 percent mineral oil will minimize cornmeal dust. Prebaiting is generally unnecessary. Deaths after initial exposure should be apparent on about the fourth day for rats and fifth day for mice. Fresh anticoagulant baits should be offered for another 2 to 3 weeks or until all feeding stops.

Bait rejection, evidenced by lack of consumption, indicates the use of unpalatable material. Failure to achieve desired control with anticoagulants when the baits are well accepted may be due to one or more of the following reasons:

1. The bait exposure time is too short.
2. There is insufficient replenishment of bait.
3. There are insufficient bait stations or they are not spaced closely enough. Stations may have to be within 20 to 30 feet (7-10 m) of each other for rats and 3 to 6 feet (1-2 m) for mice.
4. An insufficient area is included in the control program, which permits rodents to move in from adjacent untreated areas.
5. There is an anticoagulant-resistant population. Resistant rodent populations have been confirmed, although little is known about the extent of resistant strains. If resistance

is suspected, acute poisons may be used. A recently-approved anticoagulant, marketed under the trade name Talon[®], has been demonstrated to be effective against warfarin-resistant strains.

The concentrations of common anticoagulant rodenticides used in solid baits are listed in Table 8.

Table 8. CHRONIC (MULTIPLE-DOSE) RODENTICIDES AND THEIR CONCENTRATIONS IN RODENT BAITS^{1,2}

Common Anticoagulants*	Chemical Name	Percent Active Ingredient in Solid Baits
Chlorophacinone	2-(p-chlorophenyl)phenylacetyl-1,3-indandione	0.005
Diphacinone	2-diphenylacetyl-1,3-indandione	0.005
Fumarin [®]	3-(a-acetonylfurfuryl)-4-hydroxycoumarin	0.025
Pival [®]	2-pivalyl-1,3-indandione	0.025
Valone, PMP [®]	2-isovaleryl-1,3-indandione	0.055
Warfarin	3-(a-acetonylbenzyl)-4-hydroxycoumarin	0.025
Prolin [®]	3-(a-acetonylbenzyl)-4-hydroxycoumarin plus sulfaquinoxaline	0.025 0.025
Talon [®]	3-[3-(4'-bromo[1,1'-biphenyl]-4-yl)-1,2,3,4-tetrahydro-1-naphthalenyl]-4-hydroxy-2H-1-benzopyran-2-one	0.005

* Trade names are given where no established generic names are available.

TRACKING POWDERS

Rodents groom themselves by licking their feet and fur frequently, ingesting dust and other matter adhering to their bodies. Toxic tracking powders have been developed to take advantage of this habit as a mechanism to poison rodents. Tracking powders may be either an acute or chronic rodenticide formulated with appropriate diluents. They must be registered for such use.

Tracking powders are effective where food is plentiful and bait acceptance is poor. They do not result in the development of bait- or poison-shyness and can be an effective supplement to baiting and trapping. Toxic powders are placed strategically in rat burrows, along runways, behind wallboards, and on the floor of bait stations. Since sporadic feeding and nibbling habits of mice make them more difficult to poison with baits, tracking powders may be relatively more effective. Although powders have been used in outdoor locations, they are more effective indoors. Since toxic tracking powders are not safe when used where rodents might track poison onto food or food-contact surfaces, they have only limited usefulness in food processing plants.

POISON BAIT FORMS AND PLACEMENT

Proper placement of baits can be more important than the type of bait. Baits should be placed along runways, near burrows, in and near harborages that rodents frequent, and under cover so rodents will feel secure when feeding. Baits must never be placed on overhead ledges, near open elevator shafts, or in other places where they may be dislodged and fall into food products, equipment, or containers. An ample supply of bait must be provided. Underbaiting with acute toxicants can produce bait- or poison-shyness that will be difficult to overcome; insufficient bait with chronic poisons will interrupt the continuous feeding cycle and make the poison ineffective.

Loose bait materials can be wrapped in wax or other paper to form packages that are easy to carry and place. Packaging helps to keep perishable baits fresh and cereal baits dry. Dry cereal anticoagulant baits, packaged in 4- to 10-ounce (0.1 to 0.5 kg) portions in paper or plastic bags called "place packs" are commercially available. They are easily placed under pallets and other locations where bait stations are not feasible. However, such practices can lead to serious hazards in food plants and are not recommended except in carefully selected and restricted areas. Pelletized baits are commonly used. They permit the blending of grains into a single particle that is easily handled by rodents. The pellets prevent separation of loose cereal mixtures during shipment. A wide variety of pelletized baits is commercially available.

Anticoagulant baits embedded in solidified paraffin blocks are useful in wet locations, such as sewers, warehouses, and outdoor areas. The blocks are reasonably moisture proof, minimizing the problem of moldy bait. They are helpful in roof rat control where the blocks can be fastened to rafters, poles, and other locations where bait boxes are inappropriate. Since loose baits are more acceptable, paraffin blocks should be limited to locations where loose baits cannot be used.

Bait boxes, or bait stations, protect baits from weather and from being scattered. The boxes provide a protected feeding place for rodents and restrict accessibility mainly to rodents. Bait boxes or other types of enclosed bait stations (Figure 13) should be large enough to accommodate several rats or mice at a time. The boxes should have at least two openings about 2.5 inches (6-7 cm) in diameter for rats and smaller for mice. A bait box usually contains a self-feeder hopper for the bait. Bait boxes can be purchased commercially or custom constructed from cardboard, wood, plastic, or metal. Locks, seals, latches and hinges make bait stations tamper-proof. All stations should be conspicuously labeled. Open bait trays should not be used since they are easily kicked, walked on, or otherwise disturbed, scattering poisoned bait.

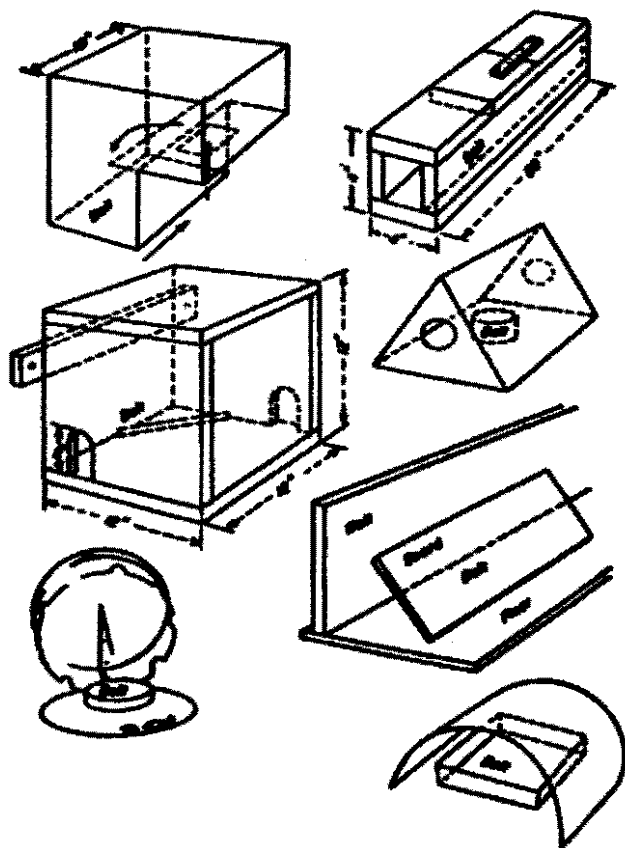


Figure 13. Bait boxes for prebaiting or offering poisoned bait to rodents.

Although some commercial bait stations have a water dispenser for either plain water or poison solutions, it is not essential. Norway rats require water, but they find alternate sources. Mice can exist without water but drink if water is available. Roof rats are capable of living for weeks without water and forego any other water supply if moist foods are available. An appealing bait must serve as the attractant.

Bait boxes or enclosures should be placed along the outside walls of all food facilities. If the property is fenced or otherwise secure from public access, placing additional boxes along the property perimeter should be considered. Initially, all bait boxes should be checked daily. Signs of activity should be noted and the bait replenished. As rodent activity decreases, inspections can be reduced to weekly intervals. Bait, especially in indoor stations, should be discarded at the first sign of insect activity.

Fumigants

A fumigant, or poisonous gas, has a high rate of kill. Fumigation is an expensive control measure for large areas and is generally used only when a building must be treated for other reasons, such as a serious insect infestation. Fumigants are commonly used in limited spaces, such as trucks and railcars, primarily for insect control. They are also frequently used for outdoor rodent control where burrow entrances are accessible. Since there are inherent hazards associated with the use of toxic fumigants in buildings and structural enclosures, such fumigation should be performed only by licensed structural pest control operators or individuals with comparable knowledge, experience, and certification. The registered compounds for use as rodent control fumigants in burrows and buildings are discussed below.

Methyl bromide (CH_3Br) is the most toxic of the fumigants and is widely used. It is a quick acting, highly toxic, colorless, odorless gas. It can be used in burrows by releasing about 1/2 to 1 ounce (15-30 ml) of methyl bromide liquid into the burrow. The liquid volatilizes immediately. Methyl bromide should not be used near vegetation since it is toxic to plants and severely injures or kills trees.

Chloropicrin (CCl_2NO_2) is the main constituent of tear gas. Minimum lethal concentration for rats is 1 ounce per 1000 cubic feet at 63°F (1 g per cubic meter at 17.2°C). For mice, 1.5 to 2 pounds per 100 square feet of floor space (730 to 975 g per 100 sq m) is frequently recommended. Chloropicrin can repel rodents below these lethal concentrations. It is also used as a warning additive in toxic gases, such as methyl bromide, that have little or no odor. Calcium cyanide [$\text{Ca}(\text{CN})_2$] is available as a dust or granular powder that releases hydrocyanic acid (HCN) gas upon contact with damp air or soil. HCN is extremely toxic and kills quickly. The dust is normally applied to outside burrows with a hand stirrup pump at the rate of 1 pound (450 g) of dust per 30 burrows. The granular powder can be placed as far into the burrow as possible with a long handled spoon at the approximate rate of 1 ounce (30 g) per burrow. HCN has a deleterious effect on liquids and greasy products; some fruits and vegetable can be burned by high concentrations.

Food Plant Pests

Other registered compounds include carbon tetrachloride (with ethylene dichloride and paradichlorobenzene), gas cartridges (sodium nitrate, sulfur, charcoal), hydrocyanic acid, and sodium chlorate/sodium cyanide mixture. For effective treatment with any fumigant, rodents must be exposed to the toxic gas. Building treatments may miss rodents in burrows, while burrow treatment may fail if gases escape. When burrows are treated, openings must be sealed with dirt or sod.

Carbon dioxide (CO₂) is available as a compressed gas and in solid form as dry ice. It is used to treat cold storage and other rooms where food is stored and materials on tightly tarped pallets. CO₂ is not a toxicant. It causes death by asphyxiation by displacing the oxygen in the air. Carbon monoxide (CO) from vehicle exhaust gases has been used for burrow fumigation. CO from this source is more expensive, dangerous, and not as effective as commercial fumigants. Neither carbon dioxide nor carbon monoxide is a registered fumigant.

Dead Rodents

Dead rodents should be collected promptly to prevent odors and secondary poisoning (when poisoned baits are used). Carcasses should be picked up with gloved hands, tongs, sticks, or other implements to avoid or minimize possible infection from ectoparasites, such as fleas. The bodies should be placed in plastic bags; the bags should then be tightly sealed and disposed of as garbage.

Some rodents killed by poisoning or fumigation may be situated in inaccessible locations. Odors from decaying bodies may persist for several days. When such odors cannot be tolerated, a structural pest control operator should be contacted to apply odor-masking chemicals. Caution should be exercised to assure that the chemicals do not contaminate or deleteriously affect foods.

Trapping

Trapping in a food plant requires more time and effort than does poisoning. If only a few rodents are present or poisoning is inadvisable, it is the method of choice. If a large rodent population is present, a poisoning campaign followed by persistent trapping should prove effective. Since trapping does not require hazardous rodenticides, does not leave dead rodents in inaccessible locations, and its success is quickly evident, it has obvious advantages. Traps widely used in food plants include baited snap traps, unbaited snap traps with treadle triggers, and live-catch traps.

The common wood-base snap or guillotine trap is quite efficient and the least expensive for both rats and mice. Two sizes are available in most hardware stores, farm supply stores, and supermarkets. Rat traps do not work with mice nor mouse traps for rats. The baited trigger should be adjusted so that only the slightest pressure or pull is required to spring the trap. As with poisons, bait selection is important. Baits that are difficult to attach to the trigger should be tied on with thread, string, or wire. Soft baits can be wrapped in cheesecloth and tied to the trigger. Using prebaited unset traps will increase the effectiveness of snap traps.



Figure 14. A snap trap modified by fastening a piece of cardboard to expand its trigger size.

Treadle snap traps, also called expanded or extended trigger snap traps, are designed to trip when pressure is slightly exerted on the trigger plate. Baits are not required but may be used. Snap traps of this design are available from pest control equipment suppliers. Standard snap traps can be easily modified by attaching a square of cardboard or thin metal to the bait holder (Figure 14).

When baits are not used to attract rodents, these traps are effective only when placed in runways or other high activity areas. However, in such areas treadle snap traps offer the advantage of not requiring baits.

Live-catch or multiple-catch mouse traps, such as the Ketch-All[®] or Tin Cat[®], are popular and well suited to food processing and storage facilities. Although these mechanical devices are relatively expensive, they are safe and capable of catching and holding several mice without resetting. Captured mice should be drowned. One manufacturer offers a tube attachment connected to a large jar; when the jar is partially filled with water, the entrapped mice drown themselves.

Traps should be placed along runways or near walls, in or near harborages, at known feeding places, behind boxes, and other activity areas. Effectiveness is increased by creating artificial runways with boxes or by leaning a board against the wall over a trap. Snap traps should be left unset for 2 or 3 days until rodents become accustomed to them. The trap should be placed at a right angle to the runway with the trigger facing the wall (Figure 15: A,B). If traps are placed parallel to a wall, two should be used and placed so the triggers face approaching rodents (Figure 15: C). Rat traps should be nailed to beams or secured with wire or string to prevent their being dragged away. Rat traps can be fastened onto overhead structures to intercept roof rats (Figure 16).

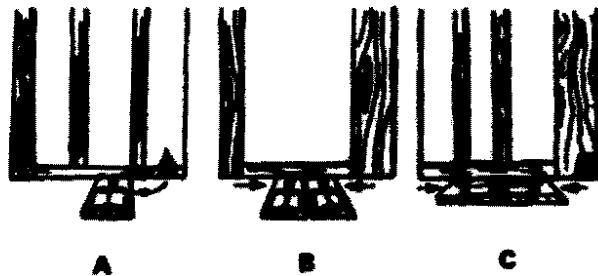


Figure 15. Proper placement of snap traps: A, single trap with trigger facing wall; B, double set to increase chances for success; C, double set placed parallel to wall with triggers facing outward.

