



U.S.-PAKISTAN PARTNERSHIP FOR AGRICULTURAL MARKET DEVELOPMENT

CELEBRATING FOUR YEARS OF IMPACT



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## INTRODUCTION

The U.S.-Pakistan Partnership for Agricultural Market Development (AMD), a United States Agency for International Development (USAID) funded project, aimed to improve the ability of Pakistan's commercial agriculture and livestock sectors to compete in international and national markets in the four target product lines; meat, high value and off-season vegetables, mango and citrus. AMD played catalytic role to generate private sector driven investments in the four target product lines by actively promoting cooperation and integration amongst the value chain actors and ancillary service providers. AMD developed implementation strategy, underpinned by a commercial and market driven approach with a focus on strengthening supply chain and increasing market access. AMD encouraged investments in the four target product lines through matching grants and technical assistance, and empowered stakeholders by developing synergies among them to accomplish together what they could not do alone. AMD supported upgrading and streamlining of supply chains, provided technical assistance to optimize profit margins, increased participation of women entrepreneurs, and ultimately help make Pakistani meat, high value and off-season vegetables, mango and citrus become more profitable and competitive.





## MESSAGE FROM THE COP

Agriculture occupies an important position in Pakistan's economy, and has enormous potential to become the engine for the country's economic growth. To support the transformation of the country's agriculture sector from subsistence to commercial operations, the United States Agency for International Development (USAID) initiated a four-year project titled "U.S.-Pakistan Partnership for Agricultural Market Development (AMD)" in 2015. The project was implemented by Cultivating New Frontiers in Agriculture (CNFA). AMD's objectives were to support the development of Pakistan's commercial agriculture sector through increased economic performance of focus enterprises to meet both international and domestic demand and requirements in the targeted product lines of livestock, high value and off-season vegetables (HVOSV), citrus, and mango. Through the mechanism of matching grants and technical assistance, AMD intended to strengthen the supply chains and increase market access of target product lines via the development of synergies that would allow stakeholders to accomplish together what they could not do alone.

Over the past four years, AMD successfully worked with several grantees and partners, employing the appropriate tools and strategies to build stakeholder capacities and industry-wide collaboration in target product lines. Key components of AMD's grant program were trainings and the provision of in-kind equipment, both of which imparted a sizeable increase in the skills, knowledge and productivity of project grantees. Over the years, AMD's support led to the upgrading and streamlining of target product lines, an increase in the participation of women entrepreneurs, and the overall optimization of profit margins, rendering Pakistan's livestock, HVOSV, mango and citrus sectors more competitive and profitable.

I am indebted to the AMD team and all partners we have collaborated with from the private, public and government sectors. The project would not have achieved such remarkable results without your support, and I would like to extend my sincere gratitude for your continued dedication to the project's mission. I believe AMD's efforts have triggered sustainable changes in Pakistan's commercial agriculture sector – such as introduction of new technologies and greater access for Pakistani produce to global market – and I look forward to watching these changes unfold in the coming years.

### **Nega T. Berecha**

Chief of Party  
AMD Project



# LIVESTOCK





# LIVESTOCK

Pakistan's major natural resources of arable land and water have enabled agriculture to become the mainstay of the country's economy, providing employment to over 42% of the labor force. The livestock sector contributes 11.6% to the Pakistan's GDP and accounts for 56.8% of the county's entire agriculture sector. Despite the scale and scope of livestock production within the country, Pakistan's meat exports to other countries are worth \$244 million in the global meat market of \$44 billion (TDAP<sup>1</sup>, 2018). A number of factors have led to low export volume, including lack of commercial backgrounding and feedlot fattening farms, a limited number of abattoirs equipped with proper machinery and equipment, improper control of foot and mouth disease (FMD) and - above all - absence of beef breeds capable of providing a higher feed conversion ratio (FCR).

In response to these competitive barriers, AMD designed initiatives for all the segments of the livestock sector, to be delivered through the provision of in-kind grants and technical assistance. The ultimate objective was to strengthen the meat supply chain of Pakistan and to improve market access. AMD supported a private sector semen distribution company to initiate a breed improvement program. Likewise, AMD provided support to 12 livestock farmers to upgrade their backgrounding and feedlot farms. These farms were equipped with silage and haymaking machinery, total mixed ration (TMR) wagons, feed mills, and other equipment. Such technology advancements helped farmers reduce their production costs by increasing the size of beef carcasses in a short time span. AMD also developed a feedstuff database in collaboration with the University of Veterinary and Animal Sciences Lahore to reduce the overall feed costs of livestock farms.

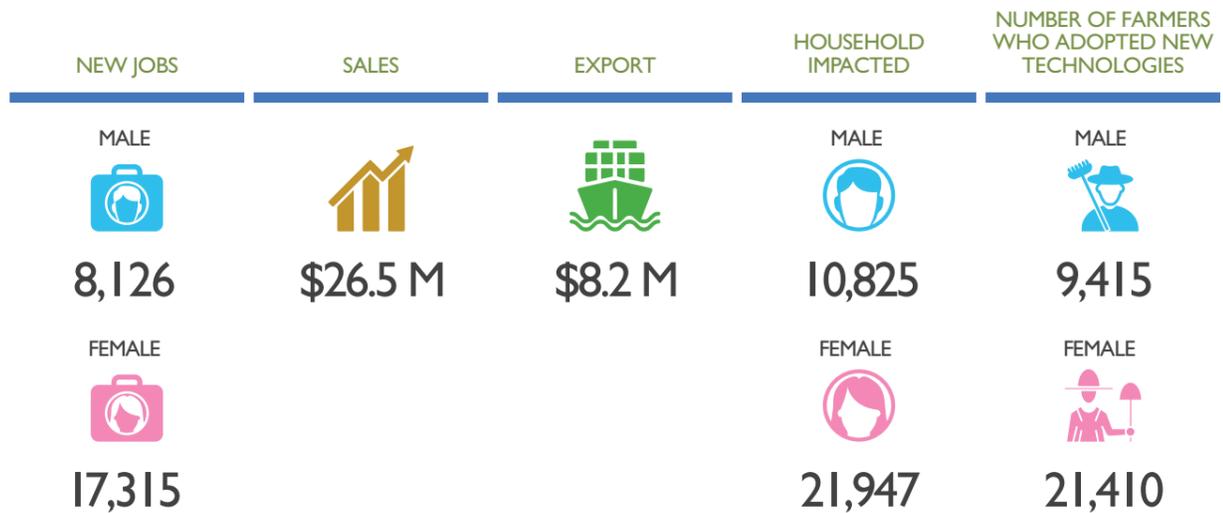
Since abattoirs are the export hubs of meat, AMD upgraded three of them with blast freezers and vacuum packaging machines to allow a wider range of products and entry into the frozen meat market. In addition, the project provided grantees with: 1) burger patty machines to promote value addition of meat, 2) traceability software to introduce animal traceability at farms and abattoirs, and 3) ration



