Enabling agricultural policies for benefiting smallholders in dairy, citrus and mango industries of Pakistan – Project No. ADP/2010/091

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Pakistan's Dairy, Mango and Citrus Sub-sectors: An overview

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Executive Summary:

This background paper examines and synthesizes existing literature on agricultural inputs in Punjab and Sindh provinces of Pakistan with a specific focus on dairy, citrus and mango sub-sectors. More specifically it aims to identify the ways to improve the productivity of these sub-sectors with a special focus on the identification of key issues regarding inputs and output marketing. The paper is written within the framework of Australian Centre for International Agricultural Research (ACIAR) funded research project entitled "Enabling agricultural policies for benefitting smallholders in dairy, citrus and mango industries of Pakistan" which is being undertaken by a team of the researchers from Victoria University, Australia in collaboration with different institutes of Pakistan. The aim of this project is to review prevailing policies and develop options, evaluate and define implementation pathways for new enabling policies to improve the livelihoods of smallholders in the dairy, citrus and mango sub-sectors of Punjab and Sindh provinces.

The paper discusses key issue relating dairy, citrus and mango sub-sectors in sections as follows:

1. Introduction
2. Small land holdings in connection to low productivity
3. Water related issues in general and in particular to dairy, citrus and mango sub-sectors;
4. Nutrient availability
5. Animal and plant protection
6. Availability of agricultural credit
7. Artificial Insemination
8. Insufficient extension services

1. Introduction

This background paper has been prepared within the framework of the research project "Enabling agricultural policies for benefitting smallholders in dairy, citrus and mango industries of Pakistan" which is funded by the Australian Centre for International Agricultural Research (ACIAR), and is being undertaken by a team of the researchers from Victoria Institute of Strategic Economic Studies at Victoria University Australia in collaborating with different organizations and Universities of Pakistan.

The overarching aim of this project is to review prevailing policies and develop options, evaluate and define implementation pathways for new enabling policies to improve the livelihoods of smallholders in the dairy, citrus and mango subsectors of Punjab and Sindh provinces. One of the specific objectives of the project is to document important policy-related constraints to, and opportunities for, increasing the income of smallholders in the dairy, citrus and mango enterprises in Punjab and Sindh.

The share of livestock sector in agricultural value addition was the most i.e. 55.9% (GOP, 2014). Pakistan is ranked amongst top seven positions for the production of different livestock products[1] (FAO, 2014). Pakistan is the 4th largest milk producing country in the world with 36 million tons of milk produced annually. The number of buffalos has increased by more than 200% from 8.2 million heads in 1960 to 27.2 million heads in 2006. Similarly, the number of cattle has increased by about 80% from 16.6 million heads to 29.6 million heads during the same time period. Punjab is the leading share holder with more than 65% and 48% of buffalos and cattle, respectively, followed by Sindh with 27% and 23% share of buffalos and cattle, respectively (GOP, 2011). The potential of dairy in Pakistan is huge. The sector operates mostly in the informal economy (i.e. loose milk consumed in the villages and or sold in the cities through "Gawallas") which contributes 97% of the production. These farmers are not linked to formal markets. The animal herds are thinly spread across thousands of square kilometres with an average of 2 to 5 animals per household. Farmers are following very old and traditional dairy farming practices (PDDC, 2006).

Horticulture is another important sub-sector in the agricultural GDP. It contributes 6.3% towards the agricultural GDP and has a share of 22.7% in national food production (GOP, 2011). It has a great potential to reduce socio-economic problems of rural communities by increasing their income (Alam and Mujtaba, 2002). During 2011-12 annual production of fruits and vegetables in Pakistan remained 13.6 million tons. Fruit production remained at 5.6 million tons, out of which citrus production was 2.4 million tonnes i.e. 42 percent (GOP, 2013).

Citrus is the leading horticultural (fruit) crop of Pakistan in terms of cultivated area, production and export. Citrus is a group of diverse species of fruits comprising mandarins, oranges, lemons, limes and grape fruits. It is being cultivated in all the four provinces of the country. However, Punjab province is at the top of the list in terms of citrus production i.e. more than 96% of citrus is grown in Punjab. In Punjab, Sargodha district is the famous for the production of citrus with

[1] 3rd for goat hair, 4th for goat skins, 6th for buffalo milk and meat (live), 7th for buffalo meat, ghee of buffalo milk and buffalo hides.

