# DAIRY SCIENCE PARK

# Modulating Special economic Zones for Meat and Dairy Production

*Developing Enterprising Capacity Of Livestock And Poultry Farms In Khyber Pakhtunkhwa, Pakistan for employment generation and export*

**Prepared by**

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**Project summary:**

The Khyber Pakhtunkhwa province of Pakistan is rich in natural resources, dominated by livestock, including the 14.84 million sheep and goats valuing Rs.160 billion and 27% share in the national poultry sector having an investment of Rs.200 billion, producing 834 billion kg meat. The huge assets have got the potential to support the agro-based economy of the province through income generation, self employment and production of certified high quality food items for domestic and international Halal Food Market. However, a lot has to be done to achieve this goal, through technical and marketing interventions to boost up the per unit productivity and introduce quality control system.

The present project is focusing on analyzing the current status of health, productivity, nutrition, fertility and management aspects of the local farming. The inefficient practices would be documented and their economic impact would be worked out. Improved practices based upon studies to be conducted under the project and elsewhere, would be introduced into the local production system. The research studies would focus on management interventions for enhancing ovulation rates, conception/birth rates, growth rates, feed conversion efficiency and health status with special focus on debilitating, parasitic, infectious and zoonotic diseases of small ruminants. The available local plants in the project areas would be evaluated for toxic, medicinal and nutritional properties. The local breeds would be evaluated as candidates for business entrepreneurs. Quality control system would be established for the feed, biologics and medicine as recommended under local and inter-national laws. Analytical methods would be developed to predict the safety and quality of food products. Business incubation concept of HEC will be introduced into the enterprises developed under the project for employment generation.

A Central Veterinary Laboratory would be established for disease diagnosis and analyzing quality of the feed, biologics and medicine as recommended under local and international laws. Analytical methods would be developed to predict the safety and quality of food products. Non-destructive spectrophotometric measurements will be developed to predict the quality and safety of food products. The relevant agencies would be advised on practical and legal impact of food safety regulations including product liability, commercial law and intellectual property. Economic evaluation of the enterprises would be made to assess the feasibility of the improved production system for employment generation. Two Farmers Welfare Centers would be established to provide a platform for the farmers, scientists and marketing partners to abridge the gap among the framers and service providers. The materials required for improved health, nutrition and fertility would be made available through sale of commodities on reasonable rates, training and demonstration of improved practices by experts and extension workers. One Business Incubation Center would be established for demonstrating livestock based entrepreneurs. The change in the profitability would be documented and analyzed. Three model abattoirs supported by chilling facilities would be introduced at farming clusters. Chilled vehicles would be provided for transportation of meat from field abattoirs to the central Unit at Peshawar. Hazard analysis and critical control point (HACCP) and Halal Certification would be introduced at the production, processing, storage and marketing setups.

**The province**

The Khyber Pakhtunkhwa province is located on northern boarders of Pakistan. The province is spread over 74,521 sq km, with a population of over 22 million. It comprises of three major administrative parts. One part, composed of settled areas, consists of the districts of Abbottabad, Bannu, Battagram, Charsadda, Dera Ismail Khan, Hangu, Haripur, Kohistan, Kohat, Karak, Lakki Marwat, Mansehra, Mardan, Nowshera, Swabi, Peshawar and Tank. The second known as PATA has a population of 831,000. The third part, FATA, has a population of 3,764,000.

The province provides a gateway to the Subcontinent, since times immemorial, it has witnessed migration-waves of peoples, campaigns of conquerors, flow of innumerable caravans of commerce, influx of intellectuals, artists, poets and saints from the north into its fertile valleys and onwards to the plains of the Punjab, Sindh and beyond the Indus to South Asia. Over the centuries this area was instrumental in the spread of many concepts and intellectual thought. Buddhism found its finest expression here in the Gandhara civilization. And from here it spread northwards to pollinate Central Asia, north-east to China, Japan and the Far East. Then came Islam with its unique transforming sweep. The Mughals of South Asia are descended from the various Central Asian Turkic armies and immigrants that settled in the region from the early Middle Ages onwards. Peshawar has been the gateway of these migrations to the Central Asia.

