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POSTHARVEST INSTITUTE FOR PERISHABLES



NIS Potato Storage Project
in
Russia and Ukraine
August 1993

NIS Potato Storage Project

in Russia and Ukraine

Trip Report:

Identifying Causes of Potato Bruising

in Russia and Ukraine

prepared by:

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Cooperative Agreement No.: CCN-0006-A-00-3007-00

for:

USAID/NIS Task Force Office

Submitted by:

The Postharvest Institute for Perishables

University of Idaho

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ACKNOWLEDGMENTS

There were many individuals and organizations that were of great help in accomplishing the task of understanding the post harvest problems and losses in the Russia and Ukrainian potato industry. Because of the numbers involved, please refer to the **RUSSIAN CONTACTS** and **UKRAINIAN CONTACTS** at the end of the report and the comments. Without the cooperation and help of these organizations and individuals it would have been impossible to understand the problems in their respective countries.

I. EXECUTIVE SUMMARY

It has been estimated by U.S., Russian and Ukrainian experts that the postharvest loss in the potato industry is thirty percent (30%) to eighty percent (80%) in their respective countries. This trip focused on determining where the losses occur in the harvesting and handling process. The challenge was to link the harvest and handling in the potato industry together to establish responsibility for the problem losses because no one in the industry would accept responsibility. No one stepped up and said, "I have a problem". It was always someone else's fault. Everyone agreed there was a problem, but it was always the "other guy" who was the problem.

Potatoes are a very fragile commodity. If they are not handled carefully and gently, they will be bruised. A bruise on a potato generally breaks the skin on the tuber and allows bacteria or fungi to penetrate below the skin of the potato and then begin to multiply. This shows up as a discolored or decayed area. Often Russian housewives have to peel much of the potato away to remove defects caused by bacteria which have entered the potato via a bruise located on the tuber. It is this problem that initiates major postharvest losses in the potato industry in the NIS. Every step in the distribution process is subject to bruising potatoes. Reducing bruise is also the area that can show the quickest and greatest results with the least amount of capital expenses.

As a result of the trip, the following areas were identified as the points needing remedial action to correct postharvest food losses: poor soil preparation for planting to eliminate clods at harvest, low quality seed potatoes, inadequate insect control during the growing season, inadequate late blight control, no understanding of bruise prevention, poor design in potato equipment for harvest, hauling, piling, and storage (all need modification), a general lack of understanding on how to run and operate potato harvesters, pilers, and other equipment to reduce bruising, no understanding of tuber handling temperatures to reduce bruising, no humidity in storage, few working temperature controls, poor storage management, and inadequate potato removal procedures.

II. INTRODUCTION, METHODOLOGY, RESULTS AND DISCUSSION

A. Introduction

This trip was intended to specifically identify a major source of postharvest losses in the potato industry in Russia and the Ukraine. This was accomplished by in depth conversations with seed growers, commercial growers, directors and personnel employed by base storage units, VOCA personnel, AID personnel, farm organizations in Russia and Ukraine, government and parastatal organizations, visits to large "private collective" farms, market visits with home growers in the streets, private farmers and talking with others that have visited and studied the situation in the NIS.

Each of the individuals and groups that were contacted helped to clarify the problems. It became clear that there was a pattern of problems that was consistent throughout the NIS. This situation exists today because the central planning of the former government replicated their mistakes throughout the whole country. If a problem can be identified and corrected in one location, the results might be packaged into transferable solutions that could be introduced to other potato producing areas of the NIS.

Because bruising of potatoes is not generally understood, education is very important. With farmers, a show and tell program is very necessary. Also, if bruising can be identified on site at the time it actually happens with the individuals that are handling the potatoes, accountability will be established and postharvest losses may be reduced dramatically in the future.

B. Methodology

This consultant built on contacts from previous trips to Russia and Ukraine and contacts from friends and acquaintances who had developed relationships in the former NIS. Each contact was interviewed with questions that were derived from this consultant's experience in potato activities. By following the potatoes from seed purchase to delivery to the eating public, problems were identified at each step of the distribution channels. It was necessary to visit in a "hands on" way each step to appreciate the real problems because often the local individuals did not have a similar frame of reference to be able to intelligently discuss the various subjects.

C. Results and Discussion

The major source of postharvest potato loss in the NIS is a result of potatoes being bruised during the various handling operations from harvesting to eating. The main source of initial information concerning Russia was supplied

by Concern Roscar (Russian Potato Concern) which is located in Moscow. They have contacts in other areas of the NIS. It was interesting to quiz them and see their emphasis on technology and equipment. They have a strong feeling that the problem was poor equipment. They felt that if they could obtain "good" American equipment, that this would solve most of their problems. In evaluating the situation, I saw many potatoes being sold in the private markets sector that were perfect and without bruises or other problems. I could not understand why there were such large reported losses when the potatoes that I was seeing were of such good quality. As I dug deeper for more information, I found that most of the private sector farms had dug their potatoes by hand, while most of the larger collective farms used Russian or East German built combines which tended to bruise potatoes unless all conditions and operations are perfect. (Even then, I don't think the current design can be operated in a bruise free mode). Therefore, the big difference between the quality of the large farms and the small ones is the use of improperly run mechanical labor saving devices which add to the harvest losses.

