

Food Safety Management Systems

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Consumers expect, deserve and have a right to safe food. In the past few years, there have been a number of episodes that have brought into question the adequacy of current controls used by manufacturers in producing their foods. Various illnesses from food caused by pathogenic microorganisms have been the most troublesome.

The issue of pathogenic organisms has recently been brought to the forefront by significant outbreaks in the population. Some of them have involved large numbers of people and in some instances, such as those caused by *Listeria*, a number of deaths have occurred among the elderly, young or immunocompromised individuals. These outbreaks caused by *Listeria* in a Mexican-style cheese in California, a *Salmonella* outbreak from fluid milk in Illinois, *Listeria* in cole slaw, enteropathogenic *E. coli* in precooked hamburgers, and Norwalk virus in frosting that made at least 2,000 people ill in Minnesota, highlight the fact that all is not well with the current control systems in the food industry.

Other types of episodes do occur, but these generally affect only a few people or individuals and do not receive the same notoriety as do pathogenic bacteria. These have involved chemicals and physical objects. Very few episodes have resulted from the misuse of pesticides in food. Monitoring of residues in food by various organizations have shown that pesticide residues in the majority of ready-to-eat foods are far below the tolerances established by the Food and Drug Administration.

Most of the fear the consumers have about pesticides is derived from perceived impressions created by certain activist groups and fostered by the media.

This is not to say that they couldn't be a hazard, but the record does show that pesticides have been handled responsibly for years in the food system.

Why Increasing Problems?

Why have there been increasing problems with pathogenic organisms? A number of reasons have been advanced. First and foremost is the fact that the food industry has undergone many significant changes over the past 20 years. Besides innovations in packaging, formulations and distribution systems, large food companies have shifted to highly-automated, high-speed operations. Many food prod-

ucts today, such as bakery and dairy products, are produced in huge quantities and are shipped almost immediately after production to distribution centers or chain warehouses. Many of these products are on the shelf and purchased by consumers a very short time after production. This time period is so short in some instances that laboratory tests cannot be completed in time to forestall bad product from getting into the consumers' hands. There is also the problem that almost anyone can go into business and produce and sell foods that may present a hazard, regardless of their expertise in food safety.

If the potential for disaster is considered under these conditions, it is apparent that the development and procurement of raw materials and the manufacture and distribution of food products must be controlled in a manner that assures the safety of the food when it leaves the plant. It is obvious that the utilization of a superior system of control is of paramount importance.

There are other factors based to a large extent on a desire to increase product availability, convenience, freshness and consumer acceptance and satisfaction that have also tended to narrow the margin between safe and unsafe food. New products are now appearing on the market whose primary method of preservation is refrigeration.

If these products are abused by being subjected to higher temperatures or kept well beyond their shelf life under refrigerated conditions, they could become hazardous. Most of these products do not have fail-safe features.

It is also well known that current food distribution systems are not what they should be. This is especially true from the standpoint of adequate temperature control during the storage, transportation, retail handling and home storage of food products. It is for this reason that a number of manufacturers of refrigerated nonsterile food products have set up their own distribution and in-store display systems where they can exert their own control. Doing this however, is extremely expensive. Compounding this problem is the lack of knowledge on the part of some consumers as to how to properly handle, cook and store these types of food products, as well as many others they purchase.

As far as the cause of problems with more traditional foods, there are a number of explanations that have been advanced. In the older, more established industries, such as flour mills, meat plants, dairies and bakeries, there may well be complacency in that these foods have been produced for many years without apparent difficulties. It is also a fact, however, that many changes have been made over the years in these old traditional processes that may not have been researched well enough to determine the potential problems these changes might cause. This has resulted, for instance, in cross connections of piping between raw product and pasteurized product.

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There is also a shortage of engineers who fully understand some of the older systems and the purpose of some of the designs that had been used. Some engineers are not aware of food safety problems that can be generated through the design of equipment. Thus there have been problems, for instance in equipment changes and replacements that have resulted in contaminated product. The equipment cannot be properly cleaned and sanitized.