The province is mostly hilly terrains in the north and arid plains in the south. The people inhabiting the province are animal lovers getting livelihood from the cattle, buffaloes, sheep, goats, and poultry. The former two species are dairy type and the later three provide a source for meat production. Due to scarcity of water the hilly and arid areas are more suitable for meat production and the pastures support a huge number of sheep and goats in the region.

**Table 1. Livestock population of Pakistan (million heads)**

| Unit | Cattle | Buffaloes | Sheep | Goats | Poultry |
|---|---|---|---|---|---|
| 1976 | 14.9 | 10.6 | 18.9 | 21.7 | -- |
| 1986 | 17.1 | 15.7 | 22.6 | 29.0 | -- |
| 1996 | 20.4 | 20.2 | 23.5 | 41.2 | -- |
| 2006 | 29.6 | 27.3 | 26.5 | 53.8 | -- |
| 2012 | 36.9 | 32.7 | 28.4 | 63.1 | 721 |
| % ↑ 36 yrs | 147.7 | 208.5 | 50.3 | 190.8 | 300 |
| % KP share | 20.1 | 7.1 | 12.7 | 17.8 | 20 |

**The Peri-urban Dairy Farming**

As a part of the agricultural production system, dairy farming is a prerequisite to alleviation of poverty. It supplements other income generating activities to eradicate poverty and create adequate opportunities for enhanced rural and peri-urban employment, income generation and economic access to food. The horizontal expansion in dairy farming is still in progress. The increasing human population of the urban areas, the rising income levels and the awareness about need of animal proteins in human diet, has resulted in increasing demand for milk and meat. This demand for food items and the rising levels of prices, calls for expansion of dairy and livestock industry.

*Social norms at dairy farms:* Social norms are shared values and expectations which vary from one society to another and from one situation to another. Norms range from crucial taboos, such as those against incest or cannibalism, to trivial customs and traditions, such as the correct way to hold a fork. Norms playa key part in social control and social order. Dairy farm provides a unique environment for development of special social norms. The dairy farms are located in the peri-urban areas of the major cities to meet the demand of milk of the urban populations. The farms are established without scientific planning for construction of buildings. roads, water supply and drainage and other requirements of the people and the dairy operations. The farmers are taking care of 57 million dairy animals (cattle and buffaloes) in Pakistan, approximate value being RS.1.5 trillion and contributing to the national economy to the tune of Rs.1.2 trillion per annum. But they do not get the desired contribution from the society.

*Living standards:* Peri-urban dairy farms are usually owned and managed by Gujars, the dairy farmers, their families and the hired labor. Their living standard is low due low profitability of the farms. The high and non-regulated cost of inputs and state-controlled lower price of the products make the profit margin low. Lack of state-subsidy and hostile marketing system bulldoze enterprises. Under such circumstances the living standard of the dairy farmers is definitely deteriorated. The farmers have little chance to send their children to better educational institutions, which usually are expensive. The children discontinue their education after passing to" class at school. A so-called self employment is provided to the children by their parents at the dairy farms and their potential for better contribution to the society is wasted.

*Investment behavior:* Establishment of the traditional dairy farms is based upon opportunity cost, instead of new investment. The huge investment made by the ancestors of the farming family and the rising levels of unemployment compel them to stick to the business, willingly or nonwillingly. The farming family tries to continue the business without calculating the financial inputs and products, and the products have been reported to recover only 75% of the cost of productivity. Under such type of income levels the dairy farmers possesses no capital to invest in strengthening their business. The traditional peri-urban dairy farmers survive under miserable conditions for decades or their business is squeezed to a smaller size or total extinction. The status of non-investment make the operations inefficient and resultantly. the production cost further increases, making the profit margin further narrower.

*Interaction with markets:* Dairy farmers have to interact with market for procurement of inputs and sale of products. The marketing system is hostile to the farmer and attempts to get benefits out of his business without providing support and productive inputs. Resultantly, all the market forces around the dairy farm get wealthier while the dairy farmer gets poorer and ultimately, is compelled to abandon his business. Buffaloes are supplied to the farms by dealers on very high interest rates, sometimes exceeding 50% per year. The amount has to be returned in installments, which come from sale of the milk. Half of the amount earned from sale of the milk is spent on paying the installment while about half if paid to feed dealer, remains very little with the farmer for household expenditure. The quality of animals and feed supplied to the dairy farm is usually inferior.

