



Demand Analysis Report- Islamic Republic of Afghanistan



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DEMAND ANALYSIS REPORT FOR AFGHANISTAN

I. An over view of Afghanistan

Afghanistan's capital is Kabul. The country is divided into 34 provinces, which are further divided into a total of 398 provincial districts. The districts are sub-divided into cities and villages. Each province has Provincial Council, an elected body, which is supposedly involved in development affairs for its provinces. The population of Afghanistan in 2011 was estimated as 35.3 million.

Afghanistan has mountains, hills, plains and deserts. As such, its climate is extreme with dry bitter cold winters, very hot summers, snow falls on the higher altitude, and dust storms occur in dry areas. Substantial variation exists in day and night temperatures. Most of the rain falls between October and April. However, the agriculture sector remains very important in building Afghanistan's economy, in spite of the fact that only 12 percent of its land area is arable and only about half of that is cultivated. The Kunduz Province in the north and Helmand Province in the south constitute the primary agricultural areas.

Most of the farms are very small, as about 69 percent of these farms are below five hectares. Only about 16 percent of the farms have over 10 hectares of arable land, either irrigated or rain-fed and just 6.5 percent of these farms have over 20 hectares, cover about 33 percent of the irrigated and 50 percent of the rain-fed land (*The World Bank; FAO, 2011*). Main crops include wheat, maize, barley, sugarcane, and cotton. The important fruit and vegetable crops are pomegranates, apricot, almond, walnut, mulberry and grapes, as well as onion, potato, tomato, watermelon and melon. Water requirements are usually met by rains in spring and melting snow in winter. Animals include cattle, karakul sheep and poultry, which play an important role in enhancing the income of farmers. The development of agriculture suffers from, among some other factors, a lack of proper irrigation, weak extension services, and poor marketing. Putting effective ban on opium cultivation by farmers, who are tempted by the high income from this crop, remains a serious problem for the government.

II. An over view of Agriculture sector, policies, programmes, priorities.

Key features of the Afghan agricultural sector:

- On average accounts for a third of GDP (in 2012, agriculture contributed 25 per cent of national GDP (\$4.5 billion out of \$18 billion).
- Agro-processing accounts for over 90 per cent of total manufacturing.
- The sector employs some 4.5 million workers, or 60 per cent of the total Afghan workforce.

- Very high inequality in holdings - majority (60 per cent) of holdings are small (< 1ha) owning only 13 per cent of the land and cultivating 22 per cent of the crop land.
- Most farmers producing for own consumption – subsistence orientation.
- High geographical dispersion with population concentrated in selected fertile areas with water.
- Relatively well functioning markets - exports as well as domestic value chains.
- No policy baggage – relatively undistorted (27 policy/strategies still in draft form).
- Large institutional and capacity deficit - opportunity to reform ensuring private sector oriented service delivery.
- Most provinces are relatively free from poppy. Most poppy free areas are where the poor are concentrated – north and northeast. In the southern provinces, where poppies are most prevalent, it is more a large farmer crop than a small farmer one.

Afghanistan is a landlocked country and does not actively engage in trading with neighboring nations. About 60 per cent of population in the country is estimated to make a living from agriculture related activities. Most of these agriculture related activities are within the small scale and self-sufficient production and explain the low level of US\$ 1,000 per capita nominal GDP.

Overall performance of agriculture in Afghanistan is very much dependent on cereal production, which accounted for over three-fourth (77 per cent) of the agricultural GDP at 2010/11 market prices. Corresponding shares of horticulture and livestock sub-sector in agriculture GDP were 9 per cent and 14 per cent, respectively.

Average annual cereal production of Afghanistan (2005 to 2009) is 5.2 million tons. Year to year changes in the production level of cereals are considerable, ranging from 3.6 million tons (2008) to 6.3 million tons (2009) in 5 years (2005 to 2009). In 2002, 2004, 2006 and 2008 cereal production dipped considerably down mainly due to prolonged drought followed by dismal failure of rain fed crops. In 2003, 2005, 2007, 2009 and 2010 rich cereal harvest was reaped due to favourable weather conditions.

The highest self-sufficiency in cereal (97 per cent) was achieved in 2009 when there was bumper harvest of cereals (6.33 million tons). In that year the shares of irrigated area and rain fed areas in the total cereal production were 67 per cent and 33 per cent, respectively.

The importance of rain fed agriculture cannot be overemphasized given its one-third share in the overall cereal production. Firstly, among the households engaged in agriculture, about one-third households have access to rain fed land. Secondly, households that rely heavily

on production from rain fed crops are in the remotest areas and are intensely vulnerable to crop failures. Lastly, irrigated land access to a household is typically estimated at less than 0.8 ha. Hence, one of the challenges is to achieve long-term sustained growth in agriculture where the weather should not play a very dominant role in the overall cereal supply.

Policies, programmes, priorities

Agriculture dominates the Afghan economy and society. Economic development is a process of transforming the economy from predominantly agricultural to manufacturing and services. However, because of the current resource base and its impact on comparative advantage, the manufacturing and service sector will be heavily dependent on agriculture. Even as the importance of agriculture declines with economic growth, agriculture will increase immensely in absolute size and be the basic engine for the transformation of the economy and even more so for poverty reduction and poppy eradication.

Food Security: In a low-income country, food security is uppermost in the minds of Afghans and their government. As development occurs, agriculture produces food and the income for purchasing food and allows specialization in commodities best suited to the natural resource base. Afghanistan needs to produce food staples utilizing less arable land so that more of this land can be devoted to high value commodities that further other objectives. National production needs are articulated in the Food Security, which also delineates policies for dealing with emergencies that arise from weather and other obstructions to the upward trend in production. In the long run, it is designed to achieve large enough increases in farm incomes, rural wages and employment that food security is assured by adequate income even in depressed years. Food security entails more than merely providing adequate calories. Malnutrition and micronutrient deficiencies are widespread in Afghanistan, especially among children. Between 45 and 55 percent of children under the age of five suffer from chronic malnutrition as indicated by height for weight statistics. The expansion of horticulture production results in an increased availability of needed nutrients and lower prices

Earning Foreign Exchange: Agriculture has always dominated Afghanistan's exports and will continue to do so into the foreseeable future. That is because of the abundance of natural resources ideally suited to producing high quality dried fruits and nuts as well as the proximity to large rapidly growing markets and a strong historical position in those markets. Massive investments and institution building needed to expand the potential. Dried fruit and nut exports are envisaged as reaching \$1 billion annually within ten years.

Poverty Reduction: The rural regions of Afghanistan are home to the bulk of the poor. This means that they earn less than \$1 per day despite the infusion of money from poppy production

in some of these areas. The poor are not those who produce the bulk of agricultural output – the poor are largely in the rural non-farm sector. Farmers produce most of the output and are not poor by the standards of their community. They have income from their labor and from land. The poor are those who are largely dependent on labor alone for income.

There are many families with plots of land so small that they provide neither sufficient income or of employment. Those people, often classified as farmers, are part of the rural non-farm population. Thus, a massive increase in employment in the rural non-farm sector is needed. However, the goods and services in the rural non-farm sector are mostly produced for the local market. For reasons of quality and transportation costs, the produce is not exported to other countries. If they are to grow, farm incomes must rise to provide the income to drive those sectors.

With the rapid growth of farm incomes, market towns become vibrant places. Poverty and underemployment are alleviated. Rising farm incomes and increased demand for agricultural production drive the rural non-farm sector and efforts to grow that sector without these factors simply transfer income amongst the poor. Thus, it is emphasized activities that rapidly increase farm incomes, stimulate employment opportunities and increase wages. Efforts to broaden participation in these effective activities are important. While those processes are at work, special attention is to be given to various aspects of food security for the poor and to address programs that raise the incomes of the poor and of poor resource areas.

Improved Income and Status of Women: Closely associated with the issue of poverty is the status of rural women. High priority must be given to intensive livestock development, an area already dominated by women on the production side. The opportunity is there to engage women in marketing livestock products, particularly dairy products and thereby increase their control of income. The horticulture priority also offers opportunity to bring women into active participation in production and marketing. However, for those efforts to work, provision of services must be made sensitive to past tendencies to exclude women from participation and to exclude them from the income raising potentials of improved technology. Large numbers of women must be trained as agents in the extension program, especially in the livestock and horticulture areas.

III. An over view of Horticulture, Animal Husbandry and Fisheries.

Horticulture

At the national level horticulture production in 2012 is estimated to be 7 per cent more than the last year. Higher and sustained growth followed by marketable surpluses of fruits and

vegetables will enable substantially higher foreign exchange earnings for Afghanistan in 2012.

Data on horticulture products are scanty. Based on available information from various sources and latest field reports, preliminary estimates of the production of various fruits and vegetables in 2012 are:

Production of Fruits and Vegetables, 2012 (Preliminary Estimates)

Commodity	Production ('000 tons)
All fruits (Afghanistan)	1401
Almond	47
Walnut	12
Grape	530
Apple	90
Apricot	75
Orange	9
Other citrus	2
Pomogranate	24
Pear	3
Peach	12
Plum	25
Melons	222
Water Melons	190
Other fruits	160
All vegetables (Afghanistan)	834
Potato	500
Onion	135
Tomato	85
Carrot	37
Okra	20
Pumpkin	17
Others	40

In the northern region, fruits and vegetables are in good conditions, although there are reported cases of slight damage by the flash floods in few areas. The main fruits for the **northern region** are melon, watermelon, almond and pomegranate. Fruit production in the northern region is expected to be 10 per cent more than the last year. Main fruits in Balkh are melon and watermelon. Grapes are in good conditions but almond suffered damage by frost. Melon flies and aphid have been reported to be serious problem in some areas of this province. In Mazar the farmers, fruits' and vegetables' wholesalers are happy to have a better production and marketing prospects than the last year. In Samangan, the main fruits are almond, grape, apricot, pomegranate and walnut. Aphid in grape has been reported. Little over 300 ha of fruits

and vegetables have been destroyed by floods. In Faryab production of fruits is estimated to be 8 per cent more than the last year. The main fruits are apple, grape, apricot and peach. Aphid in grapes has been reported. In Sar-I-Pul fruit production is going to be at least 15 per cent less than the last year. The main fruits are grapes, almond, peach, pistachio and pear. Serious damage due to floods has been reported in fruits (100 ha) and vegetables (over 50 ha).

Fruits and vegetables in the **North-East** are generally in very good conditions and are expected to be at least 10 per cent more than last year, thanks partly to ample marketing opportunities. The main fruits in North-eastern region are melon, water melon, grape, apple and almond. Some areas with horticulture were damaged by floods in Khinjan and Dushi districts of Baghlan province. Reports of disease in fruits (aphid, anthracnose and melon flies) and vegetables (Colorado beetle in potato and grasshopper) have been reported in Kunduz and Baghlan. Hailstone damaged fruits in Kunduz. Grape production is very good this year especially in Kunduz. Recent rainfalls in Kunduz caused rust and aphid in vegetables.

Area with fruit in the **West** is estimated to be only slightly higher than last year. Grape production is going to increase by over 20 percent. Stone fruits (apricot, almond and plum) in some districts have been adversely affected by harsh weather conditions, including frost. The yield reduction in these crops will be 20 per cent compared to the potential yields. As regards vegetables, both area and production have increased by 5 per cent compared to last year and their production prospects are good. Aphid has been spotted in vegetables and fruits in few areas. Hailstorm of the impacted negatively to some orchards in rain fed areas of Herat (Gulran, Kushk-i-Robat Sangi and Kushk-i-Kuhna districts). In Farah, area under and production of fruits are forecasted to be same as last year. Vegetables have been adversely affected by harsh weather conditions that would cause estimated 10 per cent reduction in their potential yield. In Badghis, area with fruits has increased by about 10 per cent compared with last year but their potential yield will be reduced by about 5 per cent because of the hailstone damage. Vegetable area is expected to be same as last year but its production will be reduced by 6 per cent because of the afore-mentioned causative factor.

In **West Central Region**, area with fruits and vegetables shows an increase by a narrow margin only. In Bamyan, area with fruits (apple and apricot, especially) has increased by about 5 per cent than that of last year, thanks mainly to the considerable effort made by Root of Peace (an NGO). Yield of fruits is forecasted to be at the same level as last year. Area with vegetables (potato, cabbage, tomato and carrot, in particular) is at par with the last year but their yield will be reduced due to unfavorable weather condition and aphid. Major problems in vegetable production are short growing season, cut worms, aphids and lack of good quality seed. In Ghor,

area planted with fruits has increased by about 15 per cent compared to last year, and yield by 10 per cent compared to last year. Vegetable area also shows an increase of over 15 per cent and overall vegetable production is likely to increase by over 10 per cent. Hailstone, pest and diseases are the main challenges faced by horticulture crop growers in Ghor this year. These adverse factors will cause reduction in the “potential yield” of such crops by about 15 per cent.

In **Central Region**, more ideal conditions exist for growing fruits and vegetables. Irrigation is available and widely used for intensified and diversified horticulture. Marketing of fruits and vegetables is easier due to relatively easier access to transportation facilities. Access to extension facilities and good seed is also unrestricted. A sharp (15 per cent) and sustained rise in production of fruits and vegetables is realistically expected.

Paktya in **South** has good conditions for growing fruits and vegetables. Irrigation is available and widely used for horticulture. Apple gardens have been adversely affected by powdery mildew, causing reduction in yield potential by 5 per cent. Farmers have requested DAIL to help eradicate the disease. In Paktika horticulture this year is good because there was adequate rainfall during the crucial period of flowering. Less damage due to hailstone and less prevalence of pests and disease are other salient features this year. Hence, bumper production of fruits is expected. Horticulture is in good condition in Khost also. DAIL has made plan to control common diseases and insects in horticulture. In Ghazni prospects of horticulture are good as there were timely precipitation of snow and rains. Bumper harvest of fruit is going to be reaped this year. Spring rainfall has also helped a lot in this regard.

In **Eastern Region** area under and production of fruits have increased specifically for citrus (lemon, orange and Keno), pear, peaches and apricot, especially in the last 5 years. Yield is going to be at least 5 per cent higher than normal this year due to availability of enough water for irrigation and good weather condition. There is no reported case of adverse conditions also. Area cultivated with vegetables has significantly increased compared to last year and before last year because it has potential to generate much higher income compared to other (licit) crops. Last year and this year the price of vegetables was favorable and there are good market outlets for fruits and vegetables within eastern region and outside. In the last two years the price of tomato and onion has gone higher encouraging farmers to increase the area under these crops. Yield of these crops is much better than last year and the year before that. Main vegetables grown in Nangarhar and Laghman are cauliflower, cucumber, onion, tomato, spinach, squash, okra and eggplant. Cucumber, tomato and onion, in particular, bring in very healthy profit to farmers. If enough water is available for irrigation, substantial increase in the area under vegetables is a profitable venture in the eastern region.

In the **South-West** overall condition of horticulture, with flowering in the mid or late spring, is very good. Some fruits like plums have been adversely affected by harsh weather in winter, and by early spring. High wind also damaged some fruit trees during flowering. This year supply of irrigation water is reliable and there is no reported case of any serious pests or diseases in fruits and vegetables. Since three 3 years the only direction area under horticulture is going is up. Peach, plum and apricot from Kandahar fetch high price in the market for their best quality. Additional cold stores established in the province will help reduce post-harvest losses. In Helmand farmers grow fruits primarily for home consumption because of a lack of good market opportunity locally or outside. In Zabul fruits and vegetables were badly damaged by hailstone. There is no reported case of other diseases or pests. Irrigation water is enough in Karizes and canals. In Urozgan horticulture has been badly affected by cold weather during flowering stage. Almonds are affected by soft scale and grapes have powdery mildew. Other fruits are in normal conditions. In Nimroz horticulture is yet to revive its lost vigor, especially in Khashrod and Zarang, which have potential to become important areas for fruits. Zarang has great potential for horticulture production particularly after Nahre Lashkari will be rehabilitated. In other parts of the province the farmers have lesser access to irrigation water. They have no sizeable marketable surpluses of fruits and vegetables also because these crops are primarily grown for home consumption. In Urozgan horticulture is badly affected by cold weather during flowering stage. Almond trees are affected by soft scale; grapes have powdery mildew. Other fruit trees are in normal conditions. Fruit and vegetables are in below normal conditions in Daikunde. Area under fruits is at par with last year but the production is going to be lower because about 50 ha of orchards and 40 ha of vegetable area have been damaged by recent floods.

Forestry

Afghanistan's timber has been greatly depleted, and since the mid-1980s, only about 3 per cent of the land area has been forested, mainly in the east. Significant stands of trees have been destroyed by the ravages of the war. Exploitation has been hampered by lack of power and access roads. Moreover, the distribution of the forest is uneven, and most of the remaining woodland is only found in the Kunar, Nuristan and the Paktia regions in the east of the country.