Another factor is the emergence of pathogens that heretofore had not been recognized as serious threats to the food supply, such as *Campylobacter jejuni*, and *Listeria monocytogenes* which grow well at refrigerated temperatures. Other organisms may become more prevalent over time. For instance, it has been estimated that many of the people from the United States who visit Central and South America return as carriers of Enteropathogenic *Echerichia coli*. There are now larger populations of immigrants in the United States. Some of them are undoubtedly carriers of pathogenic organisms common to the countries they have arrived from, which may appear more frequently in our food supply.

Action Needed—Now!

If we look at all of these changing conditions, we must conclude that we cannot afford to react to crisis situations, but must act now to reexamine the control systems we are currently using and to move quickly toward establishing preventative systems of food control. After-the-fact testing is just not reliable.

Where does food safety start? Logically, it starts in the design of the food products. Before adequate control can be exercised over a food system, it is necessary to fully understand the criticality of the processes, the ingredients and all of the other components that make up the product.

This must be done in order to be able to predict the types of controls that will be necessary in the system so that whatever goes out of the plant door is safe. The Hazard Analysis Critical Control Point (HACCP) program is a proven way of accomplishing this. This system as now used in some of the food industry is a spin-off from the U.S. space program. The basics were developed by The Pillsbury Company in conjunction with The National Aeronautics and Space Agency (NASA). The Natick Laboratories of the U.S. Armed Forces, and the U.S. Air Force Space Laboratory Project Group also played a role.

Development of HACCP

The pathway to the HACCP system started in 1959 when Pillsbury was asked to produce a food that could be used under zero gravity conditions in the space capsules. We started with the fact that no one really knew how foods, and especially particulates, might act in zero gravity. Our approach to solve this problem was to produce bite-sized foods covered with a flexible, edible coating to prevent crumbling and atmospheric contamination.

The most difficult part of the program, however, was to come as close to 100% assurance as possible that the food products we were producing for space use would not be contaminated with pathogens, either bacterial or viral, or toxins or chemicals that could cause an illness that might

result in a catastrophic mission. It was quickly determined that by using current techniques of quality control there was no way we could be assured that there wouldn't be a problem. Further, the amount of testing that had to be done to arrive at a reasonable decision point as to whether a food was acceptable was extremely high. In fact, a large part of the production of any particular batch of food had to be utilized for testing, leaving only a small portion available for the space flights.

Since companies for good reason don't practice this type of destructive testing, how much in the way of hazards were we missing by testing only the raw materials, and some online and end-product tests?

This brought into serious question the prevailing system of quality control that was being used in our plants and the food industry as a whole. Most quality assurance programs are based on what the quality assurance manager believes is a good program. There is no uniformity of approach or even understanding in the food industry as to what constitutes an excellent program.

A New Approach

In our search for an answer, we examined the zero defects program utilized by NASA and found that it was designed for hardware. The type of testing that was used for hardware, such as x-ray and ultrasound, were nondestructive and therefore suitable for this purpose but not for food. In looking for a possible solution, we decided to try a new approach to the problem. We concluded after extensive evaluation that the only way we could succeed would be to have control over the raw materials, the process, the environment, personnel, storage and distribution beginning as early in the system as we possibly could. We felt certain that if we could establish this type of control, along with appropriate record keeping, that we should be able to produce a product that we could say was safe with a high degree of assurance. For all practical purposes, if it was done right it should not require any testing of the finished packaged material other than for monitoring purposes. The type of record keeping required under NASA rules facilitated our experimentation with this approach.

We were required by NASA to keep records that allowed traceability of the raw materials we used, the plant where it was produced, the names of people involved in the production and anything else that might contribute to the history of the product.

In other words, this was a mechanism for tracing problems back to the source. For instance, we knew that latitude and longitude where the salmon used in salmon loaf were caught. It was by using this approach that we developed the Hazard Analysis Critical Control Point system (HACCP).