43% production (Table 1). Kinnow (mandarin) is the most popular variety grown in Sargodha. Citrus can be grown on a wide range of soils. It does not like heavy, clay, sandy, alkaline and waterlogged soils. The common rootstock used in Punjab is rough lemon. Alternate bearing, fruit drop and granulation are the most common physiological issues with citrus. Citrus canker and citrus wither tip are the common diseases and it is susceptible to citrus psylla, citrus leaf miner, scales and mites.

Pakistan is ranked among the top ten producers of the world for citrus production (Nawaz et al., 2011) with 2.4 million tons of production (GOP, 2013) and is the 6th largest producer of Kinnow (Syed, 2009). Despite ranked in top ten producers of the world, Pakistan's average yield of citrus (11 tons/hectare) is low compared to the average yields of other citrus producing countries e.g. Brazil, USA and Turkey (22, 26 and 27 tons/hectare, respectively). The potential yield of Citrus in Pakistan is 18-20 tons/hectare (PHDEB, 2006). Similarly, the productive life span of citrus in Pakistan is very short i.e. 20-30 years compared to up to 50 years in other countries (Nawaz et al., 2011).

Table 1. Top 5 citrus producing districts

Districts	Area (ha)	Production (T)	Area (%)	Production (%)
Sargodha	89751	999632	44.8	46.8
Toba Tek Singh	11412	160758	5.7	7.5
Mandi Bahauddin	10136	156224	5.0	7.3
Sahiwal	8253	92413	4.1	4.3
Khanewal	6612	84033	3.3	3.9
Country Total	199940	2132276	62.9	69.8

Source: AMIS, 2009

After citrus, mango is the second largest fruit produced in Pakistan with 1.68 million tons produced in 2012-13 (GOP, 2013). It is grown mostly in Punjab and Sindh. However, a small proportion is also grown in KPK and Baluchistan. Predominantly, it is grown in Multan, Rahim Yar Khan and Muzaffargarh districts of Punjab which contribute 58% of total production (Table 2). However, districts Hyderabad and Mirpurkhas produce early crop which remains significant for domestic as well as exports.

Table 2. Top 5 mango producing districts

Districts	Area (ha)	Production (MT)	Area (%)	Production (%)
Multan	31565	393028	18.5	22.7
Rahim Yar Khan	28732	381606	16.9	22.1
Muzaffargarh	19222	195021	11.3	11.3
Khanewal	13314	149813	7.8	8.7
Sanghar	7922	64209	4.6	3.7
Country Total	170166	1727932	59.1	68.5

Source: AMIS, 2009

The production of mango has seen a gradual increase during the past five decades. It has increased from 0.13 million tons in 1958 to 1.68 million tons in the year 2012-13. Pakistan remained sixth largest producer of Mango in 2007 with 5.7% share in global mango production

after India, China, Mexico, Indonesia and Thailand (SBI, 2010). Per hectare production of mango remained 10.62 tons which is better than world average i.e. 7.51 tons per hectare but has potential to go beyond 15 tons, the Brazilian production i.e. 15.83 tons per hectare (GOI, 2013). The rootstocks for mango are used from the local variety known as 'Desi'. The vegetative propagation is performed mostly through inarching. The physiological problems of mango include malformation and alternate bearing. Main diseases are anthracnose, powdery mildew, and sudden death of trees. The main insects are mango hopper, mango mealy bug and midges.

Despite the fact that Pakistan is ranked amongst top ten producers of citrus, mango and livestock products (dairy), all three sub-sectors can be characterised by low productivity. Most of the historical growth in production of these sub-sectors was a result of increasing number of plants/trees and animals. To meet the growing needs of country's population and to export the surplus, the productivity must be increased. This paper aims to identify the ways to improve the productivity of dairy, citrus and mango sub-sectors. To achieve this aim, the specific objective is to identify key issues regarding agricultural inputs and markets in general and in particular to these three sub-sectors.

2. Small landholdings: a reason to low-productivity?

Pakistan's agriculture is dominated by the small landholders. During last four decades the number of farming units in Pakistan has increased by more than 3 folds. The proportion of marginal and small farms (up to 5 hectares) has gone up to 86% (GOP, 2011). The average farm size in Pakistan is 3 hectare (GOP, 2013) which is far better than that of India (1.21 hectares), Korea (1.0 hectares) and China (0.6 hectares). But, the productivity of Pakistan's agriculture sector is low compared to these low holding countries. Table 3 depicts that small land holdings are not a constraint; and can be used as a tool of enhancing productivity by focussing on small landholders.