balancing software. Technical assistance and trainings through local and international consultants also remained part of all interventions. A special training program was carried out for women livestock farmers and rural entrepreneurs interested in livestock farming.

As no strides could be made without the active involvement of stakeholders, AMD worked with relevant ministries of the Government of Pakistan to gain access to international markets like China, Russia, Indonesia, and other key Asian countries. The project also made concerted efforts to improve Pakistan's ranking in the Progress Control Pathways (PCP) from stage 2 to stage 3, thus allowing meat exporters to access markets which had previously not imported Pakistani meat due to potential foot and mouth disease contamination. AMD successfully developed the dossier required of Pakistan for this purpose by the World Organization for Animal Health (OIE).

Marketing support remained an integral part of AMD's initiatives, with the project supporting meat exporters to participate in several international food fairs/exhibitions and interact with leading buyers of importing countries to explore new avenues in the international market. AMD has successfully completed its envisioned initiatives, including introducing new technology and advanced practices in Pakistan's livestock sector. AMD has initiated a chain reaction in the Pakistan's livestock sector which has already started yielding results in the form of increased meat exports, growing livestock farms in the country, expanding private sector investment, new employment generation, and better profits for livestock farmers.



<sup>1</sup> Trade and Development Authority of Pakistan (TDAP)

## FARYAL HAYAT THAL FARMS

Faryal Hayat is an entrepreneur and owner of Thal Farms in Khushab, Punjab. Her dedication and hard work have helped her break barriers and establish her own livestock backgrounding business. Faryal's journey began when she was looking to make productive use of ancestral land that she owned, which was otherwise difficult and costly to maintain.



“Although this land had been lying idle for years, I was always determined to put it to good use so that the nearby community could also benefit from it. While searching for business ideas, I learnt about the U.S.-Pakistan Partnership for Agricultural Market Development (AMD) project in 2015. At the time they were organizing sessions on the concept of backgrounding – some of which were conducted by experts from abroad.” said Faryal.

Backgrounding, which forms a critical part of the beef supply chain, is the practice of raising calves from weaning to a weight suitable for entry in the feedlot. This was a relatively new concept in Pakistan and therefore quite risky for any new investor. Faryal, a housewife with no prior farming experience, attended AMD's sessions and found herself instantly attracted to the idea.

“The sessions were very informative and the business idea itself seemed to have a lot of potential. I then approached USAID-AMD and worked together with them to draft a complete feasibility assessment for the development of my farm. That paved the way for me to set up a small-scale livestock farm with 50 animals.”

Soon after setting up Thal Farms, Faryal applied for and was selected as a USAID-AMD backgrounding grantee. As a result, her farm received grant equipment such as maize choppers, forage harvesters, hand-driven fodder cutter, TMR wagon, hydraulic trolley and feed mill. She also received trainings on various aspects of backgrounding such as selection, procurement and health management.

“The combination of trainings and machinery grants had a strong impact on my business in terms of better farm management and improved efficiency. The visits from international consultants were particularly helpful in addressing issues specific to our farm. In addition, USAID-AMD linked my business with feedlots and processors through regular stakeholder meetings and these meetings gave me a better understanding of the market mechanism and the requirements of the processors and feedlot owners.” said Faryal.

With USAID-AMD's support, Faryal initially increased her farm's capacity to 100 animals and is currently constructing sheds to increase it further to 200 animals. It takes calves up to 90 days on a strict nutrition plan to reach the desired weight before being sold to feedlots.

Faryal has also set out to help the local community, especially by empowering women.

“In line with my vision to help the community at large is ensuring 10-15% of all animals on my farm are purchased from women in nearby villages. This encourages them and provides much needed financial benefits. Women are also employed on the farm itself as caretakers, which allows them to earn a reasonable income.”





## MOHAMMAD IQBAL KHAN BALOCH BALOCH FEEDLOT

Mohammad Iqbal Khan Baloch from Lodhran, a district in South Punjab, has been in the livestock business for over 14 years. Initially Iqbal was only aware of traditional methods of rearing and maintaining his farm; his income at that time barely fulfilled his necessities.

When Iqbal learned about AMD's efforts to address the needs of Pakistani farmers to boost their potential for both domestic and international markets, he decided to attend the training sessions to see for himself. He was impressed by AMD's initiatives for the livestock sector and how each of them was addressing challenges in the overall supply chain.

Soon after Iqbal applied for an AMD grant – which included equipment on a cost-sharing basis, trainings and technical assistance.



**“I never imagined that out there today exist such farms with modern mechanizations. To me there was only one way of doing things, the traditional way passed on by my forefathers. I was extremely pleased when I received confirmation of being accepted as an AMD grantee. It gave me the added motivation to transform my farm along modern lines – and unearth its untapped potential,”** Iqbal said.

AMD worked to address Pakistan's lack of competitiveness in export markets due to issues of inconsistent supply and poor quality. AMD successfully targeted interventions along the entire beef value chain, delivering training and in-kind equipment to 12 grantees through the medium of cost-share matching grants. Part of these efforts focused on the development of beef finishing farms (feedlots), aimed to decrease the age and increase the size of Pakistani beef carcasses.

