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FARMING MANAGEMENT IN PAKISTAN: SUGGESTED TECHNIQUES

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and Riaz Ahmed Shaikh^{****}

Abstract: *In this paper an attempt has been made to identify types of farming in deserted district Tharparkar, Pakistan and suggest the techniques for improvement. Study reveals that in Tharparkar farming is of three types: rain-fed agriculture (crops), livestock and use of rangeland (no-crops). Situation of rain-fed agriculture is very bad because of fluctuation in amount of rainfall year to year. Livestock is sustainable source of income generation and use of rangeland is also beneficial. Following techniques needs for its improvement: forecast of rain, quality of seed, methods of cultivation, financial support, market, electricity, export program, storage facilities, NGOs support, water facilities, awareness of education, roads, gas, cultivation of Kandi plant, and other indigenous and exotic plants, village organization, time to time research, reform of a farmland, rearing of livestock of better quality, and conservation of rangeland. The study concludes that livestock will be first level sustainable source of income; rangeland second and farmland third if suggested techniques are applied.*

JEL: Classification: J24; J43; O13; Q12; Q15; Q16

Keywords: Farming, Rain-Fed, Livestock, Rangeland, Vegetation and Sustainable

BACKGROUND

Agriculture has been given very much importance since time immemorial all over world even in developed countries. It is very important in developing countries, where level of mechanization in agriculture is very low. In developed countries owing to high level of farm mechanization the agriculture contributes much production.

The agriculture is the backbone of Pakistan; it contributes 21.3 percent in GDP of Pakistan in year 2005-2006. Pakistan's livestock activities accounted for

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about 36 percent of the total value of agricultural output and about 9.0 percent of the GDP in the country during the year 1999-2000 (ES 2001). In the year 2005-2006 livestock sector contributes almost 50 percent to the value addition in the agriculture sector, and almost 11 percent to Pakistan's GDP, which is higher than the contribution made by the crop sector (47.4%) in agriculture and 10.3% in GDP) (ES 2006:22).

Third World countries largely depend on the ability of the rural poor to increase their disposable incomes. It is estimated that some 55 percent of all the world's cattle are found in the tropics of the Third world as are 60 percent of the world's buffaloes (mainly in Asia). In countries like Pakistan, 40 to 60 percent of all goods taken to market are transported by animals including camels, donkeys, buffaloes and oxen. In predominantly agricultural countries like Pakistan especially Tharparkar, livestock is an insurance against harvest failures and a source of easily cashable investment capital (Wasim 2007).

Livestock of Tharparkar has more than 22 percentage of share of whole province's livestock (Wasim 2007). Indeed, crop and livestock activities are, to a great extent, interdependent upon each other for their functioning within the farm sector. The latter provides inputs like farmyard manure (IFYM) and draught power for the crop sector and, in turn uses fodder, crop products and residues.

Tharparkar desert is disadvantaged district of Sindh Province (Pakistan). According to census 1998 it covers 2000 square kilometers area with population of one million. Its' main source of income is livestock, but people like agriculture too and it fails due to droughts falling every alternate year; so farming is done as a lottery. Farmland and rangeland are the open meadows for animal grazing. This meadow helps the farmers supplying the fodder in drought conditions at very low level. Rangeland is going to be destroyed due to cutting trees for fuel purpose and not knowing the importance of it. Old cultural and traditional measures for crops cultivation and livestock rearing; and present physical, social, economical and infrastructure changes have made Thar disadvantaged too. It is evident that there are wide gaps in the coverage of key pro-poor services, such as, primary education, prevention of health care and village electrification (Herani, Rajar and Khaskheli 2007).

There is need to stop cultivation and same land can be used for non-crops wherever it depends fully on rain. Non-crops (natural vegetation) need less care, no investment and labor work. In case of no product, at least it does not waste the time and invested money. Actually it contributes production in kinds; if one gets the fruit of it then each and every observer will replicate it. Some areas of Thar at present are more suitable for livestock like Muhrano and Vat, because of natural vegetable. In Vat area water is at low depth can be pulled out easily and can be used for crops, and somewhere people do it. All the landowners of Vat areas can do it.