Table 3. Cross country comparison of agricultural productivity

	Pakistan	India	Korea, Rep.	China	Philippines
Average land holdings (Hectares)	3.0 (GOP, 2013)	1.2 (Chand et al., 2011)	1.0 (Chand et al., 2011)	0.6 (Chand et al., 2011)	2.2 (Fukuda et al., 2014)
Cereals* (Tons/hectare)	2.8	2.9	7.1	5.8	3.5
Citrus (Tons/hectare)	10.2	10.1^^	--	--	--
Mango (Tons/hectare)**	10.6	6.5	--	9.4	4.4

* Calculated from WB, 2014

** Calculated from GOI, 2013

There is enough empirical evidence on the inverse relationship between the farm size and its productivity (Cornia, 1985; Singh et al., 2011; Vu et al., 2012; Ali and Deininger, 2014). Empirical evidence in Pakistan also lends support to the inverse relationship between farm size and agricultural productivity (Sharif et al., 1986; Naqvi et al., 1989; Hai 1997; Ahmad and Qureshi, 1999; Shah, 2010; and Sial et al., 2012).

3. Water availability

The agriculture sector of Pakistan has seen enormous growth due to the availability of surface and ground water. The cultivation of new irrigation-intensive varieties of various crops has increased output and thereby on profit of farmers (Acumen, 2008). It is the fact that the abundant

availability of irrigation water has facilitated rapid adoption of fertilizers and new seeds since the green revolution era of the mid-sixties (Kemper, 2003; and Khan, 2006).

The total area irrigated by all sources of water has increased over the years from 9.3 million hectares in 1965-66 to 19.4 million hectare in 2010-11 i.e. more than 100% increase. Currently, at farm gate, surface water availability is 87 million acre feet and that of ground water is 50 million acre feet (GOP, 2011). Due to the efforts made by the government and private sector towards groundwater development, the problem of water logging in Punjab has disappeared with some exceptions of isolated natural depressions and the areas with saline shallow groundwater. As a result of high tubewell installations the groundwater table in Punjab are declining. The volume of groundwater extraction significantly exceeds the volume of water recharged. The difference has been estimated as much as 27% (NESPAK, 1991). The over extraction of groundwater is resulting into the deterioration of groundwater quality due to the intrusion of water from saline groundwater zones into the over pumped fresh groundwater zones (Ahmad and Kutcher 1992).

Government of Punjab reconsidered its role in groundwater management due to the increased number of private tubewell instalments. The government decided to phase out the shallow water public tubewells in the fresh groundwater areas. Furthermore, increased operational and maintenance costs of the deep tubewells forced to close more than 30% of the tubewells. Rest of them were operating at less than 50% of their original capacity. The government decided to phase out all the deep tubewells under SCARP scheme, and promoted private tubewell installations by providing subsidy to farmers. Whereas, the private tubewell development in Sindh remained slow due to: the ample availability of surface irrigation supplies (Ahmad and Kutcher 1992); and the groundwater is very saline in most of the areas (Steenbergen and Oliemans, 1997).

The per capita water availability in Pakistan has decreased by over 400% from 5,260 cubic metres in 1951 to 1,038 cubic metres in 2010 which is just over the 1,000 cubic metres per person threshold value under the global criteria. If the situation remains the same, water availability will be further decreased to 877 cubic meters by 2020 and to an alarmingly low level of 575 cubic feet in 2050. Furthermore, the storage capacity of Pakistan's irrigation system is just for 30 days as compared to the neighbouring country India where the storage capacity is for 120-220 days. Due to the low storage capacity, the agricultural productivity is on risk (Mustafa, 2012).

All the three sub-sectors i.e. dairy, mango and citrus require relatively more water to produce best quality products. As in dairy production, buffalos are the main source of milk. Buffalos are also known as water buffalos. To get maximum output and good quality milk, buffalos need water: for drinking, in feed and metabolic water (feed degradation). Drinking water is the most important water and it should be of good hygienic quality. The water requirements of each buffalo depend on: the diet, the environment (humidity, temperature, etc.) and physiological function (pregnancy, lactation, etc.) (TNAU, 2014). Similarly, citrus require around 10000 m^3/ha/year water (Falivene et al., 2006) and mango requires approximately 11976 m^3/ha/year water (Mostert and Hoffman, 1997).