The above situation is similar to the history of the potato industry in Idaho. In the late 1950's, mechanical potato harvesters were first introduced to the Idaho potato industry. There were many problems with bruised potatoes at this time with the new mechanical harvesters in comparison with hand harvested potatoes. Many growers said that they were never going to use these "new fangled bruise machines". In many ways their initial objections were correct. There was more bruising with the newly developed machines than with the hand harvesting method. It took several years and many improvements for the mechanical harvesters to come close to the low bruise levels of hand harvesting. There were dozens of different designs and each year there was another model that was introduced that was better than the last one. The driving force behind the shift in Idaho and the U.S.A. to mechanical harvesters was the rising cost of labor and the difficulties of actually obtaining labor to do the hand work. (This consultant was the last generation of Idaho school kids that worked with non-mechanical harvest during a two week "harvest vacation" in the fall each year.)

In the NIS, there is only one manufacturer of potato harvesters in the country. The fact that there is only one plant is typical of the former central control and planning type of economics practiced in the former Soviet Union. This potato harvester is not user-friendly. It is not efficient in terms of acres harvested per day. It is not efficient in terms of dirt elimination. It is built like a tank. (Tanks don't make good potato harvesters.) Tanks make good machines for bruising potatoes and so does the current harvester when operated without attempting to circumvent the bruise problem.

The emerging private farmer who has enough hectares to be an economical unit needs to farm more potatoes than he can harvest by hand. Therefore, the bruise problem resulting from mechanical harvesting in the NIS will be a problem for any private farmer that is enlarging his operation to achieve efficiencies of scale. If the farmer moves from low bruise hand harvesting to mechanical harvesting without adequate understanding of bruise problems, he could be out of business the first year if he uses a mechanical harvester such as is used in the NIS.

In discussing equipment with a number of farmers and their employees, I was shocked to hear them ask questions like, "Why do you keep talking about potatoes hitting potatoes as such a big deal?" They did not understand that potatoes on potatoes eliminates most bruises, while potatoes on metal creates them. Therefore, it is important to make sure the farmers understand the management basics of bruise control.

It is also important to identify at which points bruising takes place in order to be able to improve the situation. Problem areas that were identified are as follows:

1. Spring preparation of soil for planting: Soils with clay content produce clods if the soil is worked in the spring when it is too wet. Hard dirt clods then result in bruising of potatoes at harvest, in storage and in destorage. Many of the new private farmers are not aware of the problems of working ground when it is too wet. It is also important to have the prepared soil soft at least 5 cm. below the final seed placement depth. This reduces the possibility of clods at harvest time. This soft landing zone gives less rolling of the seed piece at planting time. (Rolling seed pieces result in uneven spacing of the plants.)
2. Tractor tires: In looking at the tractors used for pulling potato harvesters in the NIS it was obvious that there was a problem with the narrow potato rows and the wide tires on the tractors. The large tires bruise potatoes in the potato bed (soil) before the harvester can even dig them. Another problem is the actual width adjustment of the tires on the tractor axle. Tractors are shipped with a standard tire setting on the adjustable axle. The tires should be set to run in the center of the furrow which will protect the tubers as much as possible from the tire treads. Both the front and the rear axles need to be adjusted. If narrow tires are not available in the NIS, the "guess row" needs to be widened at planting time.

3. Planting depth of seed potatoes: it is important to plant at least four inches below the level in order to protect the tubers from sunlight and frost.
4. Digger blades: Digger blades determine how much dirt is going to be delivered to the chains of the harvester. These blades need to be adjusted to slide the potatoes on top of the chain and not into the chains.
5. Volume of soil carried by the harvester: The volume of soil being carried by the harvester is very important for cushioning the potatoes at each drop. It is ideal to carry dirt as far as possible and still not put any in the truck. The volume of potatoes being carried on the harvester chains also influences the required amount of soil.
6. Rubber padding: Every right angle needs rubber padding against the steel plates where potatoes can hit and bruise.
7. Drops: Every drop needs to be full of potatoes or dirt to eliminate distance and impact against hard surfaces. These drops need to be reduced as much as possible. This is a major problem at the AID supported storage sites in Ukraine and Russia. Each tuber has over thirty feet of drops to get to the potato pile in the storage building. This needs to be corrected.
8. Slope of receiving surface: The receiving surface should be sloped, if possible, so that the potatoes slow down in a rolling manner, rather than an abrupt stop. This reduces the spot impact on the potato.
9. Flighted conveyors: Conveyors or chains that have "flights" on them to carry tubers up inclines have a tendency to "flip" or "throw" tubers at the end of the incline. By leveling out the incline at the top or kinking the end so that the conveyor is actually letting the potatoes fall away from the flights, results in less bruising. All the farms, using mechanical equipment, and the base storage units have this problem.
10. Soft-belt principle: All drops on to a belt conveyor should have the metal support cut out from underneath the rubber belt at the point of impact. This gives a cushioned stop instead of an abrupt stop for the tubers. (This was a major problem at the USAID supported storage sites in Ukraine and in Russia.)
11. Chain speed: Every chain needs to be adjusted in terms of each other to keep them full of dirt and potatoes at normal digging speed.