HACCP is a preventative system of food control. The system can be used to monitor or control any area or point in the food system that could contribute to a hazardous situation.

Hazard Analysis

These hazards included contaminants, pathogenic microorganisms, physical objects, chemicals, raw materials, a process, use directions for the consumer or storage condi-

tions. The Hazard Analysis portion of HACCP involves a systematic study of the ingredients, the food product, the conditions of processing, handling, storage, packaging, distribution and consumer use. This analysis allowed us to identify in the process flow the sensitive area that might contribute to a hazard. From this information, we were able to determine the Critical Control Points in the system that had to be monitored.

Critical Control Points

The definition of a Critical Control Point is "any point in the chain of food production from raw materials to finished product where the loss of control could result in an unacceptable food safety risk."

Our first problem using this approach was that we knew what we wanted to do, but didn't know how to do an adequate hazard analysis. In searching for a method, we found that the U.S. Armed Forces Natick Research and Development Center had developed a system of analysis called modes of failure. After evaluating this method, we adopted this technique with some modifications as our model. We also found that to do an adequate analysis we had to break down each product and its production system into its components and analyze each segment for its potential contribution to safety and then connect them all together to develop the overall interrelationship.

It is amazing how something done in an early stage in the system can have a major effect later on.

Starting with the raw materials, we looked at specific ingredients as well as each stage of its processing as it moved from the field through the food chain. This was done to determine what might happen to it and what we might expect in the way of problems when it appeared at the plant. It was from these analyses that we were able to select out those sensitive ingredients and areas that must be monitored and controlled in order to insure that we would not bring a hazard into the plant. This included searches of the literature, discussions with suppliers and, of course, our own history of the ingredients.

The areas of concern ranged from the potential presence of pathogens, heavy metals, toxins, and chemicals to the type of treatments the ingredients might have received, such as pesticide applications or a pasteurization step. The next segment was an analysis of the manufacturing process, the building, the general environment and method of people control to ensure that we completely understood all of the points or areas in the facilities and process that might contribute to a hazard. It also included determining those procedures that would prevent a hazard. Another area of investigation was the examination of the storage, transportation and distribution to be used for the product and the abuses it might receive. Finally, an analysis was conducted to determine what the consumer might do to the product that could cause unsafe conditions.

This is a rather simplified sketch of what must be done. It does, however, show that detailed knowledge of the total system for the production of any food must be developed. It also implies that knowledgeable people have to be involved in the analysis.

Whether a company realizes it or not, understanding the

process, package, use directions for the consumers and conditions of storage should be a normal procedure in developing a product. Large companies can do these analyses on their own; however, small companies may have to depend on their suppliers and consultants for much of the information.

A major part of doing a hazard analysis is knowing what questions to ask and how to use the information after it is obtained. We do know through data we have developed that a properly set up HACCP system will work and that the products produced under this system have a high level of assurance that they are safe.

Making HACCP Work

A question that is generally raised in any discussion about HACCP is: "How does HACCP relate to a quality assurance program that a manufacturer currently has in place?" Most companies will find that many of the critical control areas have already been identified by their quality assurance departments. The difference is that most quality assurance tests and controls are set up as isolated tests or events. There is generally no interrelationship developed with the rest of the data generated. HACCP requires that all critical tests and monitoring points be interrelated and interlocked as a system. This must be done in order to insure that there would be no way for the system to go out of control without it being detected through the monitoring program.

Another difference is that monitoring under a HACCP program must be done on a regularly scheduled basis. Further, the information from each monitoring point must be documented and signed by the person or persons responsible for this task. This is not an onerous task and does pay large dividends since if there is a deviation, the amount of product affected is usually very small. Depending on the frequency of the monitoring, the deviation can be narrowed down to a few hours or less of production and should still be in the control of the plant.

It is essential to note that if a deviation does occur, it must be immediately reported and appropriate corrective action taken and documented as quickly as possible.