The history of water policy dates back to 1921 in British-India to distribute water among different provinces/states. After independence, water remained a dispute between India and Pakistan. Indus water treaty was signed to settle this dispute in 1960, which gave exclusive water rights of the three eastern rivers (Ravi, Bayas and Sutlej) to India and three western rivers (Indus,

Jhelum and Chenab) to Pakistan. To meet the needs of water shortage created by the loss of three rivers, Pakistan constructed canals from western rivers to eastern rivers as a replacement and built two major dams during 1960 to 1970 (Ghani, 2009).

Later in 1968, a water allocation and rates committee were constituted by the Government of West Pakistan known as Akhtar Hussain Committee. The committee reviewed barrage water allocations, reservoir release patterns, drawdown levels and use of ground water in relation to surface water deliveries (GOPun, 2002). The committee submitted its report in June, 1970, but was unable to get any attention because of splitting West Pakistan into four provinces. Later in October, 1970, the government of Pakistan set up another committee chaired by former justice Fazle Akbar. The committee's role was to recommend groundwater allocations and their use with flow supplies and reasonable water requirements of the provinces for agriculture, industrial and other uses. The committee submitted its recommendations in 1971, however, no decision was taken on the recommendations and an ad hoc distribution of waters stored by Chashma Barrage and later Terbela Reservoir was ordered among the provinces. Later in 1977, the government constituted another commission. It comprised of chief justices of the four provincial High Courts and was headed by the Cheif Justice of the Supreme Court of Pakistan. The report of this commission, however, remained pending till the Water Appointment Accord of 1991 (Khalid and Begum, 2013). According to this accord, the share of provinces is given in Table 4.

Table 4. Water shares of Provinces under Water Appointment Accord

Province	Water Shares		Total	Balance Supply Shares (%)*
	Kharif	Rabi		
Punjab	37.07	18.87	55.94	37
Sindh	33.94	14.82	48.76	37
KPK	5.28	3.50	8.78	14
Baluchistan	2.85	1.02	3.87	12
Total	77.34	37.01	114.35	100

* Including flood flows and future storage
Source: Malik, 2011

Water pricing policies

The history of the modern water pricing policies dates back to 1873, when the British Government enacted the Canal and Drainage Act. The water rates were based on the volume of water required to mature a crop in term of depth in inches of water i.e. the crops needing less water were charged at lower rates and vice versa. Furthermore, subsidy was provided according to the cropping patterns and on food crops. Water price is known as 'abiana' and is being collected by the Provincial Governments for canal water.

The Indus basin Irrigation System (IBIS) comprises 45 canals: 22 in Punjab, 16 in Sindh, 5 in KPK and 2 in Balochistan. The Provincial Irrigation and Drainage Authorities (PIDA) were established in 1998 which was responsible for the fixation of canal water prices. In the past, the water rates varied from crop to crop and from canal to canal which increased from time to time to meet the expenditures incurred on the maintenance of irrigation system. PIDA (Punjab) modified the rates of abiana in 2003 and announced flat rates of Rs.85/- cropped acre during kharif season and Rs.50/- per acre during Rabi (Sufi, 2010). On the other hand, the PIDA (Sindh) kept the canal water prices constant at Rs.93, Rs.182, Rs.89, Rs.40 and Rs.53 for cotton, sugarcane, rice, maize and wheat, respectively (GOP, 2012). These prices are far too less to

compensate the operating and maintenance costs of the irrigation system. Till date, there is no ground water pricing policy in Pakistan.