12. Ground speed: The ground speed should always be faster than the km/hr. speed of the primary chain (the first chain in the harvester).
13. Revolutions per minute (RPM) of the tractor: If the harvester is PTO driven by the tractor, the RPMs need to be constantly adjusted as a function of changing soil, field, weather and tuber conditions.
14. Loading of trucks: The combine should never stop while harvesting except to turn around or change trucks. The standard practice in the NIS is to load the harvester and then stop; pull the truck under the harvester and unload the machine. Stop and go. Stop and go. This gives empty drops all through the harvester every time one unloads and starts again.
15. Unloading of trucks: The NIS use dump trucks to harvest potatoes. This can be a good method if managed correctly. The big danger is the initial drop on to the pilers. They need to stop the pilers when the truck is unloaded so that all the drops on the piler remain full. In some areas that were visited, the potatoes were treated like coal. Dump trucks unload the potatoes in the storage building and a front end loader then scoops up the potatoes and dumps them into the pile of stored potatoes.
16. Pilers in storage: All the drops need to have rubber padding placed on the metal striking surfaces to make the impact softer.
17. Tuber temperature: Potato bruising is inversely related to temperature. The higher the pulp temperature of potatoes, the lower the bruise danger. The general temperature in Russia seems to be adequate at harvest time. This could account for the fact that not all the potatoes are bruised, only a large percentage. But, when the potatoes are taken out of storage, the pulp temperature needs to be taken into account. If they try to handle the potatoes with mechanical equipment when the pulp temperatures are low, which is necessary for good long term storage, they will end up with bruised potatoes delivered to the consumer.
18. Humidity: The standard for good storage is 99 percent relative humidity. I did not see any humidifiers in any of the storages that I visited in the NIS. The relative humidity should range from 50 percent to 80 percent in these storages. I confirmed with Roscar that humidity was not added to storages in the NIS. Proper humidity is necessary for bruise healing at harvest time. Without good humidity the process of suberization (healing of nicks, cuts and bruises) on potatoes does not

take place without decay producing bacteria and fungi attacking other potatoes.

19. **Sorting equipment:** All the big farms that I visited had large sorting equipment sites. They were trying to sort and grade at harvest time. The potato is most vulnerable at this time. The equipment that is used for sorting at harvest time is not designed to reduce bruising of potatoes. Most of the equipment has drops of up to 10 feet. The total of all the drops that each potato experiences is over 25 feet before it is delivered to the storage building!
20. **Time of sorting:** Sorting should take place at least 30 days after the end of harvest. The apparent reason that this sorting takes place at harvest is to deliver potatoes to the state controlled base storage units. With this program, the central government could control the supply of food and plan to insure enough food for the state stores. Bruising was not a concern of the central planners. If the weather gets too cold for transport, central base storages would act as a supply for cities like Moscow so that they would not run out of food. In Idaho we have times when the weather shuts down all shipments of potatoes due to the cold temperatures. In the U.S., the transportation infrastructure allows other areas that are not experiencing severe weather to fill in the supply gaps that Idaho can't supply. In the NIS, the transportation infrastructure and marketing structure is not as flexible.
21. **Base storage units:** The large scale storage operations that receive produce and deliver to the stores in the cities have a serious problem with bruising potatoes shipped by producing farms. This is being addressed by the Postharvest Institute in a special training program that has been approved by USAID.

III. CULTURAL PRACTICES

A. Cultural Practices and Management

Every aspect of each handling operation of potatoes requires diligence in the attention to details if damage to the potatoes is to be kept to a minimum. The common denominator is the lack of understanding of "cause and effect" in the area of bruising potatoes. It was apparent in conversations with both Russian and Ukrainian farmers and potato specialists that they did not understand the cause of bruising, and some were not aware that this was the problem that resulted in storage losses.

When we talked about padding on steel surfaces and keeping hoppers and drops full of potatoes to reduce drop distances, it often appeared that they did not understand the principal of what was being presented to them. This situation was consistent throughout the NIS.

If the management practices in the NIS were used in Idaho, producers would have a high percentage of bruising in their potatoes.

B. Handling Temperature

A fact that became apparent in discussions throughout the NIS was that the land elevations of the potato producing areas are less than 1000 feet (300+ meters) above sea level. The elevations and the consistent day and night temperatures result in a much warmer pulp temperature during much of the harvest period than what is experienced in much of the potato growing areas of North America. This little recognized fact results in much less bruising in the NIS than what would have been experienced in Idaho under similar management and equipment.

In Idaho, which has an elevation of 4000-5000 feet above sea level, pulp temperatures are often 1-5 C. In the NIS, the temperatures at harvest time are generally in the 10-15 C. Because bruising is inversely related to temperature, such that bruising decrease as temperature increases, the NIS ignored bruising for years because they hand-harvested their potatoes. When harvest machinery was introduced to the NIS, the automatic checks and controls of a free market were not in place to lead to reduced bruising in the potato industry.

The interesting point is that there is not more bruising than what actually occurs. A significant factor here is that the tubers are generally small in size due to various reasons. But, this small size helps reduce bruising. For the farmers to grow larger potatoes for french fries, they will have to eliminate this major problem or experience marketing difficulties.

C. Equipment and Design Modifications

Because there was not an opportunity for competition to develop in the area of machinery production under the former Soviet Union's central planning system, companies have not had the opportunity to start equipment production that would lead to competition and improved equipment design.

At this time, this consultant has not had the opportunity to observe the potato harvesting machinery in operation. Nevertheless, it is obvious to the trained

eye what problems exist by examining poorly designed equipment that is not "potato friendly" and by asking questions on how they operate this machinery.

There was a constant response to our discussions in this area. The response was, "Can you come or can you send someone to teach us how to modify our equipment and operate it so we will not bruise our potatoes?"

The needed modifications apply to every area of operation from planting, seed handling, harvesting, piling, and storage.

D. Insect Control

There was very little emphasis or discussion on insect control. This whole area needs to be developed and understood by both the NIS and the U.S. advisors. The first step would be to identify the extent and severity of the problems.