Product Safety Operating Committee

An accepted and recommended procedure in developing and utilizing a HACCP program is to have a product safety operating committee (PSOC). This committee is responsible to make sure that all new product specifications go through this system. This group must make certain that the hazard analyses have been properly executed and documented and that nothing has been overlooked. This committee also examines the microbiological and engineering data, the equipment used, the facility to be used, the personnel practices and that the proper safety controls and monitoring stations are in place. This committee should ideally consist of quality assurance personnel, engineer(s), microbiologist(s), product development scientists, and any other experts considered necessary, depending on the product and the degree of hazard the product represents. What is essential is an appropriate cross-section of disciplines that can examine the data and draw reliable conclusions. A further benefit of the central committee is the facilitation of communications. Problems

and solutions to problems can be transmitted throughout the company instead of staying within a subsidiary or business through lack of communication.

Physical System Hazard Control

A very important facet of the HACCP system is the development and maintenance in the plant of what we call the Physical System Hazard Control (PSHC's). This consists of a schematic drawing of the actual layout of the process, including the equipment used in each process, all the piping and any other related and connected physical equipment. This area is crucial because it is used to delineate the critical control points to be monitored, the frequency of monitoring and the operating conditions necessary to maintain control.

It must be updated on a regular basis to reflect current conditions. The PSHC is also used during audits to determine if unauthorized changes have been made. Changes in an approved system must never be made unless reviewed and approved by the PSOC. There are many examples of changes having been made in equipment or piping that have resulted in a hazard, simply because no one thought to determine what effect the change might have on the rest of the system.

It is critical to have adequate training of personnel, not only on the HACCP system and how it works, but also personnel in laboratories on test procedures used and of those individuals who will monitor the Critical Control Points. The HACCP system is basically a series of checks and balances.

HACCP Principles

It is important as the HACCP system is being adopted widely by industry and government agencies, that it be applied uniformly. HACCP has always been guided by certain principles. The HACCP Committee of the U.S. National Advisory Committee For Microbiological Criteria For Foods during their deliberations expanded the principles, along with details of what each principle means in order to promote a uniform application of HACCP. The principles apply to all hazards, not just microbiological.

The principles are as follows:

- Principle 1 – Assess hazards associated with growing, harvesting, raw materials and ingredients, processing, manufacturing, distribution, marketing, preparation and consumption of food.
- Principle 2 – Determine the critical points required to control the identified hazards.
- Principle 3 – Establish the critical limits that must be met at each identified critical control point.
- Principle 4 – Establish procedures to monitor critical control points
- Principle 5 – Establish corrective action to be taken when there is a deviation identified by monitoring of a critical control point.
- Principle 6 – Establish effective record keeping systems that document the HACCP plan.
- Principle 7 – Establish procedures for verification that the HACCP system is working correctly. Verification measures may include microbiological,

physical, chemical, electronic and sensory methods.

The committee was unanimous in their opinion that the preferred system of food safety control should be the HACCP system and has recommended this approach. The committee furthermore believes it should be mandatory, recognizing however that it will require a somewhat lengthy phase-in period. The committee also believes that there should be a level playing field between imported, exported and domestic products. During this phase-in period, they are recommending a redistribution of enforcement activities. For example, those companies that develop an approved HACCP program would receive the least regulatory effort. Those operating under Good Manufacturing Practices, the next largest amount of effort. Companies that operate under unknown conditions and controls should receive most of the inspection effort. This allocation would permit the greatest agency attention to the areas of highest risk.

Major Areas

There are ten major areas that must be dealt with in the program which are necessary for a good HACCP system. These are important to all industries, but have some areas especially important to the processed food industry.

1. Product Specifications. Product specifications must be complete and cover every facet of the production of the food product. They should be so detailed that anyone could use the specification to produce the identical product. It should also delineate all of the hazards in the ingredients, the manufacturing process and the finished food as well as where the Critical Control Points are in the system. This is the blueprint for operations and Quality Assurance to use for that particular product.