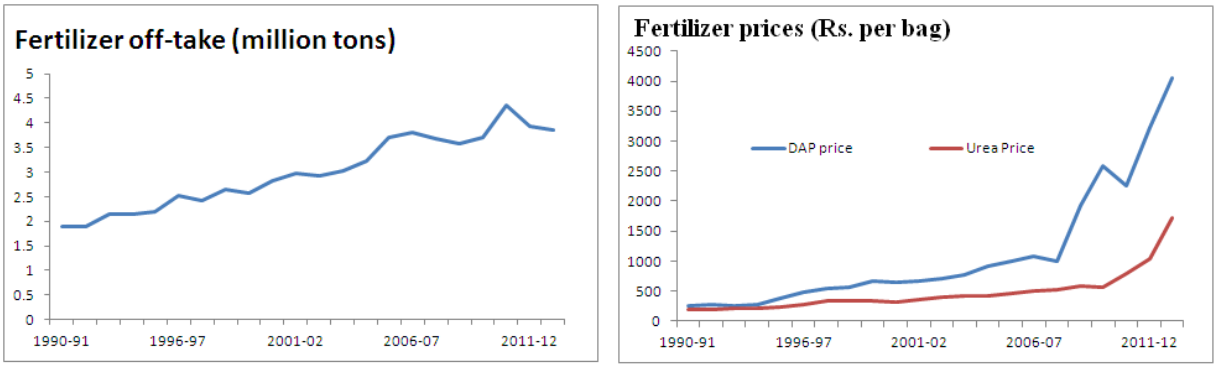
4. Nutrients availability

Fertilizer is one of the basic inputs to ensure good yields of agricultural crops. Its contribution towards increased yield is from 30% to 60% in different crop production regions of the country. This is important to note here that all soils in Pakistan are deficient in nitrogen (N), about 90% soils are deficient in phosphorus (P) and 30% in potassium (K). The deficiency of micronutrients is also appearing in most of the soils. Due to intensive cultivation, the soil fertility is continuously depleting (Hasker, 2010).

The nutrient management of orchards (both mangos and citrus) influence plants/trees vegetative growth, flowering, fruit set and fruit size. The farmers can get maximum output by choosing carefully the combination of different components of fertilizers. (Ibrahim et al., 2004; Abd-Allah, 2006; and Alva et al., 2006). There are two methods of fertilizer application: the foliar feeding and soil applications. The foliar feeding method yields better results than the soil applications. This helps promoting resistance against diseases and pest attacks and increases yield substantially (Havlin et al., 2005; Omaima and Metwally, 2007; and Tariq et al., 2007). It is 10 to 20 times more efficient than soil application. However, farmers are unable to take advantage from this efficiency due to weather conditions, application of wrong spray mix or right mix at wrong time (Yaseen et al., 2004; Alva et al., 2006; Zaman and Schumann, 2006).

In Pakistan, there was no chemical fertilizer use till the 1950s. The use of fertilizers has increased at a rate of more than 40% during 1959-60 to 1969-70. The demand for fertilizers increased regularly at 12.4% in the 1980s. Since 1990s the demand has increased by more than 100% from 1.89 (million tons) during 1990-91 to 3.86 (million tons) during 2011-12. (GOP, 2013). The annual consumption of nitrogenous fertilizers increased from 1.47 million tons to 3.02 million tons. Similarly, phosphate fertilizers' off take was increased from 0.4 million tons to 0.63 million tons during the same time period. The prices of fertilizers have gone too high since 1990. More than 1500% increase in the prices of DAP and about 800% increase in the prices of Urea has been recorded (GOP, 2013). Figure 1 Explains the demand and prices of fertilizers. Pakistan is self-sufficient in the Urea production, hence Urea is not imported. The prices of Urea in the country are less than the international prices at farm gate. Urea price surge after 2008-09 is a result of natural gas load-shedding and revised rates to the fertilizer industry. On the other hand the prices of DAP are linked with international market and is imported.

The fertilizer off take has not seen an increment as their prices. For smallholder farmers, the increasing prices are pulling fertilizer out of their range. A major proportion of the fertilizer demand is for major crops. Orchards are the second priority of the farmers.



Data Source: GOP,2013

Figure 1. Demand and prices of fertilizers.

Poor availability of nutrients is one of the major constraints in the development of the livestock sector (Sarwar et al., 2002). Usually, the nutritional requirements of cattle and buffalos are mainly met through fodder crops and wild shrubs, grass along with agro industrial waste (Khan et al., 2013). Current production levels of fodder crops are only able to fulfil the maintenance requirements of animals. The yield and quality enhancement of fodder crops could substantially increase livestock productivity. The issue of under feeding animals requires a shift in current policy focus of supply driven interventions towards the introduction of high quality forage crops, commercial processing of balanced concentrates and the adoption of modern technology with respect to the harvesting and storage of forage crops and agro based industries' by-products (Hasker, 2010). The gap between the requirement and availability of nutrients can be minimised by enhancing the knowledge of farmers about the usefulness of agro industrial waste and by products. For this, the extension services to convince the farmer to adapt new non-conventional livestock feeding, for example, use of silage, urea and poultry litter (as a source of NPN). This could help minimise the gap between protein availability and protein requirements of animals (Sarwar et al., 2002). Furthermore, farmers must be encouraged to grow fodder varieties that produce fodder round the year or practice rotational crop production and growing of mixtures of other non-conventional fodders like turnips, carrots and wild peas (Hasnain and Usmani, 2006).

