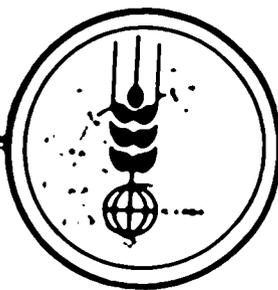


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International Center for Agricultural Research in the Dry Areas

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RESEARCH REPORT

No. 77

STRENGTHENING LINKAGES BETWEEN
RESEARCH,
AGRI-BUSINESS AND FARMERS

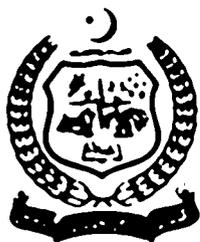
by

Mr. Haywood Ahmed Chaudhry

1991

THE MART/AZR PROJECT

HIGH ELEVATION RESEARCH IN PAKISTAN



Pakistan Agricultural Research Council

ARID ZONE RESEARCH INSTITUTE

Brewery Road, Quetta, Pakistan.

MART/AZR PROJECT RESEARCH REPORTS

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This Institute has responsibility for undertaking dryland agricultural research in all provinces in Pakistan through its headquarters in Quetta, Baluchistan and its sub-stations at D.I. Khan (NWFP), Umerkot (Sind) and Bahawalpur (Punjab).

This series of research reports outlines the joint research findings of the MART/AZR Project and AZRI. It will encompass a broad range of subjects within the sphere of dryland agricultural research and is aimed at researchers, extension workers and agricultural policy-makers concerned with the development of the resource-poor, arid areas of West Asia and North Africa.

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STRENGTHENING LINKAGES BETWEEN
RESEARCH,
AGRIBUSINESS AND FARMERS

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PARC : AZRI : USAID : ICARDA

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TABLE OF CONTENTS

Executive Summary	ii
1. Introduction	1
2. Objectives of the consultancy	2
3. Scope of consultancy	3
4. Approach of the consultancy	3
5. The concept of agribusiness	4
6. The importance and scope of agriculture and agribusiness	4
7. Scope of the agribusiness sector in Balochistan	5
8. AZRI technologies with commercial potential	10
9. The meat industry	13
10. The leather and skin industry	14
11. Sharaish (glue) manufacturing	17
12. The wool industry	17
13. The seed industry	19
14. Recommendations and conclusions	20
15. References	24
Annex	
Annex 1. Area, production and yield of crops grown in Balochistan	29
Annex 2. Livestock population in Balochistan	30
Annex 3(a). Animals slaughtered inside slaughter houses (1987/90)	30
Annex 3(b). Animals slaughtered outside slaughter houses (1987/90)	31
Annex 4. Seminar programme	32
Annex 5. List of seminar invitees	34
Annex 6. List of seminar participants	35
Annex 7. List of persons visited	36
Annex 8. List of seed companies in Pakistan	38
Annex 9. Itinerary of consultant	40

EXECUTIVE SUMMARY

1. The Government of Pakistan (GOP) now recognizes the potential role of the agribusiness sector in agricultural research, production, marketing, processing and overall development of the resource base. The private agribusiness sector with its forward and backward linkages with the farming sector can make a significant contribution towards increasing farm production, incomes and employment opportunities, especially in the rural areas. Therefore, one of the objectives of GOP policy is to develop mechanisms and implement policies which increase private agribusiness participation in identifying problems, conducting research, disseminating known research results to farmers, and using the research results in profitable agribusiness operation.

2. Agribusiness can assist public sector research institutions with the funding of research, and the verification, marketing, processing and distribution of technologies. In addition, it can bring to the attention of researchers the problems it faces in the marketing of agricultural commodities, thus making research more problem oriented. Under the self-reliance policy of the GOP, stronger linkages between agribusiness and public research institutes will help to remove the financial constraints which affect these institutes.

3. In the past agricultural research was mainly confined to public research institutes and field stations with scant regard to the farmers real problems, and the Government's extension services were expected to transmit research findings to the users of such information, namely farmers and private agribusinesses. But the linkages of the extension services with farmers have been weak, and with agribusiness they have been virtually non-existent. Only recently has agribusiness been integrated into this process. A consultancy was therefore commissioned with aim of strengthening the linkages between research at the PARC Arid Zone Research Institute (AZRI) in Quetta, agribusiness in Balochistan, provincial government departments and farmers. Technologies developed at AZRI with commercial potential were given particular attention, as were some of the problems facing agribusiness which could be addressed by AZRI. The consultancy ended with a seminar to present the

findings to participants from provincial government departments, AZRI staff, farmers and representatives of trade and industry, and to develop conclusions and recommendations.

4. AZRI, with the support of the Agricultural Extension Department, the FAO supported Fruit Project and the new UNDP Livestock/Range Management project, should organize pilot plantations of fourwing saltbush to demonstrate and create a demand for seedlings. Private fruit nursery growers should be encouraged to grow saltbush by providing them with some free seed and advice. Seedlings required by AZRI for on-farm research could be purchased from a private nursery, thereby creating an initial market.

5. The camel seed drill being evaluated at AZRI requires further testing and demonstration in farmers' fields before inviting agribusiness to assess its commercial potential.

6. Because of the relatively small area of rainfed wheat (70,000-120,000 hectares), barley (3,000-11,000 hectares) and lentils (100 hectares) in Balochistan, the demand for improved seed makes large-scale commercial production unlikely. However, local business involvement on a small-scale may be a viable proposition which could be implemented by leasing land on government farms to agribusinesses.

7. There is a substantial market of around Rs15 million per annum for livestock medicines, vaccines and equipment in Balochistan. This could be an attractive market for agribusiness, but first the provision of free or subsidized medicines by government departments needs to be phased out.

8. About Rs1,000 million is lost because poor quality skins and hides are delivered to tanneries. Research should be initiated to find ways to reduce this loss.

9. Raw wool supplied to the domestic mills and exporters has low quality for several reasons, and thus the price producers receive is reduced. Research is needed to find ways to improve the quality of wool sold by producers.

10. In Quetta glue (sharaish) is made from slaughter house and tannery waste under primitive conditions which need to be improved.
11. A seminar was held on June 16, 1991 at the Serena Hotel, Quetta, on "Strengthening Linkages Between Research and Agribusiness in Highland Balochistan". It was attended by representatives from AZRI, provincial government departments, trade associations, agribusiness and farmers. The findings of the consultancy were presented and the relevant comments from the ensuing discussion have been incorporated in this report.
12. The consultant recommends that the following steps should be taken for strengthening linkages between research, agribusiness and farmers operating in Balochistan;
- compile an agribusiness directory,
 - prepare pre-feasibility studies on AZRI technologies with commercial potential and distribute the studies to agribusinesses in and outside Balochistan,
 - invite agribusiness representatives and farmers to field days at AZRI and on farmers' fields,
 - promote deregulation of state control over agricultural sectors such as the seed industry, animal health services, etc.,
 - encourage government to lease their farms to agribusiness for conducting research and commercial operations such as seed production;
 - establish linkages between research, agribusinesses, trade associations and Chambers of Commerce,
 - establish close contacts with the newly established agribusiness cell located in Federal Ministry of Food, Agriculture and Cooperatives,
 - establish a committee to strengthen linkages between research, agribusiness and farmers,
 - hold seminars, workshops and training courses to create an awareness about technologies with commercial potential and,
 - design appropriate mechanisms to communicate relevant information among the different partners involved in agricultural research and the production of agricultural commodities, from farmers through to consumers.

1. INTRODUCTION

In Pakistan, agriculture is handled mainly by the private sector, from production to processing, storage and marketing, as well as importing and exporting. Private agribusiness produces many inputs such as seed, fertilizers, pesticides, farm machinery, etc. In spite of many constraints to agribusiness development, especially policy constraints, the sector has continued to expand. Twenty-four seed production and distribution companies are registered in the country. However, in 1988/89 it is estimated that certified and uncertified seed still represented only 10.4 percent of the total seed used.