The natural forests in Afghanistan are mainly of two types: dense forests of oak trees, walnut trees, and many other species of nuts that grow in the southeast, and on the northern and northeastern slopes of the Sulaiman ranges; and sparsely distributed short trees and shrubs on all other slopes of the Hindu Kush. The dense forests of the southeast cover only

2.7 per cent of the country. Roundwood production in 2003 was 3,148,000 cubic metres, with 44 per cent used for fuel.

The destruction of the forests to create agricultural land, logging, forest fires, plant diseases, and insect pests are all causes of the reduction in forest coverage. Illegal logging and clear-cutting by timber smugglers have exacerbated this destructive process. There is currently a ban on cutting new timber in Afghanistan. Prior to 2001 and under Taliban rule, massive deforestation of the country side was permitted and Afghans moved large quantities of logs into storage centers for profit, where the trees wait for processing on an individual tree by tree request.

Animal Husbandry

Livestock is a key component of rural Afghan livelihoods. Livestock represent a bank on the hoof, the majority of the draft power available for crop farming, milk and meat for household consumption and sale, manure used as a natural fertilizer, fuel for cooking and heating in the winter, and sale of wool, hides and skins which were once important export earners.

During the last two decades the animal health situation has significantly worsened. Contagious diseases have spread throughout the country while parasitic diseases have increased in all species. Although some action has occasionally been undertaken to contain outbreaks, the disease situation has become worrying in most provinces where heavy losses are periodically reported.

The state veterinary and animal husbandry services today are largely manned by employees of the former centrally managed system of the 70's. They lack modern management skills and participatory planning skills. Physical damage, looting and lack of financial resources have left these Departments almost totally unable to perform any of their core functions.

As stability returns to Afghanistan, there is an urgent need to rehabilitate private and public sector delivery systems in a carefully planned process whereby the two sectors form a partnership through innovative institutional and organizational relationships.

Initially, livestock as an income generator is more important than horticulture. However, the demand is generally dependent on the domestic market. It is anticipated that it will take a few more years for domestic demand to achieve steady growth at a rate that will permit a 6 per cent growth rate in livestock production. A small proportion of livestock products are exportable and the potential for them to grow ahead of domestic demand exists, but these export shares will be complex to recover. Nevertheless, in the intermediate run, livestock will

be a major source of growth in farm incomes and a stimulus to the rural non-farm economy. This is reinforced by the potential to displace the bulk of current large imports of livestock and livestock products. First of all, a sustainable feed resource base needs to be established.

The livestock sector holds exceptional potential for empowering women and increasing household incomes. Women provide most of the labor and the management for livestock in the small scale and mixed farming systems. Livestock, which includes poultry, is one of the few solid avenues available for small-scale farmers, the landless rural poor and female headed households to escape from poverty. Since the sector is so large the impact on and by women can be immense. It is also well suited to micro finance services, which target women for small loans for working capital. If additional assistance were provided for marketing, the interface of livestock development, credit services and marketing assistance would ensure rapid progress.

In order to be effective development strategies and interventions need to consider the diverse livestock production systems in Afghanistan. Currently, the majority of farmers keep a few animals as part of diversified subsistence farming and mixed farming systems. Semi-intensive and specialized production units operate where the feed resource base is sufficient to ensure a steady production.

Needs based, demand-driven input and service provision mechanisms are needed to serve these different production systems, enabling subsistence farmers and the rural poor to initiate livestock production with subsequent intensification and specialization when opportunities develop

Extensive Livestock Production: Extensive livestock production occurs over vast areas of the country and includes a large population of nomadic herders. Rangelands cover around 45 per cent of the total land area in Afghanistan. However, large areas that are considered barren or “wasteland” are also used for grazing, particularly in the winter. The total graze-able area therefore is much larger, estimated at 70-85 per cent of the total land area.

Pastoralism is a social and economic system based on the raising and herding of livestock, including migration to utilize to the maximum seasonal available pasture for the livestock.

There are three categories of pastoralism:

- Migratory, livestock dependent societies (e.g. pastoralists)
- Recently settled, formerly migratory livestock dependent (e.g. Former pastoralists)
- Settled people, that still hold on to the cultural identity and refer to themselves as “kuchi.”

The potential for growth in the range livestock sector is low and pastoralists may only have a limited contribution to make to the national economy in the future. It has been estimated that pastoralists own about 30-50 per cent of the livestock in the country. In the past, 35 per cent of all exports were from livestock products.

Pastoralists fill an ecological niche by using marginal lands, which are unsuitable for other economic uses. In certain areas, they have a significant impact on watershed management, which is vital to the irrigated agriculture.

Changes in summer and winter pastures have taken place over the last centuries and customary mechanisms to determine pasture user's rights do exist, and are functioning to a certain extent. In areas where grazing rights have been recently established, and where these were politically manipulated, there is a high level of conflict over user's rights.

Due to these considerations, the pastoralist sector is important because of the interaction and potential conflict of interest with fast growth in the irrigated crop sub- sector because of watershed development and management issues that influence the sustainable livelihoods of both groups. Community management of grazing lands and problem resolution mechanisms will be important for the conversion of substantial areas to arable agriculture development of questionable merit.

Studies have shown that there are significant income problems amongst the pastoralists. Some of pastoralists earn income as migrant laborers, leaving their families behind in the kuchi areas. Their skill levels, other than livestock keeping, are low and unskilled labor is all they can obtain. Destitute pastoralists who have lost all their livestock tend to settle permanently in their traditional winter areas and may face insecurity of tenure. They are often at risk of being evicted from the land by local residents or commanders. This land insecurity places additional stress on already destitute people. In recent years, an increased diversification of household income and a move towards a more semi-migratory lifestyle has taken place.

Intensive Livestock Production: A sufficient, sustainable feed resource base is crucial for intensive production systems in order to improve the nutritional status and productivity of animals. This includes a substantial increase in the area planted with fodder crops. The horticulture chapter notes the desirability of inter-planting orchards with alfalfa, Egyptian clover and other legumes for animal consumption. Thus, there are complementarities between the two sectors as well as with the need for immediate increase in income while fruit trees mature. Calculations from similar systems and production conditions have shown that the income from producing fodder crops could easily outweigh income from traditional crops per

square unit of land where demand for fodder is growing.

Expanding agribusiness for meat and milk processing and to provide high quality mixed feeds to the intensive livestock areas and mixed farming units is important.

That, as in the case of horticulture, will require substantial assistance to the private sector in building trade associations, assisting in legislative improvements and in access to credit as well as best practices in other countries through business exchanges. As temporary measures, this assistance does not require investment into building government capacity.

Assistance will be needed at the production level for privatizing services and input supply enterprises. For example, veterinary services that farmer and herders pay for. In many areas the shift to private practices is well along and in others it may take considerable time to make that shift. There will be a continuing need to assist private feed mills with information on optimal feed mixes, taking advantage of changing availability of feedstuffs. The livestock chapter defines an extensive extension system to carry word to farmers and to provide the basis for joining farmer's organizations to put farmers concerns and needs at the center.

Laboratories are needed for several specific aspects of the processing and supply chain for animal products. Eventually research will be called for in developing the most effective feed systems and interaction with the crop farming system.

Important Issues and Constraints

General Issues:

- The lack of a livestock policy and livestock development strategy.
- The lack of coordination between Government, donors and NGOs activities.
- The lack of adequately trained personnel in almost all areas of veterinary and animal husbandry services provision either to undertake public or private functions.
- The weak organization of the public services and inadequate distribution and motivation of human resources.

Issues Related to Animal Health:

- The lack of a disease surveillance network, laboratory services for disease diagnoses, investigation and an Epidemiology Unit to manage livestock information in such a way that it can inform and feed the planning process.
- The increasing incidence of endemic, zoonotic and exotic livestock diseases.
- The lack of quality vaccines produced in Afghanistan. Despite adequate building space and trained personnel, the necessary equipment is currently unavailable.

- The absence of animal movement control and quarantine facilities at Afghanistan's borders for imported live animals and inspection of trade animals.
- Inadequate separation of trade and slaughter animals at marketplaces allowing for possible contamination of farm animals by trade animals.
- Inadequate slaughter facilities and trained meat inspectors to enforce needed sanitary measures for the protection of consumers.
- The insufficient and outdated legal framework for the control of livestock disease, the regulation of private animal health service providers, the importation of veterinary medicines, biological products and animal feed,
- standards and regulations governing meat inspection, the processing of livestock products including slaughter facilities and dairy processing plants;
- The uncertainty over the sustainability of the private delivery of animal health and production services and input supplies through the donor / NGO financially supported VFU system.

Issues Related to Animal Husbandry:

- Poor knowledge and monitoring of livestock numbers, productivity and production. The census undertaken in 2002 gives indications but its results are questionable.
- Poor standards of livestock management, including especially housing and nutrition.
- Weak feed resource base and periodic lack of pastures or feed linked to frequent droughts and insufficient availability of agriculture by-products which affects production and growth of national herds. This is aggravated by the undue occupation of a number of traditional pasture areas by powerful people (commanders).
- Lack of marketing facilities for live animals and animal products. Farmers have little information on marketing possibilities and opportunities, particularly for what concerns livestock by-products like hides and skins, wool, etc.
- Inadequate organization of processing and marketing of livestock by-products, including hides, skins, wool, and milk products.
- Lack of clear and adapted extension information and of a coherent extension organization.
- Inadequate information on, or access to, genetic material (grade reproducers, semen, embryo-transfer, etc.), equipment and other materials for upgrading indigenous livestock.

- Insufficient and outdated legal frameworks for the control of livestock inputs and feeds, reproduction and genetics, livestock trade, processing of livestock products, etc.
- Lack of coherent legislation on land rights, conflict between nomads and sedentary farmers over land rights, severe conflict of interests between winter grazing rights and cultivation in many lowland regions.
- Inadequate financing of animal production investments. Existing financing tools are no longer operational.
- Insufficient investment in feed manufacturing.
- Lack of coordination between security institutions and government services, particularly along the borders.
- Weak water resource management.
- An eroded and outdated traditional knowledge base.

Strategies for Animal Health and Veterinary Services:

The veterinary strategies will be to:

- Develop prevention and control programs to decrease impact of contagious transboundary and emerging diseases based on modern disease intelligence networks and systems, through improved co-ordination with all stakeholders;
- Create a favorable environment for the promotion and generalization of private veterinary services and drugs delivery;
- Intensify control measures against zoonotic diseases; and
- Implement throughout the country systematic inspection of products of animal origin. Strategies for the prevention and control of contagious diseases:
- Develop communication and extension aides to train field professionals in disease recognition and clinical diagnosis;
- Increase farmers awareness information through participatory epidemiology teams used for extension at the same time as they collect data;
- Improve awareness and organization of traders;
- Determine the impact and incidence of the disease through participatory epidemiology;
- Specify how the causal agent is being transmitted and maintained;

- Find out where are the most important contamination spots and determine the vulnerable points to attack;
- Ensure effective clinical diagnosis and laboratory confirmation;
- Organize laboratory support for surveillance; and
- Recommend possible interventions or mandatory control. Strategies for veterinary services and drug delivery:
- Improve co-ordination between public services and private stakeholders and develop a system of partnership based on regular consultation and involvement, participation to disease detection, surveillance, reporting and control programs.
- Develop rules of partnership and promote coordination of approaches for services and drugs delivery.
- Encourage private service delivery initiatives, including the use of government assets and contractual arrangements for implementation of certain public services.
- Ensure planning, in consultation with concerned stakeholders, for progressively introducing full cost recovery of services and inputs.

Strategies for the control of zoonotic diseases

- The development of investigative and laboratory diagnostic capacities as for the main contagious animal diseases; and
- The implementation of public awareness programs to inform the population of the existing potential contamination risks.

Strategies for the organization of veterinary public hygiene:

- Review conditions regarding the marketing and slaughtering of animals and processing of animal products in particular meat and milk supply of urban centers to determine strategy;
- Consult traders and distributors on the problems they have to face and possible solutions;
- Carry out a detailed study to determine priorities and specify the infrastructure, equipment, training and organization needed;
- Define an implementation program including technical justifications, costing, and feasibility and possible time schedule to progressively expand veterinary public hygiene activities;

- Prepare relevant legislation and regulations to create an appropriate regulatory environment.
- Establish sound community based watershed management

Strategies for Animal Husbandry

- Improve the genetic resource base to increase production of meat and milk according to regional specificities and feeding resources.
- Selection through identification of reproducers and adapted breeding practices of local breeds according to their proven qualities and disease resistance.
- Collection and/or import of sperm for the development of dairy production and the development, with close involvement of the private sector of artificial insemination practices.
- Preservation and selection of suitable goat and sheep breeds to increase the national production of meat, milk and specific products like skins and wool to appropriately planned national targets.
- Promote increase of backyard production in rural areas through selection and careful crossing of local breeds (poultry, ducks, geese, turkeys..) and develop modern poultry farming (layers and broilers) in the vicinity of urban centers through import and multiplication of chosen exotic strains and investments in hatcheries to increase the national production of meat and eggs to develop availability of low cost animal proteins for the population and for import substitution. Assess the current feed resource base both traditional and non-conventional in the context of seasonal availability. Identify best option and develop fodder crop production systems for mixed farming and intensive production systems including comparative studies on return on investment with traditional crop production (wheat).
- Promote fodder and animal feed production to increase artificial forage production in order to improve and complement animal nutrition and increase food security during winter and drought periods and to facilitate availability of balanced feed to allow for the development of modern and intensive animal production practices.
- Establish Community Based Natural Resource Management committees for addressing range land management and conflict resolution and develop a pasture based local negotiation process on mechanisms and conditions of use of the pasture-land.
- Review the existing legal and regulatory framework for the sub-sector and determined

what additions will be required to arrive at the desired level of legitimacy of the Range Management and livestock development plans.

- Promote the creation of community based common interest groups (farmers associations, cooperatives)
- Carry out a comprehensive assessment of the current status of the range lands, and the (reversible or irreversible) effects of the drought.
- Develop a Pasture Monitoring and Early Warning system, and build the capacity of the relevant institutions (notably Disaster Preparedness Unit and the MAAH) to develop an emergency action plan for response. Explore the potential for range lands to support dry land farming of fodder crops .
- Development of a legislative framework at national, provincial and district level which legitimizes and endorses community agreements on Joint Community based Natural Resource Management Implement a pilot program for Joint Community based Natural Resource Management;

Fisheries

The country has plenty of water reserves and suitable climate for fish farming. Fishing takes place in the lakes and rivers, particularly in the Kabul River around the Jalalabad area. Fish constitute a smaller part of the Afghan diet today because fish farmers are unable to produce enough fish to keep up with the demands of customers. Using explosives for fishing, called dynamite fishing, became popular in the 1980s and is still practiced by some even though it is illegal today. The annual catch was about 900 tons in 2003. Most fish and seafood is imported from neighboring Pakistan, Iran, the United Arab Emirates and other countries. In recent years, USAID has helped many Afghans in establishing fish farms across the country. There are about 300 fish farms throughout the country and the largest one is at the Qargha, which supplies fish eggs to the other fish farms.

IV. Present status and challenges in Agricultural Extension, Marketing, Food Processing, Infrastructure and any other relevant issues.

Agricultural Extension

Extension services play a vital role in addressing food insecurity and malnutrition. Farmers need sound and timely advice in making decisions on how best to make use of the limited assets available to them and what kind of risks can they afford to take in improving their livelihoods. Unfortunately, in the past 25 years the extension service had been

incapacitated and needs to be resuscitated and reformed. Such a reform is now in process with a view to making the Extension Department of Ministry of Agriculture, Animal Husbandry and Food (MAAHF) an effective transmitter of improved technology at the service of the rural community.

Broadly speaking, Afghan agriculture is made of three subsets. A large segment consists of subsistence farming in which the main asset is the farmer's labour. Another segment is potentially market oriented but is constrained by the lack of adequate assets in possession of the farmer. Only a small portion of agriculture is truly market driven and the operator has adequate assets commensurate with the demands of market agriculture. The extension service must maintain the flexibility to respond to the needs of each subset, particularly the second subset that is capable of making Afghan agriculture a prosperous enterprise. Therefore, making hard choices would be inevitable.

The reform, which is fairly advanced in the planning stage, involves the establishment of a functional multidisciplinary extension team in each of the 371 districts (Uluswali) in the country. The team will consist of 7 trained persons (2 in extension, 1 in plant protection, 1 in horticulture, 1 in animal production, 1 in veterinary science and one in forestry). Missing from the team is the person knowledgeable in water management. However, it is hoped that this gap will be filled once the transfer of the Water Management Department from Ministry of Energy and Water (MEW) to MAAHF is materialized.