5. Animal and plant protection

Good maintenance of animal health is one of the basic requirements to enhance productivity. Despite the availability / existence of a number of veterinary hospitals / dispensaries throughout the country, farmers are unable to get maximum benefits as the number of vaccinated animals is not more than 10% annually (Iqbal and Ahmad, 2002). There is an inconsistency in vaccination programmes against major diseases (especially, foot and mouth diseases) which affects productivity (Sarwar et al., 2002). Pakistan lacks compulsory vaccination laws that is one of the major reasons of epidemics due to which high livestock mortality and morbidity was observed. This caused heavy losses in productivity. Most important diseases that are endemic in Pakistan include; foot and mouth disease (FMD), hemorrhagic septicemia (HS), black quarter (BQ), rinder pest in cattle and sheep pox, anthrax and enterotoxaemia in sheep and goat (Iqbal and Ahmad, 2002; and Nazir and Khan, 2009). The economic losses due to these diseases have been estimated to be Rs. 100 billion (one billion US$) alone in the Punjab. Such losses can be minimised through improved community-based health delivery services (Nazir and Khan, 2009).

Pest attacks are one of the major factors of low productivity of mango and citrus orchards in Pakistan. The beneficial effects of all other inputs may wipe out due to the pest attacks. In Pakistan, pesticide use for orchards is not that widespread as it should be (Khan et al., 2011). Table 5 shows that the application of plant protection measures is 22% of the total cropped area across different farm sizes.

Table 5. Application of plant protection

Size of Farm	Total Cropped area (Million Ha)	Area covered by plant protection (Million Ha)	Area (%)
up to 5 hectares	11.15	2.42	21.7
5-10 hectare	4.54	1.07	23.6
10-20 hectare	3.37	0.75	22.2
20-40 hectare	1.63	0.35	21.5
above 40	1.47	0.34	23.1

Source: GOP, 2011

The use of pesticides in Pakistan has increased gradually. Since 1990-91, the consumption of pesticides has increased by over 200%. The major share of pesticide sprays has been used for major crops i.e. 3 sprays on average in Punjab and 1 in Sindh. Whereas, fruits and vegetables have received 2 average sprays in Punjab and 1 in Sindh (GOP, 2011). Moreover, use of pesticides and other plant protection applications used in both provinces are by the types of crop production rather than sizes of land area cropped. Both types of farmers sowing same crop use almost similar types and quantities of plant protection commodities. However, large farmers are observed to spend low prices on the use of pesticides as compared to the small farmers (Table 5). This is because large farmers do not grow the whole land for one crop and most of the large farmers are able to adapt organic farming, which is not affordable in case of small farmers. Likewise, large farmers also use inter cropping and leave the area vacant that is also not considered in such price comparisons of large and small farmers.

6. Agricultural credit

Agricultural credit is the main source to obtain new technologies for an efficient and profitable agricultural sector. It helps improve farm productivity (Khan, 1997; Bashir et al. 2007 & 2009; Kazmi et al., 2008; Bashir and Mehmood, 2010). The agricultural credit facilities are an important part of the commercialization process of agricultural economy. Hence, the availability of easy and cheap credit is the quickest way to enhance productivity. It has been a prime policy of almost all the governments in Pakistan to fulfil the credit needs of the farming community (Bashir and Azeem, 2008).

The agricultural credit market can be divided into two components i.e. the informal and formal. The informal credit market traditionally comprises of friends, relatives, village shopkeepers, traders, commission agents, etc. Such sources usually advance loans for short time periods and charge very high interest rates i.e. up to 35% for different inputs. These loans are advanced to cover up difficult periods or consumption purposes along with to buy seasonal inputs where cash

is required. These sources are not only inadequate but also they are not dependable. There is no comprehensive data available about the disbursement of credit by informal sector. Some studies, however, reported that the informal credit sources comprises of about 50% share of the total agricultural credit market (Irfan et al., 1999). These sources are still popular particularly among the small farmers, because of easy access, no documentation, no collaterals and availability of credit in time (Bashir and Azeem, 2007).