2. Product Safety Analysis. This analysis which is developed for each product and line is part of the product specification. It highlights for the plant and quality assurance personnel the hazards that may exist in the production of the food product.

3. Purchasing Requirements. Procurement should be required to buy only those ingredients or equipment specified and only from suppliers approved to furnish that product. This affords an excellent opportunity to educate the suppliers on the HACCP system. If they have a good system, it should not be necessary to test every shipment they make, but rather monitor them on a random basis.

4. Good Manufacturing Practices. The HACCP system does not do away with GMP's, but rather incorporates them into the system. A manual covering GMP's must be written and maintained for each plant. The GMP's, of course, deal mostly with sanitation, buildings, grounds etc.

5. Physical Systems Hazard Control. As mentioned previously, this is the plant schematic for each line used for each product produced that shows the equipment and the interrelationship of the components and where the critical control points are in the system.

6. Recall System. Every company should have a program in place for tracing product and being able to conduct a recall of any specific product in a very short period of time. This demands records of codes, lots of ingredients used in the production of any given coded product and an invoicing

system that allows rapid trace of shipments.

7. Contract Manufacturing. Every contract manufacturer should be required to meet the same conditions as the company-owned plants. They must operate under the same rules and the same criteria. After all, they are an extension of the company's manufacturing operations and should be treated no differently. It can also create problems in the plant if people find out that contract packers have different standards than those they are held to.

8. Facility Auditing. Each company should conduct facility audits on a periodic basis to insure that the requirements and the policies of the company are being followed, particularly in the area of food safety.

9. Customer Complaints. This is a significant part of a HACCP program in that customer complaints are very often an early warning system that all may not be well in the system. They must be reviewed regularly by management, the product safety operating committee and the quality assurance personnel. A procedure for taking appropriate, timely action in regard to complaints must be in place.

10. Incident Reporting. All incidents, whether they be regulatory, accidents, misuse of ingredients, safety issues etc., should be reported immediately to appropriate designated people in the company. Incidents must be dealt with in a timely fashion. Safety problems have reached and affected consumers because of delays in reporting incidents. A good rule is: If it's a deviation from the norm, report it.

Health Hazards

The food industry has certain areas that are of great significance from a health hazard standpoint. A list of hazards to check for is as follows:

- A. PHYSICAL POINTS CRITICAL TO PRODUCT SAFETY
 - a. Metal Detectors
 - b. Magnets
 - c. Sifters/screens
 - d. Thermometer calibration (not temperature)
 - e. Equipment in general
 - f. Other
- B. BIOLOGICAL POINTS CRITICAL TO FOOD SAFETY
 - a. Approved suppliers
 - b. Sensitive ingredients
 - c. Heat treatments – time and temperatures
 - d. Hold times and temperatures
 - e. Process water
 - f. Human contact
 - g. Other, e.g. consumer abuse
- C. ENVIRONMENTAL AREAS IN THE PLANT THAT HAVE ENVIRONMENTS THAT MUST BE CONTROLLED FOR PRODUCT SAFETY.
 - a. Storage areas – temperature
 - b. Isolation of sensitive areas, e.g. cross contamination by ingredients, raw product or human.
 - c. General environment
- D. CHEMICAL RESIDUES ON RAW MATERIALS AND/OR RESIDUES IN PLANT
 - a. Pesticides
 - b. Packaging migration

c. Maintenance materials

d. Process water

E. TRANSPORTATION/DISTRIBUTION/CONSUMER ABUSE

a. Time/temperature

b. Instructions/labeling

You may have the feeling about now that the HACCP system is complicated.

I wish to assure you that it is nothing more than an orderly, logical approach to preventing incidents from happening and that if one does occur, the tools are in place to control the situation.

International Aspects

As you may or may not know, the HACCP system is being adopted worldwide. The World Health Organization has established a HACCP committee and will undoubtedly recommend its use.