Since the privatization of the pesticide industry in 1980, pesticide consumption has increased rapidly from 253 tons to about 4,500 tons of active ingredients. The current market for pesticides is estimated at over US\$150 million per year and the Pakistan Agricultural Pesticide Association reports that consumption of pesticides has recently been growing at 10 percent per annum. Some 145 pesticides are registered in Pakistan by their common names and around 200 branded products are being sold to farmers by 18 pesticide companies, 7 of which are presently foreign owned. A doubling of the production of cotton in 8 years is evidence of the benefits the private sector's role in helping farmers to protect their cotton fields from pest attacks. The private sector improved the availability and distribution of pesticides, and the dissemination of research knowledge to farmers about proper pesticide application.

Another example of the rapidly emerging agribusiness sector is the poultry industry which has been growing at 20 percent per annum, while a private poultry growers' association has been formed by 1,800 large producers.

In recent years, export of leather and leather goods has been one of the major agribusiness successes of Pakistan. Revenues increased steadily from Rs795 million in 1975/76 to Rs11,506 million in 1989/90. There are currently 400 tanneries operating with an estimated annual output of 40 million square meters of leather.

The agribusiness sector seldom carries out extensive research of its own, relying on in-country and foreign researchers to find solutions to its problems. Private companies often pay a royalty to foreign parent companies so that they may

use the technology and brand names for marketing a product. Under existing Pakistani law, a 1-3 percent royalty is permitted on the manufacture of different goods for a period not exceeding 5 years.

In the past, research was mainly confined to public research institutes and field stations, but with the introduction of the Farming Systems Research concept, efforts have been made to involve farmers in research on problems that farmers have helped to identify. However, until recently, the agribusiness sector has not been integrated into the research process. The Government of Pakistan (GOP) now recognizes the potential role of the agribusiness sector in agricultural research, production, marketing, processing and development. Therefore, one of the objectives of GOP policy is to develop and implement mechanisms to increase agribusiness participation in identifying problems, conducting research and disseminating results.

Since 1985, the International Center for Agricultural Research in the Dry Areas (ICARDA), with headquarters in Aleppo, Syria, has had an agreement with the United States Agency for International Development (USAID) to strengthen the research capability of the Arid Zone Research Institute (AZRI), a Pakistan Agricultural Research Council institute located in Quetta. This agreement is being implemented under the Management of Agricultural Research and Technology (MART) project of USAID. Realising the importance and role of agribusiness in agricultural development, the 1990 amended MART project gives special emphasis to strengthening linkages between public sector research institutes, agribusiness and farmers. As a first step in strengthening these linkages, a consultancy was commissioned as part of the MART project.

2. OBJECTIVES OF THE CONSULTANCY

The objectives of the consultancy were:

1. to assess the scope of the agribusiness sector in highland Balochistan,
2. to bring to the attention of relevant agribusinesses in Balochistan, Punjab and Sindh technologies developed at AZRI that may have commercial potential,
3. to identify problems facing agribusinesses that could be investigated by AZRI and thereby increase the value of agricultural and livestock commodities to producers,

4. to present the recommendations of the consultancy at a seminar attended by officials from provincial government departments and local trade and industry, AZRI staff and farmers, and
5. to write a report on the consultancy, including recommendations to assist AZRI in developing its links with the agribusiness sector.

3. SCOPE OF THE CONSULTANCY

This consultancy is concerned with rainfed agricultural systems and the range/livestock sub-sector of highland Balochistan. The agribusiness sub-sectors receiving particular emphasis by the consultant are seed (wheat, barley and forages (vetch and fourwing saltbush) for rainfed cropping areas, agricultural machinery (camel planter), and small ruminant meat, wool, hair, skins and health.

4. APPROACH OF THE CONSULTANT

The approach used by the consultant was:

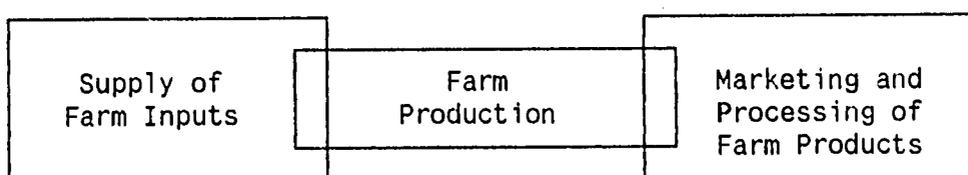
- to collect secondary information available from various sources on factors which affect agribusiness in Balochistan,
- to become acquainted with AZRI's research activities in general and those technologies with commercial potential in particular,
- to visit financing institutions, agribusinesses and the Balochistan Chambers of Agriculture, and Industry and Commerce in Quetta to discuss the AZRI technologies and solicit their interest in promoting the commercialization of these technologies,
- to identify and visit agribusinesses in Quetta and its neighbourhood, discuss with them their present activities, describe to them the technologies available at AZRI, and solicit their interest in commercializing these technologies,
- to identify representatives from agribusiness companies, the Balochistan Chambers of Agriculture, and of Industry and Commerce, banks, the Departments of Agriculture, Livestock and Forestry in Quetta who would attend the seminar,
- to visit selected companies in Punjab and Sindh Provinces which may have an

- interest in the AZRI technologies with potential for commercialization,
- present the findings of the consultancy at a seminar, and
- to submit a report describing the different aspects covered during the consultancy.

5. THE CONCEPT OF AGRIBUSINESS

In the broadest sense, agribusiness may be taken to include all industrial scale operations related to the production and processing of agricultural products, from the supply of inputs of production to production and supply of consumer goods incorporating agricultural materials. The concept of agribusiness is shown schematically in Figure 1.

Figure 1. Schematic presentation of the concept of agribusiness



6. THE IMPORTANCE AND SCOPE OF AGRICULTURE AND AGRIBUSINESS IN PAKISTAN

At the present stage of development of Pakistan's economy, agriculture has greater scope for increasing production, incomes and employment than any other sector, particularly in rural areas. To achieve the production potential of Pakistan's rich agricultural resource base, an effective infrastructure of public services is essential: research, education, utilities, and roads. Equally imperative is the need for good private sector services provided by small businesses, corporations, and cooperatives to provide the necessary production inputs as well as process, distribute and market the farm outputs. The history of development of agriculturally advanced economies bears testimony to the key role played by private sector agribusinesses in technology development and innovation and in the provision of services to farmers.

The importance of agriculture and agribusiness activity is illustrated in Table 1.

Table 1. The agricultural economy of Pakistan

ECONOMIC INDICATOR	ECONOMIC IMPACT
Employment to Total Employment	70 percent
Contribution to Total Gross Domestic Product	50 percent
Exports to Total Consumption	50 percent
Household Consumption to Total Consumption	60 percent
Energy Consumption (1987/88)	44 percent
Consumption of Imports (1988/89)	46 percent
Food/Fibre Manufacturing Tax Revenue (1985/86)	27 percent
Capital Investment to Total Investment (1984/85)	36 percent
Agricultural Capital Formation (1987/88)	Rs8,648 Million
Agricultural Credit (1987/88)	Rs15,893 Million

Source: RONCO/AGRI-BI-CON (1990)

7. SCOPE OF THE AGRIBUSINESS SECTOR IN BALOCHISTAN

The Government of Balochistan (GOB) through policy statements, seminars, workshops and other efforts has emphasized increasing agricultural production but little attention has been directed towards the development, promotion and linkage of agribusiness with research in the development, promotion and linkage of agribusiness with research in the province. This linkage could make a substantial contribution towards modernizing agriculture. The success of agribusinesses and the difficulties farmers have in increasing production are interdependent. The more the private sector is encouraged in activities such as the supply of inputs, technology and field oriented services to farmers and in the marketing, processing, storage, packaging, transport, export and upgrading of farm produce, the faster will be the growth of the agricultural economy, farm incomes and employment generally.

Balochistan is the largest province of Pakistan, covering over 43 percent of the land area. Over 67 percent of its people derive their livelihood from agriculture. Agribusiness employment and trade, supply of inputs and marketing of agricultural products also provide jobs to a substantial portion of the remaining population. Over half of the provincial gross domestic product comes from the agricultural sector. Some of the factors which affect the future scope of agribusiness in Balochistan are given below.