Four years later, and with AMD's support and technical assistance, Iqbal now has around 1200 animals on his farm compared to the 250 he began with. He is now selling animals to commercial processors, whereas previously he used to sell off his livestock in local markets at a low price.

**“AMD's trainings motivated me to push myself beyond my limits and made me think out of the box. I am grateful that the project guided me about how to maintain my feedlot, to purchase farm animals, prepare their diet and also helped create market linkages. If it wasn't for AMD I'd still be following conventional methods”** said Iqbal.

Baloch dairy received a range of equipment for the cultivation, harvesting and preservation of silage and hay, and the milling, mixing, ration-balancing, and delivery of feed – which have had a significant impact on streamlining and making farm operations more efficient.

In addition, AMD also provided feedlot grantees with herd management and traceability, and ration-balancing software programs. Traceability of livestock is becoming a crucial requirement to access global markets. Traceability systems provide accurate information about the origin of the animal and movement of the carcass through various stages of production, processing and distribution. It is also an important tool to prevent the spread of animal diseases and enhance overall biosecurity. The ration balancing software will help feedlot farmers reduce feed cost through formulating economical rations for feedlots. The software helps optimize nutrients in feed at the lowest possible cost.

**“Guidance from AMD helped transform my business. I now try to share my experience and knowledge with other farmers in my vicinity, who are very keen to learn about the new technology. I guide them and train them to help create awareness,”** Iqbal added.

Iqbal is now in business with exporters from Karachi and Lahore and is getting a good price for his livestock with increased profit margins.

AMD also provided trainings to local women on the weaning of calves and preparing them for backgrounding in order to earn a respectable livelihood by linking them to livestock buyers as well.

## ABDUL HANNAN TAZIJ MEAT & FOODS

Hannan - Managing Director of Tazij Meat and Foods - has been in the meat export business for nearly two decades. His vision and hard work helped develop Tazij Meat and Foods into a state-of-the-art abattoir in 2009, and soon after he began exporting halal meat to markets in the Middle East such as Saudi Arabia, Qatar, Muscat, Bahrain, and Dubai.



It was only after Abdul entered the meat export market, especially in the GCC region, that he understood why Pakistani exporters were not getting higher returns. The reasons, according to Abdul, included a lack of knowledge about international standards among suppliers, and a lack of knowledge about how to increase shelf life and premium meat cuts.

According to Abdul, “Our first challenge was to understand the requirements of the international market when it comes to premium quality meat. Suppliers were used to conventional meat cuts and were accustomed to their names in Urdu and Punjabi. International markets demanded premium cuts, higher quality meat and better packaging which I felt was something we needed to work on.”

As he searched for solutions to these challenges, Abdul learned about USAID-AMDs work in the livestock sector – especially in meat value addition. He applied and was selected by AMD to receive a cost-sharing grant. This was Abdul's first step towards developing his abattoir along international standards. His business received support from AMD in the form of trainings, technical assistance and grant equipment items (i.e. a vacuum packing machine, blast chiller and meat traceability software). Slaughterhouse workers were provided with trainings on basic hygiene, special butchery cuts and capacity building.

AMD has worked to enhance the capacity of three private sector meat processors and exporters - including Tazij Meats and Foods - to produce meat cuts and value-added products by improving the shelf-life, reducing freight charges through making sea shipments viable, and supporting innovations such as vacuum packaging.

The introduction of vacuum-packed and refrigerated beef cuts to the portfolio of Tazij Meats and Foods will help the company command a premium price for its exports. The enhanced quality and shelf-life of the product made possible by vacuum packaging will also make it easier to manage the supply chain while targeting retail outlets in the GCC region.

“The Vacuum Packing Machine solved one of our main problems in the export market. It helped increase the shelf life of meat from 3 days to 30 days, which helped us export fresh meat around the world – and that too by sea, therefore cutting our transportation costs as well. The traceability software, being used for the first time in Pakistan, is also a significant addition to our business. Global markets have quite stringent requirements in this regard, so we're very pleased to have this software available.”

“There's still a long way to go but I'm happy that we're on the track to progress. USAID-AMDs efforts to support the meat export industry are commendable. AMD's biggest contribution is the development of backgrounding and feedlot farms, which was critical for the livestock sector because this is where the animals are raised. If the basic stage of meat production is brought up to the required standards, everyone involved along the supply chain will benefit eventually. It is important for local farmers to be financially sustainable, so they can raise a better product – it's a win-win situation for everyone” said Abdul Hannan.

In March 2019, Tazij Meats and Foods successfully sent the first vacuum-packed beef shipment from Pakistan via sea to Qatar. This is the first time that a local producer has managed to export vacuum packed meat in this manner.

According to Abdul, “It was a truly great moment sending the first vacuum packed meat shipment to Qatar. Government officials and other stakeholders present at the inauguration ceremony were impressed with AMD's efforts. I am certain these efforts will open up a new era for Pakistan's meat sector.”



A close-up photograph of several green vegetable leaves, likely from a leafy green vegetable like kale or collard greens. The leaves are vibrant green with prominent, light-colored veins. Small, clear water droplets are scattered across the surface of the leaves, particularly on the right side. A thin, vertical white line runs down the center of the image, dividing it into two halves. The background is dark and out of focus.

**HIGH VALUE &  
OFF SEASON  
VEGETABLES**



# HVOSV

## HIGH VALUE & OFF-SEASON VEGETABLES

Pakistan is blessed with diverse agro-climatic conditions, soil types, rainfall levels and temperatures suitable for year-round cultivation of vegetables. These factors have provided Pakistan with a comparative advantage over countries with less favourable conditions for agricultural production and immense potential for vegetable export. Pakistan's high value and off-season vegetable (HVOSV) sector also produces vegetables in open fields and under controlled conditions. Despite such favourable conditions and diverse production means, Pakistan's HVOSV sector has continued to struggle with low yields, poor quality produce, high losses during and after harvest, and non-compliance with sanitary and phyto-sanitary (SPS) requirements of major export markets.