The number of snap traps should exceed by three times the estimated number of rodents; 100 traps in a large warehouse is not an excessive number. Traps should be placed in the late afternoon and checked, picked up, or rebaited the following day. The traps can be painted a bright color and numbered to facilitate accounting and locating them. Continuous trapping is generally not satisfactory. Best results are usually obtained by trapping for three consecutive nights, then unsetting the traps and waiting a week before repeating.

After most of the rodents have been caught, the remainder may be very difficult to trap. Since they will avoid snap traps if they have previously sprung one without being caught, it is necessary to outwit these remaining pests. Snap traps can be camouflaged by sinking them below ground level and covering the area lightly with fine soil, sand, or sawdust. Traps can also be buried in shallow pans of grain, meal, or sawdust.

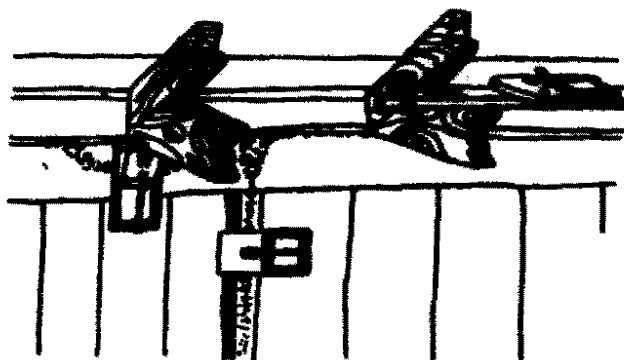


Figure 16. Rat traps secured to overhead structure to intercept roof rats. Note the trap (left) modified with cardboard to expand its trigger.

Since mechanical multiple-catch mouse traps do not normally result in trap shyness, they may be used continuously. However, they should be checked frequently. Multiple-catch traps are especially useful when placed along the wall on each side of normally-open doors. Stray rodents entering a doorway will usually seek immediate cover. These traps will appear to offer sanctuary and will entrap many mice before they can find harborage within the facility.

Glue Boards and Repellents

Rodent glue is expensive and relatively ineffective in rat control but may be fairly effective against mice. Stiff cardboard or presswood board is coated on one side with a very sticky, non-hardening adhesive. Large numbers should be strategically placed where mice will run over them and become entrapped. Rats can drag the boards away. Surface dust and temperature extremes decrease the effectiveness of glue boards. Prepared glue boards and cans of adhesive are available from pest control suppliers.

Chemical repellents have been developed to protect timber, sheathing, and cartons against rodent gnawing. Although tertbutyl dimethyltrithioperoxycarbamate (R-55[®]), an area repellent for house mice, and tri-n-butyltin chloride (BioMet 12[®]) for polyethylene coated electric cables are registered by EPA, there are no useful chemical repellents for food plants.

Various electronic devices are marketed as rodent repellents, including ultrasonic generators and electromagnetic devices. Mice and rats are easily frightened by strange sounds but quickly become accustomed to constant or regularly repeated sounds. Ultrasonic sounds are unidirectional, do not carry far, and do not penetrate into or behind stored objects. Pending firm scientific evidence, these devices should be viewed with skepticism as mechanisms for driving rodents from a warehouse.^{1,2,3} However, ultrasonic sound directed at open doors possibly may discourage rodents from entering. Extensive studies of electromagnetic devices have failed to demonstrate any rodent deterrent efficacy.⁴

RECORDS AND REPORTS

A complete record of control activities and effectiveness should be maintained. Records should include a diagram indicating the location of bait boxes, traps, and other control devices. Records should be kept of the poisons used, when and where placed, the unconsumed baits collected and how they were disposed, trapping programs, the numbers of rodents caught or found dead, and other evidences of activity. When poisons are used, specimen labels and other pertinent information should be filed.

Rodent control programs may be conducted exclusively with plant employees, solely by a commercial pest control operator (PCO), or a combination of the two. Commercial exterminators should be carefully selected and their work covered by a contract. It is

recommended that the sanitarian or other plant employee accompany the PCO representative working in the plant. The exterminator should be required to file a complete report of activities, including poisons used, placement of poisons and traps, collection of poisoned baits, evidence of rodent activity noted and locations. Recommendations for permanent control measures should also be given. A report form, such as the one illustrated in Figure 17, should be required to provide appropriate information following each service call. These reports should be reviewed and filed by the plant manager or sanitarian.

Report of Rodent Survey and Control	
Plant _____	Date _____
1. Name of commercial exterminating company _____	
2. Persons consulted in plant _____	
Rodent Survey	
1. Control satisfactory? Yes _____ No _____	
2. Harborage (indicate specific locations) _____	
3. Evidence and exact location of infestation _____ (fecal deposits, damaged food or packages, gnawings, rat runs, etc.)	
4. Food supplies available _____	
5. Approximate degree of rodent infestation _____	
6. Were old baits of last control picked up? _____	
Rodent Control	
1. Type of bait used _____ Poison used _____	
2. Direct poisoning _____ or prebaiting _____	
3. Location of baits _____	
Was any member of plant staff shown where bait was placed? _____	
If so, who? _____	
4. How was poison bait protected? _____	
5. Other control measures installed (overseeing, flushing, etc.; be specific) _____	
Recommendations	
1. Special or serious problems, if any _____	
2. Additional control measures by plant _____	
3. Rodentproofing needed _____	
4. Harborage that should be removed _____	
5. Storage areas inaccessible for inspection _____	
6. Additional recommendations _____	
Signed _____	
(Field Representative)	

Figure 17. Example of a report form to be completed by a PCO after each service call.

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**Action to be Taken When Rodent or Evidence of Rodent
Infestation is Found in an Establishment**

- I. Production or production related area, such as processing room, ingredient storage, cooler, or any areas where meat or meat product is accessible.**
- A. Movement of any material in or out of the area is withheld.**
 - B. Operations are immediately stopped in the department.**
 - C. Before movement of material or before operations may be resumed, the following are required:**
 - 1. All packaging materials and containers must be examined for rodent damage and must be discarded if contaminated.**
 - 2. Containers of dry ingredients that have been opened and left uncovered in accessible areas must be discarded with their contents.**
 - 3. Any product or parts of carcasses or intermediate product showing evidence of rodent contamination must be decharacterized or destroyed. An ultraviolet light can be used in carcass and exposed product examination.**
 - 4. A complete cleanup, wash down, and sanitizing of equipment must be performed.**
 - 5. All accumulations of equipment, paper, or other debris that could provide harborage in the offending area must be removed.**
 - 6. A complete survey must be conducted (by the establishment) of the premises and outlying areas for harborages and rodent access points. All suspected harborages must be eliminated and all possible access points closed.**
 - 7. All dry storage materials must be arranged to provide easy access for cleaning.**
 - 8. The inspector (USDA) must determine that the above actions are satisfactorily completed.**
- II. Non-production areas, such as machine shop, maintenance shed, unused equipment storage, and areas removed from the production area, should be:**
- 1. Free of accumulations of any debris that could provide harborage, and**
 - 2. Arranged to provide easy access for cleaning among stored materials.**
- III. The following are considered characteristic of a minimum rodent control program.**
- A. A responsible and qualified individual is designated in charge and given the authority in writing to require action.**
 - B. At least once per week a complete survey of inside and outside premises is made to determine effectiveness of control and to determine conditions. A copy of the survey report is given to the inspector (USDA).**
 - C. All openings into the plant where rodents might gain entry are closed. All holes within the plant that could possibly be an entry point are sealed.**
 - D. All conditions surrounding the plant where rodents could hide and breed are eliminated.**
 - E. Bait boxes are maintained outside of processing areas where there is likelihood of rodent activity. (Anticoagulant poisons are preferred.)**
 - F. There are no accumulations of waste litter that might provide food. Equipment or supplies that could be a harborage are removed.**
 - G. A contract with a recognized extermination firm is usually helpful.**
-

PEST CONTROL FOR THE FOOD PROCESSOR

Richard F. Stier
Consulting Food Scientist

INTRODUCTION

There are few people who tolerate insects and rodents in their homes and business. Who hasn't had a night's sleep interrupted by a mosquito buzzing in their ear, or found rodent droppings under the sink? Your first thought is to get rid or kill, the intruder. That intruder, be it insect, rodent, cat, dog, or bird, that that has infringed on "your turf" is considered as a pest.

Consumers tend not to tolerate pests, and food processors should not. In fact, regulations specifically mandate that pests be excluded from food processing plants food safety mandates that. The current Good Manufacturing Practices, defined in 21 CFR Part 110, state that,

*"No pests shall be allowed in any area of a food plant."
and that*

"Effective measures shall be taken to exclude pests from the processing areas and to protect against the contamination of food by pests."

The regulations also specifically define a pest as, "any objectionable animals or insects including, but not limited to, birds, flies, and larvae." The legal definition is fairly close to how consumers think of pests...undesirable.

PEST CONTROL...WHY?

So why have the United States (and many other nations) included pest prevention as part of their Good Manufacturing Practices or hygiene policies? There are a number of reasons for this. First and foremost, pests carry disease. Rats and mice can carry or spread many diseases, including salmonella, Hanta virus, and the bubonic plague. Bubonic plague or the Black Death was spread by fleas on infected rats many years ago. In the middle ages, plague epidemics swept through Europe killing millions; almost 1/3 of the population according to some estimates. Insects, especially flies can also spread disease. Consider the unpleasant places where we find large populations of flies. Do you want them on or near your food? Research indicates that flies can spread many different human diseases. Birds spread disease through their droppings and themselves. The production of safe and wholesome food is, the main reason for controlling pests.

There are also many economic reasons. Pests can damage or totally destroy agricultural commodities and finished goods. In developing nations, where hunger is most keenly felt, pests destroy or damage an inordinate amount of food, further contributing to the problem. An infested warehouse will result in loss of product sales, action by regulatory agencies and adverse publicity.

The bottom line is that pest prevention is good business. Excluding pests from your processing operations is required by law, however in doing so you protect your products and your potential profits. We are in a time where food safety and quality control are on everyone's concerns. Processors and buyers are taking a more active role in assuring that foods they produce are safe. This attitude is rolling down the food supply chain, so therefore supplier audits and vendor certification programs are becoming more common. For example, if you want to sell to restaurant chains such as the Tricon Group or McDonald's, processors like Pillsbury or General Mills or supermarkets such as Sainsbury's, you must have a HACCP plan in place. Part of that HACCP plan will be your prerequisite programs, which include pest control. If an auditor finds that your plant has a problem, you can lose a customer or be dropped from consideration as a supplier. It will cost you a client.

CONTROLLING PESTS IN YOUR PLANT

The first item that comes to mind when the subject of pest control is mentioned is pest elimination, or preventing the intruder. Pest control is more than simply killing pests. In fact, according to Jim Bowyer of Clark Pest Control, 90% of pest control or pest management is sanitation. Pests, be they rodents, insects or birds, are like human beings. They need food, water and shelter to survive. There are, always several basic principles of what is known as Integrated Pest management or IPM. These basics are;

- ◆ Deny Access
- ◆ Deny Food
- ◆ Deny Water
- ◆ Deny Shelter

Finally, if these principles in the fail, elimination of pests. Application of the current Good Manufacturing Practices is a good way to help assure that your plant stays pest-free. There is one other principle that has not been mentioned. That is correctly monitoring the location. It is also important to understand the habits and characteristics of different pests that can invade a food plant. There are times that it helps to be able to think like a rat, pest, or bird. Let us take a look at these basic principles of IPM.

Deny Access - A food processor's first line of defense is the exterior fence line then the building itself. Buildings should be designed and maintained to prevent pest from entering. Insects, rodents and birds can enter through cracks and crevices, doors, windows, gaps in walls, under or through walls and even as hitch-hikers. Each and every processor needs to walk around the outside and the inside of their building and look to see whether there is a potential access points. A rat can get through a hole the size of a quarter and a mouse the size of a dime. If one can see light around doors or windows, there is enough space to allow access. One area where birds often enter plants is where corrugated walls or roofs meet. These gaps may be high but they should be plugged. One of the hardest areas to seal are doors. Rollup doors should be fitted with rubber bumpers that will contact the floor below the door and make a seal. Some operators fit their doors with brushes. The brushes discourage rats and mice from trying to push through and into your plant. Other operations employ air curtains on their doors. Air curtains may be fitted to different size doors, from walk through to roll up warehouse doors, to be fitted with air curtains. Operators must take care that the air curtains have sufficient air flow to discourage pests and that they are properly adjusted. The air should be adjusted so that it flows away from the interior. Don't blow insects and air into the plant. Another tactic that some processors employ to keep pests out is to use compressed air to clean pallets before entering the plant.

Deny Food - All creatures must eat to live including food plant pests. This is why good sanitation is such a crucial element in pest control. Processing operations must be cleaned each and to eliminate the sources of food for pests, and to control microbial growth. Cleaning is made easier if the equipment and the plant itself have been constructed using basic principles of sanitary design. One component of this is elimination of areas where food can accumulate or be trapped. This is especially important in bakery or snack food operations. Flour or grain that accumulates under equipment, in the rafters or in other areas in the plant can attract pests and result in the development of an infestation. A way to minimize this occurrence is to be sure that support legs on equipment are flush to the floor. Some operations even with epoxy floors requires that you seal the base of the supports to completely eliminate any chance for food to accumulate and insects to hide. In this kind of operation, rafters should be rounded or triangular with the pointed side up. This kind of design will prevent accumulation of food. Operators must be aware of hanging ceilings. Food from processing areas can accumulate between the ceiling and the roof and attract pests. This precise situation was observed at a manufacturer of dried food ingredients. The product that accumulated on top of the suspended ceiling served as the site of feeding for a infestation.

Deny Water - Insects, rodents and birds also water. Food processors need to do what they can to eliminate water sources on the interior and exterior of the food plant. One of the areas where water can accumulate are on improperly

graded floors. Floors should be graded so that they slope towards drains. An other area are the drains themselves. The drains should not allow water to accumulate. This, like the floors, is a flaw in construction.

Areas on the grounds where water can accumulate are potholes in roads or yards, graded loading docks and drainage ditches. Operators should also check pipes and hoses to be sure that they are not leaking. Leaky pipes can create problems. Standing water needs to be addressed at a plant by plant basis. Routine inspection and maintenance of the grounds can help to prevent problems. Ditches are not a good idea. If drainage is required, use underground pipes.

Deny Harborage - Pests need a place to live and breed. Insects can do this anywhere they can hide. They can be found in cracks and crevices, under pallets, in electrical panels and in vegetation. Storage of trash, waste and other materials around plants, and especially around doors, provide harborage and can encourage access. For example, it is never a good idea to stack pallets (or other materials) against the wall adjacent to a door. Pests can hide in these pallets and enter through open doors.

Birds need areas to roost and to nest. Roosts and nesting preferences vary by species. The principle bird pests in the United States are pigeons, swallows, sparrows and gulls. Operators need to understand the habits of the birds near where their plant is located. The best way to control birds is to eliminate areas for roosting and nesting. If an operator has a covered loading dock, he may have to place bird netting over rafters and girders to keep birds from nesting. Gulls perch on roofs of plants. Installation of wires along roof tops discourage roosting by making landing difficult. Ornamental vegetation is attractive, but can encourage roosting and provide food for birds. Keep vegetation to a minimum to minimize pests.