7.1 Area

The geographical area of the province is 34.7 million hectares of which only 4.5 percent or 1.5 million hectares is cultivated.

7.2 Climate

The climate is extreme with temperatures of over 40°C in summer and below freezing in winter. The annual rainfall is only 75-125 mm in the south and west; in the north-east it is 300-400 mm but still sporadic and uncertain although better distributed between winter and summer.

7.3 Population

Only 6 percent (6.4 million) of Pakistan's population lives in Balochistan, giving a density of 18 persons per square kilometer against a nationwide figure of 127.

7.4 Rangelands

More than 60 percent of all the rangelands in Pakistan are in Balochistan and 79 percent of the total land area of Balochistan (27.4 million hectares) is rangelands which are important for raising small ruminants.

7.5 Livestock production

Pakistan has 27 million sheep and 23 million goats of which 11.1 million (41 percent) sheep and 7.3 million (24 percent) goats are in Balochistan. The number of livestock and trends in population growth are given in Annex 2. In addition, about 2.5 million sheep and 0.8 million goats are reported to belong to Afghan refugees. The goat population has kept pace with the growth of the human population (around 3 percent per annum), but the sheep population has grown at about 2 percent per annum (Government of Pakistan, 1989).

7.6 Feed resources

In Balochistan livestock feed is derived mainly from rangelands and other grazing areas, and also from straw and other agro-industrial by-products including animal, fish, and crop wastes. The total feed available at present from all sources in Balochistan is estimated to be 4.41 million tons of Total Digestible Nutrients (TDN) and 0.44 million tons of Digestible Protein (DP) derived as follows:

	<u>TDN</u>	<u>DP</u>
	(million tons)	
Rangelands	1.64	0.21
Other grazing	1.70	0.17
Crop sector	1.07	0.06
	-----	-----
Total	4.41	0.44

Source: FAO (1987).

7.7 Meat production

The estimated production of meat for each species of animal in Balochistan (1987/88) is given below:

Meat production in Balochistan (1000 tons live weight)	

Cattle	23
Buffalo	3
Sheep	78
Goats	54

Total	158

Source: FAO (1987).

7.8 Hides and skins

Hides and skins are a by-product of livestock slaughtered for meat and also come from sick animals that are slaughtered or die. Production of hides in Balochistan in 1986 was 0.2 million pieces and of skins 9 million pieces (FAO, 1987).

7.9 Wool and hair production

On the basis of sheep numbers, slaughter offtake and mortality, estimated wool and hair production was 12.1 thousand tons and 2.5 thousand tons, respectively in Balochistan (FAO, 1987).

7.10 Milk production

Estimated annual demand for milk in Balochistan is 458,000 tons, based on per capita requirements of 71.6 kg per year. But estimated total production in 1986/87 was 300,000 tons, leaving a deficit of 158,000 tons (Pakistan Banking Council, 1988).

7.11 Crops

In addition to the vast arid rangelands, Balochistan has four main agricultural regions between the sea-coast and the high plateaux which reach 2500 m above sea level. These regions are:

1. Highland areas to the north and north-east of Quetta which are used for commercial orchards, high value vegetables, and cereal production.
2. The upland areas of Kalat - Khuzdar where fruits and cereals are grown.
3. The canal irrigated plains of Sibi and Nasirabad Division which are suitable for food grain production and other crops.
4. The Mekran region where fruits such as dates, citrus, cheeku, coconut and papaya are grown.

The area, production and yield of winter (rabi) crops grown in Balochistan is given in Annex 1.

7.12 Irrigation

Of the 1.5 million hectares of cultivated land, 0.53 million hectares (35 percent) are irrigated and 0.97 million (65 percent) are either solely rainfed (Khushkaba) or use rainfall plus some harvested flood water (Sailaba). Major sources of water are from canals, providing water to 0.34 million hectares, tube wells and wells which water 0.11 million hectares, and karezes and other sources which supply 0.05 million hectares of cropped land (Government of Pakistan, 1988a).

7.13 Agribusiness

Agribusiness in Balochistan has developed at a slower rate than in Punjab and Sindh, the major reasons being:

- the population is small and scattered, with a significant proportion of nomads and migrants,

- public sector domination of activities such as seed production, animal health, wool industry etc.,
- low levels of literacy (7%) and skills,
- tribal structure of rural society,
- limited purchasing power which restricts the market,
- lack of confidence by investors in government policies,
- absence of trained manpower,
- low rainfall and an extreme climate,
- a limited and scattered cultivated area,
- difficulty of recovery of loans and loan arrears,
- poor infrastructure and long distances between production and consumption centres increase marketing costs,
- a fragile law and order situation, and
- more profitable alternative investment opportunities.

The number of agribusinesses in Balochistan is shown in Table 3.

Table 3. Agribusinesses in Balochistan

SECTOR	UNITS	JOBS
Flour Mills	252	599
Dairy Farms	56	193
Poultry Farms	14	42
Tobacco Grinding	16	110
Ice Factories/Cold Storage	20	64
Food Processing	8	65
Vegetable Ghee	1	200
Rice Mills	17	133
Oil Expellers	3	6
Total	387	1412

Source: Pakistan Banking Council (1988).

7.14 Electricity supply

At present, less than 25 percent of the province's villages have electricity.

7.15 Roads

The total length of roads in Balochistan is 17,824 km, of which only 3,202 km are black topped.

8. AZRI TECHNOLOGIES WITH COMMERCIAL POTENTIAL

A number of technologies have been identified and tested by AZRI during the past 6 years. Those with commercial potential are described below.

8.1 Range plant and forage improvement

The Range Section of AZRI is testing fourwing saltbush (*Atriplex canescens*) which appears to have commercial potential for improving feed production on rangeland and in rainfed areas. The total area of rangeland in Balochistan is 27.4 million hectares but 10 million hectares are considered unproductive. Saltbush could be planted on much of the remaining 17.4 million hectares. It would make feed available to sheep, goats and camels during periods of shortage.

Saltbush is a perennial shrub which can be grown from seed in nurseries and from cuttings. Although vegetative propagation from cuttings shows some promise and would accelerate the establishment of fourwing saltbush, nursery production of seedlings is more likely. Under prevailing rainfall conditions (200 mm), fourwing saltbush can produce at least 1000 kg dry matter per hectare each year. Once planted, it continues to grow for at least 10 years. On the other hand, feed legumes have to be planted every year using 70 kg seed per hectare.

Saltbush can survive in saline soils and with very little rainfall whereas legumes cannot survive under these conditions. 3,000-4,000 plants are required per hectare, and one man can quite easily raise 30,000-40,000 plants in a nursery. Economic evaluation under farmer conditions remains to be carried out by AZRI. Release of such shrubs to farmers does not require the approval of the Government Varieties Evaluation Committee (VEC) and could be introduced on farms once a demand for seedlings had been generated.

In addition to fourwing saltbush, woollypod vetch (*Vicia villosa* ssp. *dasycarpa*), an annual forage legume, is the most promising new fodder species being studied at AZRI. Trials carried out since 1985 have shown that woollypod vetch can produce at least 2500 kg dry matter per hectare, provided adequate moisture is available; its water requirements are similar to those of barley. However, seed production is low and testing in farmers' fields and government registration of varieties is required which may take another 2 years. In addition, economic evaluation has yet to be made. Therefore, this legume is not yet ready for release to agribusiness.

8.2 Camel seed drill.

The Agronomy Section at AZRI has developed a camel seed drill in association with Naeem and Company, Samundri Road, Faisalabad. Its main advantages over the traditional local camel planter are that it plants three rows at a time, making it up to three times faster than the local planter; it also places the seed at a constant, uniform depth which results in a better and more even germination and growth, and higher yields. The timing of sowing could also be improved to make best use of the scarce moisture and the area under crop also increased. The seed drill can be used for sowing wheat, barley, lentils, and forage legumes. Naeem and Company in Faisalabad was asked to establish contact with local farm machinery suppliers in Quetta and to recruit an agent to supply and promote the camel seed drill in Balochistan.