Global vegetable production and trade is experiencing an upward trend due to improved means of long-distance shipping and changes in consumer preferences. Unfortunately, Pakistan has not adequately responded to changes in global demand for vegetables, failing to develop a supply chain that could ensure consistent, high-volume and competitively priced produce that meets global quality and food safety standards. As a result, less than 13% of the country's total vegetable production is being exported.

To address this challenge, AMD launched several initiatives to strengthen Pakistan's HVOSV supply chain and increase market access. Specifically, AMD: 1) developed an end-to-end cold chain for vegetables to increase shelf-life and reduce post-harvest losses, 2) initiated and strengthened contract farming to connect small- and medium-sized farmers with exporters to facilitate premium prices for the improved quality of their vegetables, 3) trained farmers on good agricultural practices, and 4) increased the supply of high-yielding certified seed. The project also worked on vegetable value addition by setting up two chili oleoresin plants to meet domestic demand and build export potential. Such value addition was also anticipated to reduce post-harvest losses of chili primarily caused by aflatoxin.



To increase market access of Pakistan's vegetables, AMD successfully linked exporters with international buyers by facilitating participation in national and international exhibitions, conducting a trial sea shipment of HVOSV products to Dubai to reduce transportation costs, and supporting setting up the country's first E-Beam food irradiation facility. All these efforts have ultimately translated into larger exports for Pakistan, along with enhanced competitiveness, and higher rates of employment generation and greater profits for farmers.



## SARFARAZ ABBASI

# ABBASID AGRI FARM

Sarfraz Abbasi, a business graduate with a vision for the future, set up Abbasid Agri Farms in 2004 to grow English vegetables such as Iceberg lettuce, cucumber, broccoli, celery, leeks, and capsicum. Sarfraz started his business on a small scale but was always dreaming big. His keen interest in innovative farming techniques and readiness to experiment meant that he was able to grow more varieties of vegetables over the years.



**“I knew I couldn’t grow each variety all year-round – unless I could find or replicate certain climatic conditions. That motivated me to reach out and work with contractual farmers in areas across northern Pakistan where the summers aren’t as harsh and therefore conducive to growing certain vegetables year-round. During the winters I would shift my geographical focus. It took me over a year to produce good quality iceberg lettuce, which is currently our signature crop”** said Sarfraz.

During this time, Sarfraz began working to acquire certification in Global Good Agricultural Practices (GAP), following demand by international fast food chains such as McDonalds and KFC. With Sarfraz at the helm passionately driving things forward at Abbasid Agri Farms, certifications were quickly achieved. This meant that he could now supply vegetables to McDonalds and KFC restaurants in Pakistan, which was a significant step up for his business. However, he realized that he would need better equipment and capacity building of staff for sustained growth. It was around this time that Sarfraz learned about the U.S.-PAKISTAN Partnership for Agricultural Market Development (AMD).

**“I applied for a grant with AMD because of challenges I was facing in certain areas of the business. Post-harvest losses were high and farm efficiency wasn’t at the level it could have been. I was lucky enough to be selected.”** - Sarfraz Abbasi

AMD provided Abbasid Agri Farms with grant items including a blast chiller, reefer van, packhouse, and humidifier – all on a cost-share basis. The reefer van and blast chiller helped lower the temperature of the produce immediately after harvest, while the humidifier created the perfect environment to store produce in the cold storage to ensure freshness. Additionally, AMD provided trainings for workers and neighboring farmers on post-harvest, tunnel farming, shrink wrapping and vacuum packing. Because of all this support, Abbasid Farms was able to reduce wastage, increase shelf-life of produce and preserve the nutritional value of products for consumers by maintaining a continuous cold chain.

AMD’s support also helped Sarfraz improve the skills and knowledge of staff and generate employment. Both profits and the induction of female workers into the workforce increased by approximately 20-30 percent. Sarfraz is now building on this newly acquired knowledge to adopt techniques such as vacuum packing, which could increase shelf life of produce by up to 10 times.

As Sarfraz puts it: **“In the absence of AMD’s support, it would have taken my business at least another 5 years to reach the stage it is at today. We are now supplying to some of the largest fast food chains in the country – which has resulted in increased income not only for the business but also for associated contract farmers and workers.”**





## SIDDIQUE MISRI OLEORESIN EXTRACTION UNIT

The global market for oleoresin is increasing rapidly due to the relative ease with which this category of products can be handled, transported and meet food safety requirements. Additionally, oleoresin has diverse applications in food, pharmaceutical and other products. Chili oleoresins are widely used for their color and pungency characteristics in a variety of products, especially in food.

Sindh and Punjab are the major chili producing areas of Pakistan. However, chili production in Pakistan has been negatively impacted over the past five years, with some estimates showing a reduction in production of over 50%. A major source of post-harvest chili loss has been due to aflatoxin infestations. One solution to this issue is higher reliance on oleoresin extraction. Oleoresin is extracted from fresh chilies just after harvest a method which – as opposed to open air drying - reduces the chances of aflatoxin infection while standardizing the product. Chili oleoresins are a highly desired substitute for powdered products in both national and international markets.



To tackle the challenge of carcinogenic aflatoxins present in chilies and other horticultural products being produced in Pakistan, AMD mobilized private sector investment in setting up a chili oleoresin business as a value-added product line. The effort was expected to render Pakistan's chili sector more competitive in international markets through diversifying the overall product line and reducing losses during post-harvest handling, transportation and processing.

“Pakistan was previously importing oleoresin from other countries but now the country has become self-sufficient and will export rather than import oleoresin. The global oleoresin industry is worth \$2 billion and is expanding, so this oleoresin plant will help save foreign exchange and allow Pakistan to meet its domestic as well as international requirements.” - Siddique Misri, Chief Executive Officer at Zaiqa Foods.

Major food processing companies operating in Pakistan are currently importing oleoresins from other countries. The situation is being reversed with AMD's support. Private sector partners such as Zaiqa Foods, which launched the first oleoresin plant in Pakistan.

“With the help of Oleoresin technology, we will be able to better utilize our dandicut variety of chili which is popular globally due its strong aroma and unique taste. This will open up the U.S. and European markets for Pakistan as well.” - Siddique Misri, Chief Executive Officer at Zaiqa Foods.