**Sheep, goats and poultry status**

As a part of the agricultural production system, livestock farming is a prerequisite to alleviation of poverty. It supplements other income generating activities to eradicate poverty and create adequate opportunities for enhanced rural and peri-urban employment, income generation and economic access to food. The horizontal expansion in livestock farming is still in progress. The increasing human population of the urban areas, the rising income levels and the awareness about need of animal proteins in human diet, has resulted in increasing demand for milk and meat. This demand for food items and the rising levels of prices, calls for expansion of dairy and livestock industry.

During 2012 the population of cattle, buffaloes, sheep and goats was 36.9, 32.7, 28.4 and 63.1 million respectively out of which the share of KP province was 20.1, 7.1, 12.7 and 17.8% respectively for the four species (Table 1). As for other provinces of the country, the livestock farms in KP are established without scientific planning for construction of buildings, roads, water supply and drainage and other requirements of the people and the farms. The 14.84 million sheep and goats valuing Rs.160 billion are reared by farmers in various parts of the province. Total investment in poultry sector of the country is Rs.200 billion, supporting 721 birds and producing 834 billion kg meat. KP is contributing 20%.

The sheep and goats farms in the Khyber Pakhtunkhwa are owned and managed by shepherds, their families and the hired labor. Their living standard is low due to low profitability of the farms. The high and non-regulated cost of inputs and state-controlled lower price of the products make the profit margin low. Lack of state-subsidy and hostile marketing system bulldoze enterprises. Under such circumstances the living standard of the farmers is definitely deteriorated. The farmers have little chance to send their children to better educational institutions, which usually are expensive. The children usually discontinue their education after passing primary schools. A so-called self employment is provided to the children by their parents at the dairy farms and their potential for better contribution to the society is wasted.

The farming system for sheep and goat production is in still its primitive form based upon opportunity cost, instead of new investment. The huge investment made by the ancestors of the farming family and the rising levels of unemployment compel them to stick to the business, willingly or non-willingly. The farming family tries to continue the business without calculating the financial inputs and products, and the products have been reported to recover only 75% of the cost of productivity.

Under such type of income levels the farmers possesses no capital to invest in strengthening their business. The traditional farmers survive under miserable conditions for decades or their business is squeezed to a smaller size or total extinction. The status of non-investment make the operations inefficient and resultantly the production cost further increases, making the profit margin further narrower.

**Marketing constraints**

The livestock and poultry farmers have to interact with market for procurement of inputs and sale of products. The marketing system is hostile to the farmer and attempts to get benefits out of his business without providing support and productive inputs. Resultantly, all the market forces around the farms get wealthier while the farmer gets poorer and ultimately, is compelled to abandon his business. Loans are provided in some instances to the farms by dealers on very high interest rates, sometimes exceeding 50% per year. The amount has to be returned in installments, which come from sale of the animals.

Although the present farming system cannot exhibit its profitability and enterprising capacity, the use of improved practices can enhance the profit rates. Appropriate breed selection and adoption of improved health, feeding and management practices may result in accelerated growth rage and fertility of animals by up to 5 times of the existing levels. Development and introduction of improved practices would improve the products quality, enabling it to pass through the certification process.

**The Faculty of AHVS, Agricultural University**

Faculty of Animal Husbandry and Veterinary Science is an important component of the University supporting the livestock sector through teaching, research and industrial services. DVM degree program has been in place since 2004, before which the degree of BSc (Hons) Animal Husbandry was awarded. The degree programs have adopted the standard curriculum approved by the Pakistan Veterinary Medical Council and the Higher Education Commission. Postgraduate programs are offered in Livestock Management, Animal Nutrition, Animal Breeding and Genetics, Theriogenology, Pathology and Poultry Science. The postgraduate degrees are MSc (Hons) and PhD. The Faculty realized that the degree programs be standardized for basic and postgraduate education to bring them in line with other institutions in the country and abroad. The curricula were developed jointly with other universities to produce graduates with professional knowledge and skills compatible for job requirements and development initiatives in the country.

The current trend in research of postgraduate students is linked with local farmers highlighting their problems and issues and providing solutions in a scientific way. These projects are well appreciated and supported by the different funding bodies. To promote the Faculty vision in R&D, an International Workshop on Dairy Science Park - Peshawar - Nov 21-23, 2011 was organized with the assistance of various sister organizations and the Higher Education Commission of Pakistan. The theme was to provide a scientific and business support to the livestock and poultry activities, with the help of provincial government and SMEDA/KPCCI.