Rodents will nest or burrow wherever they can feel safe. Rodents will nest in a wide range of materials, including foods and packaged materials. This is one reason that trash and waste materials must be removed. Piling old materials against a wall is an invitation to an infestation. It is also one of the reasons that operators should maintain corridors of at least 45 centimeters between walls and stored materials and 35 centimeters between rows of stored product and that they should store product at least fifteen (15) centimeters off the ground or floor. These principles also allow for cleaning, monitoring of pests and inventory control. Rodents will also nest on plant grounds. Paving is an excellent way to minimize rodent infestations. They can burrow, but not through concrete or asphalt.

MONITORING

As with any other operation in your plant, monitoring of pest activity is an essential element of control. Many operators monitor rodent activity by installing bait stations along their property lines and along the outside of their buildings. Bait stations, should be located no more than every 100 feet along exterior property lines and every 50 feet around the outside of the buildings. Traps ~~must~~ be locked and secured so they cannot be moved. Pest control operators chain bait stations to cyclone fences or anchor them to the ground. The use of a product called "liquid nail" may also be used to anchor bait stations. Poisons should only be used on the outside of the plant. To monitor activity indoors, snap traps, glue boards or live traps may be used. So that plant staff and others know where traps are located, signs should be placed on walls above each trap location and numbered. Snap traps should be monitored on a daily basis. Live traps at least once a week. These devices will kill rodents, but their real role is monitoring. They can also help to prevent them from entering your plant. If activity is detected as evidenced by increased catch numbers in live traps or gnawing of baits, increased vigilance and trapping, may be necessary.

Pheromones are insect sex hormones. They are used as attractants to trap and monitor for the presence of insects. Each pheromone is specific for an individual insect species. Processors of grain frequently use these tools to monitor conditions within plants and warehouses. Traps for Indian meal moths or grain beetles may show a processor or a warehouse operator that there is a infestation. These kind of traps may also be used to locate an infestation and monitor the efficacy of treatments. The figures show how the use of pheromone traps allowed a pest control operator to isolate the source of an infestation, a "hot spot," and how a series of treatments helped to bring the problem under control.

PEST ELIMINATION

When sanitation programs break down or plant barriers fail to do their job and pests enter, steps must be taken to eliminate the offending pests. The use of additional traps or bait stations may be employed to catch and eliminate rats. Isolation and destruction of burrows or nests will further help to eliminate the problem.

With birds, the goal is to force them away or kill them. Care must be taken that only the targets, that is, the target pests are removed. Songbirds and others are protected, so care must be taken if one wants to use a product like avitrol. This is a chemical that disorients birds. It literally makes them seem to be drunk and act erratically. The erratic actions will supposedly cause the flock to move elsewhere. If they become established within a plant or warehouse, the only

solution may be to shoot them. If this is the route that is taken, care should be taken not to damage of the facility or equipment.

When there is a rodent problem, operators need to set additional traps or put out more bait. It is also essential to find the source of the infestation. In other words, "*Seek out the Source (SOS)*." And never, ever use cats as a means to eliminate a rodent infestation.

SUMMARY

Pest control is and should be an integral part of the quality control programs for each food processor. It is also considered to be one of the prerequisite programs for HACCP. This means that without a proper pest control program, a processor should not even consider HACCP implementation. To properly control pests, processors should adopt an integrated approach to controlling pests. Integrated pest management or IPM should focus on denying the pests access to the plant, food, water and shelter. The best way to control pests is good sanitation. In fact, there are some who believe that 90% of pest control is good sanitation.

REFERENCES

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Bowyer, J. Clark Pest Control, (1999), "Integrated Pest Management", Presented in short course sponsored by the Institute of Food Technologists, "Sanitation and GMP Compliance: Prerequisites for HACCP and Food Quality", Cairo, Egypt, August 25-26, 1999.

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Olsen, A.R., (1998), "Regulatory Action Criteria for Filth and Other Extraneous Materials. III. Review of Filth and Foodborne Enteric Disease", Regulatory Toxicology and Pharmacology, 28:3, 199-211.

Standards for Sanitation and IPM Pest Control

1. **Building Exterior.** Is there litter? Are weeds and brush kept clear? Is equipment stored outside? Are pallets or cardboard stored properly? Is trash area properly maintained? Is building free of cracks, crevices or holes?
2. **Building Structure.** Are all windows closed and screened? Do doors fit tightly? Are there cracks or holes in the walls? Does the roof leak? Are there cracks in the floor that can collect debris? Are there cracks around door thresholds, dock plates, etc.?
3. **General Housekeeping.** Is wall clearance adequate? Are spills cleaned up promptly? Are floors cleaned regularly? Do employees have specific cleaning assignments? Are there written instructions?
4. **Storage Practices.** Is storage up off floor by a minimum of 6"? Is storage 18" away from walls? Is there ??? Aisle-ways? Are rack legs clean? Are the upper levels of storage racks cleaned? Are pallets clean? Is there spillage on or under racks? Are easily infestable items segregated? Are infested products returned or damaged products segregated?
5. **Employee Areas.** Are lunch or break rooms clean? Are locker rooms clean? Are employee lunches stored or consumed in product areas?
6. **Receiving Practices.** Is there a separate area for damaged products? Are raw materials dated upon arrival?
7. **Storage Organization.** Are shelving/pallets clean and well organized? Are toxic products separated from food grade items? Are maintenance facilities separated from food items? Are nonfood odors present in the facility?
8. **Inventory Control Practices.** Is there a system in place that assures the proper rotation of products? Are finished goods shipped out on a first in, first out (FIFO) basis?
9. **Insect Control.** Is there evidence of insect infestation? Are there conditions present which could support an infestation? Is there potential harborage? Are dead insects present on windows or other areas? Are insect light traps clean?
10. **Rodent Control.** Is there evidence of a rodent infestation? Is there evidence of birds? Is rodent proofing adequate?
11. **Monitoring Results.** Were any insects caught in pheromone traps? Were any insects caught in sticky traps? Do the number of insects caught indicate an infestation? Was the infestation localized?

Pest Management Strategy:

Food processing facilities present an attractive and complex pest control environment. Pest activity in and around food processing facilities has considerable impact on product quality and requires compliance with standards. To effectively meet these challenges it is necessary to apply the principles of Integrated Pest Management (IPM) programs consisting of four (4) basic steps

A.

- 1. An understanding of the biology and ecology of a pest is critical to develop an effective control program.**
- 2. Always seek a permanent solution to pest problems rather than a series of temporary solutions. Permanent solutions include altering conditions to prevent future occurrences.**
- 3. Use the principles of Integrated Pest Management (IPM) when developing a pest management program.**
- 4. Use pest control methods that have the least impact on the environment and nontarget organisms.**

Monitoring by a professional pest control company should be used to constantly monitor pest activity. Application of pesticides may be made but will be limited to preventative applications in areas of historically high pest activity and areas where pests are likely to enter the interior. Pest sighting logs (Exhibit 4) are critical sources of information during these inspections.

On the basis of inspections and monitoring, recommendations should be made to help prevent pest infestation. (See Exhibit 3 for sample Pest Management Inspection Report) These recommendations fall into the following areas.

B.

- 1. Sanitation - The development of a pest infestation is greatly reduced by high standards of sanitation. Sanitation can be defined as the removal of conditions (food, water, harborage) which encourage or allow a pest population to survive.**
- 2. Building Maintenance - Proper building and repair practices can prevent significant pest problems. Drainage, sealing, caulking, rodent-proofing, construction and general maintenance of buildings are important steps in this area. An example would be the simple sealing of cracks and crevices which provide harborage for insects within buildings.**

3. **Facility Practices and Procedures** - This involves changing behavior of people working in the plant. An example would be making sure that doors to the outside are not kept propped open or that trash is eliminated dumpster lids or trash containers are kept closed.

These recommendations will be documented in the "Sanitation Inspection Report" (Exhibit 4) along with any pest activity noted during service. A detailed list of inspection standards of some items that are included in our sanitation report (Exhibit 3). A customized Sanitation Inspection form can be developed for your plant. The following are the five (5) basic types of control measures that can be used to develop a pest management plan. An IPM program will include at least two (2) or more of the following:

1. **Sanitation** - Proper sanitation is necessary for prevention but is a means of controlling existing infestations. The removal of food and water sources stresses the pest populations, making traps and baits more effective. In addition, university research has shown that oils, greases and dirt render many insecticides less effective.
2. **Mechanical Control** - These methods involve the use of traps, barriers, caulking, mechanical exclusion (screening), using air currents and manipulation of environmental factors (temperature and humidity).
3. **Cultural Control** - This involves changing the habits and behaviors of people to reduce infestations. An example of this would be changing cleaning schedules to prevent product accumulation or help train food processing plant or warehouse personnel to clean spills as soon as they occur.
4. **Biological Control** - Traditionally this measure uses biological organisms or their by-products to control pests. Examples include the use of *Bacillus Thuringiensis* for aquatic breeding insects, parasitic wasps for fly control or fungus for cockroach control.
5. **Material Application Control** - The correct and safe use of materials may constitute a portion of our control operations. All materials are carefully reviewed for their appropriateness and appropriate application techniques that have been selected.

Although the use of chemical control measures, may be use, they will not always be a part of our control plan. Many of the non-chemical control measures need to be implemented by your plant facility personnel. These recommendations will be reported to facility management on our "Sanitation Inspection Reports," (Exhibit 3).

PEST MANAGEMENT SERVICE AND SANITATION REPORT FOR WAREHOUSES

Exhibit 8

CODES: 1-GERMAN ROACHES, 2-ORIENTAL ROACHES, 3-RATS, 4-MICE, 5-ANTS, 6-STORED PRODUCT PESTS, 7-OTHER

DATE	TIME IN	TIME OUT	SERVICE ADDRESS, CITY, ZIP	
			NAME	
	___ AM	___ AM	ADDRESS	
	___ PM	___ PM	CITY	ZIP

- 1. ATTIC
- 2. BAKERY
- 3. BASEMENT
- 4. BEER STORAGE
- 5. BOTTLE STORAGE
- 6. BREAKROOM
- 7. COLD STORAGE COOLERS
- 8. COMPRESSOR ROOM
- 9. DAIRY COOLER
- 10. DOORS-EMERGENCY
- 11. DOORS-ENTRY
- 12. DOORS-RECEIVING
- 13. DROP CEILING
- 14. DRY GOODS
- 15. ELECTRICAL PANELS
- 16. EXTERIOR AREA
- 17. FOUNTAINMILK
- 18. FOYER
- 19. ICE CREAM DP
- 20. ICE MACHINES
- 21. JANITORS ROOM
- 22. LIQUOR ROOM OR STORAGE
- 23. LOCKERS-EMPLOYEES
- 24. MILK SHAKE MACHINES
- 25. OFFICES
- 26. RECEIVING AREA
- 27. RESTROOM-EMPLOYEES
- 28. RESTROOM-PUBLIC
- 29. SALAD BAR
- 30. SERVICE DELI
- 31. SERVING LINE
- 32. SNACK BAR
- 33. SOFT DRINK
- 34. STEAM TABLE
- 35. STOVEHOODS
- 36. TRASH AREA
- 37. TRASH COMPACTOR
- 38. TRASH CONTAINERS
- 39. TRASH ROOM
- 40. WAREHOUSE AREA
- 41. OTHER

A ✓ INDICATES CONDITIONS THAT ARE UNACCEPTABLE IN AREAS INDICATED.

CUSTOMER #		ACCOUNT STORE #
USE THE LOCATION LISTED NUMBER(S) TO INDICATE LOCATION(S) NEEDING ATTENTION		
HOUSEKEEPING AND SANITATION	STORAGE PRACTICES	
ACCUMULATED TRASH DIRT OR DEBRIS	STORAGE ON FLOOR	
SPLASH OR FOOD RESIDUE	STORAGE IN CARDBOARD BOXES	
STANDING OR PUDDLED WATER	CLUTTERED STORAGE	
FLOOR DRAINS DIRTY	STORAGE ON INVERTED MILK OR POP CASES	
OLD RODENT EVIDENCE	OTHER	
OLD INSECT EVIDENCE		
OTHER		
STRUCTURAL DEFICIENCIES	RODENT-PROOFING, INSECT PROOFING NEEDED	
SURFACE DETRIORATION (WALL, FLOOR, CEILING)	DOORS NEEDING RODENT-PROOFING	
LOOSE WALL COVERING	OTHER OPENINGS NEEDING PROOFING	
LOOSE BASEBOARDS OR TILE COVERING	DOORS NOT SELF-CLOSING OR LEFT OPENED	
HOLES OR GAPS IN WALL	FLY PAN OR AIRCURTAIN NEEDED	
UNREPAIRED CRACKS & CREVICES	OTHER	
PLUMBING REPAIRS NEEDED		
OTHER		

EQUIPMENT: TOTAL NUMBER SERVICED SHOWN IN BOX (INCLUDES MISSING IF REPLACED) AND TOTAL NUMBER MISSING IN LOWER BOX

ITEM	BAIT STATIONS	RAT TRAPS	MOUSE TRAPS	TRIP CAT	VERTICATE TRAPS	AEROSOL FLY MACHINES	INSECT LIGHT TRAPS	INSECT MEASUREMENTS	GLUE BOARDS
SERVICED									
MISSING									

THERE WILL BE A CHARGE FOR REPLACING ANY MISSING OR DAMAGED EQUIPMENT

EXCELLENT
 GOOD
 FAIR
 POOR
 CRITICAL

SUMMARY COMMENTS:

IN-HOUSE SURVEY GUIDELINES

(Use this as a guide for your in-house survey inspection)

Consider the following information when completing your in-house survey inspection report.

A. Exterior of the facility:

1. Make note of sanitation conditions. Look for excessive debris, excessive standing water, liquid or product spills. Poor interior or exterior storage practices.
2. Check outside bait stations for the following:
 - ~ Are they anchored?
 - ~ Is the bait fresh?
 - ~ Are markers in place?
 - ~ Are service date stickers under lid?
 - ~ Last time serviced? _____
 - ~ Are stickers dated and initialed?
 - ~ Has there been rodent activity? (Evidence of bait being eaten or droppings)
 - ~ Are the bait stations placed sufficiently for a good preventative monitoring program?
 - ~ Are the bait stations numbered for a rodent location map?
 - ~ A note how many will be serviced each month?
3. Are birds roosting?
4. Were fire ant hills seen?
5. Dead flies by lights?
6. Is there high grass or weeds outside, or near exterior fence line?

B. Interior of facility:

1. Check Ketch-Alls or Tin Cats for the following:
 - ~ Are they properly wound?
 - ~ Are they properly placed?
 - ~ Are wall markers present?
 - ~ Check dates - are they serviced on a regular basis?
 - ~ Are they clean inside? (Free of webs, dirt and debris?)
 - ~ Any evidence of rodent activity? Are the Ketch-Alls or Tin Cats sufficiently in place for a good preventative monitoring program?
 - ~ Tin Cats or Ketch-Alls damaged?
 - ~ A note how many serviced each month?
2. Make note of rodent droppings and where each month.
3. Are there any infestations - insects/rodent - location and type.
4. Ask employees about pest sightings and frequency.