## SHAKIB ARIF CHILI CONTRACT FARMERS

Due to an increasing number of small farms in Pakistan, the country is facing productivity issues associated with higher costs, low productivity and market fluctuations. To overcome these issues, farmers are engaging in informal contract farming, whereby agricultural production is carried out through an agreement between an exporter or processor (buyer) and a farmer.

Unfortunately, such agreements are not executed as formal or written contracts and cannot enforce standards like periodic assessments of crop quality and volume. As a result, during the growing season exporters are unsure of the exact volume and quality of produce available at any given time. In turn, exporters are unable to provide international buyers with assurance of produce quality and volume. In addition to these issues, informal contracts often involve a middleman connecting the farmer to the exporter. Due to prices associated with logistics and commissions, this arrangement reduces the profitability of the transaction.

To overcome the lack of confidence and farmer protection created by this longstanding, informal business model, and to increase the profitability of this transaction, the U.S.-Pakistan Partnership for Agricultural Market Development (AMD) promoted formal contracts between the exporters and farmers. In addition to enhanced legal and financial protection, these contracts included a technology transfer component.

In April 2018, as a first step towards developing this formal contract model, after consulting with relevant stakeholders AMD successfully developed a contractual agreement between National Foods Ltd and Mian Muhammad Saleem, a leading chili grower. On June 27, 2018, AMD also facilitated the signing of similar agreements between Shaan Foods Ltd. and with two chili farmers. Through this formal contract, processors were expected to provide farmers with a premium price of up to PKR 1,000 per 40kg of quality chilies. Farmers, in turn, were expected to adopt good agricultural practices to ensure a consistent quantity and quality of chilies in the market. Furthermore, as part of the technology transfer component of these contracts, AMD developed documents defining grade specifications of chilies, pricing mechanisms (based on grades), and good practices in production, handling, distribution, and storage.

**According to Shakib Arif, Chief Operating Officer of National Foods Ltd: “The development of a standard Contract Agreement, Quality Grades and Pricing Mechanism has developed a formal structure for business relationships between processors and producers which will help improve the quality and yield of chili produce.”**

The promotion of formal contractual agreements and good agricultural practices in Pakistan is expected to improve the yield and quality of chilies. Such agreements in the chili, high value off-season vegetables (HVOSV) and citrus industries will provide greater financial security to farmers by ensuring competitive prices on a consistent basis. AMD is confident that the success of formal contract agreements will compel other growers and exporters to engage in similar arrangements throughout the horticultural sector.



## CHAUDHRY RIAZ PAKISTAN'S FIRST E-BEAM FACILITY

The U.S.-Pakistan Partnership for Agricultural Market Development (AMD) supported the establishment of Pakistan's first Electron-beam (E-beam) Irradiation facility at Port Qasim in Karachi with its private sector partner Pak Electron Beam Irradiation Pvt Ltd.

The plant conforms to all international standards and became operational in April 2019 for commercial irradiation with adequate processing capacity to cater to the needs of the food and pharma industries.

The facility will benefit a cross-section of industries in Pakistan, including the agriculture sector, by decreasing post-harvest food losses due to spoilage and deterioration in quality, while increasing market access by extending the shelf-life of foods.

The U.S. Food and Drug Administration (FDA) has approved e-beam irradiation for food products, including fruits, vegetables, spices, and meat. The FDA has approved this technology because it does not affect the nutritional value of the food or leave radioactive traces.

The result of the e-beam irradiation process is similar to conventional pasteurization and is often called "cold pasteurization" or "irradiation pasteurization." Like pasteurization, irradiation kills bacteria and other pathogens (that could otherwise result in spoilage or food poisoning) without destabilizing the natural properties or maturation of the product. The e-beam process kills larva and sterilizes pests - including the notorious fruit fly - without damaging the product or the integrity of the fruit. Current measures to guard against the transportation of the fruit fly require invasive treatment of the fruit through extended submersion in high-temperature water.

The technology holds the potential to open new export markets for Pakistan while preserving the storage capacity of food products. Furthermore, this technology could also increase food security by holding stocks safely for extended periods - including cereals, pulses, onion, and potato.

Based on a 60% utilization rate of the e-beam facility, it is expected that revenues will be generated to the tune of approximately USD 3M during the first year, with ancillary benefits throughout the supply chain in various sectors including agriculture, food processing, medical/ surgical, and industrial products.

AMD conducted awareness workshops in Islamabad and Karachi headed by Ronald Eustice, an international e-beam and food safety technical expert. Participants included leading processors and exporters of cereals, pulses, spices, fruits, vegetables, and meats, along with other sector stakeholders. The workshops provided an opportunity for Pakistan's food and pharmaceutical sectors, along with relevant governmental authorities, to learn about e-beam irradiation technology and the benefits to the different sectors and food industry.

AMD is confident that the utilization of the e-beam facility for agri-food and pharma products will open up new markets in Pakistan, leading to economic growth, foreign exchange, and job creation through increased exports.



## MIAN MOHAMMAD SALEEM CHILI SEED PROCESSING - KUNRI

The town of Kunri in Southern Sindh is famous for one thing: an indigenous variety of chili called 'Dandicut chili'. It is said to be the only chili with a natural aroma and around 80% of its production in Pakistan is being carried out in Kunri. However, the country has recently seen a decline in Dandicut chili production due to lack of modern chili seed processing facilities – including those capable of processing open-pollinated seeds. As a result, the yields of open-pollinated chili varieties, which are highly preferred due to their unique taste and aroma, have declined on average from 2 tons per acre to 0.9 tons per acre.



AMD has worked to strengthen the chili sector by partnering with private sector investors to upgrade and establish centralized seed grading and packing hubs, nursery development and marketing of high-quality seedlings. These hubs were necessary for overcoming the above-mentioned constraints facing the red chili value chain in Pakistan. AMD facilitated multiple initiatives to resurrect the country's chili sector, including conducting comprehensive modular chili training programs for farmers in three core cultivation areas. The trainings focused on practical field demonstrations, and the exposure of Pakistani chili farmers and processors to large-scale commercial chili processing facilities in New Mexico, USA.