There is a need of physical and institutional infrastructure development to create a more equitable relationship between the market economy and the Tharis. During the last two censuses the importance of livestock in Sindh is increasing as compared to other provinces (Wasim 2007). Livestock population of Sindh, increased more percentage wise, in NWFP and Balochistan. We have chosen the agriculture of Tharparkar-Sindh mainly, because of the reasons:

- i) Tharparkar-Sindh is almost dependent on agricultural, especially on livestock farming. The productivity of most of the livestock of district is higher as compared to average of all the districts of Sindh.
- ii) Tharparkar is the biggest belt of desert and its economy depends upon the livestock as compared to whole Pakistan too, because of rain-fed agriculture. Since majority of the small and medium farmers are poor therefore they kept their own livestock for draught power and milk purposes. It is the insurance against the harvest failure and source of easily cashable investment capital. Due to smallholdings both they can neither use machinery nor afford it and they have natural resources of fodder in the free meadows of Tharparkar except the monsoon season.
- iii) Livestock population is round about more than 22 percent of whole Sindh and needs more attention of researchers to evaluate it. Agriculture dependent families are 81 percent in Tharparkar. (Herani 2002:253; ES 2006)
- iv) In spite of the important role of livestock in agriculture especially Tharparkar, it has not yet received adequate attention in economic planning of Thar district.
- v) It seeks to stimulate the thinking of professional scientists and owners of farmland and livestock in the rural areas of Thar with a view to increase the farming of crops, livestock and its alternates, and the support provided by this resource to people's livelihood.

Main objective of the study is thus to identify the Types of Farming and suggest the Techniques for the improvement. Data was collected to achieve the result of this study. For the collection of data, there were two types of references and source, primary and secondary. The methods for conducting inquiries, in order to collect primary data of farming can be of three types: case study method, statistical method, and sample survey method. This study is based upon the random samples survey method and collected data was tabulated in tables and analyzed for the defined purpose covering the period 1988-2002 and it is taken from Herani (2002). To update the paper to 2007 informal interviews were managed from Tharis and information was collected for better results. In this paper we don't use the data rather in the light of conclusions drawn from that we suggest some Techniques for the improvement of farming, and we end this study with Concluding Remarks .

TYPES OF FARMING

By the opinions of participants recorded from 1771 participants of Tharparkar which are given in chapter seven of Ph.D thesis of Herani (2002), we come to know that there are three types of farming. (i) cultivated (crops) , (ii) uncultivated (non-crops) (iii) livestock rearing.

Cultivated Crops

(i). Farmlands¹ are cultivated in the season of monsoon when it rains. Otherwise no crops are cultivated by other sources except in some areas of Nagarparkar and little areas of Mithi district near to Naukot. Crops sowed in the farmland are called cultivated crops. As agriculture is rain-dependent and suffers from drought every alternate year. For improvement of this failure lot of suggestions are required concluded from the opinions of Tharis and researchers review from different sources.

(ii). Uncultivated (Non-Crops)

It is concluded from the opinions of Tharis and personal experience that the rangland² is the also source of income and contributes some crops which are sowed in farmland like mullon, watermelon, meha (vegetable) and some wild fruits, like piloo and singri. It is the major source of fodder, fuel and vegetables. These are not sowed therefore are called non-crops or uncultivated crops and are harvested by Tharis. At the same time others trees are also used for the fodder in the season of monsoon and drought too. So this is the cheapest source of income but needs hardworking and further planning for betterment.