The goal is to make the extension service more responsive to the income generating needs of rural women, such as dairy development, sheep fattening, poultry production, home gardening, sericulture and apiculture. The inclusion of this dimension would transform the Extension Department as an effective tool of rural extension. The reform is expected to take 5 years culminating in the establishment of 2500 trained extension staff covering all districts of the country. There are promising signs of donor assistance in the reform process including support for the provision of the necessary infrastructure at the district level.

An issue currently on the agenda is the extent to which the extension service can be privatized. The opinions expressed are diverse. While there may be some room for privatization in specific branches of extension, such as veterinary, the dominant view among the national experts is that any move towards rapid privatization would be a premature gesture at the present time simply because Afghan agriculture is still in the very early stages of market orientation and farmers are not in a position to bear the cost of privatized extension services. The problem is further complicated by the current policy emphasis of reaching the poor and the vulnerable, which is in no position to afford privatized extension service.

Research results need to be transferred to the farm community. The extension communication methods to be used include the following:

Individual contact: office visit, home visit and personnel letters.

Group contact: field demonstrations, field days, village meetings and field visits.

Mass Contact: Mass contacts methods for creating public awareness on the part of the farm community. The main purpose and procedure for conducting each of these methods include the following:

Farmers' Field Demonstrations (FFDs) Field extension personnel voluntarily invite farmers for conducting FFDs. A group of farmers select the most active and successful farmer for demonstration, provided that the farmer is willing to cooperate with others in sharing the information and experience with other farmers in the village. Large numbers of farmers will be trained on the site of the demonstration.

Field Days: Field days are to be held in each district on crop and animal production achievements by selected farmers or on the improved technologies to be adopted by the farmers. Necessary preparation including media coverage is to be made with the successful farmer about specific achievement and with the field extension personnel regarding the improved technology for this purpose.

Field Visits/Meetings: Field visits and meetings are held to address immediate problems of farmers. Attempts will be made to use village meetings as an educational process for complementing other extension teaching methods and thereby reach a large number of farmers.

Publications: Extension publications include booklets, pamphlets, folders and posters. The number and type of publication is to be decided on the basis of farmers' needs communicated by field extension personnel. The research and extension personnel jointly provide technical materials to be formatted for dissemination to farmers.

Radio and T.V Programs: Materials for radio broadcasting and T.V are to be prepared on seasonal basis by the extension personnel for the purpose of public awareness and providing information on the current farm problems.

Exhibitions: Exhibitions are mainly used for general public awareness. District level training centers are to be used for exhibition purposes once a year for displaying high yielding technologies and communicating their performance. Besides public awareness, they are also useful for encouraging competition among the farmers. The extension compound in each district is to be used for exhibiting improved animals breeds and management practices

The Borlaug Institute at Texas A&M Agrilife Research (TAMU) joined a consortium led by University of California-Davis (UC Davis) to implement **USAID Afghanistan Agricultural Extension Project- II (AAEP II)**, a three year project aiming to build the capacity of Afghanistan's public extension system in cooperation with the Afghan Ministry of Agriculture, Irrigation, and Livestock (MAIL). AAEP II's four primary objectives include:

- Building the technical capacity of public extension service providers;
- Increasing household incomes;
- Improving nutrition at the household level; and
- Promoting increased engagement of women in the agricultural industry and support for women through public extension services

Working towards these objectives, TAMU leads the livestock component of the project with focused research and extension capacity building, which will include:

- ***Establishing a Livestock Model Teaching Farm, Parwan Province-*** TAMU is establishing a Livestock Model Teaching Farm at the newly constructed DAIL training center in Parwan Province in order to improve the capacity of the Parwan DAIL Livestock and Extension staff and to serve as the hub of livestock applied research, demonstration and training for other district and provincial extension and livestock staff throughout the AAEP II target provinces.
- ***Supporting Livestock Extension and Research Nationally-*** TAMU will dedicate a significant level of effort to supporting and enhancing the livestock programs at each of the AAEP sites in Kabul, Nangarhar, Herat and Balkh. The TAMU Livestock Program Manager, with support from local and TAMUS short-term technical assistance, will provide animal health, nutrition, husbandry and food safety and processing training for Afghan extension agents in each province. TAMU hopes to create livestock demonstration and extension (mini) centers at each PMTF, and contribute to DAIL needs assessments, training efforts and livestock-specific M&E activities to empower DAIL staff to meet farmer needs through training and appropriate innovations.
- ***Integrating Livestock and Women in Agriculture (WIA):*** Recognizing that 90 per cent of women in the AAEP impacted provinces are engaged in livestock production, collaboration with the WIA activities will have a significant impact on the AAEP II objectives. TAMU will contribute to the design and evaluation of needs assessments in each province in order to target livestock extension support for women based on their

family roles, specific to the local context. TAMU will collaborate with WIA to develop demonstration and training programs for Ministry of Agriculture Home and Economic Development staff, extension staff and Farmer Field School leaders in areas such as: basic animal health, small ruminant nutrition, dairy production, apiculture, food safety and preservation, and poultry production in order to improve dietary diversity with meat, milk and egg product while creating opportunities for women to contribute to family farm income.

The United States Agency for International Development's (USAID) Afghanistan Agricultural Extension Project-II (AAEP-II) helps Afghanistan's Ministry of Agriculture, Irrigation and Livestock deliver effective services to rural clientele by strengthening cooperation among other government agencies working in the agricultural sector.

A key component of AAEP-II is the establishment of provincial model teaching farms in five core provinces (Balkh, Herat, Kabul, Nangarhar, and Kunduz). This includes providing small grants for lead farmers to replicate good practices on their farms where other farmers can learn. The model farms give farmers an on-the-ground example of the best agriculture techniques and access to trainers.

AAEP-II information services and training also will be available in an additional 20 provinces via a cooperative agreement with the Ministry and its regional directorates.

Activities

- Help agricultural extension workers transfer useful information and technology to farmers.
- Improve rural household food security and income generation.
- Improve nutrition for farm households.
- Improve agricultural services for women working in the agricultural sector.

Accomplishments

As of August 2015, AAEP II staff sponsored 116 trainings on a range of topics reaching more than 6,000 trainees (including 1,471 women and 4,560 men). Participants were government employees (extension workers from the Ministry or its regional directorates, researchers), farmers, community and field farm school leaders, university professors and students, and private sector suppliers. This has led to:

- Improved access to agricultural techniques for Afghan farmers, through a national cadre of professionals and field-based farm schools.

- Increased adoption of improved agricultural practices by farmers, for example on irrigation techniques, pest and disease prevention for crops and land management.
- Increased horticultural sales.
- Better access to vegetables and diet diversity for rural poor, via increased rural incomes.
- Improved involvement of women in ensuring livestock health and production on participating farms.
- Improved farmer technical knowledge on agricultural production, postharvest processing, and marketing.
- Reduced postharvest losses, particularly in grain and horticultural produce.

Marketing

Priority Problems in markets include lack of transportation and infrastructure (roads), barriers in the value chain (such as lack of value-added facilities), packing products are expensive and inaccessible in rural areas, no market standards, poor **postharvest practices** and infrastructure, poor export opportunities, **export standards** are not generally known, undervaluing of local varieties for international marketing (ie landrace pear varieties).

Priority Opportunities include improved postharvest practices, infrastructure for post-harvest (cool storage, packing houses, drying houses, etc.), promoting sorting and grading so that higher quality products can be sold for more, raising awareness of **postharvest** practices, simple devices for measuring postharvest status (thermometers, phsycrometer, etc), establishing international trade agreements.

As Afghanistan dramatically increases its production and exports of horticulture products, effective marketing of these products will be critical. Key components of Afghanistan's marketing strategy are implementing certain certification schemes, attending trade fairs, forward integrating to key markets, negotiation and implementing transit trade agreements with neighboring countries. The total 10-year marketing budget is estimated at \$ **8.2 million**; the major activities are described below.

Hygiene and management: the EU market will soon require all exporters of food to the EU to comply to standards such as HACCP or GMP and to begin implementing management standards such as ISO 900X. These standards are practically unknown on a theoretical level in Afghanistan and there are no certified exporters. An institution should be created to first provide awareness about these standards, and then audit and certify exporters and eventually growers. The estimated cost of this program is \$3 million over 4 years.

Organic and fair-trade: once the hygiene and management systems are in place, Afghan exporters could differentiate their products through certifications such as organic or fair-trade. However, the hygiene standards are a prerequisite for organic and fair-trade products. As in the case of hygiene and management, these concepts are unknown in Afghanistan, so a program to raise awareness and then audit and certify exporters and growers. The estimated cost is \$3.8 M over 4 years.

Grape sector study: significant work and practical experience has been incorporated into the dried fruit and nut components of this plan. Better planning and analysis is needed to determine how to successfully implement a strategy around the successful export of grapes. Logistics issues such as the cold chain and different processing options such as juice and concentrate manufacturing need to be addressed. This study should be conducted in 2006 and the estimated cost is \$400,000.

Trade fair attendance: attending trade fairs is an important part of benchmarking competition and making new buyer contacts. Afghan exporters should regularly attend international trade fairs to enhance market learning. Total cost is estimated at \$1 million with the private sector paying for 80% of this cost.

India forward integration strategy: Afghan exporters are already beginning to move ahead with establishing warehousing and wholesaling operations in India to earn higher margins on dried fruits and nuts. Once this strategy has been tested, it could be applied to other markets to allow traders and exporters to capture more value from their sales and learn about new and existing markets.

Farm Mechanization

The Farm Mechanization Programme is aimed at mid-sized farmers growing crops for the market from 18 provinces: Herat, Farah, Ghor, Badghis, Balkh, Faryab, Samangan, Sar-e-Pul, Jawzjan, Kunduz, Badakhshan, Baghlan, Takhar, Kabul, Bamiyan, Kapisa, Panjshir and Parwan. Farmers apply for the programme through the Provincial Departments of Agriculture, Irrigation and Livestock and, if accepted, receive a week-long hands-on training course on the operation and maintenance of the DF-15 two-wheeled tractor, seed drill, roto-cultivator, reaper and trailer. The project has also trained 250 mechanics specialized in the repair and maintenance of the tractors and attachments, with access to a wide range of spare parts and supplies. When the farmer has completed the training course he or she takes the voucher to the designated dealer and pays the subsidized price of about \$1,400 (65,000 Afghanis) to complete the purchase of the tractor and attachments.

Food Processing

Why is food storage and processing important in Afghanistan? Afghanistan's climate is characterized by intense and long winters in many regions, notably in the Central Highlands, Northern Plains and in the Hindu Kuch range. The cold and snow limit the local availability of fresh foods, especially fruits and vegetables, and prevents the transport of fresh foods from other regions. Many families are thus exposed to high levels of food insecurity and malnutrition for many months, every year. Food storage and processing can help Afghan families improve their diet throughout the year, by increasing the availability of diverse foods in the winter. Storing and processing foods when they are available in large quantities (after harvest) can also prevent wasting produce that cannot be eaten immediately. It can also help households increase their income in several ways: - by adding value to food products - by enabling them to sell produce after the harvest, when prices are higher - by making produce easier to transport - by decreasing the size and weight of the produce, and thus their transport costs. Food processing is therefore particularly beneficial for households living in remote areas which are far away from markets. Many Afghan families already use simple food storage and processing techniques, such as drying fruits and vegetables, or making pickles. However, it is possible to help them improve the quality of their processed foods and to diversify the techniques they use. Food processing can also be introduced in areas where it not yet common, which are generally food insecure areas (such as Bamyan, Badakshan, Ghor, Daikundi, etc.) where food processing can have a positive impact on household food security, nutrition and income.

Common problems related to food storage and processing in Afghanistan

Post-harvest losses of food in Afghanistan are generally high, for the following reasons:

- Fruits and vegetable are not sorted after harvest
- Produce are improperly handled during harvest, storage, transport and at the retail point
- Produce stay long periods in inappropriate storage conditions (too hot or cold, not ventilated and exposed to insects, rodents, and dust)

Food processing techniques often suffer from the following weaknesses and constraints:

- poor hygiene conditions, leaving foods exposed to dust and insects
- limited awareness and knowledge about simple food processing techniques
- low quality of processed foods, making them unsuitable for marketing or unsafe for consumption

- limited access to food processing equipment and materials, in particular packaging

In order to achieve the vision of becoming one of the world's leading suppliers of horticulture products, the Horticulture Working Group drafted ambitious objectives that aim to increase exports of the seven products above from US\$127 million to \$934 million over 10 years. This can be achieved by investing heavily in new orchards and vineyards, building modern processing facilities that meet international standards and continues scanning of international markets to identify new opportunities and adapt to them.

In processing, building or upgrading 22 new raisin processing factories, 35 nut processing facilities are required, as well as additional infrastructure for the post-harvest handling of the fresh fruit export and packaging of all products.

Physical Infrastructure

The physical infrastructure for agriculture must be built rapidly at immense cost. That requires rehabilitation of the rural road system and development of market centers to increase competitiveness and efficiency.

Other Relevant issues.

What are the cross-cutting issues that need to be resolved urgently?

Water for agriculture – rehabilitation of existing irrigation schemes and expansion of areas is key to agricultural development.

Technology Development – Adaptive R&D investment, rehabilitation of at least 7 research centres in different agro-ecological zones for testing new promising varieties.

Extension Services – Opening up the Extension Services Delivery System to include private service providers (NGOs, input and output traders), and Farmer Field Schools (FFSs) are key to technology transfer.

Regulation of Agricultural Inputs - A key area for crop improvement is to develop a more effective system for certifying the pedigree and quality of seeds and planting materials.

Land Policy - Securing the rights of private owners, especially in irrigated and peri-urban areas, improving land leasing and land acquisition arrangements, including for agroindustry, and facilitating the development of efficient land markets.

Agricultural Finance - Supporting the expansion of agricultural finance, such as ADF is critical. Institutions such as Microfinance Investment Support Facility for Afghanistan (MISFA) can support the development of financial products adapted to the agriculture sector.

Women in Agriculture - The training and use of female extension workers across interventions is critical for effective services supporting female farmers in Afghanistan.

V. Status of Agricultural Extension and Research system.

To prosper, farmers need improved technology. This is especially true of agriculture rather than industry because of land constraints in agriculture. Yields must be increased. Protection from disease and pests must be provided. A constant search must be to discern and better satisfy changing human tastes.

Research in marketing and production systems is required. Priority commodities gives detail on how extension systems start by responding to farmer's needs, conveying information about their needs back to the research system and following through with farmer field days, on- farm trials and demonstrations. To achieve these goals, a bottom-up system that responds to farmers needs with modern, constantly improving technology that facilitates a constant increase in productivity, competitiveness and incomes.

Research, extension, and farmers associations lend themselves to internal priorities consistent with the commodity priorities and sub-priorities delineated in the earlier chapters. A high growth rate in agriculture in Afghanistan is highly dependent on exports for a significant portion of incremental production, which also means that reliance on the transfer of technology from international competitors cannot be sustained for very long.

For the near future, Afghanistan can grow on known technologies and compensate for the lack technological know-how with the currently low farm wages. Eventually Afghanistan will want to compete more directly in technology in the context of higher farm incomes and rural wages. Developing a research programme takes time, especially given the paucity of trained scientists. The effort must be commenced immediately. Because modern research is expensive, only a few commodities and functions can be covered. The horticulture and food security chapters are clear on the priorities and adhering to those priorities is essential.

At first, the programme will focus on applied research that is hardly distinguishable from extension. Over time, the private sector may take over some of the applied types of research while asking for support from the public sector for more upstream research. This calls for considerable donor supported technical assistance for the research system.

Overall immediate priorities are for research in support of food security (wheat and farming systems and pest and disease control) and research in support of the horticulture priorities. Looking toward the future, livestock growth is also important. The work of International Center for Agricultural Research in the Dry Areas (ICARDA) and International

Maize and Wheat Improvement Center (CYMMT) with their considerable expatriate expertise that includes the training of Afghans sets a desirable standard. Such efforts are currently needed in horticulture and eventually in various aspects of livestock production.

Because of the lack of trained scientists in Afghanistan and the urgency of getting started, expatriate scientists on long-term assignment must play an important role. The Rockefeller model in India was a highly successful example of getting the green revolution started immediately while building Indian capacity to keep it going. The expatriates must conduct research in close collaboration with Afghan colleagues. Afghans must also train at research centers in other countries. This provides critical research while building national capacity.

The expatriate research participants should be experienced on the practical side of applied research to provide direction in orienting the extension system towards best modern practices. This is an important spin-off from the early stages of building research capacity.