Mian Mohammad Saleem, President of the Sindh Red Chilli Growers Association and the owner of Beacon Seed, was one grantee who worked with AMD to eliminate threats to red chili production and develop a complete chili seed processing plant and modern commercial chili seed nursery. Following AMD's initiatives, Mohammad Saleem planted selected Dandicut seeds on over 2000 acres of land. The results took everyone by surprise; his yields almost doubled to about 200 tons.

**“The project is bringing a great improvement in production areas with yields increasing by up to 60 percent with processed seeds. It is expected that with full-scale implementation of facilities yields are going to double on average,” says Muhammad Saleem.**

Beacon Seed is associated with almost 500 vegetable farmers covering a total cultivable area of more than 10,000 acres. The introduction of seed processing and commercial nursery facilities will help improve the quality, yield potential, disease resistance, and shelf-life of open-pollinated Dandicut seed, making the supply chain more robust and helping producers achieve better prices.

Muhammad Saleem also received processing machines for chili seeds, which helped him sell chili from over 5000 acres of land. This grant equipment included a seed pod separator, seed cleaner, gravity table/seed separator, seed dresser & treatment machine and packaging machine. The machinery is the first of its kind in Pakistan and will initiate a new phase of development of this traditional chili variety.

**“The demand was quite high this year more than our produce of Kunri chili but we look forward to next year for meeting these demands and providing certified OP seed (open pollinated) to other growers as well in order to contribute to the chili sector, I am grateful AMD for educating us and helping reverse the decline in chili production.” says Mohammad Saleem.**

The product is also now being sold at a budget friendly price in comparison to hybrid seeds being imported at a very costly price for local growers. This initiative will help Pakistan keep up with growing demand in the international chili market.





**CITRUS**



# CITRUS

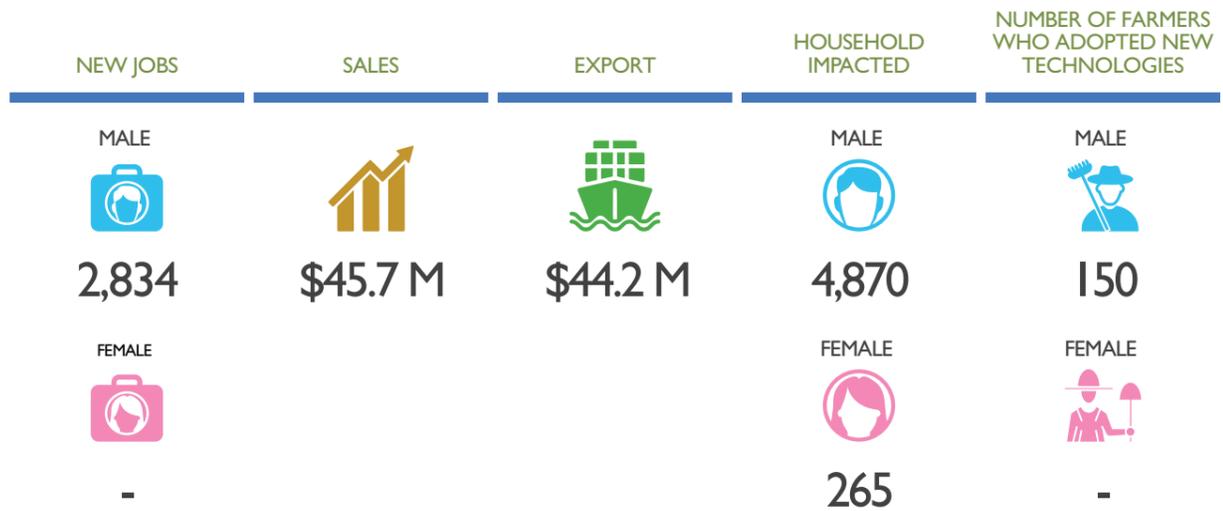
Citrus is a scientific term used for a class of fruit-bearing plants, comprised of mandarins, clementine, oranges, grapefruits, tangerines, lemons, and limes. Pakistan produces 2.34 million tons of citrus annually on 192,230 hectares and citrus is the country's largest fruit crop, constituting approximately 30% of total fruit production. Even though citrus production outweighs local demand, Pakistan only exports 15% of total citrus produced - representing a mere 1.4% share (US\$ 201 million) of the global citrus industry (valued at US\$ 14.4 billion in 2017).

Pakistan is the largest producer of kinnow (mandarin), resulting from favorable climate and soil conditions of the Sargodha district of Punjab province. The juice content of kinnow is the highest (44% - 47.5%) among all peeler varieties and has a unique flavour which distinguishes it from comparable mandarins produced around the world.

The Pakistani kinnow receives a relatively lower price in global markets due to quality issues resulting from suboptimal farm management practices, ineffective post-harvest handling, limited use of technology, and limited farmer awareness about good agricultural practices. In response to these barriers, AMD selected as grantees four large citrus processing and export facilities located in the district of Sargodha. The project developed linkages between these grantees and hundreds of farmers under the contract farming model. Under this execution model, AMD rolled out a comprehensive capacity building program for farmers and introduced new technologies through the provision of new equipment (and associated practices) aimed at integrated pest and disease management, tree pruning, canopy management, nutrient balancing, safe harvesting and post-harvest handling, and climate-smart agricultural practices. The model employed effectively increased fruit yields and quality along with greater compliance with the SPS requirements of importing countries. As a result, partner citrus farmers are now witnessing higher profit margins.



AMD's market access strategy led the Pakistani kinnow industry to develop new international business linkages. The project developed new buyer-seller linkages through facilitating the participation of processors and private enterprises in the international food exhibitions and supported Pakistan government entities to revisit the preferential trade agreement with Indonesia. Pakistan is now exporting to Indonesia throughout the citrus season from December to April. As a result, Indonesia has become the second largest export market of Pakistani citrus. Such an increase in citrus exports has resulted in greater income generation opportunities for exporters, processors, farmers, and others employed by the citrus industry.