(iii). Livestock Rearing

It is the draught power and insurance for Tharis in case of crops failure and is easily cashable in emergency. Related studies of Tharparkar (Herani 2002; Herani, Rajar and Khaskheli 2007; Rajar, Herani and Dhakan 2007; Herani, Rajar and Dhakan 2007; Hassan and Hardy 1993; Shaikh 1992) have also discussed about this at some extent. Keeping in view these studies and suggestion we do not go in details of it but we need detailed suggestion for the improvement of over all farming of Tharparkar. These suggestions are made in the following section.

TECHNIQUES

Following measures should be accepted and adopted to overcome the difficulties and failure of agriculture.

Forecasting of Rain

Forecast arrangement should be done for rain, which would provide Tharis a surety about rain and they will be prepared for agriculture and no farmland will be left without agriculture. They will sow the farmland with full confidence and concentration and will get full production. Otherwise they would not do agriculture. This process will save their seeds, fodder, labor

force animal labor and money, which are expended during farming. This expenditure is about 50 percent of their income got from the crops including labor in cash and kind (Herani 2002:351). It is calculated simply as below. For the agriculture mostly all members remain engaged fully and some times partially. More than 120 days, People remain engaged in this work with average of 10-hour a day³. If days of labor are calculated with minimum wages along with expenditure done during farming and compare it with the income, then we will find it equal to selling price of total production. From above discussions we conclude that Tharis are not able to become prosperous because of failure of rain unless rain is forecasted.

In case of no rain they will do other job for income generating getting suitable earning. After passing time they will be able to find alternate and profitable work for them being skilled man. In the result they will try to improve quality of their production and quantity too and will become prosperous than before. From above discussion it is concluded that forecasting is important and all the other reasons are secondary for agriculture of Thar. Artificial rain needs more research and for precipitation purpose salt used should be part of fertilizer, which is helpful for germination, and growth of plants. If efforts are taken then in some areas of Nagarparkar and Vat (area near Runn of kuch) under ground water can be beneficial for agriculture⁴.

Quality of Seeds

Impure and inferior quality of seeds is cause of low yield per acre. Little storage of seeds is damaged by insects and it is not procured for lack of money.⁵ In this age of science and technology such type of seeds should be used, which are approved by re-researcher. Sindh Agriculture University Tando Jam can help in this matter by analyzing seeds to get more yield and low water or they ripen during one rain or two rains.

Useful Ploughing Method

Old traditional methods are in use in Thar, which take much time to cover, required area of farmland to be ploughed. Due to shortage of livestock which is used for ploughing land becomes wet and hard and becomes unable for ploughing leaving the land uncultivated. Tractors will prove better in future when every body will use it and by this practice difference of sowing date will be overcome.

Financial Support

Mostly agriculture and livestock is the main source of income. In the field of agriculture 89% of the families are working as farmers practically in the season of rain and 11 % are not taking interest in agriculture in which young generation is included (Herani 2002:353). Finance plays an important role in production as Tharis are poor and 80 percent are in debt (Herani 2002:264) and do not have lot of saving in cash enough for purchase the seeds and to use new varieties of seeds, which they want. They should be supported

financially, but only in kinds and at their doors for the safety of not selling these items at shop for other necessities. Giving seeds at door is the real finance for agriculture support and will be utilized in proper way up to 90 %. Finances supporting institutions should participate in this job. Proper training and motivation would be helpful for farmers.

Availability of Market

At this time there is no central market also in district head quarter. They are found in cities like Hyderabad and after that Karachi; and they are the big trade centers. Small markets are available in villages but they purchase the production at cheapest rates. There are medium scale shops at only in Taluka headquarters and in Tapa headquarters. This type of marketing creates problems to buy and to sell production etc., consuming very precious time.

Network of roads saves time and can be beneficial, and it is long-term plane; but immediately arrangement of shops at village level by giving micro-credits will be helpful. Therefore proper arrangement for marketing should be done. For this purpose there is also need of lot of knowledge concerned with those villages. After that shops should be opened. This is a very small factor and is difficult to do it at big scale. But if it is done then it is good. One medium size shop at each village should be opened. Finance should be done by shares of local indigenous organization with the help of supporting agency/NGO on the formula of network marketing and benefit should be divided according to shares.