It will be important, I believe, for any company that wants to operate internationally to have a HACCP program. For the first time, there is a system and a language that all can understand in the food safety area. This should result in more uniformity of requirements and regulations worldwide and less artificial trade barriers based on food safety.

We should also consider the role of the regulatory agencies in food safety and the decided advantage a HACCP system has. The regulatory agencies are continually facing changes in the area of food processing and distribution. I know that most regulatory agencies have recognized that we all must move to a system that is based on prevention rather than discovery after the fact. It is impossible for regulatory people to do a plant inspection once a year and have a comfortable feeling as to the adequacy of the controls that are being used in many plants. The plan should be established and controlled by the industry and monitored by the regulatory agencies. This type of effort does require a great deal of trust and cooperation by all parties. I'm also convinced that most manufacturers will recognize over time that a reliable safety system is good business and can be a competitive advantage.

One reason I believe the HACCP system will prevail is that it has the endorsement of a committee of the U.S. National Research Council, the National Advisory Committee on Microbiological Criteria for Foods and, as I mentioned, the World Health Organization is now involved.

It is interesting to contemplate that some day the world food industry may be playing with the same deck of cards. To a regulatory person or a company, this can be helpful since exchanges of information worldwide can be on a common basis of understanding.

In Summary

- The HACCP approach to food safety is one that will work. It is a preventative method of control. It is far better to prevent problems from occurring than to rectify the problems later.
- The HACCP system is cost-effective, in that additional people are generally not necessary if a company has a good quality assurance program.
- Time and money can be saved through less ingredients

- being rejected and less product being destroyed.
- The discipline that is necessary for a HACCP program invariably leads to higher quality and uniformity of product.
- An additional advantage of the HACCP system is that for

the first time the industry and governments will have in common a uniform method and language for controlling the safety of food that all understand.

Discussion

G. Hicks: You mentioned some advantages to the HACCP system and I was wondering what expected benefit from a system can we see in reduced illness, etc. from a microbiological standpoint from what we are seeing today?

R. Wooden: How to measure the effectiveness of a food safety program. Our management asks that all the time. Obviously, we believe that the effect should be tremendous. If you are trying to prevent the problem up front, you are not going to have the cross-contamination of piping. You are going to have someone in QA looking at the recording charts on a pasteurization process to make sure that the operator didn't cut it off 10 minutes early so that he could go on a coffee break. It is just a continuous monitoring thing and what it does is that it brings to the attention of the quality management people in the plant something that may be going wrong before it actually gets out on the street; and preventing it from getting out on the street is really the bottom line. I can't give you any numbers, I don't have any on how many illnesses it is going to prevent. It's got to go a long way in reducing the number of incidents that would come from manufactured food. The Pillsbury Company has utilized a HACCP-based food safety system since 1971, up to and including today. And up to and including today, we have not had a Class 1 or Class 2 food safety recall on any product in that period of time. That's got to be some kind of measure of effectiveness. It's just statistics, I don't know how much faith you want to put in that but we haven't been caught with any problems and by being caught, I mean catching ourselves. I guess that is the best answer I can give you. It appears to work and work very well.

Hicks: Let me ask you a follow-up on that; concerning the area of mishandling by consumers, people in restaurants, etc., can we expect to eliminate bacterial contamination to the point that they can continue to mishandle food because mishandling, of course, is a major problem?

Wooden: There are very few incidents of food-borne illnesses that will come from manufactured processed food from a food facility. Then we, of course, have the manufactured milk out of Hill Farm Dairy and that got 20,000 people salmonella and so that one didn't work out too well. One of the points of the HACCP program is instruction and education for the consumer. That instruction comes mostly in the form of labeling and is very explicit in telling them what to do with this stuff and how to do it. That is a piece of the HACCP Program, examination of a proposed label is a check of a critical control point, so we have adequate handling, cooking, etc. instructions. For example, with our microwave pizzas, we go to great pains to see to it that over the range of ovens that are available in the marketplace, (and we reassess that

annually), the recipe information that we give the consumer on that pizza package will be sufficient to affect a pathogen kill, if in fact there are pathogenic organisms on the pizza. So labeling and consumer education are a big part of that mishandling problem. The National Restaurant Association and the Food Marketing Institute have their HACCP-based programs that they recommend to their patrons to eliminate some of those problems. In fact the name of the program for the Food Marketing Institute is SAFE; it is an acronym for something but that is the name of the program.