# ANSAR IQBAL

## MATEELA KINNOW FACTORY

Ansar Iqbal is the CEO of Mateela kinnow Factory in Sargodha and has been a kinnow processor and exporter for the past two decades. Despite initial struggles, Ansar's company eventually managed to compete in international markets located in the Far East, Russia and the Middle East. Through this experience, Ansar realized the true scale of the challenges faced by Pakistan's citrus sector:



**“Pakistan only manages to export one third of its total kinnow produce. When we stepped into the international market, we realized that our fruit lacked the required quality. Pakistan produces seeded citrus variety, while the global demand is mostly for seedless varieties. The cosmetic appearance of our fruit is also not up to the mark. In a highly competitive global market, this is a real problem for Pakistani exporters.”**

Ansar believes the main reason for poor quality and low production volume is that Pakistani farmers are unaware of modern farming techniques from planting to pruning. He also believes that farmers are unaware of proper fruit maintenance measures, the lack of which results in varied sizes of fruits.

**“We were very keen to work with USAID-AMD because their approach targeted citrus farmers directly by distributing modern machinery and providing in-depth knowledge on modern farming techniques”** said Ansar Iqbal.

Mateela Kinnow Factory works with registered contract farmers, all of whom have benefitted from modular trainings in areas such as harvesting, irrigation and use of fertilizer. In addition, the new farm machinery has increased efficiency while ensuring no damage to the fruit. Ansar has indicated that as a processor and exporter, his company tries to help contract farmers as much as possible from planting until pruning. AMD has also helped create forward market linkages which provided opportunities to exporters in subsidizing small-scale farmers for items such as fertilizers.

After three years of working with USAID-AMD, Ansar is beginning to see a tangible difference in production. He says that while in previous years Grade-A products represented a mere 30-40% of overall production, this year's production is estimated to increase to 60+%. While significant, Ansar is aware that there is still a long way to go in making Pakistani Citrus exports competitive.

**“Grade-A production for large citrus producing countries such as Turkey, Spain and Morocco is more than 90%, which indicates that Pakistan is still behind. Despite this, we have taken some major strides by working with USAID-AMD and farmers to build on the new techniques farmers have learnt in order to enhance production in seasons to come. A globally competitive kinnow will benefit farmers, exporters and eventually the country as a whole.”**

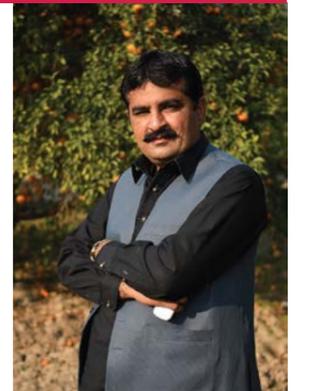




## NASAR ABBAS KINNOW FARM OWNER

Nasar Abbas currently owns a kinnow orchard in Sargodha and has been in the business of citrus farming since his father laid the groundwork more than a decade ago. But despite his vast experience, his business was experiencing some critical challenges which resulted in declining profits due to reduced fertility of his land.

**“The traditional farming methods which my father taught me have become outdated. But since I lacked in-depth knowledge about modern citrus farming techniques and how to effectively adapt them to local conditions, it was difficult for me to change current practices. We were struggling with pest attacks each season, which was affecting the quality and quantity of the fruit”** commented Nasar.



This was a significant problem considering that Nasar had a contract farming agreement with one of the largest kinnow processors in Pakistan.

The U.S.-Pakistan Partnership for Agricultural Market Development (AMD) set out to address issues facing farmers such as Nasar and help improve the quality and quantity of Grade-A Kinnow production in Pakistan. AMD began working with processors to provide trainings and in-kind grant items on a cost-share basis to citrus farmers. As a result, Nasar and his workers received modular trainings on harvesting, fertilizer use, pest management, and irrigation. Nasar also received equipment such as spray machines, citrus harvesting ladders and harvesting tools.

**“Working with USAID-AMD Project has helped us a lot. The trainings have given us a much better understanding of different citrus diseases and how to control them. In addition, the modern farming techniques and machinery have helped us improve both the quality and quantity of Kinnows produced. We are now able to produce more Grade-A fruit which fetches a higher price in the market.”** Nasar elaborated.

Nasar also believes the trainings his farm received have helped nearby farmers learn and adopt better practices for fertilizer application, irrigation and harvesting. The increased production of Grade-A fruit means farmworkers and other laborers associated with Nasar’s farm are reaping the benefits of their hard-work in the form of increased wages and salaries.

**“The improved quality and volume of kinnows allow me to transfer those benefits to the workers, which has helped some of them pay school fees and healthcare expenses. A trained workforce also has its advantages because now we can train new employees on our own.”**

Nasar is confident he can build on USAID-AMD’s support to further enhance production and tap into new global markets.



**MANGO**



# MANGO

Pakistan is the sixth largest producer of mango in the world. It produces 1.784 million tons (as of 2016-17) annually utilizing 170,000 hectares crop area. Although Pakistan has some of the world's finest mangos due to their sweetness, aroma and smooth texture, exports of fresh mango are just limited to 64,000 million tons worth US\$ 48 million (as of 2015-16). Pakistan is mostly exporting to low-value, wholesale markets in the Middle East. Even in the United Kingdom and some European countries, Pakistan is mostly selling to ethnic diaspora markets at very low prices. Global trade potential and available export surplus is far greater which provides an excellent opportunity for Pakistan to enhance its export.

Pakistan needs to develop and strengthen the mango supply chain to ensure consistent high-volume, competitively priced and reliable mango exports which meet global standards. Such supply chain requires mango processing facilities, equipped with state-of-the-art processing and packaging machinery, along with strong backward linkages with mango farmers that can supply high-quality mangoes, free of quarantine diseases and pest.

To address these needs, AMD provided state of the art graders to 13 mango processing facilities of Punjab and Sindh province to enhance their technological capability, reduce labor costs and shipment processing time, and penetrating into international high-end markets through meeting their grading and packaging requirements. The project also developed the capacity of mango processors and farmers to: a) enter into contract farming with mango farmers to improve their supply chain, and b) compliance of SPS, packaging and traceability requirements.