Supply of Electricity

Electricity can be supplied to all over Thar; such a capacity is feasible in grid stations over there. It should be supplied in small villages as soon as possible, for the development of Thar it is helpful in preserving lot of dairy products and agriculture produce in long run, but at present time it is better for the better lifestyles, living standards and health purpose which are main targets of human beings on this planet.

Areas where depth of underground water is at low level can be pulled out. It will be helpful for agriculture at some extent and for potable water. The electricity is an important factor of Thar development. At this time speed of network is slow in comparison of roads. Water pulling and number of tube-wells will increase with its introduction. Easily availability of water will save the time, which was being wasted already in collecting.

Promotion in Export Programme

Those commodities, which are exportable, should be recommended. By this practice production of that commodity will increase. There are some things which are non-cultivated but grow naturally are also suitable for export and need no regular rain. In this way Tharis will get foreign exchange.

Storage Facilities

Storing facilities are necessary for fodder and grain. People store grain at their villages in small quantity, because of non-availability of storage and they cannot store it for much time. Insects destroy it in the period of one year. Dry grasses collected after season is over, are stored by old methods and becomes wasted at the time of rains due to getting wet and destroyed. Fruits e.g. watermelon and melon also need cold storage facility for storing and preserving can be used for export and also in country too. Motivation workshop should be arranged at village level with the help of local leadership/organizations. These workshops should be repeated at intervals of one or two months to teach them: how, where and when things can be stored.

NGOs Support

At this time some active NGOs are working in Thar for the welfare of Tharis. It is further expected that, their work should be spread all over Thar, with full concentration. It is observed that NGOs work in better ways. Some income generating sources should be arranged. Staff should be more educated and experienced concerned with the subject and creative minded persons are also needed in NGOs. In government jobs, people become careless due to service security, political pressure and tribes/caste system of Thar. That is why they may be irresponsible in comparison of NGOs.

Water Facilities

Thar is lacking water facilities. It depends upon underground water of wells. For Tharis water has great importance and SAZDA had installed tube-wells in so many villages, it is best practice, but due to not availability of electricity some of them were not in proper use. After the work of SAZDA which does not exist now, some active NGOs carried it on and with the help of villagers they started to install tube-wells, and this scheme is successful, people are getting benefits from it. People are also having sweet water for drinking purpose not for agriculture purpose. At last from above discussions we reach in conclusion that water is very important factor for the Tharis prosperity and it should be facilitated to Tharis. If under ground water is taken out by installing tube-wells, then it is enough for one hundred years for potable water, and at some extent for the fodder purpose, (Shaikh 1992). Since nineties till 2007 number of tube-wells is installed and riverine (River) water through pipeline is supplied from Naukot to Mithi and Kunri to Chachro. All these schemes are successfully working but more networks are needed to for the outreach.

Education

Educated and skilled man power is human capital and asset for the country. A well-educated, innovative and skilled population is foundation as well as goal of development. Forty to sixty percent growth rate in GDP can be attributed to investment in human capital and the increased productivity that results. Sustainable development can not occur in the absence of human resources.

Educated people will be help full for it, but at present there is no awareness among the educated and others for development, which should be over there. Unfortunately Tharis have got bad concept about education that there should be government job for educated. They lack awareness of it that education awakens the hidden abilities, and improves consciousness. At this time along with education there is a need of training of awareness of development and informal education through local organization. At present the literacy rate of Thar is at the bottom of the list of all districts of Sindh province.

Roads

Roads are necessary for development of Thar. They will help in marketing facilities. It will be easy to sell production and purchase things. Seventy percent problems will be solved by reaching roads in each village. Presently in the period of President Pervez Mushraf network of roads have improve at much extent and it is appreciable. It is also under construction so it may be given more attention to spread al over Thar at village level.