The investment plan allocates \$24 million to extension (in addition to large allocations in the horticulture and food security chapters); \$12 million to food security related research, including the wheat and farming systems programs with their ICARDA and CYYMY inputs, \$5 million and \$3 million respectively to pest control and post-harvest technology; and \$7 million to horticulture research.

Role of Research for Development in agriculture

Since science and technology are the drivers of change, the agricultural revival / renewal has to be basically knowledge-intensive, technology led and resource based. Stagnating productivity growth in the sector and declining total factor productivity in agriculture are major challenges to meet the needs of a market-driven, competitive regime. In this context, **Research for Development** assumes more importance because it is a cost-effective method for promoting sustainability and attaining competitiveness. Harnessing advances in frontiers of science in selected priority areas with larger spin-off benefits by focusing on basic and strategic research also assumes significance. There is also a need to revisit the existing public extension system, which is considered to have been weakened over the years in the state, districts and block levels. Hence, there is a serious search for alternatives to the present public agricultural extension system.

A critique of the existing agricultural research and extension system

We have a good network of agricultural research institutions in the country, which is facing serious resource crunch to meet the existing and emerging challenges. The Research System has although significantly contributed to the agricultural progress since independence,

but the situation has changed and challenges foreseen in future are complex and the system has to prioritize and focus itself to the jobs for which it has a mandate as also competitive advantage. Similarly, the technology delivery system requires an immediate re-look. Technology development and delivery need to be in a continuum and should be interactive.

The research system has to forge linkages with **the public extension system** at all levels, particularly at the district and below levels where the actual uptake and impact happens.

Keeping in view the needed change in technology development and delivery system, at the same time utilizing the existing system, a framework for technology development and delivery is suggested. It is realized that **far greater emphasis on basic and strategic research is essential** in pursuit of effective technology development.

VI. Public and Private institutions and their relevance in Agricultural development.

Although the Ministry of Agriculture in Afghanistan was established in 1848, agricultural extension activities started only around 1920s. The Agricultural Development Bank of Afghanistan was established in 1954, and agricultural research and extension organizations were established during 1960s and 1970s with the assistance of the United States Agency for International Development (USAID).

Afghanistan had a well-established extension service during 1970s. The World Bank started the Training and Visit (T&V) approach during the mid-1970s as well as USAID providing financial and technical assistance to strengthen both agricultural research and extension. Also, under USAID scholarships, the government of Afghanistan sent dozens of nationals to the American University of Beirut and other institutions for higher education in agricultural extension. Also, **the American Peace Corps Volunteers (PCVs)** also ran training programmes for extension agents in Afghanistan. At that time, the country had 24 research stations, with a combined staff of over 1,000. Similarly, there were about 216 extension units (one in each district), with an average of nine staff members for each unit, who also functioned as community mobilizers. The total number of extension staff in 1978 was comprised of about 2,520 persons. At that time, the country was almost self-sufficient in cereal production.

The country had barely started recovering from effects of long wars when the **9/11 incident** occurred in 2001, followed by a US-led invasion of Afghanistan. Although the Taliban were quickly ousted from power, the war did not stop due to insurgencies. Several years of almost non-stop bloodshed forced large numbers of Afghans, including farmers, to flee to other countries.

In spite of the ongoing war, most government institutions, including extension, started functioning, receiving huge financial aid from USAID and other donors. In 2006, the Ministry of Agriculture, Irrigation and Livestock (MAIL) came up with a Master Plan for the development of the agriculture sector, under which central and regional “research and extension boards,” were to be created. The objective of the extension services, as mentioned in the document, was “...to transfer agricultural technologies and practices to farm community for adoption purposes”. The methods for technology transfer were specified as individual contacts through office and home visits and letters; group contacts through field demonstrations, field days, village meetings and field visits; and mass contacts through publications, exhibitions, radio and television. In 2008, the MAIL, with the assistance of the Food and Agriculture Organization of the United Nations (FAO), developed the National Medium Term Priority Framework (NMTPF) 2009-2013.

MAIL is now implementing the National Agricultural Development Framework (NADF) prepared in 2009. Four key areas are natural resource development, agriculture production and productivity, economic re-generation, and program support and change management. Another institution called Comprehensive Agriculture and Rural Development Facility (CARD-F) is being developed which will serve as linkage between MAIL and the Ministry of Rural Re-habilitation and Development (MRRD) programs. Although extension is not explicitly mentioned in the implementation program, it is assumed that it will cut across all development initiatives for the welfare of farmers.

Presently, MAIL has primary responsibility for providing extension services to farmers. A few other public institutions also undertake some extension activities. The government has asked multilateral and bilateral donors and NGOs to assist in the delivery of extension services. A number of international NGOs and several US consulting companies are now receiving funds from USAID and are engaged in extension activities or other related extension work. However, a public extension service, which has neither adequate human nor physical resources, still operates irrespective of its impact. While extension agents are barely present in most districts, only Kabul District has the highest concentration, i.e. about 76 extension workers.

Recently, USAID has approved a \$14 million Afghanistan Agricultural Extension Project (AAEP), which has been designed to assist the MAIL to deliver more effective, demand-driven extension services to producers and other rural clientele. Anticipated results of the project include a cadre of extension staff with the technical expertise and appropriate methodologies to effectively extend information and knowledge; increased public accessibility to, and use of, government extension services; development of extension training modules and

educational materials based on high-priority needs; targeted agricultural universities, vocational high schools, and technical institutes with increased capacity to prepare future extension personnel; improved services for women working in the agricultural sector; and a pluralistic approach to extension that responds to farmers needs for research-based technologies, builds upon the innovations of Afghanistan farmers, and promotes coordination among the various entities providing extension-related services.

MAIL's another USAID funded five-year Agricultural Research and Extension Development (AGRED) program will provide \$65 million to strengthen agricultural research and extension services, build the management and technical capacity of the extension and research directorates in 50 districts, and rehabilitate research centers, as well as extension stations in seven agricultural zones as stated by the Minister.

In addition to USAID, Afghanistan is being assisted in developing various aspects of its agriculture sector by the World Bank, regional development banks, European Union, UNDP, FAO, almost all major bilateral European and Middle-East donors, as well as China, Japan (JICA) and other countries. There are at least 14 externally funded major projects in rural and agricultural development. In addition, FAO is implementing at least 22 projects funded by various donors.

Major institutions providing extension and advisory services

Public Institutions

Ministry of Agriculture, Irrigation and Livestock (MAIL)

- Agriculture Extension General Directorate (AEGD), The AEGD is one of the four general directorates under the Deputy Ministry of Agriculture Affairs, the other three general directorates covering research, livestock and animal health, and natural resources management. The AEGD has three directorates, namely crops extension, family economy, and horticulture. The Ministry's website does not show specific functions of the AEGD, but, logically, extension seems to be involved in almost all major activities of the Ministry. Presently, the AEGD is comprised of about 600 staff who are aging, have not received meaningful in-service training for years, and have not been paid satisfactorily in spite of the fact that they work in the field under conditions are dangerous. It is hoped that the new USAID project on strengthening agricultural extension will reform the extension services in line with the latest trends.
- Ministry of Rural Rehabilitation and Development (MRRD) the mission of MRRD is to ensure the social, economic and political well-being of rural society, especially poor

and vulnerable people, through the provision of basic services, strengthening of local governance and promotion of sustainable livelihoods free from a dependency on illicit poppy cultivation. The Ministry follows sustainable rural livelihood strategies to empower rural communities through good local governance, increased productive infrastructure, enhanced livelihoods, informed decision making, and mitigation of shocks.

- The Afghanistan Institute of Rural Development (AIRD), AIRD is an institution under MRRD. The primary mission of the AIRD is to support the implementation of comprehensive rural development toward socio-economic development and poverty reduction in Afghanistan through training and education services, provision of research and policy inputs, and dissemination of results and findings to stakeholders. AIRD works under the Local Governance Pillar of MRRD. Its current organizational structure comprises six units covering training and education, research and policy, impact evaluation, information dissemination & external relations, rural technology park, and administration & finance. AIRD has 83 staff members including 50 contract staffs and 43 permanent civil servants.
- Agricultural Research Institute of Afghanistan (ARIA), Kabul, (No information on ARIA's specific activities are presently available).

Non-Public Institutions: Private companies

Presently, no private companies have developed a “well established” private extension service within Afghanistan. A few private companies, however, cover agriculture among other businesses by selling various agricultural inputs. In 2011, the National Group of Improved Seeds in Afghanistan complained that although the government had promised to buy improved seed from 39 private national agricultural companies, it was ignored by the government after the companies had already produced 32,000 metric tons of seed, and it was done in spite of great demand for seed by the farmers. Examples of these national, private companies are:

- Afghanistan Chemical and Fertilizer Company
- Afghan Seed Company
- Bahar Agricultural and Seed Company, Ltd.
- Helal Agricultural Seeds Co., Ltd.
- Noor Agricultural Seed Company

Non-governmental organizations

Just as in certain developing countries where long wars severely damaged public institutions and attracted NGOs to perform their functions, the same phenomenon has been occurring in Afghanistan for decades. One recent estimate of the number of international and indigenous NGOs working in Afghanistan is over 800, giving an impression of an ongoing competition among them. Most NGOs are international, funded by bilateral donors. In the past when the civil war had started in Afghanistan, a significant number of NGOs became active both in rehabilitation of rural people and the provision of agricultural inputs. Since the present war started in 2001, most NGOs have been working in collaboration with the US and European countries that are participating in the war. In order to ensure good quality work by the NGOs, the **US Department of Agriculture (USDA)** also attached agricultural advisors to the Provincial Reconstruction Teams.

Six examples of NGOs which are active in agricultural extension in Afghanistan are as follows:

- The Agha Khan Foundation which seeks to strengthen local and commercial agricultural operations as well as district level producer associations. In addition, it puts a focus on Integrated Pest Management, Integrated Crop Management, Farmer Field Schools, value-chain and forming a partner with MAIL.
- Afghan Aid has its own extension unit; uses Farmer Field Schools approach to provide training to farmers; develops value chain; performs extension activities in collaboration with agricultural technology transfer centers located in each agro-ecological zone in support of district level Agro-Ecological Committees.
- ACIDI-VOCA has organized basic veterinary training sessions for farmers covering 200 villages and arranged vaccinations for 136,000 animals.
- BRAC introduced the Agriculture and Livestock Development and Credit Support Programme in Afghanistan in 2003.
- Dutch Committee for Afghanistan has established Veterinary Field Units in 27 provinces in addition to a special cooperative of para-veterinarians, and
- OXFAM which is running a food gardens program

Consulting companies

Many US consulting companies, mostly funded by USAID and are working in collaboration with USDA, have been performing rural and agricultural development activities including extension work. A few examples are:

- **CNFA** (Citizens Network for Foreign Affairs) which has established demonstration plots for farmers and provided training in the management of underground vegetable storage units, Also, it has facilitated the creation of the Farm Service Center Association of Afghanistan (FSCAA), which sets standards for stores and allows them a vehicle to jointly pursue opportunities.
- **Chemonics** has organized national agricultural fairs for farmers to show them improved agricultural production practices such as laser land leveling, and
- **DAI** (Development Alternatives, Inc.) which is involved in rebuilding the agriculture sector by improving access to markets, farm inputs and business services in rural areas

Farmers-based associations, cooperatives and societies

Even though cooperatives are not looked at favorably for various reasons, the current Master Plan (2008-2013) of the Afghan government has a target of establishing 5,000 new cooperatives. Presently, no cooperatives are actively involved in business with the exception of a few which are supported by agencies like FAO. Donor agencies, consulting firms and NGOs are helping Afghan farmers organize into farmer associations. It will, however, take time for them to mature due to lack of peace in the country. Two examples of such farmer associations are:

- Regional Poultry Farmers Associations which was formed with FAO's assistance, including 300 Village Groups covering 16,000 families, and the Poultry Producer Groups of village women established through intensive training and organization, and
- Afghan Soybean Farmers Association, which was the first association of its kind, formed in Kapisa Province in 2011.

List of Extension Providers

The following list shows an excerpt from the GFRAS Directory of Extension Providers for Afghanistan. Some of these entries may be specially marked for having more detailed information in the database of the Worldwide Extension Study WWES.

Training options for extension professionals

There are many established universities in Afghanistan with Faculties of Agriculture, which offer degree programs in various agricultural disciplines. Pre-service education for extension professionals takes place at these academic institutions. Major universities with faculties of agriculture are:

- Herat University, Herat

- Kabul University, Kabul
- Kandahar University, Kandahar
- Paktia University, Paktia

The four universities listed above provide in-service training for the extension staff, as well as these institutions, including:

- **The Afghanistan Institute of Rural Development**
- **Agricultural Training Center, Kandahar.** This ATC was re-habilitated and renovated by USAID, with a residential facility that will house local agricultural extension agents and has available lecture and conference rooms, as well as kitchen space, all powered by solar energy. Available greenhouses with drip irrigation, provides farmers with hands-on training in best agricultural practices.
- **Nangarhar Afghan Agriculture Training Center**, Nangarhar, as well as the above donor-funded NGOs and Private Sector firms linked to extension
- **Info-mediaries and information and communication technology (ICT)** for agricultural advisory services

VII. Present capacity building programmes and potential areas.

Capacity building in the Policy and Planning Department is the key to Afghanistan having and implementing an integrated strategy with priorities for achieving rapid growth in agriculture and consequently prosperous farmers, enhanced government revenues, poverty reduction, and substitution for illicit crops. The Department will play the central role in ensuring that donor programs fit into the broad strategy and priorities of the MAAHF and reinforce each other and the government's efforts to achieve results. A small cohesive staff has been defined consistent with personnel availabilities. To achieve the desired results a large, phasing out, technical assistance is required that will help conduct the necessary tasks while training their counterparts in the Ministry. Concurrently a substantial training program is required including several persons sent out for Master's Degree. Furthermore, a substantial budget is required for vehicles and equipment.

The Ministry is fully endorsing the open market economy policy and is cognitive of the crucial role that the Economic and Planning Department could serve as a "think tank" to the Ministry in formulating policy, designing projects and programs, monitoring and assessing accomplishments, coordinating different stakeholders work, and drafting appropriate law and regulations. At the same time, the Economic and Planning Department could be instrumental

in enhancing inter-departmental cooperation inside the Ministry and between the Ministry and other outside institutions serving the agricultural sector.

While a Planning Department existed in the Ministry since its creation, the Department did not work on the basis of a clear term of reference and was weak due to numerous factors. Under the new organization, the General Department of Policy Economic Analysis and Planning (PEAP) would have a pivotal role in designing appropriate strategies, and identifying priorities; formulating policy advice based on proper analysis and accurate data; conducting prospective studies in crop production, trade, price and marketing; monitoring and evaluating the projects and programs; and establishing liaison and strong bond with donors, sister ministries serving the agriculture sector, and inter Ministry departments.

Under the new organization, PEAP consists of six departments:

1. Policy and Analysis
2. Planning, Program and Project Development
3. Monitoring and Evaluation
4. Statistic and Agricultural Market Information
5. Foreign Affairs
6. Legislation Review and Analysis

The Ministry has a keen interest in strengthening PEAP immediately so that this Department could be instrumental in upgrading the rest of its departments and enhancing its resource efficiency.

The main objective of strengthening PEAP would be to increase farm income and marketing efficiency through appropriate strategy and policy measures, improve efficiency of the budgetary resources of the Ministry, avoid duplication of efforts, and enhance stakeholder participation in the design and implementation of the projects and programs, encourage private investment in agriculture, alleviate poverty, promote efficient utilization of natural resources, and improve coordination and communication inside the ministry departments as well as other institutions and donors involved in the agricultural sector. Its specific objectives are:

- Create an enabling capacity to formulate appropriate strategy, policy and position papers in the Ministry to achieve national policy goals in agriculture.
- Identify and design in collaboration with technical department staff viable investment proposals for financing.
- Establish an monitoring, evaluation and progress reporting system for the projects and programs to enable the senior staff of the Ministry to gauge the impact of different

interventions in the sector and provide appropriate directives for streamlining implementation.

- Provide a data bank for the agricultural sector through close collaboration with Central Statistic, and with any sample survey activities, collecting price and marketing information for selective agricultural crops.
- Coordinate with the donor community and the Ministry's provincial field departments, and other stakeholders in agriculture.
- Formulate appropriate legislative and regulation proposals for orderly functioning of farmers groups, preservation of natural resources, and safeguarding quality of agricultural inputs and outputs.