AMD facilitated the participation of exporters in international events, arranged buyer-seller meetings, and developed exporters' capacity to explore untapped markets. The project also arranged mango festivals, mango galas and mango fares in Pakistan to promote Pakistani



mangoes. Foreign diplomats and commercial counsellors of several countries visited these events, which generated many new export leads. With AMD efforts, Pakistan's mango sector has crossed another milestone of technological advancement and is better positioned to export even larger mango shipments to the US and Europe.

NEW JOBS		SALES	EXPORT	HOUSEHOLD IMPACTED	NUMBER OF FARMERS WHO ADOPTED NEW TECHNOLOGIES
MALE				MALE	MALE
293	\$8.3 M	\$5.4 M	1,179	13	
FEMALE				FEMALE	FEMALE
4			369	27	

SMEs BENEFITED	PUBLIC SECTOR INVESTMENT	HUBS DEVELOPED	MARKET LINKAGES
			
167	\$11.8 M	8	159

## MAJOR (R) TARIQ MANGO EXPORTER

Major (R) Tariq, owner of Lutfabad Mango Farm in Multan, is one of the leading mango exporters and processors in Pakistan. But like most Pakistani mango exporters, he faced several difficulties in competing in the international market.

Constraints such as dependence on high-cost air freight, limited knowledge of modern grove management techniques, improper harvesting practices and manual post-harvest handling, phytosanitary standards, and limited access to relevant markets negatively impact the competitiveness of Pakistani mango.

Major (R) Tariq believes that sustainable growth of exports and greater profitability hinges upon the use of up-to-date technology and modern processes.



**“Our processors still lack operational efficiency due to manual grading and sorting practices currently in place. A grading system and corresponding grading machines with far greater accuracy and efficiency is essential for attaining a standardized product with harmonized shape, size and aesthetics.”**

Manual grading causes extensive bruising, limited daily volumes, and inconsistent size/weight grading. This has hindered the Pakistani mango exporters getting a premium for what many consider the world’s best mangoes. Since the grading technology is an expensive investment, Major (R) Tariq continued with manual grading.

That was until he learned about the work of the U.S.-Pakistan Partnership for Agricultural Market Development (AMD) for the development of the mango sector. AMD supported the mango sector to improve quality, increase shelf life, reduce transportation costs and help exporters meet export protocols. Under its grant program, AMD provided 13 state-of-the-art imported mango graders through a cost-share mechanism. The new grading machines have improved the efficiency and accuracy of grading mangoes to meet international standards. They also weigh the fruit and sort them according to size, which helps cater to different market requirements.

These mango graders were fully functional for the 2017 mango season and were utilized by Major Tariq to grade export quality mangoes.

**“The mango sector experienced a significant decrease in production this season mainly due to unfavorable climate conditions. However, I was able to cut cost and improve processing times due to the graders resulting in at least 10-12% increase in exports.”**

He exported 400-450 tons to high-end markets in the UK, Netherlands, Spain, Italy and U.S.A. and a further 4,300 tons by road to countries such as Azerbaijan, Uzbekistan, Iran and Afghanistan. The value of automatically graded mangoes exceeded USD 400,000.

Lutfabad Farms also acted as a hub for other nearby farmers, who did not have their own facility to process and grade mangoes for export markets.

**“Programs such as AMD continue to help fuel Pakistan’s economy by improving agricultural sector productivity and facilitating exporters to secure new market access and build brand recognition for Pakistani produce,”** said Major Tariq.





## ASMA ERUM MANGO TRAININGS FOR WOMEN

Asma Erum, from Shujabad in the suburbs of Multan, is one of 350 women who benefitted from trainings organized by the U.S.-Pakistan Partnership for Agricultural Market Development (AMD) for women from the mango processing sector.

AMD arranged awareness and training sessions for women hub owners, managers and workers on maturity indices, grading, sorting, packaging and strengthening linkages between women mango farmers and hubs.

The trainings also covered other topics including skill development of women farmers in post-harvest handling of mangoes, to reduce post-harvest pest and disease infestation, to understand the importance of packaging for marketing, marketing of mango in high end markets, preparation of value-added products (pickles, jams), preservation of mango to enhance shelf life and personal hygiene and safety awareness.

As a result of the trainings, Asma was able to set up a home-based business manufacturing and selling mango pickles. Initially, she struggled to attract customers, but gradually she began selling to others in her own neighborhood – and that was when things really took off.

**“Once the first couple of jars were sold, my motivation grew. I dedicated a separate room in my house for the business and began considering how I could diversify. Eventually I began adding items such as ornaments, bangles and dresses for women and children,” Asma said**

Asma’s motivation and hard work drove her to better understand and apply the concepts in the trainings and to turn it into a revenue generating activity.

Asma was particularly thankful to her husband for his support in order to prosper in conservative region such as South Punjab where the idea of working women is still not widely accepted. She now plans to increase the volume of pickle production and to explore markets in Multan.

**“AMD’s trainings helped me immensely, especially in terms of taking my first steps as an entrepreneur. This has not only provided a degree of financial independence but I am also supporting my family and ensuring that my children get the best education” Asma said.**

AMD has had a special focus towards creating an environment that encourages, supports, and respects women’s inclusion and entrepreneurship, and simultaneously provides skill enhancement training for women in coordination with AMD’s project grantees.

Although Pakistan is one of the largest producers of mangoes in the world with around 1.7 million tons produced annually, continued constraints such as dependence on high cost air freight, limited implementation of modern grove management techniques, lack of international standards compliance, improper harvesting and post-harvest handling, and phytosanitary standards, negatively impact the competitiveness of Pakistani mango.

AMD is supporting the mango sector to improve quality, increase shelf-life, reduce transportation costs and help exporters meet export protocols. AMD’s support has helped increase exports by \$5.4 million over the past three years. AMD will continue to assist the development of Pakistan’s mango sector through providing additional technical assistance and working with Pakistani growers, packers and exporters to secure new market access and build brand recognition of Pakistani mango.