Supply of Gas

In all over Thar people use wood for fuels, for cooking and other heating purpose. Number of trees is going to be cut because of heavy usage of fuel. Green trees and shrubs are prohibited to cut but people cut it and do not avoid. Village people use the wood for making house of straw and wood. This type of practice also reduces the greenery and lot of trees and shrubs go to be destroyed. It can be saved at some extent by altering the gas supply. When gas is available at cheapest rate then no body will use fuel of wood. This practice will increase the number of plant reducing the pollution saving a lot of money of environment department which try to plant more trees. At the same time these plants supply fodder and fruits which generate income. It will be helpful for increase of livestock.

Cultivation of Khejdi (propos ginerasia) Plants

It is very important plant of Thar, which is the rich source of vegetable and fodder for livestock. This plant requires less water of rain. It can remain without rain for many years giving fruits. Leaves are used for fodder for goats, sheep, and camels. Singri (pod) used for many purposes. Tharis boil Singri (pod) and after boiling make it dry for preservation. This dried pod is also used as dry vegetable for two years also. Improved process of it can be sold in cites. At first time to grow it and save, it is difficult, but it can be saved by saving its seedling for only one year in the shelter of trees, herbs, thorny plants, or saving it in any way, which is possible for them. It takes a lot of time to get ready for production. If once plants are able for production then till 100 years they can live alive for production

Local/ Organization

We find from every rural development program that local/indigenous/Village organization is must; with out it awareness is impossible or very slow. For

example in Somalia local organizations promised to do every thing themselves like; healthcare facilities, roads, schools and so many other things and getting developed. In this sub-continent there was practice of Panchayat (local organization) system. At present it is also there but in weakened shape. At this time city government is the same type of practice. Grameen Bank of Bangladesh organized local organization for the development and encouraged them by micro financing. It becomes successful in improving the economy of poor (Yunus 2005) and same is going to be replicated at this time in all over world.

At present time there is need of introducing some new and additional tool of net working. Using this system micro-financing and micro-sharing/depositing, just like shares of companies should be introduced. At present these organization can be more successful, using this networking for more benefits these organizations will prove helpful for Tharis. If these organizations are organized to convince and motivate then labor work can be taken by local villager concerning with their problems. In this way development of Thar can be possible comparatively sooner than expected (Herani, Rajar and Dhakan 2007). In this concern Lenin gave a formula for development is that, Development of soviet socialism = Soviet + Electricity and Nehru gave equation for India that Socialism = Local organization + Electricity (Mithal1976). And for the development of Thar we are giving equation as under:

Development of Thar = Local organization + Live stock+ Networking system.

For the organization some clear-cut spiritual teachings are also available as cited bellow: 'In brief, from among the wise men in every village a board should be organized and the affairs of that village be under the control of that board' (Hornby 1912:548). 'Under their advice a place must be appointed, and they must assemble together in that place and hold fast to the rope of consultation, and decide upon and execute that which is conductive to the people's security, affluence, welfare and tranquility' (NSA 1971:178). 'It is incumbent upon the trustees of the house of justice to take council together regarding such laws as have not been expressly revealed in the book. Of them whatever they deem advisable and proper that must they enforce' (NSA 1971:182). Solution begins with the village, and when the village is reconstructed, and then the cities will be also. So this is the importance of Local organization. If there is strong system of the local organization for Thar then development is assured.

Re-search

Research of physical, social and economic problems, infrastructure facilities and other income generating facilities are important to institutionalize new relationships for the purpose of strengthening the local organization and making development viable. It increases the awareness in people and

marketing.

Tharis sell products at local market at villages less than 50 % of rate of cities e.g. ghee, wool, furs etc.⁶. Research work helps in different ways. It will show that what quality and quantity of any product can be produced and how long it will take time for production. Answer of these questions will encourage the investors; policy makers, businessman and others who are interested for the development of Thar and in this way foreign exchange also can be earned.