8.3 Production and distribution of improved crop varieties

The area of irrigated wheat in Balochistan has steadily increased from 72,600 hectares in 1977/78 to 177,300 hectares in 1987/88. The rainfed area fluctuates considerably depending on the season; it averages around 80,000 hectares, but reached 121,400 hectares in 1983/84 compared with 6,000 in 1987/88, a very dry year. About 560 tons of improved wheat seed, including a local production of 171 tons, were distributed in the province. Therefore, only 3 percent of the total wheat area is under improved varieties. Costs of seed distribution are very high due to the wide dispersal of the growing area. Thus, wheat seed production, particularly for the highland areas, has little potential as a large-scale commercial activity. However, small-scale businesses supplying seed at the divisional level may be a viable proposition in the long run. This could be done through contracting government farms to agribusiness.

The area under barley has varied between 3,000 and 11,000 since 1980, while lentils usually occupy around 90-100 hectares. There is thus a rather small market for improved seed.

Germplasm improvement of wheat, barley, and lentils has been conducted at AZRI since 1982 in cooperation with ICARDA. Some of the most promising results achieved since then are outlined below.

8.3.1 Wheat. To date, the superior bread wheat line Shi4414/Pews has been identified for winter planting. This line has resistance to yellow rust (*Puccinia*

striiformis), shows better productivity than the local landrace, particularly in dry years, and has a sufficiently high level of cold tolerance for winter planting. At present, there are no improved selections for spring planting. However ten potentially superior genotypes, suited to this shorter maturity period, have been identified. It will be several years before superior selections are identified, bulked up, and certified by the government VEC.

8.3.2 Barley. Barley is better adapted to drought stress than wheat. Thus, in highland Balochistan there is potential for increasing barley production from its current limited area through the identification of drought resistant genotypes. Five such barley genotypes have been selected for highland Balochistan. Among them, Arabi Abiad, a Syrian landrace, has been selected for both winter and spring planting since it is more drought tolerant and yields more grain in dry environments than the local landrace, especially when sown in spring. Arabi Aswad, another landrace from Syria, Wadi Hassa, W12291, and W12269 are quite promising varieties. It will also be some years before field testing, bulking up, and government certification are complete.

8.3.3 Lentils. Local lentil varieties have the smallest seed in the world and for this reason AZRI is trying to introduce large-seeded varieties which are preferred by local consumers. ILL5865 and ILL5677 equal the yield of the local variety, but are also resistant to drought and heat and are twice the size. More trials are still needed on these promising lines.

8.4 Livestock health

Some of the common diseases of small ruminants in Balochistan are listed below.

- | | |
|--|---|
| - Anthrax | - Bovine viral diarrhoea |
| - Black quarter | - Mastitis |
| - Enterotoxaemia | - Parasitic gastroenteritis |
| - Foot and mouth disease | - Coccidiosis |
| - Small ruminant pest
(peste des petit ruminants) | - Fascioliasis |
| - Haemorrhagic septicaemia | - Warble fly infestations |
| - Rabies | - Ecto- and endoparasitic
diseases (lungworms, nasal bot
fly, mange, ticks) |

There are 52 veterinary hospitals, 516 dispensaries and 25 artificial insemination (AI) centres in the province, staffed by 111 vets, 590 stock assistants (SA) and 28 AI staff. The total number of livestock vaccinated during 1989/90 was 5.96 million and treatment was given to 9.6 million head (Government of Balochistan, 1990). However, the Livestock Department in Balochistan has problems procuring medicines and vaccines and spends about Rs10 million a year on medicines. The German centre for lamb fattening is selling medicines at cost price and farmers are buying them. One private dispensary at Moosa Khail is selling medicines and many people are buying them. Apparently there is a substantial market for medicines and vaccines in the province but the potential size of this market has not been determined.

These findings indicate that there is considerable potential for the private sector to enter the animal health market. However, a major problem for the private sector is the provision by government of medicines either free or at a subsidized rate to farmers. Phasing out of this government assistance and increasing the involvement of the private sector in the supply of medicine will reduce the financial burden on the government which is in accordance with its privatization policy. The money saved by eliminating the subsidy on medicines would be better spent in strengthening the livestock services in the province. Marketing of animal medicines could be handled more efficiently by the private sector.

9. THE MEAT INDUSTRY

There are 16 slaughter houses in Balochistan and the total number of sheep and goats slaughtered during 1989/90 was 0.9 million (Government of Balochistan, 1990). For details see Annex 3.

9.1 Slaughter house facilities. At Quetta slaughter house and others in Balochistan there are no pens for holding live animals before slaughter; most of the facilities are very rudimentary and do not provide even minimum standards of hygiene. Ventilation systems, lighting, water supplies and drainage should be improved. Meat transport facilities from slaughter houses to butcher shops are unhygienic, the meat being exposed to dust, dirt and flies which increase the risk of health problems to consumers.

9.2. Slaughter house by-products. Slaughter house by-products form a valuable source of revenue for the butchers and potentially represent about 20 percent of total sales (FAO, 1987). Carcass dressing and the handling of by-products are carried out in the same building and poor handling methods often reduce the level of recovery and value of by-products. Edible offal (lungs, liver, stomach, head and feet) are collected by merchants and sold in offal markets located close to slaughter houses. Blood is collected and dried in conditions which reduce its potential value as an ingredient for animal or poultry feed. Skins and hides are bought by traders who work as contractors in slaughter houses.

9.3 Livestock marketing system. The livestock marketing system in highland Balochistan, even though it is not modern, is quite well organised and integrated. Studies at AZRI indicate that producers receive 68.5 percent of the price paid by consumers, which includes the price paid by edible offal merchants and skin traders (Mahmood and Rodriguez, 1991). The remaining 31.5 percent represents the value of the services provided by the intermediaries in the marketing chain. Consumers buy ungraded meat at prices regulated by the local authorities (Deputy Commissioners). However, there are no mechanisms enabling consumers to express their dissatisfaction about the quality of meat or the unhygienic conditions in which the meat is sold by butchers (Mahmood and Rodríguez, 1991). This is the major weakness of the livestock marketing system.

9.4 Actions by AZRI

AZRI should encourage the local authorities (Deputy Commissioners) to introduce meat grading and differential retail prices according to quality and to supply and demand; training courses should be given to slaughter house workers, particularly on skinning, processing, grading and storage of meat and skins. This would increase the value of these commodities.

10. THE LEATHER AND SKIN INDUSTRY

Export of leather and leather goods has been one of the major agribusiness successes of Pakistan in recent years. The GOP attaches high priority to the continued development of this industry and has established the Leather Industry Development Organization, with headquarters in Islamabad.

10.3 Processing

There are currently some 400 tanneries in the country with a reported annual capacity of 40 million square meters. However, there is no tannery operating in Balochistan. The minimum number of small ruminants required to run a tannery economically is 500 head per day (Pakistan Banking Council, 1988). The Quetta slaughter house has the capacity to process 350-400 small ruminants and the unofficial slaughter houses in Quetta could potentially provide the remaining skins needed by a tannery.

10.4 Prices

Skin prices vary from Rs60 to Rs160 depending upon the quality. The major factors which determine prices are the presence of cuts and skin defects caused by disease and insects. In addition, supply and demand in the domestic and international markets determine the final price.

10.5 Constraints facing the leather and skin industry

The major constraint facing the leather and skin industry is the poor quality of hides and skins available for processing. Poor shearing techniques are a major cause of damage to skins. The other important causes of low quality are cuts and damage due to ticks, lice and warble flies (cattle and goats are more susceptible to infections than sheep). Careless flaying (skinning) damages skins and deterioration due to improper preservation and handling after slaughter compounds the damage. A survey carried out by the Leather Industry Development Organization (Government of Pakistan, 1990b) estimated that 25 percent of hides and skins are seriously affected by the factors mentioned above, and that the overall value of the finished leather is reduced by about 25 percent, equivalent to export revenue losses of Rs1,000 million.

