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KOSOVO NEW OPPORTUNITIES FOR AGRICULTURE PROGRAM

FINAL REPORT ON TECHNICAL SUPPORT FOR MANUFACTURING OF ACIDIC FOODS

October 2013

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BACKGROUND

USAID supports economic growth in Kosovo through programs that strengthen and improve the competitiveness of Kosovo agribusinesses, improve the business environment, and encourage local economic development. Accordingly, USAID/Kosovo awarded Tetra Tech ARD the task order for the New Opportunities in Agriculture (NOA) in Kosovo Program.

The goal of the program is to increase economic growth in Kosovo through expanded, environmentally-sustainable production and sales of value-added agricultural products by enabling producers and processors to compete regionally and globally. The program has the following components:

1. Products and farmers linked with markets;
2. Agriculture products diversified and increased;
3. Food quality and safety improved;
4. Increased affordable and accessible credits; and
5. Improved coordination within the agriculture sector.

During the last few years the number and capacity of local fruit and vegetable processing companies in Kosovo has increased. Unfortunately these processing firms are facing difficulties in raw material supply, proper use of equipment and production of high quality products. Fruit and vegetable processing on a commercial scale in Kosovo is relatively new and processors need additional support in areas related to fruit processing techniques, proper use of equipment and development of new products. Taking this into consideration, there is a need for technical assistance to support local processors' development and to increase their competitiveness.

PURPOSE OF ASSIGNMENT

The main purpose of this activity was to provide on-the-job technical assistance to an existing fruit and vegetable processor in Kosovo. The processor targeted as the beneficiary of the technical support was Abi & Elif 19, located in Prizren.

The consultant was asked to provide the assisted fruit and vegetable processing company with the following:

- Recommendations regarding opportunities for the development of new products that can be produced using existing equipment.
- Expose vegetable processors to packaging samples from the US.
- Practical technical assistance on new types of products, including jams and pickled vegetables, and recipes in demand in the region (EU specifically).
- Comprehensive instructions for new pickling recipes.
- Recommendations for needed equipment and details on equipment specifications necessary to upgrade facilities based on new formulations and products.
- Recommendations for process improvement and recommendations for better organization of work force, standard operating procedures (SOP), labor needs for improved use of equipment and process procedures.
- Recommendations regarding testing and quality control facilities (improvements).
- Best options for the cost of ocean freight transportation from Kosovo to final northwest coast USA or Vancouver Canada destinations.

EXPECTED DELIVERABLES

- A summary report on the activities, results and recommendations of the technical assignment.
- Recommendations and a list of new activities where the assisted processing company should focus their efforts aimed at improved results and increased sales and jobs.
- Carry back product samples to present to US and North American buyers.

EXECUTIVE SUMMARY

Short-term technical advisor Richard Steinfeld was requested to assess the constraints faced by the processing company ABI & ELIF 19 (ABI) and provide hands-on technical assistance in new product development.

Mr. Steinfeld demonstrated best practices in product development techniques and procedures in exploring the possibility of value-added products of existing lines. These included pickles, peppers, tomato-based products and sauerkraut. The basic procedures, as demonstrated to the company, are universal for all high-acid products. Mr. Steinfeld provided instructions for and assisted ABI in the testing/implementation of new pickle recipes. Due to the limited amount of time allocated for the assignment, final evaluation of the experimented sample product could not take place until after Mr. Steinfeld's departure.

In addition to new product development, ABI's physical facilities, manufacturing practices and Quality Assurance capacities were assessed. Mr. Steinfeld also accompanied ABI owner, Irfan Fusha, to two food fairs in Pristina, and on a separate occasion accompanied Mike Kimes, NOA Chief Technical Officer to Denje to visit Rizona Manufacturing. Rizona is yet another company in Kosovo which manufactures pickles and peppers.

FIELD ACTIVITIES TO ACHIEVE PURPOSE

Mr. Richard Steinfeld was accompanied by NOA staff to the Headquarters of ABI in Prizren, Kosovo. There they met with Irfan Fusha, owner of ABI & ELIF 19, and Hartim Gashi, Supply Coordinator.