Reform of Farmland

This reformed (fenced) farmland will produce all varieties of fruits and vegetables, which are produced in cultivated agriculture. All this production achieved by this fenced farm will need only harvest and limited look after. But in rain-fed traditional agriculture production needs sowing, labor of ploughing and a lot of care waiting for production but in case of failure of enough rain the entire struggle will be fruitless. In case of fenced farmland which does not require the sowing, ploughing, and a lot of care; the expenditure of all these things and labor will be saved and some types of fodder and wild fruits are available for harvest. This fodder will be helpful for livestock, which is the main income-generating source of farming. For the proper use the farmland what ever they have got should be divided approximately into three parts as mentioned below:

Table-1. Suggested Distribution of Farmland

| 1 | 2 | 3 |
|--|--|---|
| Fenced area For natural vegetation (not for cultivation) | For rain fed agriculture (cultivation purpose) | Partially cultivated at boundary side for the purpose of saving internal natural vegetation |

Source: Generated by authors

The third portion should be fenced by live plants by sowing seeds of devi plant, ber or with any other suitable easily available plant. For the purpose of production disperse the selected seeds of small melons and watermelon among this fenced farmland and all the other land, which is used for cultivation. After doing this plough round about ten feet area in side the fencing as an alarm that, this land is fenced and protected from livestock. All the livestock herds /owners should be invited by local organizations to inform that this type of land should be protected from livestock. In this way these people will help in protection of fenced farmland. In this protected and fenced farmland lot of grasses, fruits, vegetables, vegetable and edible melons and water melons will grow naturally with out any labor for example: ploughing and human labor and expenditure of looking after. Naturally grown creepers and their fruits will be helpful for fodder. In this land grasses if collected will be enough for one

year for ten livestock. The fruit of vegetable are sold in local market and in cities. These methods will remain successful and in this way incoming years the remaining farmland will be fenced for the proper use of it and livestock will be reared in large scale boosting the economy of Thar. It will be sustainable source of income in future.

Rearing of Livestock

Main source of income generating is livestock. For the improvement of livestock better and more productive races are required to conserve the livestock for the sustainable livelihood. It can be done by decreasing number of it and improving quality. It will save time for labor and fodder too. Low stock of livestock will prove better for conservation of it. When natural vegetation will increase livestock automatically will increase. Promotion of livestock will lead Thar to develop other agro-based industries. It will progress step-by-step, first at small scales like: for use of wool, bone, furs, and dairy products and then somewhat larger like: milk plant, meat plant, and looms will come into existence. In this way the promotion of agro based industry will lead Thar, to an industrial economy (Herani 2002:363).

Conservation of Rangeland

The conservation of rangeland is too much beneficial for the fodder purpose and at the same time for the wild fruits and vegetables for human being and as a fodder. This type of protection is beneficial for environment saving the amount of environment department and it proves best meadows for Tharis livestock. If livestock out of Thar is brought in these meadows, then these people should be charged per head as entry fees. This amount should go in the account of development of Thar. This type of practice will help the protection of fodder of rangeland. This amount is charged from outsiders because Tharis conserve it and plant the trees in the rangeland that is why only they have right of harvest. In other case no benefit from the rangeland conservation would be taken properly. In this way farming of Thar would remain successful in sector of livestock. By maturing this sector so many other sectors belong to it will merge boosting the economy of Thar sharing economy of the country.

Conservation of rangeland should be encouraged by planting indigenous and exotic plants and grasses. Tree plantation should be fixed in the season of monsoon. Each and everybody should be encouraged by local organization to plant and conserve at least one plant for one year and in the next year other should be planted. At the same time conservation way should be adopted by own experiences. Our suggestion is that if a tree is planted in between bushes and a pitcher of mud is buried near it leaving its mouth out of soil and should be filled with water at least once in a week (experience of Balochistan's farmers)⁷ or they should pour water which is utilized for washing hands when they go out for call of nature. This water will be enough for the growth of plant and after one year it will be naturally survived by rainy and under ground water. Some indigenous plants are recommended for planting in rangeland

like: Kandi (propos ginerasia), ber (Acura psedotomentosa) and Devi, and exotic plant are also recommended for planting like: cactus. Climate is suitable for cactus and it is expensive in cities and it needs low water. It is used in cities in home gardens.