In our meetings we did have extensive discussions on Colorado Potato Beetle because this insect's damage is so obvious and the insects are large and can be seen easily. In terms of virus vectors such as the Green Peach Aphid (*Mysus persica*), it seemed to be unknown as to the extent of the damage that these viruses cause to the potato industry. These problems may be in place but the aphids are very difficult to see by the untrained eye. Insect socks or nets for collecting insects seemed to be unknown to the Russian and Ukrainian potato industry. Thrip, one of the most destructive insects to potatoes, was not fully understood by the industry either.

E. Seed Potato Quality

The need for vector control in growing potatoes directly relates to the quality of seed potatoes that are available. It was reported that 90 percent plus of the seed potato stock in the NIS is infected by viruses. A large percentage of all the potatoes are grown without using certified seed potatoes. Those potatoes that are classified as certified seed are generally also infected with viruses. It appears that there has not been an effective program to keep seed sources virus-free. This would account for a yield reduction of 20-75 percent.

Sprouts were observed in seed storage in both Russia and Ukraine. It was apparent the seed vitality was very low due to poor storage conditions. The poor storage conditions were a result of fluctuating storage temperatures and humidity, too cold a temperature at times during storage and too warm a temperature during part of the storage period. Sprouts were very thin and spindly with multiple sprouts per tuber, just short of the "rooting stage" in storage. This is the sign of very old physiologically aged seed potatoes.

Seed potatoes of the physiological age that was seen in the NIS are not as resistant to drought, hail, frost, foliar diseases, and soil diseases. This quality of seed potatoes produce many more "daughter" tubers and die more quickly, resulting in many tubers of a smaller size and a lower total tonnage per hectare.

It is of great importance that USAID has made potato storage construction in Russia and the Ukraine a priority. One of the first USAID funded projects that will be completed in Russia and Ukraine are three demonstration potato storages.

F. Fungi Control

The irrigated desert areas of the northwestern part of the U.S. only have late blight in a few areas that have wet (or irrigated), cool weather. Early blight is much more of a problem in the growing areas in this region of the U.S. The late blight in the NIS is responsible for reduced vine growth during the summer growing period, but the biggest danger is storage loss from this disease. Recalling history, it was late blight that was responsible for the Irish potato famine during the 1800's.

It is not clear to this consultant how great a problem this disease is in the NIS. A visit during the growing season would give a better understanding of the vegetative problems. A detailed study during the removal of potatoes from storage would help give a perspective of the losses incurred as a result of this fungi.

G. Transportation

The most widely used method of potato transportation is the small dump truck. This is a low sided, steel, flat bottomed dump truck. In terms of initial bruising, this vehicle is not a problem. The loading of the vehicle is where bruising could occur if the drop off the boom of the harvester is not kept to a minimum. After loading of the truck, the potatoes are transported to the storage buildings. At this point, there is a large drop from the back of the truck onto the ground or into a piler's hopper. This drop is often 3-5 feet in distance. The tubers that drop to the bottom first will most likely be 100 percent bruised.

Therefore, it is important to remember that the problem is accumulative in terms of the number of bruises on individual potatoes and in terms of the numbers of individual tubers that have a bruise. Every time the potato experiences a drop, from the primary chain (the first chain) on the harvester

to the delivery of potatoes to the consumer, the potato is at risk of being bruised.

IV. RECOMMENDATIONS

It is recommended that one or more specialists be sent to Russia and Ukraine in a training program to modify local harvesting machinery and potato handling equipment by using parts and supplies brought from the U.S. as well as utilizing local items. (The U.S. parts would allow rapid changes, rather than searching the NIS for the needed small items during the training process.) The modifications would focus on bruise reduction changes. Most of the changes would involve structural modifications to specific locations mentioned in this report, addition of padding and person-controlled changes in harvest machinery operations.

It would be beneficial to take pictures of the modified changes for broad distribution in the NIS. It would also be beneficial to involve as many of the local farm mechanics and farmers in the change operation so that they could duplicate the modifications on their farms.

The presentation of the three postharvest bruise prevention videos (University of Idaho) would be of great help in presenting the general concepts of bruise reduction. (In Ukraine, we obtained a request to air the films on a weekly national farmer's TV show that is watched by most of the progressive farmers in the country. I would expect that the same thing could be done in Russia.)

Additionally, using catacohl, a chemical for quickly and visually enhancing fresh bruises to demonstrate how bruises are incurred and can be reduced or eliminated would be a dramatic and personal teaching tool.

By making changes at the farmer's location and then taking the machine to the field for harvest showing the reduction in bruising, we deliver knowledge to the farmer at a level that he can absorb and apply immediately. Farmers are responsive to "seeing and touching" animals, equipment, methods, technology and ideas. If one can show them it really works, they will immediately adopt the "concept" if they can afford it. In this case, 90 percent of the changes will be labor, cutting, welding, and grinding. The 5 percent in parts can be sourced with local items.

It would be natural to locate the initial training focus and machinery modifications with the farms that are involved in the USAID supported potato storage construction projects in Russia and Ukraine. This would give farmers exposure to both good state-of-the-art potato storage and potato equipment improvements at the same time.

If the changes are made in Russia first, then the lessons and learning could be transferred to the Ukraine immediately for the current harvest.

It would be important to have as many representatives as possible on site during the changes to obtain the maximum impact in reducing bruising. Two of the groups that would be good to have involved would be AKKOR and several from the Ministry of Agriculture.