Mr. Steinfeld presented the following samples as examples of acidified foods in the US:

- Refrigerated Garlic Dill Pickle Spears
- Horseradish Sweet Chips
- Sliced Jalapenos
- Greek Pepperoncini
- Hot Banana Pepper Rings
- Mild Banana Pepper Rings
- Refrigerated Dill Pickle Chips
- Vlasic Long Sliced Dill Pickles, fresh pack
- Steinfeld's Fresh Pack Dill Pickles.
- Sweet Pickle Relish
- Whole Sweet Pickles
- Sauerkraut
- Refrigerated Spicy Dill Pickle Spears
- Nalley's Baby Dill Pickles

PRODUCT DEVELOPMENT

Mr. Steinfeld assisted ABI in preparing the below-detailed products.

<u>Winekraut/Sauerkraut</u>

Together, ABI and Mr. Steinfeld decided to make "Winekraut" without the wine, similar to products manufactured in Germany. Market cabbage was purchased and equipment was modified to chop the cabbage and prepare it for fermentation. The outer wrapper leaves of the cabbage were removed, and the cabbage was then cored and chopped. A mixture of 98.1% cabbage and 1.9% salt was hand blended and placed in a barrel. The cabbage mixture was compressed until the juice of the cabbage covered the particulates. A plastic bag filled with water was placed on top of the cabbage blend. The purpose of the water bag is to keep the surface of the cabbage under the brine and minimize the exposure of the product to air and airborne microorganisms.

The product is typically monitored in the barrel, and when 1.10-1.50% lactic acid is produced, the product is packed in containers and heat processed. This usually occurs within seven days after preparation. Because of the low salt level, the product is subject to rapid deterioration after seven days. The product should be packed no later than eight days after being introduced into the barrel.

Typically, fine salt is used for the process. Due to time constraints and availability, in this case, coarse salt was used instead. In addition, only market cabbage was available. Since market cabbage

has a significantly higher moisture content and higher chlorophyll content in the leaves, this created a "soupy cabbage/salt slurry," and the chlorophyll is expected to discolor during fermentation.

Figure 1: Rick Steinfeld preparing cabbage

The sauerkraut was placed in a barrel on Friday, Sept 27, 2013. On October 2, the sauerkraut was at 0.9% lactic acid and the salt was 1.1%. The lower-than-expected salt level indicated the plastic bag placed on the sauerkraut had leaked on top of the product. On October 3, the water bag was removed and the top 30 cm of product were removed from the barrel. The sauerkraut was tested again and a 1.2% lactic acid and 1.9% salt were the results. A crew was assembled and the ambient sauerkraut was placed in a jar, compressed until the liquid was observed at the top of the jar and sealed. The jars were heat pasteurized. The total pasteurization time, including holding and cooling, was 73 minutes. Because of time constraints regarding the experiment, no effort was made to determine adequate pasteurization time. This can be determined at a later time. The product was to be evaluated by the company the week of October 7.

The demonstration of "European Sauerkraut" was successful regarding the steps of fermentation. The purpose of the exercise was to demonstrate the procedures necessary to prepare cabbage for the manufacture of sauerkraut. It needs to be emphasized again that since market cabbage was used with coarse salt and cut on machinery not designed to shred cabbage, the cabbage overcooked in the pasteurizer. In spite of all the variables, a product was made demonstrating the principles of fermentation. Future consideration will include adding a flavor other than wine. White grape juice is a possibility.

If one is going to manufacture sauerkraut similar to that found in the US, a mixture of 2.5% salt and 97.5% kraut cabbage ratio should be used. The fermentation is monitored and the product can be manufactured after a minimum of 1.5% Lactic Acid is achieved. This fermentation time can take between three weeks to several months, depending on the initial temperature of the cabbage. If the sauerkraut is stored in the tank for a long period of time, lactic acid can exceed 2%. The fermentation ceases when the pH reaches approximately 3.2. This low pH environment is not conducive to microbial growth.