The Leather Industry Development Organization provides training to private processors through the Pakistan Tanners Association. This training is mainly in the manufacturing of leather goods. There is no training of producers, shearers, slaughter house employees or traders who process and store skins and hides. AZRI needs to encourage the departments concerned to arrange appropriate training courses.

11. SHARAISH (GLUE) MANUFACTURING

In Quetta, one operator makes glue (sharaish) using slaughter house and tannery waste (bones, horns, ears and leather). This is collected, mixed with caustic soda, boiled, cooled and transformed into sharaish which is used in the cloth and tent making industry. Production is limited by water shortages, a lack of proper waste water disposal and high summer temperatures - because sharaish is produced in the open and needs low temperatures to set, it can only be produced in winter and spring. AZRI should encourage the departments concerned to seek advice on how this activity could be improved. A study of the economics of replacing fuelwood with natural gas should be undertaken.

12. THE WOOL INDUSTRY

Wool is an important output of the sheep industry in rainfed areas of Balochistan. Raw wool is either fleece wool collected at shearing or pulled wool recovered from the skin tanneries. Most sheep are shorn twice a year, the spring shearing yielding a predominantly white wool whereas the autumn wool is yellowish with a low value. Local sheep breeds have wool with coarse fibres suitable for carpets, felt and textiles such as blankets, rugs and shawls.

12.1 Wool production

On the basis of sheep numbers, slaughter offtake and mortality, estimated annual wool production in Balochistan is about 12,000 tons of raw greasy wool (FAO, 1987). About 50-60 percent clean wool is obtained from the raw wool which is generally heavily contaminated with dust, grease and vegetable matter. About 2,500 tons of goat hair is also produced (FAO, 1987).

12.2 Wool exports

Wool is exported mainly in the form of carpets and as raw wool, the latter mainly to the UK, France, Germany and India. Annual exports vary between 5,000 and 7,000 tons of raw wool and in 1989/90 the 5,100 tons of raw wool exported were worth Rs283 million. The value of exported carpets was Rs3,346 million (Government of Pakistan, 1990a).

12.3 Wool marketing

Shearing is generally arranged by the flock owner and the wool may be sold on the sheep before shearing. Typically, the shearer sells to the collector in the producing area or to a wool merchant in the nearest marketing centre. From there the wool is sold to a wholesaler and transported to Multan or Karachi for re-sale through a commission agent to a wool processing company or exporter.

12.4. Prices and margins

The price of good quality wool is about Rs25 per kg and poor quality mixed wool ranges from Rs8.5-10.0 per kg. The producer receives about 80 percent and 40-60 percent of the retail price for good quality and poor quality wool, respectively (FAO, 1987).

12.5 Woollen industry

In 1986 there were about 118 woollen mills in Pakistan with an installed capacity of 170,000 spindles and 800 looms (IMG/IACP, 1988). Of these, 44 mills have closed and the remaining capacity is only 60 percent utilized. The wool processors and exporters are represented by the Pakistan Wool and Hair Exporters Association, the Pakistan Woollen Mills Association, and the Pakistan Carpet Manufacturers and Exporters Association.

12.6 Wool industry constraints

Processors and exporters receive wool which is generally dirty, is a mixture of colours and quality, and has a short staple length due to the twice-yearly shearing. These defects reduce its value and increase processing costs. The local production and marketing system is thus unable to supply the high volume and consistent quality required by the mills. Thus, the larger and more modern units are turning to imported wools which can be procured in large quantities with consistent high quality from Australia and New Zealand and can be processed more economically.

12.7 Necessary actions

The problems facing the woollen industry should be brought to the attention of the concerned research institutes and government departments. The selection of rams from local breeds with better wool quality and uniform colour and the distribution of these rams to farmers at subsidized prices would be one important initial step. This would be an appropriate task for the Livestock Department in Balochistan and

the Sheep and Wool Coordination Unit at the National Agricultural Research Centre in Islamabad. AZRI could become a partner in this effort provided extra resources were made available.

13. THE SEED INDUSTRY

13.1 Present status

In addition to the Punjab Seed Corporation and Sindh Seed Corporation, there are about 24 seed companies registered in Pakistan (see Annex 4). The total certified and uncertified seed distributed in Pakistan during 1988/89 was only 10.4 percent of the total seed used (RONCO/AGRI-BI-CON, 1990). In Balochistan, production and distribution of seed is the responsibility of the Department of Agriculture. None of the 24 registered private companies operate in Balochistan. In 1987/88 about 560 tons of wheat seed, of which 171 tons were locally produced, were distributed in Balochistan (Government of Balochistan, 1989). This means only 3 percent of the total cropped area is sown to improved varieties.

13.2 Seed companies visited and their activities

A number of seed companies were visited during the consultancy. In Karachi, Lever Brothers (Pakistan) deals with the import, production and distribution of sunflower, soyabean and maize seed. The agri-projects manager of Lever Brothers showed interest in assessing the possibilities for commercial seed production in Balochistan. Rifiadian Trading Corporation (Karachi) is an import/export company dealing with many items including the import of berseem and lucerne seed from Egypt during periods of shortage in Pakistan. Dawood Corporation (Lahore) deals mainly with production and distribution of cotton seed. The Executive Director pointed out that demand for wheat seed is low except when a new variety is released.

In Lahore the Pakistan Seed Corporation Ltd imports, produces and distributes seed of various crops. In 1990 it imported about 10 tons of barley seed (No 85 from Australia and USA) for distribution in rainfed area of Punjab.

13.3 Major problems of the seed industry in highland Balochistan

The demand for seed in Balochistan is limited because of the small cultivable areas which are scattered over a large province with very poor roads. Yields of

rained crops are low and erratic due to the limited and variable rainfall. Hence farmers growing these crops are unwilling to buy seed at higher prices as the risks of losing the crop are too high. Seed production and distribution are in the hands of the public sector which has control over seed prices. This acts as a disincentive to agribusiness.

13.4 Action by AZRI

Once a new variety has been certified, seed companies wish to verify its superiority on their own farms before deciding on its potential for commercial production. However, companies are interested in receiving improved genotypes from AZRI's Germplasm Group so that they may compare them with varieties being developed by other research institutes. Incentives required to encourage agribusiness, such as tax rebates, should be clearly identified and government should modify its policies regarding the seed industry. Training courses for local agribusiness and extension workers in seed production methods would encourage establishment of a local seed industry in Balochistan.

14. RECOMMENDATIONS AND CONCLUSIONS

14.1 In the past most agricultural research was confined to research institutes and stations but with the introduction and adoption of the concept of Farming Systems Research efforts are being made to involve farmers in research to solve their problems. However, until recently agribusiness has been poorly integrated into the research process. The GOP has also recognized the potential role of agribusiness in agricultural research and development, and production, marketing and processing of farm commodities. Therefore, one objective of GOP policy is to develop mechanisms and implement policies to increase agribusiness participation in the identification of problems, in research to solve these problems and in the dissemination of research results.

About two-thirds of Pakistan is arid or semi-arid and several of the technologies being developed at AZRI are relevant to these areas of the country where there is no water for irrigation. Just a small improvement in range offtake and agricultural output would have a significant impact on the overall economy of Balochistan. AZRI's research on improved forages, particularly on fourwing saltbush, has definite commercial potential. Improved varieties of wheat would reduce the area that farmers now have to sow to cover their household

requirements, and that would release land for forage crops. However, commercial seed production is likely to be on a small scale. The camel seed drill is an attractive innovation since it could reduce the time needed to sow crops, increase crop yields and expand the area which could be planted.

AZRI has technologies with commercial potential, and strengthening the linkages with agribusiness will enable these technologies to reach the pastoralists and farmers of Balochistan. However, the technologies need further testing, tuning and on-farm verification so that their potential for adoption by farmers can be determined more exactly. Agribusiness will then be in a better position to decide on the commercial viability of the technologies.