Addressing food security and malnutrition will require that capacity building efforts be integrated in all the strategies aiming to improve food security and nutrition. Capacity building activities should include:

- The training of MAAHF staff members and other partners, including national NGOs, in a variety of technical disciplines appropriate to activities initiated by MAAHF, giving special attention to the extension agents at the district level.
- The training of key members of the farmers' association in accounting and good management practices, including simple techniques of financial analysis at farm level.
- The training of the staff of Community Development Councils (CDCs) in project identification, preparation, appraisal, monitoring and built-in evaluation.
- The training of lead farmers to serve as facilitators and agents of change in the district.
- Orientation-cum-training visits of farmers to demonstration farms.

Training: Integrated linkages between research, extension and training are key for MAAHF impact at the field level. Providing training to research and field level extension personnel improves field level capacity on a continuous basis that is needed for the effective implementation of research findings. Training topics to be communicated to farmers are prepared on the basis of research results and the needs expressed by farmers.

Farmer training on crops and livestock will be conducted as part of an integrated field school using a practical and participatory approach. It facilitates the horizontal and vertical communication process that is essential to the teaching-learning process and raising the level of knowledge and skills of the farmers.

This village-based integrated farmer' field school approach is not only useful in raising

the level of knowledge and skills of the farmers, but to encourage positive competition among farmers, that is so essential for the achievement of economic progress and social cohesion. The farmers' training program is to be carried out either on the demonstration site or on the farm of the pioneer or progressive farmers in the village.

Mediating the appropriate skills and technologies cannot be effective unless there is a thorough understanding of the farmers, what they do, why they do it, and what they need, or think they need, in the way of improved skills and technologies. Any extension worker, or any researcher, must ground themselves in the needs and perceptions of the farmers.

It is anticipated that nearly all the research in the immediate future will be relatively simple and straightforward adaptive research. This is what is needed in the country. However, this will form a solid training ground for young researchers who will eventually take up more ambitious initiatives in original research. Even now, the first step in crossing wheat varieties has taken place, although the emphasis must remain on some quick results with the potential for immediate application.

The subject of agricultural research and technology transfer has been regarded as a key issue since the first natural resource management policy was being formulated. As a key area, the MAAHF has already developed an Agricultural Research and Technology Transfer Systems (ARATTS) policy and strategy, and formulated several programs for donor support.

VIII, Training priorities of the country in Agriculture and allied sectors.

The Agricultural Challenges are fourfold:

- Need for **enhanced production and productivity** to feed the growing population and to retain the economic viability of agriculture as a profession.
- Need for **address issues of equality and uneven development** so that gains of growth are more equally shared across regions and people.
- Need to understand and **address issues of sustainability**; environmental, production, institutional and fiscal.
- Need to **enhance profitability in agriculture** in the light of liberalization process and open up international markets.

For the agricultural development both **Frontline Extension and Field Extension** are very much essential.

Agriculture is **Complex, Diverse and Risk Prone**. The agricultural development activities in should address all these three issues for sustainable livelihood security for the

farmers.

For agricultural development the producer i.e., the farmer is the main partner. He should be provided with quality and time bound technological inputs, services and information. Apart from that, the following strategies are to be given more thrust for the development of agriculture in the state.

- Harnessing the value of cutting edge technologies for agricultural transformation.
- Natural resources management and conservation agriculture for sustainability.
- Rational and judicious use of farm resources and inputs to increase net income of the farm.
- Effective and timely agricultural operations through mechanization.
- Forecasting and forewarning for combating characterized risks.
- Focus on entrepreneurship development through secondary agriculture.
- Promotion of farmers' innovations for location specific technology development.
- Act as pivotal centre for exchange of information for future research and development.

Technology Development and Delivery System in Agriculture and allied Sectors

In different models, linkages will vary depending upon the nature of crop/commodity/enterprise and technology service in involving relevant stakeholders to a specific technology-enabled zone/area/situation. Such linkages will not only boost the production and productivity but also will create an enabling environment for job opportunities, rural marketing economy and export opportunities.

i) Seed Production

Development of improved varieties and hybrids and availability of their quality seed is the most vital and critical input for increasing the productivity of crops. Appropriate seed ensures its suitability for adoption in specified agro-ecologies. It also ensures its acceptability for consumer quality preferences, trade and industry suitability for various products for domestic and international markets. There is a tremendous diversity of crops and agro-ecologies. The breeders, geneticists, plant pathologists, physiologists, biotechnologists and others are engaged to work on basic, strategic and applied aspects in order to develop quality seed and associated production and protection technologies. These technologies are tested and demonstrated in the first instance. Breeder seeds are produced for production of foundation and certified seeds in the chain before it is made available to the farmers. For efficient development and delivery of improved seeds of varieties/hybrids and associated production and protection

technologies, the following system is being suggested:

- Multidisciplinary commodity and region specific technology development and testing by the regional research stations in a network mode in involving the local scientists, farmers, extension agencies and industries so that the output reaches the stakeholders without any gestation period. Frontline demonstrations have to be undertaken in the region to ensure technology absorption and awareness creation to the maximum extent.
- Production of breeder seed and test stock seed of varieties and parental lines of hybrids to be undertaken by the research institutions, while the Department agencies/private sectors/self-help group/ farmers associations/individual farmers will take up the production of foundation/certified/truthfully labeled seed including delivery mechanism for availability of seed to the farmers/growers.
- Production of truthfully labeled seed by the research institutions at their own farm to a limited extent in addition to production of more parental lines of hybrids/other varieties to expand the base of availability of quality seed to the farmers. Besides, research institutions can also augment the production of foundation seeds.
- Appropriate policy interventions by the Departments/ agencies for ensuring the availability of critical quality inputs, adequate price support policies, market infrastructure development, agro-processing industries and other facilities for optimum utilization of potential of high yielding/hybrid seed.

In the fast changing technology domain, it is imperative that awareness is brought about without any loss of time. Hence, it is necessary to ensure stock seed production and ensure supply of a limited quantity of seed by breeders as supported development activity to each village which can serve as demonstration, demand generation as well as in inbred varieties farmer-to-farmer seed flow in the village in the shortest possible time. **This new system is believed to bring much needed transformation by cutting the time lag.** To avoid any misuse of precious seed, treated seed could be supplied which will also take care of seed borne diseases.

Farmers Participatory Seed

Production: Availability of quality seed of improved varieties and hybrids is grossly inadequate and is one of the major constraints for enhancing production. High volume - low value seeds, predominantly the farmers are using farm saved seeds resulting in about 80 per cent of the area sown with farm saved seeds of old and obsolete varieties. With the



exception of high value – low volume seeds, the seed production of low value - high volume crops is primarily left with public sector agencies due to the bulky nature of most of the self-pollinated crops, more investment on infrastructure and less remuneration. Although there is enough breeder seed production in most crops, further seed multiplication through foundation and certified stages are the key constraints for availability of quality seed material. For popularizing newly developed varieties and promoting seed production of these varieties, seed minikits of pioneering seed varieties will be supplied to farmers. Seed exchange among farmers and seed producers will be encouraged to popularize new/nontraditional varieties. Seeds of newly developed varieties must be made available to farmers with minimum time gap. In this regard seed producing agencies will be encouraged to tie up with research institutions for popularization and commercialization of these varieties.

Seed Village Concept: The gap between requirement of quality seeds for the state and their supply rate is large. The supply of seeds by the public sector organizations and private agencies is insufficient to bridge the gap. The gap may be reduced by involving the end users i.e. farmers in the production of quality seeds. A group of farmers or villages will be identified under Seed Village Concept to produce a particular crop/variety. Villages with a potential of producing seeds will be identified around the research stations for easier and quality multiplication of varieties of different crops.

The main objective of the seed-village programme is to involve farmers in seed production and thereby make quality seed available at a reasonable price. Another objective is to demonstrate and saturate selected potential villages with improved varieties/hybrid seeds of major crops. Through this the Research stations can produce large quantity of quality seeds. Scientists should monitor such activities in all stages of seed production. This activity will

provide employment to seed growers and to several other villagers for seed processing, bagging and distribution.

- For implementation of seed production under Seed Village Concept, villages with high potential of production are to be selected.
- Before the start of the programmes, through a training programme, villagers are to be educated about the 'Seed Village Concept' and its importance in disseminating the improved production technologies and saturating with quality seeds.
- Secondly, the Research stations should supply genetically pure seeds of improved varieties on credit/ exchange basis.
- Thirdly, the breeders of respective crops along with scientists should visit seed production plots of each village regularly with 10-15 days interval and provide technical guidance to the farmers regarding seed production during the crop growth.
- During the crop season, the training programmes are to be organized to educate the farmers on seed production skills.
- The Seed Carnivals are also to be organized by inviting all the farmers of that village and of nearby villages to make them aware about improved varieties, importance of quality seed in getting increased yield and disseminating information regarding availability of seed.
- The seed thus produced is to be purchased by the research stations to the extent of 70-80 percent for distribution under various government programmes.
- The remaining 20-30 percent of the quality seeds left with the seed producing farmers under this programme will be encouraged to distribute the seed to their relative/ neighbours/ other fellow farmers within and outside villages to saturate the nearby areas with quality seeds.

Under 'Seed Village Concept', besides the aim of popularization of improved varieties/production technologies, the client (Public-private seed industry/seed indenter) oriented seed production is also to be undertaken. During the production programme, innovative techniques viz., seed treatment with bio-agents, pest control through IPM/bio-agent are to be addressed to minimize the cultivation cost. The training on post harvest handling of produce is to be arranged. Since the scientists are visiting the seed villages regularly, the problems faced by the farmers in the crop production of other crops are also to be addressed. This system will enable to develop intimate scientist-farmer relationship thus resulting in

efficient transfer of implementable new technologies including varieties / hybrids and feedback of new problems to initiate research. In few villages, the farmers can establish the ‘Seed Growers Associations’ for strengthening the seed production activities. The research stations should organise every year ‘Seed Carnival’ before the start of seasons. During the Carnival, sale of seeds along with technology demonstration have to be arranged. With the implementation of the this programme, the seed growers will get educated on the improved crop production technology, the quality seeds for self use and the employment opportunity and the additional monetary benefit. With this concept, the research stations can produce more quantity of quality seeds of improved varieties/hybrids of different field and horticultural crops.

Seed Quality Assurance In order to ensure high quality of seeds produced, a systematic approach right from maintenance breeding to seed treatment and packing is to be followed. Genetic purity is to be ensured through scientific nucleus seed production by growing progeny rows of each improved variety / parental lines of hybrids. Frequent field monitoring and training to the local field staff helped in implementing roguing operations. Training and on farm demonstration on crop management and post harvest handling enabled to mitigate seed moisture, health and physical purity problems. Farmers and local field staff are to be trained for seed quality assessment by local means available at villages. Final seed quality assessment is to be done at notified seed testing laboratory and in University own seed testing laboratory. Grow out tests and field emergence tests are also to be conducted to confirm the quality of seeds.

Modern Post Harvest Services

- Processing unit with a capacity of 4 tonnes per hour.
- Vegetable seed processing with a capacity 0.5 tonnes per hour.
- Pouch packing unit with a capacity of 0.5 to 5.0 kg.
- Seed driers with a capacity of 1.5 tonnes.

ii) Farm Mechanization

Farm mechanization facilitates timeliness in operations, better placement of inputs, lower cost of production and reduction in drudgery of farm workers. It plays an important role in enhancing the productivity and profitability of agriculture by 20-30 per cent reduction in cost of production and 5-20 per cent higher cropping intensity. Mechanization involves development of tools, equipment and ensuring adequate power for carrying out the on-farm and off-farm agricultural activities. The technology development in farm mechanization begins

with the identification of local needs and further design and development of tools, equipment and renewable power systems including market search through basic and strategic research by the research stations. Based on the commodity and location-specific packages developed through multilocation trials, appropriate training modules and manufacturing drawings are prepared before developing interface with the entrepreneurs and industries for making the tools and implements available to the farmers on reasonable cost. The Development Agencies and financial institutions need to provide necessary financial support for large-scale promotion of farm mechanization.

After identifying the major problems that hinder the transfer of mechanization technology, we

now try to identify strategies or means so that we could penetrate these barriers.

Information Dissemination and Management: A popular phrase in a local news segment is that “knowledge is power.” Information is the key to making sound decisions. It is this information that we need to impart to our farmers so that they may be able to have better control of their lives. Information dissemination activities through tri media, displays, farmers’ day, and the like, should be actively pursued in the countryside where these are wanting. Actual field demonstrations and loan-out of prototypes are conducted right at the farmers’ field or at pilot areas. With the rich culture, we have gained a lot of traditional or indigenous agricultural knowledge. Incorporating this knowledge into the mechanization system would limit farmers’ reluctance to the mechanization technology. Popularized versions of training and technical materials in the local dialects would promote better understanding of these materials.

A centralized information database, linking all information concerning agricultural mechanization that can be accessed by farmers, extension personnel, scientists, engineers, students, and policy makers would greatly contribute to the transfer of the technology.

Creation of Farmers’ Organizations:

Encouraging and helping farmers put up their farmers’ organization have been an effective approach toward development. With the formation of an organization, the farming community can be empowered with the knowledge and skills to identify its needs and problems, harness its resources to deal with this problem, and take action collectively. Furthermore, it is the take-off point for some of our strategies.

Trained workforce to manage coconut groves
KVK imparts training to 'coconut technicians'

Team of Certified Para technicians with Enhanced Self Esteem

- Paddy Task Force
- Coconut Technicians
- Vegetable Technicians
- New Generation Workers = Manager + Farm workers + Technocrat
- Trained in use of Machinery Technologies
- Personality Development
- Customer Relationship

They Do

- What Farmers Do
- What Farm Workers Do
- Apply Science Based Technologies
- Undertake Work on Contract Basis
- Shift in Focus of Extension From Farmers to Technicians

COCONUT TECHNICIAN TEAM
കോക്കനട്ട് ടെക്നീഷ്യൻ ടീം
A KVK Kannur concept to combat labour shortage

സേവനങ്ങൾ

- വിളവെടുപ്പ്
- മരം കടം നിയന്ത്രണം
- വളപ്രയോഗം
- ഇടവിള കൃഷി
- തടവെടുക്കൽ
- നദീതട

തൊഴിലിന്റെ അന്ധതയെ പരിഹരിക്കാനും കരാറടിസ്ഥാനത്തിൽ

Technical support, facilitation of credit assistance, land clustering and consolidation, and the like will not work without cooperation among farmers. Also, the farmer's organization is the usual entry point of developmental programs by government and non-government organizations (NGOs).

The premise for land clustering and consolidation is to transform the land and facilitate the adoption of larger-scale mechanization rather than fitting the mechanization technologies to small farms.

Clustering involves the removal of fences and other obstructions along farm property boundaries to form a contiguous land area that will increase the efficiency of operation of large machines to synchronize land preparation, planting, and harvesting; minimize turns at headlands and other interruptions; and reduce energy inputs. Land consolidation, on the other hand, improves land clustering by refining the layout of the fields in the clustered area without regard to property boundaries.

Focused R&D Activities: Due to increasing cost of fossil fuel, priority should be given to develop technologies to harness nonconventional sources of energy. More energy-efficient machines such as cultivating machines to incorporate plant residues into the soil to increase fertility, seeders and planters for optimum planting uniformity, crop protection for rationalized use of chemicals, and harvest and post-harvest operations that include village-level processing of farm products and by-products need to be continuously developed.

Training for Farmers, Extension Agents and Manufacturers: The education and training of farmers and operators are at times inadequate and need intensification by both government agencies and machinery-manufacturing firms. The R&D results are not reaching the intended end-users and, therefore, could not create the necessary impact in the countryside. Local manufacture of agricultural machinery can be promoted through trainings on village-level craftsmanship, manufacturing technology, operation, repair, and maintenance. Local manufacturers can be provided with technical assistance in the fabrication of machine prototypes. Extension agents should have ample time to learn a technology before they can effectively teach others. If this is not realized, extension work would be like "the blind leading a blind." Extension personnel may need more training than our farmers to garner credibility.

Model Farmers, Model Farms Farmer leaders are often emulated by their co-farmers. Farmers have a way of convincing other farmers to adopt a technology that they have successfully and profitably utilized. This is the basis for the model farmer, model farm strategy. However, this is double-edged; a bad experience by a farmer regarding a certain technology could spread like wildfire and could create reluctance rather than acceptance. However, a

sustainable working system being used by a farmer cooperator would enhance receptivity to the mechanization technology. Revitalizing Government Policies Reviewing the policies on tax regarding the importation of agricultural machinery and parts (engines, pumps, sprayers, etc.), manufacturing machines (lathes, milling machines, TIG/MIG welding machines), and all other materials and equipment for the manufacture of agricultural machinery would have a large effect on mechanization. At the same time, the government should try to make arrangements for companies to manufacture the agricultural machines and parts locally. This in effect would also bring down the cost of machinery in the market.