These basic rules apply to making sauerkraut. If you prepare a mixture that is less than 2% salt, there is a very good chance the wrong microorganisms will dominate and the sauerkraut will lose its texture. If the salt level is higher than 3%, another microorganism will turn the sauerkraut pink.

It is critical to monitor fermentation with pH, salt and acid titrations. Since it is the pH that determines the safety of the food, it is therefore the most important measurement. The acid in the fermentation is lactic, and should be measured accordingly.

When conventional sauerkraut is made, the brine is transferred to a holding tank and is modified with water to have the desired equilibrated percentages. The brine to liquid ratio in the finished product in glass is approximately 25-30% brine/solids.

If there is significant interest in the production of one of the products, commercial cabbage seed specifically for sauerkraut should be planted for further experimentation. Holland is the best source for these varieties. A shredder should be used for the cutting of the cabbage as well as a coring machine.

Fresh Pack Pickles

Mr. Steinfeld initiated experiments to create an opportunity to develop new flavor profiles of Fresh Pack Pickles. Fresh Pack Pickles are fresh cucumbers packed in a jar with salt, vinegar and water, which is then sealed and heat pasteurized.

Cucumbers were purchased at the local market, washed and placed in 720 gram jars. Different spices were added to ABI's basic brine formula to determine if any of the spices could be used to create a new product.

Figure 2: Cucumbers in various brine formulas

The following samples were prepared in the lab, with standard brine added and pasteurized per ABI's established formula and procedures. The quantity of spice per jar is noted. The spices used were fresh unless otherwise designated.

Dehydrated Chopped Sage	5 gms/jar
Fresh Crushed garlic	5 gms/jar
Dehydrated Chopped Oregano	2.5 gms/jar
Fresh Dill Weed (no stems)	3 gms/jar
Soaked Dehydrated Onions	10 gms/jar
Parsley	2.5 gms/jar
Soaked Crushed red Peppers	10 gms/jar
Control- No spices added	

Figure 3: Spice mixtures

The primary purpose of the experiment was to identify individual flavor characteristics that can be further evaluated to be used as value-added products. The levels of spice should allow the finished product to exhibit its characteristics in a pasteurized product.

A minimum of one week should elapse to allow the flavor components to equilibrate in the container. Sensory evaluation will determine the next step. Examples would be combining two or more components to make a new product, relying on one specific component or recreating the experiment with new flavors.

The secondary purpose of the experiment is to encourage the same procedure to be used for other products currently manufactured by ABI. This would include ketchup, tomato sauce, Ajvar and any other products.

Once potential products are identified, the products can be introduced to outside parties for additional input. This could include sensory evaluation in group marketing surveys, and ultimately introducing it to potential customers. Export customers could be presented with different flavor profiles. This could also stimulate discussion with potential customers to determine their interest in trying new spice combinations.

IDENTIFY MAJOR CONSTRAINTS WITHIN THE EXISTING PROCESSING PLANT

The existing facilities at ABI are in need of several modifications to comply with minimum standards for any food manufacturing plant. Management is in the process of building a new facility. However, management needs to implement changes in procedures (effective immediately) to assure Good Manufacturing Practices (GMPs) are in place prior to relocation.

Mr. Vladimir Kokarev, Short Term Technical Advisor, prepared an in-depth report regarding GMPs and HACCP titled "Food Safety Technical Advice for Local Processing Plants," which is being translated into Albanian. Mr. Steinfeld concurs with the recommendations put forth, and strongly urges ABI management to implement and comply with the proposed procedures before any additional investment is made by the company.

Procedures and guidelines must be established and enforced prior to the opening of the new facility. Windows need to be repaired, screens placed where appropriate, hairnets required, adequate sanitation practices, and all equipment cleaned after use.

TESTING AND QUALITY CONTROL FACILITIES

According to the Advisor's observations, the company's Technical Staff does not have adequate expertise and/or authority to manage or oversee the Quality Control/Assurance program.