C. Gartner: There doesn't seem to be much disagreement between the Advisory Councils and such that HACCP is the way to go, but how do we convince the consumer that this program is in his best interest? This seems to be the problem we saw with discretionary inspection of processed meat in the past, and the consumer response just seemed to be overwhelming that they didn't want that, and that we were letting the fox guard the chicken house. Do you have any thoughts on that, how we are going to overcome that problem as far as the meat industry goes?

Wooden: Without getting too deep into discretionary inspection, I think there were problems with groups other than individual consumers. Consumer groups, Ellen Haas' group I know in Washington is pretty much behind the concept of HACCP. They see it as preventative and a step forward and the way USDA is approaching it, last week I heard Les Crawford in Washington stand up, and Kathy Adams did the same thing, and say there will not be one less inspector, there will not be one less hour spent in the plant under a HACCP program versus the current program. So there will be no lack of inspection, there will be no diminishing of inspection which there was with the discretionary inspection program, quite a difference. Rather what this will be is a more focused and directed kind of a program, they're going to get away from, we hope, the floors, walls and ceilings kind of a concept that they have operated on for so many years; by they, I mean the inspectors. When I went through training as a food and drug inspector almost 30 years ago, that is what they taught me, floors, walls and ceilings plus a few other things. Today it is a bit different and under a HACCP program it would be considerably different. Inspection is still there but it is more focused.

E. Reynolds: I have a question concerning the Pillsbury program. Within HACCP, does this include any of the economic adulterations or regulatory requirements that would not necessarily fit under what is considered a critical control point as you defined it, and if so, how do you deal with those?

Wooden: If any of you are going to be out at the IFT meeting in Anaheim next week, you can hear Bill Sperber

from our company talk about this in the QA session. The plan that we presently have in effect is a HACCP-based program that is called a Hazard Control Plan and we have it split into three distinct segments for management purposes. The first segment is HACCP, critical control points, food safety and it is all the stuff I was just talking about. The second part of that program deals with regulatory and economic hazards. These are hazards to Pillsbury, not to the consumer but to Pillsbury, and of course if they are a hazard to Pillsbury, then they are a hazard to the consumer as well, at least that is the way we view it. The third part of it is process control and that's basically the parameters of the process in terms of quality, statistical process control if you will. So we have a program, like a clover, split into 3 parts, managed independently all within the same boundary and same system; and for regulatory purposes, we've got the whole thing computerized. We've got a large part of it presently computerized; the rest very shortly will be in operational mode so we can pop out the stuff that will be important for food safety to a USDA inspector coming in to do that piece of his job. But he is not going to see the statistical process control part, he is not going to see

the economic hazards and that kind of thing.

G. Schmidt: I would just like to comment on the question about what benefits you see from these programs. Those companies that have gone from a minimal quality control program to a complete HACCP program, in the meat business, you see fewer product returns, fewer incidents of gassiness in product, longer shelf life in the processed product, you become a quality supplier of materials to your customer and all of a sudden you have an advantage over your competition and that is the real benefit of a well-run HACCP program, do you agree?

Wooden: I couldn't agree more. In terms of the raw meat, pork and beef, that we buy at Pillsbury for Totinos and Jeno's pizza, I wish we could get all of our boxed meat suppliers into a HACCP program, we would have far less buckshot, broken knife blades, carcass tag clips, those kinds of things setting off our metal detectors on our finished product in the pizza plants and getting our USDA IIC's all upset. Those people who do have one thing, metal detection, metal control in place in those operations are very much preferred by us.