14.1.1 What can agribusiness do for research?

The success of agribusiness has been demonstrated by the pesticide, poultry, leather and carpet industries. Many agribusinesses have their own farms and they can conduct research to verify research findings, such as the Pakistan Seed Corporation at Lahore and Lever Brothers in Karachi. Public sector research institutions (PSRI) usually have limited resources and are not involved in industrial scale production and marketing. They should be looking to agribusiness to fund research on problems identified by agribusiness and incentives such as accelerated promotion should be given to scientists in PSRI who conduct research sponsored by agribusinesses.

Agribusinesses can also bring their problems to PSRI who often have the specialist expertise to find solutions to these problems. This helps research become oriented to problem solving. An example here is the skin and wool industries which have indicated that the quality of the raw material is often poor. They would like to see research conducted into ways of improving quality of this raw material.

Agribusiness will also be prepared to pay PSRI for new technologies that have commercial potential. An example here is the MILK PAK (Lahore) contract with Nestle. This payment could be made as a 1-3 percent royalty for a five year period which many agribusinesses are already paying for the use of a technology and brand names. These royalties are generally paid to foreign companies but similar arrangements should be possible within Pakistan. Under the self reliance policy of the GOP, strong linkages between PSRI and agribusiness would be a useful mechanism to solve the financial constraints of these institutes.

14.2 Involvement of agribusiness in specific technologies available at AZRI

14.2.1. Fourwing saltbush. Private fruit nursery growers should be encouraged to grow fourwing saltbush so that they gain experience of the technique of seedling production and are ready when the market develops. AZRI could initially provide them with free seed and guidance. This effort could be complemented by the establishment of pilot demonstrations made in collaboration with the Department of Forestry and Agricultural Extension, the FAO supported Fruit Project and the UNDP Livestock/Range Management Project which starts in July 1991. AZRI should create an initial demand for seedlings by purchasing them from private nurseries.

14.2.2 Camel seed drill. The camel seed drill requires further testing and demonstration on farmers' fields before agribusinesses are invited to examine it for commercial viability.

14.2.3 Production and distribution of improved wheat, barley and lentil varieties. Wheat seed production, particularly for rainfed areas of highland Balochistan, does not seem to have large-scale commercial potential and the area under barley and lentils provides a very limited market for improved seed. However, if the superior varieties being developed at AZRI are adopted by farmers, a demand for improved seed will arise. Small-scale seed production could be done by private seed companies who would lease land on government farms.

4.2.4 Animal health. There is potential for agribusiness to enter the animal health and equipment market in Balochistan. However, the major problem is the provision of medicines by government departments free of charge or at subsidized prices. This discourages agribusiness from entering this market.

4.3. Recommendations for strengthening linkages between research and agribusiness The following section describes the recommendations for strengthening linkages between PSRI and agribusiness.

4.3.1. There is a need for a directory of agribusinesses operating in Balochistan. It would include a brief description of the company and all relevant information about it. This task could be undertaken by a consultant in collaboration with AZRI, other PSRIs, and private sector institutions and departments in Balochistan.

4.3.2 Pre-feasibility studies of promising crop varieties and technologies should be conducted and sent to relevant agribusinesses in and outside Balochistan. The studies would cover market analysis, economic superiority of the new over the existing technology, relevant government policies, trained manpower needs, capital requirements, financial position of technology users, adjustments needed to farm systems, seasonality of demand, and support institutions.

4.3.3 Representatives of agribusiness, government departments and farmers should be invited to attend field days held both at AZRI and on farmers' fields. This would provide an opportunity for AZRI to demonstrate its research portfolio.

4.3.4 The removal of government control of agribusinesses such as the seed and animal health services should be encouraged. As part of the privatization policy, government farms should be leased to agribusinesses for the verification and demonstration of new technologies.

4.3.5 Seminars, workshops and training courses should be organized by AZRI to create awareness of new technologies. These could be supported by an occasional AZRI newsletter. In addition, linkages between PSRIs, government departments, agribusiness, trade associations, and Chambers of Commerce should be established. This could include establishment of a committee that would meet once or twice a year. Close contact should be maintained with the newly established Agribusiness Cell located in the Ministry of Food, Agriculture and Cooperatives in Islamabad.

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Annex 1. Area, production and yield of crops grown in Balochistan, 1987/88.

	Area (hectares)			Production (tonnes)			Yields (kg per hectare)		
	Irrig:	Un-Irrig:	Total	Irrig:	Un-Irrig:	Total	Irrig:	Un-Irrig:	Total
Rabi Crops									
Wheat	177,280	5,990	183,270	388,680	3,020	391,700	2,192	504	2,137
Barley	9,104	1,987	11,091	10,221	1,610	11,831	1,123	810	1,067
Rape seed & Mustard	16,832	2,045	18,877	12,119	917	13,036	702	448	691
Cumin	4,167	990	5,157	2,793	373	3,166	670	377	614
Gram	20,000	0	20,000	14,500	0	14,500	725	0	725
Muttar Pulse	5,350	0	5,350	2,671	0	2,671	499	0	499
Masoor	83	9	92	52	3	55	627	333	598
Vegetables	6,025	0	6,025	80,340	0	80,340	13,334	0	13,334
Fodder	13,642	1,437	15,079	485,840	21,160	507,000	35,614	14,725	33,623
Total Rabi Crops	252,483	12,458	264,941	997,216	27,083	1,024,299			
Total Kharif Crops	208,831	25,865	234,696	1,469,493	84,158	1,553,651			
Grand Total	461,314	38,323	499,637	2,466,709	111,241	2,577,950			

Source: Government of Balochistan (1988).

Annex 2. Livestock population in Balochistan (000 Head).

	1945	1955	1960	1972	1976	1986
Cattle	299	295	643	482	684	1157
Buffaloes	11	26	26	22	33	63
Sheep	979	1157	2564	3859	5075	11111
Goats	836	702	1596	3238	4441	7299
Camels	72	70	86	185	212	349
Asses	76	61	99	171	244	370
Horses	15	14	10	19	23	29
Mules	(130)	2	(407)	1	1	4

Source: Government of Balochistan (1990).

Annex 3(a). Animals slaughtered inside slaughter houses in Balochistan (1989/90).

S.No.	District	Cattle	Sheep	Goats	Buffaloes	Total
1	Quetta	18669	84055	86566	5477	194767
2	Pishin	18574	23775	25000	1899	69248
3	Chagai	596	4875	12556	---	18027
4	Loralai	6919	13288	10730	2143	33080
5	Zhob	6522	29141	29921	798	66382
6	Kohlu	1168	2708	2854	---	6738
7	Dera Bugti	414	2107	4553	---	7074
8	Sibi	1985	4083	9315	---	15383
9	Dera Murad Jamali	1505	1797	16382	764	20448
10	Kharan	255	3752	4544	---	8551
11	Kalat	642	7131	13612	---	21385
12	Khuzdar	1191	8379	7653	---	17223
13	Lasbala at Uthal	1412	1418	18293	---	21123
14	Panjgoor	939	8471	11363	137	20910
15	Turbat	219	176	1160	---	1555
16	Kachhi at Dhadar	1499	2477	16315	---	20291
Total		62509	197633	270817	11218	542185

Source: Government of Balochistan (1990).

Annex 3(b). Animals slaughtered outside slaughter houses in Balochistan (1989/90).

S.No.	District	Cattle	Sheep	Goat	Buffaloes	Total
1	Quetta	---	---	---	---	---
2	Pishin	---	---	---	---	---
3	Chagai	---	---	---	---	---
4	Loralai	---	---	---	---	---
5	Zhob	494	4187	6902	---	11583
6	Kohlu	---	---	---	---	---
7	Dera Bugti	---	2302	4071	---	6737
8	Sibi	765	1190	2445	---	4400
9	Dera Murad Jamali	---	---	---	---	---
10	Kharan	23	350	485	---	858
11	Kalat	---	---	---	---	---
12	Khuzdar	11	---	---	---	---
13	Lasbala at Uthal	---	---	---	---	---
14	Panjgoor	710	4209	6542	---	11461
15	Turbat	---	---	---	---	---
16	Kachhi at Dhadar	---	---	---	---	---
Total		62509	197633	270817	11218	542185

Source: Government of Balochistan (1990).