The "Farm Russia" is about a twenty minute drive from the only Russian potato harvester manufacturer. It would be ideal to get the cooperation of the factory and use their equipment to make the actual changes in their shop. Much of the equipment necessary to make the changes in hand would be available. The other USAID storage farm site, "Farm Zalugi" is about a two hour drive to the Russian potato harvester factory and would not be a big operation to bring the combine from "Farm Zalugi" to the factory. Both farms have new harvesters purchased from this factory.

If the factory adapts bruise reducing changes to their current production, the improvements might be spread over other productions of the NIS. They would also be the ideal channel for spreading bruise reduction information all over the NIS via video training tapes to their customers, the farmers.

V. APPENDICES

A. Appendix I, Russian Contacts

Cathy Norris
PVO/Agricultural Advisor
USAID
American Embassy
Bolshoi Devistinsky 6
Moscow, Russia
Tele: 095-205-2846
Fax: 095-205-2813

Mrs. Norris demonstrated everything that anyone could desire in terms of a concerned facilitator of USAID programs. She was helpful, courteous, and quickly grasped the situations that were presented to her. She had a very good understanding of the economy and the political realities of Russia. Her spirit of cooperation and encouragement was very refreshing in a difficult environment.

Joe Leo
USAID, Moscow

Mr. Leo was more than generous with his time and advice. His invitation to lunch with him in the Embassy cafeteria was a special treat for Yuri Moiseev, President of Roscar.

Kenneth R. Rikard, P.E.
Chief Engineer
USAID
Moscow

Mr. Rikard was very helpful with some details that saved us time. His efforts speeded up our tasks and saved us at least three days. This unrequired effort and courtesy added to the cooperative flavor of the Moscow mission.

Yuri Moiseev
President, Concern Roscar
Tele:095-590-0383
095-590-3641
095-272-2071

Mr. Moiseev is President of the new business that is heading up the seed certification program in Russia. This business is receiving USAID farm storage in conjunction with Farm Zalugi and Farm Russia and the U.S. company, Global Steel.

Nadia Rodinor
Roscar, Moscow
Vice-President and assistant to Yuri Moiseev of Concern Roscar.

Yuri Krasnov
Farm Zalugi
Moscow home tele: 095-398-297

Mr. Krasnov is Director of Farm Zalugi which is one of the farm locations receiving USAID potato storage. Mr. Krasnov is one of the more progressive private farmers in all of Russia. Cathy Norris of USAID has visited his farm with Will Anderson. Mr. Krasnov has just purchased his first potato harvester. He is very interested in getting help to modify the new harvester and to solve the drop problem out of the back of the field trucks.

Stean Genin
Director
Farm Russia
Located south of Valdimir

Mr. Genin's operation is a joint-stock company. It has been privatized for about five years. It is one of the most successful large operations in Russia. He has a good relationship with the potato harvester company in that he just purchased five new machines from them. He offered to introduce us to them during our time together.

Pavel V. Fetisov
Vice-President
Reinbank
Russia, 125171, Moscow, 4 Voikovskiy Projezd 6
Tele: 1507618

Mr. Fetisov is the bank firm that is involved in supporting Concern Roscar. He does not speak English.

Ludmila Eliseeva
Potato Specialist
Concern Roscar
Tele:095-590-0383
095-590-3641
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Mrs. Eliseeva is a highly qualified potato specialist that knows the field well. She was always giving us extra information that was very helpful in understanding the problems.

Dr. Filippov
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107078, Moscow
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921-03-29
923-98-89
Fax: 7-095-924-37-79

Zahar Abramov
Director
Vita Nova Ltd
119332, t. Meschersky, Tverskaya St., 32
West Administration Region-3, Moscow
Tele: 095-435-4030

Mr. Abramov is operating a private company that is capable of producing "mini-tubers". He is working on the cutting edge of technology. Cathy Norris of USAID requested that I contact him. I spent extensive time with him going over all his research, ideas and equipment.

Irina Astrakan
Director
International Center for Development of Small Enterprises
Nory Arbat, 19
R. 471, 2nd Building of Humanities Faculties
Lomonosov Moscow State University
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Russia
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Mrs. Astrakhan has been of great help in advising Mr. Zahar Abramov in developing his business. Her operation may be funded by USAID.

Richard Shelby
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Mr. Selby was very impressive in terms of his spirit of cooperation and sharing information concerning the countries in which he was involved. He has a genuine desire to serve with the goal of making a difference in his area of influence.

Petr Soldatenkov
Vice-President
Elevatorspetsstroy
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Mr. Soldatenkov was very helpful in providing access to his people who were very knowledgeable of storage problems in Russian agriculture.

Lev Lysyi
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Mr. Nepomjaschy was helpful in discussing the overall problems in the agricultural field.

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Harvey F. Strothmann
VOCA Farmers Supply Specialist Volunteer
Suite 1075.50 F Street, N.W.
Washington, D.C. 20001
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Fax: 202-783-7204

This consultant met Mr. Strothmann in Moscow. He is a good contact for status of agricultural chemicals in NIS.

Roger Krug
Special Projects-Ag Services
Lamb-Weston, Inc.
2005 Saint Street
Richland, Washington 99352
509-375-5804
Mobile: 509-545-2508
Fax: 509-375-5819

Mr. Krug is consulting on a joint venture in southern Russia to farm and build a processing plant for McDonalds.

Marc D. Osofsky (American)
Deputy Director
Golden Valley Foods A/O
Suite 6017
American Business Center
Radisson Slavjanskaya Hotel
2 Berezhkovskaya Nab. Moscow, Russia 121059
Tele/Fax: 095-941-8883
Int.Tel/Fax: 358-156-610-229

Golden Valley is part of Lamb-Weston efforts. They are promoting various projects including pop corn.