In order to cope with the increasing needs of credit by the farming community, institutional credit is available through Zarai Taraqiati Bank Limited (ZTBL), Commercial Banks, Domestic Private Banks (DPB) and Punjab Provincial Cooperative Bank Ltd. (PPCBL). The institutional credit has increased by more than 90% at 21.9% per annum (Siddiqui, 2013). The share of commercial banks remained the largest in institutional credit market followed by the ZTBL and DPBs. Most of the credit is disbursed in Punjab (86.1%) followed by Sindh (10.8%). It has been observed that the farmers who own 5-12.5 acres of land borrow the most (Siddiqui, 2013).

Table 6. Institutional credit disbursement

		Rs. in million			
Years	ZTBL	Commercial Banks	DPBs	PPCBL	Total
2005-06	47594.14	67967.4	16023.38	5889.49	137474.4
2006-07	56473.05	80393.18	23976.16	7988.06	168830.5
2007-08	66938.99	94749.29	43940.92	5931.45	211560.7
2008-09	75138.55	110666	41626.33	5579.43	233010.3
2009-10	79012.35	119608.98	43777.41	5721.71	248120.5
2010-11	65361.39	140312.44	50187.03	7161.54	263022.4

Source: GOP, 2011

Out of the total credit disbursed, 24% was advanced for seeds/seedling purchases and only 9% for dairy farming in 2010-11 in Punjab, while it was 26% and 6%, respectively in Sindh for the same time period. The share of major crops is the most in the loans extended for seeds/seedlings. Pakistani farmers have less access to institutional credit, on an average Pakistani farmers are getting 75% of Institutional credit what their Indian counterparts are getting that too on higher interest rates (Siddiqui, 2013). Annex 1 provides yearly data for item wise distribution of loans by institutes.

7. Artificial Insemination

It is incredible but true that there has never been a comprehensive policy on livestock with low and insufficient funds for the development of dairy sector (Ullah, 1998). Historically, livestock policies in Pakistan remained focussed on horizontal expansion of livestock (Sarwar et al., 2002). It has been noted that the livestock products are not included in the priority list of Agricultural Prices Commission till 2006. Similarly, the breeding policy mainly focused on cross breeding of exotic dairy breeds with non-descript indigenous animals (Hasnain and Usmani, 2006). The lack of knowledge sharing amongst the policy makers, farmers and experts is the biggest hindrance in formulating breeding policies (Raziq et al., 2010).

The departments responsible for livestock development in the country are still working at initial levels. They are just providing health facilities with limited animal production activities. Most of the services are provided by veterinary graduate students who are inadequately trained. It is estimated that the animal health services are not reaching more than 25% of population (Hasnain

and Usmani, 2006). Furthermore, breeding services are very limited; the artificial insemination service coverage is less than 5% (Khan et al., 2013).

9. Insufficient Extension Services

Poor / insufficient extension services are one of the major factors contributing low productivity of mango, citrus and dairy sub-sectors. Farmers are not adapting improved technologies due to lack of knowledge (Idrees et al., 2007). Knowledge and information about orchard (mango and citrus) and dairy management and production though improved extension services can improve their productivity (Moaeen-ud Din and Babar, 2006). Furthermore, it is noted that the functional relationship between various departments is weak that should be strengthen through demand-driven extension services (Idrees et al., 2007).

10. Conclusions

This study focuses on three major sub-sectors of agriculture, i.e., diary, citrus, and mango. Pakistan is ranked amongst top 7 positions for the production of different livestock products whereas citrus and mango are 2nd largest fruits produced in Pakistan. Specifically horticulture sub-sector contains substantial potential to cope with socio-economic issues of the rural communities of the country. Small land holders' crop productivity found low as compared to the other low income countries of the similar socio-economic conditions. Despite abundant availability of natural resources such as water, fertile land, and cheap labour Pakistan is not harvesting the benefits out of agriculture sector as it should be. The total area irrigated by all sources of water has increased over the years, however, water lodging appeared to be a challenging issue in soils of Punjab province. Poor availability of nutrients is one of the major constraints in the development of the livestock sector. It is observed that small landholders spend more on fertilisers and pesticides usage as compared to those with large land holdings. The reasons could be multiple such as area of land sown, type of crops sown, and weather conditions in the particular area, etc. Similarly, agriculture credit access and proper utilization of that credit is also a huge challenge faced by Pakistan since inception. Farmers of Punjab are major consumers of agricultural credit and commercial banks are the major source of loan disbursement followed by Sindh province. Extension department is considered as key section in disseminating updated information to the farmers. It plays key role being bridge between research institutes and farming communities. Unfortunately, in case of Pakistan this link/section is very weak. Need is there to activate this section to motivate the farmers for current challenges, future adaptations, and advancement in research practices to implement. This can contribute significantly in improving the agriculture sector and associated sub-sectors particularly dairy, citrus and mango.