C. Insects:

1. Any evidence of insect activity? Where?
2. Is there a flying insect problem? What kind?

D. Structures and Sanitation:

1. Look for and note any structural deficiencies (open doors, door sweeps, screening required, lift doors in need of repair, broken windows, etc.)
2. Look for dirt, webs, debris, mold and leaks.
3. Make drawing of facility noting locations of monitoring devices and bait stations.

E. Equipment

1. Do they have light traps in place?
2. Are they properly placed?
3. Do they need additional light traps to keep flying insects under control?

4. Trays clean? Bulbs changed?

F. Program/Pricing:

1. Note all types of services and time for each.
2. Note bird control, pheromone trapping, etc. (any other necessary programs)

LIST OF VENDORS TO PURCHASE EQUIPMENT

JT Eaton & Company, Inc.
 Patricia Slover
 1393 East Highland Road
 Twinsburg, OH 44087
 (330) 425-7801 - (800) 321-3421
 (330) 425-8353 Fax
 www.jteaton.com

Innovative Pest Management
 Carl Doucette
 PO Box 265
 El Segundo, CA 90245-0265
 (310) 322-1999 - (800) 608-1999
 (310) 322-8575 Fax

Target Specialty Products
 Rich Records
 15415 Marquardt Avenue
 Santa Fe Springs, CA 90670
 (562) 802-2238
 (562) 802-3296

Atlantic Paste & Glue Co., Inc.
 Darlene Porter
 170 53rd St.
 Brooklyn, NY 11232
 (718) 492-3648 - (800) 458-7454 (Out of State)
 (718) 439-0039 Fax

PCO-Tech
 17355 Darwin Ave. #1
 Hesperia, CA 92345
 (760) 947-6650
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Chapin Manufacturing, Inc.
 PO Box 549
 Batavia, NY 14021-0549
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 (800) 944-4329
 www.chapinmfg.com

Waterbury Companies, Inc.

Whitmore Micro-Gen
 Research Laboratories
 (800) 777-8570
 www.wmmg.com

Hot Foot America
 Sales & Marketing
 298 Belvedere Ave.
 Belvedere, CA 94920
 (800) 843-6334 or (770) 985-8273 Fax

Van Waters & Rogers, Inc.
 (800) 888-4VWR

FMC Corporation
 Agricultural Products Group
 Philadelphia, PA 19103

Bayer Corporation
 PO Box 4913
 Kansas City, MO 64120
 (800) 842-8020
 www.nobugs.com

Paragon Professional Pest Control
 Steve Diaz
 4371 Westlawn Ave.
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 (310) 995-8160 (Mobile)
 (800) 238-9254 (Orders)

3M Occupational Health &

Robert C. Bennet
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6023 S. Garfield Ave.
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Micro-Flo Company
PO Box 5948
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(941) 647-3412 Fax
microflo@earthlink.net

Woodstream
An EKCO Group Company
Lititz, PA 17543
www.victorpest.com

Cleary Chemical
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paul.walgenbach@clearychemical.com

Dow AgroSciences LLC
Tim Maniscalco
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j.walgenbach@clearychemical.com

Manis AgroSciences LLC
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Egyptian participating banks:

1. AlWafany Bank of Egypt
2. American Express Bank
3. Arab African International Bank
4. Arab Bank
5. Bank of Alexandria
6. Bank of Commerce and Development
7. Banque du Caire
8. Banque du Caire Barclays International
9. Bank Misr
10. Commercial International Bank
11. CitiBank
12. Credit Internationale d'Egypte
13. Delta International Bank
14. Egypt Arab African Bank
15. Egyptian American Bank
16. Egyptian British Bank
17. Egyptian Commercial Bank
18. Egyptian Gulf Bank
19. Export Development Bank
20. Industrial Development Bank of Egypt
21. Misr American International Bank
22. Misr Exterior Bank
23. Misr International Bank
24. Misr Iran Development Bank
25. Mohandes Bank
26. National Bank of Abu Dhabi
27. National Bank of Egypt
28. National Bank for Development
29. National Societé General Bank
30. Suez Canal Bank
31. United Bank of Egypt

**You have all the support you
need !**

Where to find us ?

• United States Agency for International
Development.

Commodity Management Division.

Zahraa El-Maadi

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Tel: (20-2) 516-5505 ext. 2143, 3789

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• United States Agency for International
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• Ministry of Economy and International
Cooperation.

Department of Economic Cooperation with U.S.A.

48-50 Abdel Khalek Sarwat , Cairo.

Tel.: (20-2) 390-5100 , 390-5125

Fax: (20-2) 393-8187

What you want to know about USAID's...

Private Sector Commodity Import Program

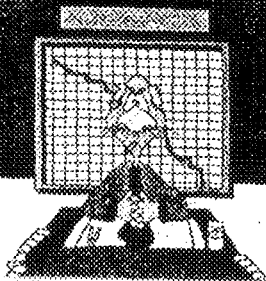


is all here. |

Importing US Commodities Under The PRCI

The Process:

- Get quotations from a reasonable number of U.S. suppliers, or one offer can be submitted if you are an agent, representative or distributor for the supplier.
- Fill in the application form.
- Submit the application to any of the Egyptian participating banks.
- Fulfill all the bank requirements for the credit.
- After approval of your credit facilities by your participating bank and once the bank and USAID/Egypt are assured that all requirements have been fulfilled a letter of credit is opened by your bank and advised by the U.S. correspondent bank to the U.S. supplier.



NOTES :

- Only private sector importers are eligible.
- The interest-free grace period starts from the date the payment is made to the U.S. supplier.
- The exchange rate is fixed at the time the letter of credit is opened.
- The minimum transaction amount is \$10,000.
- You can qualify for a maximum limit of \$ 8 million per year, according to the type of transaction.
- Information about U.S. Suppliers is available from the Foreign Commercial Service at the American Embassy.

Maximum interest free grace period

	Trade	Consumer	Enduser Investment in U.S. Goods	Enduser Investment in U.S. Goods	Enduser Investment in U.S. Goods
for non-capital equip.	9 Months	9 Months	12 Months	12 Months	
for capital equipment	9 Months	18 Months	24 Months	24 Months	36 Months

Maximum repayment period (after the interest free grace period)

for non-capital equip.	6 Months	12 Months	18 Months	18 Months	
for capital equipment	6 Months	3 Years	3 Years	3 Years	3 Years

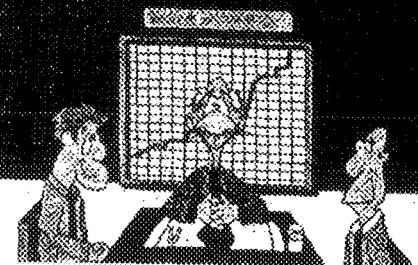
ANNUAL LIMITS FOR INDIVIDUAL IMPORTERS

...The minimum transaction size for both capital equipment and non-capital equipment is \$ 10,000

...The maximum use of the program per importer during a calendar year is as follows :

- 1) Trader \$ 8 million
- 2) Enduser importing non-capital equipment \$ 4 million
- 3) Enduser importing capital equipment \$ 8 million

• The United States Agency for International Development (USAID) acts only as a financier of import transactions. Neither USAID nor the Government of Egypt has any responsibility for the performance of a supplier or for the quality, suitability or reliability of a supplier's products.



MINISTRY OF INTERNATIONAL COOPERATION

GENERAL CIRCULAR NO. 1

Issued June 15, 1999

Rules and Procedures for Utilization of Funds under the Private Sector Commodity Import Program

- 1. To encourage the Egyptian Private Sector to participate in the development of the country in accordance with the priorities of the State, funds from the United States Agency for International Development (USAID) economic assistance program are provided to the private sector to finance the importation of capital goods, intermediate commodities and raw materials from the U.S.A. The rules and procedures set forth in this Circular shall apply to all funds advanced to the private sector under the Private Sector Commodity Import Program. In addition, all import transactions to be financed under this program must comply with USAID Regulation 1.**
- 2. All Egyptian private sector entrepreneurs and firms are eligible to participate in this program. Entities which are established in a free zone or which have Public Sector ownership exceeding 40% are excluded from this program. However, in some cases where the project is determined to be specially serving the national economy, an increase in the percentage of the Public Sector ownership could be considered upon mutual agreement between the Ministry of International Cooperation, Department of Economic Cooperation with USA (MIC, DEC/USA) and USAID/Cairo. Importers must have a commercial or industrial registry and a taxation card (unless legally exempted), with the latter to suffice in the case of a private entrepreneur working in non-commercial or industrial fields (unless legally exempted).**
- 3. Primary implementation responsibility for this program shall rest with the Participating Banks listed in Attachment No. VI to this Circular. Allocations of funds will be made available through Letters of Commitment in favor of the Participating Banks' named U.S. Correspondent Banks and will be based on proper and prompt utilization and timely reporting. MIC, DEC/USA and USAID/Cairo must approve all proposed allocations to the Participating Banks.**

4. Funds advanced pursuant to this program may be used to import only those items which are eligible in accordance with the USAID Commodity Eligibility Listing which does not include luxury, consumer, used or reconditioned goods. Additionally, erection, training and installation services associated with the commodity purchase are not eligible for financing under this program. Funds advanced under this program are not to be used to import items which are prohibited under Egyptian importation law. Furthermore, commodities imported under this program are prohibited from being resold to the military or police forces and/or their organizations.
5. Any importer, importing as an end-user, may sell capital equipment imported under this program after final payment has been made to the Participating Bank. Imported items must relate to the importer's business field as stated on both the commercial/industrial registry and tax card (unless legally exempted). Further, commodities imported under this program cannot be re-exported in their same condition unless they constitute a basic component of a new end product.
6. The minimum transaction size shall be \$10,000 unless USAID/Cairo and MIC, DEC/USA otherwise agree in writing.
7. The maximum amount of financing that can be utilized by an individual importer during a calendar year is as follows:
 - A. END-USER:
 - Importer who is importing non-capital equipment for its own use may utilize up to \$4,000,000
 - Importer who is importing capital equipment for its own use may utilize up to \$8,000,000
 - B. TRADER:
 - Importer who is importing commodities for resale purpose may utilize up to \$5,000,000

8. Private sector importers who desire to use funds provided under this program shall make application at any one of the Participating Banks. Alternatively, a potential client may apply through any other local commercial bank. In this case the application will be forwarded to one of the Participating Banks for action. Each application must include:

A. Completed transaction form signed by the importer (Attachment I);

B. Evidence that the importer has followed negotiated procurement procedures. These procedures require the importer to follow good commercial practice in soliciting quotations or offers in a uniform manner from a reasonable number of prospective U.S. suppliers and that all quotations or offers received, whether or not specifically solicited, shall be given consideration before making an award. A reasonable response time must be given to potential suppliers. If an importer obtains only one offer, the importer's request for financing must include a letter stating the reasons that only one offer was obtained. Justification for approving financing under these circumstances must be based on one of the following reasons:

- (1) The importer is purchasing for resale or processing, as the supplier's regularly authorized distributor or dealer, a commodity which, under the terms of the distributorship or dealer agreement, the importer is precluded from buying from another supplier. USAID/Cairo requires that the importer submit a valid copy of the agency/dealer/distributorship agreement with the request for financing. In addition, a statement is required from the supplier that prices are net and do not include any commissions.
- (2) The importer is purchasing for resale a registered brand-name commodity from a supplier who is the exclusive distributor of that commodity to the area of the importer.
- (3) Proprietary procurement is justified and the necessary equipment, materials, or spare parts are available from only one source, taking into account any special requirements such as the need for in-country service capability. Standardization on a particular brand or proprietary procurement may be justified by the importer obtaining:

- (a) Substantial benefits, such as economies in maintenance of spare parts inventories, stronger local dealer organization, better repair facilities, or greater familiarity by operating personnel; or
- (b) compatibility with equipment on hand; or
- (c) special design or operational characteristics.

C. Each pro forma invoice submitted must show:

- i. the name and address of the importer;
- ii. the quantity, description and unit price of each item in sufficient detail for ready identification;
- iii. the U.S. Department of Commerce Schedule B Number (Harmonized Number) for all items;
- iv. the delivery terms (FAS, FOB, CFR, CIF or CIP) and named place of delivery. USAID will not finance Ex Works transactions;
- v. U.S. source and origin;
- vi. if the commodity is financed on a CFR, CIF or CIP basis, the proforma invoice must:
 - (a) state that transportation will be effected on a U.S. flag carrier;
 - (b) state the FAS or FOB commodity cost at named U.S. port offering regular liner service to named Egyptian port or bulk cargo service to named Egyptian port as appropriate;
 - (c) state the estimated insurance cost for CIF or CIP quotations;
 - (d) state the estimated freight costs.

D. A summary of offers, the importer's selection and basis of selection, such as lower price, better delivery terms, etc.

Attachment No.1

Transaction Form

Private Sector Commodity Import Program

nk: _____

Transaction No.: _____

If this transaction is being forwarded on behalf of another bank in accordance with Article 8 of the Circular, please specify which bank: _____

Importer's Name: _____

Address: _____

Governorate: _____

Phone No: _____ Fax No.: _____

Contact Person Name: _____ Direct Phone No.: _____

Address of Production Facility (Farm, Factory, etc.), if different than No.1 above

Nature of establishment:

Sole proprietorship, Partnership, Limited liability stock company etc.

Provide name of principal, major partners or major stockholders:

Established under Law: _____ (Commercial Law, 32, 43, 159, 230 etc.)

Tax Card No.: _____ Commercial Registry No.: _____
(state if legally exempted)

Business Field: _____
(e.g. hospital, farm, plastics factory, trading ect.)

Paid in Capital: _____ Woman's Ownership Percentage _____

Public Sector ownership: _____

Number of Employees: _____

8. Information regarding United States businesses:

- A. Does the importer or any owner of the importer or any business enterprise affiliated with the importer or its owners, own or operate a business of any kind which is located in the United States? Yes ___ No ___
- B. If yes, does this business have a production facility or operation in the United States? Yes ___ No ___
- C. If the answer to B above is yes, describe the operations of this business in the United States. _____

9. Has importer previously used this program? Yes ___ No ___ If yes, provide value of all Letters of Credit opened for this importer under the program during this calendar year, \$ _____

10. Is the importer operating a business for which the commodities being imported is located in Upper Egypt as stipulated in the General Circular No.1 of 1999? Yes ___ No ___
If Yes, please indicate the name of the Governorate _____

11. Has the importer increased exports more than 10% of sales during the most recent 12 month accounting period? Yes ___ No ___

12. Commodity to be imported: _____
Is it a Capital Equipment? Yes ___ No ___
Is it an Environmental Equipment listed in Attachment VII? Yes ___ No ___

13. Purpose of importation: a) own use _____
b) reselling _____

14. U.S. Department of Commerce Schedule B No.(s) [Harmonized System No.(s)]

15. U.S. Supplier Name: _____
Address: _____

6. By signing below, I hereby certify that to the best of my knowledge the information provided above is accurate and true and that all pro forma offers submitted with this transaction are true and accurate originals provided by the suppliers named therein or true and accurate photocopies of originals.