The manufacture of jams, marmalade, tomato products, peppers and pickles are designated as high-acid foods. There is no procedure that was observed regarding the use of pH to assure product safety. There is no pH Meter in the lab. Current staff has access only to pH paper, which is not remotely accurate in regards to product safety. Steps need to be taken immediately to implement proper Quality Assurance tests are conducted on a timely basis.

The advisor recommends that a pH meter be acquired by ABI, and that the owner is required to take a training course on the importance of using a pH meter for the manufacture of high acid-based products. In addition, procedures should be implemented for checking drain weights on a regular basis if they are not in place. Fill ratios appear to be on the light side. Vacuums need to be taken and recorded.

During the assignment, ABI's work was primarily in tomatoes, Ajvar and ketchup. No pickles were being processed due to the time of the year at which the assignment took place.

PROCESS IMPROVEMENT REGARDING WORK FORCE AND STANDARD OPERATING PROCEDURES (SOPs)

The Advisor recommends bringing in an outside expert, and starting process improvement from the receiving end and work through the plant. Because of the low wages and expectations, work is at a very slow pace. Productivity standards are very low.

Raw products are scattered on the floor and workers are seated near the ground on makeshift apparatuses such as pallets. Cardboard is used as cushions. Windows are broken and without screens, and doors are left open exposed to the outside.

Employees need adequate facilities to wash their hands prior to entering all processing areas. Hairnets should be provided to all employees. Management must be held accountable so that all the procedures are in place and enforced.

There is a significant amount of discussion regarding a new facility for ABI. Steps must be implemented now to ensure new habits will be in place at the new facility. If they are not mandated, the new facility will rapidly become yet another facility that does not comply with quality standards.

The Technical Department needs training. Due to lack of expertise, the staff goes through the same rituals day after day, and they do not understand the principles of food processing and the consequences to the company if something is not done properly. There was no effort of the Professional Staff to participate during the Advisor's extended visit; interest was finally showed during the final day of a product cutting attended by Mr. Fusha. The same lack of participation can be said of manufacturing.

IDENTIFY PROCESSING EQUIPMENT AND PROCESSING CONTROL

The below is a list of equipment that should be acquired and actions that should be taken in order to improve quality control.

- Of utmost importance is the pH Meter. This piece of equipment needs to be purchased and used immediately. It needs to be a high-quality machine that can measure pH to two decimal places.
- Capper: all products should be sealed with a vacuum. No hand tightening.
- Material handling. Empty jars should be loaded onto the conveyor without the employees placing their hand inside the jar. Simple devices are available that will help in transferring the containers in a sanitary way.
- Wood should not be used in the plant. Boards are unacceptable devices to push product into various transfer points. These bottlenecks should be remedied with mechanical devices.
- Raw product coring and cleaning: tables and chairs in a clean environment should be provided in the prep areas of the operation. Dumping peppers on the concrete floor is unacceptable.
- Replace all broken windows, entry doors and install screens where appropriate.
- Remove peeling paint from the ceiling and walls.
- Hire a sanitation crew to clean the processing area after production. Excessive waste was observed day after day, and never cleaned.
- Clean the outside of the building. Offer the broken pallets to the employees for wood. It will save the company money, reduce potential contamination and help the employees. Remove all broken containers inside and outside the facility.
- Eliminate cardboard as cushions for the chairs. It is a source of contamination.

- Translate the USAID/Kosovo Paper titled Food Safety Technical Advice for Local Processing Plants, and review this with the owner and Supply Coordinator for immediate implementation. If GMPs are not enforced, then HACCP does not exist in any form.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE ACTIVITY

The number one priority must be product safety. All future grants and aid should have stipulations that Good Manufacturing Practices will be in place in order to qualify for assistance. All high-acid manufacturing processing plants should require that minimum pH standards are in place and adhered to in order to safeguard the consumer. Specific recommendations per focus area are provided below:

Quality Control

- ABI management should develop a manual regarding Quality Control Standards and Methods. All facilities should have a certified technologist on site during production to assure product safety.
- It is mandatory for processors who want to export to the major retail chains in the EU or USA to have GMP and HACCP. Many commercial customers are requiring third party inspections by approved vendors and are requiring that programs such as Safe Quality Food (SQF) be fully implemented.