Monitoring and Evaluation: There is no sense in developing machines that nobody is using. Technology verification and assessment would permit evaluation for developing, modifying, or entirely stopping the development of a technology. For instance, technology adoption assessment was conducted for the UPLB hand tractor. The study established the potential of the technology and revealed possible modifications to further enhance its performance and acceptability. It also revealed that locally trained manufacturers lacked some knowledge in marketing strategies.

Custom Hiring of Farming Operations: Instead of buying their own machinery for their field operations, some farmers resort to custom hiring. Operations such as land preparation, harvesting, drying, and milling are mostly the operations available to such services. Payment can be in the form of cash or certain percentage of the harvest. This is currently a viable mechanization relationship between farmers and contractors. The custom service operation appears to be a workable strategy for promoting mechanization because it is based on a direct client-provider relationship governed by normal market forces. The farmer has power over the provider and can demand quality and value, otherwise the next provider gets the contract. Here, the limited-resource farmer is in control over the essential services provided.

iii) Post-Harvest Technology

Post-harvest technologies are commodity and location-specific and appropriate basic and strategic research inputs including varietal characteristics of a particular crop, post-harvest physiology, nutritional physiology, food biochemistry, and post-harvest ecology are assessed before the intended products and processes could be developed by the research stations. These research inputs are essential for developing products, processes and ultimately design of pilot plants.



Based on the assessment of market response and consumer acceptance, standardization of product, process and equipment is undertaken to ensure the quality and safety of the output. These developments are then evaluated and demonstrated in different locations for the entrepreneurs, NGOs, self-help groups, and cooperatives for large-scale promotion and adoption of the post-harvest technologies. Banks, Development Departments and other agencies are given the exposure for enabling them to extend necessary financial support.

iv) Rain fed Farming through Watershed Management

The productivity of rain fed areas occupying 60 per cent of cultivated area and supporting 59 per cent of population is still low and is a major concern of policy makers, planners and R&D investments portfolio. Even after achieving the full irrigation potential, nearly 50 percent of cultivated area will remain rain fed, constituting an important source of food and livelihood. Therefore, integrated and holistic development of rain fed areas within the perspective of watershed management constitutes one of the key elements of increased production. There is a need to develop appropriate technology to remove the production constraints of these areas and establish an effective system for the dissemination of the technology to the farmers. The research back up concerning basic and strategic issues would be provided by the research stations. Research is required to be focused on run-off and recharge modeling, soil-water-plant interactions, water harvesting, *in situ* moisture conservation, integrated nutrient and pest management, contingent crop planning during droughts and drip / sprinkler / fertigation systems. The socio-economic-environmental-market imperatives should

be given due consideration while framing up technologies. The technology generated is required to be further assessed and refined for different agro-climatic situations and disseminated through Development Departments (Agriculture, Horticulture, Animal Husbandry, and Forestry), SHGs, NGOs, Cooperatives and web-based Agro-advisory Services. The financial institutions would need to provide financial support for development of infrastructure like water harvesting ponds and pressurized irrigation systems. The activities and functioning of the watersheds need to be in a participatory mode, ensuring transparency and equitable sharing of services and benefits among different stakeholders. The participatory watershed management will be facilitated through formation of watershed associations. The technological interventions would have deliverables in terms of water conservation, increased land productivity, enhanced employment, livelihood security, equitable sharing of benefits, and empowerment of women, environmental upkeep and better quality of life.

v) Integrated Farming Systems

Development and adoption of integrated farming system provides high opportunities of productivity enhancement, employment, income generation and nutritional security by diversifying and integrating different components of farming, *viz.* crops, horticulture, livestock and fisheries (depending upon location specificity). The systems based on multiple



recycling of carbon, energy and nutrients would also help minimize environmental loading with pollutants. The different components of the system have complementarities with waste products of one component becoming source of food and energy for another. The researchable issues encompassing analysis of nutrient and energy fluxes among system

components, path analysis of bio-physical constraints, multiple uses of water, water harvesting and recycling, socio-economic conditions of people, internalization of ITK and market

analysis, etc., are to be addressed through basic and strategic research by the research stations. The integrated technology would be developed integrating crops, horticulture, fisheries & livestock by research organizations having R&D facilities on different system components at the research stations. Further assessment and refinement of developed farming systems to cater to region and location specific requirements would be accomplished on Cropping/Farming System Research. The technology would be disseminated through NGOs, SHGs, etc., and different functionaries of Departments (Agriculture, Horticulture, Animal Husbandry, Fishery) at district and block levels. The backward and forward linkages would provide the required feedback to the research stations on upgradation of technology. Regular trainings are to be organised on different aspects of technology to extension personnel and various stakeholders.

vi) Green House Technology

The aim is to provide a device which would assist farmers in carrying out complex everyday tasks involved in Polyhouse Farming, assist them in monitoring, irrigating, fertilizing, planning and maintaining the crops, as well as providing assistance and backbone support in case of emergency situation .

This involves exploring Polyhouse plantation process, problems faced by farmers. People who want to enter a new area of activity generally tend to do some study and gather knowledge. Training an important source for this purpose as they can meet there all reputed suppliers of technology in that field.

The Greenhouse Technology is an appropriate intervention for crop, production, particularly in hostile climatic conditions. It has the potential to give manifold production of quality produce round the year from small land holdings compared to the open field cultivation. A greenhouse works on the principle that crop production is influenced not only by hereby but also by the micro – climate around the plant.

Advantages of Greenhouse: Greenhouse technology is highly relevant under Indian conditions due to variant agro – climatic condition of the country. The list of advantages includes providing favorable micro climatic conditions for the plant, cultivations in all seasons is possible, higher yield with better quality per unit area, less irrigation, suitability for cultivating high value / off – season crops, good control of pest and diseases, helping in raising early nurseries, round the year propagation of planting material, protection of the crops from wind, rain, snow, bird, hail etc., generation of self – employment.

Training Activity

- Training a Greenhouse Construction & maintain.
- How to approach the bank for making project report / bank loan/ subsidy.
- Guidance in water management & fertigation.
- Guidance a planning for plantation.
- Use of pesticides & insecticides.
- Training for the growing of crop in poly house like Gerbera, Carnation, Dutch Rose & Colour Capsicum.
- Training for the harvesting of flower &vegetable with Attractive packing.
- Guidance for the Marketing.
- In training we guide how to grow high yield & Export quality of flower & vegetable.
- To promote a new farmer for the growing of polyhouse.
- Actual practical in poly house field.

vii) Bee Keeping: Production processing and marketing

By applying a ten-year development plan, we could easily provide jobs for 10.000 people with 1,000,000 colonies to establish. In 2004 Afghanistan had 30.000 hives. Then NGO aid for the Afghan people increased in the year 2014 to approximately 600.000 hives and 8000 beekeeper. Afghan beekeeping was essentially traditional before the project of moving of *Apis cerana* into traditional type sedentary hives. With the bees in these frame hives it was hardly possible to make more than 6 to 7 kg of honey per hive per year. In 1965 , thanks to the contribution by FAO of 150 colonies of *Apis mellifera* and the importation of beekeeping equipment from Europe the development of modern beekeeping was underway. Afghan beekeepers have since increased settlements in the years 1973 to 1975 to get 42000 hives ! Indeed, the private sector is very active, they harvested 20 to 30 kg of honey per hive They thus exported honey at this time to the ex-USSR and Iran. It should be noted that at that time there were 960 professional beekeepers . NGOs have imported hives from neighboring countries to Afghanistan as an aid for job creation. Unfortunately the majority of hives have since died because of diseases and bee pests. More beekeepers must learn new technologies and methods to fight against bee diseases. Iran gave 100 hives and beekeeping equipment to the Afghan Ministry in 2004. Terre des Hommes, a Swiss NGO invited the author to a mission from 6 to 27 June 2008 and from 16 June to 4 July 2009, and 4 to 18 June 2010 to teach the technology and diseases of honey bees and the pests of bees to beekeepers in the region of Rustaq in

Afghanistan (Province Taluqan). This region, located to the north of the country, is a mountainous region near the border with Tajikistan. For several years, there were not any bees. From 2008 to 2010, Terre des Hommes imported hives from Tajikistan to the region. Terre des Hommes has established a ten-year plan to increase the number of hives & beekeepers. In 2014 there are more than 400 beekeepers with 3000 colonies and an active beekeeping cooperative. The Dadant 12 frames Tajikistan model: they are usually poorly constructed and among their major defects will be noted in particular a over small flight hole and poor ventilation as a result. Similarly, the wall thickness is almost always inadequate (often less than 18 mm) and finally there is no frame cover. It is not easy to determine the exact number of colonies because in Afghanistan hives are not identified. According to Sayed Khan Panjshri, director of the beekeeping cooperative and Reza Shahrouzi, it is believed that there would be approximately 600.000 colonies and 8000 beekeepers. Honey bee diseases and parasites observed the country does not have a health organization or specialized laboratory allowing for an organized effective protocol. Veterinarians, meanwhile, are virtually ignorant of beekeeping.

Learning Aims: Learn everything you need to know about bees, the equipment needed and how much honey you can expect. Discover how to make products from beeswax such as candles, soap and cosmetic creams.

Learning Outcomes: This beekeeping course enables you to understand the principles of beekeeping and honey production. You'll learn how to locate and maintain beehives as well as how to harvest their own honey and make beeswax products.

Course Content: This beekeeping course covers the following topics

- Introduction to the beekeeping course
- What is honey?
- History of beekeeping
- Honey flora – the importance of bees
- Legislation - locating the hive
- How to get the bees
- Honey bees – castes, lifecycles, re-queening
- Swarming
- Catching a swarm
- Collecting the pollen and nectar
- Bee hive – hive management
- Splitting a hive

- Re-locating a hive
- Harvesting the honey – types of honey
- Honey bee products – honeycomb, beer, etc.
- Australian native bees
- Bee stings
- Bee health
- Harvesting the wax
- Beeswax uses – candles, cosmetics, soap, etc.
- Flow Hive
- Top-Bar Hive
- Practical Demonstration –extracting the honey from the honeycomb
- Beekeeping course review

viii) Modern Dairy Technology and Management

- Precision Dairy Farming is the use of technologies to measure physiological, behavioral, and production indicators on individual animals to improve management strategies and farm performance.
- Many Precision Dairy Farming technologies, including daily milk yield recording, milk component monitoring, pedometers, automatic temperature recording devices, milk conductivity indicators, automatic estrus detection monitors, and daily body weight measurements are already being utilized by dairy producers.
- Other theoretical Precision Dairy Farming technologies have been proposed to measure jaw movements, ruminal pH, reticular contractions, heart rate, animal positioning and activity, vaginal mucus electrical resistance, feeding behavior, lying behavior, odor, glucose, acoustics, progesterone, individual milk components, color (as an indicator of cleanliness), infrared udder surface temperatures, and respiration rates.
- The main objectives of Precision Dairy Farming are maximizing individual animal potential, early detection of disease, and minimizing the use of medication through preventive health measures.
- Perceived benefits of Precision Dairy Farming technologies include increased efficiency, reduced costs, improved product quality, minimized adverse environmental impacts, and improved animal health and wellbeing.

- Real time data used for monitoring animals may be incorporated into decision support systems designed to facilitate decision making for issues that require compilation of multiple sources of data.
- Technologies for physiological monitoring of dairy cows have great potential to supplement the observational activities of skilled herdspersons, which is especially critical as more cows are managed by fewer skilled workers.
- The economic implications of technology adoption must be explored further to increase adoption rates of Precision Dairy Farming technologies.
- Training content must focus on What is Precision Dairy Farming?, Potential Benefits of Precision Dairy Farming, Precision Dairy Farming Examples and Investment Analysis of Precision Dairy Farming Technologies

ix) Modern Poultry Technology and Management

Poultry farming means ‘raising various types of domestic birds commercially for the purpose of meat, eggs and feather production’. The most common and widely raised poultry birds are chicken. About 5k million chickens are being raised every year as a source of food (both meat and eggs of chicken). The chickens which are raised for eggs are called layer chicken, and the chickens which are raised for their meat production are called broiler chickens. The UK and USA consume more meat and eggs of chicken than other countries of the world. On an average the UK alone consumes more than 29 million chicken eggs everyday. However, in a word commercial poultry farming is very necessary to meet up the demand of animal nutrition (eggs and meat). Commercial poultry farming is also very profitable. And commercial poultry farming business is one of the traditional business ventures. Here we are describing more about the advantages of poultry farming business and the steps for running this business.

Benefits of Poultry Farming: Poultry farming business has numerous benefits. As a result many farmers prefer to invest in this business. People generally establish poultry farm for the purpose of producing eggs, meat and generating high revenue from these products. Billions of chickens are being raised throughout the world as a good source of food from their eggs and meat. However, here I am shortly describing the main benefits of poultry farming.

- The main benefit of poultry farming is, it doesn’t require high capital for starting. You need just basic capital to start raising poultry. And most of the poultry birds are not costly enough to start raising.
- Poultry farming doesn’t require a big space unless you are going to start commercially. You can easily raise some birds on your own backyard with one or numerous coops or

cages. So, if you are interested in poultry farming, then you can easily do it on your own backyard with several birds.

- Commercial poultry farming business also ensure high return of investment within a very short period. Some poultry birds like broiler chickens take shorter duration of time to mature and generating profit.
- Poultry farm structures do not require high maintenance. You can minimize diseases and illness in poultry by following proper hygiene and care. Diseases are less in some poultry birds like quails, turkeys etc.
- In most cases, you don't need any license. Because almost all types of poultry birds are domestic. Although, if you need license from the relevant authority it is also easy for poultry.
- Poultry provides fresh and nutritious food and has a huge global demand. Global consumers of poultry products prefer them due to their nutrients and freshness. Poultry products are not much expensive and most of the people can afford those.
- Marketing poultry products is very easy. There is an established market for poultry products in almost all places of the world. So, you don't have to think about marketing your products. You can easily sell the products in your nearest local market.
- Poultry farming creates income and employment opportunities for the people. Unemployed educated youth can easily create a great income and employment opportunity for them by raising poultry commercially. Women and students can also do this business along with their daily activities.
- Almost all bank approve loans for this types of business venture. So, if you want to start this business commercially, then you can apply for loans to your local banks.
- There are many more benefits of poultry farming along with the above mentioned benefits. Start raising and you will gradually learn everything.

Various Methods of Poultry Farming: Worldwatch institute described that, “about 74% of total poultry meat and 68% of total poultry eggs produced from intensive poultry farming method. Free range farming is the other alternative method of intensive poultry farming. Free range farming method is used for large number of poultry birds with high stocking density. There are some basic differences between intensive and free range poultry farming. Intensive poultry farming method is a highly efficient system which saves, land, feed, labor and other resources and increases production. In this system the poultry farming environment is fully controlled by the farmer. So, it ensures continuous production throughout the year in any

environment and seasons. Intensive poultry farming has some disadvantages too. Some people says intensive system creates health risks, abuse the animals and harmful for environment. On the other hand free range poultry farming method requires a large place fro raising the birds and the production is about the same as intensive method. However, in the case of both intensive and free range poultry farming method the producers must have to use nationally approved medications like antibiotics regularly to keep the poultry birds free from diseases.

Layer Poultry Farming: The poultry birds which are raised for egg production are called layer poultry. Commercial hen generally starts laying eggs at the age of 12-20 weeks. They start laying eggs regularly at their 25 weeks of age. After 70-72 weeks of age egg production of layer poultry get reduced. For commercial layer poultry farming, producers generally keep the hens for 12 months from their first laying period. And then sell them for slaughter purpose. Although chickens naturally survive for more than 6 years. For re-invigorating egg laying, the hens are force moulted in some countries. For commercial egg laying poultry farming systems, the environmental conditions are often automatically controlled by the producers. For a simple example, presence of light helps the bird for laying eggs earlier. So, the producers should provide more lightening period to increase the probability of beginning laying eggs. The egg-laying birds lays more eggs in warmer months than the cold months. So, keeping the temperature of the room moderate will be very helpful for better egg production. Some commercial egg laying chicken breeds can produce more than 300 eggs a year. Layer poultry are raised in various methods. The common and most popular layer poultry farming systems are described shortly below.

Free Range Farming: Free range poultry farming means providing freely roaming facilities to the poultry birds for a certain period of a day. Although they are kept inside the house at night to keep them free from predators and adverse weather. In free range farming method the poultry birds generally roam freely throughout the whole day. Which means they spent half of their life outside the house. For free range poultry farming system select a suitable land which has the facilities of adequate drainage system, good ventilation, appropriate protection from prevailing winds, good protection from all types of predators and free from excessive cold, heat or dampness. Excessive cold, heat and damp is very harmful for poultry birds and reduce their productivity. This system also requires less feed than cage and barn systems. The poultry manure from free range farming used as fertilizer for crops directly. Although free range farming method is very suitable for poultry birds but it has some difficulties too. In this system the poultry birds can be victim of predators easily and may caught by various type of diseases.