All attached pro forma offers are bonafide and have been requested publicly or directly by me or an official of my company and received directly by me or an official of my company from the U.S. suppliers or their official agents. None of the suppliers has had any involvement in obtaining offers from any other supplier.

Banks and USAID reserve the right to contact any or all potential suppliers to verify the authenticity and accuracy of the pro forma offers.

I have read and agree to comply with Item #19 of General Circular No.1 of 1999 which includes the requirement that transaction records and supporting documentation be kept by the importer for USAID's or its authorized representative's review for three (3) years from the date of the last disbursement by USAID, and allows USAID or its representative to make site visits to examine the receipt and utilization of commodities financed under the program.

Importer's Name: _____
Signature: _____
Title: _____

We find this transaction valued at \$ _____, in compliance with General Circular No. 1 of 1999, and USAID regulations, and request USAID/Cairo concurrence to finance the transaction.

Signature of Authorized
Bank Official

Date

Attachment II

Letter of Credit Form

1. Local Bank Name: _____
2. Letter of Commitment No.: _____
3. Transaction Number: _____
4. Letter of Credit No.: _____
5. Letter of Credit amount: _____
6. Letter of Credit issuance date: _____
7. Rate of exchange applicable to this Letter of Credit: _____ L.E./\$
8. Down payment:
 - a) amount in L.E. _____
 - b) date collected _____
 - c) date transferred to Central Bank of Egypt _____
9. Repayment period for balance: _____

Signature of Authorized Bank Official

Date

Attachment III
Letter of Credit Amendment Form

Local Bank Name: _____
Letter of Commitment No.: _____
Transaction No.: _____
Letter of Credit No.: _____
Letter of Credit Amount: _____

Dear Sirs:

With respect to the L/C referenced above please find enclosed herewith copy of our telex/letter dated _____ regarding the following amendment(s) marked(*):

- Increase value of the L/C by \$ _____ exchange rate _____
- Decrease value of the L/C by \$ _____ exchange rate _____
- Cancel unutilized balance of \$ _____ exchange rate _____
The new L/C balance is \$ _____
- Extend validity of the L/C until _____
- Shipment condition to be FOB/FAS/CFR/CIF/CIP _____
- Other amendments: _____

Signature of Authorized Bank Official

Date

Attachment IV
Statement of Principal and Interest Due

Local Bank Name: _____ Exchange Rate \$/L.E.: _____
 Letter of Commitment No.: _____ Interest Rate: _____

Transaction No.	Letter of Credit No.	Installments (L.E.)			Due Date
		Principal	Interest	Total	

Note: If the balance was paid in cash, local bank is required to provide the following information:

1. Value paid in L.E. _____
2. Negotiation date (date of payment to the U.S. supplier) _____
3. Date transferred to Central Bank of Egypt _____

 Signature of Authorized Bank Official

 Date

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**Attachment No. V
Bank Monthly Report**

Local Bank Name: _____
 Letter of Commitment No.: _____

USAID Transaction No.	Importer Name	Commodity Type (Raw Material/Spare Parts/Capital Equip.)	L/C No.	L/C Amount	Disbursed Amount	L/C Issuance Date	L/C Expiry Date

 Signature of Authorized Bank Official

 Date

Attachment No. VI
List of Participating Banks

1. AlWatany Bank of Egypt
2. American Express Bank
3. Arab African International Bank
4. Arab Bank
5. Bank of Alexandria
6. Bank of Commerce and Development
7. Banque du Caire
8. Banque du Caire Barclays International
9. Bank Misr
10. Commercial International Bank
11. Citibank
12. Credit Internationale d'Egypte
13. Delta International bank
14. Egypt Arab African Bank
15. Egyptian American Bank
16. Egyptian British Bank
17. Egyptian Commercial Bank
18. Egyptian Gulf Bank
19. Export Development Bank
20. Industrial Development Bank of Egypt
21. Misr American International Bank
22. Misr Exterior Bank
23. Misr International Bank
24. Misr Iran Development Bank
25. Mohandes Bank
26. National Bank of Abu Dhabi
27. National Bank of Egypt
28. National Bank for Development
29. National Societe General Bank
30. Suez Canal Bank
31. United Bank of Egypt

Other banks, whose charter/authorization enables them to transact business in a manner compatible with the provisions of this program, may work through the above specified Participating Banks. For more information contact:

Ministry of International Cooperation
Department for Economic Cooperation with U.S.A.
48-50 Abdel Khalek Sarwat Street, 5th floor, Cairo
Tel: (202) 390-5100, 390-5125, 390-8124 and 391-0278. Fax: (202) 393-8187

United States Agency for International Development, Office of Commodity Management
Zahraa El Maadi, Cairo, Tel: (202) 516-5505, Ext. 2143, Fax: (202) 516-4652

United States Agency for International Development
36 Beni El Abbas street, Alexandria, Tel: (203) 482-9301, Fax: (203) 482-9301

To obtain copies of A.I.D. Regulation 1, please contact the above listed USAID offices.

June 1999

Attachment No. VII

Environmental Equipment

Item No.	Equipment Description	Usage	Schedule B No.
A	MONITORING EQUIPMENT		
1	Conductivity Meters	Water Quality Permanent installations or portable Plant Discharges	9027.80.3300
2	PH Meters	Water Quality Plant Discharge Permanent installations or portable	9027.80.3300
3	Water Sampling Kits	Water Quality Portable for field testing.	9027.80.3300
4	Spectrometer	Water Quality	9027.30.4040
5	Ambient Air Analyzer	Low level detection of regular pollutants, such as SO ₂ , NO-NO _x , O ₃ and CO.	9027.10.0000
6	Stack Monitoring System for Source Pollution	Measure levels of regular pollutants and CO ₂ , opacity, and flue gas flow	9027.10.0000
7	Total Dissolved Solids (TDS) Meter	Water Quality Permanent installations or portable	9027.10.0000
8	Water Flow Meters	Water Quality	9026.10.5000
9	Gas Chromatographs	Air Quality	9027.20.3000
10	Liquid Chromatographs	Water Quality	9027.20.3000
11	Gas Analyzer	Air Quality Plant emissions	9027.10.0000
B	TREATMENT OF PLANT DISCHARGES		
1	Oil Water Separators	Water Quality	8421.21.0015
2	Filters	Water Quality	8421.21.0000
3	Baghouses	Air Quality Stack Discharge. Removal of Solids Industries such as steel, lead, power generation	8421.39.8015
4	Filters for Bagooses	Replace existing filters Air Quality Stack Discharge. Removal of Solids Industries such as steel, lead, power generation	8421.39.0040
5	Scrubbers	Air Quality Stack Discharge. Removal of solids Industries such as steel, lead, power generation	8421.39.8030
6	Electrostatic Precipitators	Air Quality Stack Effluent Industries such as steel, lead, power generation	8421.39.8030

7	Cooling Towers (Evaporative)	Reduce Plant Discharge Water Temperatures Reduces Water Intake	8419.89.5040
8	Cooling Towers (Dry)	Eliminates Hot Water Discharges and Minimizes Water Intake.	8419.89.5040
9	Neutralization Basins or tanks	Water Quality Treat Caustic or Acidic discharges prior to discharge. Basins are civil construction.	7309.00.0030
10	Air Filters	Air Quality	8421.39.8030
11	Automatic Industrial Process Control Systems (complete)	Air Quality Water Quality	9032.81.6030
12	Automatic Control for Feed Viscosity	Starch & Glucose industry	9032.81.0040
13	Automatic Control for Cooling or Heating Systems	Air & Water Quality	9032.89.6020
14	Chemical Injection Systems	Neutralization of discharges Water, Stack Gases	8421.21.0000
C WASTEWATER TREATMENT AND SLUDGE MANAGEMENT SYSTEMS			
1	Screens	Water Clarifying	8479.82.0080
2	Dissolved Air Flotation	Pretreatment of Wastewater Water Clarifying	8421.21.0000
3	Vacuum Filter	Water Clarifying Dewatering	8421.21.0000
4	Gravity Belt Thickener	Thicken waste	8421.21.0000
5	Filter Press	Water Clarifying Dewatering	8421.21.0000
6	Belt Filter Press	Dewatering	8421.21.0000
7	Paddle Dryer	Dewatering Drying	8421.21.0000
8	Clarifiers	Water Clarifying	8421.21.0000
9	Sand Filters	Water Filtering	8421.21.0000
10	Carbon Filters	Removal of pollutants	8421.21.0000
11	Positive Displacement Pumps Rotary or Reciprocating	Process pump for sludge, slurry, scum	8413.60.0090 8413.50.0090
12	Submersible Waste Water Pumps		8413.70.2004
D VEHICLES			
1	Catalytic Converters	Air Quality Removal of contaminants.	8421.39.4000
2	Bus and trucks chassis. Complete with fuel supply (natural gas, electric and /or other alternative fuels), engines, transmission, brakes & steering system	City transportation, tourism, company transportation.	8706.00.1040

3	Bus and trucks complete unit powered by (natural gas, electric and/or other alternative fuels)	City transportation, tourism, company transportation.	\$707.90.9000
4	CNG Fueling Station Including: fueling dispensers, Hoses & nozzles, fueling dispenser, ASME storage vessels, mounting frames, compressor station w/compressor, drivers & controls and assembly hardware.	City transportation, tourism, Company transportation	\$414.80.2055
5	Engine Analyzer	Vehicle engine tune-up-emissions reduction	\$479.89.9000
6	Automotive Engine Maintenance Equipment	Provide routine and other vehicle maintenance	\$479.89.9000
E SOIL CONTAMINATION PREVENTION AND CLEAN-UP			
1	Regenerative Thermal Oxidizer	Volatile Organic Compound Removal Soil Vapor, Groundwater	\$421.39.8030
2	In Situ Groundwater Flow Sensors	Monitoring groundwater during remediation in landfills.	9026.26.9000
F ENVIRONMENTAL LABORATORY CONSISTING OF:			
1	PH Meters		9027.80.3200
2	Water Baths		9027.80.3200
3	COD Instruments		9027.80.3200
4	BOD Instruments		9027.80.3200
5	Gas Chromatograph/Mass Spectrometer		9027.30.9000
6	Gas Chromatography		9027.30.2000
7	Liquid Chromatograph		9027.30.9000
8	Water Tester (DO, Turbidity, Conductivity, Salinity, pH)		9027.80.3200
9	Potentiometers w/ Ion Selective Electrodes		9027.80.3200
10	Spectrophotometers		9027.30.4040
11	Fluorimeters		9027.80.3200
12	Total Organic Carbon (TOC) Measurement Instruments		9027.80.3200
13	Flame Photometer		9027.30.4040
14	UV/Visible Spectrophotometers		9027.30.4040
15	Mercury Analyzer		9027.80.3200
16	Gas Analyzer		9027.10.0000
17	Auto Analyzer for Inorganic Nonmetals		9027.80.8000
18	Drying Ovens		\$417.80.0000
19	Muffle Furnaces		\$417.80.0000
20	De-ionized Water Production Session (350 ltr)		\$421.21.0000
21	Turbidity Meters (Bench Top)		9027.80.3200
22	Conductivity Meters (Bench Top)		9027.80.3200

23	Oxygen Meter (Bench Top)		9027.80.3200
24	CO/NH ₃ /SO ₂ /NO _x /HCN/Cl ₂ Detectors		9027.80.3200
25	Noise Meter		9027.30.4040
26	Flow Meter		9026.10.5000
27	Vacuum Pump		8414.10.0000
28	Atomic Absorption Spectrometer (AAS)		9027.30.4040
29	Bench-Top Centrifuge		8421.19.0000
30	Ultrasonic Processor (Homogenizer)		9027.80.8000
31	Rotary Evaporation		8421.21.0000
32	Moisture Analyzer		9027.80.3500
33	Water Purification (By UV)		8421.21.0000
34	Solid State Flow Meter		9028.20.0000
35	Total Nitrogen Analyzer		9027.10.0000
36	Oil Content Analyzer		9027.80.3500
G	ALTERNATIVE ENERGY SYSTEMS		
1	Tracking photo-voltaic concentrators (parabolic trough or point focus)	Convert sunlight directly to electricity Create mini-utilities as alternative power plants	8541.40.6020
2	Solar-thermal power module (for electric power or industrial steam generation)	Convert sunlight to steam or electricity using a water/oil management system and a steam engine	8402.19.0000
3	Solar tracker system (support structure, instrumentation, and controls)	Operation of photo-voltaic concentrator systems	9032.81.0040
4	Photo-voltaic modules (solar panels)	Convert sunlight directly to electricity Alternative power source	8541.40.6030
5	Solar cells (not assembled into modules)	Convert sunlight directly to electricity Alternative power source	8541.40.6030
6	Wind Turbines (electric)	Alternative power source for generation of electricity	8412.80.9000
7	Windmills (mechanical), windmill pumps	Alternative power source (mechanical) for water pumping, grinding, etc.	8413.81.0030
8	Solar batteries (multi-cycle, deep discharge)	Storage medium for solar and wind electric systems	8507.80.0000
9	Multi-fuel boilers (using refuse-derived fuel, wood, municipal solid waste, or agricultural waste)	Hot water and/or steam generation	8402.19.0000
10	Waste-to-energy incineration system Aux. Equipment (including materials handling systems)	Generation of heat from burning a wide range of materials, such as rubber tires, municipal solid waste, biomass (wood) and agricultural residues.	8403.10.0000 8404.10.0050
11	Fluidized-bed combustion systems Aux. Equipment	Generation of heat from burning a wide range of materials, such as rubber tires, municipal solid waste, biomass (wood) and agricultural residues.	8403.10.0000 8404.10.0050
12	Gasification/combustion system with turbine generator	Generation of process steam, heat and electric power by burning agricultural residues (rice husks, peanut shells, straw, cottonseed hulls, wood waste, etc.	8402.19.0000