Annex 4. Seminar programme.

AZRI/ICARDA/MART PROJECT

Seminar title - ESTABLISHING LINKAGES BETWEEN AGRI-BUSINESSES AND AGRICULTURAL RESEARCH IN HIGHLAND BALOCHISTAN

Venue - Quetta Serena Hotel

Date - 16 June 1991

Session - I

Chairman: Dr Dur Muhammad,

(Director General, Livestock Department, Balochistan)

<u>ITEM</u>		<u>TIME</u>
Arrival of participants		0830
Recitation from the Holy Quran		0835
Welcome address by Dr. B. Roidar Khan, Director AZRI		0840
ICARDA and research in highland regions, by Dr. E.F. Thomson, ICARDA Team Leader, COP MART/AZR		0850
<u>SPEAKER</u>	<u>TOPIC</u>	<u>TIME</u>
Dr. S. Rafique SSO, AZRI	Importance and characteristics of fourwing saltbush as a feed during periods of scarcity	0900
Dr. B. Roidar Khan Director AZRI	Germpasm evaluation and selection for development of improved cultivars for highland Balochistan	0915
Mr. M. Islam and Mr. B.A. Chaudhry, AZRI	Development of an improved camel seed drill	0930
Dr. Masood Ahmad Khan Director Livestock Extension, Quetta	Possibilities for involvement of the private sector in livestock development	0945
Ch. Zulfikar Ali Khan DG Agriculture	Potential for development of the seed industry in Balochistan with emphasis on rainfed crops	1000
Dr. Abelardo Rodriguez	Socio-economic considerations in the linkages of agri-business and research	1015
	DISCUSSIONS	1030
	TEA BREAK	1100

Session - II

Chairman: Mr. M. Tariq Janjua

(Secretary, Agriculture Department, Balochistan)

<u>SPEAKER</u>	<u>TOPIC</u>	<u>TIME</u>
Mr. Syed Saeed Mohd. President of Chamber of Comm. and Industry Zarghoon Road, Quetta	A view point on agri-business development in Balochistan	1120
Khalifa Tahir Ahmed, Executive Member, Chamber of Commerce and Industry, Balochistan	Problems facing agri-business development in Balochistan	1135
Noor Mohammad Lehri Progressive Farmer and Member PARC Board, Quetta	Possible solutions to agri-business problems in Balochistan	1150
M.A. Chaudhry Agri-business Consultant to AZRI	Mechanisms for establishment of research linkages	1205
	DISCUSSIONS	1220
Closing remarks by Chairman		1240
Lunch for participants at Serena Hotel, Quetta		1250

Annex 5. List of seminar invitees.

AZRI STAFF

Dr. Bakht Roidar Khan, Director		Dr. A. Wahid Jasra, SSO
Dr. Shahid Rafique, SSO	Mr. M. Aslam, SO	Mr. Sarfraz Ahmed, SO
Mr. M. Bilal Chaudhry, SO	Mr. A. Afzal, SO	Mr. K. Nazir Mehmood, SO

ICARDA STAFF

Dr. E. F. Thomson, Chief of Party and Range/Livestock Adviser, MART/AZR COP
 Dr. A. Y. Allan, Agronomy/Germplasm Adviser
 Dr. A. Rodriguez, Agricultural Economics Adviser
 Mr. Pesi Amaria, ICARDA Office Manager and Financial Administrator

GOVERNMENT OF BALOCHISTAN

Mr. Abdul Razziq Khan, Additional Chief Secretary P & D

MINISTRY OF AGRICULTURE

Dr. Zulfikar Ali Khan, DG Agriculture
 Dr. Abdul Hamid Bajoi, Director ARI
 Mr. Nek M. Tareen, Project Director Fruit Plants
 Mr. Mashood Ahmad Khan, Director Livestock Extension
 Mr. Qazi Abdul Ali, Range Management Forestry Department
 Representative from Livestock Marketing and Grading
 Dr. Bashir Ahmed, Director Livestock Farms
 Mr. Ghiasuddin, Chief Conservator of Forest

COMMERCIAL ORGANIZATIONS

Ali Mohammad Jamali, General Manager, ADBP
 Mr. Syed Saeed Mohammad, President, Chamber of Commerce and Industry,
 C/o Cheap Cloth House, Cloth Market, Jinnah Road
 Mr. Khan Sohbat Panazai, Secretary General, Federation of Chambers of
 Agriculture, Pakistan
 Mr. Imran Afzal Cheema, Director Industry
 Mr. Khalifa Tahir Ahmad, Member Industrial Advisory Committee, Managing
 Director, Shukrana Textile Mills Ltd, Regal Plaza,
 Mr. Ilyas, General Manager, Habib Bank Complex Branch, Quetta

AGRI-BUSINESS AND FARMERS

Mr. Noor Mohammad Lehri, Progressive Farmer
 Mr. Eid Ahmad, Daavi and Company, Quetta
 Haji Abdul Manan, Chairman Fruit Market, Shop No 1
 Kamal-ud-Din Ahmad, Razeer Trading Corporation
 Sardar Mohammad Ali, Progressive Farmer, Fruit Nursery
 M.A. Chaudhry, Agri-business Consultant
 Ali Woollen Mills, Sirki Road, Quetta
 Mr. Imanullah, Zarghoon Nurseries, Zarghoon Road, Quetta

USAID

Dr. A. Radi, Deputy Chief, ARD USAID, Islamabad
 Dr. J. Swanson, Chief APID, ARD, USAID, Islamabad
 Dr. R.S. Senykoff, MART Project Officer, ARD USAID Islamabad
 Dr. M. Saeed, MART Project Officer, ARD USAID, Islamabad
 Dr. J. Barnett, MART/Winrock, Hyderabad/Quetta
 Dr. B. Bill Wright, COP, MART/Winrock, Islamabad
 Dr. Fazal Ahmed, LO USAID, Quetta

Annex 6. List of seminar participants.

Name	Designation	Address
1 M.A. Chaudhry	Agri-business Consultant	Al-Malik Centre, 73-W, F-7-67, Blue Area, Islamabad
2 Agha Syed Said Mohd	President	Chamber of Commerce and Industry
3 Bakht Roidar Khan	Director	AZRI
4 A.H. Bajoi	Director	ARI
5 Kamal-ud-Din Ahmad	Director	Razee Trading Corporation
6 Bashir Ahmed	P/I	ARI
7 Abelardo Rodriguez	Agric. Economist	ICARDA MART/AZR
8 Jim Barnett	MART Project	126-B, Latifabad 3, Hyderabad, Sindh
9 Sohbat Khan Panazai	Secretary General Chamber of Agriculture Federation of Pakistan	Panazai House, Near Wahdat Colony, Quetta
10 Ch. Zulfiqar Ali Khan	Director General	Agric. Bln, Sariab Road, Quetta
11 M. Aslam	S O	AZRI
12 M. Bilal Ahmad Ch.	S O	AZRI
13 M. Islam	S O	AZRI
14 Qazi Abdul Ali	DFO Research	Balochistan forest Dept.
15 Khalifa Tahir Ahmad	Member Chamber of Commerce	No. 18, First Floor, Regal Plaza, Circular Road, Quetta
16 Euan F. Thomson	COP ICARDA MART/AZR	ICARDA MART/AZR
17 Shahid Rafique	S S O	AZRI
18 Tariq Janjua	Secretary	Agriculture Dept.
19 Pesi R. Amaria	Office Manager and Financial Administrator	ICARDA MART/AZR

Annex 7. List of persons visited.

AZRI STAFF

Dr. Bakht Roidar Khan, Director		Dr. A. Wahid Jasra, SSO
Dr. Shahid Rafique, SSO	Mr. M. Aslam, SO	Mr. Sarfraz Ahmed, SO
Mr. K. Nazir Mehmood, SO	Mr. A. Afzal, SO	

ICARDA STAFF

Dr. E. F. Thomson, Chief of Party and Range/Livestock Adviser, MART/AZR
 Dr. A. Y. Allan, Agronomy/Germplasm Adviser
 Dr. A. Rodriguez, Agricultural Economics Adviser

QUETTA.