Organic Method: Organic layer poultry rearing system is also one type of free range farming system. But the main differences between the two systems are, in free range farming method a large numbers of poultry birds are raised together but in organic method a certain species of poultry bird are raised in small group with low stocking density. Organic laying system has some restrictions in the routine use of synthetic yolk colourants, water, feed, medications, other feed additives and obviously a smaller group size with low stocking density. In organic laying system the producer should keep highest 1000 poultry birds per hector and maximum 2000 birds in each house.

Yarding Method: Yarding poultry farming method is such a method in which cows and chickens are raised together. The farmer make a fence in his yard and keep all the poultry birds and cattle there together. The birds and cattle have the freedom of movement inside the fence. It is a very popular system used by small farmer.

Battery Cage Method: Battery cage layer poultry rearing method is one of the very common methods used in many countries. In this system usually small sized metal cages are used. Every cages can accommodate about 3 to 8 hens. The walls of the cages are generally made of mesh or solid metal and the floor is made of sloped wire mesh which allows the faeces to drop down. When the hens lays eggs, then all the eggs gather in the egg collecting conveyor belt of the cage. In this system food is provided in front of the hens by a long bisected metal or plastic pipe and water served to them by using overhead nipple systems. The cages are arranged in long rows in one above another system. There may have several floors in a single shade, which can keep many even thousands of hens together. For reducing feather and vent pecking, the light intensity is generally kept lower than 10 lux. The battery cage method has some benefits. The main benefits of battery cage are listed below.

- It is very easy to care for the birds.
- Very easy to collect eggs.
- Cleaner eggs.
- Requires less feed to produce eggs.
- Thousands of hens may be housed in a specific floor space of the house.
- The birds suffer less by internal parasites.
- Labor cost is very low.

Besides those benefits battery cage system has some difficulties too. By rearing large number of hens in a small place the air inside the house may contain high ratio of co₂. The hens can't get sufficient space to walk, flap their wings, stand or perch. For this reason they

may suffer by frustration and boredom and their behaviors may change which affect their production. Battery cage system is banned in some countries because it is considerate as against the animal welfare.

Furnished Cage Method: Furnished cage method is a developed version of battery cage system. In this system the hens get more spaces and facilities than battery cage system. A furnished cage for hens should contain sufficient space for walk, perch, flap their wings, nest, special feed and water pot etc.

Broiler Poultry Farming: The poultry birds which are raised for commercial meat production are called broiler poultry. By using modern farming methods broiler chickens become suitable for consumption within their 5 to 6 weeks of age. However, see the common raising systems which are mostly used for commercial broiler poultry farming.

Indoor Raising Methods: In this method broilers are kept inside a house. Rice hulls, wood shavings, peanut shells etc. are used as litter in the floor of the house. In this system the broilers are kept in a large and open house (known as grow out houses) and they become suitable for consumption within their 5 to 6 weeks of age. This types of poultry houses are well equipped with mechanical systems for delivering the feed and water to the poultry birds. Well ventilation system, coolers and heaters are must. It is very important to keep the house always dry and clean. Generally a house of 400 feet long and 40 feet wide can accommodate about 20,000 birds. One-half square feet space is required per bird.

Some Popular Poultry Breeds For Farming: There are some popular and mostly raised poultry birds. Among them chickens, turkeys, quails etc. are mostly raised poultry birds.

Poultry Housing: Good and suitable housing play a vital role in raising all types of poultry birds. Some birds grow and live hapily in the floor of poultry house and some in cages. Depending on the birds, you have to make a suitable house for your birds and ensure availability of all types of necessary facilities for them. Consider the following aspects while building houses for your poultry birds.

- Always keep sufficient space in your poultry house, depending on the birds. So that your birds can live, grow and produce happily. Never overcrowded the poultry house.
- Good ventilation system is a must. Ensure that you poultry houses are well ventilated.
- You also have to ensure sufficient flow of fresh air and light inside the house.
- If you go for commercial production, keep proper distance between one house to another house.

- Clean the house and equipment on a regular basis. Sterilize the house before bringing new chicks into your farm.
- Take necessary steps for preventing all types of predators and harmful animals.
- Make good temperature management so that you birds do not suffer by excessive hot or cold.
- Make suitable drainage system inside the house for cleaning it properly.
- Making poultry houses in calm and quite place is always a good idea. See our housing guides for various types of poultry birds.

Feeding: Feeding high quality, fresh and nutritious food always ensure good health, proper growth and high production. So, always feed your poultry birds healthy and nutritious feeds. Add all types of necessary vitamins and minerals to their feed. Commercial poultry feeds for various types of birds are available in the market. You can easily feed this to your birds. Along with feeding your birds high quality and nutritious feeds, always serve them sufficient amount of fresh and clean water according to their demand.

Care & Management: Always take good care of your birds. Learn more about various types of poultry diseases, symptoms and treatment. Vaccinate the birds timely. Provide them nutritious feed and clean water. Clean their house on a regular basis.

Marketing: Marketing process of various types of poultry products are very easy. Poultry products have a huge demand globally. So you don't have to worry about marketing your products. You can easily sell your farm products in your nearest local market or big supermarkets.

x) **Management of Soil Testing Laboratories**

- Overview of Soil Testing Service Kits and Forms Soil Test Sampling Kits
- The Field and Soil Sample Information
- The Soil Test Report/Recommendation
- Evaluating Components of Soil Fertility Soil pH Lime Index
- Buffer pH and Exchangeable Acidity
- Calculating Exchangeable Acidity
- Indexing Nutrient Availability
- Soil CEC pH
- Effect on CEC
- Other Properties Affecting CEC

- Percent Saturation
- CEC Adjustment Nutrient Balance
- Soil Organic Matter
- Interpretation of Relative Soil Fertility Levels
- Recommendations Factors Influencing
- Recommendations Calculating the Lime Requirement
- Reasons for Liming Soils Selecting Liming Materials Lime Sources Particle Size
- Effect Soil pH
- Effect Degree of Incorporation
- Time of Lime Application
- Calcium Requirement
- Magnesium Requirement Magnesium Sources
- Potash Requirement Phosphate Requirement
- Nitrogen Requirement
- Determining Fertilizer Blend and
- Application Rate Nutrient Content of Manures and Residuals

xi) Agri-entrepreneurship Development

Agriculture-based industrial products account for half of all exports from developing countries, yet only 30 per cent of those exports involve processed goods compared to a figure of 98 per cent in the developed world.

In this context, promotion of sustainable, inclusive business opportunities for the rural poor through agri-business and agro-value chain development is essential. Technical cooperation activities in this regard should focus on adding value to agricultural commodities including non-food sectors at various points of the chain of economic transactions that links input providers, farmers, traders, processors, logistic providers, distributors and retailers.

Linking resources and markets in the agribusiness value chains and strengthens forward and backward industrial linkages in order to leg up the economic transformation of countries, improve employment and income opportunities, and reinforce sustainable livelihoods.

Agro-industrial activities benefit a number of groups, including poor and marginalized rural populations, urban agro-industries and communities facing human security challenges or requiring urgent supplies of agricultural equipment and the rehabilitation of food industries. Technical cooperation and capacity-building services are provided to agro-based and agro-

related businesses and industries, inter alia, in the food, leather, textiles, wood and agricultural equipment sectors.

Promotion of investment in agribusiness and value chain development; builds partnerships and linkages with strategic financing institutions; organizes various global forums and expert group meetings in related fields; and publishes specialized training manuals, guides and electronic media.

Mobilization of expert services such as cluster development, conformity with quality and standards, rural energy, environmental management and cleaner production is very much essential.

xii) Management of Agriculture Cooperatives

Producer Company Model – An alternative to Agricultural Cooperatives

In recent times, almost every major business house of the country is venturing in a big way into the agri-business sector, especially with regulations allowing corporates to now directly have contractual arrangements with farmers. One of the triggers for this newfound interest in agribusiness by the corporates is the change occurring in the retail markets, where consumers are making dramatic shift from purchasing at neighbourhood stores to shopping at supermarkets, malls and food plazas, enabling development of food supply chains from the farms to consumers.

The expectation of farmers while carrying on agricultural activities is, beyond meeting his consumption needs, to be able to get a reasonable return on the time and money invested by him. Also his desire is to increase his share in the consumer rupee. Further, it is only when the commodity is processed and branded that value addition occurs. As the farmer exits from the scene after transacting in the primary market, he has no part in the surpluses that emerge post production.

The Cooperative Option Cooperatives are one form of organization that enables farmers to organise themselves as collectives and move up the value chain by ownership and operation of their own processing units and sometimes extend the chain upto the retail level. The cooperative experience has not been a very pleasant one, as cooperatives have largely been state promoted, with a focus on welfare rather than to do business on commercial lines. The cooperative institutions are controlled by overriding powers to direct and regulate cooperatives on his terms whenever the Government deems to throttle the growth of the very institutions they were mandated to nurture. Thus, cooperatives have never emerged as successful business

enterprises but only as extended arms of the State. The reasons for this are many and have been analysed at length by several expert committees from time to time.

The concept of producer companies was introduced to enable incorporation of cooperatives as companies and conversion of existing cooperatives into companies, while ensuring the unique elements of cooperative business with a regulatory framework similar to that of companies.

Salient Provisions of Companies Act relating to Producer Companies In a 'Producer Company', only persons engaged in an activity connected with, or related to, primary produce can participate in the ownership. The members have necessarily to be 'primary producers.' Primary produce has been defined as a produce of farmers arising from agriculture including animal husbandry, horticulture, floriculture, pisciculture, viticulture, forestry, forest products, re-vegetation, bee raising and farming plantation products: produce of persons engaged in handloom, handicraft and other cottage industries: by - products of such products; and products arising out of ancillary industries. **Formation** Any ten or more individuals, each of them being a producer, that is, any person engaged in any activity connected with primary produce, any two or more producer institutions, that is, producer companies or any other institution having only producers or producer companies as its members or a combination of ten or more individuals and producer institutions, can get incorporated as a producer company. The companies shall be termed as limited and the liability of the members will be limited to the amount, if any, unpaid on the shares. On registration, the producer company shall become as if it is a private limited company with the difference that a minimum of two persons cannot get them registered.

The objects of producer companies shall include one or more of the eleven items specified in the Act, the more important of these being:

- (i) Production, harvesting, procurement, grading, pooling, handling, marketing, selling, export of primary produce of members or import of goods or services for their benefit;
- (ii) Processing including preserving, drying, distilling, brewing, venting, canning and packaging of produce of its members; and
- (iii) Manufacture, sale or supply of machinery, equipment or consumables mainly to its members.

The other objects include rendering technical or consultancy services, insurance, generation, transmission and distribution of power and revitalisation of land and water resources; promoting techniques of mutuality and mutual assistance; welfare measures and providing education on mutual assistance principles. **Management** Every producer company is

to have at least five and not more than 15 directors. A full time chief executive is to be appointed by the board. He shall be an ex-officio director and will not be liable to retire by rotation and shall be entrusted with substantial powers of management as the board may determine. Members' Benefit Members will initially receive only such value for the produce or products pooled and supplied as the directors may determine. The withheld amount may be disbursed later either in cash or in kind or by allotment of equity shares. Members will be eligible to receive bonus shares. There is a provision is for the distribution of patronage bonus (akin to dividend) after the annual accounts are approved — patronage bonus means payment out of surplus income to members in proportion to their respective patronage (not shareholding). Patronage, in turn, is defined as the use of services offered by producer companies to their members by participation in their business activities.

A producer company is a hybrid between a private limited company and a cooperative society. It combines the goodness of a cooperative enterprise and the vibrancy and efficiency of a company. It accommodates the unique elements of cooperative business with a regulatory framework similar to that of a private limited company.

xiii) Good Practices in Agricultural Marketing

Marketing of agricultural products is as important to better performance in agriculture as farming itself. In traditional and subsistence agriculture, farmers are producing mainly to meet their family needs and their marketable surplus is too low or non-existent. Farming inputs are also acquired from family. Hence, farmers in a traditional agriculture are not well connected to product and input markets. Conversely, in a modern and commercial agriculture, farmers are producing with a purpose to make a profit and their marketable surplus is high. Most of farming inputs are sourced from input markets. Thus, in a modern and commercial agriculture, farmers have strong linkage with output and input markets. For them, marketing is not less important than production. Similarly, farmers and agribusinesses are also using financial, insurance, communication, transportation, research, and extension services.

The end objective of marketing is to satisfy consumers. To achieve this objective, farmers and agribusinesses must produce a product that meet a real need and people are willing to pay for it. The strategy should, therefore, be market first and then produce the product. That is, farmers and agribusiness enterprises must first determine the products demanded in the market place, and then decide what to produce. Hence, marketing of agricultural commodities begins with the production decisions of farmers and ends once the product is reached to its final consumers.

Agriculture in Afghanistan is largely subsistence and conventional. Due to low productivity and small holding size, marketable surplus of farmers is either too low or nil. Agricultural input and output markets are very poor in terms of infrastructure, organization, and capacity. Agricultural production is scattered across the country and farmers are mostly not organized in self-help groups or cooperatives. Furthermore, agroprocessing industries are not developed, rural infrastructure is weak, rural financial services is poor, means of transportation are inappropriate, institutional arrangements are weak, standardization, and quality control services are inadequate, and agricultural support policy is lacking. These are the major hindrances before the growth and development of agricultural markets in the country, which should be removed through designing appropriate interventions and programs.

Marketing: The term marketing means different things to different peoples. In effect, marketing is about identifying and meeting human and social needs. Marketing, thus, convert a society's needs and wants into profitable opportunities.

Agricultural marketing is defined as the performance of all business activities involved in the supply of farm inputs to the farmers and movement of agricultural products from the farms to the ultimate consumers. Agricultural marketing in a broader sense is concerned with the marketing of farm products produced by farmers and of farm inputs and services required by them in the production of these farm products. Therefore, agricultural marketing includes product marketing as well as input marketing. Marketing of agricultural commodities begins with production decision on the farm (what and how to produce? when and where to produce? how much to produce? etc.), and it is completed once the product is reached to the final consumers.

Components of a Market: A market exists when the following necessary and sufficient conditions are present:

- The availability of a commodity or service for transaction;
- The existence of buyers and sellers;
- Business relationship or intercourse between buyers and sellers; and
- Demarcation of area such as place, region, country or the whole world.

Types of Markets: Markets are classified on the basis of several dimension e.g. volume of transaction, coverage, stage of marketing, nature of transaction, etc. some major types of markets are discussed below:

- On the basis of volume of transaction: wholesale markets and retail markets

- On the basis of coverage: local/village markets, regional markets, national markets, and international markets
- On the basis of stage of marketing: producing markets, and consuming markets
- On the basis of nature of transaction: spot or cash markets, and forward markets

Selling Versus Marketing: Marketing is usually understood as selling of a product. Meaning, marketing and selling are usually used interchangeably. These two commonly used terms should not be conceived as synonymous. In a subsistence agriculture the objective of a farmer is to meet family food requirements. They also sell part of their produce in the local market so as to meet their other basic needs. In such a situation farmers sell their produce for whatever available buyers would pay i.e. they could not bargain for higher price. This is called selling not marketing. In a commercial agriculture, the objective of farmers changes from producing for family consumption to producing for market. Hence, farmers are producing according to the demand of market and bargain for higher prices. This is called marketing. In a nutshell, selling is when farmers sell their produce at prices suggested by buyers and cannot bargain for higher prices while marketing is when farmers are producing according to market demand and can bargain for higher prices. Farmers are said to be price takers in the first case whereas they are considered as price makers in the second one.

Components of Agricultural Marketing: Agribusiness managers should consider four controllable variables while preparing their marketing plans, viz. product, price, place, and promotion. As each of these four components of agricultural marketing starts with the letter P, they are called four Ps of agricultural marketing.

Product: farmers and agribusiness managers must produce the right type products, so as, to give maximum satisfaction to members of the target market, i.e. consumers. It is said that market first and then produce the product.

Price: the right product must carry the right price in light of market conditions.

Place: the right product, at the right price, must be in the right place to be purchased by members of the target market.

Promotion: members of the target market must be told in the right way that the right product, at the right place, is available at the right location. Agribusiness and agrimarketing managers strive to develop the proper combination of product, price, place, and promotion that will adequately meet the needs of consumers. How well you manipulate the mix of these four Ps will ultimately determine the success of your agribusiness.