13	Stirling cycle heat engines (bio-mass-fueled, external combustion)	Generate electricity from heat resulting from burning wood, wood pellets, sawdust, rice husks, peanut shells, and coffee hulls	8402.19.0000
H.	SOLAR SYSTEMS		
1	Solar water heater (storage tank, piping and controller)	Commercial hot water Industrial process heat	8419.19.0030
2	Stand-alone photo-voltaic lighting system (PV panels, fluorescent bulbs, batteries, controller, and monitoring instruments)	Street lighting or security lighting, hazard warning lights, remote residential or commercial building lighting	8513.10.0000
3	Solar-powered refrigeration system (PV panels, battery bank, controller, refrigerator/freezer)	Remote refrigeration	8418.10.0090
4	Solar water pumping system - PV (PV panels, batteries, controller, piping, surface or submersible pump, water storage tanks)	Water pumping for irrigation, domestic or commercial use, or use with livestock	8413.81.0040
5	Solar water pumping system - Wind Electric (wind turbine, batteries, controller, piping, surface or submersible pump, water storage tanks)	Water pumping for irrigation, domestic or commercial use, or use with livestock	8413.81.0030
6	Solar oven	Cooking or boiling water for sterilization	8417.80.0000
I	OTHER ALTERNATIVE EQUIPMENT OR SYSTEMS		
1	Anaerobic digester	Biogas generation, treatment of agro-industrial wastewater	8405.10.0000
2	Environmental data collection systems (anemometers, wind vane, pyrometers, data loggers, etc.)	Measurement of wind characteristics and solar radiation	9026.80.0000
3	DC/AC inverter, switchgear, and load distribution transfer switches	Convert direct current from PV panels to alternating current and distribute loads	8538.00.0000
4	Bio-mass material handling systems (debarbers, chippers, loaders, chip screens, feeders and cutoff saws)	Handling of biomass feedstock for incineration systems.	8428.90.0006
5	Pyrometers	Measure temperature and heat content	9025.19.4000
6	Barometers	Measure atmospheric pressure	9025.20.0000
7	Thermometers	Measure temperature	9025.11.4000
8	Psychrometer	Measure wet bulb temperature	9025.80.0000
J	RED SEA ENVIRONMENTAL EQUIPMENT		
1	Mooring Buoys and installation equipment		8907.90.0030 8905.20.0000 8430.41.0000
2	Anchors for Mooring Buoys	Low impact category	7316.00.0000
3	Sewage Holding Tanks	Boats Greater than 80 liters	3925.10.000

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NAMES AND ADDRESSES OF PARTICIPATING BANKS

American Express Bank
Mr. Emad El Gindy
Manager, Bills Department
4, Syria Street, Mohandessin, Giza, Egypt
Tel: (20-2)361-1882

Arab Bank PLC
Mr. Amr Hafez
L/C Dept.
28, Talaat Harb St., Cairo
Tel: (20-2)574-6218

Arab African International Bank
Ms. Heba Sedki
L/C Department
44, Abdel Khalek Tharwat St., Cairo
Tel: (20-2)391-1309

Bank of Alexandria
Ms. Bahiga Hashim
Assistant General Manager
49 Kasr El Nil Street, Cairo
Tel: (20-2)391-0481

Banque du Caire Barclays Bank PLC
Ms. Samia Naim Ayad
Manager
Letter of Credit Department
12 Midan El Sheikh Youssaf St., Garden City, Cairo
Tel: (20-2)361-1882

Banque Du Caire
Mrs. Soheir Gad
Deputy General Manager
22 Adly Street, Cairo
Tel: (20-2)392-8920

Bank of Commerce and Development
Ms. Maha Habib
Manager, Letter of Credit Department
Midan Sphinx, Mohandessin, Cairo
Tel: (20-2)347-2056

Bank Nisar
Ms. Nehad Ezzel Din El Sayed
Manager
Letter of Credit Department
151 Mohamed Farid St., Cairo
Tel: (20-2)357-1125

Commercial International Bank
Mr. Mounir Yassin
Deputy General Manager
Investment & Correspondent Banking
Nile Tower 21-23, Giza Street
Tel: (20-2)570-1949

Delta Int'l Bank
Mr. Ahmed Salama
Branch Manager
Annex Nile Hilton, Tahrir Square, Cairo
Tel: (20-2)778-166

Egyptian American Bank
Mr. Amr Abbas
Manager
Marketing Department
4 Hassan Sabri St., Zamalek
Tel: (20-2)339-1546

Egypt Arab African Bank
Mrs. Nadia M. Fahmy
Deputy General Manager
5 Midan Al Saray Al Koubra, Garden City, Cairo
Tel: (20-2)355-4624

Egyptian Commercial Bank
Mr. Ashraf Naim Zaki
Assistant Manager
Foreign Department
110 Kasr El Eini Street
Garden City
Tel: (20-2)355-3998

Egyptian Gulf Bank
Mr. Mostafa Galal
Manager
Letter of Credit Department
El-Orman Plaza Building
8 Ahmed Nessim Street
Giza, Egypt

Export Development Bank
Mr. Mokhtar El Gamal
General Manager
Credit Department
10 Talaat Harb Street
Tel: (202)57409655

Misr American International Bank
Mr. Zaki El Guiziri
Branch Manager
73 El Horreya Street, Alexandria
Tel: (20-3)492-2900

Misr Exterior Bank
Mr. Helmy El Shayeb
Deputy General Manager
International Department
Cornish El Nil Street, Cairo
Tel: (20-2)574-4189

Misr Iran Development Bank
Ms. Hoda Shoukry
Assistant General Manager
Letter of Credit Department
Nile Tower 21-23, Giza St., Giza
Tel: (20-2)572-7311

Misr International Bank
Mr. Refaat Mohamed El Omda
Manager
Letter of Credit Department
14, El Alfy St., Cairo
Tel: (20-2)349-4424

National Bank For Development
Mr. Abdel Fattah Salem
General Manager
Foreign Department
5, El Borsa El Gedida Street
Tel: (20-2)356-3056

National Bank of Egypt
Ms. Laila Abdel Kader
Manager
Letter of Credit Department
24 Sherif Street
Tel: (20-2)393-4204

National Bank of Abu Dhabi
Mr. Magdy Aziz Kamel
Regional Credit & Marketing Manager
Nile Tower Bldg., 21-23
Giza Street, Giza
Tel: (20-2)5737-331

INELIGIBLE COMMODITIES
PRIVATE SECTOR COMMODITY IMPORT PROGRAM

1- EQUIPMENT :

- MILITARY EQUIPMENT; SURVEILLANCE EQUIPMENT; COMMODITIES FOR SUPPORT OF THE POLICE AND OTHER LAW ENFORCEMENT ACTIVITIES .
- ABORTION EQUIPMENT AND SERVICES; LUXURY GOODS AND GAMBLING EQUIPMENT; WEATHER MODIFICATION EQUIPMENT; AND, IN GENERAL, CONSUMER GOODS .
- SPACECRAFT AND PARTS THEREOF .
- ARMS AND AMMUNITION; PARTS AND ACCESSORIES THEREOF .
- USED OR RECONDITIONED GOODS .

2- WOVEN FABRICS & TEXTILES :

- SILK .
- CARPETS AND OTHER TEXTILE FLOOR COVERINGS .
- SPECIAL WOVEN FABRICS; TUFTED TEXTILE FABRICS; LACE; TAPESTRIES; TRIMMINGS; EMBROIDERY .
- KNITTED OR CROCHETED FABRICS .
- ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, KNOTTED OR CROCHETED .
- ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, NOT KNITTED OR CROCHETED .
- OTHER MADE-UP TEXTILE ARTICLES .

3- FOOD PRODUCTS :

- MEAT AND EDIBLE MEAT OFFAL .
- FISH AND CRUSTACEANS .
- PREPARATIONS OF MEAT, OF FISH OR OF CRUSTACEANS; MOLLUSKS OR OTHER AQUATIC INVERTEBRATES .
- EDIBLE FRUITS AND NUTS; PEEL OF CITRUS FRUIT OR MELONS .
- COFFEE, TEA, MATE, SPICES AND COCOA & COCOA PREPARATIONS .
- PREPARATIONS OF CEREALS, FLOUR, STARCH OR MILK .
- PREPARATIONS OF VEGETABLES, FRUITS, NUTS OR OTHER PARTS OF PLANTS .
- BEVERAGES, SPIRITS AND VINEGAR .
- BAKER'S WARES .

4- AGRICULTURAL PRODUCTS :

- LIVE TREES AND OTHER PLANTS; BULBS, ROOTS AND THE LIKE; CUT FLOWERS AND ORNAMENTAL FOLIAGE .
- VEGETABLE PLAITING MATERIALS .
- RESIDUES AND WASTE FROM THE FOOD INDUSTRIES: PREPARED ANIMAL FEED (FODDER) .
- TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES .

5- LEATHER PRODUCTS :

- ARTICLES OF LEATHER; SADDLERY AND HARNESS; ARTICLES OF ANIMALS GUT .
- FURSKINS AND ARTIFICIAL FUR; MANUFACTURES THEREOF .
- FOOTWEAR, GAITERS AND THE LIKE .
- SEAT STICKS; WHIPS; RIDING CROPS AND PARTS THEREOF .

6- MISCELLANEOUS :

- MUSICAL INSTRUMENTS, PARTS AND ACCESSORIES OF SUCH ARTICLES .
- TOYS, GAMES, AND SPORTS EQUIPMENT, PARTS AND ACCESSORIES THEREOF .
- EXPLOSIVES, PYROTECHNIC PRODUCTS; MATCHES; PYROPHORIC ALLOYS; CERTAIN COMBUSTIBLE PREPARATIONS .
- HEADGEAR AND PARTS THEREOF .
- UMBRELLAS; WALKING STICKS .
- PREPARED FEATHER AND DOWN AND ARTICLES MADE OF FEATHERS OR OF DOWN; ARTIFICIAL FLOWERS, ARTICLES OF HUMAN HAIR .
- NATURAL OR CULTURAL PEARLS; PRECIOUS OR SEMI-PRECIOUS STONES; PRECIOUS METALS; METALS CLAD WITH PRECIOUS METAL, AND ARTICLES THEREOF; IMITATION JEWELRY; COINS .
- WORKS OF ART; COLLECTORS PIECES AND ANTIQUES .

NOTE :

• A commodity transaction may be eligible or ineligible for USAID financing based not only on the nature of the commodity but also based on its source, end use, price, supplier, etc... . Please see your participating bank or this office to discuss matters concerning commodity eligibility .



October 25, 2000

Engineer M.H. El Sisy
Siclam Dairy Processing
Mostafa Kamel Street
El-Ras El Soda
Alexandria

Dear Eng. El Sisy:

I would like to thank you for taking the time to visit with Dr. Tom Butterworth and Mr. Morad Ahmed on October 15. Dr. Butterworth was quite impressed with the facility as evidenced by his report (attached), and from what he told me when we discussed the visit. We do, however, look forward to seeing the plant in full operation.

Since you were not running yet, there is really very little that we can offer in the way of technical services. However, from the recent conversations that you had with Dr. Butterworth and Mr. Morad, plus what we talked about in August, there are a few things that we can offer in the way of potential support. I have, therefore, attached two lists for you. The first includes quality suppliers of cleaners and sanitizers and the second, companies who provide temperature monitoring devices.

Thank you again for your time and candor, and your support of our programs. We appreciated seeing your people at our programs. Should you have any questions or require any additional information, please do not hesitate to call.

Sincerely yours,

Richard F. Stier
Director, Technical Services

Cc: M. Ahmed, Files

SUPPLIERS OF CHEMICALS FOR CLEANING & SANITIZING

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CONTACT: Mr. Osama Farid
Managing Director

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02-291-9046

CONTACT: Mr. Nasr El Din A. Nasr
Egyptian Trading Ind. Office (HENKEL)
Cleaning, and sanitizing in the beverages food
and milk processing industry.

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CONTACT: Mr. Ray Docherty
Eng. Manal Shoukry

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EMAIL microbiology@mmmm.com
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FAX (612) 737-7678
Attn:
Carrie Anderson

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Warrington, PA 18976, USA
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FAX (215) 343-4670
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WEB www.measurement-dynamics.com
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FAX (714) 870-8136
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FAX (425) 863-3766
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Attn: James Colon

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FAX (909) 946-0609
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WEB www.cootechnologies.com

TMI-USA, Inc.
14130-A Sullyfield Circle
Charlottesville, VA 20151-1615
TEL (703) 502-9820
FAX (703) 227-1270
EMAIL masmark@netzero.com
WEB www.tmi-orion.com

September 30, 2000



To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, SECLAM

On Sunday, October 15, 2000, we visited the Seclam Dairy Processing Co. in Alexandria, part of the Mansour Distribution Co.

For ALEB were:

Morad S. Ahmed (ALEB)
Thomas A. Butterworth (Consultant to ALEB)

For Seclam were:

Eng. M.H. El Sisy (General Manager)
Ph. Direct: 5359099; FAX: 5349870
Eng. Ahmed Khamis (Juice Processing Manager)
Factory: Mostafa Kamel St., El-Ras El-Soda
Ph: 5358974; FAX: 5345772
www.mansourgroup.com (e-mail on website)

COMPANY BACKGROUND

Nationalized in 1963, Seclam was established in 1952 and is the oldest privately owned dairy processor in Egypt. They manufacture a wide variety of processed dairy products. They are currently installing 2 new lines: one for extended shelf life (ESL) milk in 1 L HDPE bottles with a continuous thread HDPE cap, induction heat seal and shrink wrapped label; the other line is for juice and other fruit based drinks also in HDPE but in 250 and 1000 mL with "sport" type fitments. They expect these new products to be at retail by February or March of 2001.

Both products will be distributed and sold under refrigeration. The shelf life expected for milk is 45 days @4°C or 21 days @10°C, although they plan to have all products sold before 15 days.

The ESL juice and fluid milk projects are part of a long range expansion of the product line which will be expanded next to include Edam and Mozzarella Cheeses.

Eng. Sisy has a technical and management background and started with Seclam 36 years ago (today).

THE FACILITY

The facility is large and has aged gracefully. The grounds are reminiscent of the Marriott Hotel in Zamalek. The juice line and the milk line are under construction in different buildings, both with their interiors completely renovated.