**Visit to Turkish institutions**

The author visited Turkey and attended the International Conference on Applied Life Sciences from 10 to 12 October, 2012 at Konya. Improved seed varieties of Atta Habib and Siran-2010, developed at this University, were delivered to Mr Ali Beyaz of Beyaz INSAAT at Istanbol for trials in arid and irrigated areas. After the conference the author visited Selcuk University in Konya facilitated by Dr Mithat Direk, Dr Sukru Dursun and Dr Selda Seyfi. A meeting was held with Prof Dr Ahmet Guner, Dean Faculty of Veterinary Sciences for exploring collaborating areas. Meat import was identified as an important activity of Turkish Trade and the availability of a good resource base for production of such meat at the Khyber Pakhtunkhwa was identified as a potential export base for meeting these demands. On the following day a visit was made to various departments and laboratories of the fauclty, like veterinary clinics, laboratories of pharmacology, physiology and microbiology, meat and dairy technologies and the dairy farm. The faculty members were willing for collaboration.

A visit was made to Intermak Dairy Company and collaboration was discussed with Mr Husamettin Sonmez, General Manager. They have been producing dairy equipment and exporting to various countries. Such equipments can be considered for import to Pakistan at a relative cheaper cost than the European products. Another visit was made to a commercial dairy farm having 45 kg/day a peak milk yield and 25 averages. The farm was well managed and was showing a good profitability. A dairy company Enka Sut Ve Gida Mamulleri San Ve Tic A.S. was visited, which is already exporting some dairy products to Pakistan through a representative.

**Rationale of project**

The present project is focusing on analyzing the current status of health, productivity, nutrition, fertility and management aspects of the local farming. The inefficient practices would be documented and their economic impact would be worked out. Improved practices based upon studies to be conducted under the project as well conducted elsewhere, would be introduced into the local production system. Quality control system would be established for the feed, biologics and medicine as recommended under local and international laws. Analytical methods would be developed to predict the safety and quality of food products. Non-destructive spectrophotometric measurements will be developed to predict the quality and safety of food products. The relevant agencies would be advised on practical and legal impact of food safety regulations including product liability, commercial law and intellectual property. Economic evaluation of the enterprises would be made to assess the feasibility of the improved production system for employment generation.

**Target areas**

The proposed project will focus on livestock and poultry farmers interested in meat and dairy production as an enterprise. The project will be executed at four stations, Peshawar, Mardan, Swat and DI Khan and the adjoining districts and tribal areas. Baseline surveys/situational analysis will be conducted after which the potential pockets/villages will be selected for further intervention. HUJRA,

SRSP and other appropriate organizations having social capital and established setups would be involved in project implementation.

**Goals and objectives**

1. Improving the quality standards of medium sized sheep, goats and poultry farms, compatible to those set by importing countries through building capacity of farmers; establishing a quality control ISO certified central veterinary laboratory

2. Technology incubation at medium-sized farms through business incubation center and strengthening their linkages with service providers like input suppliers, marketing, financial and development agencies

3. Further enhancing the quality of teaching and research through involvement of graduate internees and postgraduate students producing highly skilled manpower possessing business leadership and creating opportunities for self employment

4. Value addition in meat production and processing through a network of modern slaughter houses backed up by quality control and cold storage.

5. To establish at least one farmer welfare center in each selected region of the project to provide basic needs of the farms in term of feed (Concentrate), Vaccination, and basic Health inputs.

**Work plan**

The available dairy, sheep, goats and poultry herds in the central, northern and southern regions of Khyber Pakhtunkhwa would be registered by the project. The existing state of productivity and profitability would be documented and the barriers impeding profitability would be split into biological and marketing categories. Among the biological factors, the breeds would be compared for feed efficiency, fertility, health status and growth rates. Nutritional requirements/supply will be recorded.