Animals Husbandry

It is observed that when viral diseases spread, it is very difficult to control the death rate of livestock. Meanwhile at Tapa level husbandries are introduced but the staff is itself not so much experienced in the field so they become unable to control the diseases. Suggestion is that those who have livestock more than 20 should be trained in informal ways, because they already know more than veterinary dispensers and some times some people are more expert than doctors and treat in old traditional ways with better results.

With the help of village organizations seminars should be arranged by the concerned department or active NGOs for the training of farmers waving the compulsion of education. Workshop should be arranged at each second month at each village and after getting training each farmer should take responsibility of training some people voluntary. In this way each and every body that has got livestock will get enough knowledge about lot of diseases. They will adopt new methods along with traditional ways.

Medicines should be available at cheapest rates in each village. This store should be related to community. Each and every benefit of shop should be utilized for the progress of shop. In this way health care of animals can be improved at much extent resulting increase of livestock.

CONCLUDING REMARKS

Background of the study shows that Tharparkar desert is disadvantaged district of Sindh Province (Pakistan). According to census 1998 it covers 2000 square kilometers area with population of one million. Main objective of the study was to identify *Types of Farming* in Thar. This study reveals that in Tharparkar farming is of three types: rain-fed agriculture (crops), livestock and use of rangeland (no-crops).

Situation of rain-fed agriculture is very bad because of fluctuation in amount of rainfall year to year. Its' main source of income is livestock, but people like agriculture too and it fails due to droughts falling every alternate year; so farming is done as a lottery. Agriculture dependent families are 81 percent in Tharparkar.

Livestock is sustainable source of income generation. It is the insurance against the harvest failure and source of easily cashable investment capital. Livestock of Tharparkar has more than 22 percentage of share of whole province's livestock. Indeed, crop and livestock activities are, to a great extent, interdependent upon each other for their functioning within the farm sector. The latter provides inputs

like farmyard manure (IFYM) and draught power for the crop sector and, in turn uses fodder, crop products and residues. Due to smallholdings both they can neither use machinery nor afford it and they have natural resources of fodder in the free meadows of Tharparkar except the monsoon season, so there is need of attention of researchers to evaluate it.

Rangeland is also beneficial for the fodder purpose and it is common resource property of Tharis. Farmland and rangeland are the open meadows for animal grazing. This meadow helps the farmers supplying the fodder in drought conditions at very low level. Rangeland is going to be destroyed due to cutting trees for fuel purpose and not knowing the importance of it. Old cultural and traditional measures for crops cultivation and livestock rearing; and present physical, social, economical and infrastructure changes have made Thar disadvantaged too. It is evident that there are wide gaps in the coverage of key pro-poor services, such as, primary education, prevention of health care and village electrification.

Following techniques needs for its improvement: forecast of rain, quality of seed, methods of cultivation, financial support, market, electricity, export program, storage facilities, NGOs support, water facilities, awareness of education, roads, gas, cultivation of Kandi plant, and other indigenous and exotic plants, village organization, time to time research, reform of a farmland, rearing of livestock of better quality, and conservation of rangeland.

The study concludes that livestock will be first level sustainable source of income; rangeland second and farmland third if suggested techniques are applied.

Endnotes:

¹ The land which is allotted to farmers by revenue department for the purpose of agriculture is called farmland.

² The land, which is not allotted, to farmers and forest department is called rangeland.

³ Interview of Tharis from different villages

⁴ Interviews of Tharis' farmers of Nagarparkar and Vat area of Thar

⁵ Interview of Tharis from different villages

⁶ Interview of Tharis from different villages

⁷ Interview of different villagers of Balochistan and Dr. Farukh Akhtari Hub Choki Balochistan

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