Mr. Zulfikar A. Khan	Director General	Agriculture
Dr. Masood Ahmad	Director Livestock Extension	Livestock Dept.
Mr. Syed Said Mohd.	President	Chamber of Commerce and Industry
Mr. Khan Sohbat Panazai	Secretary General	Federation of Chambers of Agriculture Pakistan
Mr. Noor Mohammad Lehri	Progressive Farmer	Sariab, Quetta
Mr. Khalifa Tahir Ahmed	Member Industrial Advisory Committee, Managing Director	Shukrana Textile Mills Ltd.
Mr. Imanullah	Nursery Owner	Zarghoon Nurseries
Mr. Qazi Abdul Ali	Range Management	Forestry Dept.
Dr. Bashir Ahmad	Director	Livestock Farms
Mr. Nek M. Tareen	Project Director	Fruit Plants Project
Mr. Mohammad Rashid	Horticulturist development	Fruit Plants Project
Mr. Abdul Ahmad	Manager	Daavi and Co.

Karachi and Lahore.

Mr. M. Iqbal Brula	Senior Marketing Officer	Wool Test House Karachi
Mr. K.M.A. Mabud	Secretary	Pak. Tanners Association, Karachi
Mr. M. Jehangir	Agri-projects Manager	Lever Brothers Pak Ltd Karachi
Mr. Suleman	Manager	Rifidin Corp. Adam Jee Chamber Karachi
Mr. M. Imtiaz	Manager	Akram Tanneries Auction House Karachi
Mr. M. Afzal Hussain	Marketing Manager	Zahoor Sancho Tanneries, Karachi
Mr. Abdul Haye	Deputy Liaison Officer	USAID Lahore
Dr. M. Sarwar	Associate Professor Medicine	College of Vet. Sciences Lahore
Mr. Khaja Amanullah	Executive Director	Dawood Corp. Lahore
Mr. Tahir Hussain Gardezi	Marketing Manager Seed	Dawood Corp. Lahore
Mr. Khawaja Javed	Chairman	International Business Corp. Lahore
Mr. Sajjad Mehdi	Marketing Manager	HASSCO Pakistan Ltd. Lahore
Mr. Naeem	Owner/Manager, Naeem and Co.	Sanmudri Road Faisalabad
Mr. M. Sharif Gulzar	Secretary	Pakistan Seed Corp. Ltd. Lahore

Annex 8. List of seed companies in Pakistan

Company	Address
1 Rich Green Seed Limited	18, MacLagan Road, Lahore
2 Mehfooz Seed Industry	Mehfoozabad, Tehsil & District, Vehari, Multan
3 Rafidaian Trading Corporation Limited	17/18 Valika Chambers, New Challi, Po Box 4734, Karachi
4 Tareen Farms	Chak 12/HPR, Tehsil Lodhran, District Multan
5 Pakistan Seed Corporation Limited	C-5, 24 Jail Road, Lahore
6 Cargill Pakistan (Private) Limited	76-Shadman-II Canal Bank, Lahore
7 Sardar Jhandeer Industries Limited	Sardarpur Jhandeer, Mailsi, Vehari
8 Rahdhawa Seed Industries Limited	Jahanian, 10 Officers Colony, Multan
9 Zaheerabad Seed Corporation	Zaheer Nagar, Burewala, Vehari
10 Ferozesons Laboratories Limited	197-A, The Mall, Rawalpindi
11 Julundur Seed Corporation	Rail Bazar, Arifwala
12 Nadeem Chaudhry	2-Begum Road, Lahore
13 Pioneer Pakistan Seed (Private) Limited	92-A/11, New Muslim Town, Lahore
14 Agri-Services	3-Sheesh Mahal Park, Opp. PIA Booking Office, Abdali Road, Multan
15 Pattoki Plant	Halla Dairy
16 Dawood Corporation (Private) Limited	Al-Falah Building, Shahrah-e-Quaid-e-Azam, Lahore
17 Jaffer Brothers Limited	3, Mall Mansion, 30 Shahrah-e-Quaid-e-Azam, Lahore

- | | | |
|----|--------------------------------|---|
| 18 | Khawaja Amanullah | Al-Falah Building, Sharah-e-Quaid-e-Azam, Lahore |
| 19 | Lever Brothers Pakistan | Seed Division, Avari Plaza, Fatima Jinnah Road, Karachi |
| 20 | Punjab Seed Corporation | Hasilpur |
| 21 | National Seed Corporation | Near New Sabzi Mandi, Sheikhupura Road, Gujranwala |
| 22 | Pakistan Agri-Services Limited | Near New Sabzi Mandi, Sheikhupura Road, Gujranwala |
| 23 | Tawakkal Enterprises | |

Annex 9. Itinerary of consultant.

- 26.5.91 - Travelled from Islamabad to Quetta
 - Discussions on terms of reference with Dr. Euan Thomson, COP MART/AZR Project
- 27.5.91 - Discussions with Director AZRI
 - Dr. Thomson on Range/Livestock
 - Dr. A. Rodriguez, activities of Economics Section
 - Dr. A.Y. Allan on Germplasm improvement and Farm Machinery
- 28.5.91 - Field visit to Mastung research station
 - Field visit to Sariab station to see Germplasm Evaluation Trials
- 29.5.91 - Visit to Saltbush Trials at AZRI research station
 - Visit to Fourwing Saltbush nursery
- 30.5.91 - Discussion with Mr. Khalifa Tahir Ahmad, Member Industrial Advisory Committee and Managing Director, Shukrana Textile Mills Ltd
 - Visit to Fruit Plants project and discussions with Project Director and his staff
 - Discussion with Mr. Noor Mohd. Lehri, a progressive farmer
 - Discussion with Regional Manager ADBP, Quetta
- 31.5.91 - Write up on various topics
- 01.6.91 - Discussions with Director Livestock Extension and his staff on Animal Health
 - Visit to livestock market, slaughter house and skins agents and sharaish making agri-business
 - Discussion with Dr. Bashir Ahmad, Director Livestock Farms
- 02.6.91 - Visited Daavi and Company dealing with Farm Machinery and equipment and Balochistan tractors
- 03.6.91 - Visited Forestry Department and had discussion with Mr. Qazi Abdul Ali on Range Management
 - Discussion with Mr. Khan Sohbat Khan, Secretary General of Chambers of Agriculture, Pakistan

- 04.6.91 - Made visit to Zarghoon Nurseries, Quetta
- 05.6.91 - Made seminar arrangement (for 16.6.91); flew to Karachi
- 06.6.91 - Visited Wool Test House and had discussions with staff
 - Visited seed department of Lever Brothers Pakistan Ltd
 - Visit to Rifidaian Trading Corporation, importers of seed
- 07.6.91 - Write up on wool industry and some other topics
- 08.6.91 - Visited Tanners Associations, Tanneries and skin auction houses in Karachi
 - Travelled to Lahore in the evening
- 09.6.91 - Visit to Medicine Department, College of Vet. Sciences, Lahore
 - Visited Dawood Corporation Lahore and Livestock medicine selling shops
- 10.6.91 - Visit to Naeem and Company, Faisalabad, manufacturer of camel drill and back to Lahore and visited farm implement manufacturers
- 11.6.91 - Visit to Rich Green Seed Company, Pakistan Seed Corporation and Lawrancepur Woollen Mills office in Lahore
 - Visited Woollen Mills Associations office
- 12.6.91 - Visited Hassco Pakistan Ltd and discussed distribution of livestock medicines, vaccines, equipment, etc
 - Travelled to Islamabad in the afternoon
- 13. 6.91 - Travelled to Quetta
- 14.6.91 - Prepared paper for presentation in the seminar
- 15.6.91 - Made final arrangements for the seminar
- 16.6.91 - Participated and presented findings of consultancy in the seminar
- 17-20.6.91 - Completed writing report, held discussions with project staff
- 21. 6.91 - Submitted report to Dr. Thomson, Project Team Leader and travelled to Islamabad