Marketing Functions: Marketing functions refer to the various activities involved in moving agricultural products from the point of production to their ultimate consumers. These activities or marketing functions vary from product to product, from market to market, and with the level of economic development as well as with final form of consumption. Scholars classified marketing functions into different categories. Some classified them into primary, secondary and tertiary functions while others classified them into physical, exchange, and facilitative functions. Broadly speaking, marketing functions may include the followings:

- Packaging
- Transportation
- Grading and standardization
- Storage and warehousing
- Processing and value addition
- Buying and selling
- Market information
- Financing for marketing
- Risk bearing

Marketing Strategies for Farm Commodities: If farmers are to make the most money from a farm commodity, successful marketing is essential. The following lists some strategies that can be used to market farm commodities more profitable:

- Determine what types of markets are available to you.
- Determine the cost of various types of marketing.
- Determine transportation costs to each of the markets available to you, and sell where transportation costs are lowest.
- Determine the most profitable form in which to market your product.
- Advertise to create markets where none existed before.
- Market seasonal products at the peak of demand.
- Shorten the marketing channels between you and your customers.

Value Addition: Marketing adds value to farm products as they are moving from the farm gate to final consumers. The utilities created in the marketing process are further classified into form utility, place utility, time utility, and possession utility. Processing adds form utility; transportation adds place utility; storage adds time utility; and exchange adds possession utility

to the farm products. Suppose a farmer produced 30 tons wheat on his farm, of which he retained 10 tons for seed and family requirements. Hence, the farmer has a marketable surplus of 20 tons. He decides to sell his surplus wheat to a flour mill & bakery located 200 kilometers away in the city. Place utility is added when the wheat is transported to the flour mill & bakery. Form utility is added after it is processed into flour, breads, cake, biscuits, and cookies. Time utility is added when wheat or its derivatives are stored for future use. Finally, possession utility is added once wheat or its derivatives are sold to customers and final consumers.

Marketing Channels: Agricultural marketing channels are routes through which agricultural products move from producers to consumers. Agricultural products move from the farm gate to ultimate consumers through various market intermediaries that operate in the marketing system. This chain of intermediaries through which the various farm commodities pass between producers and consumers is called marketing channel. The value of agricultural products increases while moving from farm gate through marketing channels to final consumers. Agricultural marketing channels differ from product to product, country to country, time to time, and lot to lot. Marketing channels of fruits are different from those of vegetables and dairy.

Marketing channels may be direct or indirect. In direct marketing channels, producers sell their produce directly to consumers while in indirect marketing channels producers and consumers are connected by a chain of market intermediaries.

Marketable Surplus: Marketable surplus refers to that quantity of farm produce which is actually supplied by farmers to the market. It is defined as the residual left with farmer after meeting his requirements for family consumption, farm needs for seeds and feed, payments for labor in kind, payments to landlord as rent, and social and religious payments in kind. Increase in agricultural production must be accompanied by a rise in marketable surplus. Given the prices of farm products, higher the marketable surplus higher will be income of the farmers. Thus, increase in marketable surplus is crucial for agricultural growth and poverty reduction in the country. Although, the marketing system is more concerned with the surplus which enters or is likely to enter the market, the quantum of total production is essential for this surplus. Meaning, the larger the production of a commodity, the greater the surplus of that commodity and vice versa.

Identifying Your Customers: In order to respond to customers' needs and preferences, businesses must first know who their customers are. To find out they must study the market for their product. That is the group of all potential customers who share common needs and wants, and who have the ability and willingness to buy the product. Customers of a business may be

different with regards to place of living, style of living, gender, age groups, income level, consumption pattern, etc. which necessitate to divide the total market into smaller groups of customers who share specific needs and characteristics. This is popularly known as market segmentation. Careful identification of customers empowers an agribusiness over its competitors, and increases its profitability and survival. This also allows an agribusiness manager to provide the right product, at right place, at right price, and at right time.

Demand: Demand is an important concepts in marketing. It refers to the amounts of goods or services that buyers are willing and able to purchase at different prices at a specific time in a given market. People need various goods and services which should not be considered as market demand, unless their needs are accompanied by purchasing power. Thus, demand represents both the willingness and ability to buy a good or service. Demand for a good or service depends on its price, all other factors affecting demand such as prices of other goods (substitutes and complements), consumers' income, and consumers' tastes remaining the same. The law of demand expresses the relationship between quantity demanded of a product and its price. According to this law, there is an inverse relationship between the quantity demanded of a good and its price. Meaning, the quantity demanded of a good falls as its prices rises, and vice versa. The law of demand can be explained with the help of a demand schedule or demand curve. The table below provides a hypothetical example of demand schedule for milk in a market.

Supply: The term supply refers to the quantities of a product that will be offered for sale at different prices in a given market at a specific time. Supply of a product depends on many factors such as prices, domestic production, imports, and exports. The law of supply expresses the relationship between quantity supplied of a product and its price. According to this law, there is a direct relationship between quantity supplied of a product and its price, all other factors affecting supply remaining the same. Meaning, the quantity supplied of a product increases with a rise in its price, and decreases with a decline in its price, provided that all other factors affecting supply remain unchanged.

Product Pricing: Agribusiness companies are practicing various methods for pricing their products. The most elementary of them is markup pricing method where a standard markup is added to the cost of production. To use this method of pricing, an estimation of costs and expected sales is required.

xiv) Mushroom Production and Marketing

- Mushrooms are fleshy, spore-bearing reproductive structures of fungi.

- For a long time, wild edible mushrooms have played an important role as a human food.
- Mushroom production is completely different from growing green plants.
- Mushrooms do not contain chlorophyll and therefore depend on other plant material (the “substrate”) for their food.
- Mushroom, a protein-rich wonder food which does not have any publicity as it deserves.
- It is this precious vegetable that would solve the problem of protein malnutrition in our country.
- Coffee pulp, either as a sole substrate or supplemented with other organic materials, can be used as a substrate for growing the edible mushrooms *Pleurotus*, *Lentinula*, and *Auricularia*.
- Four types of mushrooms viz., white button, oyster, paddy straw and milky mushrooms have been adopted by farmers/ entrepreneurs at marginal and commercial scale in different parts of the country at present.
- Mushroom cultivation is a well-established and profitable biotechnological process carried out worldwide on a large or small scale.
- From a production standpoint, the white button mushroom has the highest growth rate and potential for production.
- The supply and demand gap in the world trade of mushrooms and the shrinkage of production in countries like Taiwan and South Korea due to high labor costs would result in better market prices for Indian mushroom producers.
- Cultivated mushrooms are edible fungi that grow on decaying organic matter, known as a substrate.
- Mushrooms have a high nutritional value and are high in protein.
- They are also a good source of vitamins (B1, B2, B12 and C), essential amino acids, and carbohydrates but are low in fat and fibre and contain no starch.
- It is also known to have medicinal values and certain varieties of mushrooms can inhibit growth of cancerous tumor.
- Many by-products from agricultural production and food processing can be used as growing media in mushroom production.
- The market for mushrooms continues to grow due to interest in their nutritional and health benefits.
- The market for mushrooms has been expanding in recent years.
- The trend is away from the canned product toward fresh and dried mushroom sales.

- As mushrooms become increasingly popular, consumers are searching for more and more variation within them in terms of colour, texture and shape of cap/length of stalk. The recent increase in demand for brown, oyster and shiitake mushrooms reflects this trend.
- Demand for mushrooms is at a peak during the winter/spring /autumn months as they are used extensively in the preparation of hot vegetable based dishes.
- Small-scale mushroom production is now being carried out in many rural and suburban peasant communities throughout the country.
- The mushroom production was sold directly by mushroom growers to retailers who marketed it directly to consumers.
- Mushrooms have been valued throughout the world as both food and medicine for thousands of years.
- Mushrooms are gradually becoming popular as they are rich in minerals and vitamins and very low on fat and sugar.

Topics should include:

- About Mushroom Growing
- Mushroom Study
- Mushroom cultivation & Marketing
- Cultivating Shiitake Mushrooms Through Forest Farming
- Considerations related to farm management and marketing
- Commercial production and marketing of edible mushrooms cultivated on coffee pulp
- Mushroom cultivation and marketing - Horticulture Production Guide
- Mushroom growing in India
- Making Money by growing mushrooms
- Mushroom Production Project
- Small holder mushroom production in Swaziland
- Gourmet & Medicinal Mushrooms
- Benefit/cost analysis of mushroom production for diversification of income
- Button mushroom
- Harvesting and Marketing Edible Wild Mushrooms
- Marketing and Distribution of Mushroom
- Mushrooms
- Mushrooms Marketing

- Mushrooms for healthy and wealthy life
- Mushrooms bring food security
- Mushroom - A healthy outlook for the industry
- Mushroom Processing
- Guidelines for formulation of project proposal for mushroom farming

xv) ICT Application in Agricultural Extension

Afghanistan is well suited for use of information and communication technologies (ICT) in agricultural extension, but no coherent bodies of knowledge regarding the ICT in Afghan extension landscape currently exist. This assessment aims to inform organizations seeking to employ ICT in agricultural development in Afghanistan about current players and recourses, past efforts, and potential keys to success.

Although more than 80% of Afghans are farmers, little or no agricultural extension support is available in Afghanistan, promoting unproductivity, hunger, and poverty. Following decades of war, infrastructure remains largely undeveloped due to difficult geographic and security situations. Nevertheless, the communications sector is relatively well-developed, making ICT a reasonable option for improving access to agricultural information for both farmers and regional extension agents. Among a handful of existing agricultural ICT projects, there remains a dearth of services providing production information to Afghan farmers and extension agents. These circumstances present the opportunity to deliver needs-based production information to farmers and extension agents in the field. Mobile phone and radio communications are the most promising for agricultural extension. However, major challenges remain, including unreliable electricity, widespread rural illiteracy, and lack of computer skills among potential staff. Furthermore, as international project support is progressively withdrawn, adapting to the current state of ICT and the existing needs of stakeholders in Afghanistan will be key to the sustainability of any new initiatives. Promising options include reformatting existing Internet resources (i.e. RONNA, Paywand, e-Afghan Ag) for SMS and radio delivery in collaboration with well-established stakeholders in various sectors (i.e. Ministry of Agriculture, Salam Watandar, Paywast). Early involvement of such collaborators will help ensure the situational appropriateness and sustenance of such an initiative.

Summary of Challenges and Opportunities Various opportunities make Afghanistan a great fit for ICT-based extension efforts:

- The geography is very difficult to navigate, making remote communications a more reasonable option.

- The current lack of travel budgets for district extensionists to meet in person with farmers makes remote communications the next best alternative.
- Few agricultural ICT services currently exist; increased competition would drive up quality and drive down prices of services.
- In-country organizations are seeking to outfit district extension (DAIL) offices with Internet access, equipment, and ICT training, creating an important opportunity to integrate reliable ICT services into these extensionists' portfolios.
- ICT could allow extensionists and farmers to share their knowledge and discoveries with the wider community, helping meet the great need for production of local scientific knowledge and content.
- Prolonged war has generated a generational knowledge gap among farmers, extension agents do not have access to updated information, and even material taught by universities may be more than 30 years old. ICT would enable access to updated information.
- ICT is typically well-received by youth, who compose a significant majority of the Afghan population (65% are under 25 years).
- Security remains fragile, threatening ICT infrastructure and individuals who share information across ICT channels.
- Tariffs remain among the highest in the geographic region due to a combination of poor security, high energy costs, and pro-market policy.
- Electricity is not generally available in rural areas .
- Technology and network access remain limited.
- Illiteracy rates are very high. This makes SMS impossible for most, even while voice services remain costly (see Mobile Phone Services section).
- About 62% of Afghans are in poverty or highly vulnerable to falling into poverty. This makes paying-- even for beneficial services-- unviable for most households.
- Infrastructure necessary for ICT functionality (towers, lines, etc.) remains very limited in rural areas.
- Land productivity is low in many areas, limiting the benefit: cost ratio for paying for extension services.
- Widespread corruption discourages trust or investment in institutionalized systems.
- The workforce is largely untrained, and even the most qualified individuals (such as

Ministry of Agriculture personnel) have limited ICT skills.

- The significant digital gender apartheid limits women's access to and understanding of ICT technologies, thus reducing the potential user base and impact.
- The country lacks international trade relationships and economic integration, thus limiting market opportunities and subsequently the cost: benefit ratio of paying for extension services.
- Existing extension projects are expensive, uncoordinated, and run by a myriad of donors.
- Afghans culturally prefer receiving information from personal contacts than scientific or institutionalized sources (like databases, libraries, etc.).

xvi) Agricultural Extension Management

Re Envisioning Extension System

Basic concept of extension needs to be re-looked from persuasive technology transfer originally conceived, to the model of interdependence within specific innovation system framework of the stakeholders and institutional context based on the strengths of both public and private sector.

I. The Approach Perspective: The models for technology development and delivery system in various sectors of agriculture is essentially indicative of a pluralistic environment right from research institutions engaged in technology development, up scaling and integration of technology, and its adoption by the end users. The models can be modified as per the need for various districts for appropriate multi-agency extension arrangement with the district, block and village level functionaries of various development departments, including the farmers' organizations and the private sector. There is need for formulation of location and commodity specific packages of tools and equipment and its availability through entrepreneurship development for manufacture and supply of those to the farmers at an affordable price or on custom hire service. There is a need for promotion of agro- processing centres in rural sector/ production catchments for value addition of agricultural produce including technological back-up support. The participatory resource management will be the key to watershed management. The pluralistic extension pattern requires that the programmes are jointly planned, implemented and evaluated by all service providers.

II. Unified Production System Approach: The activities of different agencies from technology development to its dissemination at the user level need to be unified. For example, once the

production and protection technology of high yielding varieties / improved parental lines and hybrids are developed, its dissemination needs to be initiated through frontline demonstrations by the University, and the mini kit testing of technology by the development departments, ensuring quality seed of improved variety/hybrid to each Village in the region for which the variety is recommended/released. Breeder seed production and test stock seed production for village must be simultaneous to cut short the time lag and ensure demand for seed by the time breeder seed is converted to certified seed and it is ready for distribution. The demonstration plot seed in each Village of inbred variety would also move from farmer to farmer in each of the villages. Simultaneously, there is need for integrated programmes for production of breeder, foundation and certified seed by seed producing agencies including the production of parental lines for hybrid seed production, supported by marketing, transport, storage, credit and policy environment. There is need for unification of processing plants and marketing both for domestic and export.

III. Knowledge Centric Approach: In knowledge-driven development, there is need for providing extension education keeping in view their diverse needs not only on production procedures, but also quality certification and reporting procedures, grading, packaging, storage, transportation and other requirements of both domestic and export markets. The farmers need to have knowledge about the whole range of agri-business, production systems, research institutions, programmes and schemes of the development departments, open markets both at domestic and global scale, and other unlimited partners is to be provided through training, demonstration, literature, and other human resources development support including interfaces at different levels.

The development of Information Communication Technology (ICT) and Telecommunication Network have paved the way for creation of information network, knowledge pool and services on new agricultural technology, products and marketing of produce, which must be intensively used. It will be appropriate to develop farmer-friendly information network to provide whole range of information leading to delivery of knowledge of new agricultural technology, products, procedures, and related services to enable them to take control of their farming environment in near future.

IV. Research-Extension-Farmer Interface

The strategy for technology development and the strategy for technology dissemination are not mutually exclusive. Agricultural extension is a process of bringing about innovation and change. There is an inherent degree of overlap among them; however, the fundamental

point is that they are potentially useful in joint assessment, diagnosis, planning, implementation, monitoring and evaluation. The models presented in various sectors of agriculture have made it clear that research and extension are part of a continuum. While research-extension linkages were theoretically possible in inter- personal mode, in the new regime, effective linkages of production systems with marketing, agro-processing and other value added activities have acquired greater importance. In the present competitive environment, the research and extension service must be reoriented to overcome the exclusive focus on production that ignored market demand, profitability and institutional arrangement in the past.

Although a variety of farmers' organizations including cooperatives, farmers' club/self-help groups, and farmers' companies have been promoted in the past, there is lack of sustainability of their existence and the purpose for which they were promoted. These farmers' organizations need to be looked as a kind of business federation for undertaking primary processing and marketing of local products and to facilitate much needed organizational support for effective implementation of quality control and standardization of farm products.

The new mechanisms and protocol suggested for technology development and delivery system for various sectors of agriculture would need spatial and functional integration and complementarities and institutional arrangements in the context of creating an environment to encourage and assimilate results of innovativeness. There is need for introducing agenda and clear delineation of task components in the form of assembly line and also creating coherent synergy within and amongst state development departments, University and all related functionaries. This would require policy support in terms of integration of efforts of institutions dealing with technology development, assessment and refinement, and dissemination including encouraging and accepting the contribution of corporate sectors, private sectors, cooperatives and farmers' associations in delivery systems.