Oleg Goussakov (Russian)
Deputy Director
Golden Valley Foods A/O
Suite 6017
American Business Center
Radisson Slavjanskaya Hotel
2 Berezhkovskaya Nab. Moscow, Russia 121059
Tele/Fax: 095-941-8883
Int.Tel/Fax: 358-156-610-229

Golden Valley is part of Lamb-Weston efforts. They are promoting various projects including pop corn.

Alexander B. Terekhov
International Secretary of Democratic Choice of Russia
Tele: 203-5723
Very active in pro-freedom, pro-free enterprise movement.

Vladimir Bashmachnikov
President
AKKOR (Russian Association of Farmers Enterprises and Agricultural Cooperative Societies)
3, Orlykov Pereulok
Moscow, 107802
Russia
Tele: 7-095-204-4027
204-4147
Fax: 7-095-208-5824

Mr. Bashmachnikov was very cooperative and signed a letter of agreement with PIP. He is an idea man. He is interested in doing projects that will actually lead to business or production. It appeared that he is open to suggestions for improvement in most areas of agriculture.

Constantine Mezentesu
Special Assistant to the President
AKKOR (Russian Association of Farmers Enterprises and Agricultural Cooperative Societies)
3, Orlykov Pereulok
Moscow, 107802
Russia
Tele: 7-095-204-4027
204-4147
Fax: 7-095-208-5824

Mr. Mezentesu was very cooperative with PIP. He is politically focused. He is very much a promoter of a free market system. (He is strongly anti-communist and very intense in this area.)

Victor Bashkirov
Director
Leningradskay Base Storage
Moscow, 127412
Korovinskoye shosse, 35
Tele: 484-40-60

Mr. Bashkirov operates a 17 hectare food cold storage distribution center in Moscow. I spent several days with him and his assistant gaining an understanding of the bruise problems associated with the potatoes that are delivered to the major food distribution centers. He promoted the necessity of new equipment. He provides perishable food supplies for about 65 million people.

Sergie Kravetz
General Director
Peasant Trade House Ltd.
7/8 Kotliakovskaia st.
Moscow 115201
Russia

Tele: 095-119-83-77
Fax: 095-110-05-97

Mr. Kravetz operates a private company in competition with AKKOR in terms of selling equipment to private farmers. He states that they take less commissions than AKKOR when they sell equipment. They have about 30 employees. They are very aggressive.

John Gordon
Strategic Russian Investments
10 B Esmond Rd.
Chiswick, London 241JQ
Tele: 081-747-3158
Fax: 081-747-3158

Mr. Gordon is from New Zealand. He is in Moscow working to set up food supermarkets by organizing the newly privatized state stores. He is working with about 12 stores. I met him through VOCA in Moscow.

Fikret Guseinov
Chairman of the Directors Board
Russian Agricultural Investment & Holding Company, Inc.
Urzhumskaya St., 5 Korpus 1
Moscow, 129343, Russia
Tele: 095-189-5922
Fax: 095-189-5985

Alexander Kargin
President
AK Computer Services, Co.
Tele: 7095-333-3612

Mr. Kargin was very helpful with some computer problems that I needed help with in Russia. Excellent source for help with communications in and out of Russia, i.e. E-Mail.

Georgy H. Maltsin, M.D.
Peoples Deputy of the Moscow Regional Council
3/26, Kirovsky Proyezd
Moscow, Russia
Tele: 925-5120
Fax: 975-2253

Mr. Maltsin is the head of the American section of the "Humanitarian Committee" for approving duty free imports of USAID materials into Russia. He was overworked, but very helpful.

Gary Miles
Telecommunication Director
BSD/EMKAH
117419, Moscow
5 Verkhne-Mikhailovsky Proezd, 16
Tele: 954-3201
Fax: 954-3201

Mr. Miles was helpful with information on joint-ventures in Russia. His company was such a venture. I met him traveling on the airplane.

B. Appendix II, Ukrainian Contacts

Terry McMahon
Director, AID Ukraine
Kiev, Ukraine
19th Floor
8/10 Kuibysheva str.
252023 Kiev, Ukraine
Tele: 044-220-5589
Very helpful and courteous.

Jim Osborne
AID Ukraine
Kiev, Ukraine
19th Floor
8/10 Kuibysheva str.
252023 Kiev, Ukraine
Tele: 044-220-5589

Amy Osborne
AID Ukraine
Kiev, Ukraine
19th Floor
8/10 Kuibysheva str.
252023 Kiev, Ukraine
Tele: 044-220-5589
Very creative individual with a good grasp of the country, even though she is new to the position.

Mikola Shkarban
President of Ukrainian Association of Farmers
Member of Parliament
10 Grushevskogo, Kiev
252001, Ukraine
Tele: 044-293-33-17
221-22-61
293-55-95
H411-82-38
Fax: 044-293-26-44

Mr. Shkarban is willing to cooperate in all areas. He spent one Saturday morning reviewing bruise films for use with their national TV program for farmers. He wants to cooperate with PIP in any way possible to train their private farmers.

Grigory Bondarenko
Advisor to the President
Ukrainian Association of Farmers
AID Ukraine
Kiev, Ukraine
19th Floor
8/10 Kuibysheva str.
252023 Kiev, Ukraine
Tele: 044-220-5589
H274-5684

Mr. Bondarenko provided the use of his video equipment to review the Postharvest Institute films on potato bruise prevention. He is open to working with programs to help private farmers. Working with "Informfermer" which is a beginning of a master list of private farmers in Ukraine.