JUICE LINE

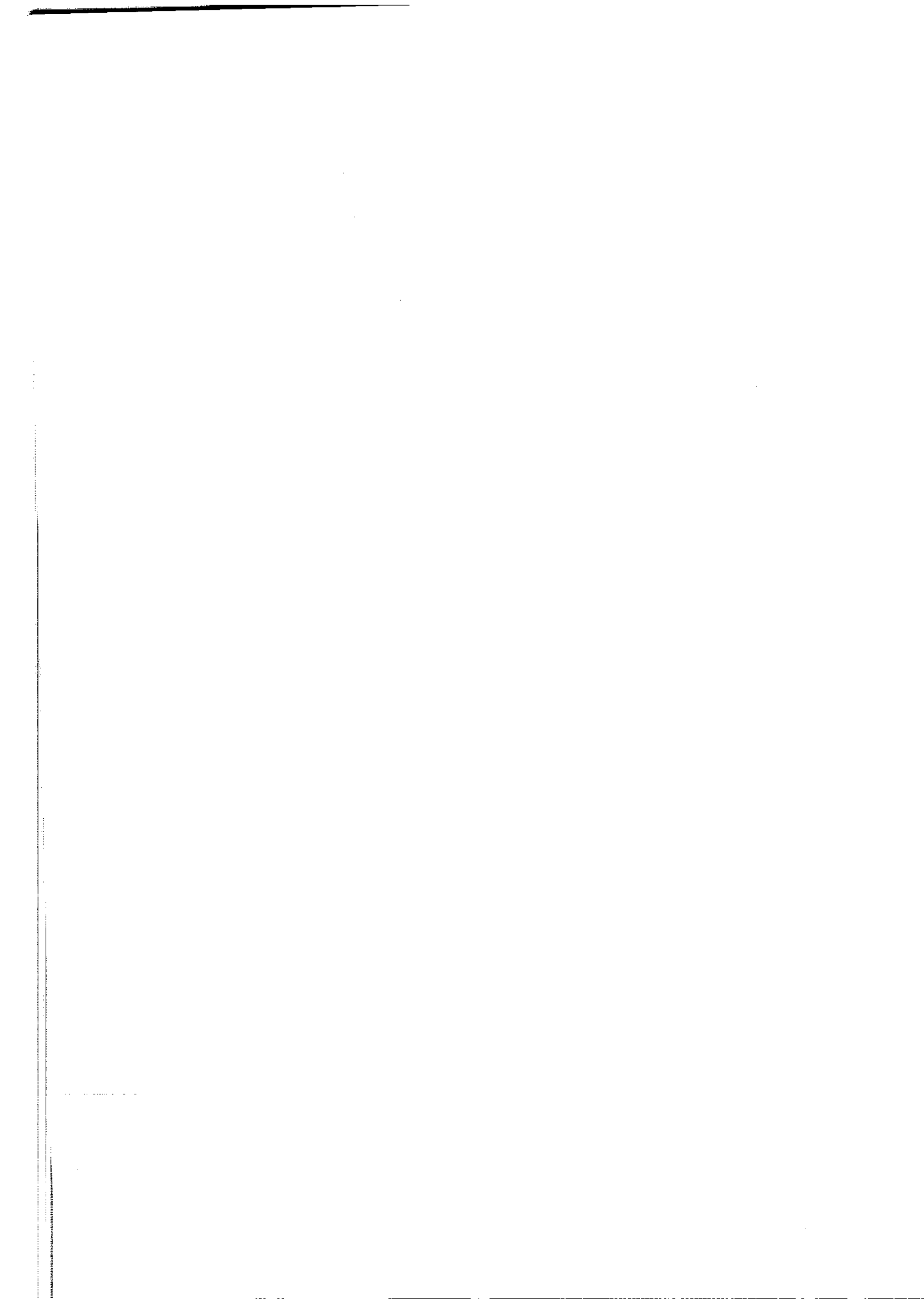
The juice line has one batching/blending tank of about 2000 L. This tank feeds any one of three 4000 L finished product tanks that feed the tubular APV pasteurizer/cooler and the Sirac filler. Bottles are blow molded on-site and on-line. These bottles are further sanitized by a spray of 30% hydrogen peroxide followed by a rinse with sterile water. After filling at 4°C the bottles are capped (inside of caps sterilized in the same manner), labeled (wrap around) and cased. The cases are then shrink-wrapped and passed on to cold storage. The capacity of this line is 7000 bottles/hr.

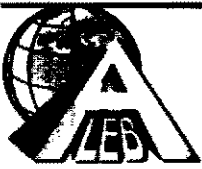
They intend a second filling line in the same room. This second line will be fed with the existing batching system.

MILK LINE

Hydrogen peroxide is apparently not allowed in Egypt for sterilization of plastic containers for milk. It is, however, used in tetrapak systems. Therefore, the milk process is somewhat different and depends on the heat of the blow molding process and sterile air thereafter to create and maintain the sterility of the primary package. Milk is sterilized in a steam infuser (135°C/0.5 sec) and thereafter processed pretty much like the juice. The obvious exception is the heat shrink label applied by a Fuji system.

I understand this was the first time someone from ALEB has been inside the facility.





October 25, 2000

TEL 02-570-1615
FAX 02-570-2187

Mr. Mohamed M. Samy
Vitrac
5 Bahi El Din Barakat Street
Giza, Cairo

Dear Mr. Mohamed:

I would like to thank you and your staff for taking the time to visit with Dr. Tom Butterworth and Mr. John Schnittker during their visit to the plant on October 18. It was too bad that you were called away, and were unable to visit with Dr. Butterworth. I have enclosed a copy of his report for your files, however. As with his last visit, he was very impressed with operation. In fact, he observed that he *"had forgotten how much care goes into the manufacture of Vitrac jams."* He was also pleased to learn that the advice that was given last year with regards to your blueberry jam was beneficial in that it appears that the improvement in product quality will help you expand markets in Japan.

Dr. Butterworth offers several suggestions that you may wish to consider that could improve your products and processes. These are;

- 1) Apple Jam – The apple flavor in this product is very weak. The use of a natural apple flavor or apple essence will improve the flavor profile and still allow the product to be called 100% apple.
- 2) Modification of Temperature Measurement – Dr. Butterworth suggests that you re-evaluate the way that you take final temperatures on your products. He suggests that using an average or "stirred" temperature would be more effective.
- 3) Tomato Juice – Dr. Buttwenworth provided your staff with background information on how tomato juice is processed in the United States. In the U.S., there is a concern with the bacterium *Bacillus coagulans*, which produces flat sour spoilage. We have provided you with some background information on this organism.

We hope that this information will be of value to you and Vitrac. Should you have any questions, or require any additional information, please do not hesitate to contact Mr. Morad or myself.

Thank you again for your hospitality and your support of ALEB.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Trip Report, Vitrac

On Wednesday, October 18, 2000 I made a second visit to Vitrac, the largest privately owned manufacturer of jams in Egypt. My first visit to Vitrac was approximately one year ago, November 9, 1999.

For ALEB were the following:

Thomas A. Butterworth (Consultant to ALEB)
John Schnittker (Information Specialist; Market Information ALEB)

For Vitrac were:

Abd El-Rahman M. Khalaf Allah (Cent. Lab. Director, University of Cairo)
Said A. Hegazy (R&D Lab Manager)

Factory address: Tersa, Toukh, Qalyobia
Factory Ph. (013) 600848; 600032; 601942; 601943; FAX (013) 600 849

Cairo Office: 5 Bahei El Din Barakat St., Giza
Ph. 5701615; FAX 5702187

Mr. Mohamed M. Samy, Technical General Manager, left his regrets that he was unable to be present because of a schedule conflict.

UPDATES

Vitrac exports to 37 countries, including Japan and the United States. Interestingly, the private label jam manufactured for the U.S. uses high fructose corn syrup manufactured in Egypt. I was not able to establish if HFCS is cheaper in Egypt than sugar and, if not, why it is used. The possibility occurred to me later that the U.S importer could have specified HFCS to reflect common practice when they may prefer product made with sugar.

One of their U.S. importers is Karabetian Import & Export Co., Los Angeles, CA 90065. They market Vitrac juices under the label "Tazah."

Several new products are in trial: Mixed Fruit Juice (or "Cocktail"), Blueberry Jam (for export to Japan), and what we would call canned fruit, only in jars (It may be interesting to note that canned fruit is a declining market in the U.S. but Del Monte has introduced a line of fruit in jars which consumers perceive as higher quality.)

Last year the sample of Blueberry Jam we tasted was too sweet and we suggested lowering the sugar level. They decreased the ^oBrix from about 65 to about 55 and a

major improvement has resulted. We liked it and so did the Japanese. They currently import the blueberries from Canada.

Manufacturing these new products will require an extension to the factory although the equipment will be the same type that now exists.

Although they have capacity to receive & process raw fruit, they currently purchase fruit pulp locally, either aseptic, frozen, or with sugar added (to 50 %Brix). Aseptic pulp seems to work best for them and longer range plans include self-manufacture of aseptic pulp.

Written procedures for GMP's and SOP's exist for the new products only at this time. They have ISO 9001 certification and they are working on their HACCP program.

THE PROCESS

Vitrac was manufacturing juice and jam during our visit and we spent most of the time with the jam line. I had forgotten how much care goes into the manufacture of Vitrac jams. Bulk glass is depalletized by hand, which also serves as the first inspection for the empty glass. The empty glass is inspected again by two individuals, inverted for steam tempering and washing, inverted again and filled. The caps are treated with U.V. light, heated with steam for an additional sterilizing effect, and heated again with steam to soften the Plastisol-type liner. After capping the jars pass under a detector for no-caps or cocked caps and then are inspected in front of light by two individuals. Next is washing followed by steam pasteurization (20 min./85°C) and progressive cooling to 40°C, maximum center temperature. After a brief air-drying, the cooled jars are inspected again by a single individual, passed under a dud detector, inspected again, dried again and labeled. Coding is not applied until the end of the two-week incubation period.

PRODUCT CUTTINGS

We tasted Mango Juice, Guava Juice and four jams: Strawberry, Blueberry, Apple, and Orange Marmalade. All had excellent flavor with the exception of Apple: if I were not told it was apple I could not have guessed. There was no off flavor but it tasted only of sugar. Vitrac does not use essence recovery and apple flavor is particularly sensitive to loss through evaporation. Vitrac should perhaps consider purchasing either apple essence or a natural apple flavor. Both would qualify as 100% apple.

The Strawberry Jam lacked a bright red color, a problem for which I could offer no suggestions. However if Vitrac were to manufacture a product, like Strawberry Topping, in which an artificial color is allowed, a low level of FD&C Blue #1 ("blue" is not a typo) will make a strawberry/sugar product appear to have a deeper red color.

OTHER SUGGESTIONS

The final product temperature is measured as a center temperature with the maximum at 40°C, max. Controlling a cooling process to a center temperature has at least three disadvantages:

1. The exact center is difficult to find.

Missing the center with the temperature probe will result in an artificially low reading.

2. The center temperature changes with time after the cooling process.

Quality Control technicians, being human, do not like to make trouble when trouble can be avoided. If a test jar comes off the line is was measured at, say, 41 or 42°C at the center, only a little experience would tell that individual that delaying the measurement for just a few minutes would bring the jar within specification. In this way the real final temperature could increase without being detected.

3. Different sized containers will be cooled to different "real" temperatures.

The temperature of consumer size jars will equilibrate within a few hours of manufacture and will assume an average or "stirred" temperature. It is this average temperature that will ultimately determine if cooling was sufficient. Smaller containers will have a higher average temperature than will larger containers, given the same center temperature exiting the cooler.

I suggested that they consider measuring final temperature as an average, or "stirred" temperature. Obviously this would require a different temperature maximum than 40°C.

Vitrac also manufactures a small quantity of Tomato Juice from fresh, which is pasteurized in a similar way as other juices. I told them about the concern in the U.S. about flat sour spoilage in Tomato Juice and how the product is typically processed.

Thermophilic Organisms Involved in Food Spoilage: Introduction

CLEVE R. DENNY

National Food Processors Association, 1133 Twentieth Street, N.W., Washington, D.C. 20026

(Received for publication May 28, 1980)

The thermophilic spoilage organisms will be discussed in this series of papers. As you know, thermophilic means heat-loving. Some of these organisms in the vegetative form can grow at 70 C or 158 F. In fact, Gordon and Smith (10) showed that 45 of 87 cultures of *Bacillus stearothermophilus* could grow at 70 C. These thermophilic organisms are all spore-formers, can grow anaerobically, and have some heat resistance, so we would expect them to be of some consequence in the spoilage of canned

food. Inadvertent under-processing and post-process contamination of canned foods are the leading causes of canned food spoilage today. However, before 1930, the leading cause of spoilage in canned foods was probably thermophilic spoilage.

In 1913, Barlow (1) submitted to the University of Illinois his Master of Science thesis, based upon experimental studies on spoilage of canned corn. Almost unnoticed at the time and for some years afterward, this piece of research was eventually recognized as a landmark in the bacteriology of canning. Earlier literature has indicated that the role of thermophilic bacteria in spoilage was suspected, but supporting data were lacking. Barlow's contribution, and an outstanding one, was in demonstrating the fact of spoilage through the activity of thermophilic bacteria.

In more recent years, Barlow's work has been cited by various writers, with fitting tribute to its soundness and originality. The text, however, has not been generally available to workers in the science of food preservation, since it was never published. To make this historic contribution more generally accessible, the National Canners Association reproduced Bronson Barlow's thesis, "A Spoilage of Corn Due to Thermophilic Bacteria."

During the 1926 canning season, bacteriologists from the Research Laboratories of the National Canners Association conducted the first of a long series of bacteriological investigations in canning factories. This work was reported by Cameron (2). It was ascertained very early in the investigations that refined sugar, a canning ingredient for a number of products, might contain spores of thermophilic spoilage organisms. This was reported in *The Canner* in

1930 (3). The fact that use of sugar containing excessive numbers of these organisms could lead to spoilage difficulties was demonstrated in a practical way by the use of a test pack (8). It was quite evident from the data that even extensive heat processing failed to eliminate the spoilage types contributed by the high-count sugar. As a result of the early studies, the National Canners Association, in 1931, set up advisory bacterial standards for sugar (11). Reports on microbiological methods for detecting and estimating thermophilic bacteria in sugar were published in the *Journal of the Association of Official Agricultural Chemists* in 1936 (4), 1938 (5), 1940 (6) and 1950 (7). These standards are applied to sugar or liquid sugar intended for use in the canning of low-acid foods (pH 4.6 or above). The method is listed as "Thermophilic Bacterial Spores in Sugars - Official First Action (46.062)" in the 12th edition of *Official Methods of Analysis of the Association of Official Analytical Chemists* (9).

Similar procedures have been applied to other ingredients such as starch, flour and spices to test for thermophilic spores. Equipment and product material on the canning line, particularly if held hot, can become sources of contamination. These organisms reproduce and form spores much faster than mesophilic organisms, so sanitation plays an important role in keeping their numbers low.

The thermophilic spoilage spores are much more heat resistant than the mesophilic anaerobic spore-formers, such as the putrefactive anaerobes. The thermophilic spoilage organisms produce no toxins and exert no health consequences; some may remain ungerminated in low-acid canned foods. The definition of commercial sterility in the Food and Drug Administration regulations on processing of low-acid canned foods, 21 CFR § 113, allows the presence of some of these spores. Therefore, canned foods are not completely sterile, but may contain dormant spores of thermophilic bacteria. The spores will never germinate if the canned food is cooled properly and held at room temperature. Also, the thermophilic spores will autosterilize eventually when held at temperatures at which they cannot germinate or outgrow. Studies by Pearce and Wheaton (12) and by

Schmidt and Nank (13) have shown this fact. This information also allows the industry to produce canned food of much better quality than if the thermophilic spores would have to be inactivated.

In addition to the thermophilic spores that affect low-acid canned foods, *Bacillus coagulans*, the acid-uric flat sour organism was found in the 1940s, to cause spoilage of tomato juice without swelling the container. Heat resistance of spores of the bacterium does not exceed 0.7 min at 250 F in pH 4.3 tomato juice, and it has been eliminated in commercial practice by presterilization.

The thermophilic anaerobes swell the container. Flat sour organisms do not swell the container but sour the product. There may be other spoilage signs, such as cloudy brine. The sulfide spoilage organisms darken the product and produce the odor of hydrogen sulfide.

Thermophilic spoilage may be eliminated by preventing steam leaks which keep equipment hot; by good sanitation of canning lines, with frequent cleaning; by holding hot product before canning at 165 F or above; by cooling cans to 110 F or lower if possible; by storing cans at temperatures below 86 F and by providing for air circulation among stacked cans.