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Annex-1 Item wise loan disbursement by institutes

					Punjab					
Years	Seed/Seedlings	Fertilizer	Pesticides	Dairy Farming	Poultry Farming	Fisheries	Tubewells	Tractors	Others	Total
1995-96	819.3	2481.8	1153.9	263.1	26.6	0.4	85.1	2821.7	491.6	8143.5
1996-97	713.2	2233.5	1129.5	818.6	41.8	2.4	191	2924.2	594.2	8648.4
1997-98	1984.3	5615.6	2598.7	1008.1	21.1	1.7	489.3	3875	1283.7	16877.5
1998-99	3249.8	8826.8	4475	405.9	66.2	1.9	696.2	3536.7	917.7	22176.2
1999-00	2572.1	6003.5	2524.8	350.2	60.5	1.7	402.1	5256.1	519.1	17690.1
2000-01	3055.3	7193.2	2596.7	432.2	79.4	0.4	623.7	4898.7	710.2	19589.8
2001-02	3710.8	8423.1	3572	477.4	75.4	0.5	605.9	3369.3	888.9	21123.3
2002-03	5325.5	8309.8	3946.5	680.2	86.6	1	488.9	2699.4	952.1	22490
2003-04	6388.3	8029.4	4399.3	1022.4	123	1.4	403.7	1847.6	1105.2	23320.3
2004-05	8305.5	10430.3	4778.6	1206.5	186.3	8.3	597.1	2525.2	1047.2	29085
2005-06	4157.9	6664.8	3402	1105.1	177.4	12.2	322.3	2298.9	20120.3	38260.9
2006-07	11487.5	19692.8	7795.1	997.4	85.6	18.8	109.3	2872.6	2253.9	45313
2007-08	12524.3	21479.3	8498.6	3516.5	40.4	3	174.2	4434.6	2709.9	53380.8
2008-09	13724.7	23527.9	9313.2	3864.9	25.6	2.7	264.5	6684.9	3287.7	60696.1
2009-10	13759.8	23588.2	9336.9	4971.8	34.3	2.8	341.2	9656.6	2746.3	64437.9
2010-11	13020.1	22320.2	8835.1	4646.7	43.7	2.2	344	1543.4	2239.9	52995.3

					Sindh					
1995-96	164.1	488.5	272.4	70.9	2.6	2.3	17.8	276.5	144.2	1439.3
1996-97	195.6	597.8	388.2	313.8	2.5	2.6	46.4	174	388.3	2109.2
1997-98	507.1	1047.1	613.1	280.3	1.5	6.7	100	257.7	811.4	3624.9
1998-99	723.3	1799.4	902.4	121	3.2	4.1	128.3	413.9	885.7	4981.3
1999-00	645.2	2068.7	861.5	125.1	4.5	10.5	188.6	131.3	755.4	4790.8
2000	699.8	2480.	884.8	130.3	8	23.8	537.6	57.8	840.2	5663.

-01		8								1
2001		2574.								5864.
-02	1092.6	8	791.7	108.8	26.8	18.1	521	28.7	702.4	9
2002		2139.								4731.
-03	1041	4	577.2	111.6	17.8	12.8	338.9	27.8	465.3	8
2003		1959.								4247.
-04	986.5	6	449.1	114.1	48.5	10.1	269	44.6	366.3	8
2004		2477.								5206.
-05	1080.6	6	734	137.4	108	14.4	210.5	36.5	407.1	1
2005		1484.								3302.
-06	657.3	3	482.3	77.4	74.3	19.9	83.1	27	396.9	5
2006		3327.								7065.
-07	1941.2	7	1317.2	18.7	33.1	16.1	11	32.6	368	6
2007		3840.								8461.
-08	2240.1	1	1520.1	119.8	43.3	11.1	67.4	164.4	455.2	5
2008		4133.								9266.
-09	2411.5	9	1636.3	201.9	35.4	4.8	37.1	289.9	515.3	1
2009		4194.								9941.
-10	2447	9	1660.5	378.7	38.3	2.3	50.8	329.8	839.1	4
2010										8093.
-11	2109.9	3617	1431.7	470.5	16.3	0.3	62.7	15.1	370	5