Ivan Bebekh
Director
National Farmers Support Fund
Kiev, Ukraine
Tele: 293-1624
Fax: 228-7504

Mr. Bebekh met with this consultant. He was very interested in a training program that would involve his organization's regional directors. The Fund administers credits given to private farmers in Ukraine by the government via the Funds local administrators.

Marty Robinson
VOCA, Country Representative Ukraine
16, Blvd. T. Shevchenka, Room 101
Kiev, 252030, Ukraine
Tele: 044-224-3522
Fax/E. mail: 044-224-3522

Mr. Robinson is doing an impressive job in Ukraine. He has an excellent grasp of many areas of Ukraine. He was of great help in answering questions whose answers would have taken a long time to track down. The information that he provided on farms in Ukraine was invaluable.

Anatoly Kuchko
Director
Ukrainian Institute for Potato Research
Nemishaevo
Borodjanka dist.
255740 Kiev reg.
The Ukraine
Tele: 4-15-33
Fax: 04477-4-15-69

The Ukrainian Institute for Potato Research is the recipient of the USAID storage grant for state of the art potato storage being constructed in 1993.

Petro Overchuk
Head of Economics Laboratory
Ukrainian Institute for Potato Research
Nemishaevo
Borodjanka Dist.
255740 Kiev Reg.
The Ukraine
Tele: 4-15-33
Fax: 04477-4-15-69

The Ukrainian Institute for Potato Research is the recipient of the USAID storage grant for state of the art potato storage being constructed in 1993. This man is heading up the UIPR's construction of the USAID potato storage.

Igor Kholodylo
Manager
Ukrainian Institute for Potato Research
Chkalov Str. 22
Nemishaevo
Borodjanka Dist.
255740 Kiev Reg.
The Ukraine
Tele: 4-15-33
Fax: 04477-4-15-69

Mr. Kholodylo is the assistant to Mr. Kuchko, the Director. He is definitely the new generation of free market young men. The Ukrainian Institute for Potato Research is the receiver of the USAID storage grant for state of the art potato storage being constructed in 1993. He has never been a member of the Communist Party and has applied for a U.S. sponsored Cochran Fellowship Grant. His application was turned in to Jim Osborne, USAID.

Vasil S. Kutsenko
Deputy Director
Ukrainian Institute for Potato Research
Chkalov Str. 22
Nemishaevo
Borodjanka Dist.
255740 Kiev Reg.
The Ukraine
Tele: 4-15-60
Fax: 04477-4-15-42

Mr. Kutsenko is a knowledgeable potato specialist. Very much on the cutting edge in his thinking and understanding of seed potatoes.

Valerij Kononuchenko
Head of Technology Department
Ukrainian Institute for Potato Research
Chkalov Str. 22
Nemishaevo
Borodjanka Dist.
255740 Kiev Reg.
The Ukraine
Tele: 4-15-94
Fax: 04477-4-15-42

Mr. Kononuchenko is in charge of all the field equipment. He has a well stocked shop and plenty of equipment for farming. Unfortunately, much of the potato equipment promotes potato bruising. We spent a good deal of time with each other.

Boris Krasavec
Director
Kurortstroykomplex
Kiev, Ukraine
Tele: 2295227

Mr. Krasavec is handling the actual work in the construction as a subcontractor for UIPR's USAID potato storage.

Olexiy Sozinov
President
Ukrainian Academy of Agricultural Sciences
9, Suvorov str.,
252010, Kiev-10
Ukraine
Tele: 290-10-85
Fax: 044-226-32-84

Petro K. Kanincky
Deputy President of Ukrainian Academy of Agricultural Sciences
9, Suvorov str.,
252010, Kiev-10
Ukraine
Tele: 290-30-11
Fax: 044-226-33-46

Mykola N. Nagorny
Academician-Secretary of Mechanization Department
Ukrainian Academy of Agricultural Sciences
9, Suvorov str.,
252010, Kiev-10
Ukraine
Tele: 290-02-35
Fax: 044-290-42-55
Mr. Nagorny is interested in bringing in new technology for Ukraine.

Ivan V. Shabliy
Assistant President
Ukrainian Academy of Agricultural Sciences
9, Suvorov Str.,
252010, Kiev-10
Ukraine
Tele: 290-10-85
Fax: 044-226-32-84

Leonid Vlasenko
Office Manager
Ukrainian Academy of Agricultural Sciences
9, Suvorov Str.,
252010, Kiev-10
Ukraine
Tele: 290-10-85
Fax: 044-226-32-84
Tele: 291-22-44
HTele: 412-81-57

Mr. Vlasenko was very helpful in obtaining a multiple entry visa for this consultant. A visa was obtained in about one hour once the appropriate documents were ready.

Nikoly Gavriluk
Deputy Chief, Department of Elite Seed Production
Ukrainian Academy of Agricultural Sciences
9, Suvorov Str.,
252010, Kiev-10
Ukraine
Tele: 290-5964
HTele: 418-18-69
Mr. Gavriluk is a good contact for seed potatoes in the Ukraine.

Nikolai Grigorevich Pastushenko
Manager
Vigroseparator (a Zhitomir Manufacturing Plant)
Baranov St. #93
Zhitomir, Ukraine
Tele: 0412-331-948
(h)25-24-22
This company is capable of doing just about anything with metal. They have the shop equipment for all types of fabrication and construction.