Research studies would be initiated for postgraduate students and hired staff. The studies would focus on management interventions for enhancing ovulation rates, conception/birth rates, growth rates, feed conversion efficiency and health status with special focus on debilitating, parasitic, infectious and zoonotic diseases of small ruminants. The available local plants in the project areas would be evaluated for toxic, medicinal and nutritional properties. The local breeds would be evaluated as candidates for business entrepreneurs. Alternate feeds sources would be explored and digestibility trials would be conducted to evaluate the transfer efficiency of inputs into products. Reproductive efficiency of various breeds would be investigated with special emphasis on the number of live birth per 100 animals. Improved strategies would be demonstrated for improving this trait. Health parameters would be recorded regarding the current management practices and prevalence of parasitic, bacterial, viral, metabolic and mal-nutritional diseases. The economic losses associated with various health disorders would be documented and intervention models would be developed to minimize these losses.

Three Farmers Welfare Centers would be established to provide a platform for the farmers, scientists and marketing partners to abridge the gap among the framers and service providers. The

materials required for improved health, nutrition and fertility would be made available through sale of commodities on reasonable rates, training and demonstration of improved practices by experts and extension workers. One Business Incubation Center would be established for demonstrating livestock based entrepreneurs. The change in the profitability would be documented and analyzed. Three model abattoirs supported by chilling facilities would be introduced at farming clusters. Chilled vehicles would be provided for transportation of meat from field abattoirs to the central Unit at Peshawar. Hazard analysis and critical control point (HACCP) and Halal Certification would be introduced at the production, processing, storage and marketing setups.

A Quality control system would be established through a Central Veterinary Laboratory for the feed, biologics and medicine as recommended under local and international laws. Analytical methods would be developed to predict the safety and quality of food products. Business incubation concept of HEC will be introduced into the enterprises developed under the project for employment generation.

**Benefits**

1. About 1000 of the existing medium-sized sheep/goats/poultry farms of the province will be converted into models ones for the rest of stakeholders, capable of producing clean food and income generation.

2. About 1.00 million people of the KP province may be benefited, getting livestock products, self employment and adopting similar practices.

3. The products and inputs quality will be monitored and the products will pass through the HACCP procedures, reaching local and international Halal food market in including Turkey.

4. About 100 graduates will be provided self employment, to be replicated in the coming years.

5. Other investors and partners would be attracted towards the program and local residents wishing Halal investment of their money would get such an opportunity.

**Expected output**

The existing farms are underutilized and profit/health status would be improved significantly through good livestock practices, applied research, value addition and marketing support. The cost per unit produce would be reduced benefiting the consumers. The farming system would be producing certified food for local consumers and International Halal Food Market, with special emphasis on Turkey.

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**Cost estimates of the proposed project**

| | Pak Rs |
|---|---|
| **Travel to Pakistan** | 3,000,000 |
| **Travel to Turkey** | 5,000,000 |
| | |
| **Central Veterinary Laboratory** | |
| Analytical cum Semi preparative HPLC system, PDA, diode array Detector | 5,000,000 |
| Culture hoods | 2,500,000 |
| Bomb calorimeter with accessories | 3,500,000 |
| Automated Real time PCR | 300,000 |
| GEL DOC system and electrophoresis unit | 700,000 |
| NanoDrop ND-1000 Spectrophotometer | 500,000 |
| GPHF-Minilab® | 1,500,000 |
| Sonicator | 100,000 |
| Rotary evaporator | 500,000 |
| Deep freezer: (-80°C) horizontal | 200,000 |
| Micro centrifuge | 500,000 |
| Lyophilizer(Freeze dryer) | 100,000 |
| Other equipment | 10,000,000 |
| | |
| **Consumables** | 5,000,000 |
| | |
| **Meat processing unit** | |
| Model abattoirs and chicken processing unit with cold storage and transportation facilities, meat lab | 1,600,000 |
| | |
| **Farmers welfare center** | |
| Two farmer welfare centers for baseline surveys, diagnostic services, trainings, certified feed stock and delivery; biologics and medicines; hygienic end products | 5,000,000 |
| | |
| **Business Incubation Center:** For demonstration of new entrepreneurs on campus and in the field through improved practices with their linkage to industrial partners/interest groups/graduates micro financing agencies, workshops, trainings, demo models | 10,000,000 |
| | |
| **Postgraduate research** | 5,000,000 |
| **Miscellaneous expenditures** | 1,000,000 |
| **Civil works** (Animals sheds, labs, business incubation/farmers welfare centers/offices and classrooms at Peshawar and Mardan Campuses) | 50,000,000 |
| **Grand total** (Rs110 million or TL 2.02 million) | **110,000,000** |