Manufacturing

- Review the NOA Program document (described in the previous section) prepared by Mr. Vladimir Kokarev. Top Management has to demand that proper procedures and a clean safe environment will be enforced within a reasonable amount of time.
- Review current processing standards. Through experimentation, processing times could be significantly reduced to improve the quality of the product. Technical personnel should be used to oversee the process changes.
- Explore the possibility of blanching cucumbers prior to filling in a salt solution. This will assist filling the containers.
- Install metal detectors in all lines.
- Introduce piecework compensation for improving efficiency.
- Cover all chains on manufacturing equipment.
- Hire a sanitation crew and clean the area after the last shift every day.
- Require hair nets.
- Eliminate the use of wood wherever possible in the plant.
- Purchase equipment that assures all finished products have a vacuum.

New Product Development

- Continue to create value-added products using techniques presented during this visit.
- Explore the possibility of adding calcium chloride to the brine of pickles and peppers. Focus on the positive aspect of calcium in the diet, and promote it accordingly.
- Evaluate the US Products presented by the Advisor for new ideas for line extensions. Work with the NOA in sourcing new varieties (seed) of peppers and cabbage.

- Experiment with natural additives such as colors, oils and acids that will extend the shelf life of the finished product. Natural colors could include Annatto or Turmeric and artificial colors could include Tartrazine.
- Develop Nutritional Labeling that will comply with potential exporters' requirements.
- Source glass suppliers that meet export standards. Canada requires hard metrics under one liter. Examples are 500, 750 and 1 liter containers. The Advisor recommends contacting the local glass supplier to determine availability of jar sizes.
- Everyone in Kosovo that the Advisor had visited makes what is referred to as "Fresh Pack" Pickles where green cucumbers are placed in a salt/vinegar/spice solution and heat pasteurized. The pasteurization prevents fermentation by "commercially sterilizing" the pickles, and thus prevents microbial growth. Processors may want to consider diversification to include making fermented pickles. This includes, relishes, sweet and fermented dill pickles that are tank cured. This could be a potential future assignment with this or another company in Kosovo that might be interested in the following:
    - Fermented Pickles are fresh cucumbers that are placed in a salt brine and naturally fermented. A typical use of this product would be for hamburger chains such as McDonald's, Burger King, etc. The fermented products are removed from the vessels and processed into sweet or dill pickles. This method of preservation can be used for misshapen pickles, those which would otherwise be discarded, etc. Byproducts are pickle relishes, such as sweet, dill, hamburger style. By fermenting the cucumbers, a manufacturing plant can process pickles year-round basis.
    - Another type of pickle is designated as "Refrigerated." In the US an example would be "Claussen's". Cucumbers are placed in a container with acid/salt/flavorings and immediately refrigerated. This product is perishable and has a limited shelf life. It is the fastest growing market in the US and Canada. It is a premium product.

Outside Resources

There are several outside resources and excellent sources of information that might be of interest to the Program and to processors in Kosovo that can all be researched on line. These include:

- Pickle Packers International
- Visits to EU Manufacturers
- ANUGA

Acknowledgements

The following personnel were instrumental in the execution of the assignment. Particularly, Michael Kimes, Hartim Gashi and Inan Mahmuti made the assignment a success.

- Irfan Fusha, Owner of ABI&ELIF19
- Hartim Gashi, Supply Coordinator, ABI&ELIF19
- USAID
- Mark Wood, Chief of Party
- Michael Kimes, Chief Technical Officer
- Inan Mahmuti, Translator/Interpreter
- Fatan Nagavci, Value Chain Linkages Specialist

In closing, the Advisor firmly believes that ABI&ELIF19 is a major force in Kosovo, in the manufacturing of acidified foods. He thanks Mr. Irfan Fusha for the opportunity to visit his facilities and make recommendations on upgrading his facilities in order to better compete in the world market.

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