Oleg Gusev
Reporter for largest business newspaper
Kiev, Ukraine
Tele: 2-90-60-00
Mr. Gusev published a story with pictures in the largest newspaper (2.5 million) in Ukraine on the PIP program with USAID in the Ukraine while this consultant was in the country.

Alexandre Rashkovsky
President
Ralex International Company
Kiev, Ukraine
Tele/Fax: 310-207-8349
Mr. Rashkovsky shared a taxi with this consultant in Kiev. His small company is in the import-export business and deals in food processing equipment.

Serghiy Shevchuk
Export Manager
83/2, Prospekt Peremogi.
Kiev, 252062
Ukraine

Tele: 044-443-69-18

Fax: 044-443-74-31

Mr. Shevchuk was kind enough to give this consultant an appointment to discuss his company. They are one of the most successful companies in Ukraine and manufacture backhoes. They have the ability to make anything out of metal, ie. potato pilers, combines, etc.

Kristan Mills
Investor Services Assistant
Overseas Private Investment Corporation
1100 New York Avenue, N.W.
Washington, D.C. 20527

Tele: 202-336-8604

Fax: 202-408-5145

Ms. Mills was kind to invite this consultant to the OPIC luncheon for the American delegation. The American Ambassador spoke at the luncheon.

Robert S. Marshall
Vice-President
Universal Transactions
300 Main Street
Cincinnati, Ohio 45202-4123, U.S.A.

Tele: 513-241-9000

Fax: 513-241-9886

Mr. Marshall is living in Kharkiv in northeastern Ukraine. He is one of the few American's living there. He is working on joint-ventures in the country.

Oleksiy P. Myhailychenko
President
The Ukrainian Chamber of Commerce and Industry
33, vul. Velyka Zhytomyrska,
Kyiv-25, 254655
Ukraine

Tele: 044-212-29-11

Fax: 044-212-33-53

Mr. Myhailychenko was kind enough to offer to locate appropriate joint venture partners for American companies that PIP brings to Ukraine who wish to do business in this country.

Volodymyr T. Lanoviy
Chairman of the Board
Market Reform Center
15, Prorizna St., Kiev
252034 Ukraine
Room 133
Tele: 044-229-49-66
Fax: 044-229-52-63

Mr. Lanoviy is in charge of and directly involved in the difficult task of privatizing the state owned companies for the Government of Ukraine. This consultant met with him and obtained an invitation to bring cooperative projects and joint-ventures to him for discussion and cooperation.

Sam Harrell
Chairman & Chief Executive
EDI International Inc
525 Carr Street
Cincinnati, Ohio 45203
U.S.A.

Mr. Harrell's company would like to build large grain elevators. He was asked about small storage for the private farmers in Ukraine. He only gets involved in large operations. I met him at the OPIC luncheon at the National Hotel in Kiev.

Rajesh Kumar Singh
United Phosphorus Ltd
113184, Moscow, Ozyerkovski Pereulok
House No. 4, Flat No. 29,
Tele: 7-095-233-05-76
Fax: 7-095-233-05-76/292-65-11

Mr. Singh works out of the Moscow office and headquarters in Bombay. This company is a supplier of insecticides, fumigants, fungicides, and antidefoliants. They are an Indian company. They sell in both Ukraine and Russia.

Brian McGregor
Deputy Director
U.S. Department of Agriculture
P.O. Box 96456, Rm. 4006-So.
Washington, D.C. 20090-6456
Tele: 202-69-1319

Involved in privatizing of base storages in Ukraine.

Paul Fuller
Director, Livestock & Seed Division
United States Department of Agriculture
Agricultural Marketing Service
Rm. 2092 South Bldg.
14th & Independence Ave. SW
Washington, D.C. 20250
Tele: 202-720-5705
Involved in privatizing of base storages in Ukraine.

Win Henderson
Grain farmer in dry farm area of Idaho
Farm Management Specialist
407 4th Avenue
Lewiston, Id. 83501
Tele: 208-743-9110
Mr. Henderson was with VOCA in Ukraine helping private farmers. He was a perfect match for the grain farmers. The grain growing areas in Idaho that he has experience with are identical to those in Ukraine. He says even the weeds are the same in both areas.

David Sweere
President
Sophia Transcon Industries, Ltd.
8 Staronavodnitskaya st. Suite 71
Kiev, 252015 Ukraine
Tele/Fax 044-294-60-52
Mr. Sweere is working with food oils products, truck beds and garbage canisters for Germany. He is doing about \$100,000 per month business in exports.



Left to right, Dr. Yury Moiseev, Pres. Russia Potato Concern, Stein Genin, Director of Farm Russia, Will Anderson, Postharvest Institute.



Left to right, Dr. Maurie Weise, University of Idaho/PIP, Will Anderson, Postharvest Institute, Dr. Robert Dwelle, University of Idaho/PIP, Slava, news reporter, Igor Kholodylo, Ukrainian Potato Institute.



Typical drop on a Russian potato harvester. Drop falls into "boom hopper" leading to truck. Note: metal slats where potatoes land. Drop is about 2.5-3.0 feet.



Typical base cold storage unit, Kiev, Ukraine.



Loading and unloading docks - base storage unit, Ukraine.



Vladimir churches - north of Farm Russia.



Road near Farm Russia and potato harvesting company.



Current potato storage at Farm Russia.



Typical drop in large potato operation at Farm Russia, Russia.



Processed vegetables at base storage unit, Moscow, Russia.



Typical freezing of coils in storage unit at base storage unit.