Thermophilic spoilage is really not a big problem today, but there is still concern about it and interest in the responsible bacteria. The papers in this series will describe these extremely heat resistant spore-formers that reproduce at a rapid rate at very warm

temperatures.

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A Research Note

Growth and Corresponding Elevation of Tomato Juice pH by *Bacillus coagulans*

ROBERT E. ANDERSON

ABSTRACT

Slants were inoculated into sterile, tubed tomato juice and pH was observed for 21 days. Juice samples initially at supported good growth; pH was elevated to 5.0 after 6 days at 35°C. Other tomato juice samples (initial pH 5.0 or 5.5) supported good growth of these flat-sour bacteria and with varying increases in pH. The results indicate that flat-sour of tomatoes and similar foods may cause decreased acidity, usually allowing outgrowth of *Clostridium* spores in these sub-processed foods.

INTRODUCTION

Current recommended water bath methods (USDA, 1977) for home-canning of tomatoes are based on a low pH (< 4.6) to prevent outgrowth of *Clostridium botulinum* spores. Sapers et al. (1977) reviewed the critical nature of tomato acidity and subsequent safety of canned tomatoes. Studies by Huhtanen et al. (1976) shows that post process contamination of tomato by molds may elevate pH; as a result, *C. botulinum* may germinate and produce toxin. In a recent study, Valle (1982) reported that *Bacillus licheniformis* could elevate pH of water bath-processed tomatoes, making an environment suitable for growth of *C. botulinum*. However, he reiterated a common belief (Frazier, 1977), that *B. coagulans* would not elevate tomato juice pH and therefore, posed no problem or "...botulinal hazard." *B. coagulans* is a common contaminant of tomatoes. It readily ferments carbohydrates and produces acid in food media and at normal incubation temperatures. Carbohydrates become limiting after outgrowth in food products, e.g. heated tomato juice, *B. coagulans* may conceivably ferment proteinaceous material that it elevates product pH. Fields et al. (1977) reported on isolates of *B. coagulans*, strain 064-T08, that elevated from 4.2 to 4.7 after 5 days growth in a tomato serum base. However, they did not attribute any particular significance to pH increase by *B. coagulans*.

The following experiments were conducted to study the ability of and the potential for pH elevation by *B. coagulans* in tomato juice.

MATERIALS & METHODS

ORDER TO OBTAIN large quantities of spores, five-day cultures of *B. coagulans*, grown in standard methods agar (SMA, BBL), were used throughout the study. The culture used was strain 064-T08, kindly supplied by Dr. Fields of the Univ. of Missouri (Columbia, Mo.). As expected, the aerobic sporeformer did not grow in 7% NaCl broth or produce gas in glucose broth, which, according to Burgoyne's test (Gibbons and Gordon, 1976), rules out possible identity as *licheniformis*. Commercial tomato juice was dispensed 30 ml per tube in 25 x 100 mm screw cap tubes and autoclaved at 116°C for 15 minutes. Separate tubes of tomato juice were then adjusted separately to pH 4.30, 4.50, 5.00 or 5.50 with NaOH. Suspensions of spores and vegetative cells were produced by washing the inoculum in slants with 3.0 ml of a standard peptone-water dilution tube.

Each tube of juice was then inoculated with 1.0 ml of this diluted mixture of spores and vegetative cells; duplicate tubes of inoculated juice were then incubated at 35°C for 21 days and sampled at 3, 6, and 21 days for growth and pH change. Growth was measured by aerobic plate counts using SMA with incubation for 3 days at 35°C. All tubes were individually well-mixed aseptically to obtain separate, blended samples prior to pH readings or transfer for aliquot cell counts. The pH readings were determined on 5 ml aliquots using an Orion model 611 meter, standardized with three buffer controls at pH 4.00, 6.00 and 7.00.

RESULTS & DISCUSSION

GROWTH OF *B. coagulans*, strain 064-T08, was poor in tomato juice at a pH of 4.2 or 4.3, as seen in Table 1. In contrast, juice at a pH of 4.5 or higher provided much better growth with over 1.0×10^6 CFU/ml in 6 days at 35°C. As expected, when initial pH was adjusted upward toward the optimum for the sporeformer (Gibbons and Gordon, 1976), better growth was achieved.

Table 2 compares pH changes in the same inoculated juice samples over 21 days of incubation. As shown, little or no significant change occurred in juice initially at pH 4.2 (or in the uninoculated control). The pH of juices that supported good growth became slightly more acid during the first few days of incubation. By the sixth day, the pH of the juice initially at 4.5 increased to 5.07. This sample, as shown in Table 2, thus exceeded the critical pH range of 4.6-4.8 that normally would prevent outgrowth of *C. botulinum* spores (Sapers et al., 1977). Even if the demonstrated pH changes did not occur anaerobically in a completely sealed food container, these data indicate that at least some strains of *B. coagulans* could elevate pH of acid foods and, in the event of defective seals, some sporeformers, e.g., *C. botulinum*, may survive this boiling water bath treatment and produce outgrowth and toxin.

—Continued on page 607

Table 1—Comparative growth of *B. coagulans* in tomato juice

Initial juice pH	Aerobic plate count (CFU/ml) ^a and days incubation, 35°C		
	3	6	21
4.20	4.1×10^2	4.0×10^3	2.0×10^3
4.30	6.4×10^3	3.3×10^6	3.0×10^6
4.50	2.8×10^6	1.10×10^6	2.7×10^6
5.00	8.0×10^6	4.12×10^6	1.6×10^6
5.50	6.3×10^6	9.2×10^6	3.7×10^6

^a Initial juice inoculum = 2.7×10^2 CFU/ml

Table 2—Elevation of pH by *B. coagulans* growing in tomato juice^a

Initial juice pH	Days incubation at 35°C ^b			
	2	3	6	21
4.20	4.21	4.26	4.23	4.26
4.30	4.30	4.32	4.36	4.31
4.50	4.46	4.48	5.07	5.40
5.00	4.81	4.83	5.41	5.82
5.50	5.10	5.26	5.88	5.71

^a Duplicate readings of pH values on separate juice samples.

^b pH readings were obtained at the same time samples were taken for plate counts shown in Table 1.

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PHYSICAL DIMENSIONS OF RICE KERNELS BY IMAGE ANALYSIS . . .

Table 2—Image analysis method for determination of length, width, and area of rice kernels^a

Parameter	n	Mean	Standard deviation	Coefficient of variation
Length (mm)	50	6.28	0.30	4.8%
Width (mm)	50	2.67	0.08	3.0%
Area (mm ²)	50	13.17	0.88	6.68%

^a Rice variety — MARS, a medium grain commercial rice variety from the 1979 Arkansas corp. Time for Analysis: 3 min.

scopic methods are shown in Table 1. It should be noted that 10 kernels were used for each analysis and it took approximately 10 min for each analysis of 10 kernels.

Table 2 contains a summary of the measurements of length, width, and area of 50 kernels of rice from the same sample, as determined by the Image Analysis. The Image Analysis allows for sampling a larger number of kernels per measurement and, due to the computer system used, reports on statistical measurements are automatically generated.

Comparisons of data in Tables 1 and 2 indicate close agreement among the three methods. The Image Analysis technique solves still another problem associated with physical measurement of rice. The measurement of surface area is tedious at best due to the highly irregular shape of the kernel. Methods presently available merely approximate the surface area. The area measurement obtained by Image Analysis is properly considered to be a cross-sectional area taken along the major axis parallel to the minor axis assuming an elliptical 2-dimensional shape for the rice kernel.

The results of this investigation showed that the values of physical dimensions of rice kernels measured by Image Analysis method compared very favorably with those measured by the conventional Gaertner microscope and found to be superior to those data obtained by a projecting micro-

scope. By using the Image Analysis method, samples of rice may be classified in less than a third of the time required by conventional microscope methods. Image Analysis permits the use of a much greater number of kernels, providing a more representative measure of dimension while giving a better estimation of the actual sample variation among kernels. Due to the interactive nature of Image Analysis, it is no longer important or required to precisely arrange kernels in the field of view for measuring. It is possible to reject items such as broken or over-lapping kernels on the video display without manipulating the sample. The capital investment for an Image Analyzer is high. However, for those situations where a large number of samples must be classified or where time or manpower is critical, Image Analysis can prove very advantageous.

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 Ms received 12/18/83; accepted 12/23/83.

This paper is based on work performed by D.E. Goodman towards his Ph.D. dissertation, "Development and Experimental Validation of a Predictive Model for Fuffability of Gekintized Rice." Louisiana State Univ., Baton Rouge, LA.

ELEVATION OF TOMATO JUICE pH BY *B. COAGULANS* . . . From page 647

The other juice samples with an initial pH of 5.0 or 5.5 also increased in pH after 6 days incubation at 35°C. Similar growth patterns and pH elevation were observed in previous work in our laboratory using another strain of *B. coagulans* (Anderson, unpublished work, 1982). Of the tomato juice samples tested, the highest pH recorded was only 5.71 after 21 days growth at 35°C in juice that originally was pH 5.50. One explanation for this slight elevation is possibly the high buffer capacity of the juice. There was no change in the pH of the uninoculated control juice during 21 days storage at 35°C.

As reported by Gibson and Gordon (1976), *B. coagulans* has an optimum pH "...close to 6.0; minimum 4.0–5.0 in different strains." Normally considered a thermoaciduric, flat-sour bacterium, *B. coagulans* is capable of growth in media low in carbohydrates. In experiments in progress (Shamsudin and Anderson, 1983; unpublished data), we found that *B. coagulans* will continue to grow and elevate pH after added glucose is depleted from the media. After a water bath treatment, some surviving spores might be damaged requiring long storage periods before growth and pH elevation took place.

It is well known that *B. coagulans* is facultative and grows well anaerobically (Frazier, 1958). Normally, no gas

is produced and consequently, flat-sour spoilage of home-canned water bath-processed foods may go unnoticed with potentially dangerous elevated pH.

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October 25, 2000

Dr. Maher Gergis
SFCO
53 Ramsis Street
Of Demashq-Roxy-Cairo

Dear Dr. Maher:

I would like to thank you for taking the time to come into our offices to confer with Dr. Butterworth and Mr. Morad Ahmed. I apologize for not joining you, but I was simply too busy that day. I hope that the discussions went well and that you found them to be beneficial.

We hope that the solutions that were offered for problems with the "half processed potatoes" will be something that you can adopt. The "Tater Tot" type product that Dr. Butterworth described is quite popular in the United States, and an excellent use for this kind of raw material. If we can provide any help with formulation, please let us know.

Should you have any questions or require any additional information, do not hesitate to call.

Sincerely yours,

Richard F. Stier
Director, Technical Services

cc: M. Ahmed, Files, Mr. Adel Solia (SFCO)

To: R.F. Stier

From: Thomas A. Butterworth

Subject: Report of Meeting; SFCO

On Wednesday, October 20, 2000, a representative of SFCO visited ALEB headquarters as part of a follow-up to my visit of October 9.

SFCO's representative is new to the company:

Maher Gerges (Export Manager)

53 Ramsis St.
Of Demashq-Roxy-Cairo
Ph: (02) 4507962,3,4; FAX (02) 4509675
Mobile: 012 158 6793
e-mail: sfco@link.com.eg

Present for ALEB were:

Morad S. Ahmed (ALEB)
Thomas A. Butterworth (Consultant to ALEB)

Mr. Gerges joined SFCO recently enough that he has not had time to print business cards. He was brought into the company to help establish some order to SFCO's export function. A native of Egypt having lived in Australia for 28 years, Mr. Gerges seems uniquely qualified for this function, especially for markets in New Zealand and Australia.

Mr. Gerges has become a big fan of ALEB during his short time with SFCO. He was familiar with Task 3 and more recently familiar with Task 2. We gave him an outline of the various other functions.

In the course of his previous dealings with SFCO as a broker, he learned that good quality potato flakes could be made from only two Egyptian varieties: Lady Rosetta and Diamond. When SFCO uses other varieties on the flake line they are passed through only one cooking step (instead of the usual two), dried, and are referred to as "half processed potatoes." These potatoes do not perform well as flakes because of a sticky consistency and a somewhat dark color. However they have a good flavor and odor and are 100% potatoes.

Mr. Gerges received 5 containers in Australia of what he thought were SFCO potato flakes. He sent this shipment on to his customer who discovered that two or three of the containers were half processed potatoes and did not perform well as flakes. Mr. Gerges is now liable for this material in Australia and SFCO has an additional 40 MT in Egypt. This material apparently has no use. Mr. Gerges wanted some ideas on how to utilize this product without downgrading it to animal feed,

We suggested that there were many products made from reformed potatoes that do not begin as flakes. One such product in the U.S. is called "Tater Tots," reconstituted

potatoes to which salt and spices are added. The product is formed into finger food, fried and frozen. The consumer would take the product directly from the freezer to the microwave oven.

Mr. Gerges apologized for the somewhat disorganized nature of my last visit.

VISIT REPORT

Date: 18/10/2000

Place: ALEB OFFICE

Present: Dr. Maher Gergis, Export Manager SFCO

Mrs. Lisa Gergis, Marketing Assistant SFCO

TEL: (02) 4507963

MOBILE: (010) 1586793

E-mail: sfco@llnk.com.eg

From ALEB: Tom Butterworth

Morad Ahmed

Dr. Gergis explained his recent involvement with SFCO from being their import agent in Australia & N.Zealand to accepting a position of export director of SFCO was built on his belief in the export potential of SFCO products (Frozen & flaked potatoes) inspite of his personal negative experience with one shipment (40 tons) of SFCO flaked potatoes which was not in conformity with market requirements in Australia & N.Z .

Dr. Gergis acknowledged the help he & SFCO received from ALEB specially TASK 3 and mentioned that ZEB JONES promised to help SFCO find buyers for 140 tons of flaked potatoes in S.E.ASIA markets - the intervention of ALEB T.3 in this matter is greatly appreciated by SFCO .

SFCO requested a meeting with T.2 mainly to discuss the technical problems in production at their plant in KOM HAMADA following the visits of ED HAYASHI and TOM BUTTERWORTH (SANITATION, GMC , PEST CONTROL, INCONSISTENCY OF QUALITY IN BATCHES) and agreed that SFCO technical staff would attend ALEB training events to upgrade their knowledge in all aspects of food processing .

We also discussed the possibilities of: -

- Rework / Reprocess the semicooked flakes (100 tons at SFCO) .
- As for the 40 tons in Australia, we proposed marketing it as an ingredient to the snack industry for further processing (remix , add flavours , colorants, extrude , flash fry , freeze , repack ...etc provided the product is not adulterated or unfit for human consumption , which Dr. Gergis said he had undergone several tests at AGAL & FTA - Australia which confirmed that the flakes were 100% natural potatoes

(no sulphites ?!) , moisture 8-9 % and that it is not from Genetically Modified potatoes which is vital for the Australian & N.Z markets .

Dr. Gergis was also advised to keep a lookout for new concepts / machinery & products for processed potatoes during his visit to SIAL next week.

MORAD AHMED